APPENDIX 1

APPLICATION NO. - 13/00290/FULL

APPLICANT: E-GEN PARTNERS LTD FOR ERECTION OF WIND TURBINE 50M TO HUB HEIGHT AND 74M TO BLADE TIP AT FIELD 800M NORTH OF COTTON OF PITKENNEDY FARM
COTTON OF PITKENNEDY
FORFAR

ANGUS COUNCIL'S SUBMISSION

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Angus Council

Application Number:	13/00290/FULL
Description of Development:	Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip
Site Address:	Field 800M North Of Cotton Of Pitkennedy Farm Cotton Of Pitkennedy Forfar
Grid Ref:	353682 : 754728
Applicant Name:	E-Gen Partners Ltd

Report of Handling

Site Description

The application site is located on an exposed plateau between the higher Turin Hill and Forfar Hills to the south and west, with views over the lower landscape of the South-Esk valley to the north and Montreathmont Forest to the east. The landscape is generally free of tall structures and has a more open and exposed character with the exemption of a large row of coniferous planting directly adjacent to the proposed site. The site is located at a ground level of approximately 155 metres Above Ordnance Datum (AOD) and is currently in use as agricultural land as is the surrounding land. In terms of neighbouring residential properties the site is located approximately 741 metres north of the property The Bungalow, Cotton of Pitkennedy; 540 metres north-west of The Farmhouse, Pitkennedy; 1017 metres west of residential properties Mains of Melgund Cottages; 657 metres south of residential properties at Bellahill (Melgund Cottage); 1241 metres east of Mansfield; and 783 metres north-east of Craisfold Stables, Farm and Lodge.

Proposal

The application proposes the erection of a single 800kW wind turbine with a hub height of 50 metres, a rotor diameter of 48 metres and an overall height of 74 metres to blade tip. The turbine is of three blade design. The application incorporates a new 275 metre long access track that runs to the north of the turbine that links into the existing road network.
The application has not been subject of variation.

Publicity

The application was subject to normal neighbour notification procedures.

The application was advertised in the Dundee Courier on 24 May 2013 for the following reasons:

- Schedule 3 Development

A site notice was posted for Public Access - Special Interest on .

Planning History

12/00729/FULL for Installation of one 50m meteorological data gathering mast for a temporary period of three years. was determined as "Approved subject to conditions" on 2 October 2012.

Applicant's Case

Supporting documentation has been provided to assist in the determination of the application and contains information pertaining to the matters considered relevant in the determination of the application for a turbine of this scale. The documentation consists of:

Environmental Report, which considers aspects such as:

UK Planning Policy and the Development Plan; Landscape and Visual Impacts; Air Quality; Geology, Hydrology and Hydrogeology; Ecology and Ornithology; Noise and Vibration; Socio-Economics; Cultural Heritage; Safety; Shadow Flicker; Telecommunications; Aviation and Radar; and Traffic and Infrastructure.

Consultations

Community Council - Objected to the application with concerns relating to size; proximity to residential properties and Aberlemno School; Council's Guidance; and adverse impacts on cultural heritage assets in the area.

Angus Council - Roads - No objections subject to conditions

Scottish Water - No objection

Angus Council Environmental Health (Forfar) - The Environmental Health Service has offered no objections to the proposal subject to conditions. Advised that a shadow flicker assessment should include the housing development approved at Pitkennedy Farm (09/00671/FULL refers - However, this permission has expired).

NERL Safeguarding - No objection

Joint Radio Co Ltd - No objection

RSPB Scotland - There was no response from this consultee at the time of report preparation.

Dundee Airport Ltd - There was no response from this consultee at the time of report preparation.

Ministry Of Defence - No objection

Scottish & Southern Energy - There was no response from this consultee at the time of report preparation.

Spectrum - No objection

British Telecom - No objection

Tayside Police Legal Services - There was no response from this consultee at the time of report preparation.

Airwave Solutions Limited - There was no response from this consultee at the time of report preparation.

Civil Aviation Authority - No objection.

Atkins - No objection

Mll Telecom Ltd - There was no response from this consultee at the time of report preparation.

Historic Scotland - Archaeology - Does not object to this planning application. It was identified that three statutorily designated sites where the erection of the proposed turbine could have an impact on their settings: Turin Hill fort, Aberlemno cross and symbol stones and Melgund Castle. Whilst it is acknowledged that the proposed turbine would impact on the settings of these sites, it is not considered that this impact raises issues of national significance.

Aberdeenshire Council Archaeology Service - No objection subject to a "Watching-brief" condition.

Scottish Natural Heritage - There was no response from this consultee at the time of report preparation.

Natural & Built Environment - Landscape - Concerns regarding landscape effects.

Representations

9 letters of representation were received, of which 0 offered comments which neither supported nor objected to the proposal, 9 objected to the proposal and 0 supported the proposal.

The main points of concern were as follows:

The issues raised in the correspondence received relate to and are summarised as follows:-

- Government and Council Policy
- Unacceptable adverse impacts on the landscape, the landscape character, and setting within the immediate and wider landscape
- Cumulative impacts
- Unacceptable noise and shadow flicker impacts on neighbouring residential properties
- Road traffic safety impacts
- Adverse impacts on listed buildings and scheduled ancient monuments
- Adverse impacts on wildlife
- Adverse impacts on tourism
- Economic, political and environmental case for the proposal

Detailed discussion of some of these issues is considered in the assessment section of this report. In respect of issues not considered in the assessment section these are discussed below.

Impacts on tourism - the concerns raised by objectors regarding the potential impact of the development on the tourist industry are noted. Whilst there have been a number of surveys undertaken to assess the impact of wind farm development on the tourist industry there does not appear to be definitive information on the impact of existing developments. Although the possibility of impact cannot be discounted, there is no persuasive evidence to suggest that it would have an overall adverse effect on tourism in this part of Angus.

Concern over health risks from living too close to a wind turbine - the Scottish Government's Specific Advice Sheet on Onshore Wind indicates that a recent report prepared for the Department of Energy and Climate Change concluded that there is no evidence of health effects arising from infrasound or low frequency noise generated by wind turbines. I do not consider that the proposal should give rise to any other significant health issues provided it is capable of complying with relevant conditions in relation to matters such as noise.

Ineffective means for generation of renewable energy - the effectiveness or efficiency of wind turbines or the appropriateness of Government targets/ policy is not a matter for Council to consider in the determination of this application. However, an evaluation of the environmental impact of the development

balanced against the environmental benefit of renewable energy generation is provided under Planning Considerations below.

Precedent - every application is considered on its own merits against relevant development plan policies and other material planning considerations and there is no bind concept of precedent in town planning. The acceptability of this application is assessed below.

Development Plan Policies

Angus Local Plan Review 2009

Policy S1 : Development Boundaries
Policy S3 : Design Quality
Policy S6 : Development Principles (Schedule 1)
Policy ER5 : Conservation of Landscape Character
Policy ER11 : Noise Pollution
Policy ER16 : Development Affecting the Setting of a Listed Building
Policy ER18 : Archaeological Sites of National Importance
Policy ER19 : Archaeological Sites of Local Importance
Policy ER30 : Agricultural Land
Policy ER34 : Renewable Energy Developments
Policy ER35 : Wind Energy Developments

TAYplan Strategic Development plan

Policy 3D : Natural and Historic Assets
Policy 6C : Consider Criteria as Minimum

The full text of the relevant development plan policies can be viewed at Appendix 1 to this report.

Assessment

Sections 25 and 37(2) of the Town and Country Planning (Scotland) Act 1997 require that planning decisions be made in accordance with the development plan unless material considerations indicate otherwise.

Whilst the proposed turbine falls within Schedule 2 of the Environmental Impact Assessment (Scotland) Regulations 2011, it is not considered likely to have significant environmental effects by virtue of its nature, size and location. EIA is therefore not required.

In this case the development plan comprises: -

- TAYplan (Approved 2012);
- Angus Local Plan Review (Adopted 2009)

In addition to the Development Plan a number of matters will also be particularly relevant to the consideration of the application and these include: -

- National Planning Framework for Scotland 3 (NPF3);
- Scottish Planning Policy (SPP);
- Scottish Government 'Specific Advice Sheet' on Onshore Wind Turbines;
- Tayside Landscape Character Assessment;
- Angus Council Implementation Guide for Renewable Energy Proposals (2012);
- Strategic Landscape Capacity Assessment for Wind Energy in Angus (Ironside Farrar - 2013);

- Angus Wind farms Landscape Capacity and Cumulative Impacts Study (Ironside Farrar, 2008);
- SNH Siting and Designing windfarms in the landscape Dec 2009;
- Siting and Design of Small Scale Wind Turbines of Between 15 and 50 metres in height (SNH, March 2012);
- Planning Advice Note 1/2011: Planning and Noise;

NPF3 states that the Government is committed to a Low Carbon Scotland and through the priorities identified in the spatial strategy set a clear direction to tackling climate change through national planning policy. Renewable energy technologies, including onshore wind, are identified as key aspects to realising this aim whilst recognising that a planned approach to development is required to find the correct balance between safeguarding assets which are irreplaceable while facilitating change in a sustainable way.

Scottish Planning Policy (SPP, June 2014) represents a statement of government policy on land use planning. In relation to onshore wind, the SPP states that 'Planning authorities should set out in the development plan a spatial framework identifying area that are likely to be most appropriate for onshore wind farm. The spatial framework is complemented by a more detailed and exacting development management process where the merits of an individual proposal will be carefully considered against the full range of environmental, community and cumulative impacts… Proposals for onshore wind should continue to be determined while spatial frameworks are and local policies are being prepared and updated'.

The Scottish Government's Planning Advice Notes relating to renewable energy have been replaced by Specific Advice Sheets (SAS). The 'Onshore Wind Turbines SAS' identifies typical planning considerations in determining planning applications for onshore wind turbines. The considerations identified in the SAS are similar to those identified by policies ER34 and ER35 of the ALPR and the SPP as detailed above.

Angus Council has produced an Implementation Guide for Renewable Energy Proposals. It provides guidance for development proposals ranging from small single turbines to major wind farms. It indicates that wind developments are the primary area of renewable energy proposals in Angus and the planning considerations are strongly influenced by the scale and location of the proposal including landscape and visual impact, potential adverse effects on designated natural and built heritage sites, protected species, residential amenity, soils, water bodies and access.

Scottish Natural Heritage in conjunction with Angus and Aberdeenshire Councils commissioned Ironside Farrar to review current landscape sensitivity and capacity guidance in relation to wind energy development. The Strategic Landscape Capacity Assessment for Wind Energy in Angus (November 2013) provides updated information on landscape capacity for wind energy development and the potential cumulative impact of proposals in the context of operational and consented developments.

Proposals for wind turbine developments and associated infrastructure are primarily assessed against policies ER34 and ER35 of the ALPR although other policies within the plan are also relevant. The policy position provides a presumption in favour of renewable energy developments recognising the contribution wind energy can make in generating renewable energy in Scotland. These policies also require consideration of impacts on ecology including birds; cultural heritage including listed buildings, scheduled monuments, designed landscapes and archaeology; aviation; amenity in the context of shadow flicker, noise and reflected light; landscape and visual impact including cumulative impacts; future site restoration; transmitting or receiving systems; any associated works including transmissions lines, road and traffic access/safety and the environmental impact of this. These policy tests overlap matters contained in other policies and therefore these matters are discussed on a topic by topic basis.

Environmental and Economic Benefits

Policy 6 of TAYplan indicates that one of its aims for the city region is to deliver a low/zero carbon future and contribute to meeting Scottish Government energy and waste targets. The local plan indicates that Angus Council supports the principle of developing sources of renewable energy in appropriate locations.

The SPP sets out a "commitment to increase the amount of electricity generated from renewable sources" and includes a target for 50% of Scotland's electricity to be generated from renewable sources by 2020 (which was subsequently increased to 100% in May 2011 along with a target for 500MW of community and locally owned renewable energy by 2020). Paragraph 187 of the SPP indicates that planning authorities should support the development of wind farms in locations where the technology can operate efficiently and environmental and cumulative impacts can be satisfactorily addressed.

It is accepted that the proposed turbine could make a contribution towards renewable energy generation and as such the proposals attract in principle support from the development plan. I have had regard to that contribution in undertaking my assessment of the proposal.

Landscape Impacts

Policy 6 of TAYplan indicates that in determining proposals for energy development consideration should be given to landscape sensitivity. Local Plan Policy ER5 (Conservation of Landscape Character) requires development proposals to take account of the guidance provided by the Tayside Landscape Character Assessment (TLCA), prepared for Scottish Natural Heritage (SNH) in 1999, and indicates that, where appropriate, sites selected should be capable of absorbing the proposed development to ensure that it fits into the landscape. Policy ER34 of the Local Plan indicates that proposals for renewable energy development will be assessed on the basis of no unacceptable adverse landscape and visual impacts having regard to landscape character, setting within the immediate and wider landscape, and sensitive viewpoints.

The application site lies within an area identified in the Tayside Landscape Character Assessment (TLCA) as 'Low Moorland Hills' Landscape Character Type (LCT). The Strategic Landscape Capacity Assessment for Wind Energy in Angus (SLCA) (November 2013) provides more detailed assessment of the Low Moorland Hills LCT and subdivides the area into smaller Landscape Character Areas (LCA) based on their more localised landscape characteristics. The site is situated within sub area (ii) Montreathmont Moor. This is a medium to large scale farming and forestry landscape dominated by Montreathmont Forest. The SLCA indicates that this sub area has a base landscape capacity for Small/Medium 15 to 30 metre turbines; Medium capacity for Medium 30 to 50 metre turbines; and Low capacity for Medium/Large 50 to 80 metre turbines. The remaining capacity reflects the Base landscape capacity. The detailed guidance highlights that the key determining issues are the need to avoid domination of the landscape character and views from residential properties. Particularly of relevance to the determination of this application is the advice to avoid locating medium/large turbines close to the escarpment slope above Strathmore (typically rising 60-100m form valley floor) and to the eastern Forfar Hills (ranging from 50m-140m higher than the farmland).

The Angus Windfarms Landscape Capacity and Cumulative Impacts Study undertaken by Ironside Farrar in September 2008 acknowledges that the 'Low Moorland Hills' Landscape Character Type (LCT) comprises two sub-types: the lower, flatter and mainly afforested Montreathmont Forest & Moor and surrounding farmland to the east of Turin Hill and north of Guthrie and the area of widely separated steep sided hills in rolling farmland to the west.

The Council's Implementation Guide for Renewable Energy Proposals suggests that this landscape character type has scope for turbines circa 80m in height which do not disrupt the principle ridgelines or adversely affect the setting of important landscape features and monuments such as Balmashanner Monument; and Finavon and Turin hillforts.

In this instance the proposed turbine is 74m to blade tip with a 48m rotor diameter and falls into the category of medium to large sized turbines as defined in the Strategic Landscape Capacity Assessment. The proposed site is at 155m above main sea level. One of the particular landscape sensitivities in the area around the proposed turbine site is the landscape setting of Turin Hill Fort on Turin Hill, which is situated to the south-west of the proposed turbine site. It is the site of an Iron Age Hill Fort and a prominent landmark of historic and geographic meaning. The turbine would rise to an overall height of 229m above main sea level. Although the tip of the turbine would be slightly below the summit of Turin Hill

fort, there is concern that because of the proximity of the turbine to the Eastern Forfar Hills it would appear higher than the hill when viewed from viewpoints to the south and east of the hills and visually dominate eastern and southern views of the hills. The SLCA identifies that the area around sub area (ii) Montreathmont Moor has a low base landscape capacity for Medium/Large 50 to 80 metre turbines. This guidance relates to the sub area as a whole and does not mean that all sites are capable of accommodating a turbine of the height specified. In addition it is acknowledged that this sub-area influences the adjacent sub-area which has no capacity for Medium/Large turbines. The turbine is proposed close to the limit of the more exposed area of the Forfar Hills, which is sensitive to turbines of the proposed height. Accordingly, in these circumstances, I consider that the landscape impact of the turbine would be unacceptable as it would dominate the modest scale of the eastern Forfar Hills.

Visual Impacts

Policy S6 of the Angus Local Plan Review requires that proposals should not give rise to unacceptable visual impacts. Policy ER34 of the Local Plan also indicates that renewable energy development will be assessed on the basis of no unacceptable adverse landscape and visual impacts having regard to landscape character, setting within the immediate and wider landscape, and sensitive viewpoints. In assessing visual impact I consider that it is appropriate to have regard to recent appeal decisions within Angus where this issue has been considered in order to secure a degree of consistency in the decision making process.

Planning appeal decisions have generally accepted that residents should be treated as of high sensitivity in assessing the significance of visual impact. The magnitude of change (and, thus, the significance of the impact they will experience) will vary with the context of the house that they occupy: its distance from the proposed wind farm and orientation in relation to it; the presence of intervening screening from vegetation and other buildings; and the presence of other significant visual features. However it is not only the views from principal rooms that are of importance as residents also use the space around their house and the impact on occupiers and visitors approaching or leaving the properties must also be considered.

In this instance there are five residential properties within 740 metres of the proposed turbine and in the region of 80 residential properties within 2km. The applicant has not submitted an assessment of the impacts on the individual residential properties located within 2km of the proposed turbine. I have visited the residential properties considered to be most affected by the proposed turbine and made my own assessment having regard to representations received in respect of the application.

The nearest residential property is located approximately 540m south east of the proposed turbine. The property consists of a farm house set within a wider farm complex. The farmhouse is located to the south east of the farm complex and the farmhouse and its amenity space would not gain a direct view of the proposed turbine. The farm complex is at present unused and has been the subject of an application for its redevelopment to housing (09/00671/FULL refers - however, this permission has expired). In the absence of the farm complex it is considered that the visual impact on the farmhouse would be considered to be significant and unacceptable. However, at present the farm complex exists and due to these structures the visual impact is not considered to be unacceptable.

The next most significantly affected dwellings would be Buttermilk Cottage and The Farmhouse, Bellahill which are located approximately 657m directly north of the proposed turbine. Buttermilk Cottage is directly orientated towards the proposed turbine with the Farmhouse located behind. The Cottage and its amenity space are orientated towards the proposed turbine; however, views of the turbine would in part be obscured by the landform to the front of the property which slopes steeply upwards and this coupled with the position of a bank of trees between the residential properties and the turbine would possibly result in only the hub and blades being visible on the skyline. The submitted viewpoints and visualisations do not provide a satisfactory assessment of this aspect however; viewpoint 2 does seem to support this assessment although the view shown is from a much greater distance. From the information available it is considered that by the movement of the blades there would be a significant visual impact on the residential property Buttermilk Cottage; however, it is not considered to be unacceptable.

The properties located at Craiksford are located approximately 783 metres to the south-west and the property Mansfield is located approximately 1241m to the west of the proposed turbine. The main living room windows and amenity space of these properties are orientated at right angles to the proposed turbine. No viewpoint/visualisation adequately demonstrate the views gained from these properties; however, whilst they would gain views from the space around the dwellings towards the turbine similar to but at a closer distance than the view shown in Viewpoint 16, it is not considered that any visual impact be significant or unacceptable.

There is no visualisation from the properties at Cotton of Pitkennedy Farmhouse or The Cottage, Cotton of Pitkennedy which are located approximately 741m directly south of the proposed turbine. The Farmhouse is orientated away from the proposed turbine with the Cottage located behind. The amenity space of the Farmhouse and its main views are towards the front/south of the property facing away from the proposed turbine. It is also pertinent to note that the occupant of the Farmhouse is the landowner of the site on which the turbine is proposed. The Cottage is located at a greater distance to the proposed turbine and views towards the turbine would be screened by the farm complex at Cotton of Pitkennedy. The impact is therefore not unacceptable.

The properties located at Melgund Bank Farm are located approximately 1017 metres to the east of the proposed turbine. The main living room windows and amenity space of these properties are orientated at right angles to the proposed turbine. No viewpoint/visualisation adequately demonstrate the views gained from these properties; however, viewpoint 18 illustrates that the visual impact on these properties has the potential to be significant but not unacceptable.

The applicant's submitted information states that the significance of effect in visual term for properties within 2 km of the turbine would be moderate; however, the above demonstrates that the visual impacts on a number of the nearest properties would be significant. Although the visual impacts on the nearest residential properties would be significant it is not considered that they would so dominant, unavoidable and oppressive as to affect the amenity of the occupants to a level that could be considered unacceptable.

The turbine will be visible from other public places in the area and from hilltop locations. However, it is not considered that the visual impacts from these locations would be to an unacceptable level.

Cumulative Landscape and Visual Impacts

An assessment of cumulative landscape and visual effects is also required by local and national policy. SNH Guidance on 'Assessing The Cumulative Impact of Onshore Wind Energy Developments' (March 2012) indicates that cumulative landscape effects can include effects on the physical aspects of the landscape and effects on landscape character. Cumulative visual effects can be caused by combined visibility and/or sequential effects. Combined visibility may be in combination i.e. where several wind farms are in the observers arc of vision or in succession where the observer has to turn to see various wind farms. Sequential effects occur when the observer has to move to another viewpoint to see different developments.

The Council's Implementation Guide indicated that this area was a 'Landscape with Views of Windfarms' and that it had potential to be a 'Landscape with Occasional Windfarms'. The Strategic Landscape Capacity Assessment for Wind Energy in Angus (November 2013) indicates that in this sub-area there is currently one medium/large turbine in the south at Pickerton and one small/medium turbine 3km to the north. The document indicates that current consented turbines fall well within capacity. The Pickerton turbine is larger (77m) than the maximum height for the adjacent sub-area, which it influences. The SLCA indicates that sub-area (ii) Montreathmont Moor has a low base landscape capacity for Medium/Large 50 to 80 metre turbines. However, it is acknowledged that this sub-area influences the adjacent sub-area which has no capacity for Medium/Large turbines.

In this case, limited information has been provided to assist in the cumulative assessment. However, I am generally satisfied that the proposal does not give rise to any significant cumulative landscape or visual

impacts. However, there are live planning applications for other wind developments in the surrounding area, including a 45.9m turbine proposed at Bellahill Farm 240 metres to the south west (13/00998/FULL). Any decision on this application would have to be factored in when that proposal is assessed.

Amenity (Noise/Shadow Flicker/Reflected Light):

Criterion (a) of Policy ER34 requires the siting and appearance of renewable energy apparatus to be chosen to minimise its impact on amenity, while respecting operational efficiency. Policy ER35(c) indicates wind energy developments must have no unacceptable detrimental effect on residential amenity, existing land uses or road safety by reason of shadow flicker, noise or reflected light. Policy S6 Schedule 1 also refers to amenity impacts whilst Policy ER11 deals specifically with noise pollution.

The Environmental Health and Roads Services have raised no concerns regarding such impacts. On this basis I do not consider that there are any unacceptable amenity impacts from noise, shadow flicker, light, surrounding land uses or road safety that cannot be satisfactorily addressed by conditions.

Impact on Natural Heritage

The Angus Local Plan Review contains a number of policies that seek to protect important species and sites designated for their natural heritage interest and to ensure that proposals that may affect them are properly assessed. It also indicates that the Local Biodiversity Action Plans will constitute material considerations in determining development proposals. Policy ER35 specifically requires that proposals should demonstrate that there is no unacceptable interference to birds. SPP indicates, amongst other things that the importance of complying with international and national conservation obligations must be recognised e.g. the potential impact on bird populations at proposed sites near roosting and feeding areas and on migration pathways requires careful assessment. Planning guidance produced by Scottish Natural Heritage (SNH) indicates that experience suggests that many bird species and their habitats are unaffected by wind turbine developments and the impact of an appropriately designed and located wind farm on the local bird life should, in many cases, be minimal.

It is relevant to consider that the site holds no statutory or non-statutory nature conservation designations. The Turin Hill Site of Special Scientific interest (SSSI) is a composite site and the areas designated are located 1.3km to the north-west, 900m and 3 km to the south west of the turbine site. The supporting information also indicates there are no statutory or non-statutory wildlife sites on or in close proximity to the site. Their detailed ecological surveys have confirmed that the site is of limited ecological value.

It is noted that third parties have raised concern regarding the potential ecological impact of the development. No evidence that the proposal would have an adverse impact on bats or any other valuable habitats or species has been submitted. SNH and RSPB have both been consulted and neither has raised any concerns. Equally no other relevant consultees have raised any concern regarding the location of the turbine relative to any known populations of sensitive flora or fauna. Accordingly, on the basis of available environmental information, consultation responses and site visits I am satisfied that the ecological impact of the development does not justify refusal of this application.

Cultural Heritage

The development plan provides a number of policies that seek to safeguard cultural heritage. These include policies ER16, ER18 and ER19 of the Angus Local Plan Review. Policy ER34 requires proposals for renewable energy development to have no unacceptable detrimental effect on any sites designated for natural heritage, scientific, historic or archaeological reasons.

There are 2 Scheduled Ancient Monuments located within 2.5km of the proposed turbine. The Turin Hill Fort is located approximately 2.4km to the west of the proposed turbine and the Aberlemno cross slab and symbol stones are located approximately 2km to the north west of the site. Melgund Castle a Category A listed building is located approximately 2km to the north east of the turbine site.

Historic Scotland has considered the proposal in so far as it relates to potential impact on these nationally important designations and has offered no objections in respect of impacts on interests within its remit. Aberdeenshire Council's Archaeological Service has not objected to the application on the basis of impact on unscheduled archaeological sites.

In terms of the response received from Historic Scotland it has determined that the proposed turbine would not challenge Turin Hill Fort for dominance within its setting or disrupt any key relationships with other sites or landmarks. In respect of the Aberlemno cross slab and symbol stones it is noted that while the turbine would be visible in some views towards the stones from the north and west, the turbine will not disrupt the relationship between the stones themselves and the route along which they lie. Historic Scotland acknowledge that the proposed turbine would impact on the setting of these sites, but do not consider this impact would raise issues of national significance. It is considered that the views expressed by Historic Scotland focus on the impact of the turbine on the immediate setting of these sites; however, it is considered that the proposed turbine would have a significant impact on the landscape setting of these sites in certain places and in particular Turin Hill Fort. The proposed turbine would compete for prominence in views of Turin Hill Fort from stretches of the minor roads to the south-east of Melgund Castle and minor roads near Ardovie woods where the turbine would be seen next to Turin hill fort on the skyline. Overall it is considered that the proposed development would not give rise to unacceptable impacts in terms of cultural heritage interests.

Remaining Issues / Other Development Plan Considerations

The remaining policy tests cover the impact of transmission lines associated with energy generation developments; impacts on transmitting or receiving systems; impact of transporting equipment via road network and associated environmental impacts; impact on authorised aircraft activity; and arrangements for site restoration.

The supporting statement indicates that power will be transmitted along underground cabling connecting the turbine. I consider that a buried cable at this location would be unlikely to result in significant environmental impacts.

With regards to impacts on TV and other broadcast reception it is recognised that wind turbine development can give rise to interference. However it is generally accepted that digital signals are more robust to such disruption than the previous analogue system. In this case technical consultees have not raised any concern.

In terms of transport to the proposed site, the existing road networks will be used to deliver the sections of the turbine, with no improvements or upgrading of the road network required. The Roads Service has raised no objections to the proposals. In this regard, I am satisfied that road safety and the associated environmental implications of transporting the turbine to the site would not render the proposal unacceptable.

In relation to the impact of the development on aircraft activity the MOD, NATS, CAA and Dundee Airport have been consulted and have not raised any objection to the application and no significant impact on aircraft activity is anticipated. The MOD has requested that details of the construction be submitted to them in order that the turbine can be accurately mapped.

Scottish Government policy confirms that proposals for onshore wind turbine developments should continue to be determined while spatial frameworks and local policies are being prepared and updated. Moratoria on onshore wind development are not appropriate. The SPP also indicates areas identified for wind farms should be suitable for use in perpetuity. Consents may be time-limited but wind farms should nevertheless be sited and designed to ensure impacts are minimised and to protect an acceptable level of amenity for adjacent communities.

In this case I accept that the wind turbine would contribute to meeting government targets and in this

regard attracts some support from national policy and from the development plan. However, as discussed above I consider that this proposal would result in significant adverse landscape impacts. Whilst wind turbines are necessary to meet government energy targets and I accept that this is a location where the technology could operate, I do not consider that the landscape impacts can be satisfactorily addressed in respect of a turbine of the scale proposed in the location proposed. Accordingly I do not consider that the proposal receives unqualified support from the SPP.

I recognise the benefit of producing electricity by renewable means, but I do not consider that there is anything in government policy that suggests this should be at the expense of landscape considerations. In the particular circumstances of this case, I do not consider that the environmental or economic benefit of the production of renewable energy outweighs the very direct harm that this proposal would cause to the landscape.

Regard has been given to the environmental information provided in relation to the application and comments received from consultees. Account has also been taken of all relevant representations made. As discussed above, it is concluded that although the proposed wind turbine would comply with some relevant policies and criteria in the development plan, this must be balanced against the significant and adverse landscape impacts identified. These impacts are considered to be unacceptable, and in this respect the proposal is considered to be contrary to the objectives of development plan policy. It is accepted that the development would contribute towards the meeting Government energy targets; however, Government guidance confirms that schemes should only be supported where technology can operate efficiently and where environmental and cumulative impacts can be satisfactorily addressed. In this case it is accepted that whilst the technology would operate efficiently the environmental impacts identified herein would not be satisfactorily addressed. Accordingly the proposed development is contrary to development plan policy. There are no material considerations that justify approval of the application contrary to the provisions of the development plan.

Human Rights Implications

The decision to refuse this application has potential implications for the applicant in terms of his entitlement to peaceful enjoyment of his possessions (First Protocol, Article 1). For the reasons referred to elsewhere in this report justifying the decision in planning terms, it is considered that any actual or apprehended infringement of such Convention Rights, is justified. Any interference with the applicant's right to peaceful enjoyment of his possessions by refusal of the present application is in compliance with the Council's legal duties to determine this planning application under the Planning Acts and such refusal constitutes a justified and proportionate control of the use of property in accordance with the general interest and is necessary in the public interest with reference to the Development Plan and other material planning considerations as referred to in the report.

Equalities Implications

The issues contained in this report fall within an approved category that has been confirmed as exempt from an equalities perspective.

Decision

The application is Refused

Reason(s) for Decision:

1. That the application is contrary to policies S1, S6, ER34 and ER35 of the Angus Local Plan Review (2009) as the provision of a wind turbine of the height proposed would have an unacceptable landscape impact.

Notes:

Case Officer: Damian Brennan
Date: 17 June 2014

Development Plan Policies

Angus Local Plan Review 2009

Policy S1 : Development Boundaries
(a) Within development boundaries proposals for new development on sites not allocated on Proposals Maps will generally be supported where they are in accordance with the relevant policies of the Local Plan.

(b) Development proposals on sites outwith development boundaries (i.e. in the countryside) will generally be supported where they are of a scale and nature appropriate to the location and where they are in accordance with the relevant policies of the Local Plan.

(c) Development proposals on sites contiguous with a development boundary will only be acceptable where there is a proven public interest and social, economic or environmental considerations confirm there is an overriding need for the development which cannot be met within the development boundary.

Policy S3 : Design Quality
A high quality of design is encouraged in all development proposals. In considering proposals the following factors will be taken into account:-

* site location and how the development fits with the local landscape character and pattern of development;
* proposed site layout and the scale, massing, height, proportions and density of the development including consideration of the relationship with the existing character of the surrounding area and neighbouring buildings;
* use of materials, textures and colours that are sensitive to the surrounding area; and
* the incorporation of key views into and out of the development.

Innovative and experimental designs will be encouraged in appropriate locations.

Policy S6 : Development Principles (Schedule 1)
Proposals for development should where appropriate have regard to the relevant principles set out in Schedule 1 which includes reference to amenity considerations; roads and parking; landscaping, open space and biodiversity; drainage and flood risk, and supporting information.

Schedule 1 : Development Principles
Amenity
(a) The amenity of proposed and existing properties should not be affected by unreasonable restriction of sunlight, daylight or privacy; by smells or fumes; noise levels and vibration; emissions including smoke, soot, ash, dust, grit, or any other environmental pollution; or disturbance by vehicular or pedestrian traffic.
(b) Proposals should not result in unacceptable visual impact.
(c) Proposals close to working farms should not interfere with farming operations, and will be expected to accept the nature of the existing local environment. New houses should not be sited within 400m of an existing or proposed intensive livestock building. (Policy ER31).

Roads/Parking/Access
(d) Access arrangements, road layouts and parking should be in accordance with Angus Council's Roads Standards, and use innovative solutions where possible, including 'Home Zones'. Provision for cycle parking/storage for flatted development will also be required.
(e) Access to housing in rural areas should not go through a farm court.

(f) Where access is proposed by unmade/private track it will be required to be made-up to standards set out in Angus Council Advice Note 17 : Miscellaneous Planning Policies. If the track exceeds 200m in length, conditions may be imposed regarding widening or the provision of passing places where necessary.
(g) Development should not result in the loss of public access rights. (Policy SC36)

Landscaping / Open Space / Biodiversity
(h) Development proposals should have regard to the Landscape Character of the local area as set out in the Tayside Landscape Character Assessment (SNH 1998). (Policy ER5)
(i) Appropriate landscaping and boundary treatment should be an integral element in the design and layout of proposals and should include the retention and enhancement of existing physical features (e.g. hedgerows, walls, trees etc) and link to the existing green space network of the local area.
(j) Development should maintain or enhance habitats of importance set out in the Tayside Local Biodiversity Action Plan and should not involve loss of trees or other important landscape features or valuable habitats and species.
(k) The planting of native hedgerows and tree species is encouraged.
(l) Open space provision in developments and the maintenance of it should be in accordance with Policy SC33.

Drainage and Flood Risk
(m) Development sites located within areas served by public sewerage systems should be connected to that system. (Policy ER22)
(n) Surface water will not be permitted to drain to the public sewer. An appropriate system of disposal will be necessary which meets the requirements of the Scottish Environment Protection Agency (SEPA) and Angus Council and should have regard to good practice advice set out in the Sustainable Urban Drainage Systems Design Manual for Scotland and Northern Ireland 2000.
(o) Proposals will be required to consider the potential flood risk at the location. (Policy ER28)
(p) Outwith areas served by public sewerage systems, where a septic tank, bio-disc or similar system is proposed to treat foul effluent and /or drainage is to a controlled water or soakaway, the consent of SEPA and Angus Council will be required. (Policy ER23).
(q) Proposals should incorporate appropriate waste recycling, segregation and collection facilities (Policy ER38)
(r) Development should minimise waste by design and during construction.

Supporting Information
(s) Where appropriate, planning applications should be accompanied by the necessary supporting information. Early discussion with Planning and Transport is advised to determine the level of supporting information which will be required and depending on the proposal this might include any of the following: Air Quality Assessment; Archaeological Assessment; Contaminated Land Assessment; Design Statement; Drainage Impact Assessment; Environmental Statement; Flood Risk Assessment; Landscape Assessment and/or Landscaping Scheme; Noise Impact Assessment; Retail Impact Assessment; Transport Assessment.

Policy ER5 : Conservation of Landscape Character
Development proposals should take account of the guidance provided by the Tayside Landscape Character Assessment and where appropriate will be considered against the following criteria:

(a) sites selected should be capable of absorbing the proposed development to ensure that it fits into the landscape;
(b) where required, landscape mitigation measures should be in character with, or enhance, the existing landscape setting;
(c) new buildings/structures should respect the pattern, scale, siting, form, design, colour and density of existing development;
(d) priority should be given to locating new development in towns, villages or building groups in preference to isolated development.

Policy ER11 : Noise Pollution
Development which adversely affects health, the natural or built environment or general amenity as a result of an unacceptable increase in noise levels will not be permitted unless there is an overriding need which cannot be accommodated elsewhere.

Proposals for development generating unacceptable noise levels will not generally be permitted adjacent to existing or proposed noise-sensitive land uses. Proposals for new noise-sensitive development which would be subject to unacceptable levels of noise from an existing noise source or from a proposed use will not be permitted.

Policy ER16 : Development Affecting the Setting of a Listed Building
Development proposals will only be permitted where they do not adversely affect the setting of a listed building. New development should avoid building in front of important elevations, felling mature trees and breaching boundary walls.

Policy ER18 : Archaeological Sites of National Importance
Priority will be given to preserving Scheduled Ancient Monuments in situ. Developments affecting Scheduled Ancient Monuments and other nationally significant archaeological sites and historic landscapes and their settings will only be permitted where it can be adequately demonstrated that either:

(a) the proposed development will not result in damage to the scheduled monument or site of national archaeological interest or the integrity of its setting; or
(b) there is overriding and proven public interest to be gained from the proposed development that outweighs the national significance attached to the preservation of the monument or archaeological importance of the site. In the case of Scheduled Ancient Monuments, the development must be in the national interest in order to outweigh the national importance attached to their preservation; and
(c) the need for the development cannot reasonably be met in other less archaeologically damaging locations or by reasonable alternative means; and
(d) the proposal has been sited and designed to minimise damage to the archaeological remains.

Where development is considered acceptable and preservation of the site in its original location is not possible, the excavation and recording of the site will be required in advance of development, at the developer's expense

Policy ER19 : Archaeological Sites of Local Importance
Where development proposals affect unscheduled sites of known or suspected archaeological interest, Angus Council will require the prospective developer to arrange for an archaeological evaluation to determine the importance of the site, its sensitivity to development and the most appropriate means for preserving or recording any archaeological information. The evaluation will be taken into account when determining whether planning permission should be granted with or without conditions or refused.

Where development is generally acceptable and preservation of archaeological features in situ is not feasible Angus Council will require through appropriate conditions attached to planning consents or through a Section 75 Agreement, that provision is made at the developer's expense for the excavation and recording of threatened features prior to development commencing.

Policy ER30 : Agricultural Land
Proposals for development that would result in the permanent loss of prime quality agricultural land and/or have a detrimental effect on the viability of farming units will only normally be permitted where the land is allocated by this Local Plan or considered essential for implementation of the Local Plan strategy.

Policy ER34 : Renewable Energy Developments
Proposals for all forms of renewable energy developments will be supported in principle and will be assessed against the following criteria:

(a) the siting and appearance of apparatus have been chosen to minimise the impact on amenity, while respecting operational efficiency;
(b) there will be no unacceptable adverse landscape and visual impacts having regard to landscape character, setting within the immediate and wider landscape, and sensitive viewpoints;
(c) the development will have no unacceptable detrimental effect on any sites designated for natural heritage, scientific, historic or archaeological reasons;
(d) no unacceptable environmental effects of transmission lines, within and beyond the site; and
(e) access for construction and maintenance traffic can be achieved without compromising road safety or causing unacceptable permanent change to the environment and landscape, and
(f) that there will be no unacceptable impacts on the quantity or quality of groundwater or surface water resources during construction, operation and decommissioning of the energy plant.

Policy ER35 : Wind Energy Developments
Wind energy developments must meet the requirements of Policy ER34 and also demonstrate:

(a) the reasons for site selection;
(b) that no wind turbines will cause unacceptable interference to birds, especially those that have statutory protection and are susceptible to disturbance, displacement or collision;
(c) there is no unacceptable detrimental effect on residential amenity, existing land uses or road safety by reason of shadow flicker, noise or reflected light;
(d) that no wind turbines will interfere with authorised aircraft activity;
(e) that no electromagnetic disturbance is likely to be caused by the proposal to any existing transmitting or receiving system, or (where such disturbances may be caused) that measures will be taken to minimise or remedy any such interference;
(f) that the proposal must be capable of co-existing with other existing or permitted wind energy developments in terms of cumulative impact particularly on visual amenity and landscape, including impacts from development in neighbouring local authority areas;
(g) a realistic means of achieving the removal of any apparatus when redundant and the restoration of the site are proposed.

TAYplan Strategic Development Plan

Policy 3D : Natural and Historic Assets
Understanding and respecting the regional distinctiveness and scenic value of the TAYplan area through:-

- ensuring development likely to have a significant effect on a designated or proposed Natura 2000 sites (either alone or in combination with other sites or projects), will be subject to an appropriate assessment. Appropriate mitigation requires to be identified where necessary to ensure there will be no adverse effect on the integrity of Natura 2000 sites in accordance with Scottish Planning Policy;

- safeguarding habitats, sensitive green spaces, forestry, watercourses, wetlands, floodplains

(in-line with the water framework directive), carbon sinks, species and wildlife corridors, geo-diversity, landscapes, parks, townscapes, archaeology, historic buildings and monuments and allow development where it does not adversely impact upon or preferably enhances these assets; and,

- identifying and safeguarding parts of the undeveloped coastline along the River Tay Estuary and in Angus and North Fife, that are unsuitable for development and set out policies for their management; identifying areas at risk from flooding and sea level rise and develop policies to manage retreat and realignment, as appropriate.

Policy 6C : Consider Criteria as Minimum

Local Development Plans and development proposals should ensure that all areas of search, allocated sites, routes and decisions on development proposals for energy and waste/resource management infrastructure have been justified, at a minimum, on the basis of these considerations:-

- The specific land take requirements associated with the infrastructure technology and associated statutory safety exclusion zones where appropriate;

- Waste/resource management proposals are justified against the Scottish Government's Zero Waste Plan and support the delivery of the waste/resource management hierarchy;

- Proximity of resources (e.g. woodland, wind or waste material); and to users/customers, grid connections and distribution networks for the heat, power or physical materials and waste products, where appropriate;

- Anticipated effects of construction and operation on air quality, emissions, noise, odour, surface and ground water pollution, drainage, waste disposal, radar installations and flight paths, and, of nuisance impacts on of-site properties;

- Sensitivity of landscapes (informed by landscape character assessments and other work), the water environment, biodiversity, geo-diversity, habitats, tourism, recreational access and listed/scheduled buildings and structures;

- Impacts of associated new grid connections and distribution or access infrastructure;

- Cumulative impacts of the scale and massing of multiple developments, including existing infrastructure;

- Impacts upon neighbouring planning authorities (both within and outwith TAYplan); and,

- Consistency with the National Planning Framework and its Action Programme.

Cairngorms National Park Local Plan

Extract from Angus Local Plan Review (Policy S1, page 10)

DEVELOPMENT BOUNDARIES

1.29 Angus Council has defined development boundaries around settlements to protect the landscape setting of towns and villages and to prevent uncontrolled growth. The presence of a boundary does not indicate that all areas of ground within that boundary have development potential.

***Development boundaries**: Generally provide a definition between built-up areas and the countryside, but may include peripheral areas of open space that are important to the setting of settlements.*

Policy S1 : Development Boundaries

(a) Within development boundaries proposals for new development on sites not allocated on Proposals Maps will generally be supported where they are in accordance with the relevant policies of the Local Plan.

(b) Development proposals on sites outwith development boundaries (i.e. in the countryside) will generally be supported where they are of a scale and nature appropriate to the location and where they are in accordance with the relevant policies of the Local Plan.

***Public interest:** Development would have benefits for the wider community, or is justifiable in the national interest.*
Proposals that are solely of commercial benefit to the proposer would not comply with this policy.

(c) Development proposals on sites contiguous with a development boundary will only be acceptable where there is a proven public interest and social, economic or environmental considerations confirm there is an overriding need for the development which cannot be met within the development boundary.

Extract from Angus Local Plan Review – (Policy S3, page 12)

DESIGN QUALITY

1.37 High quality, people-friendly surroundings are important to a successful development. New development should add to or improve the local environment and should consider the potential to use innovative, sustainable and energy efficient solutions. A well-designed development is of benefit to the wider community and also

provides opportunities to:

- create a sense of place which recognises local distinctiveness and fits in to the local area;
- create high quality development which adds to or improves the local environment and is flexible and adaptable to changing lifestyles;
- create developments which benefit local biodiversity;
- create energy efficient developments that make good use of land
- and finite resources.

Designing Places - A policy statement for Scotland – cottish Executive 2001 *This is the first policy statement on designing places in Scotland and marks the Scottish Executive's determination to raise standards of urban and rural development. Good design is an integral part of a confident, competitive and compassionate Scotland.*

Good design is a practical means of achieving a wide range of social, economic and environmental goals, making places that will be successful and sustainable.

1.38 Design is a material consideration in determining planning applications. In all development proposals consideration should be given to the distinctive features and character of the local area. This includes taking account of existing patterns of development, building forms and materials, existing features such as hedgerows, trees, treelines and walls and distinctive landscapes and skylines.

PAN 68 Design Statements *Design Statements should explain the design principles on which the development is based and illustrate the design solution.*

1.39 The preparation of a design statement to be submitted alongside a planning application is encouraged, particularly for major developments or those affecting listed buildings or conservation areas. Early contact with Planning and Transport is recommended so that the requirement for a design statement can be determined.

The PAN explains what a design statement is, why it is a useful tool, when it is required and how it should be prepared and presented.

The aim is to see design statements used more effectively in the planning process and to

Policy S3 : Design Quality

A high quality of design is encouraged in all development proposals. In considering proposals the following factors will be taken into account:

- **site location and how the development fits with the local landscape character and pattern of development;**
- **proposed site layout and the scale, massing, height, proportions and density of the development including consideration of the relationship with the existing character of the surrounding area and neighbouring buildings;**
- **use of materials, textures and colours that are sensitive to**
- **the surrounding area; and**
- **the incorporation of key views into and out of the development.**

Innovative and experimental designs will be encouraged in appropriate locations.

Extract from Angus Local Plan Review– (Policy S6 & Schedule 1, pages 14 & 15)

DEVELOPMENT PRINCIPLES

1.44 The principles in Schedule 1 provide a 'checklist' of factors which should be considered where relevant to development proposals. They include amenity considerations; roads and parking; landscaping, open space and biodiversity; drainage and flood risk, and supporting information. The Local Plan includes more detailed policies relating to some principles set out. Not all development proposals will require to comply with all of the principles.

Policy S6 : Development Principles

Proposals for development should where appropriate have regard to the relevant principles set out in Schedule 1 which includes reference to amenity considerations; roads and parking; landscaping, open space and biodiversity; drainage and flood risk, and supporting information.

Extract from Angus Local Plan Review– (Policy S6 & Schedule 1, pages 14 & 15)

Schedule 1 : Development Principles

Amenity

a) The amenity of proposed and existing properties should not be affected by unreasonable restriction of sunlight, daylight or privacy; by smells or fumes; noise levels and vibration; emissions including smoke, soot, ash, dust, grit, or any other environmental pollution; or disturbance by vehicular or pedestrian traffic.
b) Proposals should not result in unacceptable visual impact.
c) Proposals close to working farms should not interfere with farming operations, and will be expected to accept the nature of the existing local environment. New houses should not be sited within 400m of an existing or proposed intensive livestock building. (Policy ER31).

Roads/Parking/Access

d) Access arrangements, road layouts and parking should be in accordance with Angus Council's Roads Standards, and use innovative solutions where possible, including 'Home Zones'. Provision for cycle parking/storage for flatted development will also be required.
e) Access to housing in rural areas should not go through a farm court.
f) Where access is proposed by unmade/private track it will be required to be made-up to standards set out in Angus Council Advice Note 17: Miscellaneous Planning Policies. If the track exceeds 200m in length, conditions may be imposed regarding widening or the provision of passing places where necessary
g) Development should not result in the loss of public access rights. (Policy SC36)

Landscaping / Open Space / Biodiversity

h) Development proposals should have regard to the Landscape Character of the local area as set out in the Tayside Landscape Character Assessment (SNH 1998). (Policy ER5)
i) Appropriate landscaping and boundary treatment should be an integral element in the design and layout of proposals and should include the retention and enhancement of existing physical features (e.g. hedgerows, walls, trees etc) and link to the existing green space network of the local area.
j) Development should maintain or enhance habitats of importance set out in the Tayside Local Biodiversity Action Plan and should not involve loss of trees or other important landscape features or valuable habitats and species.
k) The planting of native hedgerows and tree species is encouraged.
l) Open space provision in developments and the maintenance of it should be in accordance with Policy SC33.

Drainage and Flood Risk

m) Development sites located within areas served by public sewerage systems should be connected to that system. (Policy ER22)
n) Surface water will not be permitted to drain to the public sewer. An appropriate system of disposal will be necessary which meets the requirements of the Scottish Environment Protection Agency (SEPA) and Angus Council and should have regard to good practice advice set out in the Sustainable Urban Drainage Systems Design Manual for Scotland and Northern Ireland 2000.
o) Proposals will be required to consider the potential flood risk at the location. (Policy ER28)
p) Outwith areas served by public sewerage systems, where a septic tank, bio-disc or similar system is proposed to treat foul effluent and /or drainage is to a controlled water or soakaway, the consent of SEPA and Angus Council will be required. (Policy ER23).

Waste Management

q) Proposals should incorporate appropriate waste recycling, segregation and collection facilities (Policy ER38).
r) Development should minimise waste by design and during construction.

Supporting Information

s) (s) Where appropriate, planning applications should be accompanied by the necessary supporting information. Early discussion with Planning and Transport is advised to determine the level of supporting information which will be required and depending on the proposal this might include any of the following: Air Quality Assessment; Archaeological Assessment; Contaminated Land Assessment; Design Statement; Drainage Impact Assessment; Environmental Statement; Flood Risk Assessment; Landscape Assessment and/or Landscaping Scheme; Noise Impact Assessment; Retail Impact Assessment; Transport Assessment.

Landscape Character

3.10 The landscape of Angus is one of its most important assets. It ranges in character from the rugged mountain scenery of the Angus Glens, through the soft rolling cultivated lowland landscape of Strathmore to the sandy bays and cliffs of the coast.

3.11 A small part of north-west Angus is statutorily designated as part of a larger National Scenic Area (NSA). The character and quality of this landscape is of national significance and special care should be taken to conserve and enhance it. Part of the upland area of Angus, including the NSA, is contained within the Cairngorms National Park which is excluded from the Angus Local Plan Review. The guidance provided by the adopted Angus Local Plan will remain in force until it is replaced by a Cairngorms National Park Local Plan prepared by the National Park Authority. The Cairngorms was made a National Park in September 2003 because it is a unique and special place that needs to be cared for – both for the wildlife and countryside it contains and for the people that live in it, manage it and visit it. It is Britain's largest national park.

3.12 In seeking to conserve the landscape character of the area it is important to assess the impact of development proposals on all parts of the landscape. To assist in this the "Tayside Landscape Character Assessment (1999)" commissioned by Scottish Natural Heritage establishes landscape character zones and key character features within the local plan area to provide a better understanding of them and thus to enable better conservation, restoration, management and enhancement. Landscape Character Zones for the Local Plan Area are shown in Figure 3.2.

National Scenic Area:
Nationally important area of outstanding natural beauty, representing some of the best examples of Scotland's grandest landscapes particularly lochs and mountains.

***National Park (Scotland) Act 2000** sets out four key aims for the park:*

- *To conserve and enhance the natural and cultural heritage of the area;*
- *To promote sustainable use of the natural resources of the area;*
- *To promote understanding and enjoyment (including enjoyment in the form of recreation) of the special qualities of the area by the public;*
- *To promote sustainable economic and social development of the area's communities.*

Tayside Landscape Character Assessment 1999:
A detailed hierarchical assessment based on variations in the Tayside landscape, with a series of management and planning guidelines designed to conserve and enhance its distinctive character.

Figure 3.2 : Landscape Character Zones

3.13 Where appropriate, development proposals will be considered in the context of the guidance provided by the Tayside Landscape Character Assessment. The assessment identifies different landscape character zones, considers their capacity to absorb change, and indicates how various types of development might best be accommodated to conserve characteristic landscape features and to strengthen and enhance landscape quality. Particular attention is focussed on the location, siting and design of development and the identification of proposals which would be detrimental to the landscape character of Angus.

Policy ER5 : Conservation of Landscape Character

Development proposals should take account of the guidance provided by the Tayside Landscape Character Assessment and where appropriate will be considered against the following criteria:

(a) sites selected should be capable of absorbing the proposed development to ensure that it fits into the landscape;
(b) where required, landscape mitigation measures should be in character with, or enhance, the existing landscape setting;
(c) new buildings/structures should respect the pattern, scale, siting, form, design, colour and density of existing development;
(d) priority should be given to locating new development in towns, villages or building groups in preference to isolated development.

Noise Pollution

3.20 Noise can have a significant impact on our health, quality of life and the general quality of the environment. The planning system has an important role in preventing and limiting noise pollution and the noise implications of development can be a material consideration in determining applications for planning permission adjacent to existing noise sensitive development or where new noise sensitive development is proposed.

Policy ER11 : Noise Pollution

Development which adversely affects health, the natural or built environment or general amenity as a result of an unacceptable increase in noise levels will not be permitted unless there is an overriding need which cannot be accommodated elsewhere. Proposals for development generating unacceptable noise levels will not generally be permitted adjacent to existing or proposed noise sensitive land uses.

Proposals for new noise-sensitive development which would be subject to unacceptable levels of noise from an existing noise source or from a proposed use will not be permitted.

Planning Advice Note 56 - Planning and Noise (1999)
Noise sensitive land uses should be generally regarded as including housing, hospitals, educational establishments, offices and some livestock farms.

LISTED BUILDINGS

3.34 The relationship of a listed building with the buildings, landscape and spaces around it is an essential part of its character. The setting of a listed building is, therefore, worth preserving and may extend to encompass land or buildings some distance away. Insensitive development can erode or destroy the character and/or setting of a listed building. Consequently planning permission will not be granted for development which adversely affects the setting of a Listed Building. Trees and landscaping, boundary walls and important elevations may be particularly sensitive to the effects of development.

Policy ER16 : Development Affecting the Setting of a Listed Building

Development proposals will only be permitted where they do not adversely affect the setting of a listed building. New development should avoid building in front of important elevations, felling mature trees and breaching boundary walls.

Ancient Monuments and Archaeological Sites

3.36 Angus has a rich heritage of archaeological remains ranging from crop marks and field systems through to structures such as standing stones, hill forts, castles and churches. They are evidence of the past development of society and help us to understand and interpret the landscape of today. They are a finite and non-renewable resource to be protected and managed.

3.37 Sites considered to be of national importance are scheduled by Scottish Ministers as Ancient Monuments. There are over 200 such sites in Angus with additional sites regularly being incorporated into the List. In addition, there are other monuments of regional or local significance. All of these sites and monuments, whether scheduled or not, are fragile and irreplaceable.

3.38 The owner or occupier of a scheduled ancient monument is required to obtain consent from Historic Scotland for repairs, alterations, demolition, or any work affecting the monument. In order therefore to protect the scheduled monument any planning application that may affect it will be notified to Historic Scotland and their comments taken into account in determining development proposals.

Policy ER18 : Archaeological Sites of National Importance

Priority will be given to preserving Scheduled Ancient Monuments in situ. Developments affecting Scheduled Ancient Monuments and other nationally significant archaeological sites and historic landscapes and their settings will only be permitted where it can be adequately demonstrated that either:

a) the proposed development will not result in damage to the scheduled monument or site of national archaeological interest or the integrity of its setting; or
b) there is overriding and proven public interest to be gained from the proposed development that outweighs the national significance attached to the preservation of the monument or archaeological importance of the site. In the case of Scheduled Ancient Monuments, the development must be in the national interest in order to outweigh the national importance attached to their preservation; and
c) the need for the development cannot reasonably be met in other less archaeologically damaging locations or by reasonable alternative means; and
d) the proposal has been sited and designed to minimise damage to the archaeological remains.

Where development is considered acceptable and preservation of the site in its original location is not possible, the excavation and recording of the site will be required in advance of development, at the developer's expense.

NPPG 5: Planning and Archaeology (1994)
Sets out the role of the planning system in protecting ancient monuments and archaeological sites and landscapes. The Government seeks to encourage the preservation of our heritage of sites and landscapes of archaeological and historic interest. The development plan system provides the policy framework for meeting the need for development along with the need for preserving archaeological resources.

PAN 42 : Archaeology – the Planning Process and Scheduled Monument Procedure (1994)
Archaeological remains offer a tangible, physical link with the past. They are a finite and non-renewable resource containing unique information about our past and the potential for an increase in future knowledge. Such remains are part of Scotland's identity and are valuable both for their own sake and for education, leisure and tourism. The remains are often fragile and vulnerable to damage or destruction; care must therefore be taken to ensure that they are not needlessly destroyed.

Scheduled Ancient Monument (SAM):
The site of a scheduled monument and any other monument which in the opinion of the Scottish Ministers is of public interest by reason of its historic, architectural, traditional, artistic or archaeological interest.

3.39 While the best examples of valuable archaeological sites are designated of national importance there are numerous examples of historic sites in both urban and rural areas that are of local significance. There are also other sites where finds may have been made in the past but no remains are known to date.

3.40 Within the mediaeval burghs of Arbroath, Brechin, Forfar and Montrose areas of primary and secondary archaeological significance were identified through the Scottish Burgh Surveys undertaken in the late 1970s. This provides an indicator for prospective developers that where redevelopment is being proposed an archaeological assessment may be required prior to commencement of works or at least a watching brief during excavations.

Policy ER19 : Archaeological Sites of Local Importance

Where development proposals affect unscheduled sites of known or suspected archaeological interest, Angus Council will require the prospective developer to arrange for an archaeological evaluation to determine the importance of the site, its sensitivity to development and the most appropriate means for preserving or recording any archaeological information. The evaluation will be taken into account when determining whether planning permission should be granted with or without conditions or refused.

Where development is generally acceptable and preservation of archaeological features in situ is not feasible Angus Council will require through appropriate conditions attached to planning consents or through a Section 75 Agreement, that provision is made at the developer's expense for the excavation and recording of threatened features prior to development commencing.

Agriculture

Agricultural Land

3.64 Current national policy protects prime quality agricultural land from inappropriate and irreversible development. It is estimated that Angus has around 9.6% of this scarce and non-renewable national resource, predominantly located in the lowland area along Strathmore and the coastal strip between Carnoustie and Arbroath. As the Local Plan strategy seeks to accommodate development in and around the main towns, it is inevitable that some prime quality land will be required for development.

Prime Quality Agricultural Land – *Grade 1, 2 and 3.1 as defined and identified on the Macauley Land Use Research Institutes Land Capability for Agriculture maps.*

Policy ER30 : Agricultural Land

Proposals for development that would result in the permanent loss of prime quality agricultural land and/or have a detrimental effect on the viability of farming units will only normally be permitted where the land is allocated by this Local Plan or considered essential for implementation of the Local Plan strategy.

Renewable Energy

3.72 The Scottish Executive is strongly supportive of renewable energies and has set a target of 17-18% of Scotland's electricity supply to come from renewable sources by 2010. NPPG6: Renewable Energy Developments (Revised 2000) considers a range of renewable energy technologies and encourages the provision of a positive policy framework to guide such developments. The Scottish Executive's aspiration is for renewable sources to contribute 40% of electricity production by 2020, an estimated total installed capacity of 6GW (Minister for Enterprise, July 2005). This will require major investment in commercial renewable energy production and distribution capacity throughout Scotland.

NPPG6: Renewable Energy Developments (Revised 2000)

The Scottish Ministers wish to see the planning system make positive provision for renewable energy whilst at the same time:

- *meeting the international and national statutory obligations to protect designated areas, species, and habitats of natural heritage interest and the historic environment from inappropriate forms of development; and*
- *minimising the effects on local communities.*

3.73 The Dundee and Angus Structure Plan acknowledges the advantages of renewable energy in principle but also recognises the potential concerns associated with development proposals in specific locations. Angus Council supports the principle of developing sources of renewable energy in appropriate locations. Large-scale developments will only be encouraged to locate in areas where both technical (e.g. distribution capacity and access roads) and environmental capacity can be demonstrated.

3.74 Developments which impinge on the Cairngorms National Park will be considered within the context of the National Park Authority's Planning Policy No1: Renewable Energy.

Renewable Energy Sources

3.75 Offshore energy production, including wind and tidal methods, has the potential to make a significant contribution to the production of renewable energy in Scotland. Other than small-scale onshore support buildings, such developments currently fall outwith the remit of the planning system.

Large-scale *projects which may or will require an Environmental Assessment. These are defined as hydroelectric schemes designed to produce more than 0.5MW and wind farms of more than 2 turbines or where the hub height of any turbine or any other structure exceeds 15m.*

3.76 All renewable energy production, including from wind, water, biomass, waste incineration and sources using emissions from wastewater treatment works and landfill sites will require some processing, generating or transmission plant. Such developments, that can all contribute to reducing emissions will have an impact on the local environment and will be assessed in accordance with Policy ER34.

SNH's ***EIA Handbook*** *identifies 6 types of impact which may require an assessment:*

- *Landscape and visual;*
- *Ecological;*
- *Earth heritage;*
- *Soil;*
- *Countryside access; and*
- *Marine environment.*

Policy ER34 : Renewable Energy Developments

Proposals for all forms of renewable energy development will be supported in principle and will be assessed against the following criteria:

(a) the siting and appearance of apparatus have been chosen to minimise the impact on amenity, while respecting operational efficiency;
(b) there will be no unacceptable adverse landscape and visual impacts having regard to landscape character, setting within the immediate and wider landscape, and sensitive viewpoints;
(c) the development will have no unacceptable detrimental effect on any sites designated for natural heritage, scientific, historic or archaeological reasons;
(d) no unacceptable environmental effects of transmission lines, within and beyond the site; and
(e) access for construction and maintenance traffic can be achieved without compromising road safety or causing unacceptable permanent and significant change to the environment and landscape.

Wind Energy

3.77 Onshore wind power is likely to provide the greatest opportunity and challenge for developing renewable energy production in Angus. Wind energy developments vary in scale but, by their very nature and locational requirements, they have the potential to cause visual impact over long distances. Wind energy developments also raise a number of environmental issues and NPPG 6 advises that planning policies should guide developers to broad areas of search and to establish criteria against which to consider development proposals. In this respect, Scottish Natural Heritage Policy Statement 02/02, Strategic Locational Guidance for Onshore Wind Farms in Respect of the Natural Heritage, designates land throughout Scotland as being of high, medium or low sensitivity zones in terms of natural heritage. Locational guidance is provided to supplement the broad-brush zones.

3.78 A range of technical factors influence the potential for wind farm development in terms of location and viability. These include wind speed, access to the distribution network, consultation zones, communication masts, and proximity to radio and radar installations. Viability is essentially a matter for developers to determine although annual average wind speeds suitable for commercially viable generation have been recorded over most of Angus, other than for sheltered valley bottoms. Environmental implications will require to be assessed in conjunction with the Council, SNH and other parties as appropriate.

Strategic Locational Guidance for Onshore Windfarms in Respect of the Natural Heritage - Scottish Natural Heritage Policy Statement No 02/02

Zone 3 *– high natural heritage sensitivity. Developers should be encouraged to look outwith Zone 3 for development opportunities*

Zone 2 *– medium natural heritage sensitivity. …while there is often scope for wind farm development within Zone 2 it may be restricted in scale and energy output and will require both careful choice of location and care in design to avoid natural heritage impacts.*

Zone 1 *- …inclusion of an area in Zone 1 does not imply absence of natural heritage interest. Good siting and design should however enable such localised interests to be respected, so that overall within Zone 1, natural heritage interests do not present a significant constraint on wind farm development*

Figure 3.4 : Geographic Areas

TLCA Designation
- 1a Upper Highland Glens
- 1b Mid Highland Glens
- 3 Highland Summits & Plateaux
- 5 Highland Foothills

TLCA Designation
- 8 Igneous Hills
- 10 Broad Valley Lowland
- 12 Low Moorland Hills
- 13 Dipslope Farmland

TLCA Designation
- 14a Coast with sand
- 14b Coast with cliffs
- 15 Lowland Basin

3.79 Scottish Natural Heritage published a survey of Landscape Character, the Tayside Landscape Character Assessment (TLCA), which indicates Angus divides naturally into three broad geographic areas – the Highland, Lowland and hills and the Coast. The Tayside Landscape Character Assessment provides a classification to map these areas based on their own particular landscape characteristics (Fig 3.4).

Area	TLCA Classification	Landscape Character
1 Highland	1a, 1b, 3, 5	Plateaux summits, glens and complex fault line topography
2 Lowland and hills	8, 10, 12,13	Fertile strath, low hills and dipslope farmland.
3 Coast	14a, 14b, 15	Sand and cliff coast and tidal basin

The impact of wind farm proposals will, in terms of landscape character, be assessed against the TLCA classifications within the wider context of the zones identified in SNH Policy Statement 02/02.

3.80 The open exposed character of the Highland summits and the Coast (Areas 1 and 3) is sensitive to the potential landscape and visual impact of large turbines. The possibility of satisfactorily accommodating turbines in parts of these areas should not be discounted although locations associated with highland summits and plateaux, the fault line topography and coast are likely to be less suitable. The capacity of the landscape to absorb wind energy development varies. In all cases, the scale layout and quality of design of turbines will be an important factor in assessing the impact on the landscape.

3.81 The Highland and Coast also have significant natural heritage value, and are classified in SNH Policy Statement 02/02 as mainly Zone 2 or 3 - medium to high sensitivity. The development of large scale wind farms in these zones is likely to be limited due to potential adverse impact on their visual character, landscape and other natural heritage interests.

3.82 The Lowland and Hills (Area 2) comprises a broad swathe extending from the Highland boundary fault to the coastal plain. Much of this area is classified in Policy Statement 02/02 as Zone 1- lowest sensitivity. Nevertheless, within this wider area there are locally important examples of higher natural heritage sensitivity such as small- scale landscapes, skylines and habitats which will influence the location of wind turbines. In all cases, as advocated by SNH, good siting and design should show respect for localised interests.

3.83 Wind farm proposals can affect residential amenity, historic and archaeological sites and settings, and other economic and social activities including tourism. The impact of wind farm developments on these interests requires careful assessment in terms of sensitivity and scale so that the significance can be determined and taken into account.

3.84 Cumulative impact occurs where wind farms/turbines are

visually interrelated e.g. more than one wind farm is visible from a single point or sequentially in views from a road or a footpath. Landscape and visual impact can be exacerbated if wind turbines come to dominate an area or feature. Such features may extend across local authority, geographic or landscape boundaries and impact assessments should take this into account. Environmental impacts can also be subject to cumulative effect – for example where a number of turbine developments adversely affect landscape character, single species or habitat type.

3.85 SNH advise that an assessment of cumulative effects associated with a specific wind farm proposal should be limited to all existing and approved developments or undetermined Section 36 or planning applications in the public domain. The Council may consider that a pre-application proposal in the public domain is a material consideration and, as such, may decide it is appropriate to include it in a cumulative assessment. Similarly, projects outwith the 30km radius may exceptionally be regarded as material in a cumulative context.

NPPG6 : Renewable Energy Developments (Revised 2000)

***Large-scale** projects which may or will require an Environmental Assessment. These are defined as hydroelectric schemes designed to produce more than 0.5MW and wind farms of more than 2 turbines or where the hub height of any turbine or any other structure exceeds 15m.*

Policy ER35 : Wind Energy Development

Wind energy developments must meet the requirements of Policy ER34 and also demonstrate:

(a) the reasons for site selection;
(b) that no wind turbines will cause unacceptable interference to birds, especially those that have statutory protection and are susceptible to disturbance, displacement or collision;
(c) there is no unacceptable detrimental effect on residential amenity, existing land uses or road safety by reason of shadow flicker, noise or reflected light;
(d) that no wind turbines will interfere with authorised aircraft activity;
(e) that no electromagnetic disturbance is likely to be caused by the proposal to any existing transmitting or receiving system, or (where such disturbances may be caused) that measures will be taken to minimise or remedy any such interference;
(f) that the proposal must be capable of co-existing with other existing or permitted wind energy developments in terms of cumulative impact particularly on visual amenity and landscape, including impacts from development in neighbouring local authority areas;
(g) a realistic means of achieving the removal of any apparatus when redundant and the restoration of the site are proposed.

Local Community Benefit

3.86 Where renewable energy schemes accord with policies in this local plan there may be opportunities to secure contributions from developers for community initiatives. Such contributions are not part of the planning process and as such will require to be managed through other means than obligations pursuant to Section 75 Planning Agreement. Community contributions are separate from planning gain and will not be considered as part of any planning application.

Managing TAYplan's Assets: Safeguarding resources and land with potential to support the sustainable economic growth.

Delivering the vision and objectives of this Plan requires management of land and conservation of resources. This recognises that good quality development and the right type of development in the right places can lead to a series of social, economic and environmental benefits for those areas and the TAYplan region as a whole. This Plan balances these factors with the sometimes competing nature of different land uses.

This Plan safeguards for present and future generations important resources and land with potential to support the economy. It also requires us to ensure that development and growth in the economy occur in a way that does not place unacceptable burdens on environmental capacity and increase the exposure of users or inhabitants to risks. This can be achieved by directing development to specific locations (Policies 1, 4, 5, 6 and 7); ensuring that development is fit for place (Policies 2 and 8); and, that some areas or assets are safeguarded for a specific range of land uses (Policy 3).

This is important to support the growth of emerging sectors of the economy, such as the off-shore renewable energy sector through the protection of the region's ports for port-related uses, particularly Dundee and Montrose Ports. Similarly employment land, particularly in rural areas, can be affected through redevelopment for alternative uses or by alternative uses nearby. This could hinder or even prevent the start up of businesses in the future and/or limit business operations.

The economic recovery of the region and new development will need to be supported by appropriate infrastructure, particularly transport infrastructure. This will also contribute to behavioural change and reducing reliance on the car and on road-based freight. Ensuring that this can be delivered will require land and routes to be protected from prejudicial development. It also requires the public and private sectors to work jointly to deliver infrastructure.

Supporting future food and resource security will require the protection of finite resources like minerals, forestry and prime agricultural land* by management as one consideration in the prioritisation of land release under Policy 1.

Limiting the types of land uses that can occur within green belts at Perth and St. Andrews will contribute to protecting the settings and historic cores of those settlements from inappropriate development and prevent coalescence with neighbouring areas.

It is essential to grow the economy within environmental limits and build-in resilience to climate change, natural processes and increased risk from sea level rise. Identifying environmentally sensitive areas and important natural and historic assets where no or very limited development would be permitted, such as some coastal areas, Natura 2000** sites and other locations, will contribute to this. It will also be important to ensure that plans for managed realignment of coast and other coastal management are devised in liaison with Scottish Natural Heritage and Marine Scotland.

Prime agricultural land: Land classes 1, 2 and 3.1 – these are the most suited to arable agriculture.

***Natura 2000: European-wide designations to protect habitats and species – special protection areas (SPAs), Ramsar sites and special areas of conservation (SACs)*

Policy 3: Managing TAYplan's Assets

Land should be identified through Local Development Plans to ensure responsible management of TAYplan's assets by:

Employment Land

- identifying and safeguarding at least 5 years supply of employment land within principal settlements to support the growth of the economy and a diverse range of industrial requirements;
- safeguarding areas identified for class 4 office type uses in principal settlements; and,
- further assisting in growing the year-round role of the tourism sector.

Greenbelts

- continuing to designate green belt boundaries at both St. Andrews and Perth to preserve their settings, views and special character including their historic cores; assist in safeguarding the countryside from encroachment; to manage long term planned growth including infrastructure in this Plan's Proposals Map and Strategic Development Areas in Policy 4; and define appropriate forms of development within the green belt based on Scottish Planning Policy;

- using Perth green belt to sustain the identity of Scone, and provide sufficient land for planned development around key villages and settlements.

Natural and Historic Assets*

Understanding and respecting the regional distinctiveness and scenic value of the TAYplan area through:

- ensuring development likely to have a significant effect on a designated or proposed Natura 2000 sites (either alone or in combination with other sites or projects), will be subject to an appropriate assessment. Appropriate mitigation requires to be identified where necessary to ensure there will be no adverse effect on the integrity of Natura 2000 sites in accordance with Scottish Planning Policy;
- safeguarding habitats, sensitive green spaces, forestry, watercourses, wetlands, floodplains (in-line with the water framework directive), carbon sinks, species and wildlife corridors, geodiversity, landscapes, parks, townscapes, archaeology, historic buildings and monuments and allow development where it does not adversely impact upon or preferably enhances these assets; and,
- identifying and safeguarding parts of the undeveloped coastline along the River Tay Estuary and in Angus and North Fife, that are unsuitable for development and set out policies for their management; identifying areas at risk from flooding and sea level rise and develop policies to manage retreat and realignment, as appropriate.

Transport

- safeguarding land at Dundee and Montrose Ports, and other harbours, as appropriate, for port related uses to support freight, economic growth and tourism; and,
- safeguarding land for future infrastructure provision (including routes), identified in the Proposal Map of this Plan or other locations or routes, as appropriate, or which is integral to a Strategic Development Area in Policy 4 of this Plan, or which is essential to support a shift from reliance on the car and road-based freight and support resource management objectives.

Finite Resources

using the location priorities set out in Policy 1 of this Plan to:

- safeguard minerals deposits of economic importance and land for a minimum of 10 years supply of construction aggregates at all times in all market areas; and,
- protect prime agricultural land, new and existing forestry areas, and carbon rich soils (where identified) where the advantages of development do not outweigh the loss of productive land.

**Natural and historic assets: Landscapes, habitats, wildlife sites and corridors, vegetation, biodiversity, green spaces, geological features, water courses and ancient monuments, archaeological sites and landscape, historic buildings, townscapes, parks, gardens and other designed landscapes, and other features (this includes but is not restricted to designated buildings or areas).*

Energy and Waste/Resource Management Infrastructure: Ensures that energy and waste/resource management infrastructure are in the most appropriate locations.

This Plan seeks to reduce resource consumption through provision of energy and waste/resource management infrastructure* in order to contribute to Scottish Government ambitions for the mitigation of and adaptation to climate change and to achieve zero waste. It also aims to contribute towards greater regional energy self-sufficiency.

This requires us to use less energy and to generate more power and heat from renewable sources and resource recovery; and, to consider waste from start to finish; becoming better at resource management. This is strongly tied into resource security and living within environmental limits. It also presents opportunities to grow the renewable energy and waste/resource management sector as a whole within the TAYplan region. The issue is no longer about whether such facilities are needed but instead about helping to ensure they are delivered in the most appropriate locations.

Land use planning is only one of the regulatory requirements that energy and waste/resource management operators must consider. This Plan does not provide the locations for energy infrastructure; this role is for Local Development Plans. It sets out a series of locational considerations for all energy and waste/resource management infrastructure as the impacts and operations of these share similar characteristics.

This Plan ensures consistency between Local Development Plans in fulfilling Scottish Planning Policy requirements to define areas of search for renewable energy infrastructure and it applies this to a wide range of energy and waste/resource management infrastructure.

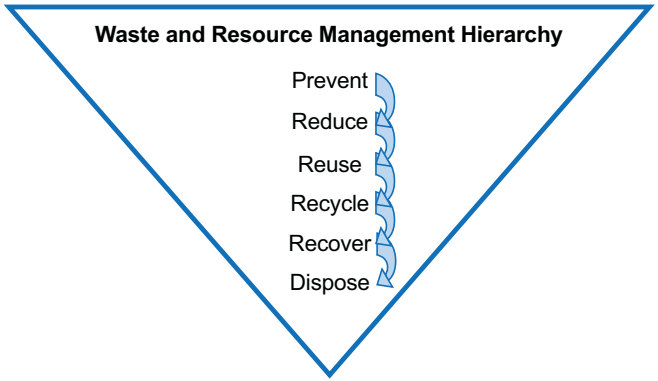
It recognises the different scales – property (eg micro-renewables or individual waste facilities), community (eg district heating and power or local waste facilities) and regional/national (eg national level schemes and waste facilities for wide areas) at which this infrastructure can be provided and both the individual and cumulative contribution that can be made, particularly by community and property scale infrastructure, to Scottish Government objectives for greater decentralisation of heat and energy.

Changes in the law allowing surplus power to be sold back to the national grid and other incentives could stimulate interest from local authorities, businesses, householders, community land trusts and other groups to obtain loans for energy infrastructure to enable development to meet local or individual needs in future. Similarly the price of materials in the global market place may continue to stimulate business interests in resource recovery.

Many of the region's existing waste management facilities have additional capacity or could be expanded in situ, including the strategic scale facilities at Binn Farm near Glenfarg and DERL at Baldovie in Dundee. No requirement for new landfill sites has been identified before 2024 and successful implementation of the Scottish Government's Zero Waste Plan and expansion of other treatment facilities could extend this to and beyond 2032.

This Plan encourages new strategic scale waste/resource management infrastructure to be within or close to the Dundee and Perth Core Areas reflecting the proximity of materials and customers for heat and other products.

Modern waste/resource management infrastructure is designed and regulated to high standards and is similar to other industrial processes. Subject to detailed site specific considerations, waste management facilities can be considered appropriate land uses within industrial and employment sites.



Energy and waste management infrastructure: Infrastructure for heat and power generation and transmission; and, collection, separation, handling, transfer, processing, resource recovery and disposal of waste. This includes recycling plants, anaerobic waste digesters, energy from waste plants, wind turbines, biomass plants, combined heat and power plants, solar power, hydro electric power plants and similar facilities.

Policy 6: Energy and Waste/Resource Management Infrastructure

To deliver a low/zero carbon future and contribute to meeting Scottish Government energy and waste targets:

A. Local Development Plans should identify areas that are suitable for different forms of renewable heat and electricity infrastructure and for waste/resource management infrastructure or criteria to support this; including, where appropriate, land for process industries (e.g. the co-location/proximity of surplus heat producers with heat users).

B. Beyond community or small scale facilities waste/resource management infrastructure is most likely to be focussed within or close to the Dundee and/or Perth Core Areas (identified in Policy 1).

C. Local Development Plans and development proposals should ensure that all areas of search, allocated sites, routes and decisions on development proposals for energy and waste/resource management infrastructure have been justified, at a minimum, on the basis of these considerations:

- The specific land take requirements associated with the infrastructure technology and associated statutory safety exclusion zones where appropriate;
- Waste/resource management proposals are justified against the Scottish Government's Zero Waste Plan and support the delivery of the waste/resource management hierarchy;
- Proximity of resources (e.g. woodland, wind or waste material); and to users/customers, grid connections and distribution networks for the heat, power or physical materials and waste products, where appropriate;
- Anticipated effects of construction and operation on air quality, emissions, noise, odour, surface and ground water pollution, drainage, waste disposal, radar installations and flight paths, and, of nuisance impacts on off-site properties;
- Sensitivity of landscapes (informed by landscape character assessments and other work), the water environment, biodiversity, geo-diversity, habitats, tourism, recreational access and listed/scheduled buildings and structures;
- Impacts of associated new grid connections and distribution or access infrastructure;
- Cumulative impacts of the scale and massing of multiple developments, including existing infrastructure;
- Impacts upon neighbouring planning authorities (both within and outwith TAYplan); and,
- Consistency with the National Planning Framework and its Action Programme.

AC4

20 May 2013
Your reference:13/00290/FULL

Our ref.WID7983

Dear Sir/Madam,

RE: PROPOSED Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip

Dear Sir/Madam

Thank you for your letter dated 17/05/2013.

We have studied this wind turbine proposal with respect to EMC and related problems to BT point-to-point microwave radio links.

The conclusion is that, the Project indicated should not cause interference to BT's current and presently planned radio networks.

Yours sincerely

Dale Aitkenhead
BT Network Radio Protection

AC5

LeslieIA

From: GUNN, Nicola [Nicola.GUNN@nats.co.uk] on behalf of NATS Safeguarding [NATSSafeguarding@nats.co.uk]

Sent: 21 May 2013 11:37

To: PLNProcessing

Subject: Your Ref: 13/00290/FULL (Our Ref: W(F) 17198)

The proposed development has been examined from a technical safeguarding aspect and does not conflict with our safeguarding criteria. Accordingly, NATS (En Route) Public Limited Company ("NERL") has no safeguarding objection to the proposal.

However, please be aware that this response applies specifically to the above consultation and only reflects the position of NERL (that is responsible for the management of en route air traffic) based on the information supplied at the time of this application. This letter does not provide any indication of the position of any other party, whether they be an airport, airspace user or otherwise. It remains your responsibility to ensure that all the appropriate consultees are properly consulted.

If any changes are proposed to the information supplied to NERL in regard to this application which become the basis of a revised, amended or further application for approval, then as a statutory consultee NERL requires that it be further consulted on any such changes prior to any planning permission or any consent being granted.

Yours faithfully,

Nicola Gunn
Technical Administrator
On behalf of NERL Safeguarding Office

AC6

McWilliamIA

From:	Spectrum Licensing [Spectrum.Licensing@ofcom.org.uk]
Sent:	20 May 2013 02:28
To:	KennedyPD
Cc:	windfarms@jrc.co.uk; Windfarms (windfarms@atkinsglobal.com)
Subject:	RE: e consultation
Attachments:	e consultation pitkennedy.rtf; mod info pitkennedy.doc

-

FIXED LINK REPORT FOR WINDFARM CO-ORDINATION AREA:

Dear Sir/Madame

For a response on all future requests please only provide the following to Spectrum.Licensing@ofcom.org.uk:

- **12 character UK NGR, eg SP 12345 12345 or, Grid Co-ordinates e.g. 123456 123456**
- **Site/town**
- **Email address for response**
- **Search radius (optional)**

Please do not post to Ofcom:

- **planning/scoping requests**
- **large packets/parcels in the post**

NGR NO 53682 54728

Search Radius 0m at Centre NGR NO5368254728 NO Links Identified. Search includes an addition

Links	*Company*	*Contact*	

These details are provided to Ofcom by Fixed Link operators at the time of their licence application and cannot verified by Ofcom for accuracy or currency and Ofcom makes no guarantees for the currency or accuracy of information or that they are error free. As such, Ofcom cannot accept liability for any inaccuracies or omissions in the data provided, or its currency however so arising. The information is provided without any representation or endorsement made and without warranty of any kind, whether express or implied, including but not limited to the implied warranties of satisfactory quality, fitness for a particular purpose, non-infringement, compatibility, security and accuracy.

Our response to your co-ordination request is only in respect of microwave fixed links managed and assigned by Ofcom within the bands and frequency ranges specified in the table below. The analysis identifies all fixed links with either one link leg in the coordination range or those which intercept with the coordination range. The coordination range is a circle centred on your provided national grid reference. We add an additional 500 metres to the coordination range that you request. Therefore if you have specified 500 metres the coordination range will be 1km.

If you should need further information regarding link deployments and their operation then you will need to contact the fixed link operator(s) identified in the table above directly.

Additional coordination is also necessary with the band managers for the water, electricity and utilities industries which operate in the frequency ranges 457-458 MHz paired with 463-464 MHz band. You should contact both the following:

- Atkins Ltd at windfarms@atkinsglobal.com.
- Joint Radio Company (JRC) at windfarms@jrc.co.uk. Additionally, you can call the JRC Wind Farm Team on 020 7706 5197.

For self coordinated links operating in the 64-66GHz, 71-76GHz and 81-86GHz bands a list of current links can be found at: http://www.ofcom.org.uk/radiocomms/ifi/licensing/classes/fixed/

Regarding assessment with respect to TV reception, the BBC has an online tool available on their website: http://www.bbc.co.uk/reception/info/windfarm_tool.shtml . Ofcom do not forward enquiries to the BBC.

Please note other organisations may require coordination with regard to your request. More information regarding windfarm planning is available on the British Wind Energy Association website www.bwea.com .

Table of assessed fixed links bands and frequency ranges

Band (GHz)	Frequency Range (MHz)
1.4/1.5	1350 -1375 1450 -1452 1492 -1530
1.6	1672 – 1690
1.7	1764 – 1900
2	1900 – 2690
4	3600 – 4200
6	5925 – 7110
7.5	7425 – 7900
11	10700 – 11700
13	12750 – 13250
14	14250 – 14620
15	14650 – 15350
18	17300 – 19700
22	22000 – 23600
25	24500 – 26500
28	27500 – 29500
38	37000 – 39500
50	49200 – 50200
55	55780 – 57000

Regards

From: KennedyPD [mailto:KennedyPD@angus.gov.uk]
Sent: 17 May 2013 16:29
To: 'NERL Safeguarding'; windfarms@jrc.co.uk; claire.b.smith@rspb.org.uk; nigel.baker@neosnetworks.co.uk; Spectrum Licensing; radionetworkprotection@bt.com; Callum.Scott@spsa.pnn.police.uk; windfarms@r4telecom.co.uk; windfarms@caa.co.uk; windfarms@atkinsglobal.com; windfarms@mlltelecom.co.uk; Tayside_Grampian@snh.gov.uk
Subject: e consultation

Planning application 13/00290/FULL

Field 800M North Of
Cotton Of Pitkennedy Farm
Cotton Of Pitkennedy
Forfar

AC6

Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip

Phyllis Kennedy Communities Planning & Transport Division, County Buildings Market Street Forfar DD8 3LG
Telephone 01307 473394
E Mail Kennedypd@angus.gov.uk

AC7

22 May 2013

Angus Council
Angus House Orchardbank Business Park
Forfar
Angus
DD8 1AX

SCOTTISH WATER

Customer Connections
419 Balmore Road
Glasgow
G22 6NU

Customer Support Team
T: 0141 355 5511
F: 0141 355 5386
W: www.scottishwater.co.uk
E: connections@scottishwater.co.uk

Dear Sir Madam

PLANNING APPLICATION NUMBER: 13/00290/FULL
DEVELOPMENT: WT Forfar Cotton of Pikennedy

Please quote our reference in all future correspondence

Scottish Water has no objection to this planning application.

Following a review of the proposal application and our resultant investigation, I am pleased to advise you that Scottish Water assets are not affected. However, if the developer subsequently discovers or becomes aware of any public sewers or water mains, I would ask that they contact me directly at their earliest convenience.

If the developer requires any further assistance or information on our response, please contact me on the above number or alternatively additional information is available on our website: www.scottishwater.co.uk.

Yours faithfully

Sheena McLure
Customer Connections Administrator

AC8

McWilliamIA

From: Windfarms (windfarms@atkinsglobal.com) [windfarms@atkinsglobal.com]
Sent: 22 May 2013 13:47
To: PLNProcessing
Subject: WF 22972 - 13/00290/FULL North Of Cotton Of Pitkennedy Farm, Forfar - NO 53682 54728

Dear Sirs,

I am responding to an email of 17-May-13, regarding the above named proposed development.

The above application has now been examined in relation to UHF Radio Scanning Telemetry communications used by our Client in that region and we are happy to inform you that we have **NO OBJECTION** to your proposal.

Please note that this is not in relation to any Microwave Links operated by Scottish Water

Atkins Limited is responsible for providing Wind Farm/Turbine support services to TAUWI.

Atkins Limited is responsible for providing Wind Farm/Turbine support services to the Telecommunications Association of the UK Water Industry. Web: www.tauwi.co.uk
Windfarm Support
ATKINS
The official engineering design services provider
for the London 2012 Olympic and Paralympic Games
Web: www.atkinsglobal.com/communications

AC9

LeslieIA

From: Claire.Herbert@aberdeenshire.gov.uk
Sent: 28 May 2013 16:04
To: PLNProcessing
Subject: Planning application 13/00290/FULL - archaeology comments

Plan App No: 13/00290/FULL
Planning Officer: Damian Brennan
Proposal: Erection Of A Single Wind Turbine With A Tip Height Not Exceeding 74m
Address: Field 800M North Of Cotton Of Pitkennedy Farm Cotton Of Pitkennedy Forfar
Post Code:
Grid Reference: NO 5368 5472

Having considered the above application, which occupies an area adjacent to the archaeology site NO55SW0008, the site of a bronze age cairn & burial (removed in 1955), I can advise that in this instance the following condition should be applied to all groundbreaking works due to the potential for previously unrecorded archaeology to survive in this area:

"Watching-brief Condition (PAN 2/2011, SPP, SHEP)

The developer shall secure the implementation of an archaeological watching brief, to be carried out by an archaeological organisation acceptable to the Aberdeenshire Council Archaeology Service on behalf of the planning authority, during any groundbreaking and development work. The retained archaeological organisation shall be afforded access at all reasonable times and allowed to record and recover items of interest and finds. Terms of Reference for the watching brief will be supplied by the Aberdeenshire Council Archaeology Service.

The name of the archaeological organization retained by the developer shall be given to the planning authority and to the Aberdeenshire Council Archaeology Service in writing not less than 14 days before development commences.

Reason: to record items of archaeological interest."

Historic Scotland should also be contacted with regards the potential impact on the scheduled Monuments to the North and West of the proposed development.

Should you have any comments or queries regarding the above then please do not hesitate to contact me.

Kind regards,
Claire

Claire Herbert

Archaeologist
Archaeology Service
Infrastructure Services
Aberdeenshire Council

Woodhill House
Westburn Road
Aberdeen
AB16 5GB

01224 665185
07825356913

Archaeology Service for Aberdeenshire, Moray & Angus Councils

http://www.aberdeenshire.gov.uk/smrpub

AC10

LeslieIA

From: Windfarms [Windfarms@caa.co.uk]

Sent: 29 May 2013 14:27

To: KennedyPD

Cc: PLNProcessing

Subject: RE: e consultation

Dear Sir/Madam

Request for Comment under the Town and Country Planning Act 1990 and the Town and Country Planning (Scotland) Act 1997

There is currently a high demand for CAA comment on wind turbine applications which exceeds the capacity of the available resource to respond to requests within the timescales required by Local Planning Authorities. The CAA has no responsibilities for safeguarding sites other than its own property, and a consultation by a Council is taken as a request for clarification of procedural matters. Councils are reminded of their obligations to consult in accordance with ODPM/DfT Circular 1/2003 or Scottish Government Circular 2/2003, and in particular to consult with NATS and the Ministry of Defence as well as any aerodromes listed in Annex 3 of the above documents, taking note of appropriate guidance and policy documentation. Should the Council be minded to grant consent to an application despite an objection from one of the bodies listed in the circular, then the requisite notifications should be made.

Whilst the CAA recommends all aerodrome operators/license holders develop associated safeguarding maps and lodge such maps with local planning authorities, the CAA additionally encourages councils/planning authorities to undertake relevant consultation with known local aerodromes regardless of status or the existence of any aerodrome/council safeguarding agreement, including local emergency service Air Support Units (e.g. Police Helicopter or Air Ambulance).

There is an international civil aviation requirement for all structures of 300 feet (91.4 metres)* or more to be charted on aeronautical charts. However, on behalf of other non-regulatory aviation stakeholders, in the interest of Aviation Safety, the CAA requests that any feature/structure 70 feet in height, or greater, above ground level is notified to the Defence Geographic Centre ICGDGC-ProdAISAFDb@mod.uk, including the location(s), height(s)* and lighting status of the feature/structure, the estimated and actual dates of construction and the maximum height of any construction equipment to be used, at least 6 weeks prior to the start of construction, to allow for the appropriate notification to the relevant aviation communities.

Any structure of 150 metres* or more must be lit in accordance with the Air Navigation Order and should be appropriately marked. Although if an aviation stakeholder (including the MOD) made a request for lighting it is highly likely that the CAA would support such a request, particularly if the request falls under Section 47 of the Aviation Act.

Cumulative effects of turbines may lead to unacceptable impacts in certain geographic areas.

The Ministry of Defence will advise on all matters affecting military aviation.

Should the Council still have a specific query about a particular aspect of this application the CAA will help in the clarification of aviation matters and regulatory requirements. Site operators remain responsible for providing expert testimony as to any impact on their operations and the lack of a statement of objection or support from the CAA should not be taken to mean that there are no aviation issues, or that a comment from an operator lacks weight.

Guidance relating to the impact of wind turbines upon aviation can be found at http://www.caa.co.uk/docs/33/Cap764.pdf. More generic comment relating to the CAA involvement in the planning process is described at http://www.caa.co.uk/docs/33/DAP_GuidanceOnCAAPlanningConsultationRequirements.pdf.

Yours Faithfully

Kelly Lightowler

K LIGHTOWLER

Squadron Leader (RAF)

Surveillance and Spectrum Management

Directorate of Airspace Policy
Civil Aviation Authority
45-59 Kingsway London WC2B 6TE
Tel: 020 7453 6534 Fax: 020 7453 6565
windfarms@caa.co.uk

*The effective height of a wind turbine is the maximum height to blade tip.

From: KennedyPD [mailto:KennedyPD@angus.gov.uk]
Sent: 17 May 2013 16:29
To: 'NERL Safeguarding'; windfarms@jrc.co.uk; claire.b.smith@rspb.org.uk; nigel.baker@neosnetworks.co.uk; Spectrum.LicensingEnquiries@ofcom.org.uk; radionetworkprotection@bt.com; Callum.Scott@spsa.pnn.police.uk; windfarms@r4telecom.co.uk; Windfarms; windfarms@atkinsglobal.com; windfarms@mlltelecom.co.uk; Tayside_Grampian@snh.gov.uk
Subject: e consultation

Planning application 13/00290/FULL

Field 800M North Of
Cotton Of Pitkennedy Farm
Cotton Of Pitkennedy
Forfar

Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip

Phyllis Kennedy Communities Planning & Transport Division, County Buildings Market Street Forfar DD8 3LG
Telephone 01307 473394
E Mail Kennedypd@angus.gov.uk

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Before Printing consider the environment.

****

HISTORIC SCOTLAND
ALBA AOSMHOR

Longmore House
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EH9 1SH

Direct Line: 0131 668 8896
Direct Fax: 0131 668 8722
Switchboard: 0131 668 8600
Deirdre.cameron@scotland.gsi.gov.uk

Our ref: AMH/142/10
Our Case ID: 201303201
Your ref: 13/00290/FULL

26 September 2013

Sent by e-mail: PLNProcessing@angus.gov.uk

Damian Brennan
Planning & Transportation Division
Angus Council
County Buildings
Market Street
FORFAR
DD8 3LG

Dear Mr Bennan

Town And Country Planning (Development Management Procedure)(Scotland) Regulations 2008
Proposed erection of wind turbine (50m to hub height and 74m to blade tip), at field 800m north of Cotton of Pitkennedy Farm, Cotton of Pitkennedy, Forfar Turin Hill,fort

On 17 May 2013, Angus Council consulted Historic Scotland on the above planning application. We responded on 30 May requesting further information to allow full assessment of the proposals.

I can confirm that the applicant's agent has now provided further information as requested and we are content that the additional photomontages supplied allow us to make an informed decision on the case. On basis of this additional evidence, **Historic Scotland does not object to this planning application**.

The development proposal
The proposal is for the erection of a single wind turbine with an overall height of 74m and associated access.

Historic Environment Assets affected
We had identified three statutorily designated sites where the erection of the proposed turbine could have an impact on their settings –

- *Turin Hill, fort* (scheduled monument)
- *Aberlemno, cross slab and symbol stones* (scheduled monument, and also a Property in the Care of the Scottish Ministers)
- *Melgund Castle* (category A listed building)

Turin Hill fort
Turin Hill fort is a substantial multi-phased defended settlement site of the later prehistoric period comprising two phases of fort building defined by substantial

ramparts, and three large stone-walled structures known as duns. These remains occupy the long summit ridge of Turin Hill. The monument's setting is characterised by this dominant hilltop location and its intervisibility with the surrounding area, in particular the contemporary monuments on Hill of Finavon to the north and Rob's Reed to the south-west.

Aberlemno, cross slab and symbol stones
This monument comprises three large standing stones decorated with carvings dating from the latter half of the first millennium AD, now located on the southern verge of the B9134. The stone featuring the cross slab is believed to be in its original location but the others may have been moved from nearby to be associated with the cross slab. The monument's setting is characterised by the relationship between the stones themselves, the long-standing route which they stand beside, and the wide views they command over the surrounding countryside.

Melgund Castle
Melgund Castle is a restored tower house standing five storeys high. Although surrounded by formal gardens, the castle enjoys open views to the south and west which form an integral part of its setting.

Historic Environment Policy Background
Government policy affirms the *in situ* preservation of the site and setting of scheduled monuments. Angus Council has planning policies which reflect these national policies. We would expect development proposals to reflect these policies and mitigate the potential impact of the development through the design process.

Impact
The turbine will be visible from all three sites described above. We consider the impacts on their settings to be as follows -

Turin Hill fort
The turbine would lie approximately 2.3km to the ENE of the monument. Although it will be clearly visible from the fort, it will not challenge the monument for dominance within its setting or disrupt any key relationships with other sites or landmarks.

Aberlemno, cross slab and symbol stones
The turbine would lie approximately 1.8km to the SE of the monument. While it will be visible in some views towards the stones from the north and west, the turbine will not disrupt the relationship between the stones themselves and the route along which they lie.

Melgund Castle
The turbine would lie approximately 1.8km SSW of the castle, where it would be visible in views out from the tower but would not dominate its setting or disrupt any key visual relationships.

While acknowledging that the proposed turbine would impact on the settings of these sites, we do not consider this impact to raise issues of national significance.

HISTORIC SCOTLAND
ALBA AOSMHOR

Historic Scotland's comments
We do not object to this development proposal.

However, we would wish to be re-consulted on any amendments to the proposed scheme, such as an increase in size, or number of turbines, or a change in location, as these could alter the impact of the development on nearby monuments and listed buildings.
If you require any further information, please contact me.

Yours faithfully

Deirdre Cameron
Senior Heritage Management Officer, Monuments East

HISTORIC SCOTLAND
ALBA AOSMHOR

By Email PLNProcessing@angus.gov.uk

Planning & Transport Division
Angus Council
County Buildings
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Direct Line: 0131 668 8896
Direct Fax: 0131 668 8722
Switchboard: 0131 668 8600
Deirdre.Cameron@scotland.gsi.gov.uk

Our ref: AMH/142/10
Our Case ID: 201301068
Your ref: 13/00290/FULL

30 May 2013

Dear Sirs

TOWN AND COUNTRY PLANNING (DEVELOPMENT MANAGEMENT PROCEDURE) (SCOTLAND) REGULATIONS 2008
Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip, Field 800m North Of Cotton of Pitkennedy Farm, Cotton of Pitkennedy, Forfar
Turin Hill,fort

Thank you for your consultation dated 17 May which we received on 17 May.

On the basis of the information provided, we are unable to determine the impact of the proposed development on nationally important cultural heritage assets in the vicinity. We require further information before we can comment on this case.

The development proposal
The proposal is for the erection of a single wind turbine with an overall height of 74m and associated access.

We have had no previous discussions with the applicant about this proposed development. We note that the application is supported by an assessment of the impact of the development on cultural heritage assets and their settings, but does not provide adequate illustrative material (photomontages/ wire frames etc.) to justify the conclusions drawn.

Historic Environment Assets affected
We consider the development has the potential to impact adversely on the settings of the three statutorily designated sites

- *Turin Hill, fort* (scheduled monument)
- *Aberlemno, cross slab and symbol stones* (scheduled monument, and also a Property in the Care of the Scottish Ministers)
- *Melgund Castle* (category A listed building)

HISTORIC SCOTLAND
ALBA AOSMHOR

Turin Hill fort
Turin Hill fort is a substantial multi-phased defended settlement site of the later prehistoric period comprising two phases of fort building defined by substantial ramparts, and three large stone-walled structures known as duns. These remains occupy the long summit ridge of Turin Hill. The monument's setting is defined by this dominant hilltop location and its intervisibility with the surrounding area, in particular the contemporary monuments on Hill of Finavon to the north and Rob's Reed to the south-west. The turbine would lie approximately 2.3km to the ENE of the monument.

Aberlemno, cross slab and symbol stones
This monument comprises three large standing stones decorated with carvings dating from the latter half of the first millennium AD, now located on the southern verge of the B9134. The stone featuring the cross slab is believed to be in its original location but the others may have been moved from nearby to be associated with the cross slab. The monument's setting is defined by the relationship between the stones themselves, the long-standing route which they stand beside, and the wide views they command over the surrounding countryside. The turbine would lie approximately 1.8km to the SE.

Melgund Castle
Melgund Castle is a restored tower house standing five storeys high. Although surrounded by formal gardens, the castle enjoys open views to the south and west. The turbine would lie approximately 1.8km SSW of the castle.

Historic Environment Policy Background
Government policy affirms the *in situ* preservation of the site and setting of scheduled monuments. Angus Council has planning policies which reflect these national policies. We would expect development proposals to reflect these policies and mitigate the potential impact of the development through the design process.

Historic Scotland's comments
On the basis of the information supplied with this application, we are unable to determine the level of impact of these proposals on the nationally important monuments and buildings described above. We are concerned that the development may have an adverse impact on setting of these sites.

We note that the applicant has assessed the impact of the development on the settings of monument, but has not provided adequate visualisations to compliment their analysis. While we note that Viewpoint 17 attempts to show the turbine in views from Turin Hill fort, the location chosen lies outwith the monument and therefore cannot give an accurate visual representation of the potential impact. Likewise, Viewpoint 18 for Melgund Castle has been taken from the adjacent public road rather than from the castle itself. There are no visualisations for Aberlemno cross slab and symbol stones available on the planning portal.

We would seek clarification of this issue and would wish to see the following visualisations provided –

HISTORIC SCOTLAND
ALBA AOSMHOR

- Turin Hill fort – view from within the fort looking towards the turbine.
- Melgund Castle – view from the castle battlements looking towards the turbine
- Aberlemno cross slab and symbol stones – view from roadside to the north of the stones showing at least one of the stones in relation to the turbine.

We would be happy to advise the applicant further if that would be helpful.

Yours faithfully

Deirdre Cameron
Senior Heritage Management Officer, AM

AC12

Memorandum

Communities, Roads, County Buildings, Forfar Telephone 01307 461460

TO: HEAD OF PLANNING & TRANSPORT

FROM: HEAD OF ROADS

YOUR REF:

OUR REF: GH/AB/MF TD1.3

DATE: 13 MAY 2013

SUBJECT: PLANNING APPLICATION REF. NO. 13/00290/FULL – PROPOSED INSTALLATION OF WIND TURBINE GENERATORS AT COTTON OF PITKENNEDY FARM, FORFAR FOR MR KRISHNA RAMCHARREN

I refer to the above planning application which deals with a proposal for a wind turbine, 74 metres in height to blade tip.

Cotton of Pitkennedy Farm is located 8km east of Forfar on the west side of the classified, C44 Central Road. Access to the site is via the U457(2) Craiksfold Road which leads west from the C44 .

Amongst the application's supporting documents is an Environmental and Planning Report which considers amongst other matters, issues surrounding traffic and transport.

The transport assessment has considered routing for abnormal loads between the port of Dundee and the site via A92 Dundee – Arbroath dual carriageway, Westway, Arbroath, A933, B9133, C44 and the U457(2).

A visual inspection of the routes and a swept path analysis has been carried out and route constraints have been identified which will require alterations to the public road network. Further requirements for alterations are anticipated to be identified as part of an additional, detailed route inspection; prior to a test run for abnormal loads should the application be approved.

An assessment of construction and use traffic generation has estimated that on average, 16 HGV movements per day will take place during the main construction phase of the development. It is recommended that a traffic route management plan is developed in order to minimize HGV movements during peak periods; prevent convoy movements and to remove the requirement for HGV's to pass each other on the U457(2) and C44.

I have considered the application in terms of the traffic likely to be generated by it, and its impact on the public road network. I have no objections to the proposed development but would recommend that any consent granted shall be subject to the following conditions:

1 That, prior to the commencement of works on site, a route condition survey shall be submitted for approval by the planning authority. The survey shall cover theU457(2) Craiksfold Road between the site access and the C44 Central Road. The survey shall be approved, in writing, by the planning authority, prior to the commencement of development on site.
Reason: in order to record the baseline condition of the identified public road.

2 That, prior to the commencement of works on site, a Construction Traffic Management and Routing Plan shall be submitted for the advance approval of the planning authority. Thereafter, the Plan shall be implemented in accordance with the approved details. As a minimum, the plan shall include those matters listed in Appendix C Full Access Report submitted as part of the application.
Reason: in the interests of road safety, free traffic flow and the amenity of all road users.

3 That, the above Construction Traffic Management Plan shall include a method for the review and monitoring of the road condition referred to in Condition 1, above and allow for any deterioration identified during the construction phase of the development to be rectified by the applicant.
Reason: in order to protect the structural integrity of the public road.

4 That, any mitigation works identified as necessary within the boundaries of a public road shall be carried out to the satisfaction of the planning authority, in accordance with the standards of Angus Council.
Reason: in order to maintain the public road network in a satisfactory manner.

5 That, prior to the commencement of works on site, visibility splays shall be provided at the junction of the proposed access with the U457(2) Craiksford Road, giving a minimum sight distance of 90 metres in each direction at a point 2.4 metres from the adjacent channel line of the U457(2) Craiksfold Road.
Reason: in the interests of road safety.

6 That, within the above visibility splays nothing shall be erected or planting permitted to grow to a height in excess of 1050mm above the adjacent road channel. Thereafter, the visibility sightlines shall be maintained as such until the turbines are decommissioned or the access to the public road is stopped-up, whichever is the latter.
Reason: in the interests of road safety.

7 *That, prior to the commencement of use of the site access, the verge crossing at its junction with the public road shall be formed and constructed, in accordance with the standards of Angus Council (Type C).*
Reason: to provide a safe and satisfactory access in a timely manner.

8 That, the above access shall be designed so as to prevent the discharge of surface water onto the public road.
Reason: in the interests of road safety.

I trust the above comments are of assistance but should you have any further queries, please contact Adrian Gwynne on extension 3393.

Comments for Planning Application 13/00290/FULL

Application Summary

Application Number: 13/00290/FULL
Address: Field 800M North Of Cotton Of Pitkennedy Farm Cotton Of Pitkennedy Forfar
Proposal: Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip
Case Officer: Damian Brennan

Customer Details

Name: Mr Tom Sampson
Address: Mains of Balgavies Forfar

Comment Details

Commenter Type: Community Council
Stance: Customer objects to the Planning Application
Comment Reasons:
Comment:Dear Sirs,

Aberlemno Community Council considered this application at our meeting of 3rd June. It was the unanimous decision of the meeting to object to this proposal. We feel that this is too large a turbine to be sited in the historic centre of Angus. It will be highly visible from the Aberlemno stones and both Turin and Finavon hill forts. There are a number of properties within a kilometre of the proposed site, which may be adversely affected by the proposal. Aberlemno school is within 2 kms, and under the council's own guidance document this is a high risk site.

Yours Truly

Tom Sampson

Chairman Aberlemno Community Council

AC14

Defence Infrastructure Organisation

Taneisha Martin
Safeguarding Assistant
Ministry of Defence
Safeguarding – Wind Energy
Kingston Road
Sutton Coldfield
West Midlands B75 7RL
United Kingdom

Telephone [MOD]: +44 (0)121 311 2143
Facsimile [MOD]: +44 (0)121 3112218
E-mail: DioOpsNorthlms7a2a1@mod.uk

Your Reference: 13/00290/FULL

Our Reference: DIO/SUT/43/10/1/18345

Damian Brennan
Angus Council
Planning & Transport
County Buildings
Market Street
Forfar
Angus DD8 3LG

12 June 2013

Dear Mr Brennan

Please quote in any correspondence: 18345

Site Name: Pitkennedy

Proposal: Erection of 1 Wind Turbine

Planning Application Number: 13/00290/FULL

Site Address: Cotton of Pitkennedy, Forfar

Thank you for consulting with the Ministry of Defence (MOD) about the above planning application in your communication date 17 May 2013.

I am writing to tell you that the MOD has no objection to the proposal.

The application is for 1 turbine at 74 metres to blade tip. This has been assessed using the grid reference below as submitted in the planning application or in the developers' pro-forma.

Turbine	100km Square Letter	Easting	Northing
1	NO	53682	54728

In the interests of air safety, the MOD requests that the turbine is fitted with aviation lighting. The turbine should be fitted with 25 candela omni-directional red lighting or infrared lighting with an optimised flash pattern of 60 flashes per minute of 200ms to 500ms duration at the highest practicable point.

The principal safeguarding concern of the MOD with respect to the development of wind turbines relates to their potential to create a physical obstruction to air traffic movements and cause interference to Air Traffic Control and Air Defence radar installations.

Defence Infrastructure Organisation Safeguarding wishes to be consulted and notified of the progression of planning applications and submissions relating to this proposal to verify that it will not adversely affect defence interests.

If planning permission is granted we would like to be advised of the following;

- the date construction starts and ends;
- the maximum height of construction equipment;
- the latitude and longitude of every turbine.

This information is vital as it will be plotted on flying charts to make sure that military aircraft avoid this area.

If the application is altered in any way we must be consulted again as even the slightest change could unacceptably affect us.

I hope this adequately explains our position on the matter. If you require further information or would like to discuss this matter further please do not hesitate to contact me.

Further information about the effects of wind turbines on MOD interests can be obtained from the following websites:

***MOD*:** http://www.mod.uk/DefenceInternet/MicroSite/DIO/WhatWeDo/Operations/ModSafeguarding.htm

Yours sincerely

Taneisha Martin
Safeguarding Assistant
Defence Infrastructure Organisation

SAFEGUARDING SOLUTIONS TO DEFENCE NEEDS

MEMORANDUM
COMMUNITIES

TO: Damian Brennan
Planning Officer (Development Standards)

FROM: Louise Akroyd
Environmental Health Officer

YOUR REF: 13/00290/FULL

DATE: 07 June 2013

SUBJECT: Erection of Single Wind Turbine, Land 800m North of Cotton of Pitkennedy

---

I refer to the above application and can advise that I have reviewed the submitted information and noise impact assessment and would advise that I am satisfied that the noise predictions and background noise and wind monitoring has been undertaken using appropriate methodology and that the results obtained suggest that existing levels of residential amenity would be adequately safeguarded.

The assessment follows monitoring for background noise levels at one location near the proposed turbine location and wind speed data collected at the turbine location at 10m height.

I understand that a shadow flicker assessment has been undertaken using WindPro 2.6 programme and section 14 - paragraph 14.4.4 of the report states that flicker effects have been proven to occur only within ten rotor diameters of a turbine, equivalent in this case to 480m, and that there are no residential properties within 480m of the proposed turbine. I would advise that this is not the case and that Pitkennedy Farm has been granted planning permission (Planning Ref: 09/00671/FULL) for a housing development which is 465m from the wind turbine (see Section 10 Noise and Vibration - Table 5 of report). I would therefore advise that these properties would need to be included in a shadow flicker assessment.

I would, however, not object to this application proceeding subject to the following conditions being attached to any consent granted:

1. That the turbine shall be an Enercon E-48 800kW with a hub height of 50m unless otherwise agreed in writing by the planning authority.

2. At any property lawfully existing at the date of this planning permission the rating level of noise emissions, including any tonal correction, from the wind turbine, when measured in accordance with the guidance in ''The Assessment and Rating of Noise from Wind Farms, ETSU-R-97'', shall not exceed the levels:

   a) L_{A90} noise limit as shown in tables A & B, during the respective periods described in these tables; where there is more than one property at a location the noise limits apply to all properties at that location.

   b) L_{A90} 35dB (A) at wind speeds up to 10 m/s at 10m height at any other location.

NOISE LIMITS TABLE A
At all other times

Location	Standardised 10m Height Wind Speed m/s								
	4	5	6	7	8	9	10	11	12
The Farmhouse, Pitkennedy Any residential property existing within the site boundary of Angus Council Planning Application 09/00671/FUL	35.0	35.0	36.1	37.3	38.5	39.7	39.7	39.7	39.7

NOISE LIMITS TABLE B
Between 2300hrs – 0700hrs

Location	Standardised 10m Height Wind Speed m/s								
	4	5	6	7	8	9	10	11	12
The Farmhouse, Pitkennedy Any residential property existing within the site boundary of Angus Council Planning Application 09/00671/FUL	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0

TABLE 3
Co-ordinate Locations of the Properties Listed in Table A & B Above

Property	Easting	Northing
The Farmhouse, Pitkennedy	354117	754432
Any residential property existing within the site boundary of Angus Council Planning Application 09/00671/FUL	354089	754494

Note – Table 3 the geographical co-ordinates references are provided for the purposes of identifying the general location of the dwellings to which a given set of noise limits applies.

3. At the reasonable request of the Planning Authority following a complaint, and within 28 days of any such written request, and at their expense, the operator of the development shall measure and assess the level of noise emission from the wind turbine following the procedures described in ''The Assessment and Rating of Noise from Wind Farms, ETSU-R-97'' or such other methodology as may be agreed in writing by the planning authority and submit a copy of the report of that assessment to the planning authority. In the event that noise emissions from the turbine exceed the levels set by the previous condition, operation of the turbine shall cease until measures to reduce noise levels to comply with the condition are implemented. Should such measures fail to achieve compliance with the noise levels set by the condition the operation of the turbine shall cease until otherwise approved in writing by the planning authority.

4. Prior to the commencement of development an assessment of the impact from shadow flicker shall be carried out and a mitigation scheme shall be submitted for the written approval of the Planning Authority. Once approved the operation of the wind turbine shall take place in accordance with the scheme unless the Planning Authority gives prior written consent to any variation. For the avoidance of doubt the mitigation scheme shall apply to all sensitive receptors including all residential properties and office buildings within 540m of a turbine.

If you require any further information please let me know

AC16

From: Windfarms Team [windfarms@jrc.co.uk]
Sent: 10 June 2013 11:04
To: KennedyPD
Cc: Ruaridh.maclean@scottish-southern.co.uk
Subject: Planning Ref: 13/00290/FULL -- Cotton of Pitkennedy Farm,
Pitkennedy, Brechin, Angus

Dear Sir/Madam,

Planning Ref: 13/00290/FULL

Name/Location: Cotton of Pitkennedy Farm

Turbine at NGR: 353682 754728 - must be accurately located at this grid reference

Hub Height: 50m Rotor Radius: 24m

(defaults used if not specified on application)

Cleared with respect to radio link infrastructure operated by:-

Scottish Hydro (Scottish & Southern Energy) and Scotia Gas Networks

JRC analyses proposals for wind farms on behalf of the UK Fuel & Power Industry and the Water Industry in north-west England. This is to assess their potential to interfere with radio systems operated by utility companies in support of their regulatory operational requirements.

In the case of this proposed wind energy development, JRC does not foresee any potential problems based on known interference scenarios and the data you have provided. However, if any details of the wind farm change, particularly the disposition or scale of any turbine(s), it will be necessary to re-evaluate the proposal.

In making this judgement, JRC has used its best endeavours with the available data, although we recognise that there may be effects which are as yet unknown or inadequately predicted.JRC cannot therefore be held liable if subsequently problems arise that we have not predicted.

It should be noted that this clearance pertains only to the date of its issue. As the use of the spectrum is dynamic, the use of the band is changing on an ongoing basis and consequently, developers are advised to seek re-coordination prior to considering any design changes.

Regards

Keith Brogden

Wind Farm Team

The Joint Radio Company Limited
Dean Bradley House,
52 Horseferry Road,
LONDON SW1P 2AF
United Kingdom

DDI: +44 20 7706 5197
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07th of March 2014

13/00290/FULL Cotton Of Pitkennedy Farm Forfar
Comments of Planning Advisor (Landscape) on Landscape and Visual Impact of the Erection of a single Wind Turbine with a Blade-tip-height not exceeding 74m at Cotton Of Pitkennedy Farm Forfar

Landscape Effects
The site for the proposed turbine is located in the TAY12 Landscape Character Area Low Moorland Hills, near the area of Montreathmont Moor, but also close to the area of the Forfar Hills.

The landscape is characterized by rolling undulating farmland of medium scale, populated by scattered properties and farmhouses which are interconnected by a network of small roads. The site is on an exposed plateau between the higher Turin Hill and Forfar Hills to the south and west, with views over the lower landscape of the South-Esk valley to the north and Montreathmont Forest to the east. The landscape is generally free of tall structures and has a more open and exposed character with the exemption of a large row of coniferous planting directly adjacent to the proposed site.

The proposed turbine of 74m blade tip height with a 48m rotor diameter falls into the category of medium to large sized turbines. The proposed site is at 155m above main sea level. One of the particular landscape sensitivities in the area around the proposed turbine site is the landscape setting of Turin Hill Fort on Turin Hill, which is situated directly to the south of the proposed turbine site. It is the site of an Iron Age Hill Fort and a prominent landmark of historic and geographic meaning. An obvious concern would be the altitude at which the turbine would be placed, 155m above main sea level, compared to the height of Turin Hill, the biggest landform of the eastern Forfar Hills at 240m height above main sea level. Because of its proximity to the Eastern Forfar Hills the turbine at its proposed size would risk dominating these modest landforms.

The area around Montreathmont, where the turbine site is proposed, is generally considered suitable for medium to large sized turbines, due to its lower lying topography and its large areas of woodland cover with less exposed sites and more screening. However the proposed turbine site is also located close to the limit of the more exposed area of the Forfar Hills, which is sensitive to turbines of the proposed height.

In conclusion of the discussed above issues regarding landscape effects, adverse landscape effects are likely to arise because of the height of the proposed turbine.

Visual Effects
Visual sensitivities in the area are the landscape settings of the scheduled monuments and historic landmarks of Turin Hill Fort (scheduled monument), the Aberlemno cross slab and symbol stones (scheduled monument, and also a Property in the Care of the Scottish Ministers) and the remains of Melgund

Castle (category A listed building). Main receptors of visual impact to be considered would be travellers along the B9134 between Forfar and Brechin and the B9113 between Forfar and Montrose, the residential properties in close vicinity such as Pitkennedy Farm at 420m, Melgund Bank Farm, Bellahill, the bigger settlements of Netherton at 1.4km Aberlemno at 1.6km Letham and Dunnichen and visitors to the historic monuments.

Visual Impact on the Landscape Setting of Turin Hill Fort

The visual impacts of the proposed turbine on the landscape setting of Turin Hill Fort would occur in certain places and in closer vicinity of the development. They would affect views of Turin Hill Fort from the stretches of the minor roads south-east of Melgund Castle where the turbine can be seen further to the left of the hill fort, and minor roads near Ardovie woods. From here the turbine would be seen next to Turin hill fort on the skyline and could be said to compete for prominence and height with the latter, as shown on photomontage and wire line visualisation for viewpoint no6.

When moving along the B9134 (near Melgund) the views of most interest are the expansive and distant views over the lower ground farmland with a backdrop of hills to the north east and west. These views act as a major distraction of the viewer in the opposite direction from the turbine site. The views towards the turbine site are mostly short distance views of raising landforms like Angus Hill. At visual openings towards the turbine site the view is often partly screened or framed by electricity pylons, rarely allowing a distant glimpse of the turbine site or Turin Hill. The setting of Turin Hill from views along the B9134 has therefore a low to medium sensitivity.

The visual impact of the turbine on the landscape-view from Turin Hill is shown in the photomontage and wireframe visualisations no 17a and b. Judged by the latter the turbine would be a visible feature in the landscape due to its size. From this viewpoint the turbine would appear out of scale with the intricate pattern of fields and hedgerows of its surrounding landscape. In the visualisation the turbine appears bright white in colour which would further increase its visual impact.

Visual Impact on the Landscape Setting of Aberlemno Standing stones

The turbine would have an impact on the setting of the historic monument of the Aberlemno Standing stones which is demonstrated in the photomontage and wireframe visualisation no 2a and 2b. The turbine adds a visible new element amongst other structures to the mid-distance horizon line of the landscape setting. This impact could be judged moderate, and the sensitivity of this landscape setting in the background could be judged medium as there are other structures that the turbine could be related to. The turbine still would stand out above the horizon line, and if it would comply with size guidance for the Forfar Hill subarea ii which is medium size, its visual impact could be substantially reduced.

Visual Impact on Properties in close proximity

The closest properties not involved in the application are The Farmhouse, Pitkennedy, Forfar, Angus, DD8 2UH at 440m distance, Bellahill Farmhouse, Melgund, Brechin, Angus, DD9 6TB at 710m distance, Craiksfold Farm, Turin, Forfar, Angus, DD8 2UY at 850m distance and Melgund Bank, Melgund, Brechin, Angus, DD9 6TA at 860m distance to the proposed site.

In particular the Pitkennedy Farm at 440m distance, which is 6 times blade-tip height, is likely to be subject to significant visual impacts. The turbine would be located at the top of a small plateau behind the farm complex and could be perceived as towering over the properties. From the properties at closer proximity views of the turbine are likely to be prominent; nevertheless the extensive distant views which are of more interest and sensitivity generally open up away from the turbine site and are not in the same arc of view. Views towards the turbine site from the properties and roads around it are characterized by a high and close horizon and are compromised by a large row of high coniferous planting. The closest properties are at a distance between 6-12 times turbine blade-tip-height which means that there is an increased likelihood of significant visual impact; however there are no visualisations from viewpoints representing views from affected properties closest to the turbine site to help assess the likely extent of the impact.

Visual Impact on nearby settlements

The turbine might be visible on the horizon over Aberlemno Parish church when approaching it from main road although it would be partly screened by vegetation. For views across the Lunan Valley, from the road and from the settlements of Netherton, Letham and Dunnichen the turbine is unlikely to have significant visual impact although there might be visibility according to the ZTV map. Unfortunately the lack of viewpoints from this area makes it difficult to assess this further.

Conclusion

Because of the size of the turbine and its particular location and landscape setting there would be significant visual impact for certain viewpoints. Nevertheless, the undulating topography and the arrangement of views in the landscape around the site act in favour of mitigation of visual effects and reduce visual sensitivity at numerous viewpoints.

Cumulative Landscape Effects

If the future development was to be limited to maintain a Low Moorland Hills landscape with occasional wind turbines for the East of Forfar, distances between medium to large turbines should be 5 to10km. The existing medium-large sized turbine at 3.8km to the south-east of the site near Pickerton Guthrie (12/00365/FULL) would be closer than 5km. With the application for another large turbine at 4.4km distance to the south-east of the site near Dubton Farm Guthrie (13/00695/FULL) and the screening for three medium-large sized turbines at 3.9km distance North East of Balnacake Farm, the turbine risks to have several other existing and potential developments within 5km radius.

At this point there are three other consented medium-large sized turbines in a radius of 10km:
a 77m-tip-height turbine at 3.8km distance to the south-east of the site near Pickerton-Guthrie (12/00365/FULL), a 77m-tip-height turbine at 7.4km distance to the north-east of the site near Dunswood Menmuir Brechin (12/00115/FULL) and a 67m-tip-height turbine at 8.7km to the south-east of the site near the North Mains Of Cononsyth (10/00603/FULL).

There are also three medium sized turbines in the radius of 10km which have been consented, one 47m-tip-height turbine at 10km to the north of the site, near Balhall Lodge Menmuir Brechin (10/01133/FULL), one 49.5km tip-height turbine at 7.6km to the north-west of the site, near Broom Farm Tannadice (13/00171/FULL) and one 48m tip-height turbine at 7.4km to the south of the site, near Newton Of Idvies Farm Idvies Letham (11/00621/FULL).

There are 2 small sized turbine schemes consented within a radius of 5km, one 34.2m tip height turbine at 3.1km near Carsegownie (13/00130/FULL) and a 20.3m tip-height turbine at 1.7km the east near Melgund Muir Pitkennedy (10/00995/FULL)

There are numerous applications pending for mainly medium to large single turbine schemes within a radius of 10km from the site for the proposed turbine:

77m tip-height turbine at 4.4km distance to the south-east of the site near Dubton Farm Guthrie (13/00695/FULL)

77m tip-height turbine at 6.9km distance to the south-west of the site near the Golf Course Cunninghill Forfar (13/00825/FULL)

77m tip-height turbine 7.3km north-west of the site near West Cottage Tannadice (13/00828/FULL)

77m at 8.1km distance to the east of the site near Bolshan Farm Bolshan Arbroath (13/00887/FULL)

77m tip-height turbine at 8.3km to the south of ths site, near Ascurry Farm Ascurry Letham 13/01029/FULL

45m tip-height turbine at 8.1km to the north-west of the site near Kalulu House East Murthill Forfar (13/01067/FULL)

There is currently a screening process for 3 turbines of medium/large size at 3.9km distance North East of Balnacake Farm.

Cumulative Visual Effects
The 77m tip-height turbine at 3.8km distance to the south-east of the site near Pickerton Guthrie (12/00365/FULL) is visible from near the proposed turbine site. Successive views of the two turbines are likely to be experienced from Turin Hill and from stretches of minor road on the plateau of Pitkennedy. A

sequential view of the two turbines when travelling down the B9113 is likely to occur when travelling in the direction of Montrose. Due to the very limited number of receptors which experience cumulative visual impact, the latter would not be judged as significant. A ZTV assessing cumulative impact of the proposed turbine and the turbine near Pickerton Guthrie would have been helpful to assess cumulative impacts.

Melgundbank Farm
By Brechin
Angus
DD9 6TA

Head of Planning & Transport
Angus Council
County Buildings
Forfar
DD8 3LG

15th May, 2013

Dear Sir / Madam

I wish to object to the single wind turbine application, ref 13/00290/FULL, North of Cotton of Pitkennedy farm, by Forfar and my reasons are:

Angus is a beautiful and scenic county with many long distance views, especially from high vantage points which the local residents and many tourists benefit from. The introduction of a 74 metre columnar construction on the skyline would have a serious detrimental impact on the local landscape and this is something I believe that Angus Council should be trying to preserve. A structure of this size on an area of high ground would be starkly visible and would have a substantial adverse effect on the experience of local and recreational users of this beautiful area because of its constant active presence and would significantly reduce the visual amenity which could have a negative effect on tourism within the Angus area.

There are many examples of historical monuments within the Pitkennedy and Aberlemno areas, such as the Pictish standing stones, Melgund castle and the fort on Turin hill, and it would be a great shame to spoil the natural area surrounding these great examples of our past. Balgavies and Rescobie lochs are also within close proximity to the proposed site and this proposed development could impact on the natural habitat of many species of birds and mammals.

The proposed sight for the turbine is close to a number of rural dwellings and is less than 2km from the local primary school. It will seriously affect their visual amenity and have possible negative health effects due to the strobe effect, noise, and flicker. Our own dwelling is less than 1km to the East of the site, and this is likely to provide us with substantial amounts of light flicker and low frequency noise pollution which is very likely to contribute to my husband suffering from additional migraine headaches, due to his light sensitivity.

I support the search for renewable energy sources but request the Council to encourage other technologies such as solar PV cells, which are more acceptable to the population and less destructive of the environment in which we live.

Yours faithfully,

[redacted]

Lynne Howe

Comments for Planning Application 13/00290/FULL

Application Summary

Application Number: 13/00290/FULL
Address: Field 800M North Of Cotton Of Pitkennedy Farm Cotton Of Pitkennedy Forfar
Proposal: Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip
Case Officer: Damian Brennan

Customer Details

Name: Mrs Lorna Bruce
Address: 3 Crosston farm Cottages Aberlemno Forfar

Comment Details

Commenter Type: Member of Public
Stance: Customer objects to the Planning Application
Comment Reasons:
Comment:I object strongly to yet another application in this historic and beautiful area of Angus. I am in favour of smallscale turbines to assist in the everyday running of farms, but not when it puts a blight on the landscape, and their efficiency is doubtful. I have a beautiful view of fields and hills and definately do not want to see a tower of metal nearly 250 feet high.

Melgundbank Farm
By Brechin
Angus
DD9 6TA

Head of Planning & Transport
Angus Council
County Buildings
Forfar
DD8 3LG

15th May, 2013

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I support the search for renewable energy sources but request the Council to encourage other technologies such as solar PV cells, which are more acceptable to the population and less destructive of the environment in which we live.

Yours faithfully,

[redacted]

Murray Howe

Myrestone Cottage

Lunanhead

Forfar

Angus

DD8 3PA

IL\KN

22nd May 2013

Angus Council

Planning Dept

County Buildings

Forfar

Angus

Dear Sir

Planning Application Reference 13/00290FULL

Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip | Field 800M North Of Cotton Of Pitkennedy Farm Cotton Of Pitkennedy Forfar

I wish to object to the above planning application for the following reasons:

A turbine of this size is out of scale with the surrounding landscape. It would bring an industrial sized turbine into a predominately agricultural landscape.

The application states that:

The Project will be located approximately 1.6 km from the east most edge of the settlement of Aberlemno, and some 4 km north east of Forfar. There are a number of scattered houses in the vicinity of the site, with 6 residential properties inside the site boundary. The nearest non-involved property, Pitkennedy Farm, is approximately 475 m to the east of the turbine.

It also lists the separation distance as follows:

Towns / villages within approximately 10 km of the proposed Project site include:

x Netherton (1.20 km north);

x Aberlemno (1.65 km north west);

x Forfar (4.52 km south west);

x Letham (6.31 km south);

x Dunnichen (6.56 km south west);

x Lunanhead (6.66 km south west);

x Tannadice (7.06 km north west);

x Friockheim (7.64 km south east); and

x Brechin (8.50 km north east).

Government guidelines recommend a separation distance of 2km from residential settlements. It is obvious therefore that both Netherton and Aberlemno fall well within this. The siting of this turbine would impact on the visual amenity of many of these residences.

The hamlet of Aberlemno is a renowned Pictish Site with visitors to the Stones coming from all over the world. There are also Turin and Finavon Hill Forts, both Scheduled Ancient Monuments, in the near vicinity.

Within the past year an application for a single turbine at Woodside Farm was rejected by Angus Council and an application for 3 turbines on Finavon Hill was rejected by the Government Reporter.

However there is now another application with the Council for a smaller turbine at Woodside and also scoping has been completed for 5 turbines at St Mary's Well (Carse Gray Estate), with an application expected in Summer 2013. There is also an application in for a single turbine at Newmill Farm near Balgavies Loch. This application would therefore add to the cumulative effect of turbines in the Lunanhead/Aberlemno/Letham area, should they be given approval.

Item 4.2.5 of the Environmental Report states - *There are no footpaths within the proposed Project site boundary, with the closest public right of way being located some 0.9km to the south-east of the proposed turbine location. There is no distinction in Scottish legislation between footpaths and bridleways and as such, due to the distance between the nearest PROW and the proposed turbine location, the turbine will comfortably comply with the British Horse Societies recommended minimum separation distance of 200 m between turbines and Bridleways. There are no 'core paths' within the site boundary or adjacent to the site, with the closest approximately 0.9km to the south-east of the proposed turbine location, running through Montreathmont Forest.*

Whilst the British Horse Society have recommended a minimum separation distance of 200 m between turbines and Bridleways, I can assure you that a horse does not

recognize distance of separation. I recently took my horse to Kirriemuir for a hack where we encountered a small single turbine near the Golf Course. This was the first time my mare had seen a turbine and I can assure you it was not a pleasant experience for her or myself! If this turbine and others go ahead in our countryside I feel we will have nowhere left to enjoy hacking! The B9134 is now far too busy to use during the week with large speeding lorries and cars using it as a back road from Forfar to Brechin. We are therefore left with the quiet rural lanes around the proposed turbine site to enjoy hacking out on and to gain access to Montreathmont Forest.

It states that this turbine at 75 meters would only produce enough electricity to support a mere 447 to 637 homes. That is of course if it works at its full potential, as has been said before – If the wind don't blow, the lights wont glow!! Why should our beautiful countryside be derogated by such an industrial sized monster, if it can only support such a meager amount of homes.

Given that there are so many applications presently lodged or about to be lodged in this particular area I would ask that you reject this application.

Yours faithfully

[redacted]

Mrs K J Cooper

Comments for Planning Application 13/00290/FULL

Application Summary
Application Number: 13/00290/FULL
Address: Field 800M North Of Cotton Of Pitkennedy Farm Cotton Of Pitkennedy Forfar
Proposal: Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip
Case Officer: Damian Brennan

Customer Details
Name: mr andrew vivers
Address: arniefoul glamis forfar

Comment Details
Commenter Type: Member of Public
Stance: Customer objects to the Planning Application
Comment Reasons:
Comment:I write to object to this wind factory application.

In August 2013, the United Nations Economic Commission Europe (UNECE) declared that the UK government's National Renewable Energy Action Plan (NREAP) violates the laws that transpose the Aarhus Convention into the UK legal framework, in that it is not abiding by Article 7 of the Convention. In particular the public have not been given full access to information on the established unacceptable negative impacts on people and the environment, nor have the public been given decision-making powers over their approval.
For this reason alone there should be a moratorium an all wind turbine applications.

Further to the above, the term Wind Farm is a disingenuous spin on the words farm and farming. My dictionary describes farming as: the husbandry or cultivation of animals, plants, fungi and other life forms, for food, fibre, bio-fuel and other products, in order to sustain human life.

Wind turbine applications often state that the turbine(s) are required for farming diversification. This is obviously incorrect. What it is, is an industrialisation and sterilisation of huge areas of farmland.

When two or more turbines are gathered together, it should be called a wind factory.

Firstly, wind turbines are certainly not life forms, and therefore it can not be a farm nor farming. And secondly, there is no conclusive evidence that they sustain human life, or the lives of any other life form (except perhaps a few carrion feeders until they are killed by the impact of a blade or suffer internal haemorrhaging and death).
In fact the opposite is probably true.

For example, there is mounting evidence that the end result of wind turbine manufacture and use is an increase in CO2 emissions. Furthermore, there is mounting evidence that wind turbine use is harmful to humans, livestock, and other life forms.
Of the millions and millions of bats that are killed each year by wind turbines, it is estimated that 90% drown in their own blood when their lung capillaries rupture as a result of the pressure changes near turning blades. Only around 10% are killed by the impact of a blade.

There is also growing concern over the stress, internal haemorrhaging, birth defects and still births, of livestock and pets that are kept near wind turbines. These same harmful affects are no doubt occurring to our wild life, and other life forms.
Humans are reported to suffer depression, dizziness and insomnia and I am sure that internal haemorrhaging, birth defects and still births will follow as the years go by.
Much of the harm is caused at vibrations beyond our human hearing range.

Recently, the cities of Kolding and Sønderborg in Denmark decided to not erect further wind turbines (in their 500 km2+ jurisdictions) until the uncertainty about the health impacts on neighbours is settled.
Mr Mauri Johansson (Specialist in Community and Occupational Medicine) recently stated that: "During the last 12 months, several smaller municipalities had done the same, in spite of strong pressure from government. They are not satisfied with the noise regulations, and demand that genuinely independent studies be done concerning the effects of wind turbines on health.
Last year, retired Danish High Court judge Peter Roerdam stated that wind power is an industry which has thoroughly corrupted the political system Further, Mr Mauri Johansson has this year added that: It is clear the institutional political corruption, and the lack of professional ethics on the part of wind industry acousticians and public health researchers, who ignore or deny the existence of the sleep and health problems and the consequent serious long term damage to health, is not limited to Denmark.
Indeed, in 1987 a report, led by N.D.Kelley from the Solar Energy Research Institute in Colorado, found impulsive infrasound caused health problems. This report has been ignored for 25 years.
Wind electricity is one of the most expensive forms of electricity to be produced. Each turn of a blade adds to our electricity charges. This is as a result of their abysmal efficiencies. It has been calculated that the average turbine only produces between 15 - 28% of its rated capacity over a year, and the kilowatts of electricity produced per square kilometre, or cubic kilometre, of a wind factory is equally abysmal.

The way these huge costs are arbitrarily added to our electricity bills, and the profits kept by a select few, is worse than the illegal chain letter scam.
I say worse because one has to actually opt in to be scammed by a chain letter. This is not the case with wind energy. However, it would be a simple matter to contact all electricity users and ask them if they wish to pay for wind electricity - and if so, could they tick the opt in to be scammed` box. The cost of wind electricity could then be proportioned fairly between those willing and able to pay for it.

I understand that thousands of dirty diesel generators are being prepared all over Britain to provide emergency back-up when wind power fails - in order to prevent the National Grid collapsing.
Under this hugely costly scheme, the National Grid is set to pay up to 12 times the normal wholesale market rate for the electricity they generate. Currently the wholesale price for electricity is around £50 per megawatt hour (MWh) but diesel-generator owners will be paid £600 per MWh. These generator owners will also be paid enormous sums for just having them available to be switched on.

Any suggestions that:
because there are already turbines or pylons in the area, then it is somehow OK to compound the problem with these enormous turbines is ludicrous! You do not solve a problem by creating an even bigger problem.

because there is already a commercial business in the area and therefore it is somehow OK to compound the problem with these enormous turbines is similarly ludicrous. Why enhance an eye sore with an even larger eye sore?

if we have to have wind factories, then this is as good a place as any to have one is again ludicrous. We are meant to be living in a democracy and nobody should have to have anything; particularly when it is against the wish of the majority of the population. There are probably now as many, if not more, opinion polls against wind turbines as there are for them. One thing is certain though, those against are growing rapidly as more and more people realise the true nature and cost, both financially and environmentally, of wind turbines, be they individual or factory units.

the county has somehow missed out on tens of millions of pounds worth of investment money by the rejection of several wind factory applications is, once again, ludicrous. Very little of that supposed investment would ever benefit the county, as is proven time and again, where the local business to gain the most is probably the fencing contractor!

communities would somehow gain from the so-called Community Fund, or community bribe as more and more people are calling it, is .ludicrous - although there is an argument that this is merely another disingenuous misleading spin. The value of the bribe is often only equivalent to the concessions and exemptions a landowner receives for having a wind factory on his land, and therefore the net gain to local county and therefore community, is probably zero.

jobs would be increased by this application is misleading, if not ludicrous. The majority of the workforce in the construction, erection and maintenance of the turbines comes from abroad, and if the American example is anything to go by, any UK jobs come at a cost of $12m per job. The is also the valid argument that they are not green jobs anyway, since they cause harm to humans

and the environment, and raise CO2 emmissions.

it is somehow OK to empty properties and effectively sterilise huge areas of Scotland so that wind factories can be built is outrageous and is reminiscent of the Highland Clearances. Scotland has much to be proud of in its history with our willingness to fight for, and support, freedom and democracy. This renewable energy policy is certainly not something to be proud of.

Finally, any arrangement which pays millions of pounds to wind factories to NOT produce electricity is beyond belief. If this was applied to every business, I dread to think where the money would come from to pay for all the surplus production and services.

Should Scotland gain its independence, one wonders if the electricity users of the rest of Great Britain will continue to be prepared to pay the exorbitant price for Scottish wind power, even if it is later sold back to them at a ridiculously reduced price. If not, and if these costs are placed solely on Scottish electricity users, it will cause great hardship, financial difficulty, fuel poverty and bankruptcy to many people and businesses in Scotland, and Scotland will swiftly follow in the footsteps of countries like Spain and others who have fallen for the wind power scam. (Spain is a particularly cautionary tale. By failing to control the cost of guaranteed subsidies, Spanish electricity users have been saddled with 126bn of obligations to renewable-energy developers.)

In theory would take about 1,500 wind turbines of around 100m tall spread over 20km2 to produce the same electricity as a 1,000 megawatt (1GW) power station even then the wind farm could not provide a steady supply. Wind varies considerably, and thus the power station is still required or maybe we need to cover over 100sq km with turbines to possibly provide something near the power from one power station!

In Denmark there are over 6000 turbines for 5.4m people, yet wind power only counts for less than 19% of their electricity requirements, has not resulted in the closure of any power stations, and they have one of the highest electricity prices in Europe.

Germany has the most expensive electricity in Europe and it is estimated that up to 800,000 Germans have had their power cut off because they couldnt pay the countrys rising electricity bills.

In the UK there are around 5 million households that are struggling to pay their ever rising electricity bills (mainly as a result of these wind factories).
German CO2 emissions have been rising for two years in a row as coal is experiencing a renaissance, and they are building 20 new coal-fired power stations to provide power when there is no wind or sun usually in the winter when the power is most needed.

CO2 emissions in the EU as a whole are likely to rise because of increased coal burning at power stations.

There are very few good wind turbines. By good I mean ones which comply with a few simple, common-sense criteria such as:

a) where the electricity produced helps to supplement the power requirements of the landowner without taking money from every other electricity user in the country to do so;
b) where they do not cause continuous harm to humans and other life forms;
c) where the CO2 emissions caused by the construction, erection and maintenance of the turbines is accurately assessed and the result (either increased or decreased), is justified;
d) where the loss of revenue to other local businesses caused by the location of the turbines is justified.

If one applies these few criteria to wind factories, then there are no good wind factories, either onshore or offshore (the financial cost and CO2 emissions caused by offshore factories are considerably greater than onshore factories).

If we are to have renewable energy providers for our national requirements, then we should be considering systems that guarantee to provide a steady supply of power at more than 30% efficiency, do no harm, and help save the environment. Wind power can never achieve this.

On a more personal level, we run a holiday cottage business, and many of our visitors have stated that, with regret, they will not return if Angus over-run with turbines. This will greatly affect our livelihood and many other businesses in the area which rely on tourism. I am sure this growing dislike and rejection of turbines applies to other areas of the country.

I urge you not to follow the disastrous example of Aberdeenshire, Highlands and other areas, by allowing the county to be invaded by these turbines.

Let common-sense prevail, reject this application, and help save Scotland for future generations.

Mrs E Lashly
Melgund Cottage
Aberlemno
Forfar
DD8 3PJ

[redacted]

13 February 2014

13/00290/FULL - Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip - Field 800M North Of Cotton Of Pitkennedy Farm Cotton Of Pitkennedy Forfar

Dear Sir

I wish to submit an objection to the above planning application on the grounds of visual impact, possible shadow flicker and the impact on the wider landscape.

My property lies at a distance of approximately 1.5km directly north of the proposed site. I already have a direct and prominent view of the monitoring mast from my front windows and garden.

I feel that the size and scale of the wind turbine will greatly diminish the enjoyment of my property.

The site is higher than my cottage therefore the height of the turbine will be considerably elevated making it the prominent feature on the skyline.

The planned turbine is 78m (255ft) to blade tip. The elevation of the land between our cottage and the site is approximately 40m (131ft), this makes the structure visible at a height of 118m (386ft).

As the turbine would be directly south of our home and because of the added elevation, and given the low angle of the sun for a great part of the year, there may be a possibility of light flicker.

There is also the impact on the wider landscape:-

This area of Angus is a little gem with the Aberlemno stones to the west and the lovely Melgund Castle to the east.

There is a farm track from the Brechin road (just below Angus Hill) which goes through to Mains of Melgund farm and then on to Melgund Castle. This track is a favourite route for walkers, joggers, cyclists etc.

The beauty of this walk is the view to the south with vast open countryside dotted with traditional farm buildings, large open fields (often grazed by flocks of wintering geese) and the uncluttered panoramic skyline.

I understand there is a move to provide more leisure pursuits around the Aberlemno area and this track provides a safe country walk away from traffic.

The introduction of this large industrial sized turbine, with the possibility of more to follow, will despoil and denigrate this lovely place.

I understand landowners need to exploit their resources and wind turbines seem to provide a lucrative source of income.

However everything comes at a cost and I believe in this instance the price for this plan will be paid by:

a - my family, friends and myself and future owners of my home with the probable depreciation in value, and loss of full enjoyment of our property;
b - the local community with loss of amenity;
c - the possible loss to local businesses of potential and returning tourists;
d - the wider community in rising energy costs needed to subsidise wind turbines.

The imposition of such a large moving object on the skyline will be totally out of scale with the surrounding area. Such an imposing structure will greatly mar and degrade the rural pastoral character of this area. It will also reduce its ambience and tranquility which is swiftly becoming a decreasing resource in Angus.

I hope you will consider this letter of objection and please don't hesitate to contact me if you need any more information.

Regards

[redacted]

Mrs E Lashly

BrennanDG

From: Betty Lashly
Sent: 24 February 2014 13:49
To: BrennanDG
Subject: 13/00290/FULL

Dear Brennan
13/00290/FULL
I recently sent an objection letter regarding the above planning application.
I understand that there is another wind turbine planned for the same site just a short distance away. It would seem that there is a possibility I will now have two large turbines in view of my house.
Are you able to confirm this?
Unfortunately I'm not able to download the photomontages but I don't expect there will be one for my area as there will be a substantial visual impact.
Although I sent my objection letter by post I don't mind receiving any subsequent correspondence by email.
Regards
Mrs E Lashly
Melgund Cottage
Aberlemno
DD8 3PJ

BrennanDG

From: Betty Lashly [redacted]
Sent: 30 March 2014 17:46
To: BrennanDG
Subject: Pitkennedy/Bellahill wind turbines

13/00290/FULL | Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip | Field 800M North Of Cotton Of Pitkennedy Farm Cotton Of Pitkennedy Forfar

13/00998/FULL | Erection of a single wind turbine of 32.4m to hub and 45.9m to blade tip including temporary access track and ancillary infrastructure. | Field 1025M South Of Bellahill Farm Melgund Brechin

Dear Mr Brennan

Further to my objections to the above plans I hope you will consider the following points:

1) I have great concern regarding light flicker and the winter sun. On the Pitkennedy plan they use the standard 10 rotor blade widths to assess shadow flicker. However I fear that this calculation is not sufficient for our location. Given our latitude the mid-winter sun will be a mere 10.6 degrees above the horizon. Therefore there is no doubt that we will be subjected to prolonged periods of light flicker during the winter months.

Reference: *The Department of Energy and Climate Change*
Update of UK Shadow Flicker Evidence Base

All the data collated was analysed and a number of conclusions were drawn. The current recommendation in Companion Guide to PPS22 (2004) to assess shadow flicker impacts within 130 degrees either side of north is considered acceptable, as is the 10 rotor diameter distance from the nearest property. It is acknowledged that this is a 'one size fits all' approach that may not be suitable depending on the latitude of the site.

[redacted]

3) Also, the windows of our main rooms face south. This a great benefit to us especially during the winter as, besides cheering us up, we benefit from the winter sunlight to help heat our home, thus reducing our fuel consumption. If we are subjected to light flicker on sunny winter days, besides the potential health issues and an increase in our fuel use, we would have to black out the light entirely to get any peace .

4) With regard to my concerns about the landscape I still can't find any references in either of the plans to each other. No cumulative effects, responses, etc, nothing.

5) There are no photo montages regarding the north of the site. None near our cottage or on the public track linking the B9134 to Melgund Castle. Nothing from the road between Angus Hill and Aberlemno, even although this is a tourist route.
(Granted there is one photo montage taken from the north at Burghill nr Brechin, but given the geography its hard to see that any turbine, no matter what it's size, could be seen from that location).

Please contact me if you need any further information or clarification of the above.

Kind regards
Mrs E Lashly
DD8 3PJ

BrennanDG

From: Betty Lashly
Sent: 25 April 2014 11:40
To: BrennanDG
Subject: re pitkennedy/bellahill

Dear Mr Brennan,

Thank you for responding to my email and helping me with the problem of viewpoints from the north.

I agree that viewpoint 2a/b/c/d ,all basically the same photo, taken from near the Aberlemno stones is a little north of west. Also viewpoint 18 taken from Melgund Castle is a little north of east. However Viewpoint 4 was taken from a farm track off the A90, and like (viewpoint 8) Burghill near Brechin, the turbines would never been seen from those positions. (ES states '*no view of the site and are therefore not covered in any further detail).* So I'm afraid I still feel that the landscape from the track between the B9134 and Melgund Castle, because of the beautiful uncluttered skyline, should be preserved or at least assessed.

The pylons off to the side of the road seem to be used as some justification for this development, however the line of pylons actually veer to the west over Finavon Hill and don't cross the skyline from the Aberlemno stones to Melgund Castle and beyond.

As my cottage faces the site and we are within the 2km boundary I don't know why our view is not assessed as 'high' as it says in the ES (page 40 - Sensitivity of Receptors - 'residents experiencing views from dwellings').

Presumably the decision regarding this plan will be 'desk based'. So to achieve a balanced decision it must be necessary that those who make these decisions are given a full picture of the impact this development will have.

The environmental statement admits that this plan will have a 'moderate adverse' impact for people living within 2km. This contrasts with the 'slight to negligible' amount of electricity that may be produced by these turbines.

There seems to be an assumption that, because the Aberlemno community is made up of individual traditional cottages and farms scattered within a pastoral landscape, the people living there are given less consideration than people living in more compact communities.

Regarding flicker/strobe/glint - This seems to be a very contentious issue. Anecdotal evidence seems to link medical problems with the flicker from wind turbines.

I understand that the flicker calculations are based on the 10Xrotor blades radius (480m). I believe this is assessed on the 'plane' and doesn't take into account the topography of the land. The ES (14.3.1) uses the Windpro computer model to assess shadow flicker. Question - is the assessment restricted to the 480m radius or does it go beyond that boundary? The residents in this area know full well the problems with dazzle from the low winter sun. Other residents in the area have objected to the plan because of this issue.

Thank you again for your help and I hope you will consider the further points I have raised.
Regards
Mrs E Lashly
DD8 3PJ

BrennanDG

From: Betty Lashly
Sent: 21 May 2014 07:12
To: BrennanDG
Subject: Pitkennedy/Bellahill
Attachments: window.JPG

Dear Mr Brennan

It has been brought to my attention that we may have a problem with noise from these turbines. Because of the topography of the area and the height of the turbines the noise from the turbines would travel down into the bowl shaped terrain so amplifing the sound. Also because the turbines are placed relatively close together there would be a greater risk from amplification.
From my own experience the sound of a tractor working in the field up on the hill sounds much louder than would be expected due to a sort of *amphitheatre* effect.

I am also attaching a photomontage I've made of the view from my living room window. I understand there are guidelines on how these sort of photos are presented and I am looking into having this done properly. However I have done a lot of measurements from the plans and I am confident that the photo is a good representation of what the turbines could look like. I have done this to illustrate my concerns regarding the visual impact these turbines will have on our home. I have enlarged the original photograph slightly to make the trees on top of the hill a more realistic size as seen with the naked eye. You will know a camera lense tends to make the landscape recede further from the eye than is a true view. There are a number of these large turbines around now and you can see how different the actual size is compared to the photomontages presented by the developers. Anyway you are very welcome to come out here and see for yourself.

The sun only appears to skirt the top of the hill and I'm sure it will pass beind the moving blades. As you can see the turbines would be the main object seen from our window and garden.

Thanks again for your help
Regards
Mrs E Lashly

Comments for Planning Application 13/00290/FULL

Application Summary
Application Number: 13/00290/FULL
Address: Field 800M North Of Cotton Of Pitkennedy Farm Cotton Of Pitkennedy Forfar
Proposal: Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip
Case Officer: Damian Brennan

Customer Details
Name: Mrs Fiona Ainslie
Address: West Cottage St Murdoch's Well By Brechin

Comment Details
Commenter Type: Member of Public
Stance: Customer objects to the Planning Application
Comment Reasons:
Comment:I object as to this proposal as it would have a detrimental effect on the home of the Aberlemno Stones.

It would create a precedent and encourage applications for similar structures, as is borne out by the application for a neighbouring wind turbine at Bellahill Farm.

This turbine would industrialise an area that currently allows visitors to enjoy the stones in a peaceful and rural setting. There is such a lot in this small area for visitors, The Aberlemno Stones, Melgund Castle, Turin Fort, nearby lochs and Montreathmont Forest.

Aberlemno Community Council's objection is important as they speak for the community and local democracy.

This turbine is too close to a number of homes and some are likely to experience:

Noise
Shadow Flicker and Strobing
Reduction in property values

Noise

There are many turbine noise victims in the UK. The actual numbers are often hidden because house owners fear admitting the problem as it will impact on the value of their homes.

In the event you decide to approve this proposal, I respectfully ask that strict noise conditions are

imposed to protect residents

Shadow Flicker and Strobing

Residents can suffer very badly from these effects even if the long shadows do not reach their property. Views from their windows will let on to flickering and strobing in their gardens and surrounding areas, causing stress and sometimes leading to fits for those susceptible to this condition.

Reduction in Property Values

Those surrounding the site of the turbine are likely to find it more difficult to sell their properties.

This proposal would divide the community. A few will profit whilst many more, without any right to compensation, will see not only their homes, gardens and environment spoiled by overpowering structures but also stand to see their greatest financial asset diminished.

I therefore respectfully ask you to reject this proposal.

Comments for Planning Application 13/00290/FULL

Application Summary

Application Number: 13/00290/FULL
Address: Field 800M North Of Cotton Of Pitkennedy Farm Cotton Of Pitkennedy Forfar
Proposal: Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip
Case Officer: Damian Brennan

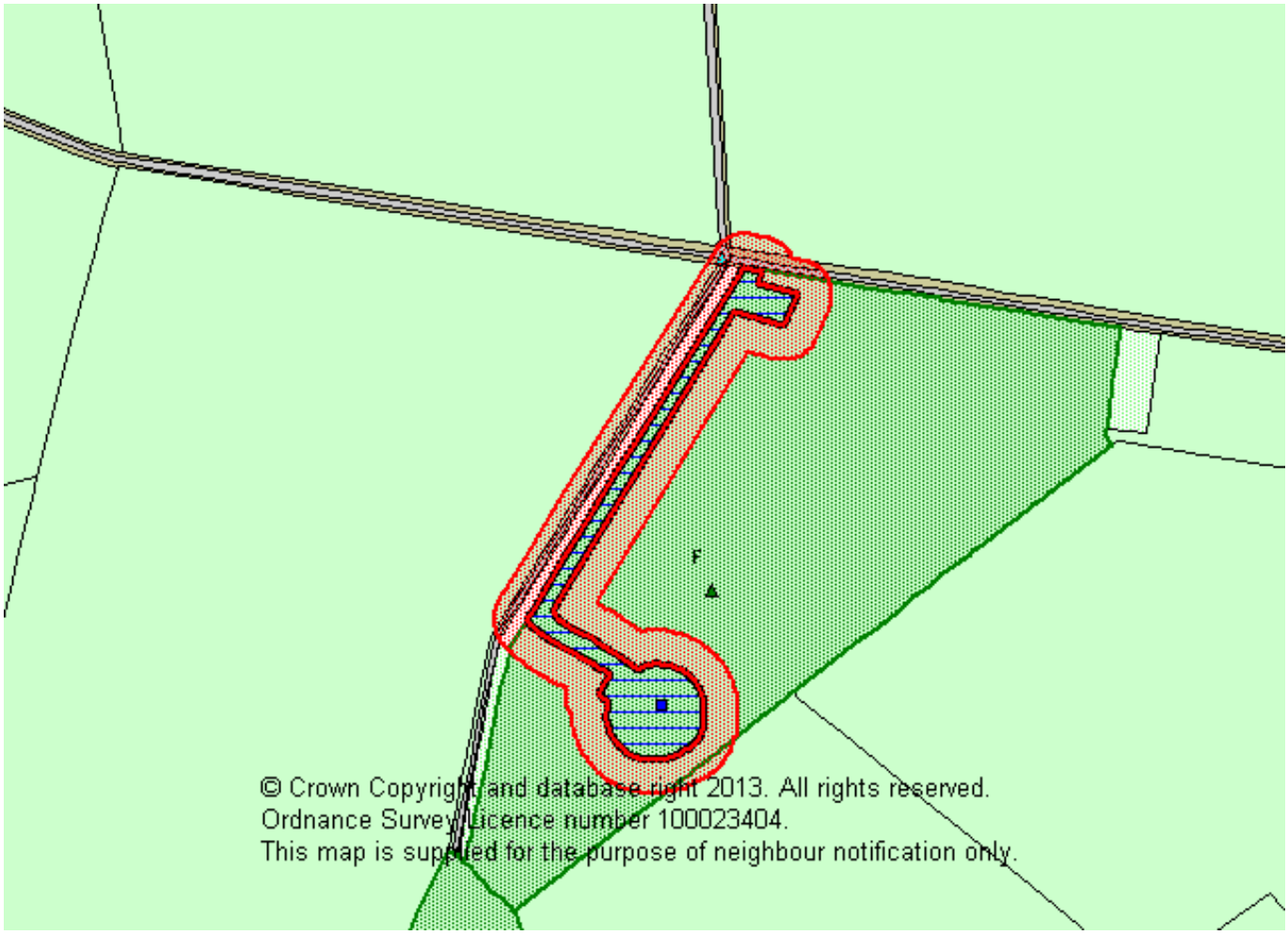
Customer Details

Name: Mrs Isobel Luke
Address: 1a,Argyll Street Brechin

Comment Details

Commenter Type: Member of Public
Stance: Customer objects to the Planning Application
Comment Reasons:
Comment:They are a blur on the countryside & are not economical.

AC26


F
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AC27

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LEGEND

Landownership boundary

Refused

Kilometres 0 0.5 1

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COTTON OF PITKENNEDY

Site location plan

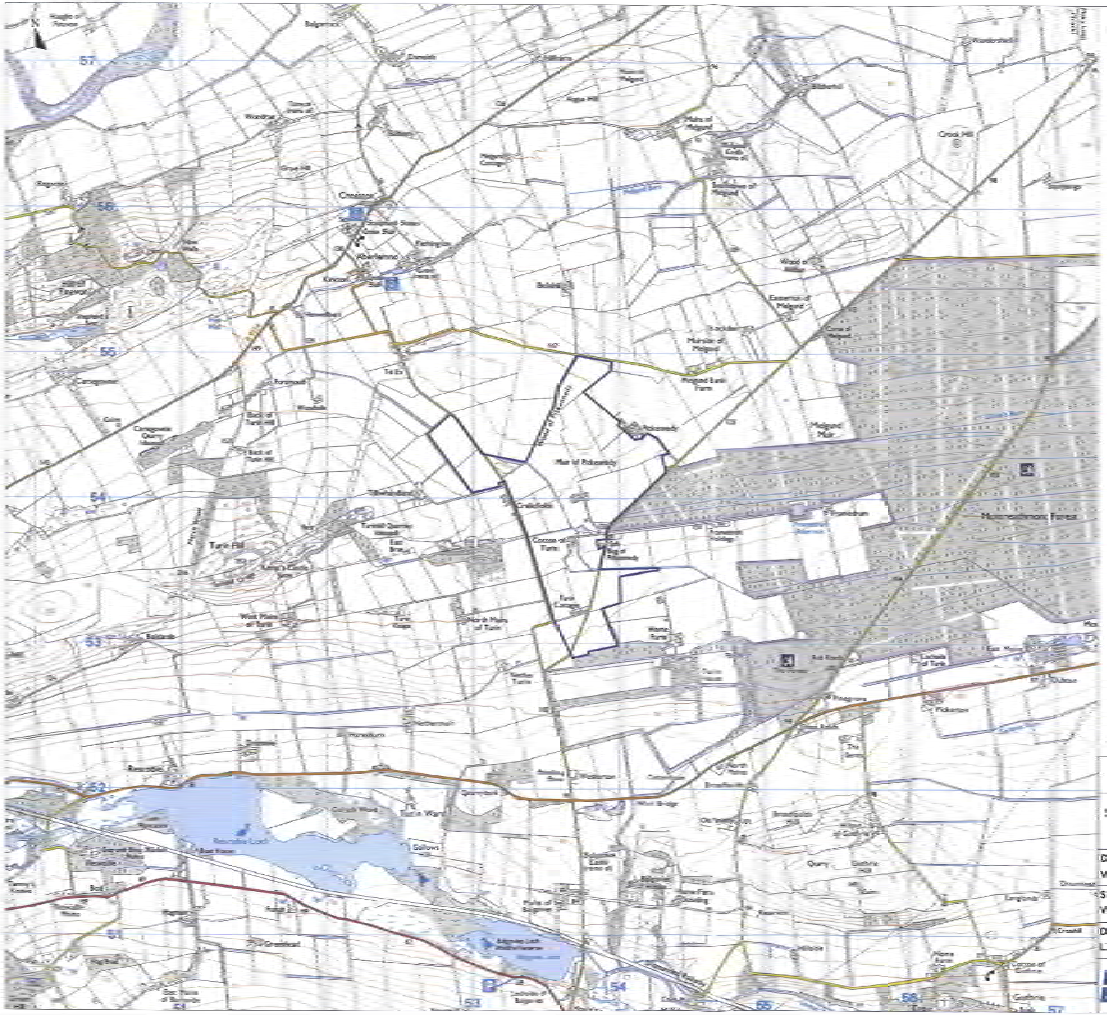
DOCUMENT REFERENCE	LAST REVISION DATE
V1	December 2012
SITE DESIGN VERSION	**SCALE**
V4	1:25k when printed at A3

DRAWN	CHECKED	APPROVED
LT	TR	RW

PARSONS BRINCKERHOFF

FIGURE 4.1

AC27



LEGEND

Landownership boundary

13/00290/FUL

REFUSED

Kilometres

0 0.5 1

COTTON OF PITKENNEDY

Site location plan

DOCUMENT REFERENCE	LAST REVISION DATE
V1	December 2012
SITE DESIGN VERSION	SCALE
V4	1:25k when printed at A3

DRAWN	CHECKED	APPROVED
LT	TR	RW

PARSONS BRINCKERHOFF

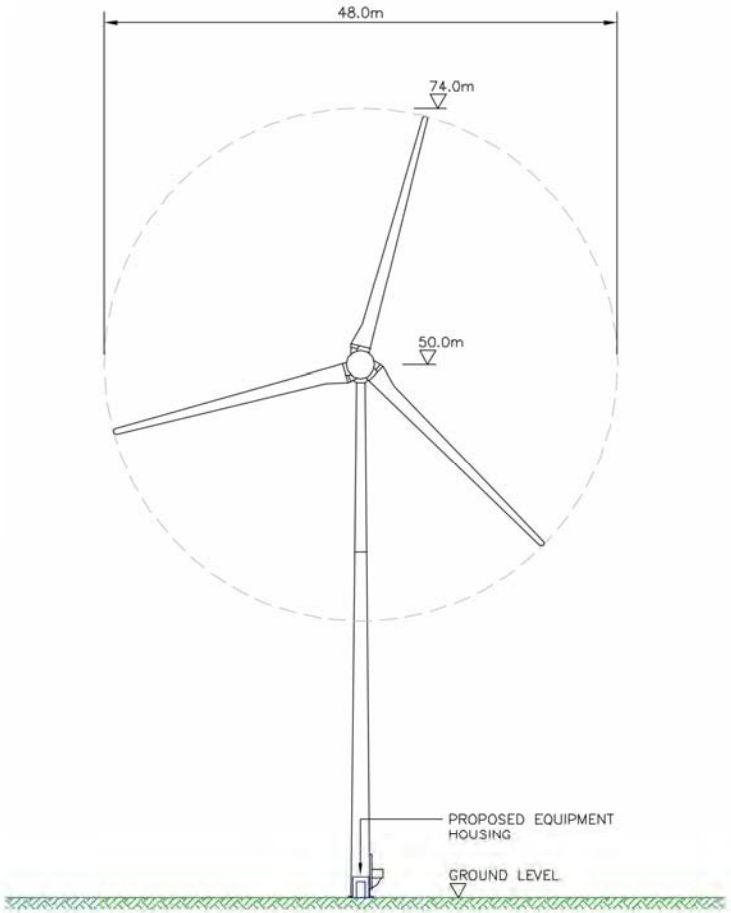
FIGURE 4.1

AC27

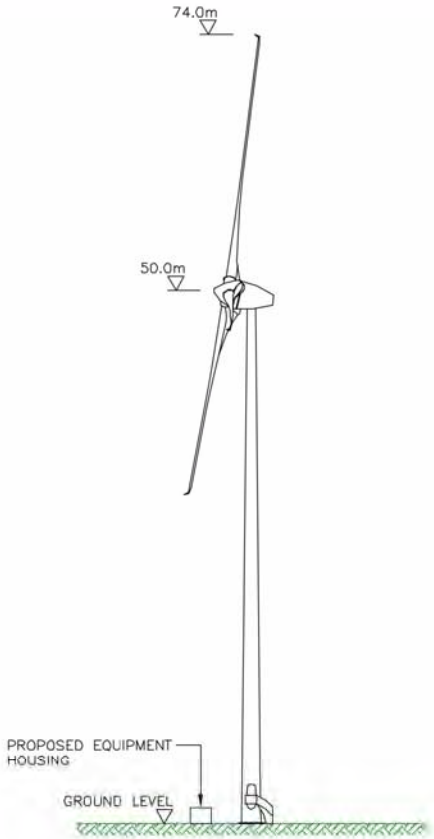

LEGEND
Landownership boundary
Planning application boundary
147m
134m
Track
Hare Cairn
Fox Covert
Wood of Pitkennedy
13/00299/FULL
REFUSED
Metres
0
50
100
Reproduced from Ordnance Survey digital map data.
COTTON OF PITKENNEDY
Plan of planning application boundary
DOCUMENT REFERENCE
V1
LAST REVISION DATE
December 2012
SITE DESIGN VERSION
V4
SCALE
1:2500 when printed at A2
DRAWN
CHECKED
APPROVED
PARSONS BRINCKERHOFF
FIGURE 5.1

AC27

Refused



FRONT ELEVATION
(1:500)



SIDE ELEVATION
(1:500)

PLAN VIEW
(1:500)

COTTON OF PITKENNEDY

Front and side elevations and plan view of proposed wind turbine

DOCUMENT REFERENCE	LAST REVISION DATE
V1	March 2013
SITE DESIGN VERSION	**SCALE**
V1	1:500 when printed at A3

DRAWN	CHECKED	APPROVED
LT	TR	RW

PARSONS BRINCKERHOFF

FIGURE 5.4

AC28

AC28

AC28

AC28

AC28

AC28

AC28

AC29

ANGUS COUNCIL

TOWN AND COUNTRY PLANNING (SCOTLAND) ACT 1997
(AS AMENDED)
TOWN AND COUNTRY PLANNING (DEVELOPMENT MANAGEMENT PROCEDURE)
(SCOTLAND)
REGULATIONS 2013

PLANNING PERMISSION REFUSAL
REFERENCE 13/00290/FULL

To E-Gen Partners Ltd
c/o Parsons Brinckerhoff
Per Leila Tavendale
Amber Court
William Armstrong Drive
Newcastle Buisness Park
Newcastle-Upon-Tyne
NE4 7YQ

With reference to your application dated 9 May 2013 for planning permission under the above mentioned Acts and Regulations for the following development, viz.:-

Erection Of Wind Turbine 50M To hub Height and 74M To Blade Tip at Field 800M North Of Cotton Of Pitkennedy Farm Cotton Of Pitkennedy Forfar for E-Gen Partners Ltd

The Angus Council in exercise of their powers under the above mentioned Acts and Regulations hereby Refuse Planning Permission (Delegated Decision) for the said development in accordance with the particulars given in the application and plans docqueted as relative hereto in paper or identified as refused on the Public Access portal.

The reasons for the Council's decision are:-

1 That the application is contrary to policies S1, S6, ER34 and ER35 of the Angus Local Plan Review (2009) as the provision of a wind turbine of the height proposed would have an unacceptable landscape impact.

The application has not been subject of variation.

Dated this 1 July 2014

Iain Mitchell - Service Manager
Angus Council
Communities
Planning
County Buildings
Market Street
FORFAR
DD8 3LG

AC30

ANGUS COUNCIL

TOWN AND COUNTRY PLANNING (SCOTLAND) ACT 1997 (AS AMENDED)
TOWN AND COUNTRY PLANNING (DEVELOPMENT MANAGEMENT PROCEDURE) (SCOTLAND) REGULATIONS 2008

PLANNING PERMISSION APPROVAL
Reference 12/00729/FULL

To: **E-Gen Ltd**
c/o Parsons Brinckerhoff
Amber Court
William Armstrong Drive
Newcastle Business Park
Newcastle-Upon-Tyne
NE4 7YQ

With reference to your application dated **3 August 2012** for planning permission under the above mentioned Acts and Regulations for the following development viz:-

Installation of one 50m meteorological data gathering mast for a temporary period of three years. at **Field 800M North Of Cotton Of Pitkennedy Farm Cotton Of Pitkennedy Forfar** for **E-Gen Ltd**

The Angus Council in exercise of their powers under the above mentioned Acts and Regulations hereby **Grant Planning Permission (Delegated Decision)** for the said development in accordance with the particulars given in the application and plans docqueted as relative hereto in paper or identified as approved on the Public Access portal. The permission is subject to the following conditions, namely:-

1 That the development hereby approved shall be begun before the expiration of three years from the date of this planning permission.
2 That the mast hereby approved shall be removed from the site no later than 36 months from the date of its erection unless otherwise approved through the grant of a further planning permission. On expiry of the 36 month approval period, the mast shall be removed and the site shall be returned to its previous condition within 21 days of the date of removal or other such period as may be agreed in writing with the planning authority.
3 That prior to the commencement of development a scheme for the provision of aviation lighting on the mast, to a specification that satisfies the MOD, shall be submitted to and approved in writing by the planning authority. The approved lighting shall be installed upon erection of the mast and shall be retained in fully operational condition thereafter.
4 That prior to the commencement of development, the applicant shall provide the Ministry of Defence (Defence Estates – Safeguarding) with the following information, a copy of which shall also be submitted to the Planning Authority:
- Proposed date of commencement of construction;
- Estimated date of completion of construction;
- Height above ground level of the tallest structure;
- Maximum extension height of any construction equipment;
- Latitude and Longitude of the proposed mast.

The foregoing conditions are imposed by the Council for the following reasons:-

1 In order to comply with the requirements of the Town and Country Planning (Scotland) Act 1997 (as amended).
2 To ensure that the site is left in a clean and tidy condition following completion of the development.
3 In the interests of air safety.
4 To safeguard defence interests.

The reason(s) for the foregoing decision by the Council are as follows:-

That the proposed development is a temporary structure and will not have a significant impact on the amenity of the area and is compatible with the relevant policies of the development plan. There are no material considerations that justify refusal of the application contrary to the provisions of the development plan.

Dated this **2 October 2012**

Head of Planning and Transport,
Infrastructure Services,
County Buildings,
Market Street,
FORFAR DD8 3LG

NOTES

AC30

The decision was based on the following amendment(s):-

1. None.

It should be understood that this permission does not carry with it any necessary consent or approval to the proposed development under other statutory enactments e.g. the Building (Scotland) Acts 1959 and 1970, Building (Scotland) Act 2003 and the Building (Scotland) Regulations 2004.

WARNING ANY ALTERATIONS MADE TO THE APPROVED PLANS OR STATED CONDITIONS WITHOUT THE PRIOR CONSENT OF THE LOCAL PLANNING AUTHORITY COULD LEAD TO ENFORCEMENT ACTION BEING TAKEN TO REMEDY OR REINSTATE THE UNAUTHORISED ALTERATIONS

ANGUS COUNCIL
THE TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2011
SCREENING OPINION
INSTALLATION OF A 800KW WIND TURBINE 50M TO HUB HEIGHT AND 74M TO BLADE TIP IN ORDER TO GENERATE ELECTRICITY AT FIELD 800M NORTH OF COTTON OF PITKENNEDY FARM COTTON OF PITKENNEDY FORFAR.
PLANNING APPLICATION 13/00290/FULL

Angus Council has received a planning application for the erection of a wind turbine to Generate Electricity (74 metres to blade tip) at Field 800M North of Cotton of Pitkennedy Farm Cotton of Pitkennedy Forfar. The development falls within Schedule 2 of The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 and therefore the application requires a Screening Opinion under Regulation 6.

In this case Angus Council has determined that this is not an EIA development for the following reasons: -

- The proposed development does not fall within Schedule 1 of the above Regs.;

- The proposal falls within Schedule 2 under (3) Energy Industry, (i) installations for the harnessing of wind power for energy production (windfarms);

- The proposal does not fall within a sensitive area, eg: SAC, SPA, SSSI, National Park, World Heritage Site or Scheduled Monument etc;

- The proposal exceeds the threshold of 3(i) of Schedule 2 because the hub height of the turbine is 50 metres (ii);

- The proposed turbine is not likely to have “significant environmental effects” having regard to its nature, scale and location. In coming to this view, it is noted that the development does not appear to involve unusually complex or potentially hazardous operations.

13 June 2013

AC32

Cotton of Pitkennedy

e-Gen

Environmental Report

Main Text

April 2013



PARSONS BRINCKERHOFF

AC32

Cotton of Pitkennedy Wind Turbine Environmental Report

April 2013

Prepared for
e-Gen Partners
Berwick WorkSpace
Boarding School Yard
90 Marygate
Berwick upon Tweed
TD15 1BN

Prepared by
Parsons Brinckerhoff
Amber Court
William Armstrong Drive
Newcastle Business Park
Newcastle upon Tyne
NE4 7YQ

www.pbworld.co.uk

PARSONS BRINCKERHOFF

CONTENTS

SECTION 1

INTRODUCTION

1 INTRODUCTION

1.1 Purpose of the Report

1.1.1 This Environmental Report (ER) has been prepared by Parsons Brinckerhoff Limited (PB) on behalf of e-Gen Partners Ltd (e-Gen) in support of a planning application for a single wind turbine to be located at Cotton of Pitkennedy, to the north-east of the town of Forfar in Angus.

1.1.2 The Project will comprise one wind turbine, access tracks and a small substation, to be located at the base of the turbine. The proposed wind turbine will be located in the north of the Cotton of Pitkennedy agricultural holding.

1.1.3 This ER constitutes the results of a study of the potential environmental impacts of the proposed Project on its location, and provides details of the proposed mitigation measures to minimise any identified adverse environmental impacts.

1.2 The Developer

1.2.1 The Cotton of Pitkennedy Project is being proposed by e-Gen, a wind energy developer who focuses on wind energy projects in the 500kW to 1500kW band across rural Scotland, working predominantly with farmers and landowners.

1.2.2 In developing their proposal for the Cotton of Pitkennedy site, e-Gen has sought both to maximise the generation potential of the renewable energy in the area, whilst taking into consideration localised constraints and minimising the extent of any environmental impacts resulting from the proposed development.

1.3 The Consultant

1.3.1 This ER has been prepared by Parsons Brinckerhoff, a company with over 125 years experience in the engineering sector and over 100 years experience in the power generation sector. PB is one of the world's leading power and energy consultancy companies providing advice and assistance to governments and developers alike on all manner of power projects.

1.3.2 The power generation group within PB has significant experience in the wind energy market having worked on many projects in the UK, Europe, Africa, Asia and Australasia.

1.3.3 Ecology and ornithology studies contained within this report were undertaken by GLM Ecology – a specialist ecology consultancy.

1.4 The Project

1.4.1 The purpose of the Project is to construct and operate a wind energy development that will generate electricity in a sustainable manner. The proposed site comprises privately owned land. The Project will comprise one turbine capable of producing up to 0.8 MWe by converting the kinetic energy of the wind into electrical energy. The turbine will have a total height to tip of no more than 74m. The rotor will consist of three blades connected to a hub supported by a steel tower.

1.4.2 The Project will be located approximately 8 km north-east of Forfar, and approximately 25 km north of Dundee. The site location is shown in Figure 4.1.

1.4.3 The exact model of turbine to be used at the proposed site will not be known until a contractor / manufacturer has been chosen. For this reason, the ER has been based on preliminary design information for which any changes would only improve the potential environmental impact. For the purposes of this ER, turbines of the maximum size envisaged will be considered, that is one turbine up to 74 m to tip. The rotor diameter will not exceed 48 m and the hub height will not exceed 50 m.

1.4.4 The turbine will be connected by underground cables to an onsite substation building that will house switchgear and transformers as necessary. The power generated by the turbines will then be exported to the regional grid operated by Scottish and Southern Energy. This cable route will be the subject of a separate planning application by Scottish and Southern Energy.

1.4.5 Construction of the proposed wind turbine is expected to take up to 6 months. The majority of this work will include construction of the turbine foundation and road infrastructure. The turbine itself will be manufactured off site, brought to the site in sections and erected using a crane.

1.4.6 The proposed wind turbine will help to displace electricity currently generated by fossil fuel fired plant and will avoid the emissions of pollutants, including the greenhouse gas carbon dioxide, associated with such plant. The wind turbine will also contribute to regional and national targets for renewable energy generation.

1.5 The Environmental Report

1.5.1 e-Gen originally sought the opinion of Angus Council on the 10th November 2011 as to the need or otherwise for a full Environmental Impact Assessment (EIA) to be undertaken for the project with respect to the Town and Country Planning (Environment Impact Assessment) (Scotland) Regulations 2011. These Regulations state that any wind energy application involving the installation of more than two turbines or where the hub height of any turbine, or height of any other structure, is in excess of 15 m is considered as a Schedule 2 development which may require a full EIA to be undertaken.

1.5.2 Two turbines at the site were screened for and Angus Council confirmed on the 11th January 2012 that a full Environmental Impact Assessment (EIA) would not be required for the development. A copy of the screening reply from Angus Council is included in Appendix A.

1.6 Consultations

1.6.1 As discussed in Section 1.5 a screening exercise was undertaken by e-Gen for the project with Angus Council to determine the need or otherwise for a full environmental impact assessment for the project. The council advised that a full EIA was not required, nevertheless, to ensure that an appropriate level of environmental assessment work was undertaken e-Gen and their project team has maintained a dialogue throughout the preparation of their planning application with various parties to ensure a robust planning application has been prepared.

1.7 Cumulative Impact Assessment

1.7.1 Cumulative impact assessment is a key part of the environmental assessment process and is concerned with identifying situations where a number of impacts from separate projects combine to cause a significant impact on a particular resource.

1.7.2 The ER considers existing wind turbines in the area. A full list is given in Table 1.1 and shown on Figure 6.26. Projects being proposed by other developers have been considered if under construction, holding planning permission or in the planning process (in the event that sufficient information on these is available). Whilst there may be other wind development projects at the feasibility stage or about to submit planning applications, it is not possible to address these as layouts and sizes are not fixed until formally submitted for planning.

Further information on cumulative assessment is included in Appendix E

TABLE 1.1: WIND FARM DEVELOPMENTS WITHIN 25 KM OF THE PROPOSED SITE

Site	*Location*	*Turbine Output (MWe)*	*Number*	*Maximum Power Output (MWe)*	*Height to Hub (m)*	*Height to Tip (m)*	*Approx Distance to Proposed Site (km)*
Consented and Operational Wind Farms							
Baldoukie Farm	Forfar	0.006	1	0.006	15	19.8	7.4
North Mains of Cononsyth	Arbroath	0.33	1	0.33	50	66.5	8.7
Afflochie Farm	Brechin	0.225	2	0.45	32.2	45.7	10.4
East Pitforthie Farm	Brechin	0.1	1	0.1	37	47.5	10.5
Windyedge Farm	Brechin	0.02	2	0.04	20.6	27.15	10.8
East Memus	Forfar	0.8	1	0.8	60	86.5	11.8
Glen Trustra	Brechin	0.225	2	0.45	32.2	45.7	12.1
Whitefield of Dun Farm	Montrose	0.33	1	0.33	50.5	67	12.7
Newton of Inshewan	Kirriemuir	0.01	1	0.01	18.3	24.8	12.9
Glen of Craigo	Craigo, Montrose	0.01	3	0.03	18.3	24.8	15.4
Ark Hill	Balkeerie	0.8	8	6.4	50	74	21.4
Brigton Farm	Laurencekirk	0.85	1	0.85	55	81	21.7
Castleton of Eassie	Glamis	0.01	3	0.03	18.3	24.8	21.8
Tealing Airfield	Tealing	0.8	1	0.8	60	86.5	21.9
Dundee Michelin Tyres Plc	Dundee	2.3	2	4.6	85	121	23.5
Scotston Hill	Auchterhouse	0.8	1	0.8	55	79	24.4
Wind Farm Projects currently Proposed							
Dunswood	Brechin	0.5	1	0.5	50	77	7.4
Chapleton of Menmuir	Brechin	0.225	1	0.225	32.2	45.7	11.9
Auchenreoch Farm	Edzell	0.225	1	0.225	32.2	45.7	12.0
Cairndrum Farm	Edzell	0.225	1	0.225	32.2	45.7	12.7
Nathro Hill	Brechin		17		80	132	13.2
Balrennie Farm	Edzell	0.225	1	0.225	32.2	45.7	13.2
Govals	Gateside	0.8	6	4.8	60	86.5	15.9
Frawney	Gateside	2.5	5	12.5	60	100	16.8
Dodd Hill	Tealing	3 (max)	5	15 (max)	85 (max)	126 (max)	17.5
Carrach	Kirriemuir	0.8	9	7.2	60	84	22.6

SECTION 2

THE PROJECT

2 THE PROJECT

2.1 Introduction

2.1.1 For clarity the key elements of the development can be summarised as follows.

TABLE 5.1 – KEY ELEMENTS OF PROPOSED DEVELOPMENT

Element of Proposed Scheme	***Details***
Number of Turbines	1
Energy Capacity of each Turbine	0.8 MWe (maximum)
Height to Hub	50 m (maximum)
Height to Blade Tip	74 m (maximum)
Number of Turbine Blades	3 per turbine
Speed of Turbine Rotation	6-16 rpm (depending on model selected)
Diameter of Turbine Tower	3.5 m at base (maximum)
Diameter of Rotor	48 m (maximum)
Materials for Turbine Tower and Blades	Tower – tubular conical steel; Blades – glass reinforced polyester composite.
Substation	10 x 5m footprint. Approximately 3 m high. External facing materials to be agreed pursuant to planning condition.
Access Tracks	Existing tracks will be utilised wherever possible. It is proposed that 0.36 km of new access tracks will be constructed. Tracks to be generally 5m min width and to be constructed from compacted stone.
Temporary Construction Compound	The compound area will be 625 m^2. The compound area will contain areas for the parking of vehicles, storage of materials and a site office including staff welfare facilities. It will be screened by temporary earth bunds.
Crane Pads	The crane pads will be 660 m^2 for each turbine to facilitate construction. An additional 300 m^2 will be required for a soft blade laydown area. Each crane pad will be constructed from crushed stone, and the blade laydown area will be levelled ground.
Electrical Connection	The turbines will be connected to the substation (if located outside of the turbine) by underground cabling. Underground cabling will also be used to connect the turbine to the electricity distribution network. Cable trenches within the site are to be contained alongside the access road with a width of 1.5 m and depth of 1 m dependent on ground conditions

2.1.2 The coordinates of the proposed wind turbines are as follows:

Turbine Number	Easting	Northing
T1	353682	754728

2.1.3 The proposed Project will comprise one turbine, capable of producing around 0.8 MWe. The site location is shown in Figure 4.1.

2.1.4 The turbine to be used at the site will comprise three bladed upwind horizontal axis wind turbine as these have been demonstrated to be the most reliable. However, the final selection of the exact type and size of wind turbine to be used for the Project depends on a number of factors, including equipment availability at the time of construction.

2.1.5 The turbine will stand up to a maximum of 74 m to tip. It is expected that the hub height would be a maximum of 50 m tall (the distance from ground to the hub) and that the turbine will have a maximum rotor diameter of 48 m. The turbine will have a rotor that will consist of three blades. A figure showing the front and side profile of a typical turbine design that could be constructed at the proposed site is shown in Figure 5.4. However, it is anticipated that the developer could use a combination of any sizes to achieve this design.

2.1.6 The turbine will require its own transformer to change the voltage to one that is appropriate for electrical interconnection with the grid. The transformer may be internally housed within the turbine nacelle or tower, or housed externally within a small substation adjacent to the tower base. If an external substation is used, it will be located close to the tower and coloured appropriately for the site. The power generated by the turbines will then be exported via an underground cable connection to the local energy distribution network. Further details are provided in Section 5.7.

2.1.7 When generating, the rotational speed of the blades is optimised to maximise energy capture and varies between 6 and 16 rpm (revolutions per minute). When not generating due to insufficient wind speed, the blades turn at a slower speed, or not at all. At high wind speeds, approximately 25 meters per second, wind turbines are programmed to stop by the high speed cut out limiter controller so as to avoid the structural stresses encountered at these higher wind speeds which could otherwise damage the turbines.

2.2 Project Layout

2.2.1 The positioning and layout of the turbine within the site aims to minimise any environmental impacts while maximising the exposure of the turbine to the wind resource. In siting the turbine, similar constraints to those used in selecting the site are considered and a computer model is used to determine the optimal configuration.

2.2.2 In addition, environmental factors have been a consideration in the siting of the turbine. These environmental factors have included ecological and archaeological features and landscape issues.

2.2.3 “Micro-siting” is the final iteration in the design of the Project site layout and is undertaken in the final stages of development as further information becomes available. For example, the results of geotechnical investigations to be conducted at the proposed turbine location will inform the ground conditions, (e.g. any zones of underground voids or fractures). Similarly there may be design features of the turbine selected for installation at the proposed site that may require minor changes to the design as outlined in this ER. Because such factors may not be discovered until the final design stage, or even the construction stage, some flexibility in determining the exact turbine location is required at the planning permission stage.

2.2.4 National planning guidance with respect to wind developments (PPG 22 – Planning Policy Guidance on Renewable Energy) recognises the flexibility required due to micro-siting and recommends that, as the precise wind regime on any site cannot be predicted with absolute accuracy, local planning authorities may consider granting planning permission in such terms that will permit the siting of individual turbines within carefully defined areas rather than at precisely defined positions. E-Gen propose that the final micro-siting of the turbine will be agreed with the local authority and will therefore be the subject of an appropriate planning condition.

2.2.5 Any micro-siting would be in accordance with the findings of the environmental assessments undertaken (and the results in this ER) and any further site specific factors which could only be determined through detailed ground investigations in the construction phase. It is requested by the applicant that a micro-siting area of 50m is allowed for the turbine position, provided site constraints (eg. noise limits, etc) are not impinged upon.

2.2.6 Figure 5.1 illustrates the proposed general site layout of the key elements as envisaged, subject to any minor micro-siting. These include: the wind turbine; substation; roads; the crane pad and construction laydown area.

2.2.7 It is believed that the existing track running along the southern edge of the site boundary will allow for access to the site without modification to land outside the landholding. The site entrance location shown on the plans has been selected to take into account visibility and the most likely access route to the site. The site entrance bell mouth will be of a suitable radius to permit entry of the abnormal load / length vehicles required.

2.2.8 The permanent project footprint would occupy approximately 0.227 hectares (ha) situated within a site that covers some 126.9 ha. During the construction phase an additional 0.1 ha would be temporarily required for laydown and working areas.

2.3 Development of the Project Layout

2.3.1 Throughout the development of the proposed Cotton of Pitkennedy Project, e-Gen has sought to minimise the impact of the Project especially in relation to landscape and visual amenity. This has been achieved through listening to the concerns of interested parties including all statutory and non-statutory consultees.

2.3.2 Careful consideration has been given to all relevant planning policy documents and guidance notes in the refinement of the Project layout including the various supplementary planning documents (both adopted and draft) (See Section 3 of this ER). Consideration has also been given to recent planning decisions by Angus Council to ensure that the project reflects lessons learned on other projects in the District.

2.4 Further Information

2.4.1 Further information on the project and the various turbine components and operation, safety considerations, the energy balance of the Project, construction, operation and maintenance, and decommissioning activities are detailed in Appendix G.

SECTION 3

UK PLANNING POLICY AND THE DEVELOPMENT PLAN

3 UK PLANNING POLICY AND THE DEVELOPMENT PLAN

3.1 Introduction

3.1.1 This planning section identifies the relevant development plan documents polices, national planning policies and guidance, against which the proposals are to be considered.

3.1.2 It is intended to assist Angus Council in its consideration of the merits of the application and also those persons interested in the application in understanding the planning context and the reasons why the proposal has been designed to fit that context.

3.1.3 Matters such as visual impact, ecological interest and archaeological/cultural heritage assets, noise, shadow flicker and transportation and aeronautical consideration are dealt with in detail in other sections of the ER. Potential impacts on residential amenity have become an issue in relation to some proposals for wind farms. This section includes a sub-section that addresses the issues that can arise in relation to such impacts.

3.2 UK Planning Policy

3.2.1 There are numerous planning guidance documents relating to UK Planning Policy on the siting and development of wind energy projects at a national level. At the local and regional level, development is governed by the documents that make up the "Development Plan". The Development Plan relevant to the proposed Cotton of Pitkennedy Project includes specific policies for guiding development in Glenfarg and the wider Perthshire area. The policies relevant to the proposed Cotton of Pitkennedy Project are discussed in this Section and have been considered as appropriate in the environmental assessment process and in the preparation of this ER. Further details, where appropriate are also referred to in the individual technical sections (6-16) of this ER.

National Guidance

3.2.2 With regard to the proposed Cotton of Pitkennedy Project the following NPPGs, PANs, policy statements and specific advice sheets are considered to be relevant:

SPP 6:	Renewable Energy
NPPG 6:	Renewable Energy Developments (revised 2000)
PAN 1/2011:	Planning and Noise (2011)
Specific Advice Sheet:	Onshore Wind Turbines
SNH Policy Statement 01/02:	SNH's Policy on Renewable Energy (2001)
SNH Policy Statement 01/02:	Strategic Locational Guidance for Onshore Wind Farms in Respect of the Natural Heritage (2002)
Action Plan:	2020 Routemap for Renewable Energy in Scotland

National Planning Framework

3.2.3 The National Planning Framework for Scotland 2 (NPF2) 2009 represents the spatial aspect of the Government's Economic Strategy and confirms the importance of renewable energy to Scotland's energy mix. The NPF2 is intended to:

"*takes forward the spatial aspects of the Scottish Government's policy commitments on sustainable economic growth and climate change, which will see Scotland move towards a low carbon economy.*"

Furthermore, the NPF2 states that:

"Government is committed to establishing Scotland as a leading location for the development of renewable energy technology and an energy exporter over the long term' and that 'the aim of national planning policy is to develop Scotland's renewable energy potential whilst safeguarding the environment and communities."

Scottish Planning Policy 6: Renewable Energy

3.2.4 The most relevant policy guidance note issued by the Scottish Government to the proposed Development is "Scottish Planning Policy 6: Renewable Energy" (SPP 6) published in 2007. SPP 6 aims to ensure the delivery of renewable energy targets for Scotland, as well as supporting the development of a viable renewable industry in Scotland. The statement confirms the Government's previous commitment to generating 40% of Scotland's electricity from renewable sources by 2020.

3.2.5 The SPP sets out how the planning system should manage the process of encouraging, approving and implementing renewable energy proposals when preparing development plans and determining planning applications.

3.2.6 Relating to wind energy developments explicitly, the statements notes that the Scottish Ministers expect planning authorities to make positive provision for renewable energy developments by supporting a diverse range of renewable energy technologies including encouraging the development of emerging and new technologies.

3.2.7 The Government have recognised that during the lifetime of this SPP, onshore wind power is likely to make the most substantial contribution towards meeting renewable targets and that Scotland has considerable potential to accommodate this technology in the landscape although, increasingly, careful consideration must be given to the need to address cumulative impacts. It is suggested to Local Authorities that their development plans should set out a spatial framework, supported by broad criteria, for the consideration of wind farm proposals over 20 megawatts.

3.2.8 In all instances, Local Authorities are asked to assess applications in relation to criteria based policies to provide clarity on the issues that must be addressed to enable development to take place. The criteria will vary depending on the scale of development and its relationship to the characteristics of the surrounding area but are likely to include impacts on landscapes and the historic environment; ecology (including birds), biodiversity and nature conservation; the water environment, communities; aviation; telecommunications; noise; shadow flicker; and any cumulative impacts that are likely to arise.

3.2.9 The importance of cumulative landscape effects is also recognised. Local Authorities are reminded to take account of those projects that are currently the subject of valid but underdetermined applications, and that views of neighbouring authorities should be taken into account. The statement also defines that decisions should not be unreasonably delayed because other schemes in the area are at a less advanced stage in the consideration process and that, in such circumstances, the weight that planning authorities should attach to undetermined applications should reflect their position in the application process.

3.2.10 The temporary nature of renewable energy developments has been explored within the statement and planning authorities are asked to include appropriate conditions for the decommissioning of renewable energy developments, including their ancillary infrastructure, when they reach the end of their life and the restoration of the

environment, taking into account any proposed after-use of the site. In addition, planning authorities should ensure that sufficient finance is set aside to enable operators to meet their restoration obligations. Authorities are asked to satisfy themselves that this finance is secured irrespective of whether the developer or operator of the development is still in business at the end of the consent period, and may for example require financial guarantees, binding against the developer or operator and any successors in title, by way of a Section 75 planning agreement, as part of the approval of planning permission to ensure that restoration will be fully achieved.

3.2.11 Further information on the UK Plan-Led System, SPP6: Renewable Energy, NPP Guideline 6: Renewable Energy, PAN1: Planning and Noise, Specific Advice Sheet on Onshore Wind Turbines, SNH Policy Statement 01/02 and 02/02, and the 2020 Routemap for Renewable Energy in Scotland is detailed in Appendix F

3.3 Local and Regional Planning Policy

3.3.1 The following planning policy documents are particularly useful for consideration against the proposed Cotton of Pitkennedy development:

- TAYplan Strategic Development Plan (June 2012);
- Angus Local Development Plan Main Issues Report (November 2012);
- Dundee and Angus Structure Plan 2001-2016;
- Angus Local Plan Review (February 2009); and
- Implementation Guide for Renewable Energy Proposals (June 2012).

3.3.2 Regional and local planning policy in the form of the development plan comprise the TAYplan Strategic Development Plan (June 2012) and the Angus Local Development Plan is supportive of wind energy development in Angus. Further information on the guidance provided in these plans, and other regional and local planning documents is outlined in the following sub-sections.

3.3.3 Further information on the TAYplan Strategic Development Plan, the Angus Local Plan Review and the Implementation Guide for Renewable Energy Proposals are detailed in Appendix F.

TAYplan Strategic Development Plan (June 2012)

3.3.4 The TAYplan seeks to reduce resource consumption through provision of energy and waste/resource management infrastructure in order to contribute to Scottish Government ambitions for the mitigation of and adaptation to climate change and to achieve zero waste. It also aims to contribute towards greater regional energy self-sufficiency.

3.3.5 This requires us to use less energy and to generate more power and heat from renewable sources and resource recovery; and, to consider waste from start to finish; becoming better at resource management. This is strongly tied into resource security and living within environmental limits. It also presents opportunities to grow the renewable energy and waste/resource management sector as a whole within the TAYplan region. The issue is no longer about whether such facilities are needed but instead about helping to ensure they are delivered in the most appropriate locations.

3.3.6 It recognises the different scales – property (eg. micro-renewables or individual waste facilities), community (eg. district heating and power or local waste facilities) and regional/national (eg. national level schemes and waste facilities for wide areas) at which this infrastructure can be provided and both the individual and cumulative contribution that can be made, particularly by community and property scale

infrastructure, to Scottish Government objectives for greater decentralisation of heat and energy.

3.3.7 Further information on Policy 6 of TAYplan is included in Appendix F.

Angus Local Development Plan Main Issues Report (November 2012)

3.3.8 The Angus Local Development Plan (LDP) Main Issues Report (MIR) was published in November 2012 and the consultation period will extend until 4th January 2013 to seek views on the issues affecting Angus, and how Angus should develop over the next 20 years.

3.3.9 The Angus LDP MIR notes that The Scottish Government has set a target of generating the equivalent of 100% of Scotland's demand for electricity from renewable sources by 2020. The planning system has an important role to play in the achievement of this target, by ensuring that new developments (eg. on-shore wind farms, biomass facilities, hydro-electric schemes) are well located and designed. It will also be important to ensure that the general approach of the LDP to all forms of renewable energy is consistent with national policy and provides clarity for prospective developers on our locally-important environmental assets.

3.3.10 The proposed 'Preferred Option' for wind turbine developments is as follows:

In addition to the current policies of the local plan, a more detailed map-based approach to assessing cumulative impacts will also be developed as part of a spatial framework for all wind energy development across Angus. This spatial framework will be an enhancement of the recent implementation guide and will be adopted as formal supplementary guidance.

Dundee and Angus Structure Plan 2001-2016

3.3.11 In the Renewable Energy and Waste Management Renewable Energy section of the Dundee and Angus Structure Plan 2001-2016, it is noted that:

6.42 The Scottish Executive indicates through NPPG6: Renewable Energy Developments (Revised 2000) and PAN45: Renewable Energy Technologies that Planning Authorities should seek to provide positively for renewable energy development where this can be achieved economically and in an environmentally acceptable manner. Individual renewable energy sources and technologies take a variety of forms including energy from waste, wind, energy forestry and crops, solar, hydro electric, landfill gas and tidal barrage.

6.43 The Renewables Obligation (Scotland) and NPPG6 (Revised) seek to stimulate further renewable energy development and reflect the Scottish Executive's wish to see the proportion of Scotland's energy generated from renewable sources increase to 18% by 2010. While it may be expected that proposals for renewable energy development in the Structure Plan Area will focus on wind energy there remains potential for a range of other sources, such as bio-mass, solar power, small scale hydro schemes and possibly in the longer term wave energy.

3.4 Discussion of Relevant Planning Policy

3.4.1 The project is considered to be compliant with the higher level requirements of the SPP6 and NPPG6 documents discussed above which are considered to promote the development of areas such as the Angus area provided that the development can be proved to have no significant adverse impact on the environment.

3.4.2 The local planning policy, in the form of the Local Development Plan Main Issues Report, the Local Plan Review, and the Dundee and Angus Structure Plan are very supportive of renewable energy in principle, and the Local Plan Review establishes clear criteria against which renewable energy proposals will be assessed. The

policies contained within these documents that have been established as being relevant to the Project are discussed below.

3.4.3 Further information of the primacy of the development plan as a material consideration, and a summary of the material planning considerations is detailed in Appendix F.

3.4.4 The proposed Project represents an excellent opportunity to develop a renewable energy project for a number of reasons.

- Availability of good wind resource;
- Location outside existing ecological designations;
- Location outside landscape designations;
- Location away from existing settlements;
- Availability of suitable areas of land for the development;
- Easy access to and from the site; and
- Availability of Grid Connection.

3.4.5 In addition to providing clarity on local planning policies, the Implementation Guide also included four appendix plans showing: International Designations (Map 2); National Designations (Map 3); Local Designations (Map 4); and Other Considerations (Map 5). These maps were used extensively during the development process to ensure that the proposed development was feasible and appropriately sited.

3.4.6 The proposed Cotton of Pitkennedy turbine is located a considerable distance from all international (Map 2), national designations (Map 3), and other considerations and constraints (Map 5). As the local designation map (Map 4) shows, the turbine is located in a relatively unconstrained part of the County, albeit there is a single archaeological area identified in the vicinity of the turbine (which has been taken account of in the siting of the turbine).

3.4.7 In identifying the proposed location of the Cotton of Pitkennedy, all of the above factors have been considered, and it is the applicant's belief that the scale and position of the proposed wind turbine is appropriate for the local area, and takes into account all of the constraints to development outlined in the regional and local planning policies.

3.4.8 The proposal is a temporary development for which permission is sought for a period of 25 years, after which the site would be fully restored in accordance with the requirements of the Local Planning Authority. Upon the decommissioning of the Project, all its above surface elements could be taken away, leaving no visible trace. Alternatively, access roads may be left in-situ, as per a planning condition. Where possible materials associated with the decommissioning would be recycled. The limited period of operation, and ease of removal of the proposed Project, is therefore considered to be an additional significant favourable material consideration.

3.4.9 Further information on the contribution of the Project to national Renewable Energy Targets and sustainable development are detailed in Appendix F.

3.5 Conclusion

3.5.1 The adopted Development Plan supports the Scottish Government drive to increase the proportion of electricity production sourced from renewables to 40 per cent by 2020. Local policies reflect National Policy Guidance, as embodied in NPPG 6; climate change policy and energy policy. These elements of national policy all identify a clear national need for projects of this type due to the pivotal role renewable

energy, and wind energy in particular, will play in implementing the UK climate change and energy strategy.

3.5.2 The proposed Cotton of Pitkennedy wind turbine is strongly supported by local, regional, and national policies and targets to promote sustainable development in general, and renewable energy in particular. It is carefully located so as to minimise its potential environmental impact in visual, ecological and human terms. The site is also well located in relation to connection points on the transmission network, and is fully compatible with the broad environmental and socio-economic ethos of the local planning policy.

3.5.3 In identifying the proposed location of the Cotton of Pitkennedy, all of the international, national and local designations and constraints have been carefully considered, and it is the applicant's belief that the scale and position of the proposed wind turbine is appropriate for the local area, and takes into account all of the constraints to development outlined in the regional and local planning policies, as demonstrated in section 3.6.12 above.

3.5.4 This Environmental Report incorporates an Environmental Assessment of the project based on the requisite legislation and the relevant planning policy framework.

SECTION 4

THE SITE

4 THE SITE

4.1 Site Selection

4.1.1 E-Gen have identified a number of sites within rural Scotland through the use of a custom-made mapping tool, which recognizes areas of land most suitable for small scale wind developments. Feasibility studies have been undertaken at a number of sites. Issues that e-Gen have examined in their assessments have included:

- Wind resource;
- Distance from housing;
- Existing land use and designation;
- Ecological and archaeological factors;
- Flood risk;
- Availability of electrical connection;
- Aviation and air defence;
- Accessibility and rights of way, and
- A site area sufficient to accommodate a viable project.

4.1.2 These studies have shown that the proposed Cotton of Pitkennedy site was not constrained by the above factors and was therefore considered suitable for the construction of a Wind Energy Development.

4.1.3 Detailed consideration of the above criteria for the proposed site indicated the following:

Wind Resource

4.1.4 The siting of wind turbines is constrained by the need for a location with a sufficient wind resource to allow the project to operate in a technically and commercially viable manner. Developers rely on published wind energy maps to initially identify areas with sufficient wind resources. The DTI wind speed database (ETSU NOABL) contains estimates of the annual mean wind speed throughout the UK. The data is the result of an airflow model that estimates the effect of topography on wind speed. There is no allowance for small-scale topography or local surface roughness (such as tall crops, stone walls, or trees), both of which may have a considerable effect on the wind speed. Planning permission has been granted for a 50 m meteorological mast at the site, which will monitor wind speed and direction and enable an accurate assessment of wind resource at the site to be made.

Distance to Housing

4.1.5 There is currently no guidance in national, regional or local planning policy relating to separation distances between houses and wind turbines although potential impacts (such as noise and visual impact) which may result from proximity of turbines to housing have been considered.

There are six residential properties within the site boundary; and a further four residential properties are located immediately outside of the site boundary. A range of other houses and buildings, including a school, are located within 500m of the site boundary.

Existing Land Use and Designation

4.1.6 The site consists entirely of agricultural land, currently used for growing crops. The site is not the subject of any national or local designation.

Ecology

4.1.7 The preliminary site selection study undertaken established that there were no statutory or non-statutory wildlife sites either on or in close proximity to the site. Detailed ecological surveys have since been undertaken and have confirmed that the site is of limited ecological value.

Flood Risk

4.1.8 There is no risk of flooding at the proposed Project due to either construction or decommissioning activities.

Landscape

4.1.9 The site is located well away from national and internationally important landscape designations with no World Heritage or AONB being located within 30 km of the proposed site. A National Park, the Cairngorms, is located approximately 22km from the site. Forfar Loch Country Park is located approximately 8.5km from the site, but is not considered a designated landscape.

Availability of Electrical Network Connection

4.1.10 Wind projects need to connect to an electricity network to deliver power to the regional power system. Developers must therefore consider the adequacy of the existing transmission facilities (i.e. the presence of lines of the correct voltage and also the availability of unused capacity on the existing lines). Remoteness from a suitable connection point requiring construction of a lengthy transmission line to interconnect to the power grid can make a project uneconomic and also impacts on transmission losses. Discussions will be held with Scottish and Southern Energy Power Distribution to confirm the best method of connecting to the power distribution network. This is likely to be through a point of connection at the Pitkennedy property. An interconnection agreement will be negotiated with Scottish and Southern Energy Distribution and a separate planning application submitted by Scottish and Southern Energy Power Distribution for the electrical connection from the wind turbine to the connection point as appropriate.

Aviation and Defence (MOD/CAA)

4.1.11 Civil Aviation Authority (CAA) and the Ministry of Defence (MOD) have been consulted on the proposed development in accordance with RenewableUK guidelines. The MOD no longer responds to pre-planning enquiries and as such no consultation response has been received. Dundee Airport was also consulted as it is located within 30km of the project site. No response has been received from the above consultees; however no issues regarding radar interference are anticipated. This issue is discussed further in Section 15 of this ER.

Telecommunications

4.1.12 Initial studies of the microwave, radar, television (TV) and radio transmissions indicated the project was feasible. Several companies were contacted to provide details of whether the turbine would be likely to interfere with their communication equipment. The companies included the Joint Radio Company, Atkins Ltd and Airwave Solutions Limited. This is discussed further in Section 14 of this ER.

Accessibility and Rights of Way

4.1.13 An initial review of the local infrastructure indicated that access would be feasible. There are no public rights of way across the site with the nearest being approximately 0.9km south-west of the proposed turbine location, passing through Montreathmont Forest. Please see Appendix C for the Full Access Report.

Sufficient Area for a Viable Project

4.1.14 The area of the proposed site is sufficient for the installation of a single turbine with an electrical output of 0.8 MWe. The turbine has been positioned in order to take maximum advantage of the wind regime while being far enough away from wind flow obstacles (trees, buildings) on site.

4.2 Further Site Details

4.2.1 The proposed Cotton of Pitkennedy turbine will be located entirely within the Cotton of Pitkennedy Farm landholding. The Project site is centred on Grid Reference NO536547. The site location can be seen in Figure 4.1.

4.2.2 The Project site falls within Angus, and is administered by Angus Council.

4.2.3 The Project will be located approximately 1.6 km from the east most edge of the settlement of Aberlemno, and some 4 km north east of Forfar. There are a number of scattered houses in the vicinity of the site, with 6 residential properties inside the site boundary. The nearest non-involved property, Pitkennedy Farm, is approximately 475 m to the east of the turbine.

4.2.4 Towns / villages within approximately 10 km of the proposed Project site include:

- Netherton (1.20 km north);
- Aberlemno (1.65 km north west);
- Forfar (4.52 km south west);
- Letham (6.31 km south);
- Dunnichen (6.56 km south west);
- Lunanhead (6.66 km south west);
- Tannadice (7.06 km north west);
- Friockheim (7.64 km south east); and
- Brechin (8.50 km north east).

4.2.5 There are no footpaths within the proposed Project site boundary, with the closest public right of way being located some 0.9km to the south-east of the proposed turbine location. There is no distinction in Scottish legislation between footpaths and bridleways and as such, due to the distance between the nearest PROW and the proposed turbine location, the turbine will comfortably comply with the British Horse Societies recommended minimum separation distance of 200 m between turbines and Bridleways. There are no ‘core paths’ within the site boundary or adjacent to the site, with the closest approximately 0.9km to the south-east of the proposed turbine location, running through Montreathmont Forest.

SECTION 5

THE NEED FOR AND BENEFITS OF THE PROJECT

5 THE NEED FOR AND BENEFITS OF THE PROJECT

5.1 Overview and Need for the Development

5.1.1 The proposed development would contribute towards the UK's targets, as stated in the Energy White Paper 2007, of producing over 10 per cent of electricity from renewable resources by 2010 and 20 per cent by 2020, and the subsequent Climate Change Act (2008) which aims for the net UK carbon account for the year 2050 to be at least 80% lower than the 1990 levels. The Project will also help achieve the stated aims of the European Union's 'Renewables Directive' (2001/77/EC) of reducing greenhouse gas emissions in the union by 12 per cent by the end of 2010 and 20 per cent by 2020.

5.1.2 The development in the UK of renewable energy projects, such as the proposed Cotton of Pitkennedy Wind Farm, has principally been driven by initiatives and targets set by the Government in order to combat climate change. In addition, the decline of the UK's indigenous energy supplies and increase in energy imports requires a shift from our current dependence on fossil fuels. The construction and operation of renewable energy projects, such as the proposed Project, will add to the diversity of the UK electricity generation sector, helping to maintain the reliability of supplies. Wind energy is inexhaustible and is not subject to the instability of the international fuel markets. Wind energy developments also eliminate the emissions of the acid gases and local air quality pollutants associated with the operation of existing fossil fuelled generation plant.

5.1.3 Further information about climate change, tackling climate change and European legislation, and the Feed-in Tariff support system is presented in Appendix E.

5.2 UK Climate Change Programme

5.2.1 The **UK Climate Change Programme,** published in November 2000, set out the Government's proposals for meeting the UK's legally-binding target of a 12.5 per cent reduction in greenhouse gas emissions, (Kyoto Protocol) and for moving towards the Government's domestic goal of a 15 per cent reduction in carbon dioxide emissions by 2015. The programme also confirmed the requirement to supply over 10 per cent of UK electricity from renewable sources by 2010 in line with the Renewables Directive. The UK programme for reducing greenhouse gas emissions includes the Climate Change Levy, carbon trading, increased energy efficiency and a renewable energy support programme. The Climate Change Levy comprises a tax on the use of non-renewable energy used in industry, commerce and the public sector, with offsetting cuts in employers' National Insurance Contributions. Renewable energy, such as that from the proposed Project, is exempt from this levy.

5.2.2 Since this time the UK Government has introduced the Climate Change Bill which aimed to achieve a mandatory reduction of 60 per cent in the carbon emission from the 1990 level by 2050, with an intermediate target of between 26 per cent and 32 per cent by 2020. The bill was passed in to UK Law as "**The Climate Change Act**" on 26 November 2008 and in addition to reductions in 2020 and 2050 targeted an 80 per cent reduction over 1990 as an apparitional target. The U.K. is the first country to ratify a law with such a long-range and significant carbon reduction target.

5.3 Local Targets for Renewable and Wind Energy

5.3.1 The Scottish Government is committed to increasing the proportion of electricity which comes from renewable energy to 32% by 2012, and to 100% by 2020, as stated in the '2020 Routemap for Renewable Energy in Scotland'. Angus has demonstrated a strong desire to help meet these targets, as demonstrated by the large number of approved and operational wind projects in the district (refer to Table 1.1).

5.3.2 In June 2012, Angus Council's Infrastructure Services Committee approved the Implementation Guide for Renewable Energy Proposals, which covers all renewable energy, including hydro, bio-energy, solar and wind power proposals. The document is designed to explain and clarify the existing Angus Local Plan Review policy base that will be used by Angus Council in determining renewable energy planning applications.

5.3.3 The proposed Cotton of Pitkennedy wind turbine will make a small but positive contribution to these targets, with an installed capacity of 0.8 MW, enough on average over a year to provide between 447 and 637 households with electricity. The project will also help Scotland to meet its national target of generating 100% of Scotland's electricity requirement from renewable generation by 2020.

5.4 Additional Benefits of the Project

5.4.1 In addition to playing a major role in achieving the Government's targets for renewable energy and thereby tackling climate change, wind energy has a number of additional benefits for the region and the UK, including:

- Economic benefits – in terms of UK construction and maintenance jobs etc
- Power supply benefits – by increasing diversity and security of electricity supply.
- Environmental benefits – reduced emissions of pollutants in addition to carbon dioxide

5.4.2 These issues are discussed further in Appendix E.

5.5 Environmental Benefits

5.5.1 In addition to the benefits associated with reduced emissions of greenhouse gases, other external environmental costs of conventional generation are avoided, including poor air quality and the damage to the natural and built environment caused by acid rain, as in addition to the prevention of emissions of CO_2 (the main greenhouse gas), the use of wind power prevents the emissions of the acid gases and local air quality pollutants such as sulphur dioxide (SO_2) oxides of nitrogen (NO_x), particulate matter of less than 10 microns (PM_{10}s) and Volatile Organic Compounds (VOCs). Producing energy from the proposed Project would reduce the quantities of these pollutants being produced in the UK, thus helping the UK government's environmental and social objectives. In addition there is no requirement for fuel transportation. Using a methodology proscribed by RenewableUK it can be calculated that the proposed Project could help prevent the emissions of:

- Between 778 and 2268 tonnes of CO_2 per year
- Up to 34 tonnes of SO_2 per year; and
- Up to 11 tonnes of NO_x per year.

5.5.2 For further details of the calculation methodology, see Section 7: Air Quality.

5.5.3 During the operational phase of the wind farm, the surrounding agricultural land will be available for use right up to the turbine base with the only sterilized areas of land essentially being the turbine base and access tracks. Also when compared to conventional power stations, wind farms are easily and quickly decommissioned and any visual impact is totally reversible.

SECTION 6

LANDSCAPE AND VISUAL IMPACTS

6 LANDSCAPE AND VISUAL IMPACTS

6.1 Introduction

6.1.1 This Section presents the findings of the landscape and visual assessment. It provides an assessment of a single wind turbine of 50m to hub/ 74m to tip height at Cotton of Pitkennedy, in terms of the potential effects on landscape character and visual amenity of the surrounding area.

6.1.2 Effects on the landscape include physical changes to the landscape as well as changes to landscape character. Effects on the landscape may also include effects on areas designated for their scenic or landscape qualities at a national, regional or local policy level. Effects on visual amenity relate to changes to views, and the appearance and prominence of the wind farm in those views.

6.1.3 The assessment comprises 5 main sections:

- Assessment Methodology
- Baseline Conditions
- Assessment of Landscape and Visual Effects
- Potential Cumulative Landscape and Visual Effects
- Conclusions

6.1.4 All figures referred to in this chapter can be found in Section 7.

6.2 Consultation

6.2.1 A Screening Direction was received from Angus Council on 11th January 2012. The Council's Direction included the following request,

"Prior to the submission of a formal application I would request that agreement is reached with this Authority in respect of the scope of the supporting information required to support the proposed development. Specifically I would suggest that early contact be made with Stewart Roberts, Countryside Officer with regards to landscape impacts and requirements for further information (ie. ZTVs and visualisations)."

6.2.2 Following subsequent contact with the Planning Officer and Countryside Officer a response to consultation on photomontages was received 21st June 2012 and the viewpoints were agreed on 17th October 2012. Wherever possible, this assessment has taken on board the suggestions raised in the Council's responses.

6.3 Assessment Methodology

Assessment – General Approach

6.3.1 The LVIA methodology is set out below. Its purpose is to describe and evaluate separately baseline landscape character and visual amenity, and to assess potential impacts arising from the development of the site for wind turbines. It considers impacts in relation to:

- Landscape character and resources, including effects on the aesthetic values of the landscape caused by changes in the elements, characteristics, character and qualities of the landscape;
- Designated landscapes, historic gardens and designed landscapes, and recreational interests;
- Visual amenity, including effects upon potential viewers and viewing groups caused by changes in the appearance of the landscape as a result of the project; and

- Cumulative effects arising in conjunction with existing and proposed windfarm developments.

6.3.2 Landscape character and resources are considered to be of importance in their own right and are valued for their intrinsic qualities irrespective of whether they are seen by people. Impacts on visual amenity as perceived by people, are therefore clearly distinguished from, although closely linked to, impacts on landscape character and resources. Landscape and visual assessments are therefore separate although linked processes.

6.3.3 The sequence of the LVIA is as follows:

Baseline Studies
Legislation and planning policy
Landscape context
Landscape character and sensitivity
Visual composition and sensitivity
↓
Landscape and Visual Impact Assessment
Evaluation of significance of landscape effects
Evaluation of significance of visual effects
Mitigation
Assessment of cumulative effects
Conclusions

6.3.4 The landscape and visual impact assessment (LVIA) has been carried out with reference to the following guidance and best practice documents:

- *Guidelines for Landscape and Visual Impact Assessment 2nd Edition*, (GLVIA) published by the Landscape Institute and Institute for Environmental Management and Assessment (2002);
- *Landscape Character Assessment and Guidance for England and Scotland*, Countryside Agency in conjunction with SNH (2002);
- *Scottish Planning Policy* (SPP), The Scottish Government (February 2010);
- *PAN45: Renewable Energy Technologies*, Scottish Executive (Revised 2002);
- *Guidance for the Cumulative Effects of Windfarms,* SNH (Version 2 revised April 2005);
- *Strategic Locational Guidance for Onshore Windfarms in Respect of Natural Heritage,* SNH (2005);
- *Visual Representation of Wind Farms: Good Practice Guidance, SNH (2006)*
- *Guidance – Natural Heritage assessment of small scale wind energy projects which do not require formal Environmental Impact Assessment (EIA),*SNH (March 2008); and *Siting and Designing Windfarms in the Landscape, Version 1,* SNH (December 2009)

Approach to Landscape Character Baseline

6.3.5 Landscape character is what makes an area unique. It is defined as 'a distinct, recognisable and consistent pattern of elements, be it natural (soil, landform) and/or human (for example settlement and development) in the landscape that makes one landscape different from another, rather than better or worse.'

6.3.6 The essential components of landscape character are:

- A distinct and recognisable pattern of elements. Landscape elements are the dominant features which characterise, contribute to or detract from the overall landscape impression, i.e. the built form, the landform, land use, vegetation, water, field patterns, walls etc. They are quantifiable and can be described; and
- Landscape Type: These are identifiable at the broader scale and are understood in terms of areas with a homogeneous character based on geology, topography, geomorphology, vegetation and / or land use or dominant elements, e.g. moorland, rolling upland, historic parkland, urban. These are elements or groups of elements which can be classified as a landscape type of a particular quality and value. Sensory experiences, e.g. tranquillity and wildness, are also considered as part of the overall make up of the character type.

6.3.7 The quality and sensitivity of the baseline landscape has been assessed and categorised in accordance with the criteria shown in Table 6.1 Sensitivity of Receptors. The capacity of the landscape to accept development is reflected in the degree to which it is able to accommodate change (due to a particular development or land use change) without adverse effects on its character. Landscapes that have the highest sensitivity to change have the lowest capacity to accept change. Sensitivity is not absolute, it will vary according to the character of the existing landscape and the extent and nature of the Development proposed.

6.3.8 Quality relates to the physical state of the landscape and its intactness from visual, functional and ecological perspectives. It also reflects the state of repair of individual features and elements that make up the character in any one place.

6.3.9 The sensitivity of a landscape to change varies according to the nature of the existing resource and the nature of the proposed change. Considerations of value, integrity and capacity are all relevant when assessing sensitivity.

6.3.10 Value relates to the value or importance attached to a landscape for its scenic or aesthetic qualities or cultural associations. It may be recognised through national, regional or local designations.

6.3.11 Integrity is the degree to which the value and condition has been retained.

Approach to Visual Amenity Baseline

6.3.12 The Zone of Theoretical Visibility (ZTV) extends over a 30km radius from the proposed Pitkennedy Wind Energy development and indicates the areas where views of the proposed turbines are theoretically available. All ZTVs contained in the LVIA are computer-generated and have been prepared using intervisibility software with Ordnance Survey Digital Terrain Mapping (DTM) and a model of the proposed turbine. It indicates where views of the turbine are available theoretically. The ZTV does not take account of the screening effect of surface features, including minor landform, woodlands, hedgerows and built development, and as such present the 'worst case' scenario.

6.3.13 Visual receptors, such as users of buildings, recreational spaces, footpaths and transport routes, have differing sensitivities to their visual environment. Generally, this is dependent upon their interest in the visual environment, their viewing opportunity and duration, and the context of the views. These factors may be expressed in terms of:

- The value of the view/viewpoint reflects the intrinsic character and scenic qualities of its location and context. Where recognised through the designation of an area, such as a National Park, National Scenic Area, value is increased, while the

presence of detracting features in a view will generally reduce value. Higher value views/viewpoints are likely to be more sensitive to change;

- The importance of the viewpoint – as indicated by some form of recognition, e.g. as noted in a guidebook, marked on a map or indicated on the ground by a sign or other visible feature. The provision of facilities e.g. seating, parking, footpath may also indicate a location of higher importance. Views gained from locations where people gather outdoors may also be of higher importance; and

- Viewers' expectations, occupation and activities when experiencing the view.

Assessment of Receptor Sensitivity

6.3.14 The approach to assessing the sensitivity of receptors is set out in Table 6.1 below.

TABLE 6.1 SENSITIVITY OF RECEPTORS

Sensitivity	Landscape Receptors	Visual Receptors
High	Important / highly valued landscape recognised by national or regional designation; Sense of tranquility or remoteness noted in Landscape Character Assessment (LCA); High sensitivity to disturbance specifically noted in LCA; and The qualities for which the landscape is valued are in good condition, with a clearly apparent and distinctive character. This distinctive character is susceptible to relatively small changes	Viewers' attention likely to be focused on the landscape or have proprietary/high interest in their everyday visual environment and/or with prolonged and regular viewing opportunities. Such receptors would include: - Residents experiencing views from dwellings. - Users of public rights of way and access land - Strategic recreational footpath and cycleways - People experiencing views from important landscape features of physical, cultural or historic interest, beauty spots and picnic areas Large number of viewers and/or location in highly valued landscape could elevate viewer sensitivity to highest level.
Medium	Landscape of moderately valued characteristics reasonably tolerant of changes; Landscape is not recognised by national or regional designation; The landscape is relatively intact, with a distinctive character. and The landscape is reasonably tolerant of change.	Viewers with moderate interest in their environment, and discontinuous and/or irregular viewing periods. Such receptors would include: - Road or rail users - Users engaged in outdoor sport or recreation other than appreciation of the landscape (i.e., hunting, shooting, golf, water-based activities) - Users of secondary footpaths or footpaths that may be already impacted by intrusive features.
Low	Relatively degraded or low value landscape with no designations; Landscape integrity is low, with a	Small number or low sensitivity of viewers assumed. Viewers with a passing interest in

Sensitivity	Landscape Receptors	Visual Receptors
	landscape in poor condition and a degraded character; and The landscape has potential capacity to accommodate significant change.	their surroundings and momentary viewing periods. Such receptors include: - Drivers/travellers and/or passengers of moving vehicles including trains. - People at their place of work, including agricultural workers and other non-motorised users on most roads or those already impacted by intrusive features.

Assessment of Effects

6.3.15 Consideration is given to the potential effects of the proposed development, with mitigation, on landscape character and resources, and on visual amenity. Effects can be direct, indirect, cumulative, adverse or beneficial, permanent (i.e. operational) or temporary (often associated with the construction phase) and are defined below. The assessment distinguishes between impacts on landscape character and those associated with visual amenity and views across the site.

- **Direct** impacts are those imposed on landscape elements on the site as a direct result of development, such as the loss of existing trees or other vegetation;
- **Indirect** impacts may occur some distance from the site, e.g. removal of screen vegetation on the site would allow views in from surrounding areas;
- **Cumulative** impacts occur when additional developments of similar type appear in an area or when a development might impose several different impacts on the same resource or receptor;
- **Short Medium** or **Long Term** describes the duration of an impact; and
- **Permanent** or **Temporary** relates for example to additional impacts during construction compared to the permanent change caused by the new development.

6.3.16 The assessment considers the magnitude of change the development would exert on the landscape because of:

- The proximity of the turbine to the landscape receptor – generally the magnitude of effect reduces with increasing distance as it exerts progressively less influence on the landscape; and
- The extent to which the turbine can be seen, and the extent to which landform, woodland, buildings etc. intervene; and
- The extent to which a landscape receptor would experience visibility of the turbine and its resulting effects on character.

6.3.17 Criteria used to assess the magnitude of predicted landscape effects range from high through to negligible/no change and are set out below in Table 6.3 Magnitude of Change.

6.3.18 The Guidelines for Landscape and Visual Impact Assessment (GLVIA) identifies a higher level of significance is generally attached to large scale effects and effects on sensitive or high-value receptors; thus small effects on highly sensitive sites can be more important than large effects on less sensitive sites.

6.3.19 The GLVIA provides the following general guidance when judging the significance of effects on the landscape:

- Loss of mature or diverse landscape elements, or features;
- Effects on character areas, which are distinctive or representative;
- Greater weight should be given to those elements, features and areas if they are identified as being of high value or importance, i.e. effects on those recognised as being of national importance are likely to be of more significance than effects on those of local importance;
- Landscapes of high value and sensitivity to the type of change proposed are likely to be more seriously affected by development than those with a lower sensitivity; and
- A test of significance is not directly related to planning policy.

6.3.20 The significance of an effect may be beneficial but more usually it will be adverse, at least initially. Significance will be determined using informed and well-reasoned professional judgment. The two principal criteria determining significance are the sensitivity of the receptor to change of the nature proposed by the development, and the magnitude of the effect. By combining the sensitivity of the receptor with the predicted magnitude of change the level of significance is established as shown in Table 6.4 Significance of Landscape and Visual Effect below. Table 6.5 Significance of Effects describes the potential changes that would arise.

Visual Assessment Methodology

6.3.21 The assessment of the magnitude of potential impacts is an assessment of the extent of change upon visual amenity as a direct result of the development, depending upon factors including:

- The scale of change in the view with respect to the loss and/or addition of new features;
- The degree of contrast, or integration of/compatibility with any new features with existing features in the view;
- The duration of the effect (temporary or permanent, intermittent or continuous) (temporary effects are considered to be less significant than longer term or permanent effects);
- The distance of the receptor from the source of the effect;
- The angle of view and presence of intervening vegetation or features;
- The dominance of the impact feature in the view, and
- Seasonal variation.

6.3.22 This assessment assumes that the change would be seen in clear visibility and under appropriate lighting conditions and considers:

- The attributes of the landscape in which the Pitkennedy turbine would be sited. i.e. the scale and character of the landscape in which it would be viewed; the presence or absence of landscape features; and the scale / enclosure of the landscape within the field of view;
- The design and siting of the proposed turbine itself; and
- The atmospheric conditions prevalent at the time of viewing.

6.3.23 The Scottish Executive's document PAN 45 (Revised 2002): Renewable Energy Technologies provides the following general guide to the effect which distance has on the perception of the development in an open landscape. The PAN 45 guidance is a useful guide to the relationship between distance of an object and its prominence in the landscape.

TABLE 6.2 GENERAL PERCEPTION OF A WINDFARM IN AN OPEN LANDSCAPE

Distance	Perception
Up to 2 km	Likely to be a prominent feature
2-5 km	Relatively prominent
5-15 km	Only prominent in clear visibility - seen as part of the wider landscape
15-30 km	Only seen in very clear visibility - a minor element in the landscape.

6.3.24 It is assumed that the visual effects of the Project will reduce as viewing distance increases. The magnitude of visual effects at any given distance will vary according to the range of factors described. Table 6.3 Magnitude of Change describes differing degrees of effect on visual amenity.

6.3.25 Photomontage images illustrating an observer's view of the proposed turbine have been produced for each of the viewpoint locations described in Table 6.6 Viewpoint Locations. The images have been produced in accordance with best practice guidance, the Landscape Institute Advice Note 01/11, 'Photography and Photomontage in Landscape and Visual Impact Assessment'.

6.3.26 The computer generated wireframe and photomontage images are intended to illustrate the potential visual effects of the turbine from each viewpoint and should be read in conjunction with descriptions of wider visual changes that are likely to occur based on findings made during the site survey.

TABLE 6.3 MAGNITUDE OF CHANGE

Magnitude	Landscape Effects	Visual Effects
High	Total permanent / long term loss or substantial change to key landscape features or elements of the baseline that are important to character resulting from the proposed windfarm; The proposed windfarm lies within or close to highly sensitive landscape; and Size of turbines out of scale with	Major permanent / long term change in the existing view, change very apparent and dominant involving high level of change in character and composition of baseline, i.e. pre-development view

Magnitude	Landscape Effects	Visual Effects
	existing elements	
Medium	The proposed windfarm forms a visible and recognisable feature in the landscape; Proposed windfarm is some distance from highly sensitive landscape; Notable partial permanent / long term loss or alteration to one or more key landscape features or elements of the baseline that are important to character resulting from the proposed windfarm; Other built elements or human activities in views; and The scale of turbines fits with existing features.	Medium permanent / long term change in the existing view, change apparent involving change in character and composition of baseline, i.e. pre-development view
Low	Changes to the physical landscape, its character and the perception of the landscape are slight or short term; The proposed windfarm is a long distance from highly sensitive landscape; and Effect reduced by the presence of many other built elements or human activities in views;	Minor permanent / long term change in baseline, i.e. pre-development view, - change will be distinguishable but not prominent from the surroundings, whilst composition and character of view, although altered will be broadly similar to pre-change circumstances
Negligible / No Change	The effect of change on the perception of the landscape, the physical landscape or landscape character resulting from the proposed windfarm is minimal, approximating to the 'no-change' situation	Very slight permanent / long term change in the existing view- change barely distinguishable from surroundings. Character and composition of view substantially unaltered

TABLE 6.4 SIGNIFICANCE OF LANDSCAPE OR VISUAL EFFECT

		Landscape or Visual Sensitivity		
		High	**Medium**	**Low**
Magnitude of Change	**High**	Substantial	Substantial	Moderate
	Medium	Moderate	Moderate	Slight
	Low	Slight	Slight	Slight
	Negligible / No Change	Neutral	Neutral	Neutral

TABLE 6.5 SIGNIFICANCE OF EFFECTS

Significance	Landscape effects	Visual effects
Substantial	Substantial changes affecting the character of the designated landscape or reason for which it was designated. Substantial changes affecting the character of the landscape or elements therein. The integrity of the landscape would be degraded.	The scheme would result in a substantial change and significant deterioration in the existing view
Moderate	Changes affecting the character of the designated landscape or reason for which it was designated. Changes affecting the character of the landscape or the elements therein.	The scheme would cause a clearly visible change or noticeable deterioration in the existing view
Slight	Slight changes affecting the character of the designated landscape or reason for which it was designated. Slight changes affecting the character of the landscape or the elements therein.	The development would cause a slight change or slight deterioration in the existing view
Neutral	No or minimal perceptible changes affecting the character of the designated landscape or reason for which it was designated. No or minimal perceptible changes affecting the character of the landscape or the elements therein. Note that this includes no effect	The development would be barely discernible deterioration or would not change the existing view. Note that this includes no effect

Cumulative Assessment Methodology

6.3.27 Cumulative landscape and visual effects are the additional effects that would arise from constructing and operating the wind turbine at Pitkennedy, assuming all other planned and recently built developments are already present within the landscape. Potential effects arising from the intervisibility of these developments and the wind turbine at Pitkennedy have been assessed and detailed. The assessment considers whether the proposed wind turbine development in conjunction with these new developments would alter the baseline landscape and/or create an unacceptable degree of adverse effect on visual receptors within their combined visual envelopes.

6.3.28 The following types of cumulative effects are assessed, as recommended by SNH guidance 'Cumulative Effect of Wind Farms':

- Static cumulative impacts including:

- Combined or simultaneous visibility - in which two or more Wind Farms are seen together at the same time, from the same place, in the same (arc of) view where their visual effects are combined;

- Successive or repetitive visibility - in which two or more Wind Farms are present in views from the same place but cannot be seen at the same time together, because they are not in the same (arc of) view. The observer has to turn his head to see new sectors of view other Wind Farms unfold succession.

- Sequential cumulative visual impacts - in which two or more Wind Farms are not present in views from the same place and cannot therefore be seen together at the same time. The observer is required to move to another viewpoint to see the second or more Wind Farms, so that they appear in sequence. Sequential cumulative visual impacts are usually assessed in terms of progression along a route.

- Cumulative landscape impacts – including impacts on landscape designations, designed landscapes, sense of scale, sense of distance, focal points, skyline, wildness and remoteness and special landscape areas.

6.3.29 As with the assessment of 'stand alone' Wind Farms, assessment to determine whether cumulative effects are likely to be 'significant' or 'not significant' involves the combined consideration of the sensitivity of the landscape receptor or visual receptor to the Wind Farm proposal, and the magnitude of change, or scale of the effect that would occur in the landscape or in the view. Although the sensitivity of the landscape receptor or visual receptor is no different for cumulative assessment, different criteria are used to assess cumulative magnitude of change and the significance of cumulative effects.

6.3.30 The assessment considers the additional contribution to the magnitude of change arising from the proposal as High, Medium, Low and Negligible / No Change based on the following factors:

- The location of the Pitkennedy turbine in relation to other developments;
- The direction and arrangement of existing and proposed development in relation to the proposed project;
- The distance between the turbines and the receptor - magnitude will decrease as distance increases;
- The number and scale of wind turbine developments seen simultaneously, successively or sequentially; and
- Landscape setting, context and degree of visual coalescence of existing and proposed developments.
- The relationship between developments in terms of the relative size (height) of wind turbines and distance;
  - The extent of the developed skyline; and
  - The effects on a sense of wildness and remoteness.

6.3.31 Cumulative landscape and visual effects may be beneficial or antagonistic. Where they comprise a range of benefits, for instance extensive screen/ structure planting, they may be considered to form part of the mitigation measures.

6.3.32 The duration of construction of the developments is also an important consideration when the visual impacts of construction cranes and lighting can be visible on certain sites for several years.

6.3.33 The significance and definition of cumulative landscape and visual effects is set out in Table 6.6 below.

TABLE 6.6: MAGNITUDE OF CUMULATIVE EFFECTS

Magnitude of Effect	Cumulative effects
High	The addition of the Wind Farm proposal would lead to a major alteration in the cumulative baseline of the receiving landscape or visual receptor, such that it may be perceived as a 'Wind Farm landscape'
Medium	The addition of the Wind Farm proposal would lead to an alteration in the cumulative baseline of the receiving landscape or visual receptor, such that the addition would be notable
Low	The addition of the Wind Farm proposal would lead to a minor alteration in the cumulative baseline of the receiving landscape or visual receptor, such that the addition would not be conspicuous
Negligible / No Change	The addition of the Wind Farm proposal would have a negligible effect on the cumulative baseline of the receiving landscape or visual receptor, such that the addition approximates to the 'no change ' situation

6.3.34 Table 6.7 provides a guide to the assessment of significance and should not be regarded as prescriptive. The effects judged to be of 'substantial' or 'substantial / moderate' significance may be regarded as analogous with 'likely significant impacts' as referred to in the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999. These will occur where a wind energy development would have a material cumulative effect on the landscape receptor / view gained from a viewpoint, such that the landscape receptor / view is characterised and defined by the turbines. No significant effects occur where although the turbines may be present, the landscape receptor / view continue to be characterised and defined by its baseline characteristics, rather than the wind energy development.

6.3.35 Significance criteria have not been applied to this assessment, and criteria derived from the GLVIA have been used instead. These criteria have been applied because they define the types of landscape or visual impact that would occur at each level of significance. For the purpose of this assessment, impacts that are assessed as being either moderately adverse or above are considered significant. Although slight adverse or beneficial and neutral impacts are not considered significant, they remain worthy of consideration throughout both the design and the decision making process.

TABLE 6.7: ASSESSMENT OF SIGNIFICANCE OF CUMULATIVE EFFECTS

		Landscape / visual receptor sensitivity		
		High	**Medium**	**Low**
Magnitude of effect	**High**	Substantial	Substantial	Moderate
	Medium	Moderate	Moderate	Slight
	Low	Slight	Slight	Slight
	Negligible	Neutral	Neutral	Neutral

6.3.36 The assessment of cumulative effects is covered in Section 5: Potential Cumulative landscape and Visual Effects.

6.4 Illustrative Tools

Visibility Maps (ZTV)

6.4.1 Computer generated Zone of Theoretical Visibility (ZTV) Maps were produced to assist in viewpoint selection and to appreciate the potential influence of the development in the wider landscape.

6.4.2 Visibility Maps indicate areas from which it might be possible to secure views to part or parts of the proposed development. However, use of the Visibility Maps needs to be qualified on the following basis:

- There are a number of areas within the Visibility Maps from where there is potential to view parts of the proposal, but which comprise agricultural land where the general public do not appear to exercise regular access;
- The Visibility Maps do not account for the effects of screening and filtering of views as a result of intervening features, such as buildings, trees and hedgerows; and
- The Visibility Maps do not account for the likely orientation of a viewer – for example when travelling in a vehicle.
- The combined effect of these limitations means that the Visibility Maps tend to over-estimate the extent of visibility – both in terms of the land area from which the project is visible and also possibly the extent of visibility (e.g. number of turbines) from a particular viewpoint.
- The use of this type of Visibility Map is considered good practice and should be considered as a tool to assist in assessing the visibility of the project. The Visibility Maps do not present an absolute measure of visibility and do not represent the "visual impact" of the proposed development.

Viewpoint Assessment

6.4.3 The assessment of landscape and visual effects has been carried out from a representative selection of viewpoints, which was agreed with the local authority. The selected viewpoints are representative of the views experienced at different distances

and directions from the site, as well as from the various landscape character types identified in the Study Area from which the proposed development would be visible.

6.4.4 Detailed analysis of the viewpoints includes description of the existing and predicted view, analysis of magnitude of change and the effects on landscape character and visual amenity.

6.4.5 For key viewpoints a wireframe diagram can be prepared using Wind Farm computer software, based on OS Landform Panorama and/or OS Landform Profile data.

6.4.6 The viewpoint analysis will be illustrated with reference to a range of illustrative material, including photographs, wireframes and photomontages. All photographs will be taken with a 35mm SLR camera, with 50mm focal length lens, mounted on a level panoramic head tripod. Photographs are supplied as digital converted images, and computer generated panoramas are constructed using computer software, for example Adobe Photoshop.

6.4.7 In the assessment all of the photographs, wireframes and photomontages will be prepared with reference to best practice guidance. They will record a 90 degree angle of view, illustrating the full extent of the proposals within the local landscape context experienced at the viewpoint.

6.5 Policy Context & Baseline Conditions

6.6 Landscape Planning Designations

6.6.1 There are 4 registered gardens or designated landscapes within 10km of the site.

TABLE 6.8: GARDENS or DESIGNATED LANDSCAPES WITHIN 10 KM OF THE WIND FARM SITE

Name of Gardens or Designated Landscapes	Distance (km) from site	Orientation from site
Guthrie Castle	5	SE
House of Pitmuies	5.1	SE
Brechin Castle	8	NE
Kinnaird Castle	8.1	NE

6.6.2 There are 7 registered Listed buildings within 2km of the site.

TABLE 6.9: LISTED BUILDINGS WITHIN 5 KM OF THE WIND FARM SITE

Listed buildings	Grade	Distance (km) from site	Orientation from site
Tillywhandland	B	1.3	SW
Aberlemno; Parish Kirk	C	1.6	NW
Aberlemno; Parish Kirkyard	B	1.6	NW
Aberlemno; Flemington Symbol Stone	B	1.6	NW
Flemington Castle	B	1.6	NW
Flemington Farmhouse	B	1.6	NW
Melgund Castle	A	1.7	NE

6.6.3 A desk top search of Special Areas of Conservation, Special Protection Areas, Important Bird Areas and Sites of Special Scientific Interest located within 10 km of the centre of the site, has noted 4 SSSI's.

TABLE 6.10: NATIONALLY AND INTERNATIONALLY DESIGNATED SITES WITHIN 10 KM OF THE WIND FARM SITE

Designated Site	Name	Distance from site	Orientation from site
SSSI	Turin Hill (Code; 1570) (Geological)	1	W
		1.2	SW
		3.5	SW
SSSI	Rescobie and Balgavies Lochs (Code; 1345) (Biological)	3.6	SW
SSSI	Restenneth Moss (Code; 1346) (Biological)	4	SW
SSSI	Forest Muir (Code; 648) (Biological)	10	W

6.6.4 There are no conservation areas on the site, but there are three within 10km.

TABLE 6.11: CONSERVATION AREAS WITHIN 10 KM OF THE PROPOSED WIND FARM

Name	Distance from site	Orientation from site
Tannadice	5.2	NW
Dunnichen	6	SSW
Forfar	9	SW

6.6.5 There are no Scheduled Monuments on the site. However, 15 Scheduled Monuments lie within 5 km of the site and the setting of some of these maybe an issue.

TABLE 6.12: SCHEDULED MONUMENTS WITHIN 5 KM OF THE PROPOSED WIND FARM

Name	Distance from site	Orientation from site
Melgund Cottage and Enclosure	1.75	NNW
Aberlemno; Flemington Tower	1.6	NW
Turin Hill Fort	2	SSW
Balbinny,Enclosure	2.05	NNW
Carsegownie,Cairn	2.5	W
Netherton (Enclosure 500m S)	2.9	NE
Netherton (Settlement 400m S)	3	NE
Finavon, Fort	3	W
Netherton (Enclosure 150m S)	3.3	NE
Balgavies Castle	3.1	S
Balgavies House	3.15	S
Haresburn Croft Burial Mound	3.5	SW
Guthrie Hill (Cairn)	4	SE
Finavon Castle	4.8	NW

Rob's Reed Fort	5	SW

6.7 National and Regional Planning Policy

6.7.1 Scottish national planning policy is covered by The Second National Planning Framework (NPF2), which receives statutory footing from The Planning Act (Scotland) 2006. The NPF2 sets sustainable economic development at its core and focuses its provisions to 2030; It also sits alongside the first National Planning Framework (NPF1) which provides development guidance to 2025.

6.7.2 The NPF2 document 'articulates the spatial consequences of policies for economic development, climate change, transport, energy, housing and regeneration, waste management, water and drainage, catchment management and the protection of the environment. It identifies key strategic infrastructure projects as national developments and reflects the ambitious emissions targets which will see us move to a low carbon economy. It embodies the Scottish Government's continuing *commitment to realising the potential of places, highlighting economic and environmental opportunities in each and every part of Scotland.'* The NPF2 also states that the Scottish Government is, *'committed to establishing Scotland as a leading location for the development of renewable energy technology and an energy exporter over the long term. It is encouraging a mix of renewable energy technologies, with growing contributions from offshore wind, wave, and tidal energy, along with greater use of biomass. The aim of national planning policy is to develop Scotland's renewable energy potential whilst safeguarding the environment and communities.'*

6.7.3 The Tay Plan, Proposed Strategic Development (June 2011) Policy 6: Energy and Waste/Resource Management Infrastructure, suggests that consideration should be given to:

- Sensitivity of landscapes (informed by landscape character assessments and other work), the water environment, biodiversity, geo-diversity, habitats, tourism and listed/scheduled buildings and structures;

6.7.4 Dundee and Angus Structure Plan 2001-2016

6.44 While Dundee City and Angus Councils support the principle of developing sources of renewable energy it is recognised that proposals, particularly on a large scale, may have locally significant adverse impacts on the environment, landscape and local communities which will require to be taken into account. An Environmental Statement as outlined in NPPG6 (Revised) and PAN45 will be required for any large scale proposals or where development is likely to have significant effects on the environment. Detailed guidance on dealing with individual developments and sources of renewable energy, including locational guidance and where appropriate areas of search will be established in Local Plans.

6.8 Local Planning Policy

Angus Local Plan (2009) - Renewable Energy

6.8.1 The Dundee and Angus Structure Plan acknowledges the advantages of renewable energy in principle but also recognises the potential concerns associated with development proposals in specific locations. Angus Council supports the principle of developing sources of renewable energy in appropriate locations.

Policy ER34 : Renewable Energy Developments

Proposals for all forms of renewable energy development will be supported in principle and will be assessed against the following criteria:

- *(a) the siting and appearance of apparatus have been chosen to minimise the impact on amenity, while respecting operational efficiency;*
- *(b) there will be no unacceptable adverse landscape and visual impacts having regard to landscape character, setting within the immediate and wider landscape, and sensitive viewpoints;*
- *(e) access for construction and maintenance traffic can be achieved without compromising road safety or causing unacceptable permanent and significant change to the environment and landscape.*

6.8.2 Scottish Natural Heritage's Tayside Landscape Character Assessment (TLCA), indicates that Angus divides naturally into three broad geographic areas – Highlands; Lowland and Hills; Coast. The TLCA provides a classification to map these areas based on their own particular landscape characteristics. The impact of wind farm proposals will, in terms of landscape character, be assessed against the TLCA classifications within the wider context of the zones identified in SNH Policy Statement 02/02.

3.80 The open exposed character of the Highland summits and the Coast (Areas 1 and 3) is sensitive to the potential landscape and visual impact of large turbines. The possibility of satisfactorily accommodating turbines in parts of these areas should not be discounted although locations associated with highland summits and plateaux, the fault line topography and coast are likely to be less suitable. The capacity of the landscape to absorb wind energy development varies. In all cases, the scale layout and quality of design of turbines will be an important factor in assessing the impact on the landscape.

3.82 The Lowland and Hills (Area 2) comprises a broad swathe extending from the Highland boundary fault to the coastal plain. Much of this area is classified in Policy Statement 02/02 as Zone 1- lowest sensitivity. Nevertheless, within this wider area there are locally important examples of higher natural heritage sensitivity such as small- scale landscapes, skylines and habitats which will influence the location of wind turbines. In all cases, as advocated by SNH, good siting and design should show respect for localised interests.

3.83 Wind farm proposals can affect residential amenity, historic and archaeological sites and settings, and other economic and social activities including tourism. The impact of wind farm developments on these interests requires careful assessment in terms of sensitivity and scale so that the significance can be determined and taken into account.

3.84 Cumulative impact occurs where wind farms/turbines are visually interrelated e.g. more than one wind farm is visible from a single point or sequentially in views from a road or a footpath. Landscape and visual impact can be exacerbated if wind turbines come to dominate an area or feature. Such features may extend across local authority, geographic or landscape boundaries and impact assessments should take this into account. Environmental impacts can also be subject to cumulative effect – for example where a number of turbine developments adversely affect landscape character, single species or habitat type.

6.8.3 In the Angus Local Plan Review (Angus Council June 2012), policies ER34 Renewable Energy Developments and ER35 Wind Energy Development are relevant to development proposals ranging from small single turbines to major windfarms subject to S36 of the Electricity Act. The development site is within an area where renewable energy proposals will be considered by the Council. Planning

considerations are strongly influenced by the scale and location of a proposal including landscape and visual impact.

Policy ER34: Renewable Energy Developments Proposals for all forms of renewable energy developments will be supported in principle and will be assessed against the following criteria:-

Criterion (a) the siting and appearance of apparatus have been chosen to minimise the impact on amenity, while respecting operational efficiency;

- *Appropriate landscaping and planting can help a building or other appropriately scaled structure to blend into the landscape.*
- *Wind turbines for example should be chosen to reflect the scale of the landscape*

Criterion (b) there will be no unacceptable adverse landscape and visual impacts having regard to landscape character, setting within the immediate and wider landscape, and sensitive viewpoints;

- *As the extent and degree of landscape and visual impact increases so to does the need to assess potential cumulative issues and mitigation measures. The supporting information and accompanying visual/graphic information should be commensurate with the scale and location of the proposal.*
- *All forms of renewable energy development should be considered within their landscape context where applicable, Policy S6: Development Principles and Schedule 1: Development Principles will form the basis for the assessment of small scale proposals, which have a local impact only.*

Landscape and Visual Impact of Wind Turbines

- *Wind turbines are likely to have the greatest landscape and visual impact over the greatest distance and this aspect is addressed in Section 4 Landscape and Visual Assessment of Wind Energy Proposals.*

Policy ER 35 Wind Energy Development

The Lowland and Hills area is recognised as of generally lower sensitivity to turbines in terms of visual, landscape and natural heritage interests. However, there may be areas within the Lowland and Hills Area where large turbines would have an unacceptable impact, or where properly sited and designed wind energy development can be accommodated in areas of higher natural heritage, landscape and visual sensitivity.

The Tayside Landscape Character Assessment

6.8.4 The site is located within the Tayside Landscape Character Assessment (TLCA) area. The TLCA was prepared by Land Use Consultants in 1999, as part of a series of assessments for Scotland prepared on behalf of SNH and the local authorities. As noted above, the Character Assessment develops a landscape classification which identifies and describes a range of character areas. It also provides guidance on accommodating development and land use change. Whilst some of this guidance has been superseded, the definition of the landscape character areas and their

vulnerability to some types of development remains valid, and should be used in conjunction with the evolving SNH guidance. The landscape character areas are:

- *Area 1 Highland - primarily the Angus Glens along and to the north of the Highland Boundary Fault;*
- *Area 2 Lowland & Hills - mainly rolling farmland and low hills;*
- *Area 3 Coast - a mix of sand, cliffs and, around Montrose, lowland basin.*

6.8.5 Within Area 2 Lowland & Hills there are four landscape character types, further subdivided into five landscape character areas:

The predominant lowland landscape types within Angus are the Broad Valley Lowlands, lying south of the Highland Boundary Fault, represented by Strathmore and the Lower South and North Esk Valleys and the large area of Dipslope Farmland between Dundee, Forfar and Montrose. Both of these areas are dominated by arable agriculture and are settled with towns, villages and networks of roads. Fields are medium to large in size with intermittent hedges and trees. There are areas of shelterbelts and small plantation woodlands. Three of the main settlements in Angus (Kirriemuir, Forfar and Brechin) and the main transport artery (the A90) lie in the Broad Valley Lowlands. The Dipslope Farmland is on higher undulating ground with smaller settlements and more open aspects. The two main lowland areas are separated by ranges of lowland hills: To the west the Igneous Hills of the Sidlaws divide the Dipslope Farmland and Dundee from Strathmore, this pattern extending west into Perth & Kinross. To the east the smaller scale Low Moorland Hills around Forfar separate the Dipslope Farmland from the Lower Esk Valleys north east into Aberdeenshire the lowland landscape area is represented by the Agricultural Heartland type (from the South & Central Aberdeenshire Landscape Assessment, SNH) which merges with the Broad Valley Lowlands.

12. Low Moorland Hills This lowland character area lies between the Dipslope Farmland to the south and Broad Valley Lowland to the north. Although clearly higher than this and the Montrose Basin to the east, much of it is of lower elevation than the adjacent Dipslope Farmland to the south and east. On analysis it has two clearly different sub-types: the lower, flatter and significantly afforested Lowland Forest and Farmland area of Montreathmont to the east of Turin Hill and north of Guthrie and the area of widely separated steep sided Low Moorland Hills in rolling farmland to the west, surrounding the east and south sides of Forfar.

6.8.6 The TLCA forms the basis for the strategic assessment of landscape capacity and potential visual and landscape impact and according to the Angus Local Plan (2012 review),

Applicants will be required to establish the parameters for their individual site assessment with the Council taking cognisance of the detailed landscape and visual implications and suitable representations Where proposals are for turbines between 15 and 50m are proposed a basic VIA should be submitted and for turbines over 50m a full LVIA should be undertaken.

…Outwith development boundaries, in countryside locations it is considered that there is scope for turbines to be accommodated within the following defined landscape types. The guide heights are extrapolated from sources including the Tayside Landscape Character Assessment, the Landscape Capacity and Cumulative Impacts Study, Reporters findings from planning appeals, responses from statutory consultees and reflect the particular scale and landscape of Angus. There may be scope for

turbines of greater height, where this can be demonstrated by the applicant. This will be strongly influenced by the elevation of the turbine site, the scale of the landscape and proximity of scale features and buildings

Table 4: Levels of Acceptable Landscape Character Change

Landscape Type (LT) 12 Low Moorland Hills, Landscape Unit (LU) Forfar Hills

Existing Windfarm Character – this is a landscape with views of windfarms.

Acceptable Future Windfarm Character – landscape with occasional windfarms

Guidance: considered to have scope for turbines circa 80m to blade tip in height which do not disrupt the principle ridgelines or adversely affect the setting of important landscape features and monuments such as Balmashanner Monument; Finavon and Turin Hillforts.

6.9 Landscape Baseline Conditions

Site Context

6.9.1 The site is located on the east coast of Scotland within Aberdeenshire. The closest significant areas of population are Forfar and Brechin; located approximately 9km south west and north east from the site respectively. The closest large area of population to the site is Dundee; approximately 25km south west of the site.

Character of Area

6.9.2 Key Characteristics of No. 12. Low Moorland Hills are:

- Dominated by Lower Old Red Sandstone, though there are patches of igneous rocks, forming low eastern outliers of the Sidlaws
- Combination of low, rounded hills and craggy, ridged upland
- The area falls from 180 metres in the north-west to about 50 metres along the coastal strip
- Extensive area of farmland sloping gently towards the Angus coast
- Intensive agriculture based on cereals is the dominant land use
- Fields tend to be large and rectangular
- Rich historic heritage
- Scattered modern settlement
- Number of tall structures, principally a series of masts and a line of electricity pylons

Landform and drainage

6.9.3 The site lies in a lowland area known as the Low Moorland Hills. The site is located at 150m AOD,a relative high point in the immediately surrounding landscape; as such the site is not located within a flood zone or flood zone warning area. To the north of the site the landscape slopes from 150m AOD to 100m AOD over approximately 1.5km, to the Meglund Burn (Stream) – the location of the closest Flood Zone and Flood Warning Zone. Amongst the lower lying land there are rolling hills such as Bellahill - 900m north, Angus Hill - 2.2km north and Crook Hill – 3km north east. To the east of the site the landscape slopes gradually from 150m AOD to sea level over approximately 15km; reaching the east coast of Scotland and the North Sea. To the west of the site the landscape has two distinct high points. The Turin Hill area at 252m AOD – approximately 2km south west; And, the Hill of Finavon – at 224m AOD – approximately 2.7km north west. To the south of the site the landscape features a greater frequency of clusters of woodland and trees. The landscape is relatively flat and features Rescobie and Balgavies Loch's approximately 4km from the site.

Vegetation

6.9.4 The site and its surroundings are described as some of the best agricultural land in Scotland. Vegetation consists of scattered areas of coniferous and non coniferous trees, for example the cluster of trees located approximately 250m north of the site (adjacent to the sites access road) and the linear Wood of Pitkennedy (coniferous), immediately to the west of the proposed site.

6.9.5 Montreathmont Forest, Bertis Den Wood and Arovie Wood are located clustered together approximately 2.5km east of the site. The forests and woods are predominantly coniferous with only occasional non coniferous sections; the woodland is forestry Commission land and is the largest woodland area in the surrounding lowland hills landscape.

6.9.6 Records also indicate areas of bracken heath or rough grassland in the area, for example The Muir of Pitkennedy; a rough grazing area located approximately 350m south of the site. The Turin Hill Geological SSSI is located approximately 1.4km west of the site and features an area of coppiced woodland.

Land Use and Settlement

6.9.7 The site is an open pastoral field setting, part of Pitkennedy farmland. The land areas surrounding the farm are predominately large arable fields with occasional pasture, scattered farm buildings and residential dwellings.

Cultural Heritage

6.9.8 The area immediately surrounding the site, within 500m, has no identified significant cultural and heritage features. The wider surrounding area, within 10km, features a large range of listed buildings, ancient scheduled monuments, garden and landscape designations and conservation areas. These features and designations signify a rich cultural heritage within the area.

6.9.9 The surrounding area features several identified historic landscape features; these are listed below;

- The Turin Hill area; featuring a large number of shallow pits present on the north slopes of Turin Hill with fragments of incomplete mill-stones; the remaining pits likely mark the quarry-holes of completed mill-stones.
- Tillywhandland; One of 5 quarries n the Forfar area that compromise the 'Turin Hill' locality – located approximately 1.5km south west of the site.

- Kemps Castle; an Iron-Age complex occupying the summit of Turin Hill - located approximately 1.5km south west of the site.
- Aberlemno - Flemington Castle; A listed building and scheduled ancient monument site; the castle lies on the east side of Alberlemno at the foot of Grave Hill – located approximately 1.6km north west of the site.
- Alberlemno; Church and Cross Slab Stones; A "Historic Scotland Site" of three Pictish symbol stones – located approximately 1.6km north west of the site.
- Meglund Castle; A 16th Century L shaped House, restored in 2006, situated to the south of the Melgund Main buildings – located within a setting of a mixture of coniferous and non coniferous coppice – located 1.7km north of the site
- Framedrum reservoir; A man made reservoir located 467 ft above sea level; on the edge of Montreathmont Forest – located approximately 1.5km south east of the site.

6.10 Visual Baseline Conditions

Receptors

Key Views

6.10.1 Key views across the local landscape within which the turbine is proposed to be located are from high ground to the west of the site. Two parallel hill ridges, Hill of Finavon and Turin Hill, afford extensive views across Angus. More local views are available from Hillside at Balmashanner, Dunniden Hill and Hill of Kirriemuir.

Settlement/ Residential

6.10.2 Key settlements in the area are the market towns of Brechin, Forfar and Kirriemuir. The villages of Letham and Friokheim are also important and contribute to the settlement pattern which is quite sparse in this agricultural area. Smaller hamlets can be found such as Aberlemno, Crosston, Lunanhead, Finavon and Netherton.

6.10.3 Individual properties within 2km of the site are as follows:

Pitkennedy Farm; Muirside of Melgund (several buildings); Blackden; Bellahill; Tilliwhandland; Bog of Pitkennedy (several); Craiksfold; East Brae; North Mains of Turin; Nether Turin; Turin House; Framedrum; Woodside; Aberlemno; Flemington; Crosston; Wood of Aldbar; Southtown of Melgund; Mains of Melgund; and Melgund Cott.

Motorists and Other Road Users

6.10.4 The main arterial road through the region is the A90 Dundee to Aberdeen dual carriageway. This road runs along the Esk valley to the north of the site. The A932 running between Forfar and Friockheim (south of site) and A933 running between Brechin and Arbroath (east of site) provide important east west and north south transport links across the area. Closer into the site, the B9113 (Forfar – Montrose) runs to the south of the site and the B9134 (Forfar – Brechin) runs to the north west of the site. The site itself is located within a triangle of local lanes and farm tracks.

Rail Users

6.10.5 There are several disused railway lines in the area, all of which have now been dismantled. The nearest active line is in Brechin.

Recreation & Tourism

6.10.6 Although the area is predominantly a working agricultural and forestry landscape, there are a few key recreation/ tourist sites in the locality. The Forest of Montreathmont is close to the site, although nearly all views are curtailed by trees. Forfar has a Country Park on the west side of the town and a monument and viewpoint over the town at Balmashanner. Brechin has a Castle and the nearby Kinnaird Castle and Park. Various lochs have been created out of former gravel quarries in the Lunan Valley (Rescobie Loch and Balgavies Loch). Gutherie Castle, and House of Pitmuies Garden are near Friokheim and Cortachy Castle is situated to the north west in the foothills of the Grampian Mountains.

6.11 Key Features of the Development

The Proposed Development

6.11.1 One single Enercon E48 turbine is proposed for the site on Pitkennedy Farm. The location [Grid Ref: NO536547] is to the east of Wood of Pitkennedy (also known as Fox Covert) at 150m AOD. The wood forms a wind break with a trackway alongside.

Construction Phase

6.11.2 Construction of the wind turbine and associated structures would occur over approximately a 6 to 8 month period. The activities and temporary features include:

- Construction/ upgrading of site access;
- Provision of a temporary construction compound / site cabin;
- Excavation and construction of turbine base foundations;
- Excavations for underground cables;
- HGV deliveries to site and movement of vehicles on and off-site;
- The appearance of tall cranes and other on-site plant;
- Erection of turbine; and
- Reinstatement works, including the removal of the temporary construction compound and site cabins.

6.11.3 The construction of the Cotton of Pitkennedy Wind Turbine Development has been carefully planned and various environmental mitigation measures have been designed to limit the temporary effects of the construction phase.

Design and Mitigation

6.11.4 The location and general layout of the development has been determined by land use needs and has taken account of landscape, archaeological, ecological, geotechnical and background noise considerations identified in the course of the environmental assessment.

Turbine

6.11.5 The proposed turbine will be 50m to hub, with a rotor diameter of 48m and 74m tip height. The access track will come in from the north off the lane to Melgund Bank Farm and follow the woodland, before crossing the field to the turbine site. The crane hardstanding and blade lay-down area will be adjacent to the turbine location, on the north western side.

Transformer

6.11.6 The turbine transformer may be internally housed within the turbine nacelle or tower, or housed externally within a small substation next to the tower base. Power generated by the turbine will be exported via an underground cable connection to the local energy distribution centre. Access to the site will be via the existing access track alongside the Wood of Pitkennedy with a short stretch across the field to the site to minimise the amount of new trackway.

Decommissioning

6.11.7 The turbine will have an operational life span of approximately 25 years after which time it will be decommissioned unless a re-powering proposal has been approved. Decommissioning would be undertaken in accordance with best practice at the time.

6.12 Opportunities for Mitigation

6.12.1 Opportunities for mitigation are fairly limited due to the nature of the development. The location within the application area is considered to be the best site based on a number of factors that need to be resolved into one agreed location.

6.12.2 The topography on this part of the farm is relatively flat that therefore moving the turbine a few meters in any direction is unlikely to provide substantial gains.

6.12.3 Key visual receptors are some distance away from the site and therefore alterations in the location of the turbine within the site are unlikely to have a material beneficial effect on key receptors.

6.12.4 The existing trees in the Wood of Pitkennedy/ Fox Covert provides a good screening effect from the north west and west of the site. Although not all the turbine tower will be removed from view, a good proportion of it will be screened and some of the blades.

6.13 Assessment of Landscape and Visual Effects

6.14 General

6.14.1 Consideration is given to the potential effects of the proposed development, with mitigation, on landscape character and resources, and on visual amenity. The assessment considers the magnitude of change the development would exert on the landscape because of:

- The proximity of the turbine to the landscape receptor – generally the magnitude of effect reduces with increasing distance as it exerts progressively less influence on the landscape; and
- The extent to which the turbine can be seen, and the extent to which landform, woodland, buildings etc. intervene; and
- The extent to which a landscape receptor would experience visibility of the turbine and its resulting effects on character.

6.15 Assessment of Landscape Effects

6.15.1 There are currently no turbines within 5km of the site and therefore this turbine would introduce a new element into the local landscape. However, there are a number of tall structures, principally a series of masts on Fothringham Hill, Dunnichen, Hill of Finavon and Montreathmont Moor, and the line of electricity pylons running from north of Forfar towards Brechin, which means that the receiving landscape is reasonably tolerant of change and is of Moderate sensitivity. The Landscape Type (LT) for the

wider area is LT12: Low Moorland Hills and the Landscape Unit (LU) is for the Forfar Hills. LT12 is considered to be a landscape with views of windfarms/ turbines which are located across the region. Wind turbines in this broader landscape are considered to be acceptable and the future character of the area is a landscape with occasional windfarms. Current capacity guidance for the area suggests that this landscape is considered to have scope for turbines circa 80m to blade tip in height which do not disrupt the principle ridgelines or adversely affect the setting of important landscape features and monuments such as Balmashanner Monument; Finavon and Turin Hillforts. The magnitude of change is therefore Medium and the significance of effect **Moderate**.

6.15.2 An area of bracken heath/ rough grassland (Muir of Pitkennedy); is located approximately 350m south of the site and the Turin Hill Geological SSSI is located approximately 1.4km west of the site. Both areas will remain unaffected by the proposed turbine development. The Montreathmont Forest, Bertis Den Wood and Arovie Wood will also not have any direct landscape impacts.

6.15.3 The farmland on and around the site (within 500m), has no identified significant cultural and heritage features. The wider locality (within 10km), contains a range of listed buildings, ancient scheduled monuments, garden and landscape designations and conservation areas. These will remain unaffected by the proposals.

6.15.4 Whilst the following historic landscape features will not be directly affected as a result of this development, the setting of the following sites is assessed under Visual Amenity Effects:

- Kemps Castle (VP17); an Iron-Age complex occupying the summit of Turin Hill - located approximately 1.5km south west of the site.
- Aberlemno - Flemington Castle (not far from VP1); A listed building and scheduled ancient monument site; the castle lies on the east side of Alberlemno at the foot of Grave Hill – located approximately 1.6km north west of the site.
- Alberlemno; Church and Cross Slab Stones (VP2); A “Historic Scotland Site” of three Pictish symbol stones – located approximately 1.6km north west of the site.
- Meglund Castle (VP18); A 16th Century L shaped House, restored in 2006, situated to the south of the Melgund Main buildings – located within a setting of a mixture of coniferous and non coniferous coppice – located 1.7km north of the site

6.15.5 The key landscape characteristics for this area such as the topography, land use and the pattern/ structure of the fields, will not be directly impacted by the proposed development.

6.16 Assessment of Visual Effects (includes Residential Visual Amenity Assessment)

Located Receptors (selected viewpoints)

Viewpoint 1

6.16.1 Viewpoint 1 (VP1) is from Aberlemno Parish Church a cultural heritage receptor. The landscape is similar to 2 except more contained in its views (located in a small valley west of Flemington). The church is of historical and local importance, however, large numbers of people not expected to visit and so the receptor is considered to be of Medium Sensitivity.

6.16.2 Due to the surrounding topography and vegetation there will be intervisibility between the turbines and the church.. The construction of the turbine would therefore have no

effect on visual amenity and there would be a **Negligible** significance of effect. No mitigation would be required.

Viewpoint 2

6.16.3 Viewpoint 2 (VP2) Aberlemno Sculpted Stones is a cultural heritage receptor. The Stones stand in an elevated position on the side of the B9134 between Crosston and Aberlemno. The surrounding countryside is rolling medium sized arable fields divided up with stone walls. Woodland marks the small valley (containing Flemington) in the near view. The Wood of Pitkennedy shelter belt is partly visible on the skyline to the south. The hill of Finavon curtails the view to the west and provides a backdrop to the hamlet.

6.16.4 The base of the turbine will be out of sight, screened by intervening topography and the Wood of Pitkennedy shelter belt. However, the upper parts of the turbine tower, hub and blades will be viewed above the treeline. The Stones are promoted as a tourist destination and viewers attention is likely to be focused on the landscape around the Stones, although the site does not attract large numbers of visitors and so the sensitivity of the receptor is considered to be Medium.

6.16.5 A medium long term change in the existing view, changing the character and composition of the baseline result in a Medium magnitude of change. The construction of the turbine would cause a clearly visible change in visual amenity and therefore the significance of effect is considered to be **Moderate**.

Viewpoint 3

6.16.6 Viewpoint 3 (VP3) Mosstonmuir is on the B9113 and is a transport receptor and representative of several nearby residential properties. The area is dominated by the coniferous forest Montreathmont which has a deciduous woodland edge on this southern side. The land use is characterised by large paddocks and rectangular arable fields. There is a sprinkling of farmsteads with private tracks leading off the B9113 and telegraph poles running alongside the road. Turin Hill rises above woodland to the north-west, although the majority of long distance views are curtailed by woodland/ forest.

6.16.7 There will only be a small number of viewers (many of the properties are too close to the forest to obtain long distance views) and many of these will only have a passing interest in their surroundings resulting in a Low sensitivity viewpoint. The blade tips will only just be visible above the treeline and as this viewpoint is one of the few opportunities to glimpse the turbine structure the magnitude of change is expected to be Low. The development would cause a slight change in the existing view, but although altered, it will be broadly similar to pre-change circumstances. As there will only be a minor long term change in the baseline, the significance of effect is **Slight**. Mitigation is unlikely to have any effect on this location due to the existing forest/ woodland structure already screening most views.

Viewpoints 4 and 5

6.16.8 Viewpoints 4 and 5 have no view of the site and are therefore not covered in any further detail. Refer to Summary Table: Baseline Views, Residential Amenity and Visual Effects, below.

Viewpoint 6

6.16.9 Viewpoint 6 (VP6) Ardovie is a residential receptor and is located to the west of the turbine within a small area of farmland between North Wood and Ardovie Wood. The

view to the south-east towards the site takes in a rolling arable farming landscape with a number of scattered trees mixed in both nature and height. Farm outbuildings are visible near to the viewpoint in the direction of the turbine and a line of trees of varying heights makes a hedgerow of sorts, leading from the viewpoint towards the farm buildings. There is a lack of other vertical structures in the area with a largely open view towards the turbine. The lack of residential buildings in the area and shortage of road users heading towards Ardovie results in the viewpoint having Low sensitivity.

6.16.10 The turbine base and lower part of the tower are hidden behind the existing farm buildings, however the upper parts of the turbine tower, hub and blades will be viewed above the treeline. Ardovie marks a small number of residential properties with a road used only for access purposes. The sensitivity of the receptor is considered to be Medium owing to the overall visbility of the turbine. The development would cause a slight change in the existing view, but although altered, it will be broadly similar to pre-change circumstances. As there will only be a minor long term change in the baseline, the significance of effect is **Slight**.

6.16.11 Mitigation is unlikely to have any effect on this location due to the existing forest/ woodland structure around Ardovie already screening most views.

Viewpoints 7 and 8

6.16.12 Viewpoints 7 and 8 have no view of the site and are therefore not covered in any further detail. Refer to Summary Table: Baseline Views, Residential Amenity and Visual Effects, below.

Viewpoint 9

6.16.13 Viewpoint 9 (VP9) Balmashanner Hill is a recreational, residential and transport receptor of local interest. The view to the north east towards the site takes in a rolling arable/ pasture mixed farming landscape with restored former sand and gravel quarries. Single residential properties/ farmsteads are dotted across the landscape. The view is disrupted by significant wirescape and vertical structures arising from pylons, lower voltage electricity poles and telegraph poles. Despite this disruption, the view is of an attractive and predominantly rural landscape of local interest. Whilst the main viewpoint on Balmashanner Hill looks north across the town of Forfar, local walks around the hill include the view north east from this location, so viewers will have a moderate interest in their surroundings, resulting in Medium sensitivity.

6.16.14 The blade tips will be barely discernable in far distance and the topography near Turin Hill screens out most of the turbine tower. The backdrop of Montreathmont Forest means that the turbine is not seen on the skyline so that this aspect and the distance diminishes the apparent size and visibility. The magnitude of change will be Negligible as the development is unlikely to be noticeable in the view for the majority of viewers. The significance of effect will be **Neutral** as the character and composition of view will be substantially unaltered.

Viewpoints 10 - 15

6.16.15 Viewpoints 10-15 have no view of the site and are therefore not covered in any further detail. Refer to Summary Table: Baseline Views, Residential Amenity and Visual Effects, below.

Viewpoint 16

6.16.16 Viewpoint 16 (VP16) is a transport and residential receptor and is located on a public road to the east of Pitkennedy. The existing view is of gently rising ground, ploughed field with an island/ area of rough grassland and gorse at the crest of slope. The

southern end of woodland belt (Wood of Pitkennedy) is visible, although the rest of it disappears behind rising ground. Overhead electricity wires (33kv) cross the view on the high ground. A farmhouse and some associated buildings are tucked into the slope to the north east of the viewpoint. Large agricultural barns are prominent in landscape to the south and south west, along with other farm houses and associated buildings. There is a clear and open view of Turin Hill to the west.

6.16.17 The predicted view indicates no change to landscape features, except the introduction of an additional structure (turbine). The single turbine on high ground will dominate the view. However, the scene is of a working agricultural landscape and the scale of the turbine will not be out of place with the existence of large agricultural barns. Only a small number of viewers on the local road and a few residential properties in the locality means that this viewpoint will be of Low Sensitivity. The turbine will be a new large structure in the landscape leading to a High Magnitude of Change.

6.16.18 Although, the scale of development is not in-appropriate for this agricultural landscape, the construction of the turbine would cause a clearly visible change in visual amenity leading to a **Moderate** significance of impact.

Viewpoint 17

6.16.19 Viewpoint 17 (VP17) Turin Hill is a cultural heritage receptor. It has a similar landscape description as VP16. However, the wider scene is important from this viewpoint and takes in the Grampian Mountains to the northwest, the Esk river valley and local hillocks and forestry planting. The scene also includes a distant windfarm to the north east beyond Brechin and a single turbine to the north and one to the south east. The setting of Kemp's Castle earthworks is important. Access to hill top is not promoted and is not identified as a tourist attraction so there will only be a small number of viewers. However, the setting of monument is important and so the receptor has Medium Sensitivity.

6.16.20 A single turbine will be noticeable in the view, but will not dominate. As the viewpoint is on high ground, the viewer is looking down on the turbine, reducing its visibility. The turbine will add to the perception of wind energy developments located in the area - although only a slight addition (cumulative). A medium long term change in the existing view, changing the character and composition of the baseline means that the magnitude of change will be Medium.

6.16.21 The construction of the turbine would cause a clearly visible change in visual amenity that the overall significance of effect is **Moderate**.

Viewpoint 18

6.16.22 Viewpoint 18 (VP18) Melgund Castle is a cultural heritage receptor. The castle (remains) lies in a small valley created by the Melgund Burn and as a result has views that are constrained by topography. The area is surrounded by medium sized arable fields. 132kv pylons cut across the landscape to the north and west and the smaller 33kvnoverhead lines to the southwest.

6.16.23 The turbine will be situated on high ground above the castle and will therefore be noticeable in views towards the southwest. The topography will shield the lower part of the turbine, but the hub and blades will be visible from the grounds of the castle where vegetation doesn't intervene. This is an important cultural heritage site, but not one that is actively promoted to visitors and therefore has a medium sensitivity. A long term change in the existing view, changing the character and composition of the baseline results in a Medium magnitude of Change.

6.16.24 The construction of the turbine would cause a clearly visible change in visual amenity and lead to a **Moderate** significance of effect.

Viewpoint 19

6.16.25 Viewpoint 19 have no view of the site and are therefore not covered in any further detail. Refer to Summary Table: Baseline Views, Residential Amenity and Visual Effects, below.

Residential Amenity

6.16.26 Various individual properties lie within 2km of the site and these can be grouped into three groups based on their proximity to the site and the nature of their inter-visibility with the site.

6.16.27 The following properties, Pitkennedy Farm; Muirside of Melgund (several buildings); Blackden; Tilliwhandland; Bog of Pitkennedy (several); Craiksfold; and East Brae are all 10-15m below the turbine and situated between 0.5 and 1.5km away on ground that gently slopes away from the site of the proposed turbine. They will all have a view very similar to that demonstrated by VP16. As a result the significance of effect for these properties is **Moderate**.

6.16.28 The following properties Woodside; Bellahill; Aberlemno; Flemington; Crosston; Wood of Aldbar; Southtown of Melgund; Mains of Melgund; and Melgund Cott are situated to the north between 1.5 and 2km away. Although located on lower ground (typically 50m below the turbine), there may be partial views of the upper parts of the turbine tower and/ or the blades. They will all have a view very similar to that demonstrated by Viewpoints 2, 17 and 18. As a result the significance of effect for these properties is **Moderate**.

6.16.29 The following properties, North Mains of Turin; Nether Turin; Turin House; and Framedrum are situated to the south between 1.5 and 2km away with intervening forestry which will screen views of the turbine. There will therefore be no view and no effect. As a result the significance of effect for these properties is **Neutral**.

Motorists and Other Road Users

6.16.30 The A90 runs along the Esk valley to the north of the site and the Hill of Finavon runs parallel, screening out any views of the site. The A932 running between Forfar and Friockheim runs along the Lunan valley and the valley sides and associated vegetation screens views of the site in the north, as does the B9113 on the other side of the valley. The A933 has no intervisibility with the site due to the extensive conifer planting in Montreathmont Forest. At the Brechin end of the B9134 it starts off in the River Esk valley and then climbs the valley side passing through Crosston and Aberlemno. Drivers using this road will experience passing glimpses of the upper parts of the turbine tower and blades. As this view will be similar to Aberlemno the significance of effect is considered to be **Moderate**.

Recreation & Tourism

6.16.31 Due to distance, topography and intervening vegetation, it is considered that there will not be any significant effects on recreation and tourism as a result of the proposed development.

Summary Table: Baseline Views, Residential Amenity and Visual Effects

Receptors: H = Residential; R = Recreational; T = Road user or worker; and C = Cultural heritage

Receptor Location & Photomontage Viewpoint	Receptor	Location	Grid Ref.	Existing View	Predicted View	Visual Effects		
						Receptor Sensitivity/ Magnitude of Change	Effects on Visual Amenity	
VP1	C	Aberlemno Parish Church	522 555	Contained in its views – is located in a small valley west of Flemington, with trees and hedges completely surrounding the church.	None	**Medium Sensitivity** The church is of historical and local importance, however, large numbers of people not expected to visit. **Negligible Magnitude of Change** Due to the intervening topography and vegetation surrounding the church, the magnitude of impact is Negligible.	**Negligible** The construction of the turbine would not cause a visible change in visual amenity due to the intervening topography and vegetation	Mitigation None required.
VP2	C	Aberlemno Sculpted Stones	522 559	The Sculpted Stones stand in an elevated position on the side of the B9134 between Crosston and Aberlemno. The surrounding countryside is rolling medium sized arable fields divided up with stone walls. Woodland marks the small valley (containing Flemington) in the near view. The Wood of Pitkennedy shelter belt is partly visible on the skyline to the south. The hill of Finavon curtails the view to the west and	The base of the turbine will be out of sight, screened by intervening topography and the Wood of Pitkennedy shelter belt. However, the upper parts of the turbine tower, hub and blades will be viewed above the treeline.	**Medium Sensitivity** The Stones are promoted as a tourist destination and viewers attention is likely to be focused on the surrounding landscape. However, large numbers of visitors not expected. **Medium Magnitude**	**Moderate Adverse** The construction of the turbine would cause a clearly visible change in visual amenity	Mitigation The existing Wood of Pitkennedy provides some mitigation but is limited in what it can achieve.

Receptor Location & Photomontage Viewpoint	Receptor	Location	Grid Ref.	Existing View	Predicted View	Visual Effects	
						Receptor Sensitivity/ Magnitude of Change	Effects on Visual Amenity
				provides a backdrop to the hamlet.		**of Change** A medium long term change in the existing view, changing the character and composition of the baseline.	
VP3	H	Mosstonmuir	565 528	Coniferous forest with deciduous edge. Large paddocks and rectangular arable fields. Sprinkling of farmsteads with entrances leading off the B9113. Accompanying telegraph poles along road. Turin Hill rises above woodland to the north west. Long distance views curtailed by woodland/ forest.	Blade tips will be visible above the treeline. However, this viewpoint is one of the few opportunities to glimpse the turbine structure.	**Low Sensitivity** Small number of viewers (many of the properties are too close to the forest to obtain long distance views). Many of the viewers will only have a passing interest in their surroundings. **Low Magnitude** Minor long term change in baseline.	**Slight Adverse** The development would cause a slight change in the existing view, but although altered, it will be broadly similar to pre-change circumstances. Mitigation is unlikely to have any effect on this location due to the existing forest/ woodland structure already screening most views.
VP4	T/ H	A90 to the north of Pitkennedy	544 594	No Views			
VP5	H	Letham	528 495	No view			
VP6	H	Ardovie	583 564	Gently rolling arable land with cultivated fields stretching from the road towards farm buildings. Intermittent areas of taller	The base of the turbine and lower part of the tower will be out of sight, screened by farm buildings. However, the upper	**Low Sensitivity** Small number of viewers on local road	**Slight Adverse** The development would cause a slight change in the existing view,

Receptor Location & Photomontage Viewpoint	Receptor	Location	Grid Ref.	Existing View	Predicted View	Visual Effects	
						Receptor Sensitivity/ Magnitude of Change	Effects on Visual Amenity
				vegetation, with clumps of coniferous and deciduous trees present in more distant locations and a row of mixed trees making up a form of hedgerow along the edge of the field.	parts of the turbine tower, hub and blades will be viewed above the buildings.	past Ardovie and only a few residential properties. **Medium Magnitude of Change** A medium long term change in the existing view, changing the character and composition of the baseline.	but although altered, it will be broadly similar to pre-change circumstances.
VP7	H	Frockheim/ Balneaves Cott	602 497	No view			
VP8	H	Brechin	597 599	No View			
VP9	R/H/ T	Balmashanner Hill	462 492	Rolling arable/ pasture mixed farming landscape with restored former sand and gravel quarries. Single residential properties/ farmsteads dotted across the landscape. Significant wirescape arising from Pylons, lower voltage electricity poles and telegraph poles.	Blade tips barely discernable in far distance. Topography near Turin Hill screens out most of the turbine. Backdrop of Montreathmont Forest means that the turbine is not seen on the skyline so that this aspect, and the distance diminishes the apparent size and visibility. Unlikely to be noticeable in the view for the majority of viewers unless sunlight catches the blade.	**Medium Sensitivity** Whilst the main viewpoint on Balmashanner Hill looks north across the town of Forfar, local walks around the hill include the view north east from VP12, so viewers will have a moderate interest in their surroundings. **Negligible** The change in the view will be barely	**Neutral** The character and composition of view will be substantially unaltered.

Receptor Location & Photomontage Viewpoint	Receptor	Location	Grid Ref.	Existing View	Predicted View	Visual Effects	
						Receptor Sensitivity/ Magnitude of Change	Effects on Visual Amenity
						distinguishable from surroundings.	
VP10	C/ R	Kinnaird Castle	635 571	No View			
VP11	C/ R/ H	Hill of Kirriemuir – Wood Trail and Standing Stone	392 546	No View			
VP12	C/ R	House of Dun	670 599	No View			
VP13	H	Edzell	597 683	No view			
VP14	H	Montrose	712 580	No View			
VP15	C/ R/ H	Cortachy Castle	397 595	No View			
VP16	T/ H	Public road to the east of Pitkennedy	542 540	View of gently rising ground, ploughed field with an island/ area of rough grassland and gorse at crest of slope. Southern end of woodland belt (Wood of Pitkennedy) visible, rest of it disappears behind rising ground. Overhead electricity wires (33kv) cross the view on the high ground. Farmhouse and buildings tucked into slope on right of view. Large agricultural	No change to landscape features, except an additional structure (turbine). Single turbine on high ground will dominate the view. However, the scene is of a working agricultural landscape and the scale of the turbine will not be out of place with the existence of large agricultural barns.	**Low Sensitivity** Small number of viewers on local road and only a few residential properties. **High Magnitude of Change** The turbine will be a	**Moderate Adverse** The construction of the turbine would cause a clearly visible change in visual amenity

Receptor Location & Photomontage Viewpoint	Receptor	Location	Grid Ref.	Existing View	Predicted View	Visual Effects		
						Receptor Sensitivity/ Magnitude of Change	Effects on Visual Amenity	
				barns, prominent in landscape on left, along with other farm houses and associated buildings. Clear and open view of Turin Hill to west (left of view).		new large structure, but the scale of development is not in-appropriate for this agricultural landscape		
VP17	C	Turin Hill	515 535	Similar landscape description as VP1. The wider scene is important from this viewpoint and takes in the Grampian Mountains to the northwest, the Esk river valley and local hillocks and forestry planting. The scene also includes a distant windfarm to the north east beyond Brechin and a single turbine to the north and one to the south east. The setting of Kemp's Castle earthworks is important. Access to hill top is not promoted and is not identified as a tourist attraction.	A single turbine will be noticeable in the view, but will not dominate. Also as the viewpoint is on high ground, the viewer is looking down on the turbine, reducing its visibility. The turbine will add to the perception of wind energy developments located in the area - although only a slight addition (cumulative).	**Medium Sensitivity** Small number of viewers due to the lack of promoted access. However, setting of monument is important. **Medium Magnitude of Change** A medium long term change in the existing view, changing the character and composition of the baseline.	**Moderate Adverse** The construction of the turbine would cause a clearly visible change in visual amenity	
VP18	C	Melgund Castle	546 563	The castle (remains of) lies in a small valley created by the Melgund Burn and as a result has views that are constrained by topography. The area is surrounded by medium sized arable fields. 132kv pylons cut across the landscape to the north and west and the smaller 33kvnoverhead lines to the southwest.	The turbine will be situated on high ground above the castle and will therefore be noticeable in views towards the southwest. The topography will shield the lower part of the turbine, but the hub and blades will be visible from the grounds of the castle where vegetation doesn't intervene.	**Medium Sensitivity** An important cultural heritage site, but not one that is actively promoted to visitors. **Medium Magnitude**	**Moderate Adverse** The construction of the turbine would cause a clearly visible change in visual amenity	

Receptor Location & Photomontage Viewpoint	Receptor	Location	Grid Ref.	Existing View	Predicted View	Visual Effects		
						Receptor Sensitivity/ Magnitude of Change	Effects on Visual Amenity	
						A medium long term change in the existing view, changing the character and composition of the baseline.		
VP19	C	Roman Camp by Muir of Lour	491 443	No View				

6.17 Potential Cumulative Landscape and Visual Effects

6.17.1 Cumulative landscape and visual effects are the additional effects that would arise from constructing and operating the wind turbine at Pitkennedy, assuming all other planned and recently built developments are already present within the landscape. The assessment considers whether the proposed wind turbine development in conjunction with these new developments would alter the baseline landscape and/or create an unacceptable degree of adverse effect on visual receptors within their combined visual envelopes. As the proposal is a single turbine, the cumulative assessment has been tailored accordingly.

Cumulative Landscape Effects

6.17.2 Cumulative landscape impacts are the degree to which the single turbine at Cotton of Pitkennedy contributes to a general sense of a wind farmed landscape through introducing an additional tall structure into the landscape. The proposed turbine will introduce a turbine where few currently exist. However, if the other proposed turbine sites are all developed then the character of the landscape between Brechin and Forfar will change. Although there are existing pylons on the area, it is generally free of tall structures and therefore has a Medium sensitivity. One existing turbine (North Mains of Cononsyth) and three proposed single turbine sites (Pitkennedy, Baldoukie Farm, Dunswood) may end up within a 10km radius. This would result in a Low magnitude of change and a **Slight** significance of cumulative effect.

Cumulative Visual Effects

6.17.3 As demonstrated in the visual amenity impact assessment, the site is relatively well contained, not on the highest hills and appears to have a predominantly local impact (within 2km). Therefore only those local viewpoints that have a view of the Pitkennedy site have been used for the cumulative effects. Viewpoints VP3 and VP9 do not have significant effects and therefore have been discounted.

6.17.4 Combined or simultaneous visibility is a situation in which two or more wind farms are seen together at the same time, from the same place, in the same (arc of) view where their visual effects are combined. The turbine proposed for Baldoukie Farm (Tannadice) and the one for Dunswood (Mains of Balhall) will not be visible from VP16, VP1, VP2 and VP18. However, they will be visible in combination from 17 (Turin Hill), although the magnitude of change is considered to be Low as these are single turbines. The cumulative effect for VP17 is therefore a **Slight** significance of effect.

6.17.5 Successive or repetitive visibility is a situation in which two or more wind farms are present in views from the same place but cannot be seen at the same time together, because they are not in the same (arc of) view. The observer has to turn their head to see new sectors of view other wind farms unfold succession. Sequential cumulative visual impacts, a situation in which two or more wind farms are not present in views from the same place and cannot therefore be seen together at the same time. The observer is required to move to another viewpoint to see the second or more wind farms, so that they appear in sequence. Sequential cumulative visual impacts are usually assessed in terms of progression along a route. Travelers on the B9134 between Forfar and Brechin will have sequential visual impacts as they pass the proposed wind turbines of Dunswood, Baldoukie Farm on the right hand side and then view the single turbine at Cotton of Pitkennedy on the left handside. A similar sequential experience is likely regardless of the direction of travel however the magnitude of change is expected to be Negligible. The significance of the sequential cumulative effects is therefore considered to **Neutral** for drivers of this road. There would not be cumulative effects between Cotton of Pitkennedy and other wind farms for drivers on the A90, A932 and B9113 due to lack of intervisibility.

6.18 Conclusions

6.19 Landscape Assessment

6.19.1 There will be a **Moderate** landscape effect arising from the Cotton of Pitkennedy wind turbine development. The LT 12: Low Moorland Hills has Medium sensitivity and turbine has been located off the main ridges and within a localised landscape with other tall structures resulting in a Medium magnitude of effect.

6.20 Visual Amenity Assessment

6.20.1 VPs 2, 16, 17 and 18 will experience a **Moderate** significance of effect as a result of the turbine development.

6.20.2 Sixteen residential properties within 2km of the site are expected to experience **Moderate** significance of effect.

6.20.3 Drivers on the B9134 will experience a **Moderate** significance of effect.

Cumulative Visual Amenity Effects

6.20.4 One existing turbine (North Mains of Cononsyth) and three proposed single turbine sites (Pitkennedy, Baldoukie Farm, Dunswood) may end up within a 10km radius. This would result in a Low magnitude of change and a **Slight** significance of cumulative effect.

6.20.5 The cumulative effects of combined or simultaneous visibility at VP17 is considered to be a **Slight** significance of effect.

6.20.6 The sequential cumulative visual impacts are considered to be **Neutral** for travelers on the B9134.

6.21 General Conclusion

6.21.1 The Angus Local Plan identifies that '*…outwith development boundaries, in countryside locations it is considered that there is scope for turbines to be accommodated within the following defined landscape types'*, which includes the Lowland and Hills Area 2. The Plan states that decisions will be made in the context of information on the elevation of the turbine site, the scale of the landscape and proximity of scale features and buildings.

6.21.2 Whilst the overall assessment scoring identifies that there will be a Moderate landscape effect, this has arisen as a result of the use of broad scale studies which identified that the landscape character type of the area [LT 12: Low Moorland Hills], has Medium sensitivity. As a result, it is considered that some of the very close receptors may experience a Medium magnitude of effect with an overall Moderate significance of effect. However, none of these landscape receptors in the immediate vicinity are designated or of notable value. The landscape is a working agricultural landscape, with a character that can potentially absorb small scale development. More important heritage receptors are further away with less effect on their setting due to the intervening distance.

6.21.3 Viewpoints 2, 16, 17 and 18 will experience a Moderate significance of effect on visual amenity as a result of their proximity to the turbine. However, the number of people who will actually experience negative effects in the locality are expected to be low as there are no designations, recreational routes or large settlements close to the site. Only sixteen residential properties within a 2km radius of the site and a few drivers on the B9134 are expected to experience Moderate effects.

6.21.4 The landscape and visual impact assessment has identified that the Cotton of Pitkennedy single turbine will only have a localised impact (approximately for a 2km radius from the turbine). This impact will be of Moderate significance for the majority

of receptors within the local area. However, due to the containment of effects to the local area, the cumulative impacts are predominantly considered to be **Slight** in Nature.

SECTION 7

AIR QUALITY

7 AIR QUALITY

7.1 Summary

7.1.1 During its operational phase the proposed Project will have a positive impact on national air quality as it will likely displace generation from fossil fuel fired power stations and hence reduce emissions of pollutants such as oxides of nitrogen (NO_x), sulphur dioxide (SO_2) and particulate matter (PM). The proposed Project will also help to prevent the generation of greenhouse gases such as carbon dioxide (CO_2).

7.1.2 It is calculated using a methodology proscribed by RenewableUK that the proposed Project (comprising up to 1 × 0.8 MWe wind turbine) would directly prevent the generation of;

- Between 778 and 2268 tonnes of CO_2 per year
- Up to 34 tonnes of SO_2 per year; and
- Up to 11 tonnes of NO_x per year.

7.1.3 The proposed Project is therefore considered to afford a significant overall benefit to national air quality.

7.1.4 Additionally, the construction of the proposed Project is not predicted to give rise to any significant impacts to local air quality. Where there is potential for dust to be generated during the construction phase, mitigating measures will be employed to minimise this.

7.2 Local Air Quality

7.2.1 Construction of the proposed Project may result in the emission of dust due to wind blowing over, for example bare earth and exposed soils, in addition to emissions of oxides of nitrogen (NOx), carbon monoxide (CO), particulate matter (PM) and sulphur dioxide (SO_2) from vehicle exhausts. Local air quality in the Angus district with respect to these pollutants is generally good and do not typically exceed the UK's National Air Quality Objectives. There are no Air Quality Management Areas (AQMA) within Angus at this time, however there are a number of air quality monitoring locations spread throughout the district, including 12 passive sampling sites for nitrogen dioxide.

7.2.2 Dust could be emitted during several activities associated with the construction works if preventative measures are not taken. Dust could arise from: earth moving operations for excavation and back filling of foundations; blow-off and spillage from vehicles; concreting operations; site reinstatement and road construction.

7.2.3 Construction operations will be conducted so as to minimise the generation and spread of dust in order to prevent construction work generating levels of atmospheric dust that would constitute a health hazard or nuisance to people working on the site or living nearby.

7.2.4 It is the smallest dust particles, i.e., those with a diameter of less than 10 microns (PM_{10}) which are most likely to be deposited in the lung and therefore result in health impacts. The dust particles that may be emitted during construction will be of a large diameter (approximately 50 to 200 microns) and will therefore tend to resettle on the ground within 100 to 500 m of the site. Approximately 70 per cent of the dust will generally settle out of the atmosphere within 200 m of the source, and less than 10 per cent could be expected to remain at a distance of 400 m. The nearest residential property is located over 800 m to the north-west of the turbine and therefore should not experience any nuisance with regard to dust generation.

7.2.5 If potential for dust emissions exist, for example on dry windy days, then the following procedures will be followed:

- Materials will be tested for moisture content;
- If material is dry then water will be sprayed on to the working area to suppress dust;
- Excavation faces not being worked will, if required, be either sheeted or treated with a chemical dust suppressant;
- The amount of disturbed surfaces left exposed for significant time periods will be minimised; and
- All operatives working in areas of potential dust emission will be provided with paper type face masks.

7.2.6 Materials deposited on stockpiles on site will be closely monitored for any emission of dust and if required they will be damped down, covered or treated with a dust suppressant.

7.2.7 If finely ground materials are delivered, these will be in bag form or stockpiled in specified locations where the material can be suitably covered or damped down as necessary. All vehicles carrying bulk materials into or out of the site will be covered to prevent dust emission. Minimum drop heights will be used during material transfer.

7.2.8 A temporary wheel and chassis washing facility will be provided adjacent to the site exit and will be used by all heavy commercial vehicles leaving the site, preventing the transmission of soil from the site to the public highway. Vehicles will be encouraged to reduce their speed while moving around the site during dry weather to minimise disturbance.

7.2.9 The above measures may only be necessary should the activities leading to the greatest dust generation occur during a dry period. The use of the above methods should ensure that dust emissions will not impact on local air quality.

7.2.10 In addition to dust, there will be emissions associated with the construction machinery and vehicles, such as the exhaust from diesel powered equipment. However these will be easily dispersed by the prevalent winds at the site. It is likely that perhaps seven construction vehicles would be present on site at any one time. Any associated odour would be very minor and local in nature and would again be quickly dispersed.

7.2.11 With suitable techniques employed and a short construction time, the residual impact on air quality is expected to be minor.

7.2.12 During operation, the turbines will not emit any measurable emissions of pollutants or odours to air. Emissions from maintenance vehicles will be insignificant.

7.2.13 During decommissioning, the impacts of emissions from fixed and mobile plant and vehicles are likely to be minor and similar in scale to those associated with construction. There may be some dust generated during the decommissioning of the proposed Project. However, this will not be to the same extent as that during the construction phase, as there will be little earth moving required and therefore excavation activities will be limited to the potential removal of the top 1 m of the concrete turbine foundations. Demolition of the proposed Project will be conducted so as to minimise the generation and spread of dust. There will be no significant impact on nearby housing.

7.3 National and Global Air Quality

7.3.1 Nationally and globally, a significant benefit of the use of wind power rather than fossil fuels is the reduction of emissions of environmentally harmful gases. These benefits are associated with the prevention of emissions of carbon dioxide (CO_2), sulphur dioxide (SO_2), oxides of nitrogen (NO_x), particulate matter (PM) and Volatile Organic

Compounds (VOCs) arising from the combustion of fossil fuels. In addition to causing health effects and damage to the natural and built environment in the immediate vicinity of the power station, the emission of these pollutants in the UK can also result in transboundary impacts on areas several thousand kilometres away. The UK is therefore required to reduce emissions of these pollutants in accordance with a number of European Union Directives and also as a result of commitments made under the 1979 Geneva Convention on Long-range Transboundary Air Pollution and its Protocols.

7.3.2 In order to calculate the emissions that the proposed Project would directly offset, it is necessary to calculate the amount of the electricity the proposed Project is expected to produce in a typical year.

7.3.3 Pending further monitoring of the wind resource at the site it is necessary to assume a capacity factor, i.e., the equivalent percentage time each year that the wind turbine would operate at full load. In the UK this is assumed to be approximately 30 per cent of the time. Generally, the turbines would operate for longer periods than this, however they may not do this continually at full load. Wind Energy Projects in the UK in fact have typical availability as high as 97 per cent.

7.3.4 Annual electricity production per MW (or 1000 kW) installed capacity at the proposed Project is therefore expected to be approximately equal to:

= 1000 (kW) x 8760 (number of hours in a year) x 0.30 (capacity factor)

Therefore, annual electricity production per MW = 2 628 000 kWh.

7.3.5 Therefore, for the proposed Project which is expected to have an output of 0.8 MW, the total annual electricity production would be approximately 2 102 400 kWh.

7.3.6 There are a number of annual average UK household electricity consumptions quoted by various credible sources. PPS22 quotes a usage of 4100 kWh, while RenewableUK quotes 4700 kWh and the DTI suggest 3300 kWh. It can be calculated using these figures that the proposed Project will provide somewhere between 447 and 637 households with renewable energy annually.

7.3.7 Electricity from wind turbines typically replaces the output of coal-fired power stations, as these are the most flexible type of electricity generating plant. Nuclear plant operate at base-load, as do the majority of gas-fired plant. It is therefore the output from coal-fired plant, which can be most easily adjusted to meet the electricity demand on the system. In other words, most 'load following' is carried out by coal-fired plant and therefore it is the energy supplied from this type of plant that is replaced by electricity generated from wind turbines.

7.3.8 The quantities of gaseous emissions that the wind turbine would directly prevent being emitted from coal-fired plant can be calculated on the basis of the following figures which have been recommended by RenewableUK and the Parliamentary Office of Science and Technology respectively.

Units	RenewableUK	Parliamentary Office of Science and Technology
g CO_2/kWh	370 – 876	936 – 1079
g SO_2/kWh	10	14 – 16.4
g NO_x/kWh	3	2.92 – 5.3

7.3.9 Those of RenewableUK are lower on the basis that gaseous emissions from conventional power sources are decreasing, due to increases in efficiency and the use of pollution abatement equipment. Using the RenewableUK figures as a worst

case (i.e., lower savings) and assuming that there are no significant shifts in the pattern of electricity generation by technology, it can be calculated that the proposed Project would directly prevent the generation of the following emissions:

- Between 778 and 2268 tonnes of CO_2 per year
- Up to 34 tonnes of SO_2 per year; and
- Up to 11 tonnes of NO_x per year.

7.3.10 These reductions in CO2 and other atmospheric pollutants will be the principal beneficial impact associated with the proposed Project, contributing to combating climate change and improving UK and transboundary air quality. In combination with other wind energy projects, the cumulative reduction in emissions will assist the UK in meeting its commitments under the Kyoto Protocol and also the commitments made under the 1979 Geneva Convention on Long-range Transboundary Air Pollution.

SECTION 8

GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

8 GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

8.1 Summary

8.1.1 The site of the proposed Cotton of Pitkennedy Project is located to the west of Montreathmont Forest, a Forestry Commission Scotland coniferous wood within Angus, Scotland. The site currently comprises arable farmland. A number of drainage ditches run along the edges of fields close to the site. A drainage ditch also exists within the landowner boundary, to the north of Cotton of Turin. Framedrum reservoir is located to the east of the site.

8.1.2 British Geological Survey (BGS) maps indicate that the geological sequence beneath site comprises of the Dundee Flagstone Formation which is predominantly made up of sandstone. Any superficial deposits found at the site are classified as “Till, Devensian-Diamicton”, i.e. boulder clay or other unstratified sediment deposited by melting glaciers or ice sheets.

8.1.3 The site has cycled between coniferous woodland and rough glassland since 1894 with two quarries to the north and south of the site visible on historical maps between 1924 and 1967. The BGS identified five mineral sites for sandstone.

8.1.4 Groundwater underlying the site is designated as a highly permeable aquifer, with soils of intermediate leaching potential, and as a nitrate vulnerable zone.

8.1.5 The main surface water body in the vicinity of the site is Melgund Burn, to the north of the site. A number of drainage ditches are present on, and around the site. However, the area is not in a flood risk zone. There are no surface water abstractions within a 1 km radius of the site.

8.1.6 The principal potential impacts from the development on the geology, hydrology and hydrogeology of the area are likely to be limited to the construction phase. For example there is the potential for pollution of the surface waters through accidental spillages.

8.1.7 The construction phase is of a relatively short duration and suitable mitigation measures, such as the use of Personal Protective Equipment (PPE) for all site workers, adherence to current best practice guidance and the use of silt traps and buffer zones, will be undertaken.

8.1.8 A Site Waste Management Plan (SWMP) will be drafted for the projects construction phase with the aim of providing guidance on good working practices on site in order to minimise impacts on the soil, geology, hydrology and hydrogeology. All construction staff would be required to read the procedure and abide by its requirements. In addition, it is likely that a geotechnical ground investigation will be undertaken prior to construction, with boreholes focused on the proposed sites of the wind turbine, access roads and the control building to inform the project design.

8.1.9 Following the implementation of these mitigation measures, there are not anticipated to be any residual impacts relating to geology, hydrology, hydrogeology, or the health of future site users from the proposed development.

8.2 Introduction

8.2.1 This section details the baseline geological, hydrological and hydrogeological conditions at the site and outlines the potential environmental impacts of the proposed development on these resources. It also details the status ground and surface water contamination at the site and the risks posed to human health. Where potentially significant impacts have been identified, mitigation measures have been proposed to reduce these impacts to an acceptable level.

8.2.2 Throughout this chapter the term "the site" has been used. This refers to the blue line boundary of the site shown in Figure 4.1 of this ER. However, the actual area of underlying land which will be impacted by the excavation of the foundation for the turbine, access roads and the control building only forms a small proportion of the overall site.

8.3 Legislation, Policy and Best Practice

8.3.1 Baseline conditions and the potential impact of the development have been assessed with reference to the Town and Country Planning (Scotland) Act 1997, Planning (Scotland) Act 2006, the Environmental Protection Act (1990), the Contaminated Land (Scotland) Regulations SSI 2000/178 and 2005/658, the Construction (Health, Safety and Welfare) Regulations (1996) and British Standard BSI 6031 (1981) – 'Code of Practice for Earthworks, CLR 11 – Model Procedures for the Management of Land Contamination..

8.3.2 In addition, the following policies of Angus Council have been considered:

- Angus Local Plan Review (February 2009)

8.4 Assessment Methodology

8.4.1 The assessment approach has been undertaken with a clear understanding of the following:

- Previous land uses;
- Underlying ground conditions;
- Existing physical baseline conditions;
- Development proposals;
- Sensitivity to change;
- Magnitude of change; and
- Potential to mitigate impacts resulting from the proposed development.

8.4.2 Tables 8.1 to 8.3 have been used to assess the attribute importance of receptors and the significance criteria against which the magnitude of potential impacts from the development may have on soils, geology, hydrogeology and human health. In addition, a conceptual site model approach has been used to assess the risks posed by contaminants to human health using a source→pathway→receptor model based on the following:

- **Source** – potential source of contamination;
- **Pathway** – means by which contamination can reach and impact upon a receptor; and
- **Receptor** – that which may be adversely affected by the presence of contamination.

8.4.3 The baseline geological, hydrological and hydrogeological conditions of the proposed development site have been assessed with reference to the following:

- Envirocheck Report (please see Appendix B) – order reference 43167633_1 which included the following:
  - Groundwater Vulnerability Map;
  - Soil Chemistry Map;
  - Source Protection Zones Map;

- Sensitive Land Uses Map; and
- Historical plans from 1861 to 1995.

- Scottish Environment Protection Agency (SEPA) flood maps, via http://go.mappoint.net/sepa/
- British Geological Survey (BGS) http://www.bgs.ac.uk/opengeoscience/home.html?Accordion2=1#maps
- Scottish National Heritage Interactive Map for Scotland http://www.snh.gov.uk/publications-data-and-research/snhi-information-service/map/

8.5 Assessment Criteria

8.5.1 Tables 8.1 to 8.3 define the criteria against which the magnitude and significance of impacts has been defined on a variety of receptors of varying sensitivity.

TABLE 8.1 - DEFINING ATTRIBUTE IMPORTANCE FOR RECEPTORS

	Attribute Type					
Attribute Sensitivity	**Geology / Soils**	**End users**	**Construction Workers**	**Surrounding Land Uses**	**Controlled Waters**	**Built Environment**
High	Very good quality agricultural land. Site designated SSSI for geological reasons. Unique soil which supports rare plant communities.	Residential. Allotments. Play areas.	Extensive earthworks and demolition of buildings.	Greenfield site. Residential area. Designated site (e.g. SSSI).	Highly permeable aquifer or large / ecologically important surface water in close proximity to the site.	Listed buildings of high historic value or other sensitivity.
Medium	Good quality agricultural land. Regionally important geology or soils.	Landscaping. Public open space.	Limited earthworks.	Open space. Commercial area.	Weakly permeable aquifer, minor watercourse, minor pond in close proximity to the site.	Buildings, including services and foundations.
Low / Negligible	Common geology. Unfertile land. Brown field site.	'Hard' end use (e.g. Industrial car parking).	Minimal ground disturbance.	Industrial area Undeveloped, brownfield sites.	No surface water bodies or aquifers close to the site.	N / A

TABLE 8.2 – CRITERIA FOR ASSESSING THE MAGNITUDE OF IMPACTS

Significance Criteria		Description
Major Impact	Adverse	A permanent or long term adverse impact on the integrity and value of an environmental attribute or receptor, or exposure to acutely toxic contaminants. For example, harm to human health, designated habitats or pollution to controlled waters.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality.
Moderate Impact	Adverse	An adverse impact on the integrity and / or value of an environmental attribute or receptor, but recovery is possible in the medium term and no permanent impacts are predicted.
	Beneficial	Benefit to, or addition of, key characteristics, features, or elements or improvement of attribute quality.
Minor Impact	Adverse	An adverse impact on the value of an environmental attribute or receptor, but recovery is expected in the short-term and there would be no impact on its integrity. For example, temporary effects on receptors not designated under environmental legislation.
	Beneficial	Minor benefit to, or addition of key characteristics, features or elements; some beneficial impact on attribute or a reduction in the risk of a negative impact occurring.
Negligible impact		No impact would be detectable, either positive or negative.

TABLE 8.3 - DEFINING SIGNIFICANCE OF EFFECT CATEGORIES

		Magnitude of Impact				
		No Change	**Negligible**	**Minor**	**Moderate**	**Major**
Importance of Attribute	**High**	Neutral	Slight	Moderate	Large	Large
	Medium	Neutral	Slight	Slight	Moderate	Large
	Low	Neutral	Slight	Slight	Slight	Moderate
	Negligible	Neutral	Neutral	Neutral	Slight	Slight

8.5.2 In Table 8.3 both moderate and large significance criteria are deemed as significant will require mitigation. Where appropriate, mitigation measures have also been applied to any 'slight' effects.

8.6 Baseline Conditions

Site History

8.6.1 The earliest historical maps for the site date from 1894 and show the site to be almost completely dominated by coniferous trees. A cairn named 'Hare Cairn' is present in the north of the site and a small quarry is located approximately 400m from the site boundary, to the north-west. A second quarry labelled 'Old Quarry' is located approximately 250m to the south of the site boundary. This serves to suggest that quarrying of sandstone occurred close to the site around this time. Outside the southern site boundary are two small residential areas: Craigend of Pitkennedy and Pitkennedy. Roads surround both the northern and southern boundaries.

8.6.2 In 1902, the dense coniferous covering in the north of the site has given way to rough glassland with a more sparse covering of trees. The coniferous trees at the western site boundary have since become deciduous trees. The quarry markings remain on the map, but have not changed inside, suggesting levels of quarrying activity was neither increasing or decreasing. The map shows that a well has been established to the south of the site. The area of woodland to the west of the side is now named 'Wood of Pitkennedy'.

8.6.3 In 1924, the rough grassland in the north of the site is again covered with coniferous forest. Hare Cairn is still present in the centre of the woodland. The woodland in the south-western corner of site has been felled to leave course grassland. The quarries to the north-west and south of the site are both still in existence, suggesting ongoing quarrying operations. The well to the south of site has been replaced by a pump, which suggests an upgrade to the groundwater abstraction point.

8.6.4 In 1966, the quarry to the south of site no longer features on the map, and the quarry to the north-west of the site is now labelled as a pond, suggesting quarrying activity in the area ceased between 1924 and 1966. The Wood of Pitkennedy now exists as a narrow strip of woodland along the western site boundary. The property known as Craigend of Pitkennedy to the south of the site boundary no longer appears on the map. The Hare Cairn in the centre of the site has now been replaced by a symbol stating Hare Cairn (site of).

8.6.5 The latest available historical map dates from 1995 and shows the landscape relatively unaltered since 1967. However, since this date the deciduous plantation to the north-east of site has been felled to leave arable land.

Landscape and Topography

8.6.6 The site is located to the north of Cotton of Pitkennedy farm and is approximately 150m Above Ordnance Datum (AOD). The topography of the site and its surrounding area is gently undulating. It is dominated by arable land with a strip of mature coniferous trees running along the north-western side of the site.

8.6.7 According to the Angus Windfarms Landscape Capacity and Cumulative Impacts Study made available on the Angus Council Website, the site falls within an area classified as the Low Moorland Hills, in the sub-category of Lowland Forest and Farmland Sub Type. This is also consistent with the most recent Landscape Character Assessment for Tayside dating from 1999. The key characteristics of this region include:

- Eastern outliers of the Sidlaws;
- Combination of low, rounded hills and craggy, ridged upland;
- Moorland character evident in areas of heather and gorse;
- Some areas of extensive woodland;

- Rich historic heritage; and
- Scattered modern settlement.

Geology

8.6.8 The British Geological Survey (BGS) geology of Britain viewer details that the bedrock / solid geology underlying the site comprises of the Dundee Flagstone Formation. This formation comprises medium to coarse grainted, cross-bedded sandstone and substantial, distinctive, flaggy sandstones interbedded with minor siltstones and mudstones. It is a sedimentary bedrock formed approximately 391 to 417 million years ago, dating from the Devonian Period. The local environment at the time of deposition was likely to have previously been dominated by rivers.

8.6.9 The findings from the online viewer are also confirmed in the Envirocheck Report (Appendix B) which details that bedrock at the site comprises of lower old red sandstone, including Downtonian.

8.6.10 Superficial geology at the site i.e. the most recent unconsolidated deposits dating from the Quaternary are described as Till, Devensian-Diamicton, and were formed up to two million years ago. The local environment was previously dominated by ice age conditions.

Mining and Ground Stability

8.6.11 There are 5 BGS mineral sites surrounding the site. However operations at all these sites have now ceased. It is likely that two of these mineral sites – Bellahill and Cotton of Turin are the quarries identified from the historical map data, although there are slight inconsistencies between the two pieces of data with the BGS records identifying more quarries around the site than the historical maps. Table 8.4 provides further details.

TABLE 8.4: BGS MINERAL SITES ON THE SITE AND ITS SURROUNDING AREA

Site Name	Location	Type	Commodity	Approximate distance from site (m)	NGR	
					E	N
Muir of Pitkennedy	Abelemno, Forfar, Angus	Opencast	Sandstone	345	353800	754160
Bellahill	Abelemno, Forfar, Angus	Opencast	Sandstone	415	353450	755300
Cotton of Turin	Bog of Pitkennedy, Pitkennedy, Abelemno, Forfar, Angus	Opencast	Sandstone	710	353755	753795
Tillywhanland	Abelemno, Forfar, Angus	Opencast	Sandstone	942	352700	755100
Turinhill Quarries	North Mains of Turin, Abelemno, Forfar, Angus	Opencast	Sandstone	984	352985	753695

8.6.12 The Envirocheck Report (Appendix B) stated that there is a very low risk of ground stability hazards associated with the site and the site is unlikely to be affected by coal mining.

Landfill History

8.6.13 There is no evidence of past or present landfill activity within the site or its surrounding area.

Hydrogeology

8.6.14 The soils overlying the site are considered to have an intermediate leaching potential. Therefore pollutants could penetrate the soil into the groundwater below.

8.6.15 The groundwater underlying the site is classed by the Envirocheck Report (Appendix B) as a Major or Highly Permeable Aquifer. These formations are generally regarded as highly permeable strata, usually with a known or probably presence of significant fracturing. These aquifers generally contain significant quantities of groundwater and are therefore important for abstraction or flow to rivers.

8.6.16 The groundwater at this site is classified as falling within a nitrate vulnerable zone (NVZ). This is a European Designation under the Nitrates Directive and means that the groundwaters below the area of land identified have nitrate concentrations of above 50 mg/l or are vulnerable from nitrate pollution[1]. Thus, there are binding rules with regards to nitrates at this location which can include the limitation of fertilisers for agricultural use.

8.6.17 The British Geological Survey maps available at http://www.bgs.ac.uk/products/hydrogeology/maps.html classify the aquifer as 'moderately productive' with sandstones, siltstones, mudstone and conglomerates and inberbedded lavas, which locally yield moderate amounts of groundwater.

8.6.18 The Envirocheck Report (Appendix B) details that there are no licensed public or private groundwater abstractions or ground water discharge consents on the site or within 1 km of the site boundary.

Hydrology

8.6.19 There are no major hydrological features on the site: a number of drainage ditches are present along field boundaries, including a small network around Craiksfolds and Bog of Pitkennedy, and a single drainage ditch south of Melgund Bank Farm. These water features feed into a wider network of burns surrounding the site, including Gilkie's Burn, Melgund Burn and Battle Burn.

8.6.20 Other water bodies surrounding the site include: the Framedrum reservoir, a number of ponds at Mosstonmuir, and Rescobie and Balgavies Lochs to the south of site, amongst others.

8.6.21 The Envirocheck Report (Appendix B) details that there are no licensed surface water abstractions on site. The site does not lie within 1 km of a Source Protection Zone (SPZ) and there are no licensed surface water discharges within this radius.

[1] http://www.scotland.gov.uk/Topics/farmingrural/Agriculture/Environment/NVZintro

8.6.22 The development is not considered to be within a flood risk zone, as shown by the SEPA Indicative River and Coastal Flood Map. Thus, the area is at a low risk of flooding and according to Scottish Planning Policy (pg.42) a flood risk assessment (FRA) is not required.

8.7 Contamination Assessment

8.7.1 An assessment of historical site uses, surrounding development which has taken place in the vicinity of the site and a site walkover survey, have revealed that there is not considered to be a significant risk of contaminated land at the site. The site and immediate surrounding areas have remained as undeveloped land since 1894, no significant pollution incidents have been recorded on site or in the immediate vicinity of the site and a site walkover / study of geological maps revealed no deposits of made ground. However an intrusive ground investigation has not been undertaken, so there still remains a small risk of encountering ground of an unknown composition during construction works.

8.7.2 There is the possibility of creating contamination through construction works; however the use of stringent mitigation measures means that this risk is very small.

TABLE 8.6 – CONCEPTUAL SITE MODEL SHOWING SOURCE, POTENTIAL CONTAMINANTS, PATHWAYS AND POTENTIAL RECEPTORS

Source	Potential Contaminants	Pathways	Potential Receptors
Ground of unknown composition	Unknown at this stage	Limited groundwater, surface waters. Dermal, oral, inhalation	Site workers, controlled waters, groundwater.

8.8 Impact Assessment

Construction

Human Health (Construction Workers)

8.8.1 The site has remained relatively undeveloped, thus it is very unlikely that there will be any issues regarding contamination. In the unlikely event that contamination is discovered at the site, confirmed mitigation measures such as the use of appropriate Personal Protective Equipment (PPE) will mean that any impacts will be negated.

8.8.2 Thus, the attribute importance of for the receptor has been assessed as medium, with the potential for minor adverse impacts. The overall significance of these effects has been categorised as slight (see Tables 8.1 – 8.3).

Geology and Soils

8.8.3 The attribute importance of the underlying geology / soils at the site have both been assessed as medium (Table 8.1). The site has not been designated for its geological importance and no known mining activities have been proposed for the site. Therefore the development is not considered to represent a sterilisation of any mineral assets.

8.8.4 The outline site boundary is approximately 126.9 ha in size, however the access tracks and the foundations for the wind turbines and the control building will only take up approximately 0.227 ha (less than 1 per cent of the agricultural land at the site). Thus, any impacts that were to arise would be temporary in nature and mainly confined to localised temporary excavation and compaction impacts caused by

earthworks and vehicular movements. Impacts on near-surface soils would be within the construction footprint, laydown areas and access roads only.

8.8.5 Overall, the construction of the wind turbine will therefore have a minor impact on the underlying soils and geology at the site, in line with Table 8.2. The significance of the effect is therefore deemed as slight (Table 8.3).

Water Use and Disposal and Hydrology

8.8.6 Construction activities on any site may, if uncontrolled, cause changes to surface and water drainage due to:

- Runoff from stockpiles;
- Increased runoff from compacted soils caused by e.g. movement of heavy equipment;
- Removal of vegetated top soil; and
- The provision of access tracks.

8.8.7 A small amount of water will be required each day for the general construction works and hygiene, which will likely be brought to site by bowser. This water will be required for road construction and also dust suppression / wheel-washing facilities.

8.8.8 Without mitigation, nearby surface water quality may be affected by increased sedimentation during construction. Silt can cause lasting damage to surface water biology and can also build up to cause flooding.

8.8.9 It is possible that the deep foundations necessary to stabilise the turbines (e.g. piled foundations on to bedrock) could offer a preferential pathway for contaminants to impact upon the minor aquifer underlying the site.

8.8.10 An ecological assessment of the surface water water features has not found any notable species of interest. (see Section 9 – Ecological Assessment). Based on this information, the attribute importance of watercourses has been assessed as medium, in line with Table 8.1. The potential impact on this resource has been assessed as minor adverse due to the limited extent of groundworks. Therefore, the overall significance of effect has been assessed as slightly adverse (Tables 8.2 - 8.3).

8.8.11 The groundwater beneath the site has been classified as a highly permeable aquifer and therefore, in line with Table 8.1 it has been assessed as being of high sensitivity. It is assumed that the aquifer is unlikely to lie close to the surface of the site, due to the high ground level. There is considered to be a potentially minor impact on groundwater at the site as earthworks are likely to be limited in extent and temporary. Therefore the overall significance of effect is considered moderately adverse.

8.8.12 The construction of access tracks and the control building will result in some interception of natural surface water drainage routes. However, due to the relatively small percentage of land-take of these compared to the surrounding site, these will have a negligible impact on groundwater recharge and the volume of run-off flowing into the streams draining the site.

Oil Spills

8.8.13 There is the potential for spills / leakage of oil associated with construction machinery and vehicles. Oil spills could potentially contaminate groundwater, surface water or soils, having a detrimental impact on aquatic life, plants and human health. However, as the construction period is anticipated to be relatively short and no major works are expected, this is only considered to represent a potentially moderate adverse impact.

The highest sensitivity of these receptors (surface water) has been assessed as medium. There is therefore potentially a moderate significance of effect arising from oil spills without any mitigation.

Operation

8.8.14 During operation, only relatively small quantities of potentially hazardous substances will be stored and used at the site. These substances mainly comprise transformer and lubricating oils. No significant problems are anticipated in dealing with any of these substances. Appropriate handling precautions will, in any case, be documented and practised.

8.8.15 Approximately 400 litres of oil will be contained within the wind turbine. Most of the oil is contained in the gearbox and any leakage would be contained within the nacelle and tower structures. The turbine would be designed with fluid catch basins and containment systems to prevent accidental releases from leaving the nacelle.

8.8.16 Other leakages can come from the hydraulic brake system. However, the amount of oil contained in this system is minimal and any leaks would cause streaks on the side of the external tower. It is therefore generally possible to identify any leaks before oil reaches ground level and before any impact can occur.

8.8.17 The combination of the turbine design features, and the heavy foundation used means that any vibrations produced by a certified and maintained wind turbine would be too small to cause physical or structural damage to the surrounding area of a turbine, or to cause land instability. The impact in this regard is therefore predicted to be negligible according to Table 8.3.

8.8.18 The turbine is not situated within any areas deemed to be at risk from flooding according to the SEPA flood maps. The introduction of small amounts of hardstanding onto the site is not anticipated to have a large impact on the overall drainage regime at the site. Therefore, there is not considered to be a risk from flooding at the site or a risk of the development causing flooding to surrounding sites.

8.8.19 There will be an approximate increase in hardstanding and buildings by 0.227 ha, which comprises of only a 0.2% increase in hardstanding. Thus there will be very little additional runoff generated. Currently the site has a varying topography and areas of this will levelled at the site prior to construction, thereby improving the drainage regime.

8.8.20 Even in the unlikely event of flooding at the site, the turbines will not be manned and will be controlled remotely. Therefore risk to human life is not anticipated. Additionally, the electronic components of the turbine are contained within the steel tower, above head height and would therefore not experience difficulties in operation or pose a hazard if water did ingress onto the site.

8.8.21 The small amount of extra hardstanding at the site associated with buildings, access roads and turbine foundations would not have a dramatic effect on the runoff regime at the site.

8.8.22 The impacts of the operation of the project on the geology, hydrology and hydrogeology have there fore been assessed as follows. The attribute importance of the receptor is assessed as moderate to low, the potential magnitude of the impact is assessed as minor adverse and therefore the overall significance of the effect is assessed as slight to neutral (Table 8.1 – 8.3).

Decommissioning

8.8.23 The impacts on surface and ground water quality during decommissioning will be temporary and moderate in nature and would be similar to those described above for construction.

8.8.24 The concrete foundations will likely be left in the ground after decommissioning of the site. It is common for concrete foundations to remain in the ground for many years following decommissioning of sites. The environmental impact of this is predicted to be negligible as the foundations will be constructed of an appropriate grade of concrete to resist attack from any soil and groundwater contamination (Table 8.3). Other than the remaining foundations, the ground will be reinstated back to its original state with suitably clean topsoil and grass covering where appropriate.

8.9 Mitigation

8.9.1 Without mitigation, the construction of the Cotton of Pitkennedy Project has the potential to create several impacts relating to human health, and surface water / groundwater quality. The following mitigation measures will limit these potential impacts to a non-significant level.

Construction

Human Health

8.9.2 Dust suppression measures will be put in place to minimise dust levels on the site and in the surrounding environment. These measures are detailed in Section 7 of this ER - Air Quality and include dowsing or covering of stockpiles during dry and windy weather.

8.9.3 Appropriate PPE will be worn on site at all times during construction including gloves, high visibility clothing, protective boots, hard hat and appropriate eye protection. If deemed necessary (e.g. if airborne contaminants are found to be present) then dust masks will also be required to be worn. Any additional PPE requirements will be identified as part of the site investigation

Geology and Soils

8.9.4 A Site Waste Management Plan (SWMP) will be drafted for the construction phase. The SWMP will focus on the reduction, re-use and recycling of all waste spoil on site. Soils will be segregated according to type and contamination status and re-used where possible to fill excavations (thus also limiting impacts on the groundwater and surface water drainage regimes at the site. As part of the SWMP any additional soil materials that are to be imported to the sites will be required to have certification of their chemical concentrations to ensure that contaminative materials are not being introduced to the area

8.9.5 The SWMP will also provide guidance on good working practices in order to minimise impacts on the soil and geology resulting from the construction of the development. This will be further developed by the Contractor and agreed with SEPA and local planning authority prior to any works on site. All construction staff would be required to read the procedure and abide by its requirements.

8.9.6 The construction area will be delineated and measures taken to avoid vehicle use outside the working boundary through, for example, the erection of appropriate fencing.

8.9.7 In order to further limit disturbance, the site access tracks will be constructed first to allow movement of vehicles around the site on areas of soft-standing. Any vegetation, topsoil and subsoil will be removed to expose a suitable sub-grade. Any soils, sub-soils or aggregate suitable for reuse will be stockpiled on impermeable liners, in the vicinity of the turbine locations.

8.9.8 Speed restrictions will be imposed on site to minimise disturbance of bare surfaces and the amount of disturbed surfaces left exposed for significant time periods will be minimised. Stockpiles of loose, fine materials will be damped down or covered over if necessary, again to reduce erosion and the production of dust. The control of airborne dust is discussed in Section 7 - Air Quality.

Water use, disposal and Hydrology

8.9.9 The access roads will be constructed to manage drainage of surface water and a temporary wheel washing facility will be installed to prevent transfer of soil onto nearby public roads and discharging into highway drains.

8.9.10 If surface water drains on site interfere with the final turbine location, they will be re-routed prior to development of the site. This will move them directly away from the influence of construction activities. No drains or watercourses will be culverted - in line with latest SEPA guidance.

8.9.11 Surface water, perched waters or groundwater from dewatering operations will not be discharged to surface water or drains, without the appropriate consents from the local water or Sewage Company and / or SEPA. The disposal of this effluent will be the responsibility of the contractor. If necessary this water will be taken off-site for disposal at a suitable facility.

8.9.12 Temporary drainage routes and silt fences, constructed of geotextile, will be constructed if deemed necessary. Any pumping will be undertaken at such a rate using an appropriately sized pump in order to avoid disturbance or erosion of the stream banks. The location of dewatering pipework will be carefully positioned. The contractor will regularly inspect all dewatering pumps, pipe work and connections.

8.9.13 Cable trenches will be refilled and compacted to the same condition as the surrounding substrate in order to prevent creation of new sub-surface flow pathways and decrease the likelihood of ponded water in the excavations. Trenches will be back-filled promptly in order to minimise water ingress. If necessary temporary silt traps will be provided. Confirmed mitigation measures such as working to best practice guidance, de-watering of excavations, re-instatement of excavations with similarly graded materials to what has been excavated and lining of excavations with sand and geotextile membranes where necessary will also ensure that any impacts are limited.

Oil Spills

8.9.14 If discharge of any water is required as part of the construction process, the contractor will provide a silt trap and / or oil interceptor at a location agreed with SEPA to allow solids or immiscible liquids to settle / separate prior to discharge. The contractor will inspect, empty and maintain silt traps / interceptors. A registered waste carrier will remove from site all sludges or residues collected during cleaning operations, to a suitably licensed waste disposal facility.

8.9.15 The storage of fuel, equipment and construction materials will be designed so as to minimise the risk of soil contamination or water pollution for example through the use of bunds, drip trays and oil interceptors in accordance with SEPA guidelines. Storage locations will be defined in the SWMP.

8.9.16 Storage of fuel would be limited and secure. Temporary diesel storage tanks will be double skinned or contained within an impermeable bund, capable of holding 110 percent of the tank's contents.

8.9.17 Construction machinery will be checked regularly. Any maintenance required will occur over hardstanding or on a suitable impermeable ground cover. Refuelling will be limited to a designated area, on an impermeable surface, away from any drains or watercourses. Spill kits, absorbent pads and absorbent sands will be available on site at all times. Any spills will be cleaned up as soon as possible, according to the spill response plan in the SWMP, with any contaminated sands bagged up and disposed of correctly. Parking of staff vehicles will only be permitted in designated areas.

8.9.18 Any impacts will be minimised by restricting vehicle movements to specified routes and controlling the construction areas. In addition, a temporary site compound will be constructed for the parking of construction vehicles and equipment, staff vehicles, and the storage of materials.

Operation

8.9.19 The turbine foundation will be designed appropriately to the underlying ground conditions to make sure the turbine has maximum stability.

8.9.20 The wind turbine will be equipped with sensors to automatically detect loss in fluid pressure and / or increases in temperature in the lubricating oils used, enabling the turbine to be shut down automatically in the event of a fluid leak.

8.9.21 Any accidental gear oil or other fluid leaks from the wind turbine would be contained inside the tower as it is sealed around the base and would be cleaned up as soon as possible

8.9.22 Disposal of all waste materials, whether hazardous or not, will only be via appropriate and authorized routes.

Decommissioning

8.9.23 A decommissioning plan will be prepared and submitted to the local planning authority for approval 12 months prior to the commencement of decommissioning works. This will specify a number of mitigation measures representing best practice at that particular time.

8.9.24 At this stage it is anticipated that the decommissioning area will be delineated and measures taken to avoid vehicle use outside the working boundary. In order to further limit disturbance, the site access tracks will be taken out last.

8.9.25 Any soils, sub-soils or aggregate suitable for reuse will be stockpiled on impermeable liners, in the vicinity of the turbine location.

8.9.26 Dust suppression measures will be put in place to minimise dust levels on the site and in the surrounding environment. These measures are detailed in Section 7, Air Quality of this ER.

8.9.27 Any additional soil materials that are to be imported to the site will be required to have certification of their chemical concentrations to ensure that contaminative materials are not being introduced to the area.

8.9.28 Speed restrictions will be imposed on site to minimise disturbance of bare surfaces and the amount of disturbed surfaces left exposed for significant time periods will be minimised.

8.10 Residual Impacts

8.10.1 Provided the mitigation measures detailed in Section 8.9 are strictly followed, there are not anticipated to be any residual impacts arising from the development on soils and geology, hydrology, drainage and hydrogeology. This is summarised by the matrix in Table 8.7 which presents the potential (pre-mitigation) impacts of the development, appropriate mitigation measures and resulting residual (post mitigation) impacts.

TABLE 8.7 – SUMMARY OF RESIDUAL IMPACTS

Potential Impact	Initial (pre-mitigation) significance of effect	Mitigation Measure(s)	Residual (post mitigation) significance of effect
Construction			
Human health (construction workers)	Slight adverse	Appropriate PPE, dust suppression measures, working to best practice guidelines.	Neutral
Geology	Neutral	N/A	N/A
Surface water	Slight adverse	Following all appropriate legislation, best practice guidelines and SWMP. Locating stockpiles away from watercourses and covering in wet / windy weather. Wheel washing. Use of drip trays and oil interceptors.	Neutral
Groundwater	Slight adverse	Use of drip trays and oil interceptors. Following best practice guidance. Appropriate design of foundations.	Neutral
Drainage	Neutral	Movement of surface water drains. Construction of access roads with appropriate drainage. Temporary drainage routes installed if necessary. Trenches re-instated to pre construction conditions.	Neutral

8.11 Cumulative Impacts

8.11.1 The potential impacts listed above have been assessed alongside other wind farm developments (both proposed and in operation) given in Table 1.1 of this ER.

8.11.2 The cumulative impact assessment concludes that during construction there are not considered to be any cumulative impacts on soils, geology, hydrology and hydrogeology. This is due to the small areas involved with excavation of foundations for turbines, control buildings and access tracks, along with the neutral residual impacts and the unlikely event that two wind farms would be constructed at the same time.

8.11.3 Additionally, there are not expected to be any cumulative impacts during the operational phase of the project. The development will not impact upon any sites designated for their geological importance and the minimal amounts of ground take associated with turbine foundations, access tracks and the control building will only have very minor impacts on the drainage regime. The same is also true for other Wind Farm developments in the area (both proposed and in operation). Due to the distance of other wind farm sites from the Cotton of Pitkennedy Project, if any impacts from the operational phase of other wind farms were perceptible, none would be associated with the same watercourses or groundwater bodies which underlie or flank the site. The overall cumulative impact during operation is therefore considered to be negligible.

SECTION 9

ECOLOGICAL ASSESSMENTS

9 ECOLOGICAL ASSESSMENTS

The following section details the Ecological Assessments performed for the proposed Cotton of Pitkennedy wind turbine, by GLM Ecology.

GLM Ecology

Ecological Assessments
Cotton of Pitkennedy
Aberlemno
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Contents

1 ECOLOGY

1.1 Introduction

This section considers the potential effects of the proposed wind turbine on the nature conservation interests on and around the site, sets out the findings of the various surveys carried out and provides an assessment of impact on key sensitive species and habitats

These assessments were carried out by Garry Mortimer PhD, GLM Ecology, an experienced field ecologist with several years experience of ecological assessments at wind farm sites.

1.2 Regulations and Guidance

This ecological impact assessment (EcIA) pays explicit regard to the requirements of:

- Council Directive 79/409/EEC on the conservation of wild birds (the "Birds Directive");
- Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the "Habitats Directive");
- The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007 (the "Habitats Regulations", which translates the Birds Directive and Habitats Directive into UK law);
- The Wildlife and Countryside Act 1981, as amended;
- Nature Conservation (Scotland) Act 2004;
- 'National Planning Policy Guideline (NPPG) 14: Natural Heritage', The Scottish Office, 1999; and
- The UK Biodiversity Action Plan (BAP).

The EcIA was carried out using the following documents:

- Guidelines on Environmental Impacts of Wind Farms and Small Scale Hydro Electric Schemes, Scottish Natural Heritage, 2001;
- Survey methods for use in assessing the impacts of onshore wind farms on bird communities, Scottish Natural Heritage, November 2005;
- Wind farms and birds: Calculating a theoretical collision risk assuming no avoiding action, Scottish Natural Heritage, 2000;
- Developing field and analytical methods to assess avian collision risk at wind farms, Band et al, 2007;
- Technical Information Note 59 Bats and single large wind turbines: joint agencies interim guidance Natural England 18 September 2009; and
- Technical Information Note 51 Bats and onshore wind turbines Interim guidance Natural England 11 February 2009.

The EcIA has been carried out according to current guidance published by the Institute of Ecology and Environmental Management (2006), which is recognized as best practice.

1.3 Impact Assessment Methodology

The EcIA has been carried out according to current guidance published by the Institute of Ecology and Environmental Management (2006), which is recognized as best practice. These guidelines set out a process of identifying the value of each ecological receptor and then characterizing the effects that are predicted, before discussing the effects on the integrity or conservation status of the receptor, proposed mitigation and residual effects.

1.4 Ecological Features Evaluation Criteria

A value or sensitivity has been assigned to each ecological receptor based on the following factors:

- Importance at a geographical scale, from local to international level;
- Designation status, e.g., SPA, SSSI, non-statutory designated sites, etc.;
- Biodiversity value, e.g., national BAP habitat/species, local BAP species, etc.; and
- Social, community and economic value.

The rationale for the valuation of sensitivity has been included for each receptor for which a significant effect is predicted. Table 1 provides examples, which are designed to give guidance as to how levels of sensitivity are typically derived. The value of sensitivity of an ecological receptor refers to land within the development area and a recognised 500m zone of effect.

Table 1. Guideline definitions for the sensitivity of ecological receptors

Sensitivity of Receptor	Examples (Guidance to evaluation)
International	An internationally designated site or candidate site (SPA, pSPA, SAC, pSAC , Ramsar site, Biogenetic Reserve) or an area which the country agency has determined meets the published selection criteria for such designation, irrespective of whether or not it has yet been notified. A viable area of a habitat type listed in Annex I of the Habitats Directive, EU 1992 or smaller areas of such habitat which are essential to maintain the viability of a larger whole. Any regularly occurring population of an internationally important species, which is threatened or rare in the UK, i.e. it is a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK Biodiversity Action Plan (BAP)) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of any internationally important species.

Sensitivity of Receptor	Examples (Guidance to evaluation)
National	A nationally designated site (SSSI, ASSI, NNR, Marine Nature Reserve) or a discrete area, which the country conservation agency has determined meets the published selection criteria for national designation (e.g. SSSI selection guidelines) irrespective of whether or not it has yet been notified. A viable area of a priority habitat identified in the UK BAP, or of smaller areas of such habitat, which are essential to maintain the viability of a larger whole. Any regularly occurring population of a nationally important species, which is threatened or rare in the region or county (see local BAP). A regularly occurring, regionally or county significant population/number of any nationally important species. A feature identified as of critical importance in the UK BAP.
Regional	Viable areas of key habitat identified in the Regional BAP or smaller areas of such habitat which are essential to maintain the viability of a larger whole. Viable areas of key habitat identified as being of Regional value in the appropriate Natural Area profile. Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant Natural Area on account of its regional rarity or localisation. A regularly occurring, locally significant number of a regionally important species. Sites, which exceed the County-level designations but fall short of SSSI selection guidelines, where these occur.
County	Semi-natural ancient woodland greater than 0.25 ha. County/Metropolitan sites and other sites which the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves selected on County/metropolitan ecological criteria (County/Metropolitan sites will often have been identified in local plans). A viable area of habitat identified in County BAP. Any regularly occurring, locally significant population of a species which is listed in a County/Metropolitan “red data book” or BAP on account of its regional rarity or localisation. A regularly occurring, locally significant number of a County important species.

Sensitivity of Receptor	Examples (Guidance to evaluation)
District	Semi-natural ancient woodland smaller than 0.25 ha. Areas of habitat identified in a sub-County (District/Borough) BAP or in the relevant Natural Area profile. District sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves selected on District/ Borough ecological criteria (District sites, where they exist, will often have been identified in local plans). Sites/features that are scarce within the District/Borough or which appreciably enrich the District/Borough habitat resource. A diverse and/ or ecologically valuable hedgerow network. A population of a species that is listed in a District/Borough BAP because of its rarity in the locality or in the relevant Natural Area profile because of its regional rarity or localisation. A regularly occurring, locally significant number of a District / Borough important species during a critical phase of its life cycle.
Parish (Local)	Areas of habitat considered to appreciably enrich the habitat resource within the context of the Parish or neighbourhood, e.g. species-rich hedgerows. A regularly occurring but low number of locally common protected species within or adjacent to the Development area. Local Nature Reserves selected on Parish ecological criteria.
Very Local	Areas of habitat that have a limited ecological value. Plant assemblages tend to be species poor, but may be utilised by a small number of faunal species. Those habitats that have an effect of enriching and complimenting the local natural environment to a small degree.
Low	Areas of habitats considered to be of very limited ecological value. They are not representative of natural habitats and are very species poor. Those habitats that do not enrich the local natural environment.
NB: Where species of habitats occur in more than one category, the highest value is applicable.	

1.5 Characterisation of Effects/Magnitude of Effect

The effects on individual receptors are described in relation to a range of factors. These include the magnitude, extent (either in area or population terms), duration, timing and frequency of the effect on the structure and function of the ecosystem. Effects in combination may have a cumulative effect that is greater than when the same effects occur in isolation. Combination effects include the separate effects of the scheme upon a feature (e.g., effects as a result of the construction and operation stage), or the combined effects of a number of schemes that affect the same receptor. Consideration is given to the longevity of effects, based on the life span of the Development and reversibility of the effect.

The criteria used to determine the character (magnitude, scale, duration, reversibility) of the ecological effects are given in Table 2.

Table 2. Definition of terms relating to the Character of ecological effects

Character/ Magnitude	Definition
Very high	Total loss or very major alteration to key elements or features of the baseline conditions such that post development character, composition or attributes will be fundamentally changed and may be lost from the site altogether. For example the loss of a great crested newt breeding pond or loss/destruction of a maternity roost of a rare species of bat, loss/destruction of hibernation roost for bats, destruction of a Annex1 priority habitat or a statutory designated site. Generally irreversible and permanent. Guide: >80% of population or habitat lost
High	Major alteration to key elements or features of the baseline (pre-development) conditions such that post development character, composition or attributes will be fundamentally changed. For example the loss of a bat maternity roost, damage to a great crested newt breeding pond, pollution of a stream containing white clawed crayfish, damage to annex 1 priority habitat. Generally reversible after long period of time. Guide: 20-80% of population or habitat lost
Medium	Loss or alteration to one or more key elements or features of the baseline conditions such that post development character, composition or attributes of baseline will be partially changed. For example loss of optimal foraging habitat for great crested newts, death or injury to a low number of a locally rare species, loss of species rich ancient hedgerow, severance of a bat flight path, temporary abandonment of a bat roost. Generally reversible with mitigation on a short timescale Guide: 5-20% of population or habitat lost
Low	Minor shift away from baseline conditions. Change arising from the loss or alteration will be discernible but underlying character, composition or attributes of baseline condition will be similar to pre-development circumstances or patterns. For example loss of sub optimal foraging habitat for Great crested newt, loss of species poor hedgerow, death or injury of a very small number of common species of bat. Generally reversible without mitigation in short timescale. Guide: 1-5% of population or habitat lost.
Negligible	Very slight change from baseline condition. Change barely distinguishable, approximating to the "no change" situation. Guide: <1% of population or habitat lost.

1.6 Significance Criteria

An ecologically significant effect is defined as an effect (adverse or positive) on the integrity of the site or ecosystem(s) and/or the conservation status of habitats or species within the identified zone of effect for the Development. The definitions of integrity and conservation used for this assessment are those detailed in the Institute of Ecology and Environmental Management (IEEM) Guidelines for Ecological Impact Assessment, namely:

- Integrity is the coherence of ecological structure and function, across a site's whole area, that enables it to sustain a habitat, complex of habitats and/or the levels of populations of species; and
- Conservation status for habitats is determined by the sum of the influences acting on the habitat and its typical species that may affect its long-term distribution,

structure and functions as well as the long-term survival of its typical species within a given geographical area.

The combined assessment of the effect characterisation and the sensitivity of ecological receptors have been used to determine whether or not an effect is significant with respect to the EIA Regulations. These two criteria have been cross-tabulated to assess the overall significance of the effect in Table 4. Effects with significance of moderate or major are considered to be significant in terms of the EIA Regulations.

Table 3. Matrix used to assess the significance of potential effects upon ecological receptors.

Magnitude of effect	Sensitivity of receptor	High (International and National)	Medium (Regional and District)	Low (Parish/ (Local))	Negligible (Very Local/Low)
High		Major	Major	Moderate	Negligible
Medium		Major	Moderate	Moderate	Negligible
Low		Moderate	Moderate	Minor	Negligible
Negligible		Negligible	Negligible	Negligible	Negligible

1.7 Site Background and Context

An initial desk based search, walkover survey and scoping report was carried out in 2012 by Parsons Brinckerhoff. GLM Ecology undertook further ecology work and associated desk studies. Designated sites and associated protected species and habitats at a local and regional level have been identified through that process. A description of the local area in relation to designated sites with ecological interests and the findings of an initial desk based review of the area are presented in the context of the following sections. The following resources were used:

- NBN Gateway[1]
- RSPB sensitivity maps[2];
- Scottish Natural Heritage (SNH) Sitelink[3];
- The Scottish Biodiversity List[4];
- Tayside Raptor Group[5]; and
- Multi Agency Geographic Information for The Countryside[6].

1.8 Designated Sites

The following sites were identified within 20km from the site:

Site	Designation	Features
River South Esk	SAC	Designated for Atlantic salmon and freshwater pearl mussel
Loch of Kinnordy	SPA	Designated for greylag goose, fen and breeding bird assemblage
Montrose Basin	SPA	Designated for pink-footed goose and non-

		breeding waterfowl assemblage.
The following sites were identified within 5km from the site:		
Turin Hill	SSSI	Designated for geology.
Rescobie & Balgavie Loch	SSSI	Designated for open fen and plant assemblage
The following sites were identified within 1km from the site:		
None		

1.9 Scope of Ecological Assessments

The scope of the present EcIA was derived from the initial site background and context study above, the local knowledge and experience of the ecologist and guidance from SNH. The EcIA considers the following issues:

- Breeding Birds;
- Bats;
- Badgers;
- VP Surveys
- Phase 1 Habitat Survey.

No suitable habitat is present on site for great crested newts, otters and water voles and no surveys were deemed necessary. Habitat on site is minimal for bats and badger. Two SPAs designated for geese (Montrose Basin & Loch of Kinnordy are within 20km of the site. After discussion with Mark Moore SNH it was agreed that VP surveys for foraging geese would not be considered a priority as it was considered that the site was not known to be in an area that was used as a foraging area for these species. It was agreed that the site could be submitted for planning whilst the VP surveys are on going. If significant numbers of geese were found to be using the site then appropriate action would be implemented.

The scope of ecological assessments was in accordance with the guidance given by SNH[7] unless otherwise agreed with SNH.

2 SITE DESCRIPTION

The site at Cotton of Pitkennedy (NO 537539) is in an area of arable farmland approximately 8km to the east of Forfar, Angus. (Figures 1, 2) The site is predominantly arable fields with hedgerows and stonewalls present (Figures 3, 4). Various small shelterbelts and wooded areas are present (Figures 5, 6). To the east lies Montremont Forest, a large coniferous plantation (Figure 7). There are various small ditches on site. The single proposed turbine location is in an arable field near the Wood of Pitkennedy.

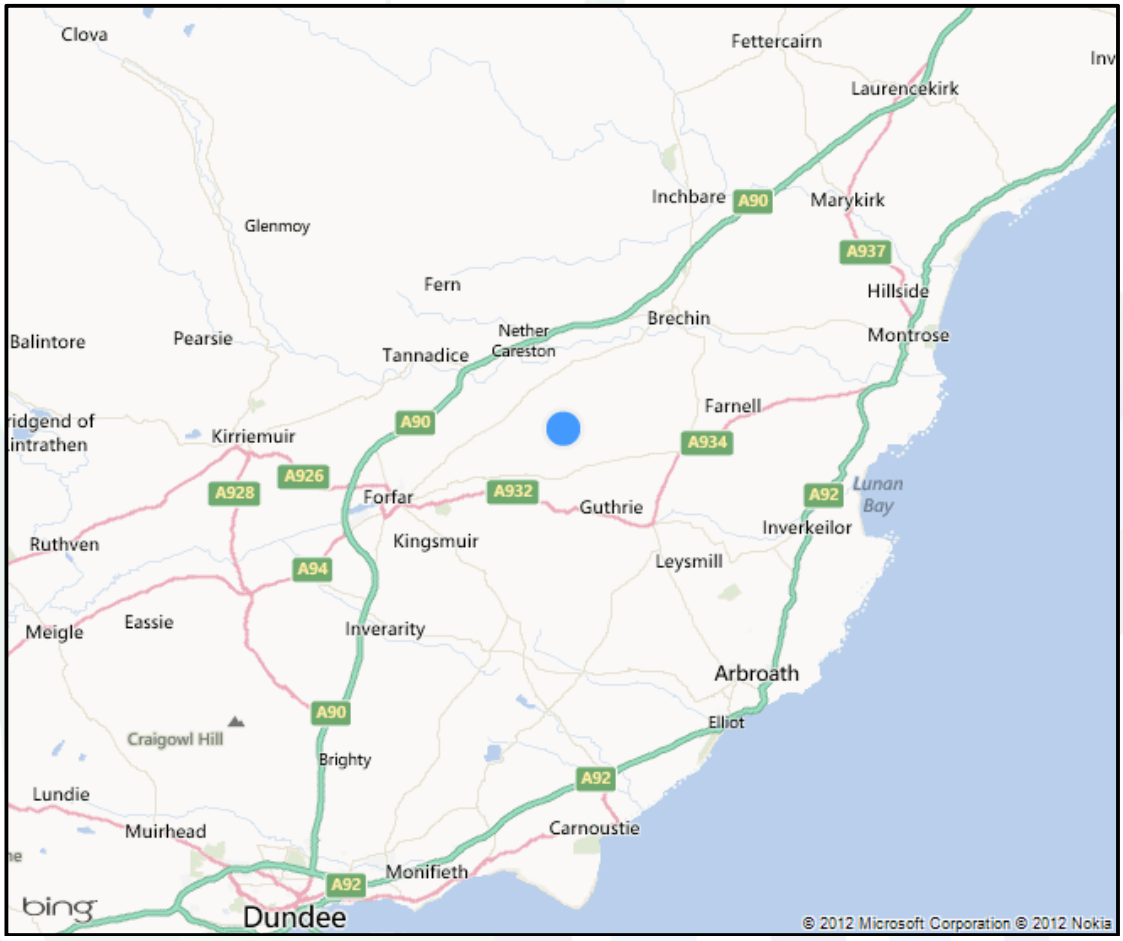


Figure 1. Site location east of Forfar.

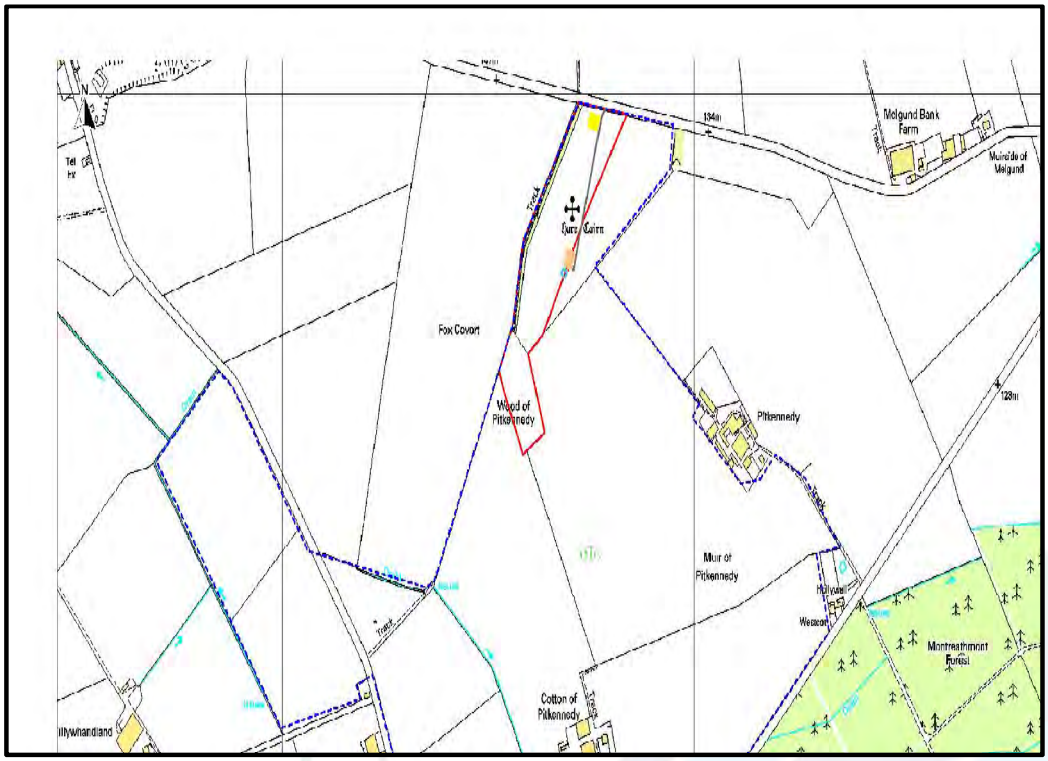


Figure 2. Turbine location.

Figure 3. Arable fields.

Figure 4. Arable fields.

Figure 5. Wood of Pitkennedy

Figure 6. Small coniferous plantation

Figure 7. Montreatmont Forest to the east.

3 ORNITHOLOGY

Generally, ornithological surveys on and around the site are required to assess potential impacts of birds throughout the year, which could arise due to:

- Potential loss, fragmentation and degradation of bird habitats arising from the construction of turbine bases, crane pads, access tracks, a sub-station and temporary construction compounds and power lines;
- Potential displacement of hunting or migrating birds through avoidance of turbines, work staff and machinery;
- Disturbance to birds due to noise from operating turbines;
- Potential disturbance to nesting birds (for example, displacement of birds from breeding habitats) resulting from the construction activities; and
- Potential for birds to collide with turbine blades and power lines.

It should be noted that the issues identified above are more likely to be significant for larger wind turbine developments; however, these were considered for this application.

3.1 Survey Scope & Methodology

To assess the presence of breeding birds on site and in the surrounding area breeding bird surveys were carried out.

3.1.1 Breeding Bird Survey

The area surveyed was the area half a kilometer round the proposed turbine site (SNH 2006) on ground owned by the developer. Other ground was surveyed by listening along the boundary. The survey work was based on the standard BTO Common Bird Census (CBC) technique where the Survey Area is walked and the route varied each survey. The number of survey visits was the same as a BBS survey (three visits) rather than the number required for a full CBC survey (ten visits). There were three day visits in approximately late April, mid May and early June.

This is a standard technique for breeding bird surveys as used for many years as per BTO's Breeding Bird Survey Instructions[8] for their Common Birds Census[9] This involves making a series of visits throughout the breeding season, during which all birds seen or heard in the area are recorded on large-scale maps using standard codes denoting their species and behaviour. The area was searched by walking transects along field edges, roads and paths. During each visit, the location of each bird was mapped. By aggregating these individual records, breeding territories were revealed (Bibby et al. 2000)[10] for each species, the number of breeding territories were then recorded. Birds of conservation concern (Eaton et al. 2009)[11] were identified. The designations used were: Breeds (B), Non Breeder (NB) and Possible Breeder (PB).

3.1.2 Schedule 1 Raptor Data Search

Tayside Raptor Group was asked whether any Schedule 1 raptors bred in the vicinity.

3.1.3 Vantage Point Surveys

Data from VP surveys are utilised as part of the assessment of potential impacts including: species presence, density, distribution and behaviour.

A single VP was used as this gave clear views of the whole site, allowing all flights to be recorded in detail to 500m outwith the site. VP watches are 36 hours for the winter period from October-March. The location, direction of flight and estimated height above the ground of target species were recorded. VPs typically covered a period of three hours and were spread out over a range of starting times during the day including dawn and dusk and encompassed all weather conditions.

Primary target species were identified as all Special Protection Areas (SPA) qualifying species including Schedule 1 raptors, wildfowl and waders. During the VPs flight data for both primary and secondary target species were recorded. Details of species, number of birds, flight height (in bands), duration and direction were recorded. The following height bands were used in the surveys:

- A- <20m
- B- 20-125m
- C- >125m.

Any flights recorded at band B and within 200m of the proposed turbine location were classified as being within the collision risk window.

3.2 Survey Results

3.2.1 Breeding Birds

Fifteen species of birds were recorded as breeding and two as possibly breeding within the survey area (Table 4). All of the recorded birds are recorded locally as common residents or summer visitors whose populations are not threatened and are in favorable conservation status in Scotland. None are specially protected. The number of breeding species is average due to the paucity of woodland and hedgerows on site. Most bird recorded were near cover or trees. Nationally three species, grey partridge and yellowhammer are on the red list of birds of conservation concern with another six on the amber list (Eaton et al. 2009).

Table 4. Bird species list for Cotton: April – June.

Breeds (B), Non Breeder (NB), Possible Breeder (PB)

Species	Latin	April	May	June	Status
Buzzard	*Buteo buteo*	3seen	1 seen	1 seen	PB
Grey Partridge	*Perdix perdix*	Heard		Heard	B
Swallow	*Hirundo rustica*		1 pair	3 seen	B
Skylark	*Alauda arvensis*	2 singing	5 singing	2 singing	B
Wren	*Troglodytes troglodytes*	Present	Present	Present	B

Species	Latin	April	May	June	Status
Dunnock	*Prunella modularis*		Present	Present	B
Whitethroat	*Sylvia communis*		1 singing	2 singing	B
Willow Warbler	*Phy. trochilus*		1 singing	3 singing	B
Great Tit	*Parus major*	Present	Present	Present	B
Blue Tit	*Parus caeruleus*	Present	Present	Present	B
Gt Spotted Woodpecker	*Dend. major*		1 seen		PB
Blackbird	*Turdus merula*	1 singing	Juveniles		B
Mistle Thush	*Turdus viscivorus*	1 singing			B
Carrion Crow	*Corvus corone*	Present	Present	Present	B
Jackdaw	*Corvus monedula*	Small numbers	Small numbers	Small numbers	NB
Rook	*Corvus frugilegus*	Small numbers	Small numbers	Small numbers	NB
Chaffinch	*Fringilla coelebs*	Small numbers	Small numbers	Small numbers	B
Goldfinch	*Carduelis carduelis*	1 pair		Present	B
Yellowhammer	*Emberiza citrinella*	2 seen	4 seen		B

3.2.3 VP Surveys

As agreed with SNH VP surveys are ongoing with 12hrs of survey work completed and 24hrs to be done. Results so far are that no Schedule 1 raptors have been recorded on site. No geese or swans have been recorded foraging onsite during any VP or any other survey work. A total of four flights of geese (750 pink-footed geese) have been recorded flying over site in a south-north heading. These flights were extremely high and not in the collision risk zone.

4 BADGERS

4.1 Badger (*Meles meles*) Legislation

Both badgers and their setts are protected by law. The Protection of Badgers Act 1992 (Scottish Version) brings together all of the previous legislation specific to badgers (except their inclusion on Schedule 6 of the 1981 Wildlife and Countryside Act as amended Nature Conservation (Scotland) Act 2004). As a result it is an offence to:

- Willfully kill, injure, take, possess or cruelly ill-treat a badger, or to attempt to do so;
- To intentionally or recklessly interfere with a sett;
- To disturb a badger when it is occupying a sett;
- Damage or destroy a sett; and
- To obstruct access to, or any entrance of a badger sett.

A badger sett is defined in the legislation as '*any structure or place, which displays signs indicating current use by a badger*'. *'Current use*' does not simply mean 'current occupation' and for licensing purposes it is defined as *'any sett within an occupied badger territory regardless of when it may have last been used'*. A sett therefore, in an occupied territory, is classified as in current use even if it is only used seasonally or occasionally by badgers, and is afforded the same protection in law.

4.2 Aims & Objectives

The aims of this assessment were:

- To assess whether badgers were present on site;
- If badgers are present to assess local population status and usage of the site;
- To recommend further survey work if required.

4.3 Data Review

A data search was carried out using NBN Gateway to determine if badgers had been recorded in the 10km square of which Cotton of Pitkennedy is enclosed.

4.4 Survey Methodology

The surveys consisted of a walkover of the site and ground within 250m of its boundary to visually inspect and assess the site for its potential to support badgers. Badgers surveys were carried out according to recommended guidelines[12, 13, 14 and 15]. Evidence of badger activity searched for included:

- Setts: badger setts typically have characteristic shapes and dimensions;
- Paw prints and badger hair caught on hedges and fences;
- Foraging signs: foraging badgers leave distinctive marks when foraging;
- Characteristic worn pathways; and
- Latrines: badgers defecate in pits, often clustering several pits into a latrine.

4.5 Results

4.5.1 Data Review

NBN Gateway recorded badger within the 10km grid square of the site.

4.5.2 Field Survey

No signs of badger were recorded.

5 BATS

5.1 Bat Legislation

Bats of all species in Britain and their roosts are protected under the Conservation (Natural Habitats, &c) Amendment (Scotland) Regulations 2007. Following recent changes to legislation in Scotland under this law it is illegal intentionally or recklessly to kill or injure a bat, to disturb a roosting bat or to damage, destroy or obstruct access to any bat roost. This applies to both summer and winter roosts, which may be in different structures. Any action, which is likely to disturb or damage a bat roost, requires a license from the Scottish Executive.

5.2 Aims & Objectives

To determine what bat species are present on the site and whether the habitat is utilized for roosting, foraging or commuting by bats.

5.3 Data Review

A data search was carried out using NBN Gateway to determine if any bat species had been recorded in the 10km square of which Cotton is enclosed.

5.4 Survey Methodology

A habitat and bat assessment survey was carried out at the site in June 2012 in accordance with guidance from the Bat Conservation Trust[16] and Natural England[17]. The objectives of the bat surveys were to identify whether the site would be considered suitable for roosting bats and whether bats were present on site. The aim was to provide sufficient evidence so that the potential impacts of the proposed development on any local bat populations could be assessed and if appropriate, mitigation suggested.

5.5 Habitat Survey

A daytime field survey was carried out in June 2012. The site was surveyed for potential flight lines/commuting routes, roosts and foraging areas and the habitat assessed for its overall suitability for bats. Any potential foraging areas were examined and linear features were assessed for their suitability as flight lines or commuting pathways.

5.6 Bat Detector Surveys

One visit was made on 20th June 2012. The dusk survey was carried out from approximately 30mins before sunset to 2.0hrs after sunset. The dawn survey was from approximately two hours before sunrise to 30mins after sunrise (Table 5) The site was divided into a circular transect (blue line Figure 8) which were surveyed constantly by two individual surveyors starting at opposite ends of the transect on each visit.

Table 5. Survey times and weather conditions.

Survey	Survey Area	Date	Sun Set	Sun Rise	Time	Weather
Night Surveys						
1	Dusk	20/06/12	22.02		21.30-23.55	E3.4/8.10C
	Dawn	09/06/12		04.30	03.00-05.00	ENE3.8/8.9C

The transect was focused on the proposed turbine location with strategic stopping points. These points encompassed all habitats found on site and included the proposed turbine location, open fields and tracks. Bats were surveyed at all times and at stopping points using Bat Box ultrasound bat detectors in conjunction with a mini-disc inline recorder between 20 - 120 MHz. Any potential bat calls on the mini discs were analysed using the Bat Sound software package and identified to species level. A SM2 static recorder was left in the turbine location for five nights in June.

5.7 Results

5.7.1 Data Review

NBS Gateway and local knowledge revealed the following bat species recorded in the 10km grid square based on Cotton.

- Pipistrelle sps *Pipistrellus sps.*
- Brown long eared bat *Plecotus auritus.*
- Soprano pipistrelle *Pipistrellus pygmaeus*
- Daubentons bat *Myotis daubentoni*

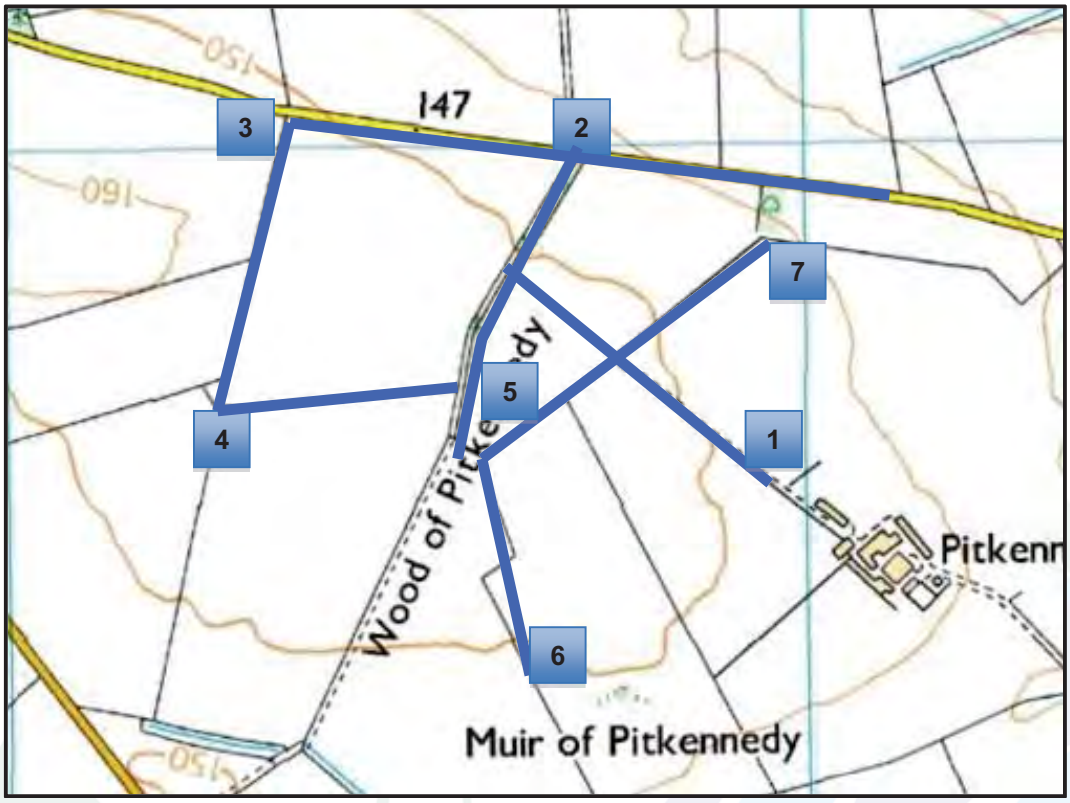


Figure 8. Bat survey area

- **Transect =**
- **Stopping points =** 1

5.7.2 Habitat Survey Results

Buildings
No buildings are within a 500m radius of the turbine location

Trees
There are limited trees within a 500m radius of the proposed turbines that have bat roost potential. The trees in the shelterbelt (Wood of Pitkennedy) are predominantly larch/spruce species and these do not generally provided cavities for roosting bats.

Foraging Areas
Arable farmland is not considered good bat foraging habitat. It would be thought that Montremont Forest and associated edges are higher quality foraging habitat.

5.7.3 Bat Detector Survey Results

Vey small numbers of common pipistrelles (<4) were recorded on the walked transect. These bats were all foraging within the Wood of Pitkennedy (see Figure 5). It is thought that theses

bats were entering the site from the northeast from along the minor road from Melgund Bank Farm.

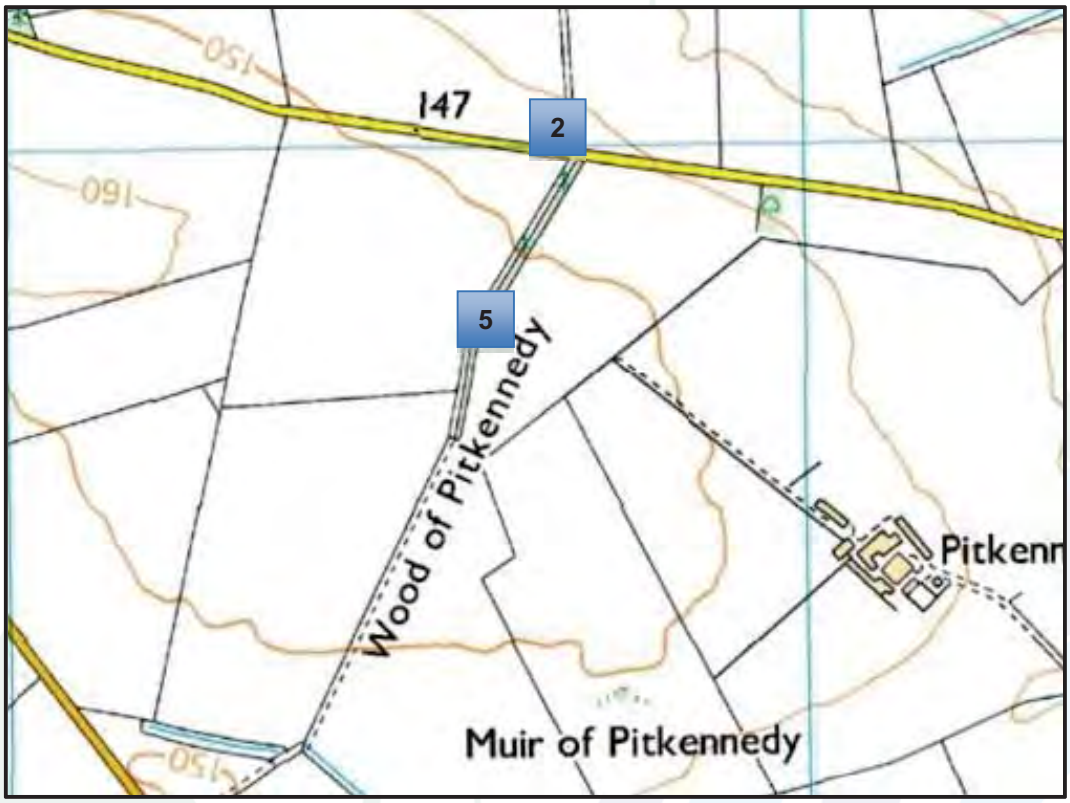


Figure 9. Areas where bats were recorded.

6 PHASE 1 HABITAT SURVEY

6.1 Legislation

Legislation exists to protect habitats and floral species from destruction, degradation and loss as a result of development activities and include:

- The Conservation (Natural Habitats, & C.) Regulations 1994;
- Wildlife & Countryside Act 1981 (as amended); and
- The Nature Conservation (Scotland) Act 2004.

6.2 Aims & Objectives

The Phase 1 Habitat Survey aimed to:

- Identify and record broad habitats within the vicinity of the development area;
- Provide a description of habitat distributions and highlight any areas of ecological constraints in relation to the proposed development; and
- Contribute towards informing planning processes.

Whilst not a full botanical survey, the Phase I method enables a suitably experienced ecologist to obtain sufficient understanding of the ecology of a site so that it is possible either:

- To confirm the conservation significance of the site and assess the potential for impacts on habitats /species likely to represent a material consideration in planning terms; or
- To ascertain that further surveys of some aspect(s) of the site's ecology will be required before such confirmation can be made.

6.3 Survey Methodology

Phase I habitat survey is a standardised method of recording habitat types and characteristic vegetation, as set out in the Handbook for Phase I Habitat Survey – a technique for Environmental Audit[24] but extended for use in Environmental Assessment (IEEM 2006) [25] with habitat types present recorded on a Phase 1 habitat map. Dominant plant species observed within each habitat type were recorded in accordance with plant species nomenclature in Stace (1997) [26].

The Phase I habitat survey undertaken in February 2012 covered the whole of the site with a focus on the proposed turbine areas at circa NS 751 398 and encompassed a 500m buffer envelope around this area. The survey was undertaken outside of the optimal Phase 1 survey timescales (taken as April to September, dependent on seasonal and geographical variation). Therefore the identification of some plants and habitats was based on dead plant material from the previous growing season. Some species, which require flowering heads to be present in order for identification to be valid, were identified to genus level only. A colour coded GIS-based map in hard copy format was produced with associated colour key.

6.4 Results

6.4.1 Field Survey

The survey area supported a number of Phase 1 habitat types, as set out below. The JNCC code used for categorisation is included in brackets after each habitat type to allow cross-referencing with the Phase 1 Handbook. The nature conservation evaluation is included within this section separately for each habitat type found on site. Habitats found outside the proposed development boundary have not been evaluated in most instances, as these are generally unlikely to be significantly affected by the currently proposed development. The Phase 1 Habitat map is provided in Figure 10.

Broad-leaved semi-natural woodland (A.1.1.1). A pocket of broadleaved semi-natural woodland was present in the centre of the site adjacent to the Cotton of Turin. This woodland was dominated by silver birch (*Betula pendula)* with frequent ash (*Fraxinus excelsior)* and occasional hawthorn (*Crataegus monogyna).*

Coniferous plantation (A.1.3.2). This habitat type was recorded in two locations at the time of survey. A small pocket of coniferous plantation woodland was identified to the south of the site with a further narrow strip present alongside a track just inside the northern site boundary. These habitats were recorded as being dominated by Douglas fir (*Pseudotsuga menziesii)* with frequent Norway spruce (*Picea abies)* and occasional Sitka spruce (*Picea sitchensis).* The understorey of these woodlands were species poor with limited understorey structure.

Mixed woodland was recorded outside of the site boundary to the east of the site. This was part of Montreathmount Woodland, which is a large expanse of predominantly coniferous woodland with a series of burns running through it.

Scattered broad-leaved trees (A.3.1). Scattered broadleaved trees were recorded along the roadside to the west of the site; dominated by ash and pedunculate oak (*Quercus robur).*

Semi-improved acid grassland (B.1.2). This habitat was found in several locations on site; in the centre of the site surrounding the area of scrub, adjacent to the wall running through the western boundary of the site and running the length of the northern section of the site. This habitat was dominated by cock's-foot (*Dactylis glomerata)* with abundant ribwort plantain (*Plantago lanceolata)* and tufted hair-grass (*Deschampsia cespitosa),* frequent meadow grass species (Poa *sp.),* dock species (rumex *sp.)* and bramble (*Rubus fruticosus agg.),* occasional creeping bent (*Agrostis stolonifera),* false oat grass (*Arrhenatherum elatius)* and black knapweed (*Centaurea nigra)* with rare gorse.

Running water (G.2). Several wet ditch systems were recorded on site. These were generally man-made ditches draining agricultural land. These were characterised by having bare earth banks and limited or no aquatic and marginal vegetation.

Arable (J.1.1). This was the dominant habitat present on site. The arable fields were Italian rye- grass (*Lolium multiflorum)* dominated with few additional species present and narrow

species poor field margins. Areas of recently ploughed bare ground were mapped adjacent to several of the arable fields.

Species poor intact hedgerow (J2.1.2). A species poor intact hedgerow was mapped in the centre of the site adjacent to the track leading to Cotton of Pitkennedy. This habitat was a recently planted blackthorn *(Prunus spinosa)* hedgerow.

Amenity grassland (J.1.2). Areas of amenity grassland were identified adjacent to the houses on site; Turin Cottages and Pitkennedy Cottages. These habitats were generally species poor and dominated by meadow grass species.

Introduced scrub (J.1.4). Areas of introduced shrub were identified in the gardens of the buildings and houses present on site. These habitats were dominated by ornamental species.

Species poor defunct hedgerow (J.2.2.2). A species poor defunct hedge was mapped running adjacent to the road in the north west of the site adjacent to the area of broadleaved semi-natural woodland. This was dominated by blackthorn with sycamore (*Acer pseudoplatanus)* and ash also recorded.

Fence (J.2.4). Most of the field boundaries recorded on site were stock-proof post and wire fences. Sometimes these were in combination with flag stone or dry stone walls in varying states of repair.

Wall (J.2.5). There were both vertical flag stone walls and dry stone walls present on site. These were present throughout the site separating field boundaries, gardens and roadside verges.

Buildings (J.3.6). There were several buildings recorded on site; residential housing such as Turin Cottages, farm buildings such as Cotton of Turin; and warehousing and machinery stores such as at Cotton of Pitkennedy.

Bare ground (J.4). Bare ground was recorded on site in farm yards and along the network of tracks intersecting the site.

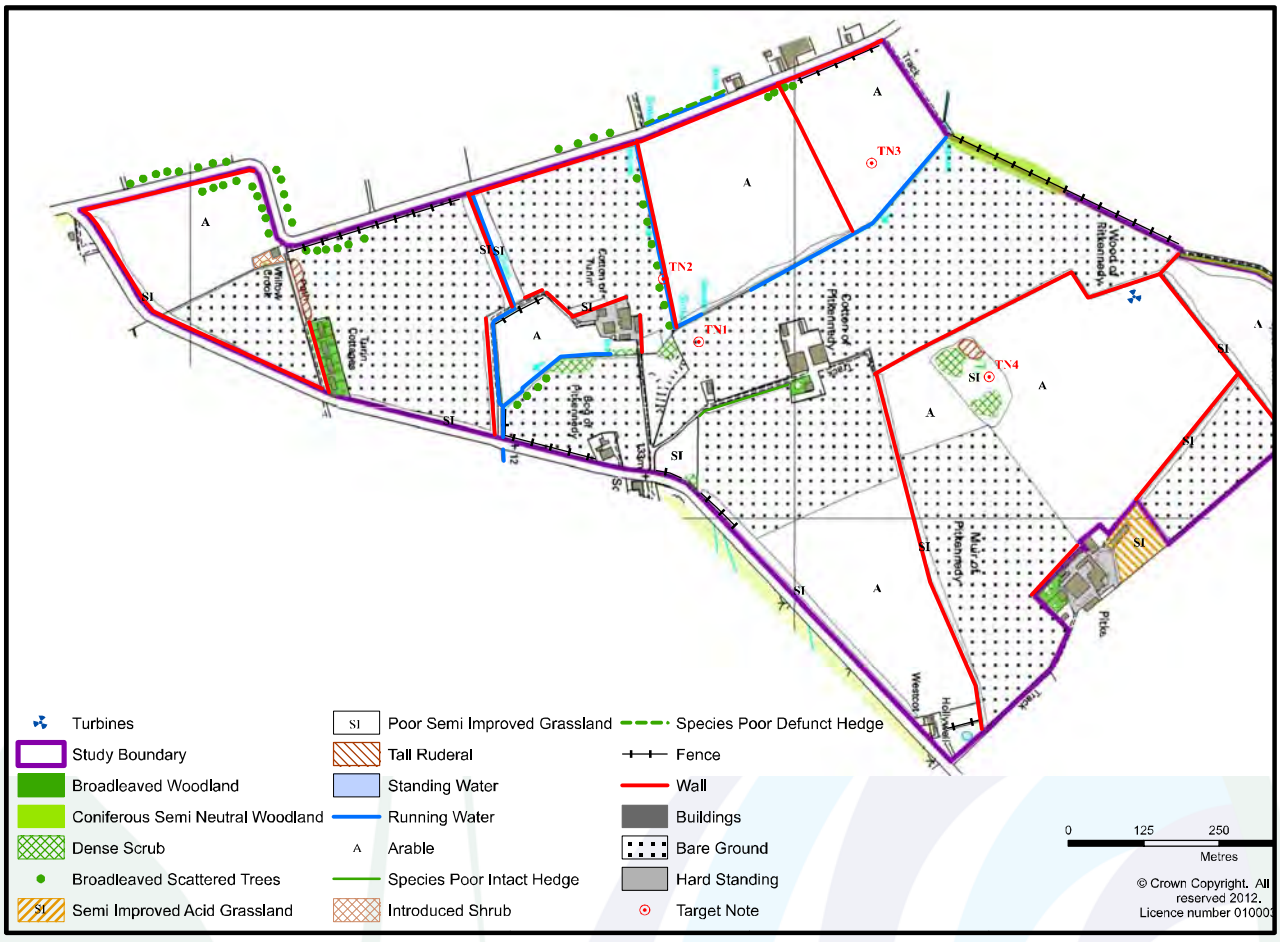


Figure 10. Habitats and associated legend

7 ASSESSMENT OF IMPACTS

7.1 Impacts on Breeding Birds

There was an average breeding species list due to the trees and hedgerows around Cotton of Pitkennedy. The species recorded would be considered as typical for arable farmland habitat and of low sensitivity. There was very little breeding on the open fields and no high sensitivity species were recorded in this habitat. The construction footprint will be on existing tracks and a small area of arable fields. No trees are proposed to be removed and no scrub. The magnitude of impact is considered to be negligible and overall the significance of impact to be no more than negligible.

7.1.1 Mitigation

No mitigation is deemed to be required.

7.2 Impacts on Schedule 1 Raptors

No Schedule 1 raptors were recorded in the area and none are known to breed on site.

7.2.1 Mitigation

No mitigation is deemed to be required.

7.3 Impacts on Wintering Birds

The loss of a small area of arable farmland would not have an adverse affect on any wintering birds given the species normally present on this habitat. Construction of the single turbine would be deemed to have a negligible significance of impact on any species.

7.3.1 Mitigation

No mitigation is deemed to be required.

7.4 Impacts on Badgers

No signs of badger were recorded.

7.4.1 Mitigation

As badgers are known to be in the general area and often wander widely and expand their territories the following mitigation is proposed:

- All contractors should be made aware of badgers and their legal protection;
- All personnel are made aware that badgers may exist close to the site and are at risk from vehicles; On site speed restrictions will be put into place for all vehicles, including construction, maintenance and visitors to the site;
- All trenches dug during construction and exposed open pipes will be covered at the end of each working day to ensure no risk to badgers, otters or any other wildlife that may have the potential to be trapped; and
- Ramps will be located within the trenches or pits that can’t be covered to allow an exit for any mammal that has gone into a trench or pit.

It is recommended that a survey be carried out in the immediate period before construction commences to determine if badgers are present.

7.5 Impacts on Bats

Only very small numbers of common pipistrelle bats were recorded. It is expected that roosts are present in farm buildings in the general area, however these are over 500m distant from the proposed turbine. No buildings will be impacted on by the construction footprint. It is considered that arable fields are poor quality foraging and that bats would forage around water and trees offsite. Within the 500m zone around the proposed turbine there is no potential in buildings for bat roosts and very limited potential in trees. No trees are to be removed for construction.

7.5.1 Mitigation

That the turbine is placed more than 50m from tip to hedgerows or tree lines.

7.6 Impacts on Habitats

A total of eleven habitats are present within the site survey area, of which the majority is arable farmland. No nationally or internationally protected habitats were identified in this assessment. The habitat around the proposed access tracks and turbine location is arable fields.

There are wet ditches onsite, however, no significant impacts on the aquatic environment are anticipated from the location of the proposed development infrastructure. There is the potential of a slight increase in run-off in to ditch systems through the ground disturbance of the construction phase but this is expected to be short lived, minor and further reduced through mitigation.

Some of the impacts predicted as a result of the proposed scheme can be considered generic impacts, which are typically associated with a development of this nature. The development of the wind turbine scheme at Cotton has been assessed as posing no significant impacts on commonly occurring habitats found on site. Therefore no specific prescriptions are recommended other than the general measures recommended below.

7.7.1 Mitigation

The following mitigation measures are proposed:

- Good construction site management should be implemented to minimise generation of litter, dust, noise and vibration. This should be controlled and monitored through the Contractor's Environmental Management Plan. Through adhering to best practices during construction and operation phases, fragmentation, disturbance and pollution to habitats present can be minimised;
- During construction management of excavated soil will focus on preventing silt runoff into the water environment during rainfall periods through careful design and maintenance of drainage/silt traps.

8 SUMMARY OF IMPACTS

Following the criteria set out in Tables 1, 2 & 3 the following table is an assessment of the impacts on flora and fauna at Cotton of Pitkennedy due to the proposed construction of three turbines.

Residual Effects	Value of receptor	Magnitude of change	Duration	Nature	Significance
Loss of foraging or breeding habitat to badgers.	Parish (Local)	Low	Short term	Negative	Not significant
Loss of foraging or roosting habitat to bats	Parish (Local)	Low	Short term	Negative	Not significant
Bat mortality due to turbine collisions	Parish (Local)	Low	Short term	Negative	Not significant
Bird mortality due to turbine collisions	Parish (Local)	Low	Short term	Negative	Not significant
Loss of habitat to breeding birds	Parish (Local)	Low	Short term	Negative	Not significant
Loss of habitat to wintering birds	Parish (Local)	Low	Short term	Negative	Not significant
Loss of habitat/vegetation	Parish (Local)	Low	Short term	Negative	Not significant
River South Esk SAC	International	Low	Short term	Negative	Not significant
Montrose SPA	International	Low	Short term	Negative	Not significant
Loch of Kinnordy SPA	International	Low	Short term	Negative	Not significant
Balgavies SSSI	National	Low	Short term	Negative	Not significant
Turin Hill SSSI	National	Low	Short term	Negative	Not significant

9 CONCLUSION

It is proposed to construct a single wind turbine and associated infrastructure on an area of arable farmland situated at Cotton of Pitkennedy, Forfar, Angus. A range of ecological assessments have been undertaken to investigate the ornithological and other ecological interest of the site and it is concluded that potential for this to be adversely affected by the current proposal is extremely unlikely.

References and a disclaimer are included in Appendix H.

SECTION 10

NOISE AND VIBRATION

10 NOISE AND VIBRATION

10.1 Introduction

10.1.1 The introduction of wind turbines has the potential to cause disturbance to the surrounding area and adjacent residential properties through noise emissions. In order to protect the reasonable amenity of neighbours of the wind turbine, an assessment of the proposed wind turbine including the measurement of the existing background noise levels has been undertaken. This report presents the approach and findings of this assessment, including recommended planning noise limits.

10.1.2 The methodology for the noise survey, including the selection of receptors and background noise monitoring locations, was discussed and agreed during a site visit with Louise Akroyd, Environmental Health Officer (EHO) at Angus Council, prior to commencement.

10.1.3 The results of the background noise survey have been correlated against hub height wind speed, calculated from simultaneously measured wind speed at various heights, with correction for wind shear. This has been done in order to establish changes in the noise climate at the proposed site with increasing wind speed. From this data, noise limits for the scheme have been derived for the night-time and amenity hours in accordance with the methodology set out in ETSU-R-97 'The Assessment and Rating of Noise from Wind Farms'.

10.1.4 A glossary of terms used is included in Appendix A.

10.2 Legislation / Policy / Good Practice

General

10.2.1 The following Legislative framework and published guidance has been used for this assessment:

- Planning Advice Note (PAN) 1/2011: Planning and Noise
- Planning Advice Note (PAN) 45: Renewable Energy Technologies
- ETSU-R-97 The Assessment & Rating of Noise from Wind Farms
- Prediction and Assessment of Wind Turbine Noise: Agreement about relevant factors for noise assessment from wind energy projects – Bowdler et al, Acoustics Bulletin, Vol 34 No 2 March/April 2009, Institute of Acoustics
- BS5228:2009 Noise and vibration control on construction and open sites
- BS7445: 2003 Description and measurement of environmental noise
- ISO9613, 1996 Acoustics – Attenuation of Sound During Propagation Outdoors, Part2: General Method of Calculation
- IEC 61400-11 Wind Turbine Generator Systems Part 11: Acoustic Noise Measurement Techniques. International Electro-technical Commission, 2002

Planning Advice Note (PAN) 1/2011: Planning and Noise

10.2.2 Planning Advice Note 1/2011 relates to noise in general. It replaced previous guidance (Circular 10/1999 and PAN56) and provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development. PAN 1/2011 itself contains no quantitative recommendations relevant to the circumstances of siting wind turbines into an existing noise environment and accordingly has not been considered further.

However, this document does endorse the use of ETSU-R-97 "The Assessment and Rating of Noise from Wind Farms".

Planning Advice Note (PAN) 45: Renewable Energy Technologies

10.2.3 This Planning Advice Note and its Annex has been replaced by web based renewables advice which will be regularly updated; the current advice on Onshore Wind Turbines specifies the issues that should be taken into account by local planning authorities in Scotland. The "noise section" of the web advice refers to ETSU-R-97 "The Assessment and Rating of Noise from Wind Farms" and it is stated that the methodology of ETSU-R-97 "This gives indicative noise levels thought to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable burdens on wind farm developers, and suggests appropriate noise conditions."

ETSU-R-97, The Assessment and Rating of Noise from Wind Farms

10.2.4 In August 1993 the Department of Trade and Industry (DTI) facilitated the establishment of a Noise Working Group (NWG) to investigate the assessment of noise from Wind Farms. The culmination of the efforts of the NWG resulted in a report in September 1996, which is referred to as ETSU-R-97.

10.2.5 The NWG recommended that the current practice of controlling Wind Farm noise by the application of noise limits at the nearest noise-sensitive properties is the most appropriate approach. This approach has the advantage that the limits can directly reflect the existing noise environment at the nearest properties and the impact that the Wind Farm may have on these levels.

10.2.6 The ETSU-R-97 report recommends the following aspects of Wind Farm noise be considered:

- The LA90 index should be used to describe both prevailing background noise levels and the predicted Wind Farm noise levels (correlated to 10 m high wind speed);
- Measurements and predictions should be undertaken using 10-minute time intervals;
- The noise limit should be set for the whole Wind Farm;
- The wind turbine noise limits should be limited to 5 dB(A) above the measured background for both quiet day and night time periods, except in low noise environments where a lower fixed limit may also apply.

10.2.7 In low noise environments the night time lower fixed limit LA90,10min of wind turbine noise should be limited to an absolute level of 43 dB, or a 45 dB fixed limit for financially involved properties. During amenity hours, it should be limited within the range of 35 – 40 dB. The actual value chosen should depend upon a number of factors:

- The number of dwellings in the neighbourhood of the Wind Farm;
- The effect of noise limits on the number of kWh generated;
- The duration and level of exposure.

10.2.8 The character of the noise from modern wind turbines is normally not considered to be tonal, and manufacturers will warrant a turbine selection to this effect. ETSU-R-97 does contain an extensive procedure for determining the tonal properties of a turbine

should this become necessary, and a penalty would be applied to the noise output to compensate in the event of a tonality problem.

10.2.9 Background noise levels upon which relative limits are based and the noise limits themselves, are based upon typical or average levels rather than extreme values at any given wind speed.

10.2.10 The noise limits referred to in ETSU-R-97 take into account the fact that all wind turbines exhibit to some extent the character of noise described as blade swish and amplitude modulation (AM). ETSU-R-97 also recognises that through design improvements, turbine manufacturers have been able to design out the source of low frequency noise and infrasound as it is the mechanical noise that gives rise to this structure-borne noise source.

10.2.11 A 2007 report produced by Salford University 'Research into Aerodynamic Modulation of Wind Turbine Noise' concluded that AM was only apparent at four Wind Farm sites, and a possible factor at a further 8 of the 133 operational UK sites considered. At the four identified sites it was considered that AM may occur between 7 and 15% of the time. Following the report by Salford University the Government advised that the assessment and rating guidance in ETSU-R-97 should continue to be used. No alternations to the guidance were proposed to take account of aerodynamic modulation.

10.3 Assessment Methodology

10.4 Construction / Decommissioning Phase

10.4.1 Construction / decommissioning activity inevitably leads to some degree of noise disturbance at locations in close proximity to the construction activities. It is however a temporary source of noise. The noise levels generated by construction activities would have the potential to impact upon nearby neighbouring dwellings. Noise levels at any one location will vary as different combinations of plant machinery are used, and throughout the construction of the proposed plant as the construction activities and locations change. These would depend upon a number of variables.

10.4.2 In the absence of specific information regarding the proposed construction plant and activities, potential construction noise impacts have been assessed using the methodology set out in BS 5228 in conjunction with general information regarding proposed activities.

10.4.3 The significance of constructional noise impacts has been assessed based on the Category 'A' daytime threshold of 65 dB(A) from Table E.1 of BS5228-1: 2009. The significance of construction noise will relate to the degree of exceedance of this value. Exceedances will be rated as negligible (<1 dB), minor (1<3 dB), moderate (3<5 dB), major (5<10 dB) and severe (>10 dB).

10.5 Choice of Noise Monitoring Locations

10.5.1 In order to determine the locations where noise monitoring is required, all residential properties within 1km of the proposed turbine location were identified, and those where turbine noise levels were predicted to exceed 35 dB(A) were acknowledged. The noise contour plot is shown in Figure 1.

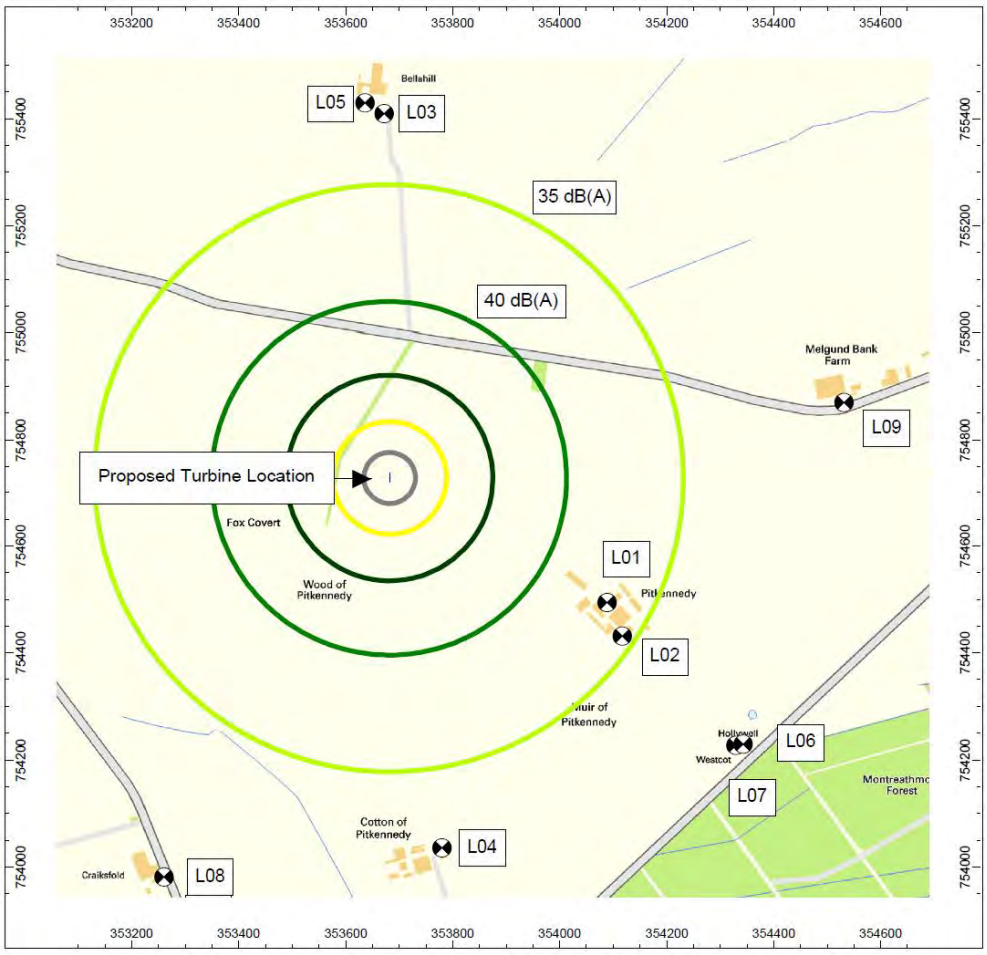


Figure 1 - Preliminary 35 dBA Contour

10.5.2 The location of each monitoring station was discussed and agreed with Louise Akroyd, an Environmental Health Officer at Angus Council, prior to survey work commencing in email and phone correspondence and also during a site visit.

10.5.3 Property L01 was chosen for the noise monitoring as it is the closest property from the proposed turbine. This monitoring location also serves as an adequate proxy for L02 and this was confirmed on site by Louise Akroyd. It should be noted that property L01 has not been built but currently has planning permission.

Table 2 - Noise Monitoring Locations

Ref	Address	Easting	Northing
L01	Pitkennedy Farm Development in Planning, Pitkennedy, Angus DD8 2UH	354088	754494

Figure 2 - Pitkennedy Farm Development in Planning (L01)

10.5.4 The monitoring location at L01 would be the closest property to the proposed turbine location at approximately 465m.

10.5.5 Ambient noise levels at this location are typically low and influenced by wind through the surround vegetation and buildings. These effects have been minimized in the choice of monitoring location, which was agreed with the EHO during the site visit.

10.5.6 This location provides a sheltered and screened location with buildings on each side, adequately representing the possible amenity spaces for the planned development.

10.6 Measurement Procedure

10.6.1 In order to gain a robust data set, the sound level meters were set to log the parameters LA90, LA10, LAeq, LAmax and LAmin over 10 minute intervals for a period of approximately 35 days between the 5th September 2012 and 10th October 2012. This allowed for later correlation between noise levels and wind speeds. Results were stored at synchronised 10-minute intervals between the sound level meters and the on site anemometry data logger. All simultaneous wind speed and direction measurements were taken on site at a height of 10 metres. The temporary meteorological mast was installed at: E 353682, N 754728. Levels of precipitation were also measured at ten minute intervals using a Davis Rain Collector located at the base of the anemometry mast. Periods with recorded precipitation were removed from the dataset. Where two or more 10 minute periods consecutively recorded precipitation, the subsequent two periods were also omitted.

10.6.2 The prevailing background noise levels, were recorded in terms of LA90,10min continuously over this period. In accordance with the ETSU-R-97 guidelines, the survey was carried out in order to identify the existing ambient noise levels during the 'quiet daytime' and night periods. 'Night' is defined in ETSU-R-97 as 11 pm to 7 am, and 'quiet daytime', which is described as amenity hours and are comprised of the following periods:

- All evenings from 6 pm to 11 pm
- Saturday afternoon from 1 pm to 6 pm,
- All day Sunday, 7 am to 6 pm.

10.7 Instrumentation

10.7.1 The noise survey was undertaken using a single Class 1 Sound Level Meter (SLM): Rion NL-52. This was connected to a half inch microphone type UC-53A, and fitted with a double skin foam ball wind shield type WS-15. The microphone was mounted at a height of 1.2m from ground. Site calibration was carried out using a Rion NC-74 calibrator. All calibration certificates are in Appendix B.

10.8 Wind Shear

10.8.1 The relationship between the 10 metre height wind speed and hub height wind speed is 'standardised' within IEC 61400-11 Wind Turbine Generator Systems Part 11: Acoustic Noise Measurement Techniques. However, there is often a disparity in this 'standardised' relationship.

10.8.2 In order to account for potential wind shear on site, the main assessment presented in this report is based on sound power data that has been 'shifted' by -2m/s, which represents the situation where the wind speed at the hub height is 2m/s greater than that assumed by the 'standardised' relationship within IEC 61400-11. This approach is recommended in the paper "Prediction and Assessment of Wind Turbine Noise: Agreement about relevant factors for noise assessment from wind energy projects" published in the Institute of Acoustics Bulletin, and represents current good practice when accounting for potential wind shear.

10.9 Correction of Baseline Data for Non Representative Events

10.9.1 Graphs of the noise data from the measurement location were analysed to identify time periods where the measurements may have been influenced by unusual, temporary or otherwise extraneous noise sources which are not considered to be part of the representative background noise climate.

10.9.2 Graphs showing the baseline noise data histories are shown in Appendix C. Please note that the rain and extraneous noise data before 22nd September 2012 was manually removed from the dataset, hence the non-continuity in the graphs.

10.10 Noise Predictions

10.10.1 The International Standard ISO 9613, Acoustics – Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation has been used to calculate the predicted noise levels of the turbines.

10.10.2 Noise predictions have been undertaken using a calculation height of 4m, and a ground coefficient of G=0.5, a temperature of 10 degrees Celsius and a relative humidity of 70%, as recommended in the IOA Bulletin article.

10.10.3 A three dimensional noise model of the proposed site has then been built using Datakustik Cadna/A noise modelling package in order to graphically present contours of the ISO 9613 calculated levels. Calculation tables verifying the noise model results using Cadna/A are presented in Appendix D.

10.11 Source Noise Data

10.11.1 This proposal is based around a candidate turbine, the Enercon E48, which has a nominal power of 800kW at a hub height of 50m, a tip height of 74m and is located at 353682 Easting and 754728. Northing. Noise limits should be conditioned to ensure that if a different turbine is selected, its output will not exceed the ETSU derived limits subsequently presented.

10.11.2 The sound power data for the E48 has been obtained from the datasheet provided by the turbine manufacturer presented in Appendix E. In order to take account of any measurement uncertainty and to present a worst case assessment, the values provided by Enercon have been increased by 1 dB. This is consistent with current good practice.

10.11.3 The data provided by Enercon is valid for wind speeds between 4 – 10 m/s. However, in accordance with 2/2012 Wind turbines distances and noise calculations, sound power levels up to 12 m/s have been detailed. As the Enercon E48 reaches rated power at 9m/s, it is reasonable to assume that the sound power output of the turbine does not increase in higher wind speeds.

Table 3: Enercon E48 Sound Power Levels

Wind Speed at 10m height (m/s)	Sound Power Level as provided by Enercon $L_{W(A)}$, dB	Sound Power Level Corrected by 1 dB for Uncertainty $L_{W(A)}$, dB	Corrected & Shifted Sound Power Level Used In Assessment $L_{W(A)}$, dB
1	-	-	-
2	-	-	90
3	-	-	94.3
4	89.0	90	98.5
5	93.3	94.3	101.5
6	97.5	98.5	102.5
7	100.5	101.5	103.5
8	101.5	102.5	103.5
9	102.5	103.5	103.5
10	102.5	103.5	103.5
11	102.5	103.5	103.5
12	102.5	103.5	103.5

10.11.4 The following octave band spectrum shape has been used for all the noise calculations, which has been taken from test report WICO 439SEC04/07 dated 2006-01-24.

Table 4: Enercon E48 Octave Band Spectrum

Octave Band Centre Frequency (Hz) / Sound Power (dB)								Overall dB(A)
63	125	250	500	1000	2000	4000	8000	
106.2	101.9	103.3	101.4	99.3	92.6	88.0	87.1	103.5

10.12 Assessment Locations

10.12.1 The noise impact of the development has been assessed at L01 as well as a number of other properties. Assessment locations (L01 – L09) have been selected to represent the points closest to the proposed development that represent local populations. The assessment locations are presented in Figure 1.

10.12.2 Table 5 shows the assessment locations, and the measurement position that has been selected to represent the receiver location for each property, for the purpose of 3D noise modelling.

Table 5: Assessment Locations

Ref	Name	Coordinates		Distance to closest turbine (m)
		Easting	Northing	
L01	Pitkennedy (in Planning)	354089	754494	465
L02	Pitkennedy	354117	754432	520
L03	Buttermilk Cottage	353672	755409	680
L04	Cotton of Pitkennedy Farm	353780	754036	695
L05	Bellahill Farm	353636	755430	710
L06	Hollywell	354329	754227	820
L07	Westcote	354343	754230	830
L08	Craiksfold Farm	353260	753981	850
L09	Melgund Bank	354531	754870	860

10.13 Baseline Conditions

10.14 Measurement Results

10.14.1 Figure 3 - Figure 4 present the results of the background noise measurements for the day and night periods at L01 and L02, using the background noise data collected at measurement location L01 as a proxy for L02. This is plotted against the wind speeds at 10m derived from the calculation of wind shear for each measurement period and the 50m hub height.

10.14.2 Included on the plots is a second order polynomial regression line that has been calculated through the background noise data to give a trend line of prevailing background noise vs. standardised wind speed (including wind shear) as required for the derivation of the ETSU-R-97 noise limits.

10.14.3 Properties L03 – L09 were found to be outside of the predicted 35 dBA noise contour and therefore have sufficient protection from noise generated by the proposed wind turbine and do not require noise monitoring, in accordance with ETSU-R-97.

10.15 ETSU-R-97 Limits

10.15.1 The lower daytime fixed limit of 35 dB(A) is deemed applicable to this development because of its proximity to other existing and proposed wind developments.

10.15.2 The noise limits derived from ETSU-R-97 for this assessment are therefore:

- Daytime: The higher of 35 dB(A) or 5 dB(A) above the derived quiet daytime background noise level
- Night-time: The higher of 43 dB(A) or 5 dB(A) above the derived night time background noise level

10.15.3 A summary of the ETSU-R-97 derived noise limits is shown in Table 6 and Table 7.

Table 6: ETSU Derived Noise Limits (Day Periods)

Assessment Location	Standardised 10m Wind Speed								
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10m/s	11m/s	12m/s
L01	35.0	35.0	36.1	37.3	38.5	39.7	39.7	39.7	39.7
L02	35.0	35.0	36.1	37.3	38.5	39.7	39.7	39.7	39.7

Table 7: ETSU Derived Limits (Night Periods)

Assessment Location	Standardised 10m Wind Speed								
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10m/s	11m/s	12m/s
L01	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
L02	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0

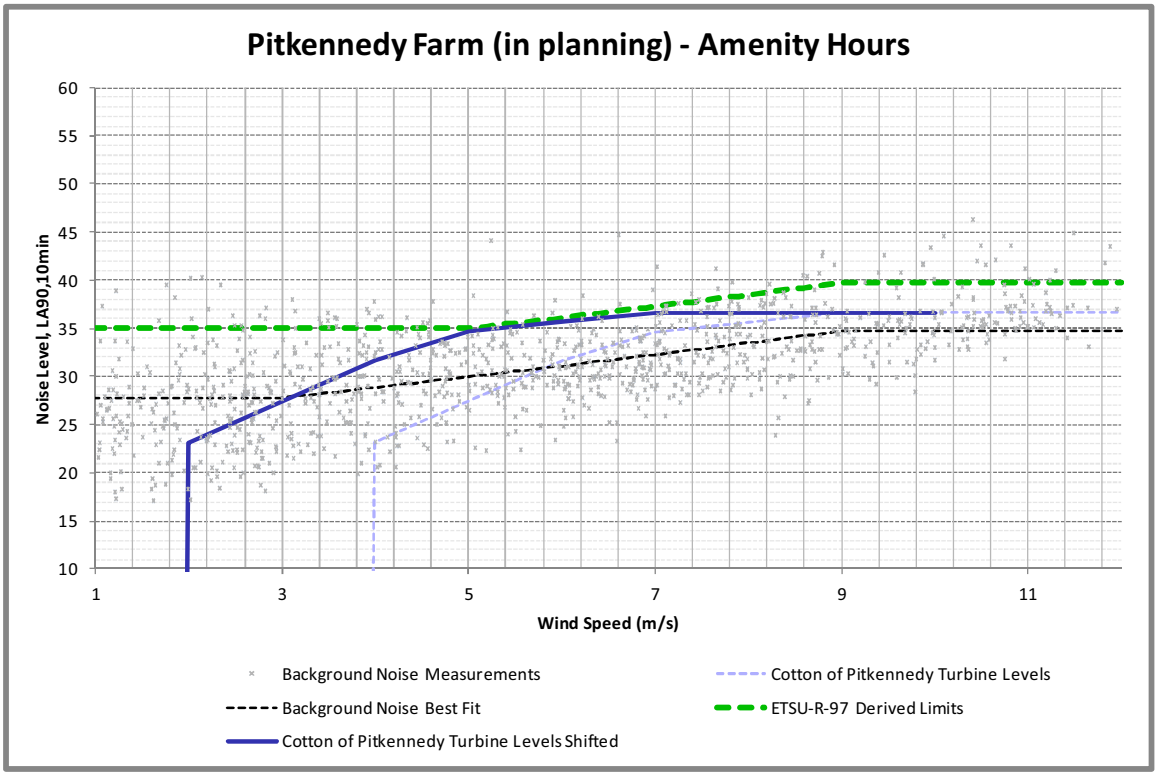


Figure 3 - Graph showing ETSU-R-97 Limits & Turbine Noise at L01

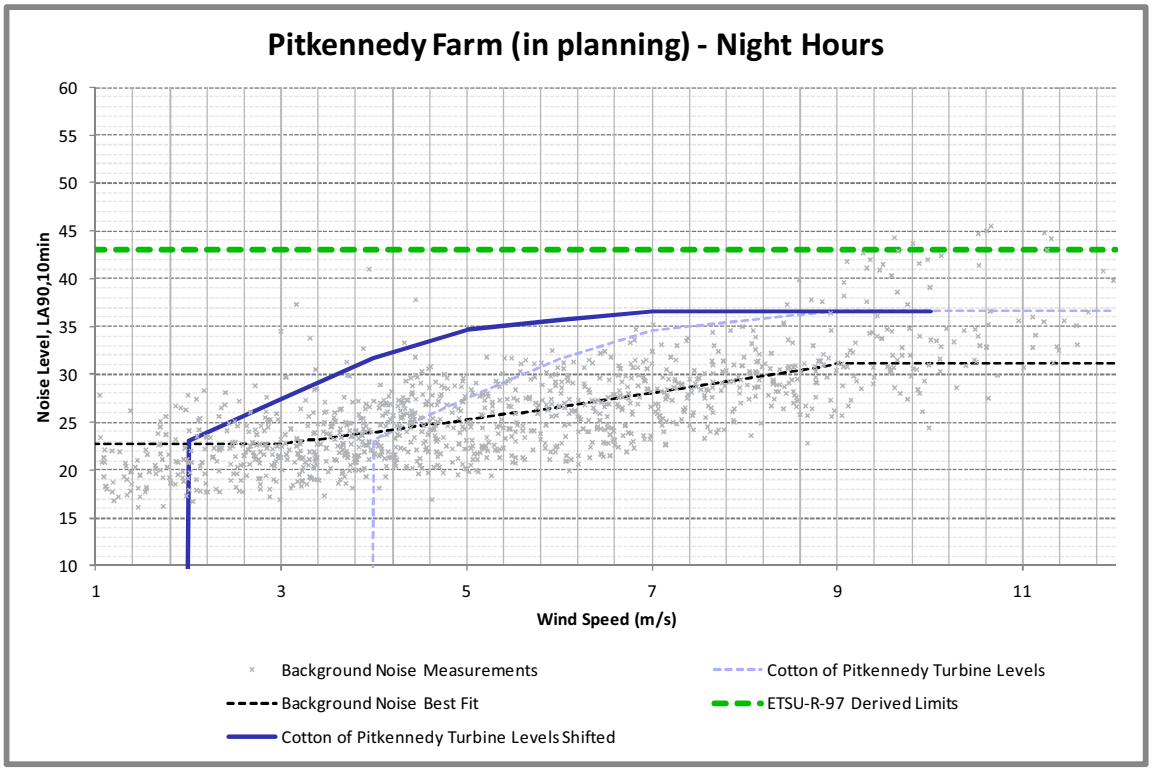


Figure 4 - Graph showing ETSU-R-97 Limits & Turbine Noise at L01 – Night Hours

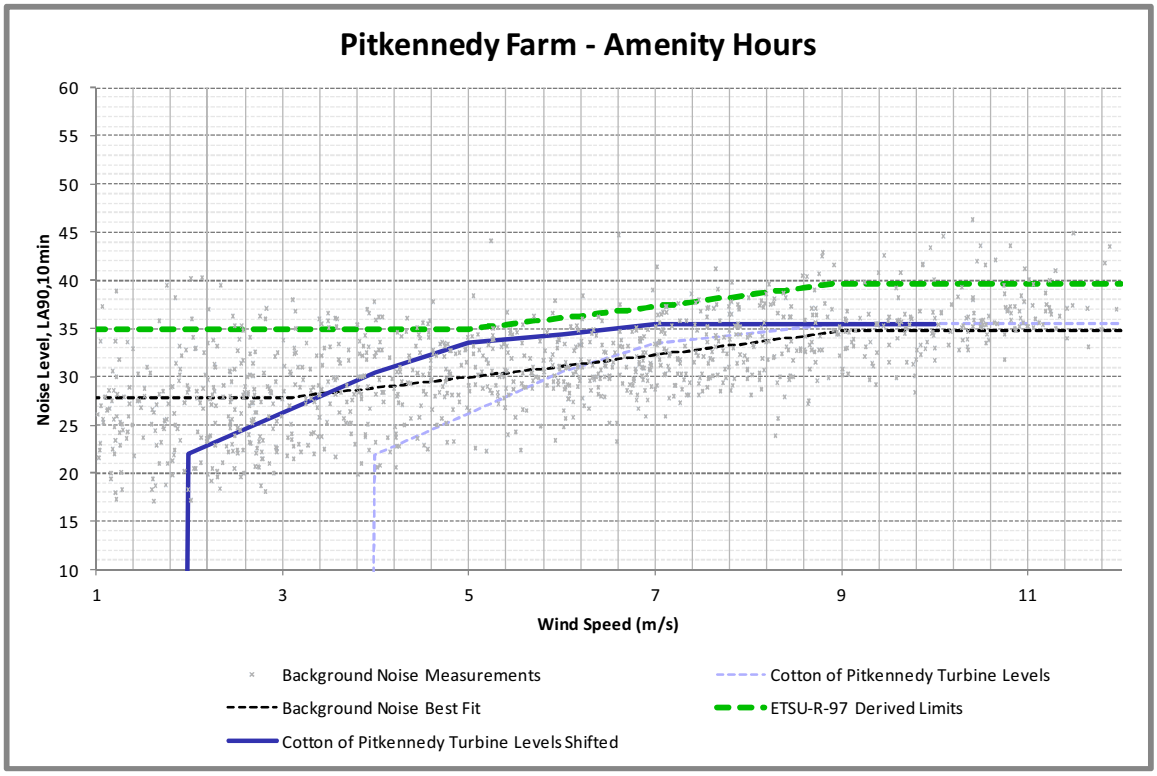


Figure 5 - Graph showing ETSU-R-97 Limits & Turbine Noise at L02 – Amenity Hours

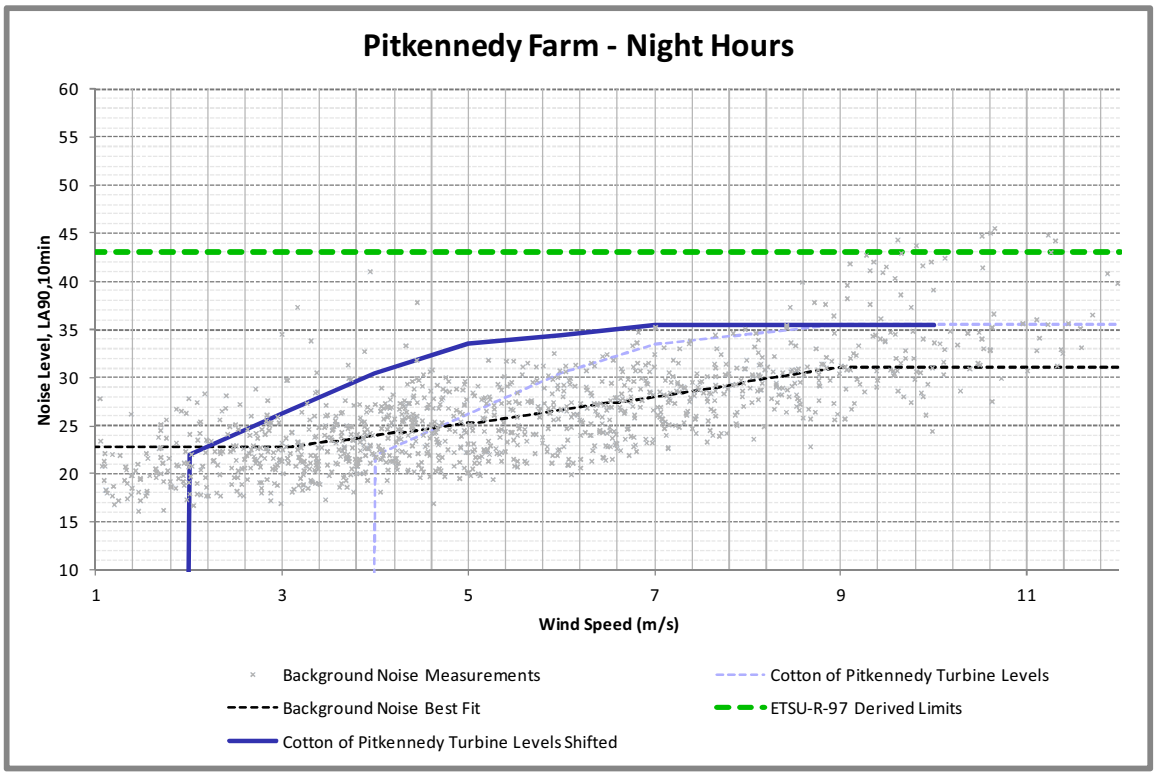


Figure 6 - Graph showing ETSU-R-97 Limits & Turbine Noise at L02

10.16 Assessment of Operational Noise Levels

10.17 Assessment of Noise during Operation of Cotton of Pitkennedy

10.17.1 The calculated immission level of the proposed Cotton of Pitkennedy Wind Turbine at a height of 4m at each receptor is shown in

10.17.2 Table 8 below.

Table 8: Predicted Immission Levels for Cotton of Pitkennedy Wind Turbine

Assessment Location	Standardised 10m Wind Speed								
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10m/s	11m/s	12m/s
L01	31.6	34.6	35.6	36.6	36.6	36.6	36.6	36.6	36.6
L02	30.5	33.5	34.5	35.5	35.5	35.5	35.5	35.5	35.5

10.17.3 The margin between the immission values (from Table 8) and the derived ETSU-R-97 limits for each receptor (from Table 6 & Table 7) are shown in Table 9 and Table 10 for the day and night periods respectively.

Table 9: Margin between Immission values and Day Limits

Assessment Location	Standardised 10m Wind Speed								
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10m/s	11m/s	12m/s
L01	3.4	0.4	0.5	0.6	1.9	3.1	3.1	3.1	3.1
L02	4.5	1.5	1.6	1.8	3.0	4.3	4.3	4.3	4.3

Table 10: Margin between Immission values and Night Time Limits

Assessment Location	Standardised 10m Wind Speed								
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10m/s	11m/s	12m/s
L01	11.4	8.4	7.4	6.4	6.4	6.4	6.4	6.4	6.4
L02	12.5	9.5	8.5	7.5	7.5	7.5	7.5	7.5	7.5

10.17.4 It can be seen from the tables above that the predicted turbine immission levels for Cotton of Pitkennedy Wind Turbine are below the noise limits derived following the guidance of ETSU-97 for both amenity day time and night time periods. Sufficient uncertainty is built into the predictions to ensure the noise limits will not be breached in practice.

10.18 Assessment of Cumulative Wind Farm Noise

10.18.1 A cumulative assessment has been undertaken to consider operational noise levels from nearby existing and proposed Wind Farms.

10.18.2 No developments were found to cumulatively impact the properties assessed in this noise assessment.

10.19 Construction / Decommissioning Noise Impact Assessment

10.20 Construction Noise

10.20.1 It is considered that the principal sources of potential construction noise impact are likely to be associated with the construction of the turbine foundations, the traffic movements to and from the site, and the erection of the turbines.

10.20.2 Predictions of the worst-case construction noise for these activities have been carried out based on the methodology outlined in BS5228:2009 'Noise and vibration control on construction and open sites'. Estimates of the source sound power and the associated levels at the Assessment Locations are presented in Tables 11 and 12.

Table 11: Example Sound Power Levels Associated With Typical Construction Activities

Plant	LAeq @ 10m, dB(A)	Number	Sound Power Level, dB(A)
Turbine Foundation Construction			
30t tracked excavator	75 dB(A)	1	103 dB(A)
Dump truck (tipping)	74 dB(A)	2	105 dB(A)
Dump truck (moving)	81 dB(A)	2	112 dB(A)
Site Dumper	76 dB(A)	2	107 dB(A)
Large rotary bored piling rig	83 dB(A)	1	111 dB(A)
70t mobile crane	70 dB(A)	1	98 dB(A)
Concrete mixer truck	80 dB(A)	2	111 dB(A)
Diesel generator	74 dB(A)	2	105 dB(A)
Vibrating poker	69 dB(A)	2	100 dB(A)
Total			**117 dB(A)**
Access Track Construction			
Tracked Excavator	85 dB(A)	3	118 dB(A)
Dump Truck	85 dB(A)	2	116 dB(A)
Tipper Lorry	79 dB(A)	4	113 dB(A)
Dozer	81 dB(A)	1	109 dB(A)
Vibratory Roller	74 dB(A)	1	102 dB(A)
Total			**121 dB(A)**
Turbine Erection			
120t crane	67 dB(A)	1	95 dB(A)
600t mobile crane	71 dB(A)	1	99 dB(A)
Articulated HGV	81 dB(A)	3	114 dB(A)
Diesel generator	65 dB(A)	1	93 dB(A)
Total			**114 dB(A)**

Table 12: Predicted Construction Noise Levels At Assessment Locations

Ref	Closest Distance to work site (m)	Worst Case Construction Noise Level		
		Turbine Foundation Construction	Access Track Construction	Turbine Erection
L01	465	56	59	53
L02	520	55	59	52
L03	580	54	58	51
L04	695	52	56	49
L05	460	52	60	49
L06	820	51	55	48
L07	830	51	55	48
L08	850	50	54	47
L09	790	50	55	47

10.20.3 The estimated sound pressure levels shown are worst-case estimates based on propagation attenuation only, and do not consider any screening, directivity or absorptive effects. The access track provision has yet to be finalised, and therefore if this has to be changed to bring it closer to properties, then some short term, temporary impacts may occur due to traffic movements, although this is not considered to be significant.

10.20.4 12 shows that the adopted construction noise criterion of 65 dB(A) is not predicted to be exceeded at any of the Assessment Locations.

10.20.5 Considering the short-duration, temporary and changing nature of the proposed construction works and the large distances between the majority of construction activities and NSR locations, construction noise is unlikely to cause a disturbance to local residents.

10.20.6 Notwithstanding this, the appointed contractor will minimise the impact of construction activities through successful implementation of an agreed Construction Environmental Management Plan (CEMP) and proper communication with local residents.

10.21 Construction Vibration

10.21.1 Some construction activities can be a source of ground-borne vibration, which can be a cause for concern at the nearest receptors. Typical activities that would lead to vibration effects include compaction and breaking.

10.21.2 The impact at the nearest properties from any vibration activities is a function of the vibration source and the propagation path to the receptor; larger distances reduce the impact. Due to the large distances involved (over 421m), it is unlikely that construction vibration will be noticeable at the receptor locations.

10.22 Mitigation

10.22.1 Aside from the implementation of an agreed Construction Environmental Management Plan (CEMP) by the appointed contractor in order to minimise the impact of construction activities no further mitigation measures are proposed.

10.23 Conclusions

10.23.1 An assessment of the likely noise impact due to the construction and decommissioning phase of the proposed Cotton of Pitkennedy Wind Turbine has been undertaken. No significant noise levels are predicted at the nearest receptors from construction and decommissioning activities due to the distances involved. If an

alternative access is required bringing the access track closer to properties, a short term noise exceedance during traffic movements to and from the site is possible. This exceedance would be infrequent, and of limited duration, and is considered to be of negligible significance.

10.23.2 Background noise data at the nearest receptors has been collected and analysed in accordance with current accepted practice, and ETSU-R-97 noise limits have been derived. The background noise data has been corrected for the influence of rainy periods and other extraneous noise events.

10.23.3 No nearby wind farm developments have been shown to cause a cumulative noise impact at any of the assessed noise sensitive receptors.

10.23.4 The operation of the proposed Cotton of Pitkennedy Wind Turbine is compliant with the ETSU-R-97 methodology, and that it can meet the relevant ETSU-R-97 noise limits. This can be achieved and controlled by the council through a suitable planning condition based on the ETSU-R-97 limits described.

10.23.5 An additional planning condition should be raised to cover the potential for tonality, as measured at the nearest receptors is negligible.

Appendix A:

Glossary of Terms

GLOSSARY OF TERMS

Ambient Noise	The total sound in a given situation at a given time, usually composed of sound form may sources near and far.
A – Weighting	A-weighting has been found to give the best correlation between perceived and actual loudness. Measurement to which this weighting has been applied are described as being in dB(A).
Attenuation	The reduction in level of a sound between the source and a receiver due to any combination of effects including; distance, atmospheric absorption, barriers, etc.
Background Noise Level, $L_{A90,T}$	The dB level exceeded for 90% of a given time interval, T.
Cut-In wind speed	The wind speed at which a turbine starts to produce power. This is usually at hub height wind speeds of around 4m/s.
Decibel (dB)	A logarithmic unit for measuring the relative loudness of noise, i.e. the sound level.
Environmental Noise	Noise governed by environmental legislation, and usually enforced by local authorities.
Facade Effect	The phenomenon of sound energy (noise) being reflected form the hard rigid, external surface of a building or structure. Where a facade is present, this effect adds approximately 2.5 or 3 dB(A) to the free field noise level (at a distance of 1 metre from the facade).
Free Field Noise Level	The noise level measured away from any reflecting surfaces.
Hertz (Hz)	Unit of frequency, equal to one cycle per second. Frequency is related to the pitch of the sound.
Hub	The centre of a turbine rotor.
Hub Height Wind Speed	The wind speed at the hub height of the turbine.
$L_{Aeq, T}$	The equivalent continuous sound level. It provides an "average" sound level over a defined period of time (T). The L_{Aeq} is the main measurement used in making assessments according to Planning Policy Guidance 24.
$L_{A90, 10mins}$	The L_{A90} is the sound level exceeded 90 per cent of the time and it is used to define background noise, and windfarm noise. In the case of windfarm noise, the L_{A90} level is usually 2 dB less than the L_{Aeq} level.
L_{WA}	Sound power is the total sound energy radiated by a source per unit time. The subscript 'A' refers to an A-weighted sound power level.
Rated Power	The maximum steady output power of a wind turbine.
Vs,10 Standardised wind speed at 10m agl	A notional value of wind speed, taking into account the estimated hub height wind speed and the on-site wind shear. The wind speed is corrected to a height of 10m above ground level (agl) for consistency with BS EN 61400-11 wind turbine sound power level data and to allow an assessment in accordance with ETSU-R-97

Wind Shear	A descriptor used to correlate the change in wind speeds at varying heights above ground level.

Appendix B:

Calibration Certificates

MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

Certificate Number	**CAL041207**
Date of Issue	**10/04/2012**
Customer	**Parsons Brinkerhoff Ltd**
	Description of Instrument Including Manufacturer / Supplier
Sound Level Meter	Rion NL-52 Sound Level Meter [Serial No. 00320638] with Rion UC-59 Microphone [Serial No. 03387] and Rion NH-25 preamplier [Serial No. 10646] Fitted with a WS-10 foam windshield. The instrument conforms to Class 1 of BS EN 61672-1:2003 The instrument was running Version 1.2 Firmware
Associated Calibrator	B & K 4226 S/N 2590976.
Date of Calibration	10/04/2012
Test Procedure	..\..\Calibration Results Sheets\Current Approved Results Sheets\NL-52 Master 61672 Approved Issue 1 (BK 2590976).xlsx Test procedures in accordance with BS EN 61672-3:2006 NOTE: Test 10.1 (Self Generated Noise with Microphone Installed) omitted.
Test Engineer	Amrat Patel

APPROVED SIGNATO[redacted]
Les Je

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL
☎ 01908 642846 🖷 01908 642814
✉ info@noise-and-vibration.co.uk 🖳 www.noise-and-vibration.co.uk

OTECH ENGINEERING INC.

ANEMOMETER CALIBRATION REPORT

Test Date: 7 February 2012 Revision No: 0

630 Peña Drive, Suite 800
Davis, CA 95618-7726
Office: (530) 757-2264
http://www.otechwind.com

Customer Information

NRG Systems, Inc.
110 Riggs Road
Hinesburg, VT 05461
USA

Instrument Under Test (IUT)

Model No: NRG #40 Sine
Serial No: 179500196380
Output: Sine Wave
IUT Power: 0 VDC
Heater Power: 0 VDC
Mount Diameter: 12.7 mm
Test Procedure: OTECH-CP-001

Wind Tunnel Test Facility

Otech Tunnel ID: WT1C
Type: Eiffel (open circuit, suction)
Test Section Size: 0.61 m x 0.61 m x 1.22 m
Manufacturer: Engineering Laboratory Design, Inc.

Data Acquisition

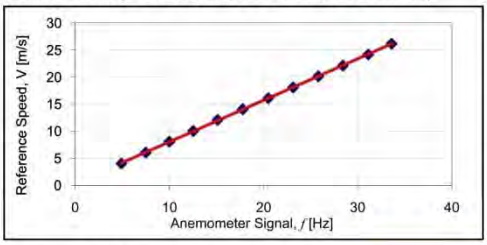
Hardware: National Instruments CDAQ-9172 USB 2.0 chassis with NI 9205 32-chan 16-bit AI module
Software: National Instruments LabVIEW 2010
Signal Reduction Method for IUT: FFT Analysis

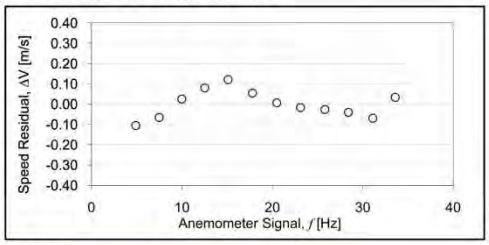
Measuring Equipment

Reference Speed: Four United Sensor Type PA Pitot-static tubes sensed by an MKS Barotron Type 220D Differential Pressure Transducer (NIST traceable)
Amb. Pressure: Setra Model 270 Barometer (NIST traceable)
Amb. Temperature: OMEGA HX94 SS Probe (NIST traceable)
Relative Humidity: OMEGA HX94 SS Probe (NIST traceable)

Test Conditions

Reference Speed Position Correction = 1
Reference Speed Blockage Correction = 1.00735
Mean Ambient Pressure = 101,058 Pa
Mean Ambient Temperature = 22.0 deg C
Mean Relative Humidity = 39.3% RH
Mean Density = 1.1884 kg/cubic meter



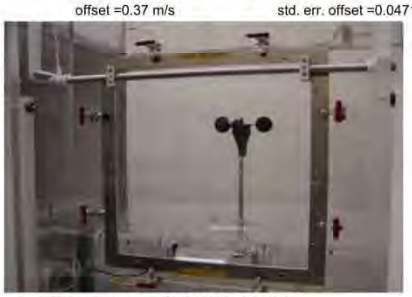


Transfer Function Test Results: **V [m/s] = 0.766 f [Hz] + 0.37**

Regression Parameters

r = 0.99996
slope =0.766 m/s per Hz
offset =0.37 m/s
std. err. estimate =0.0697 m/s
std. err. slope =0.00222 m/s per Hz
std. err. offset =0.04715 m/s

Reference Speed [m/s]	Anemometer Output [Hz]	Residual [m/s]	Ref. Speed Uncertainty
4.025	4.902	-0.105	0.604%
8.059	9.995	0.025	0.606%
12.084	15.122	0.121	0.601%
16.093	20.502	0.007	0.593%
20.129	25.812	-0.026	0.595%
24.150	31.114	-0.069	0.603%
26.154	33.594	0.034	0.601%
22.107	28.411	-0.040	0.592%
18.083	23.130	-0.017	0.598%
14.071	17.801	0.055	0.596%
10.056	12.530	0.080	0.608%
6.044	7.485	-0.065	0.606%



Note: Generic photo of test set-up

Approved by: John Obermeier, President

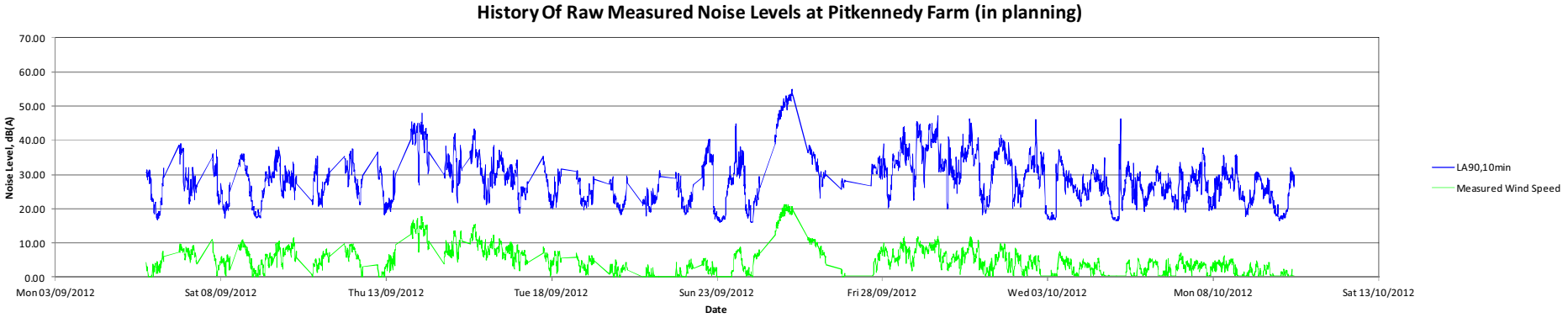
This document reports that the above IUT was tested at Otech Engineering, Inc., a wind tunnel laboratory accredited in accordance with the recognised International Standard ISO/IEC 17025:2005 (Certificate number CL-126). This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated January 2009). Uncertainties estimated at 95 % confidence level. This report shall not be reproduced except in full, without written approval from Otech Engineering, Inc.

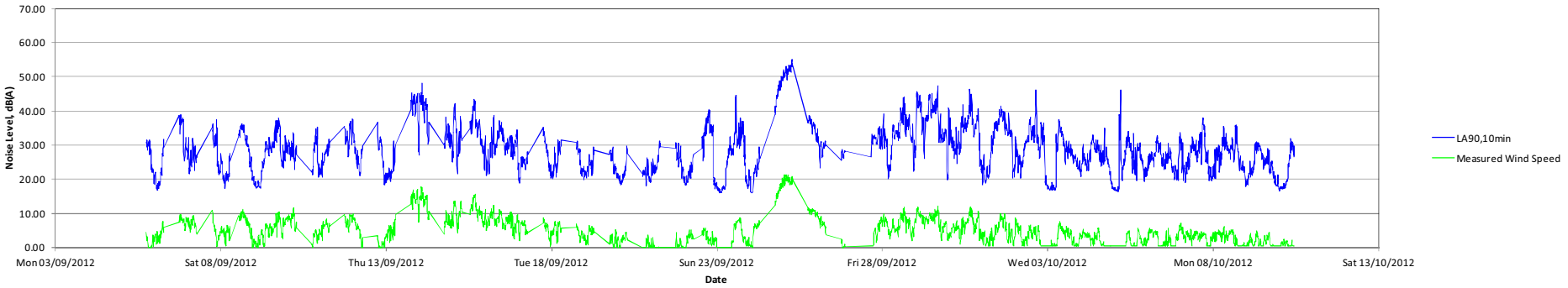
IAS ACCREDITED

References available upon request. Page 1 of 1 179500196380_2012-02-07.pdf

Appendix C:

Time History of Measured & Filtered Noise Levels


History Of Raw Measured Noise Levels at Pitkennedy Farm (in planning)
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Noise Level, dB(A)
Mon 03/09/2012
Sat 08/09/2012
Thu 13/09/2012
Tue 18/09/2012
Sun 23/09/2012
Fri 28/09/2012
Wed 03/10/2012
Mon 08/10/2012
Sat 13/10/2012
Date
LA90,10min
Measured Wind Speed


History Of Raw Measured Noise Levels at Pitkennedy Farm
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Noise Level, dB(A)
Mon 03/09/2012
Sat 08/09/2012
Thu 13/09/2012
Tue 18/09/2012
Sun 23/09/2012
Fri 28/09/2012
Wed 03/10/2012
Mon 08/10/2012
Sat 13/10/2012
Date
LA90,10min
Measured Wind Speed

Appendix D:

Verification of ISO9613 Calculation

Project: Cotton of Pitkennedy
Title: Verification of noise model at 10 m/s using ISO 9613 algorithms
Author: JDW Job Number: 351025A
Checked By: RAP Date: 10/12/2012

Location	Coordinates		
	X	Y	Z
L01 Pitkennedy (in Planning)	354089	754494	4
L02 Pitkennedy	354117	754432	4
L03 Buttermilk Cottage	353672	755409	4
L04 Cotton of Pitkennedy Farm	353780	754036	4
L05 Bellahill Farm	353636	755430	4
L06 Hollywell	354329	754227	4
L07 Westcote	354343	754230	4
L08 Craiksfold Farm	353260	753981	4
L09 Melgund Bank	354531	754870	4
Turbine	353682	754728	50

Temperature (°C)	10
rel. Humidity (%)	70
Ground Absorption G	0.5

Receptor	Octave Band Centre Frequency (Hz)	Sound Power, dB	Distance (m)	A_{div}	A_{gr}	A_{bar}	A_{atm}	L_{eq} at Receptor (dB)	L_{90} at Receptor (dB)
L01 Pitkennedy (in Planning)	63	106.2	472.27	64.5	-3	0.0	0.06	44.7	42.66
	125	101.9	472.27	64.5	0.14	0.0	0.19	37.1	35.09
	250	103.3	472.27	64.5	-0.48	0.0	0.49	38.8	36.81
	500	101.4	472.27	64.5	-1.5	0.0	0.91	37.5	35.51
	1000	99.3	472.27	64.5	-1.5	0.0	1.73	34.6	32.59
	2000	92.6	472.27	64.5	-1.5	0.0	4.56	25.1	23.06
	4000	88.0	472.27	64.5	-1.5	0.0	15.48	9.5	7.54
	8000	87.0	472.27	64.5	-1.5	0.0	55.2	-31.2	-33.18
L02 Pitkennedy	63	106.2	525.76	65.4	-3	0.0	0.06	43.7	41.72
	125	101.9	525.76	65.4	0.19	0.0	0.22	36.1	34.07
	250	103.3	525.76	65.4	-0.48	0.0	0.55	37.8	35.81
	500	101.4	525.76	65.4	-1.5	0.0	1.01	36.5	34.47
	1000	99.3	525.76	65.4	-1.5	0.0	1.92	33.5	31.46
	2000	92.6	525.76	65.4	-1.5	0.0	5.08	23.6	21.6
	4000	88.0	525.76	65.4	-1.5	0.0	17.23	6.8	4.85
	8000	87.0	525.76	65.4	-1.5	0.0	61.45	-38.4	-40.37
L03 Buttermilk Cottage	63	106.2	685.33	67.7	-3	0.0	0.08	41.4	39.4
	125	101.9	685.33	67.7	0.32	0.0	0.28	33.6	31.58
	250	103.3	685.33	67.7	-0.48	0.0	0.72	35.3	33.34
	500	101.4	685.33	67.7	-1.5	0.0	1.32	33.9	31.86
	1000	99.3	685.33	67.7	-1.5	0.0	2.51	30.6	28.57
	2000	92.6	685.33	67.7	-1.5	0.0	6.62	19.8	17.76
	4000	88.0	685.33	67.7	-1.5	0.0	22.46	-0.7	-2.68
	8000	87.0	685.33	67.7	-1.5	0.0	80.1	-59.3	-61.32
L04 Cotton of Pitkennedy Farm	63	106.2	701.67	67.9	-3	0.0	0.09	41.2	39.19
	125	101.9	701.67	67.9	0.33	0.0	0.29	33.4	31.36
	250	103.3	701.67	67.9	-0.48	0.0	0.73	35.1	33.13
	500	101.4	701.67	67.9	-1.5	0.0	1.35	33.6	31.63
	1000	99.3	701.67	67.9	-1.5	0.0	2.57	30.3	28.31
	2000	92.6	701.67	67.9	-1.5	0.0	6.78	19.4	17.4
	4000	88.0	701.67	67.9	-1.5	0.0	22.99	-1.4	-3.41
	8000	87.0	701.67	67.9	-1.5	0.0	82.01	-61.4	-63.43
L05 Bellahill Farm	63	106.2	707.25	67.9	-3	0.0	0.09	41.2	39.19
	125	101.9	707.25	67.9	0.34	0.0	0.29	33.4	31.35
	250	103.3	707.25	67.9	-0.48	0.0	0.74	35.1	33.12
	500	101.4	707.25	67.9	-1.5	0.0	1.36	33.6	31.62
	1000	99.3	707.25	67.9	-1.5	0.0	2.59	30.3	28.29
	2000	92.6	707.25	67.9	-1.5	0.0	6.83	19.4	17.35
	4000	88.0	707.25	67.9	-1.5	0.0	23.18	-1.6	-3.6
	8000	87.0	707.25	67.9	-1.5	0.0	82.66	-62.1	-64.08

L06 Hollywell	63	106.2	820.96	69.3	-3	0.0	0.1	39.8	37.81
	125	101.9	820.96	69.3	0.4	0.0	0.34	31.9	29.87
	250	103.3	820.96	69.3	-0.48	0.0	0.86	33.6	31.63
	500	101.4	820.96	69.3	-1.5	0.0	1.58	32.0	30.03
	1000	99.3	820.96	69.3	-1.5	0.0	3	28.5	26.51
	2000	92.6	820.96	69.3	-1.5	0.0	7.93	16.9	14.88
	4000	88.0	820.96	69.3	-1.5	0.0	26.9	-6.7	-8.69
	8000	87.0	820.96	69.3	-1.5	0.0	95.96	-76.8	-78.75
L07 Westcote	63	106.2	830.1	69.4	-3	0.0	0.1	39.7	37.72
	125	101.9	830.1	69.4	0.41	0.0	0.34	31.8	29.77
	250	103.3	830.1	69.4	-0.48	0.0	0.87	33.5	31.53
	500	101.4	830.1	69.4	-1.5	0.0	1.6	31.9	29.92
	1000	99.3	830.1	69.4	-1.5	0.0	3.04	28.4	26.38
	2000	92.6	830.1	69.4	-1.5	0.0	8.02	16.7	14.7
	4000	88.0	830.1	69.4	-1.5	0.0	27.2	-7.1	-9.08
	8000	87.0	830.1	69.4	-1.5	0.0	97.02	-77.9	-79.9
L08 Craiksfold Farm	63	106.2	859.58	69.7	-3	0.0	0.1	39.4	37.41
	125	101.9	859.58	69.7	0.42	0.0	0.35	31.4	29.44
	250	103.3	859.58	69.7	-0.48	0.0	0.9	33.2	31.19
	500	101.4	859.58	69.7	-1.5	0.0	1.66	31.6	29.55
	1000	99.3	859.58	69.7	-1.5	0.0	3.14	28.0	25.97
	2000	92.6	859.58	69.7	-1.5	0.0	8.31	16.1	14.1
	4000	88.0	859.58	69.7	-1.5	0.0	28.17	-8.4	-10.36
	8000	87.0	859.58	69.7	-1.5	0.0	100.47	-81.7	-83.66
L09 Melgund Bank	63	106.2	863.74	69.7	-3	0.0	0.11	39.4	37.36
	125	101.9	863.74	69.7	0.42	0.0	0.35	31.4	29.4
	250	103.3	863.74	69.7	-0.48	0.0	0.9	33.2	31.15
	500	101.4	863.74	69.7	-1.5	0.0	1.67	31.5	29.5
	1000	99.3	863.74	69.7	-1.5	0.0	3.16	27.9	25.91
	2000	92.6	863.74	69.7	-1.5	0.0	8.35	16.0	14.02
	4000	88.0	863.74	69.7	-1.5	0.0	28.3	-8.5	-10.53
	8000	87.0	863.74	69.7	-1.5	0.0	100.96	-82.2	-84.19

Receptor	Calculated	Result from	Discrepancy
L01 Pitkennedy (in Planning)	36.6	36.6	0.0
L02 Pitkennedy	35.4	35.4	0.0
L03 Buttermilk Cottage	32.8	32.8	0.0
L04 Cotton of Pitkennedy Farm	32.5	32.5	0.0
L05 Bellahill Farm	32.5	32.5	0.0
L06 Hollywell	30.8	30.8	0.0
L07 Westcote	30.7	30.7	0.0
L08 Craiksfold Farm	30.3	30.3	0.0
L09 Melgund Bank	30.3	30.3	0.0

Appendix E:

Enercon E48 Sound Power Datasheet

ENERCON ENERGY FOR THE WORLD	Sound Power Level E-48	page 1 of 1

Guaranteed Values of the Sound Power Level for the E-48 with 800 kW rated power

V_{Wind} in 10m height \ Hub height	50 m	56 m	65 m	76 m
4 m/s	89.0 dB(A)	89.2 dB(A)	89.5 dB(A)	89.9 dB(A)
5 m/s	93.3 dB(A)	93.7 dB(A)	94.2 dB(A)	94.7 dB(A)
6 m/s	97.5 dB(A)	97.9 dB(A)	98.3 dB(A)	98.8 dB(A)
7 m/s	100.5 dB(A)	100.7 dB(A)	101.0 dB(A)	101.3 dB(A)
8 m/s	101.5 dB(A)	101.7 dB(A)	101.8 dB(A)	101.9 dB(A)
95% rated power	102.5 dB(A)	102.5 dB(A)	102.5 dB(A)	102.5 dB(A)
10 m/s	102.5 dB(A)	102.5 dB(A)	102.5 dB(A)	102.5 dB(A)
Measured values at 95% rated power				**101,9 dB(A)** WICO 439SEC04/07 **101,1 dB(A)** KCE 29349-1 003 **102,2 dB(A)** MBBM 64550/7

1. A tonality value of 0-1 dB is guaranteed over the whole operational range (valid in the near vicinity of the turbine according to IEC).
2. An impulsivity value K_{IN} of 0 dB is guaranteed over the whole operational range (valid in the near vicinity of the turbine according to IEC).
3. The sound power values given in the table are valid for the **Operational Mode I** (defined through the rotational speed range of 16 – 30 rpm). The respective power curve is the Calculated Power Curve dated August 2004 (Rev. 1.x).
4. The guarantee is based on official and internal measurements of the sound power level. The official measured values are given in this document as a reference. The extracts of the official measurements are available and are valid in combination with this guarantee document. The measurements are being carried out according to the recommended national and international standards and norms (mentioned on the respective extracts).
5. In order to account for the uncertainties of measurement and sound prediction calculations, to increase the acceptance at the authorities and to avoid eventual verification measurements ENERCON recommends a safety factor of 1 dB(A) on the guaranteed values when carrying out sound propagation calculations. In countries where safety factors are already mandatory due to local regulations, the ENERCON recommendation is not applicable.

   Should this recommendation be neglected for any reasons, it is hereby explicitly referred to 6.
6. Due to the measurement uncertainties of sound measurements the verification of the guaranteed values is successful, if the measurement result of a measurement that has been carried out according to the accepted standards is in the range of +/- 1dB(A) of the guaranteed values [guarantee fulfilled when measurement result = guaranteed value +/- 1dB(A)].
7. For noise-sensitive sites it is possible to operate the E-48 with reduced rotational speed and reduced rated power during the night. The reduced sound power levels are given in a separate document.

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SECTION 11

CULTURAL HERITAGE AND ARCHAEOLOGY

11 CULTURAL HERITAGE AND ARCHAEOLOGY

11.1 Introduction

11.1.1 This section of the ER provides an assessment of the existing archaeological and cultural heritage assets of the proposed Cotton of Pitkennedy wind energy site and surrounding area, and describes the potential impact that the development may have on these resources.

11.1.2 The objectives of this assessment are to:

- Describe the survival and extent of any known or potential archaeological features which may be disturbed by the proposed development;
- Provide an assessment of the importance of these cultural assets;
- Assess the likely scale of any impacts on the archaeological and cultural heritage resource posed by the proposed development;
- Outline suitable mitigation measures to avoid, reduce or remedy significant adverse impacts; and
- Provide an assessment of any residual impacts remaining after mitigation.

11.2 Key Planning Policies

11.2.1 The Scottish Historic Environment Policy (SHEP) document (December 2011) is a relevant document in the statutory planning Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) process for Scottish projects.

11.2.2 The document states that the protection of the historic environment is not about preventing change. It states that:

"Ministers believe that change in this dynamic environment should be managed intelligently and with understanding, to achieve the best outcome for the historic environment and for the people of Scotland. Such decisions often have to recognise economic realities."

11.2.3 The key outcomes of this policy are as follows:

- The historic environment is cared for, protected and enhanced for the benefit of our own and future generations;
- To secure greater economic benefits from the historic environment; and
- The people of Scotland and visitors to our country value, understand and enjoy the historic environment.

11.2.4 This policy is supported by a series of guidance notes entitled 'Managing Change in the Historic Environment', which explain how to apply the policies in the SHEP. The most relevant guidance note to this section is 'Managing Change in the Historic Environment: Setting' and is discussed in more detail in Section 11.3.

11.2.5 Section 3 of the ER provides more information on legislation and guidance relevant to cultural heritage and archaeology.

11.3 Assessment Methodology

11.3.1 A desktop study was conducted as part of this assessment to determine the likely nature, extent, importance and state of preservation of any archaeological remains that may be present at the site or in the surrounding area.

11.3.2 The desk based assessment incorporated cartographic, photographic and documentary sources including:

- Royal Commission on the Ancient and Historical Monuments of Scotland http://canmore.rcahms.gov.uk/.
- Pastmap website http://jura.rcahms.gov.uk/PASTMAP/start.jsp. This website provides access to the following databases:
  - Historic Scotland (Listed Buildings, Scheduled Monuments and Gardens and Designated Landscapes);
  - National Monuments Records of Scotland; and
  - Scottish Sites and Monument Record.
- Envirocheck Report: Historical Ordnance Survey maps from 1867 to 2011.

11.3.3 An assessment of cultural heritage assets in the sites surrounding area was also undertaken. For the purposes of this assessment cultural heritage assets have been defined as:

- Scheduled monuments;
- Listed buildings;
- Conservation areas;
- Registered battlefields;
- Registered parks and gardens; and
- Undesignated parts of the historic environment that have significance.

11.3.4 The cultural heritage assessment focussed on two study zones:

- Inner study area – Between 1km and 5 km depending on the cultural heritage asset; and
- Outer study area – 30 km

11.3.5 The 5 km extent of the Inner Study Area is based on experience that very few assets will be susceptible to impacts on setting resulting from wind farm developments more than 5 km away. The Outer Study Area is based on the extent of the ZTV generated for use in the Landscape and Visual Impact Assessment.

11.4 Significance Criteria

11.4.1 Determining the magnitude of any potential significant impact on the archaeological resource is based on an understanding of how, and to what extent, the proposed development would impact on archaeological assets of international, national, regional, local or negligible importance.

11.4.2 Any potential impacts of the proposed development on archaeological remains are rated as high, moderate, low, negligible or uncertain, depending on both the magnitude of the change and the sensitivity of the receptor.

11.4.3 The following matrices (Table 11.1 to Table 11.3) set out the criteria for assessing the magnitude of impacts on archaeological resources of varying degrees of value.

TABLE 11.1: CRITERIA FOR ESTABLISHING RELATIVE CULTURAL VALUE

Cultural Value	Criteria
International	World Heritage Sites. Iconic Sites and Monuments. Some Scheduled Monuments.
National	Some Scheduled Monuments. All Grade A and some Grade B and Grade C(S) Listed Buildings. Registered Parks and Gardens.
Regional	Some Grade B and C(S) Listed Buildings. Remains of national importance which have been partially damaged. Historic (unlisted) buildings that have exceptional qualities in their fabric or historical associations. Conservation Areas containing buildings that contribute significantly to its historic character.
Local	Archaeological sites and remains which are of low potential or minor importance. Historic (unlisted) buildings of modest quality in their fabric or historical association. Crop marks of indeterminate origin. Remains of regional importance that have been partially damaged or remains of national importance which have been substantially damaged. Sites which contribute to local or cultural understanding of the area.
Negligible	Numerous types of remains, of some local importance. Remains of local importance that have been largely damaged. Isolated findspots with no context. Areas in which investigative techniques have revealed no, or minimal, evidence of archaeological remains, or where previous large scale disturbance or removal of deposits can be demonstrated.
Uncertain	Potential archaeological sites for which there is little information. It may not be possible to determine the importance of the site based on current knowledge. Such sites are likely isolated findspots or cropmarks only identified on aerial photographs.

TABLE 11.2: CRITERIA FOR CLASSIFYING MAGNITUDE OF PHYSICAL IMPACT

Impact	Criteria
High	Complete removal of an archaeological site. Severe transformation of the setting or context of an archaeological monument or significant loss of key components in a monument group. Complete removal or transformation of palaeo-environmental deposits leading to complete loss of research knowledge. Direct and substantial visual impact on a significant sightline to or from a ritual monument or prominent fort.
Moderate	Removal of a major part of an archaeological site. Potential transformation of the setting or context of an archaeological site or partial loss of key components in a monument group. Partial removal or transformation of palaeo-environmental deposits. Introduction of significant noise, vibration or visual impact to an archaeological monument leading to changes in amenity use, accessibility or appreciation of an archaeological site. Oblique visual impact on an axis adjacent to a significant sightline to or from a ritual monument, but where the significant sightline of the monument is not obscured.
Low	Removal of an archaeological site where a minor part of its total area is removed, but the site still retains a significant future research potential. Minor removal of palaeo-environmental deposit. Change to a historic building or feature, resulting in a small change in the resource and its historical context and setting. Peripheral visual impact on a significant sightline to or from a ritual monument.
Negligible	No perceptible change in the setting, context or physical impact to a building or feature. No impact on changes in use, amenity or access. No real change in the ability to understand and appreciate the resource and its historical context and setting.
Uncertain	The magnitude of the impact cannot be predicted.

TABLE 11.3: METHOD OF RATING OVERALL SIGNIFICANCE OF IMPACT ON ARCHAEOLOGICAL / CULTURAL HERITAGE SITES BY THE PROPOSED DEVELOPMENT

		Cultural Value					
		Uncertain	**Negligible**	**Local**	**Regional**	**National**	**International**
Magnitude of Impact	**High**	Unknown	Low	Moderate	Major	Major	Major
	Moderate	Unknown	Low	Low	Moderate	Major	Major
	Low	Unknown	Negligible	Low	Low / Moderate	Moderate / Major	Major
	Negligible	Unknown	Negligible	Negligible	Low	Moderate	Moderate
	Uncertain	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

11.4.4 Consideration has also been given to the 'Managing Change in the Historic Environment: Setting' guidance note. This defines setting as the way in which the surroundings of a historic asset or place contribute to how it is experienced, understood and appreciated.

11.4.5 The document then goes on to describe what contributes to setting:

- Current landscape or townscape context;
- Visual envelope, incorporating views to, from and across the historic asset or place;
- Key vistas, framed by rows of trees, buildings or natural features that give an asset or place a context whether intentional or not;
- The prominence of the historic asset or place in views throughout the surrounding area;
- Character of the surrounding landscape;
- General and specific views including foregrounds and backdrops;
- Relationships between both built and natural features;
- Aesthetic qualities;
- Other non-visual factors such as historical, artistic, literary, linguistic, or scenic associations, intellectual relationships (e.g. to a theory, plan or design), or sensory factors;
- A 'sense of place': the overall effect formed by the above factors.

11.4.6 These contributing factors have been considered in the current assessment to define the setting of the asset. The guidance note provides a three stage methodology for assessing the impact of a development on the setting of a historic asset or place:

- Stage 1: identify the historic assets that might be affected by a proposed change (through a desk based assessment);
- Stage 2: define the setting by establishing how the surroundings contribute to the ways in which the historic asset or place is understood, appreciated and experienced; and

- Stage 3: assess how any change would impact upon that setting.

11.4.7 The sensitivity of a cultural heritage asset to changes in its setting can be evaluated in the first instance by reference to any relevant designation, whereby those designated as nationally important will generally be considered the most sensitive. Consequently, the assessment has focussed on nationally important designated assets in the study areas which are considered in relation to impacts upon setting. Undesignated assets have been considered where, in the assessor's professional opinion, there is potential for significant impacts or where they have been raised by consultees. Following reference to the designation of the asset, sensitivity can be more finely assessed by reference to the importance of the asset's surroundings, to its character and value as a cultural heritage asset and the appreciation of its value. Also taken into account is the extent to which an asset is visible on the ground. Assets that are imperceptible or very difficult to perceive on the ground will generally be less sensitive than those that are more readily appreciable as they are to some extent already divorced from their setting.

11.4.8 Table 11.4 is a general guide to the attributes of cultural heritage assets of high, medium, low or negligible sensitivity to setting impacts. It should be noted that not all the qualities listed need be present in every case and professional judgement is used in balancing the different criteria.

TABLE 11.4 GUIDELINE CRITERIA FOR ASSESSMENT OF SENSITIVITY OF A CULTURAL HERITAGE ASSET TO IMPACTS ON ITS SETTING

Sensitivity	Guideline Criteria
High	The asset has a clearly defined setting that is readily appreciable on the ground and is important to its character and significance or the appreciation thereof. The asset will generally be readily appreciable on the ground.
Medium	The asset's character and significance and the appreciation thereof relate to some extent to its setting. The asset will generally be appreciable on the ground.
Low	The asset's surroundings have little relevance to its character and significance or the appreciation thereof. The asset is difficult to identify on the ground or its setting is difficult to appreciate on the ground.
Negligible	The asset is imperceptible in the landscape and its character and significance or the appreciation thereof does not relate to its surroundings.

Magnitude of cultural heritage effects

11.4.9 The magnitude of an impact reflects the extent to which relevant elements of the setting of the cultural heritage asset are changed by the development and the effect that this has upon the character and value of the asset and the appreciation thereof. Guideline criteria for assessing magnitude are described in Table 11.5. As with other criteria presented, this is intended as a general guide and it is not anticipated that all the criteria listed will be present in every case.

11.4.10 The following bullet points provide guides to the assessment of the magnitude of any given impact:

- Obstruction of or distraction from key views. Some assets have been sited or designed with specific views in mind, such as the view from a Roman signal station to an associated fort or a country house with designed vistas. The obstruction or cluttering of such views would reduce the extent to which the asset

could be understood and appreciated by the visitor. Developments outside a key view may also distract from them and make them difficult to appreciate if they are particularly prominent. In such instances the magnitude is likely to be greatest where views have a particular focus or a strong aesthetic character.

- Changes in prominence. Some assets are deliberately placed in prominent locations in order to be prominent in the surrounding landscape, for example prehistoric cairns are often placed to be silhouetted against the sky and churches in some areas are deliberately placed on ridges in order to be highly visible. Developments can reduce such prominence and therefore reduce the extent to which such assets can be appreciated.
- Changes in landscape character. A particular land use regime may be essential to the appreciation of an asset's function, for instance the fields surrounding an Improvement period farmstead are inextricably linked to its appreciation. Hence, changes in land use can leave the asset isolated and reduce its value. In some instances, assets will have aesthetic value or a sense of place that is tied to the surrounding landscape character.
- Duration and reversibility of impact. Impacts that are short term or readily reversible are generally of lesser magnitude than those that are long term or permanent.
- Impacts upon a defined setting will be of greater magnitude than those that affect unrelated elements of the asset's surroundings or incidental views to or from an asset that are unrelated to the appreciation of its value.

11.4.11 It should be noted that the assessment of magnitude will be based on the interplay of these factors.

TABLE 11.5 CRITERIA FOR ASSESSMENT OF MAGNITUDE OF AN IMPACT ON THE SETTING OF A CULTURAL HERITAGE ASSET

Magnitude	Guideline Criteria
High beneficial	The contribution of setting to the cultural heritage asset's significance is considerably enhanced as a result of the development; a lost relationship between the asset and its setting is restored, or the legibility of the relationship is greatly enhanced. Elements of the surroundings that detract from the asset's cultural heritage significance or the appreciation of that significance are removed.
Medium beneficial	The contribution of setting to the cultural heritage asset's significance is enhanced to a clearly appreciable extent as a result of the development; as a result the relationship between the asset and its setting is rendered more readily apparent. The negative effect of elements of the surroundings that detract from the asset's cultural heritage significance or the appreciation of that significance is appreciably reduced.
Low beneficial	The setting of the cultural heritage asset is slightly improved as a result of the development, slightly improving the degree to which the setting's relationship with the asset can be appreciated.
Negligible	The setting of the cultural heritage asset is changed by the development in ways that do not alter the contribution of setting to the asset's significance.
Low adverse	The contribution of the setting of the cultural heritage asset to its significance is slightly degraded as a result of the development, but without adversely affecting the interpretability of the asset and its setting; characteristics of historic value can still be appreciated, the changes do not strongly conflict with the character of the site, and could be easily reversed to approximate the pre-development conditions.
Medium adverse	The contribution of the setting of the cultural heritage asset to its significance is reduced appreciably as a result of the development. Relevant setting characteristics can still be appreciated but less readily.
High adverse	The contribution of the setting of the cultural heritage asset to its significance is effectively lost or substantially reduced as a result of the development, the relationship between the asset and its setting is no longer readily appreciable.

11.4.12 Changes may occur in the surroundings of an asset that neither affects their contribution to the significance of the asset, nor the extent to which its significance can be experienced. In such instances it will be considered that there is no impact upon the setting of the site.

Significance of cultural heritage effects

11.4.13 The significance of an impact on a cultural heritage asset, whether a physical impact (direct or indirect) or an indirect impact on its setting, is assessed by combining the magnitude of the impact and the sensitivity of the cultural heritage asset. The matrix in Table 11.6 provides a guide to decision-making but is not a substitute for professional judgement and interpretation, particularly where the sensitivity or impact magnitude levels are not clear or are borderline between categories. Estimated

impacts of severe, major or moderate significance equate to potentially significant impacts in terms of the EIA Regulations, whilst adverse impacts of severe or major significance are considered to equate to substantial harm as referred to in PPS5.

TABLE 5.6 GUIDELINE MATRIX FOR ASSESSING THE SIGNIFICANCE OF IMPACTS ON CULTURAL HERITAGE ASSETS

Magnitude	**Sensitivity**			
	Negligible	**Low**	**Medium**	**High**
High	Negligible	Moderate	Major	Severe/Major
Medium	Negligible	Minor	Moderate	Major
Low	Negligible	Negligible	Minor	Moderate
Negligible	Negligible	Negligible	Negligible	Minor

11.5 Baseline Assessment

11.5.1 The proposed turbine site is located on a site of arable farmland. The area is made up of rounded, undulating hills, and the area on which the turbine will be sited is located close to the top of a relatively small hill side, at an elevation of approximately 150 m Above Ordnance Datum (AOD). A row of mature, coniferous trees borders the field to the north-west of the site.

11.6 The solid bedrock geology underlying the site is the Dundee Flagstone Formation, which is made up predominantly of sandstone, with interbedded minor siltstones and mudstones. The overlying superficial geology is comprised of till (poorly sorted sediment). For more information on the geology and soil type of the site see Section 7 Geology & Hydrology. There are no watercourses on site, with a number of small drainage ditches present in the surrounding area, which, in turn, feed into small burns further from the site.

11.7 Scheduled Monuments

11.7.1 The following Scheduled Monuments are located within a 5 km radius of the centre of the site (inner study area):

TABLE 5.7: DETAILS THE SCHEDULED MONUMENTS WITHIN A 5 KM RADIUS OF THE SITE

Scheduled Monument	Description	Distance (km)
Standing stone, 120m west of Westerton	The monument is a standing stone, of the late Neolithic/ earlier Bronze Age, about 4000 years old.	0.72
Flemington Tower, Aberlemno	The monument consists of the remains of an L-plan towerhouse of early seventeenth century date with eighteenth century modifications.	1.27
Balgavies Castle	The monument consists of the remains of Balgavies Castle, destroyed by James I during his journey to the north after the defeat of Argyll in 1593. The castle is sited on a small, wooded knoll. All that remains of the castle are two adjoining barrel vaults, a further partly buried one which leads to a subterranean passage, and portions of surrounding wall footings.	1.28
Enclosures, 250m north-west of Balgavies House	The monument consists of two enclosed settlements of prehistoric date, visible as cropmarks on oblique aerial photographs. The monument lies on level ground in arable farmland at about 90m OD. It comprises two enclosures.	1.31
Cairn, 100m west-north-west and enclosure 200m west-north-west of Melgund Cottage	The monument comprises the remains of a cairn and enclosure of prehistoric date. The enclosure is represented by cropmarks visible on oblique aerial photographs, while the cairn survives as a grassed-over stony mound.	1.46
Burial mound, 175m west-south-west of Haresburn Croft	The monument comprises a burial mound of prehistoric date, visible as a grass-covered mound. It is being rescheduled in order to reflect more precisely the probable extent of buried archaeological deposits around the upstanding mound.	1.47
Cross slab, Aberlemno churchyard	The monument comprises a cross slab of Pictish date. It is in the care of the Secretary of State for Scotland, and is being re-scheduled to clarify the extent of the protected area. The stone stands in Aberlemno churchyard.	1.54
Fort, Turin Hill	Prehistoric domestic and defensive fort.	1.58
Cross slab and symbol stones, north-west of Village Hall, Aberlemno	The monument comprises two symbol stones and a cross slab of Pictish date. The stones occupy a series of three roadside recesses. Only the SW example, the cross slab, is thought to be in its original position.	1.71
Enclosure, 400m east of Balbinny	The monument comprises the remains of an enclosed settlement of prehistoric date represented by cropmarks visible on oblique aerial photographs.	1.81
Settlement, 500m south of Netherton	The monument comprises the remains of a settlement of prehistoric date represented by cropmarks visible on oblique aerial photographs.	2.42
Settlement, 400m south-south-west of Netherton	The monument comprises the remains of a settlement of prehistoric date represented by cropmarks visible on oblique aerial photographs.	2.46
Cairn, Guthrie Hill	The monument comprises the remains of a burial cairn of prehistoric date, surviving as a grassy mound of stones on the summit of Guthrie Hill. The cairn occupies the SE part of the broad plateau on the summit of Guthrie Hill at around 150m OD, overlooking large tracts of land in Strathmore and the Lunan Valley.	2.54
Cairn, 400m south-east of Carsegownie	The monument comprises the remains of a burial cairn of prehistoric date, surviving as a low, grassed-over, stony mound. The monument lies at around 160m OD on the SW side of the saddle between Turin Hill and Finavon Hill.	2.63

	It commands impressive views into the valley to the SW but faces rising ground to the NE.	
Enclosure, 150m south-south-east of Netherton	The monument comprises the remains of an enclosed settlement of prehistoric date represented by cropmarks visible on oblique aerial photographs. The monument lies on a prominent knoll in arable farmland at around 80m OD.	2.75
Fort, north-east of Hill of Finavon	The monument comprises the remains of a vitrified fort of later prehistoric date.	2.85
Guthrie Collegiate Aisle, Guthrie parish church	The monument consists of a rectangular stone-built aisle which is now free-standing within the churchyard at Guthrie, to the south-west of the parish church, but which originally projected from the south flank of the medieval parish church.	3.95
Enclosure, 200m west of Broomknowe	The monument comprises the remains of an enclosed settlement of prehistoric date represented by cropmarks visible on oblique aerial photographs.	4.04
Finavon Castle	The monument consists of the remains of a substantial fortified mansion built for the Lindsay earls of Crawford in the fifteenth, sixteenth and seventeenth centuries. The principal remains comprise the lower part of a rectangular tower house, on the north side of which a chamber tower and stair tower were later added, and around which there are traces of extensive courtyards.	4.19
Timber hall, 80m south-east of Noronbank	Prehistoric domestic and defensive feature	4.53

11.8 Listed Buildings

11.8.1 Listed buildings in Scotland are categorised as follows:

- Grade A – Buildings of exceptional, usually national interest;
- Grade B – Particularly important buildings of more than special interest; and
- Grade C(S) – Buildings of special interest, which warrant every effort to preserve them.

11.8.2 The listed buildings in the area are summarised in Table 11.8.

TABLE 11.8: GRADE A LISTED BUILDINGS WITHIN A 5 KM RADIUS AND GRADE B AND C(S) LISTED BUILDINGS WITHIN A 2KM RADIUS OF THE PROPOSED DEVELOPMENT.

Name	Distance (km)
Grade A listed buildings within 5km	
Melgund Castle	1.60
Grade B listed buildings within 2km	
North Mains of Turin, Dovecot	0.47
Tillywhandland	0.56
Balgavies, Quarry Park Cottage	0.87
Flemington Castle	1.28
Balgavies Castle	1.29
Aberlemno, Flemington	1.31
Flemington, Aberlemno	1.43
Aberlemno Parish Manse	1.53
Aberlemno Parish Church, Churchyard	1.55
Balgavies House	1.62
Balgavies House, Dovecot	1.87
Grade C(S) listed buildings within 2km	
Aberlemno, Bridge	1.49

Aberlemno Parish Church	1.54
Aberlemno, Kirkton Schoolhouse	1.55
Aberlemno, Kirkton	1.58
Melgund Castle, Gatepiers	1.64
Crosston	1.74
Auldbar Road Station, Platform	1.85
Auldbar Road Station, Station House, Stable Yard	1.87
Auldbar Road Station, Station House	1.88
Auldbar Road Station, Signal Box	1.90

11.9 World Heritage Sites

11.9.1 There are no World Heritage Site (WHS) within the study area of 30km.

11.10 Archaeological Baseline

11.10.1 There is only one recorded archaeological find within the site boundary – that of Hare Cairn archaeological site.

WoSAS Site ID	Site Name	Description	Distance (km)
34967	Hare Cairn	No traces now remain of this cairn, which measured 27m in diameter and 3m in height. When it was removed in 1955, a central short cist containing a Food Vessel National Museum of Antiquities of Scotland (NMAS EE 152) was found beneath it.	0.08

11.10.2 The turbine is located approximately 80m from Hare Cairn, and at the nearest point, the access track would pass within 55m of Hare Cairn.

11.11 Impact Assessment

Construction

11.11.1 During construction the majority of impacts on cultural heritage and archaeology are expected to be concentrated on-site and limited to unknown buried archaeology. The Scottish Sites and Monuments Records revealed the presence of Hare Cairn archaeological site within the boundary of the proposed development. Careful design of the project has maintained more than 55m separation from any part of the infrastructure and the location of the cairn to avoid direct impacts on this archaeological feature.

11.11.2 In terms of upstanding remains of archaeological and cultural heritage significance, impacts are likely to be more indirect and related to changes in the cultural and historical settings of monuments as well as visual impacts (views to and from upstanding remains) and noise impacts from construction activities.

Operation

11.11.3 Once the proposed development is operational, the main potential impacts are likely to occur due to the disruption of the cultural heritage setting and appreciation of upstanding cultural heritage, particularly scheduled monuments and listed buildings.

11.11.4 As illustrated on the ZTV (Figure 11.1), there are approximately eight areas of scheduled monuments and listed buildings within the Inner Study Area, where there would be visibility of the proposed Cotton of Pitkennedy wind turbine. However, it

should be noted that the ZTV is based on a bare earth model that does not allow for the screening effects of local topography, vegetation or buildings. Thus, it is likely that the ZTV will overstate the degree to which the proposed development will be visible.

11.11.5 The following scheduled monuments will not have inter-visibility with the proposed wind turbine: Burial mound, 175m west-south-west of Haresburn Croft; the Settlement 400m south-south-west of Netherton; the Enclosure, 150m south-south-east of Netherton; the Enclosure, 200m west of Broomknowe; and Finavon Castle.

11.11.6 The eight areas in the Inner Study Area with inter-visibility with the proposed turbines are as follows:

1) Aberlemno and surrounding areas;

2) Melgund Cottage and Balbinny;

3) Melgund Castle;

4) South of Netherton;

5) Hill of Finavon;

6) Carsegownie;

7) Turin Hill;

8) Standing Stone, 120m west of Westerton

9) Balgavies Castle and Balgavies House; and

10) Timber Hall at Noronbank.

11.11.7 Each of these areas are discussed in detail below in relation to the cultural heritage assets therein, including listed buildings and scheduled monuments.

Aberlemno and surrounding areas

11.11.8 There are three key cultural heritage assets within and adjacent to Aberlemno village, as detailed in the following sub-sections.

Flemington Tower

11.11.9 Flemington Tower consists of a scheduled monument and Grade B listed buildings and is set within a copse of trees and surrounded by agricultural buildings. Despite the immediate setting of the scheduled monument being of relative importance, the designation and surrounding buildings appear to have been designated for their cultural heritage merit rather than wider setting.

11.11.10 There is a rising hill towards the proposed wind turbine site, which limits visibility to single blade tip only.

11.11.11 Given the intervening topography and vegetation screening, it is considered that the sensitivity of the setting of the scheduled monument and listed buildings at Flemington Tower has been categorised as Medium and the magnitude of the impact on setting as Negligible. Thus, the significance of the impact of the wind energy development on the cultural heritage assets in this location is expected to be Negligible.

Cross Slab, Aberlemno churchyard

11.11.12 This area comprises a cross slab in Aberlemno churchyard of Pictish date. There are also a number of Grade B and C listed buildings around the churchyard. The setting of the cross slab is relatively localised to the curtilage of the church, however there are views from the elevated position of the slab to the north and south.

11.11.13 In the direction of the proposed turbine the land rises relatively steeply and there is a line of trees immediately to the south of the churchyard that almost entirely shield any views towards the turbine, even during winter when the trees are bare.

11.11.14 Given the intervening topography and vegetation screening, it is considered that the sensitivity of the setting of the scheduled monument and listed buildings at Aberlemno churchyard has been categorised as Medium and the magnitude of the impact on setting as Negligible. Thus, the significance of the impact of the wind energy development on the cultural heritage assets in this location is expected to be Negligible.

Cross slab and symbol stones in Aberlemno village

11.11.15 This area comprises two symbol stones and a cross slab of Pictish date, occupying three roadside recesses along the B9132 in Aberlemno village. There is also a Grade C listed building at the Crosston junction. The setting of the cross slab is relatively open, with views set against a backdrop of the landscape to the east and south-east and Montreathmont Forest forming the backdrop.

11.11.16 In the direction of the proposed turbine, views of the monuments would be set against the turbines when viewing the slabs from the north. A relatively flat field stretches away from the stones towards the turbine, before a rounded ridge. The turbine is visible behind the ridge, in amongst a number of trees and shrubs. A view of the turbine encompasses only the top section of the tower and all three turbine blades, the tip of which is approximately level with the top of the vegetation present on the ridge line.

11.11.17 Given the intervening topography and vegetation screening, it is considered that the sensitivity of the setting of the scheduled monument and listed building has been categorised as High and the magnitude of the impact on setting as Low. Thus, the significance of the impact of the wind energy development on the cultural heritage assets in this location is expected to be Moderate.

Melgund Cottage and Balbinny

11.11.18 There are two key cultural heritage assets within this area comprising two scheduled monuments to the west of Melgund Cottage and a scheduled monument to the east of Balbinny.

11.11.19 This area comprises the remains of a cairn and enclosure of prehistoric date and is represented by cropmarks visible in aerial photographs. The setting of the cross slab is limited, although there would be relatively open and uninterrupted views towards the turbine and Montreathmont Forest. There is no specific setting of the monument however.

11.11.20 It is considered that the sensitivity of the setting of the scheduled monument and listed building has been categorised as Low and the magnitude of the impact on setting as Negligible. Thus, the significance of the impact of the wind energy development on the cultural heritage assets in this location is expected to be Negligible.

Melgund Castle

11.11.21 This area comprises a Grade A listed building called Melgund Castle. There is also a Grade C listed building adjacent to the castle. The setting of the castle is relatively localised due to the presence of the agricultural buildings and surrounding forestry to the south and east. The setting of the house is against the backdrop of trees to the south-east. The predominant views from the castle are to the north and north-east, however there is an oblique view between a gap in the trees to the south-west, which would afford limited views of the proposed wind turbine.

11.11.22 In the direction of the proposed turbine the land rises gently, and there are scattered trees screening the view. Any view of the turbine is likely to encompass the full turbine.

11.11.23 Given the limited vegetation screening and oblique views from the castle and limited impact on setting of the castle, it is considered that the sensitivity of the setting of this Grade A listed castle has been categorised as High and the magnitude of the impact on setting as Low Adverse. Thus, the significance of the impact of the wind energy development on the cultural heritage assets in this location is expected to be Moderate.

South of Netherton

11.11.24 This area comprises three scheduled monuments of prehistoric date represented by cropmarks on aerial photographs. The setting of the monuments is against Mote of Melgund and Angus Hill, and views of the turbine would be limited to blade tip only with some limited tree screening.

11.11.25 It is considered that the sensitivity of the setting of the scheduled monument and listed building has been categorised as Low and the magnitude of the impact on setting as Negligible. Thus, the significance of the impact of the wind energy development on the cultural heritage assets in this location is expected to be Negligible.

Hill of Finavon

11.11.26 Views from Hill of Finavon of the turbine are very sparse, however a view would be possible from the scheduled monument vitrified Fort of later prehistoric date on the top of Hill of Finavon. The setting of the fort is relatively open in all directions, particularly across Strathmore to the north.

11.11.27 In the direction of the proposed turbine there is considerable intervening topography and some limited vegetation. As such, only the turbine nacelle and blades would be visible and the detraction from the setting of the fort would be minimal.

11.11.28 Given the considerable intervening topography and limited vegetation screening, it is considered that the sensitivity of the setting of the scheduled monument at Hill of Finavon has been categorised as Medium and the magnitude of the impact on setting as Low Adverse. Thus, the significance of the impact of the wind energy development on the cultural heritage asset in this location is expected to be Minor.

Carsegownie

11.11.29 At the base of Hill of Finavon, the Grade B and C listed buildings and scheduled monument have limited setting due to the presence of the adjacent road and situation against the steep Hill of Finavon to the north and Turin Hill to the south. The scheduled monument comprises a burial cairn of prehistoric date, surviving as a grassed-over, stony mound.

11.11.30 In the direction of the proposed turbine there is limited intervening topography from the scheduled monument, however from the listed buildings at Carsegownie the tree screening is likely to limit most of the view towards the turbine. The detraction of the setting of the monument is limited due to the general limited views of the cairn from the north-east.

11.11.31 Given the setting of the monument and views towards the site, it is considered that the sensitivity of the setting of the scheduled monument at Carsegownie has been categorised as Medium and the magnitude of the impact on setting as Low Adverse. Thus, the significance of the impact of the wind energy development on the cultural heritage asset in this location is expected to be Minor.

Turin Hill

11.11.32 Turin Hill comprises a prehistoric defensive fort set at around 250m Above Ordnance Datum to the west of the proposed Cotton of Pitkennedy turbine. The setting of the scheduled monument is open in almost all directions from its elevated position in the local landscape.

11.11.33 There are few detractors in the area for the setting of the fort and views out towards the turbine are possible from the eastern half of the monument, with an open and uninterrupted view of the turbine to the east, set against a backdrop of Montreathmont Forest. The turbine would be set into the landscape and no part of the turbine blade would be visible on the sky-line.

11.11.34 Given the setting of the monument and views towards the site, it is considered that the sensitivity of the setting of the scheduled monument at Turin Hill has been categorised as Medium and the magnitude of the impact on setting as Medium Adverse. Thus, the significance of the impact of the wind energy development on the cultural heritage asset in this location is expected to be Moderate.

Standing Stone, 120m west of Westerton

11.11.35 The standing stone scheduled monument to the west of Westerton has a limited setting has a relatively open setting to the north. A key detractor for the setting of the monument is the presence of the adjacent road, however in the direction of the proposed turbine there is very limited intervening topography, and the full turbine will likely be visible.

11.11.36 Given the setting of the monument and views towards the site, it is considered that the sensitivity of the setting of the scheduled monument at Westerton has been categorised as Medium and the magnitude of the impact on setting as Medium Adverse. Thus, the significance of the impact of the wind energy development on the cultural heritage asset in this location is expected to be Moderate.

Balgavies Castle and Balgavies House

11.11.37 This area comprises two scheduled monuments and Grade B listed buildings around Balgavies Castle and Balgavies House. The setting of the house is localised due to the presence of the surrounding forestry to the west, south and east, and to a considerable extent to the north. The castle is located on a small, wooded knoll and cropmarks of enclosed settlements in the adjacent field. The setting of the castle and scheduled monuments is localised and limited to the east and south by the vegetation, however there will be an open view towards the turbine with only partial vegetation screening.

11.11.38 It is considered that there will be no impact of the proposed turbin on Balgavies House due to the intervening vegetation.

11.11.39 Given the limited vegetation screening and generally localised setting of the castle, it is considered that the sensitivity of the setting of this Grade A listed castle has been categorised as Medium and the magnitude of the impact on setting as Low Adverse. Thus, the significance of the impact of the wind energy development on the cultural heritage assets in this location is expected to be Minor.

Timber Hall at Noronbank

11.11.40 This area comprises a prehistoric scheduled monument with a setting against Hill of Finavon to the south and with relatively open views to the north. There will be an open view towards the turbine with only partial vegetation screening, albeit the turbine will only occupy a very small portion of the view and will appear distant. In addition the turbine height will not be elevated above the surrounding landscape to the west.

11.11.41 It is considered that the sensitivity of the setting of this monument has been categorised as Low and the magnitude of the impact on setting as Low Adverse. Thus, the significance of the impact of the wind energy development on the cultural heritage assets in this location is expected to be Negligible.

Buried archaeology

11.11.42 There will be no further impacts on buried archaeology during the operation of the wind farm.

11.12 Decommissioning

11.12.1 During the decommissioning phase, it is not anticipated that there will be any additional impacts other than those mentioned for construction.

11.13 Mitigation

Construction

11.13.1 To protect any previously undiscovered archaeological finds of unknown cultural value around Hare Cairn, trial trenching prior to construction or a watching brief during construction will be implemented as considered necessary by Angus Council.

11.13.2 In the event that artefacts are encountered, construction work would be halted pending agreement with the County Archaeologist on the most appropriate way to proceed.

11.13.3 If, on review by the County Archaeologist, some previously undeveloped areas of the site are considered to have the potential for underground remains, it may be possible to steer foundations construction away from these areas by micro-siting the turbines and preserve remains in-situ.

Operation

11.13.4 During the operational phase of the plant, no adverse impacts to buried archaeology are likely as such no mitigation is required. It is anticipated that there is the potential for indirect impacts on the SAMs and listed buildings in the inner study area, through the disruption of its setting. However, due to the negligible magnitude of the impacts it is envisaged that the mitigation measures are not required. Mitigation measures such as hoardings or barriers could produce more of a visual impact than the turbines themselves.

Decommissioning

11.13.5 No mitigation measures are considered necessary during the decommissioning phase of the development. The decommissioning phase of the development is likely to be of a similar duration to the construction phase and ground disturbance will be kept to a minimum (foundations will most likely be left in situ). The mitigation measures associated with the construction phase will prevent any further impacts during decommissioning.

11.14 Assessment of residual impacts

11.14.1 Providing mitigation measures listed above are applied correctly, there are not anticipated to be any remaining residual impacts on the archaeology and cultural heritage surrounding the proposed development.

11.15 Assessment of cumulative impacts

11.15.1 The potential impacts of the development on the archaeological and cultural heritage resources of the area have also been assessed with reference to the other proposed wind farms in the vicinity. Any impacts on the buried archaeology on site would be identified through trial trenching during the pre-construction phase, and an appropriate construction scheme would be agreed through engagement with the Local Planning Authority's archaeologist.

11.15.2 The closest built wind farm is approximately 7.4 km away from the development. No cumulative impacts are expected on buried archaeology in the area as all appropriate mitigation measures will have been undertaken at existing wind farm sites and will be undertaken at the Cotton of Pitkennedy site in order to protect any existing assets. Upon assessment it is also anticipated that there will be no cumulative impact on upstanding cultural heritage assets due to the distances between the proposed site and those already in existence.

SECTION 12

SOCIO-ECONOMICS

12 SOCIO-ECONOMICS

12.1 Summary

12.1.1 It is expected that the construction phase of the proposed Project development would employ of the order of 20 construction workers. The construction period will be of approximately 6 months duration and is expected to provide work for local contractors.

12.1.2 The construction of the proposed Project will result in small direct positive economic benefits for local service companies (i.e., cafes, hotels, shops, security) during the construction phase.

12.1.3 On a national scale, and also internationally, there would be positive socio-economic impacts in terms of job creation and investment cumulatively with other wind energy developments. Estimates by the European Wind Energy Association (EWEA) value the European wind energy market at £50 billion by 2020. Furthermore, RenewableUK estimates that wind energy projects representing an investment of some £60 billion will have to be built over the next decade in order to meet UK Government targets, creating up to 160 000 'green collar jobs' by 2020.

12.1.4 During operation, the Project will be unmanned. Its performance would be automatically monitored from a centralised off site control room. Staff of two maintenance engineers is envisaged, depending on the manufacturer selected during the tendering process. These staff would be part-time at the Project as it is expected they would also operate and maintain a number of other wind projects in the area.

12.1.5 Residents living in proximity to other built wind farm sites have, over the last few years, participated in several independent surveys with regard to their attitudes to wind energy. These surveys have consistently shown that a clear majority of between 70 and 80 per cent of the general public are in favour of wind energy. This positive feeling is reflected by those living near a wind farm, and similar numbers do not believe that it spoils the scenery or causes noise nuisance.

12.1.6 Further information and assessment on the socio-economic impacts of the Cotton of Pitkennedy wind turbine project is presented in Appendix I.

SECTION 13

SAFETY

13 SAFETY

13.1 Summary

13.1.1 All construction works would comply with the Construction (Design and Management) Regulations 2007 (CDM Regulations 2007).

13.1.2 Properly designed, constructed and maintained wind turbines are safe. There is an international quality control assurance program for turbines, and a number of relevant safety and design standards. These include the British Standard BS EN 61400-1:2005 "Wind Turbines – Design Requirements". Safety of the proposed turbine will be ensured through adherence to relevant design standards, regulatory requirements, construction practices and operational procedures.

13.1.3 The turbine will be certified to withstand extreme conditions. In very high winds, brakes are applied and the blades are parked in a fixed position. Turbines are also equipped with lightning protection equipment so that any lightning strikes are directed down the tower to earth. In addition, turbines are equipped with vibration sensors to prevent blades from turning in the unlikely event of a blade problem or if there is an imbalance such as would occur from the build up of ice. If a fault were to develop, the wind turbine would automatically stop rotating and send an alarm to a remote monitoring centre, which would in turn alert a maintenance engineer.

13.1.4 The primary safety concerns of the public are, with regards to wind turbines, shedding of part or the whole of a blade or the shedding of ice. There have been very few instances of this type of accident worldwide and we are not aware of any cases where this has lead to personal injury.

13.1.5 There should be no effect on users of the footpaths, bridleways or cycle paths in the vicinity of the proposed Project site.

13.2 Further Information

13.2.1 Further information and assessment on the safety elements of the Cotton of Pitkennedy wind turbine project is presented in Appendix J.

SECTION 14

SHADOW FLICKER

14 SHADOW FLICKER

14.1 Summary

14.1.1 Shadow flicker is the impact that is experienced when moving shadows cast by rotating wind turbine blades are cast across house windows. This occurs with a periodic pattern as the blades rotate. This flickering effect is only a potential issue to receptors in buildings with windows facing the turbine locations. Outside buildings it is rare for shadows to affect a significant proportion of the available light source causing a shadow flicker impact.

14.1.2 The layout of the proposed wind farm has been designed to reduce the potential for shadow flicker to occur thereby minimising the impact to the local community. Please refer to Figure 13.1.

14.1.3 An assessment has been undertaken using a recognised industry software package that identified that there would be no potential for shadow flicker effects at any residential properties surrounding the Cotton of Pitkennedy turbine, due to the separation distance between the turbine and the nearest properties.

14.1.4 Although not anticipated to be necessary, potential mitigation measures can be put in place if a significant degree of shadow flicker occurs at local properties. Any wind turbine causing shadow flicker can be switched-off on those dates and at those times when shadow flicker would occur, and also if natural light levels are sufficiently strong.

14.1.5 In conclusion the impact of shadow flicker to local residents is considered to be negligible.

14.2 Introduction

14.2.1 This section will assess the potential for the proposed wind turbine to produce shadow flicker effects, resulting from moving shadows cast by rotating wind turbine blades. Also included are discussions on glinting and photosensitive epilepsy.

14.2.2 Shadow flicker is caused by moving shadows on the ground, such as those cast by rotating wind turbine blades, low-flying aircraft and moving vehicles. This has the potential to distract people/cause irritation and potentially scare animals such as horses. In a closed space, for example in a room with a window facing the turbine, they can create a shadow flicker, and for a stationary person in the space, such shadows can result in a momentary reduction in the intensity of the available natural light. If the regular changes in light intensity levels are sufficiently great, then nuisance may be caused. Shadow flicker effects are only a potential issue to receptors in buildings with windows facing the turbine location, as in the open air it is rare for shadows to affect a significant proportion of the available light source coming from all directions rather than just through a restricted opening (window).

14.2.3 Numerical and qualitative analyses of the impact of shadow flicker at buildings in the vicinity of the proposed wind turbines have been undertaken. A model containing the relative position of the sun in the sky, from any point on the earth's surface, and at any time during a day and year, was used. From this model it was possible to quite accurately quantify the theoretical temporal and spatial shadow flicker effects. The prevalence and impact of such effects is dependent upon a number of other factors, discussed in turn below.

14.3 Methodology

14.3.1 The WindPro 2.6 programme[2] was used to calculate the expected number of hours (worst case) for which shadow flicker could occur at a number of sensitive receptors

[2] Note: PB has independently validated the solar geometry and general model performance of the WindPro 'SHADOW' module.

(ie residential properties, buildings) in the vicinity of the proposed wind turbine. This included a model of the passage of the sun through the sky, at a defined position and during the course of a day and year. The model also used data relating to the 3-dimensional positions and sizes of the proposed wind turbine, potential shadow flicker receptor positions and sizes. The model assumes that shadow flicker might occur when the centre of the sun passes behind any part of the turbine rotor and that the turbine always faces towards the sun. The model did not however consider the intensity of any potential flickering.

14.3.2 As no meteorological data was available, worst-case analyses were undertaken, based on the assumptions discussed below.

14.4 Factors considered by numerical modelling

14.4.1 The following issues were considered by the numerical modelling:

Site position

14.4.2 One of the key factors relating to shadow flicker is the latitude of a proposed wind farm site. This influences the shape of the potentially affected area, which is characteristically a 'butterfly' or 'kidney' shape centred on each turbine. PPS 22 notes that "Only properties within 130 degrees either side of north, relative to the turbines can be affected at these latitudes in the UK – turbines do not cast long shadows on their southern side". Despite this, the assessment of the potential impact of the proposed wind farm has not been limited in this regard. The areas at greatest risk of being affected by any wind turbines can be summarised depending on the season:

- during the winter -principally to the north-west and north-east and to the west and east,
- during the summer –principally to the south-west and south-east.

14.4.3 The assessment of shadow flicker effects has therefore focussed on residences within these areas; however, potential receptor locations all around the proposed wind farm were studied.

Wind turbine - potential receptor separation distance

14.4.4 PPS22 notes that "Flicker effects have been proven to occur only within ten rotor diameters of a turbine", equivalent in this case to 480 m. This is a result of the fact that shadow intensity decreases exponentially with separation distance, and the influence of varying light levels on sight, as discussed further below. It is to be noted that there are no residential properties within 480 m of the proposed wind turbine.

Wind turbine size and number

14.4.5 A wind turbines size is broadly defined by its hub height and rotor diameter. A greater hub height simply means that the same shadow is cast over a wider area, and generally therefore further away from the turbine. However, shadows cast further away from a turbine are of less significance, due to the influence of the increased separation distance; shadows cast close to a turbine will be more intense and therefore more likely to be of concern. The rotor diameter is also an important parameter. The size of shadows cast, and the theoretical shadow flicker exposure times close to a wind turbine are proportional to rotor diameter.

Cloud cover

14.4.6 Weather conditions are a key consideration because of their influence on ambient light levels, and therefore the intensity of shadows. As no cloud cover data was available, the worst case was considered, i.e. sun shining all the day, from sunrise to sunset.

Horizon diffusion

14.4.7 The sunlight's angle varies with the latitude and time of day. The greater the latitude that the site is, the lower the sunlight's angle is, and so the more important the shadow flickering becomes. Moreover, it has been considered that an angle above horizon of less than 3° has no shadow influence. This assumption is considered reasonable due to the significant increase in light diffusion that occurs at low solar altitudes.

Shielding

14.4.8 Another key factor influencing whether or not shadow flicker occurs, is the visibility of a wind turbines rotor disc (i.e. the area swept by the blades) at a particular receptor location. If only partially visible, or not visible at all, then the impact will be reduced, or eliminated altogether. Shielding can be provided by the topography between the wind turbines and a potential receptor location and also by trees and buildings. The modelling undertaken for the project has only considered topography and therefore represents a worst case outcome.

Wind speed and availability

14.4.9 The issue of wind speed is considered, simply because it determines whether or not a turbine would operate. If wind speeds are either too low or too high, only static shadows are cast. As no long-term average hub height wind speeds and distributions data was available to identify an average proportion of time that a turbine would not be able to operate, the worst case was taken in account. The wind turbines were assumed to always be in operation with 100 per cent availability and facing directly towards each the shadow receptors, regardless of the time of day and year.

Window size/viewing area and orientation

14.4.10 The orientation of the windows in a property is relevant. Unless shadows falls over most of the area of the window(s) providing a light source to a room, the proportion of natural light entering the room will not be reduced sufficiently for shadow flicker effects to be experienced. If the window(s) does not directly face the wind farm the potential for shadow flicker will be reduced. The orientation of each shadow receptor has been defined in the model according to the shape of the buildings. The larger a window is, or the more windows there are, to allow natural light into a room, the less significant the potential impact of any moving shadows cast by a wind turbine. The size of each shadow receptor has been defined as a 1 m x 1 m rectangle, at a height of 1 m above ground level (AGL) for the lower side.

14.5 Results

14.5.1 It is anticipated that no properties will be affected by shadow flicker from the Cotton of Pitkennedy turbine due to the separation distance between the turbine and the nearest residential properties. Please refer to Figure 13.1. While the potential impact zone does overlap some building at Pitkennedy farm, these have been identified as farm outbuildings, not residential properties.

14.6 Mitigation

14.6.1 The position of the turbine has already been decided to minimise its potential impact with respect to shadow flicker, within the constraints of other relevant requirements. Although not anticipated to be necessary, potential mitigation measures include:

- Screening of the view to the wind turbine, for example by planting trees. With no line of sight to a wind turbine, there cannot be any shadow flicker impact.
- Switching off the wind turbine during the period in which it would cause nuisance shadow flicker, on the dates and times when shadow flicker could occur, and if

natural light levels are sufficiently strong. "Flicker timers" can automate this process, and limit shadow flicker exposure times to acceptable levels.

14.7 Glinting

14.7.1 Glinting is associated with the reflection of sunlight off wind turbine blades as they rotate, and can also be considered a potential nuisance.

14.7.2 In practice however, many of the issues determining whether potential shadow flicker effects are actually realised, also apply to glinting. In addition, careful selection of a wind turbines colour and surface finish will minimise the potential for glinting, and its general visual impact. The turbine towers would be painted white or light grey, as these colours minimize any contrasts with the prevailing sky conditions. It is also common practice for wind turbine blades to be provided with a semi-matt finish. In combination with a light grey colour, the reflectivity of wind turbine blades and the potential impact of glinting are therefore minimised. Overall, this issue is not considered to be a particular concern.

14.7.3 The surface treatment of the turbines will be agreed with the local planning authority, through a planning condition.

14.8 Photosensitive epilepsy

14.8.1 Photosensitive epilepsy is a condition brought on by strong flashing or flickering lights or images and affects around 3 to 5 per cent of the 1 in 200 people who suffer from some form of epilepsy.

14.8.2 Turbines such as the one proposed at Cotton of Pitkennedy do not have the potential to trigger seizures due to the frequency at which the blades rotate. The factors influencing the onset of a seizure include the frequency and intensity of flickering, and the proportion of the field of view exposed. The frequency required to trigger seizures varies individually, but is generally between 5 to 30 Hz. Whilst some people are sensitive to higher frequencies, it is relatively unusual for people to be sensitive to frequencies below 5 Hz. Of photosensitive epileptics, less than 5 per cent are sensitive to the lowest frequencies of 2.5 to 3 Hz. The wind turbine models under consideration with regard to the proposed Project have operating speeds of approximately 15 to 20 rpm and because it is three-bladed, the flicker frequency will be equivalent to three times the wind turbines operating speed, or between 0.75 to 1.0 Hz. This is well below the range that would trigger a photosensitive epileptic seizure.

SECTION 15

TELECOMMUNICATIONS

15 TELECOMMUNICATIONS

15.1 Summary

15.1.1 As with any large structure, wind turbines can potentially interfere with the telecommunication systems that are used for radio, television, mobile phones, radar and other forms of microwave communication. Interference with the telecommunication signals can cause distorted sound, image or data transmission. Issues can arise when existing telecommunication systems are not considered appropriately in the design process of new wind farm projects.

15.1.2 Ofcom, the official government body that holds a central register of civil radio communications installations within the UK, has been consulted with regard to the potential for the Cotton of Pitkennedy wind turbine to interfere with existing radio telecommunications facilities. A number of other Consultees have also been contacted. The information provided by these Consultees has been used to produce a map of fixed links and masts within the vicinity of the site. Calculations were then made regarding the separation of the wind turbine from the links that cross the site to ensure that the turbine is sited such that it will not impinge on these links.

15.1.3 The potential to impact on TV reception has also been considered. In addition to interfering with the permanent broadcast links between radio transmitters as described above, there is the potential to interfere with domestic television reception. The principal impact is where a viewer is in the 'shadow' of the wind turbines and their aerial is pointing through the wind farm to the transmitter. Viewers may have their signal periodically obstructed by the rotating blades causing a “scattering” of the signal.

15.1.4 The switchover from analogue to digital signal for the whole of Scotland is now complete. The use of this digital signal should mitigate any interference that might have been caused by the proposed turbines at the majority of local properties. Where issues are encountered and are attributable to the Cotton of Pitkennedy wind turbine, then e-Gen will arrange for appropriate mitigation to remediate the problems encountered.

15.2 Introduction

15.2.1 Telecommunication systems use a variety of electromagnetic (EM) signals, commonly described as radio waves. Users primarily include television (TV), radio, mobile telephony, microwave communications and radar (discussed further in Section 15 of this ER). Interference of EM signals can potentially occur when existing telecommunication systems are not adequately considered during a wind farm’s design and development. Interference of EM signals can cause distorted sound, image or data transmission.

15.3 Reflection and scattering

15.3.1 Any large structure, such as a wind turbine, can cause EMI interference by reflecting and scattering EM signals, depending on the materials used location, dimensions, and layout of the structure. This can cause blocking or distorting of the signal, or reflected signals may be superimposed on the original signal (commonly referred to as ‘ghosting’). Overall results of reflecting and scattering are that the signal at the receiver will be degraded, decreasing the performance and reliability of the service.

15.3.2 Interference from wind turbines is predominantly caused by blade rotation, and is related to the length and area of the metallic components within the blade, as well as the nacelle and its orientation. The blades of large, modern wind turbines incorporate carbon fibre structural elements, as well as lightning protection, consisting of a metal conducting path within the blade, which will contribute to the reflection and scattering

of signals. Signals can further be affected (accumulatively) by the periodic interference caused by the blades revolving.

15.3.3 If a wind turbine or similar large structure obstructs the 'line of sight' path between a transmitter and receiver, telecommunication signals may be scattered by reflection (forward scatter). Forward scatter will occur if a wind turbine is situated directly on or close to the line of sight path. Forward scatter can, for example, cause variations in TV picture brightness and colour. Backward (or sideways) scatter is also caused by the reflection of signals from a wind turbine, producing a delayed secondary signal resulting, for example, in ghosting effects in a TV picture. Backward scatter can occur when a wind turbine is situated behind the receiver or to one side of the main transmission path and is associated primarily with analogue signals. Digital signals are significantly less affected by such interference.

15.3.4 The area around a wind turbine where TV reception may be affected is roughly shaped like a keyhole, with the shape and size being dependent on turbine dimensions and the topography between the wind turbine, the broadcast transmitter and the receiving aerial, as well as orientation of the blades and the layout of the turbines.

15.4 Emissions

15.4.1 Any electrical apparatus, including the electrical systems in a wind turbine, will emit a certain amount of EM radiation, which can interfere with other equipment or telecommunication signals, depending on relative signal strengths. A wind turbine's control equipment, generators and power converters can all be sources of EM signals, whilst the turbine's microprocessor control systems must themselves be resistant to disturbance from external sources of EMI. Shielding, provided in part by enclosing the equipment in the grounded turbine tower, or a similar metal casing, reduces the potential for interference. The high voltage switchgear associated with a wind energy development can also produce EMI, and again, suitable shielding of the switchgear reduces the potential for interference. Installation standards exist for the electrical equipment associated with wind turbines and high voltage switchgear, which are both widely used, which ensure that EM emissions are acceptable.

15.4.2 Consequently, it is not anticipated that the proposed turbine will be a source of EM radiation that will cause any interference to telecommunication systems, or indeed, affect public health in any way.

15.5 Impact Assessment

15.5.1 The assessment of the potential for the proposed turbine to interfere with telecommunication systems has for clarity, been sub-divided into separate assessments of essentially different types of system as follows:

- TV and Radio
- microwave communications (point-to-point fixed links)
- mobile telephony (fixed point to area services).

15.6 TV and radio

15.6.1 The assessment of the potential impact of the proposed Cotton of Pitkennedy turbine on TV and radio has considered both analogue and digital broadcasting services. Analogue services are delivered by terrestrial transmitters only, whilst digital services can be delivered by terrestrial transmitters, satellites or cable. As the proposed development will not impact on satellite or cable delivered services, these services have not been considered further.

15.6.2 It is not anticipated that radio services will be affected by the proposed development as radio services use longer wavelengths that are not known to be affected by any

existing wind farms in the UK unlike television and other communication systems. This understanding is shared with the British Broadcasting Corporation (BBC).

15.6.3 The situation regarding television broadcasting services in the UK is complicated by the almost complete switch-over from the analogue to digital television signal. The digital switchover, where by the analogue signal is being switched off and replaced with a 'digital' signal started in the UK in 2008 and is scheduled to be completed by the end of 2012. The switchover has now been completed in Scotland. Terrestrial digital services are much less likely to be disrupted as compared with analogue signals. The difference here is the primary source of interference to digital reception is that associated with physical obstruction between a transmitter and receiver whereas analogue signals can suffer not only from physical obstruction but also from 'ghosting' blocking and distortion caused by signal scattering and reflection.

15.6.4 Investigations undertaken to identify the transmitters which serve households within the vicinity of the proposed Cotton of Pitkennedy turbine indicates that the principle transmitters are those located at Durris and Angus, which have now all switched to digital, whereby mitigating the majority of problems that could have arisen with regard to the proposed Cotton of Pitkennedy turbine..

15.6.5 In the unlikely event that TV reception problems attributable to the proposed development are identified once the turbine is operational, a highly robust solution could be provided to those affected through the installation or modification of a local repeater station or the installation of a "self help" cable system for a small group of houses. A "self help" cable system comprises a single "master receiving aerial" able to receive a signal that is free of interference and feeds a Remote Frequency (RF) signal by cable to affected properties. Other solutions would include the realignment of aerials to receive signals from other transmitters in the area.

15.6.6 The quality of TV reception in each area that may be potentially affected will be tested before and after construction. The developer will then rectify any loss of TV reception associated with the turbine. Following such mitigation the residual impact would be negligible.

15.7 Microwave communications (point-to-point fixed links)

15.7.1 Turbines have the potential to interfere with microwave communications links through direct physical obstruction or by being located in areas close to the mast/antennae at each end of a link (so called 'near-field' effects).

15.7.2 It is in the near-field areas that a link is susceptible to interference; at greater distances from the link the impact is negligible. The risk of interference depends greatly on the characteristics of an antennae and a wind turbine, and can be minimised by maintaining suitable distances between a potential obstacle, the antennae and the path of a link. A wind turbine should not therefore be located directly on, or very close to, the path of a link, and suitable separation distances should be maintained.

15.7.3 The EM field around the path of a link can be considered to consist of a number of concentric zones, known as Fresnel zones, each shaped like an elongated rugby ball. The radius of a Fresnel zone at any point along the path of a link is related to the link's overall length and operating frequency. Ensuring that the second Fresnel zone is kept clear of obstructions should be sufficient to minimize the risk of interference.

15.7.4 An assessment of the potential effects of the proposed wind turbine on fixed link communications has been undertaken to ensure than no existing interests are affected by the proposal. This included consultation with a full range of relevant authorities and field investigations to identify the precise locations of telecommunications masts in the vicinity of the proposed Cotton of Pitkennedy wind turbine site where applicable.

15.7.5 Ofcom were the principal group consulted as part of this assessment, as they are responsible for maintaining a comprehensive register of fixed links. Ofcom are also the primary authority in the UK for the development of new links. However, a number of other organisations also retain a limited scope to develop new links, either for themselves, or on behalf of the clients whose links they manage. The following organizations were also consulted as part of Ofcom's investigations:

- Joint Radio Company (JRC)
- Atkins Ltd
- BT Radio Frequency Allocation & Network Protection
- Cable and Wireless Worldwide
- Arqiva Services
- Everything Everywhere Limited

15.7.6 The consultees were provided with details of the proposed development and asked to provide details of any links across the site or any masts in the vicinity of the site. These details were then provided to PB and an assessment was then made to identify constraints regarding links across the site which were in turn used to inform the project layout.

15.7.7 It was found that there are no fixed point to point microwave links crossing or adjacent to the site, with the exception of a Cable & Wireless Worldwide link which traverses the southern part of the site boundary. Cable & Wireless Worldwide have confirmed they have no objection to the proposal.

15.8 Ultra High Frequency (UHF) Telemetry Links

15.8.1 UHF telemetry links in most cases are an integral part of the Supervisory Control and Data Acquisition (SCADA) systems used by utilities for monitoring and controlling their networks - including the infrastructure connecting wind farms to the grid. Interruption to the reliable operation of these links compromises the integrity of the UK energy generation, transmission and distribution systems.

15.8.2 UHF telemetry links are normally planned on the basis of approximately 99.9% availability. UHF frequencies are particularly suited to this application as a single hop can provide a reliable link over a 25 km path (up to 50 km under ideal circumstances) and it is not necessary to have a line-of-sight path from transmitter to receiver. This ability of UHF telemetry systems to operate over obstructed paths is the feature that creates the greatest potential for incompatibility with wind turbines.

15.8.3 Because wind turbines frequently occupy the higher ground and protrude above the landscape they act as massive radio reflectors such that the reflected path via the wind turbine can be superior to the intended path. The reflected signal can thus be strong enough to cause harmful interference.

15.8.4 Where a turbine is located within 1km of a link operating below 3GHz, detailed co-ordination is recommended by the Joint Radio Company. The consultation response from JRC stated that there is potential for interference scenarios with up to two (2) 460 MHz telemetry and telecontrol links operated by Scottish Hydro, as the proposed turbine is located within the co-ordination zone of the protected link paths.

15.8.5 The minimum distance between the closest link and the blade tips of the proposed turbine is 199m. The JRC have stated that they will undertake a detailed coordination study to establish the exact impact of the proposed turbine upon these telecommunication links in order to establish a mitigation strategy (if required) moving forward.

15.9 Mobile telephony (fixed point to area services)

15.9.1 Mobile telephone and paging services use a fixed transmitting station on higher ground to broadcast or repeat signals to mobile terminals, i.e. a fixed point to area service. Because mobile terminals are often moving during use, system performance varies widely, often resulting in intermittent interference on voice traffic. Data traffic, including paging, repeats messages that experience interference.

15.9.2 It is not anticipated that the proposed development will result in a deterioration of the quality of available mobile telephony services. The consultation results received from Ofcom has not highlighted any concerns in relation to mobile telephone coverage or service provisions, with none of the consultees approached raising any potential issues with regard to the project.

15.10 Conclusions

15.10.1 The proposed wind turbine will have a negligible effect on existing EM links within the locality. Where digital television reception is adversely affected, appropriate remedial works will be effected by e-Gen to ensure viewers continue to receive signals as was the case prior to the construction of the wind turbine. No fixed point-to-point or point to area services will be affected by the wind turbine. The potential interference on two UHF telemetry links will be examined in further detail during the planning stage of the development.

SECTION 16

AVIATION AND RADAR

16 AVIATION AND RADAR

16.1 Summary

16.1.1 Wind turbines have the potential to act as a physical obstruction to aviation because of their height. They can also present an obstruction to radar, through generation of unwanted radar returns; partially due to height but particularly due to the rotating blades.

16.1.2 As part of this section of the ER, informal, pre-planning consultations have been held with the Civil Aviation Authority (CAA), Fife Airport and Perth Airfield. None of these consultees responded to initial consultations; however, there are not expected to be any significant impact on aviation services as a result of the development.

16.2 Introduction

16.2.1 Wind turbines have the potential to impact on aircraft in two ways: as a physical obstruction because of their height and also because they can be detected by radar, again due, in some part, to height but particularly due to interference caused by the rotating blades. Both wind power and aviation are important to the UK's national interests and in addition both are expected to increase in the coming years. It is therefore important that both sectors can operate side by side.

16.2.2 The effect of wind turbines is applicable to both civil and military aviation activities.

16.2.3 Wind turbines may also impact on other users of radar, including met office weather stations.

16.3 Potential impacts

Physical obstruction considerations

16.3.1 Wind turbines, as is the case with any tall structure, can present a vertical obstruction to aircraft. This is of particular relevance in the vicinity of aerodromes with respect to approaching or departing aircraft or within the UK Low Flying System (UKLFS) where low flying military aircraft may be taking part in low flying training. The UKLFS is unique, and covers all UK airspace with the exception of certain areas such as airports, certain industrial sites and large areas of population. The normal lower limit for low flying by fixed wing aircraft is 75 m. As the maximum height of the turbine proposed at Cotton of Pitkennedy is 74 m, it is necessary to establish any impacts on the closest airports and flying routes in the area. Refer to Figure 15.1.

16.3.2 In certain areas, known as the Tactical Training Areas (TTAs) low flying by fixed wing aircraft is permitted in daylight hours down to between 30 m and 76 m. Helicopters may even operate down to ground level in these areas. The proposed site is outside these areas.

Electro magnetic interference considerations

16.3.3 Any tall structure can also potentially interfere with certain electromagnetic transmissions, as discussed in Section 14 of this ER. The DAP notes in "CAP 764: CAA Policy and Guidelines on Wind Turbines" that wind turbines do not in themselves cause electromagnetic interference , but they do have the potential to impact on air traffic management with regards to the following systems:

a. Primary Surveillance Radar (PSR)

16.3.4 The turbine towers and blades may be detected if they are in line of sight of a radar (or indeed where the turbines are located just over the visual horizon due to wave refraction), potentially giving false radar responses or returns or masking (shadowing) genuine aircraft returns. As the towers are stationary their radar signatures can be differentiated from moving aircraft and eliminated by radar tracking systems, however

this is not possible with the moving blades and false radar responses can occur when the turbine blades are rotating. In such cases the combination of blades from different turbines can give the impression of a moving object, causing air traffic controllers to perceive it as an unidentified aircraft.

16.3.5 Masking arises due to the reflection or deflection of the radar such that aircraft flying in the "shadow" of the turbines are not detected and also by presenting such a large number of returns that actual aircraft are lost in the clutter. Shadowing only affects aircraft flying at low altitudes and therefore generally only has a small effect. The effects of radar clutter have an impact on aircraft flying at all altitudes over the area affected and it is therefore potentially more significant, though this is generally considered to be an issue for larger areas and numbers of turbines than is considered in this proposal. It is therefore preferable to site wind farms where only limited aircraft traffic is expected and not in direct line with the end of an airfield runway. The impact of turbines on airways must also be considered, with wind turbines to be preferentially located out of the radar line of sight. It should be noted that the largest wind turbines do not necessarily have the greatest impact.

b. Secondary Surveillance Radar (SSR)

16.3.6 The SSR system relies on co-operative transmissions from aircraft carrying transponders. Transponders operate by actively responding to the incoming primary radar, sending strong signals back to give an improved radar picture. There are not therefore the same impacts associated with Primary Radar; however reflection of transmissions could be caused by wind turbines in some circumstances leading to misidentification or miss-location of aircraft. It is therefore preferable to avoid siting wind farms near ground-based SSR transmitters.

c. Microwave links

16.3.7 The turbines can cause interference with the microwave links associated with both Primary and Secondary Surveillance Radars, detailed above.

d. Navigation aids (Navaids)

16.3.8 This system enables aircraft to locate themselves and navigate from one airport to another. The system has similar reflection and deflection issues as with SSR.

Additional air defence considerations

16.3.9 Wind turbines also have the potential to impact on the Ministry of Defence (MOD) surveillance systems used to detect and identify aircraft approaching, overflying or leaving the UK and from which a Recognized Air Picture (RAP) is produced. This is a key part of the Air Surveillance and Control System (ASACS), which comprises ground-based radars, airborne radars and command and control systems.

16.3.10 There are thirteen military ground-based air defence radar sites, otherwise known as early warning systems, principally located along the east coast of the UK with no sites located in the vicinity of the project site. The performance of such stations may be impacted by any wind turbine sited in their field of view. However, air defence radars are typically more complex and therefore more capable than air traffic control radars and may be able to process out electronically some of the effects that might be caused by wind turbines. Research on this topic by the MOD is ongoing.

16.3.11 The UK operates a fleet of E-3D Sentry airborne early warning aircraft which are used to pass radar information for use in compilation of the RAP. The potential impact of wind turbines on such airborne radars is not considered significant, as although airborne radars can see wind turbines there is no firm evidence that this impacts on flight safety or performance.

Safeguarding

16.3.12 In the light of the above potential impacts, the DAP and MOD conduct a process known as "safeguarding" around certain "technical sites" to ensure that wind turbines, or indeed other structures, do not compromise air safety or the UK's defence systems. Under the current safeguarding process safeguarding maps are lodged with local planning authorities who must consult the DAP for any wind farm planning application submitted within a safeguarded area.

16.3.13 The technical sites requiring safeguarding fall into three basic categories:

a. sites engaged in or supporting airspace and air traffic management (both civil and military), including radars and navigation aids

b. sites engaged in or supporting the air defence of the UK, including radars

c. Met Office radar stations.

16.3.14 Consultation on safeguarding requirements for civil aviation sites is required within a 30 km radius centred on the aerodrome or technical site (though this does not mean that a wind farm cannot be located within this area.) At distances less than 15 km a colour coded map indicates certain areas where structures of heights above a given level would result in an objection from the DAP, however for civil airports the DAP generally devolve safeguarding responsibility to the airport in question. Edinburgh Airport is the only officially safeguarded aerodrome in the area of the proposed site, as classified in Annex 3 of the Planning Circular 2 2003 – Scottish Planning Series: Town and Country Planning (Safeguarded Aerodromes, Technical Sites and Military Explosives Storage Areas)) and lies over 35 km to the south.

16.3.15 The Met Office uses radar at 15 weather stations in the UK to assist in weather forecasting. Current advice is not to site wind farms within 10 km of these stations. The nearest weather station is at Carse of Gowrie, the Cotton of Pitkennedy site lies within 12km of the station. The MOD have stated that concerns are likely to be raised at any site within 20km. Pre-application consultations were attempted with the MOD regarding Carse of Gowrie but at the time of writing this ER, no response had been received.

16.4 Consultation and Impact Assessment

16.4.1 The most effective way to ensure that wind turbines do not impact on aviation and air defence issues is through a process of informal pre-planning consultation in order to identify and remove as many of the stakeholders concerns as possible.

16.4.2 Pre-planning consultations with Dundee Airports have been attempted with no response received from the airport contacted. Refer to Figure 15.1 for the location of this airport.

16.4.3 The Safety Regulation Group of the Civil Aviation Authority (responsible for the regulation of licensed aerodromes and air traffic services within the UK) and the Ministry of Defence's, Defence Estates Safeguarding Wind Energy Department have also been contacted to determine whether the proposal would interfere with air traffic. The CAA have not responded to any pre-planning consultations. The National Air Traffic Services (NATS) have been consulted and have provided no response, but it is expected that they will assess the potential impacts of the project in more detail after the submission of the planning application. The wind farm pro-forma available from RenewableUK was completed and sent to the MOD, but no response had been received at the time of writing this ER.

16.4.4 The necessity to install aircraft warning lights on the turbine will be agreed with the local authority and will therefore be the subject of an appropriate planning condition.

16.4.5 Temporary construction equipment, such as the crane and derrick that may be used during construction of the proposed tower is unlikely to pose a hazard to aviation safety during the construction period. Once the turbine is in place the coordinates and dimensions of the turbine will be provided to the Defence Geographic Centre to allow for the updating of their aviation maps.

Regional Civil Airports and Aerodromes

16.4.6 By reference to published Civil Aviation Authority maps, it has been confirmed that there is only one civil airport or aerodrome within 30km of the proposed wind turbine at Cotton of Pitkennedy. This airport is Dundee airport at a distance of approximately 28km from the wind turbine. It is understood that Dundee Airport is not radar equipped and a recommended buffer distance of 17km is applicable for separation of wind turbines from the airport.

16.4.7 A consultation enquiry regarding the Project was issued to Dundee Aiport in November 2011 however no consultation response has been received.

16.4.8 As a result of the above and the lack of consultee response to highlight any concerns, it is expected that the Cotton of Pitkennedy wind turbine proposal should not have any significant operational impact on Dundee Aiport.

MetOffice Meteorological Monitoring Stations

16.4.9 By reference to published MetOffice maps, it has been confirmed that there are no meteorological monitoring stations within 20km of the Project.

16.4.10 As a result, it is expected that the Cotton of Pitkennedy wind turbine proposal should not have any significant operational impact on MetOffice installations.

National Air Traffic Services (NATS) En Route Radar

16.4.11 By reference to published NATS maps, it has been confirmed that there is no radar coverage at Cotton of Pitkennedy from Primary Surveillance Radar (PSR), Secondary Surveillance Radar (SSR), Air-Ground-Air Radar (AGA) or Navigational Aids at any height above ground level.

16.4.12 A consultation enquiry regarding the Project was issued to NATS in November 2011 however no consultation response has been received.

16.4.13 As a result of the above and the lack of consultee response to highlight any concern, it is expected that the Cotton of Pitkennedy wind turbine proposal should not have any significant operational impact on NATS En Route radar.

Ministry of Defence (MOD) Low Flying

16.4.14 By reference to published MOD Low Flying maps, it has been confirmed that the Cotton of Pitkennedy wind turbine is located within a ‘Blue’ Low Flying Area, which is described as a low priority military low flying area which is less likely to raise concerns.

16.4.15 A consultation enquiry regarding the Project was issued to MOD in November 2011 however no consultation response has been received. Parsons Brinckerhoff notes that it is the MOD’s current position that no pre-application consultation enquiries will be responded to.

16.4.16 As a result of the above and the lack of consultee response to highlight any concern, it is expected that the Cotton of Pitkennedy wind turbine proposal should not have any significant operational impact on MOD Low Flying operations.

Ministry of Defence (MOD) Radar

16.4.17 By reference to published MOD radar infrastructure maps, it has been confirmed that there is no coverage at Cotton of Pitkennedy from Air Traffic Control radar at any height above ground level.

16.4.18 A consultation enquiry regarding the Project was issued to MOD in November 2011 however no consultation response has been received. Parsons Brinckerhoff notes that it is the MOD's current position that no pre-application consultation enquiries will be responded to.

16.4.19 As a result of the above and the lack of consultee response to highlight any concern, it is expected that the Cotton of Pitkennedy wind turbine proposal should not have any significant operational impact on MOD radar operations.

16.5 Conclusion

16.5.1 This assessment concludes that the proposed Cotton of Pitkennedy turbine will not have major impacts on aviation or radar equipment. Informal, pre-planning consultations have been held with the CAA, MOD and Dundee Airport; however these consultees have not responded. The site is located within 12km of Carse of Gowrie weather station, and further studies may be required to determine the impact of the turbine on the weather station. Although NATS state that they will look into potential impacts once the proposal has been formerly submitted for planning permission, no issues in this regard are anticipated.

16.5.2 It is Parsons Brinckerhoff's view that there should not be any significant operational impact from the proposed wind turbine at Cotton of Pitkennedy on civil or military aviation and radar installations or operational aviation activities.

SECTION 17

TRAFFIC AND INFRASTRUCTURE

17 TRAFFIC AND INFRASTRUCTURE

17.1 Summary

17.1.1 Construction of the wind turbine will require the delivery of large items of plant and equipment to the site, in addition to the deliveries of aggregate and concrete for the construction of access tracks and foundations.

17.1.2 The main turbine components are expected to be manufactured overseas and brought to a suitably close port from where they can be transported by road to the proposed site. See Appendix C for the Full Access Report.

17.1.3 Information on the proposed access route to the site is outlined in Appendix C (Full Access Report) to this ER. This report includes information on the weights and dimensions of the abnormal delivery vehicles, as well as showing the swept path and areas of public highway alteration required in order to access the site.

17.1.4 Due to the remote nature of the site, it is not anticipated that any alternative routes will be used by other construction traffic, including construction staff, to access the site. A maximum of 20 construction staff are expected to be working at the site at one time.

17.1.5 Peak traffic movements are expected to occur during the delivery of aggregate for the construction of the on site access roads. The delivery of aggregate is expected to require of the order of 245 lorries over a 4 week period which given an 8 hour working day gives an average of less than 2 lorries per hour.

17.1.6 All routes will be agreed with the Highways Authority at Angus Council prior to the commencement of construction.

17.1.7 The impacts of construction traffic would be mitigated through the adoption of specific routing and control measures and the implementation of a Transport Management Plan. The impacts during decommissioning would be less than those encountered during the construction phase.

17.1.8 During the operational phase, very few vehicle movements are expected. As such, any impacts on the environment and amenity of local communities and road users will be of a short term temporary nature during the construction phase of the wind turbine.

17.2 Further information

17.2.1 Further information and assessment on the traffic and infrastructure impacts of the Cotton of Pitkennedy wind turbine project is presented in Appendix K.

SECTION 18

MONITORING AND MITIGATION

18 MONITORING AND MITIGATION

18.1 Summary

18.1.1 This Section summarises the mitigation measures (outlined in the various sections of this ER) proposed by e-Gen to ensure that the impact to the receiving environment of the proposed Cotton of Pitkennedy turbine is acceptable and wherever possible minimised. It also details the changes made during the design of the turbine development to ensure that the views of the various consultees to the assessment process have been considered and accommodated where practical.

18.2 Landscape and Visual Impact

18.2.1 The landscape and visual impact assessment has identified that the Cotton of Pitkennedy single turbine will only have a localised impact (approximately for a 2km radius from the turbine). This impact will be of Moderate significance for the majority of receptors within the local area. However, due to the containment of effects to the local area, the cumulative impacts are predominantly considered to be Slight in Nature.

18.3 Air Quality

18.3.1 Construction of the proposed wind turbine may result in the emission of dust due to wind blowing over bare earth etc., in addition to emissions of oxides of nitrogen (NOx), carbon monoxide (CO), particulate matter (PM) and sulphur dioxide (SO2) from vehicle exhausts.

18.3.2 Dust could be emitted during several activities associated with the construction works if preventative measures are not taken. Dust could arise from: earth moving operations for excavation and back filling of foundations; blow-off and spillage from vehicles; concreting operations; site reinstatement; and, road construction.

18.3.3 If potential for dust emissions exist, for example on dry windy days, then the following procedures will be followed:

- Materials will be tested for moisture content;
- If material is dry then water will be sprayed on to the working area to suppress dust;
- Excavation faces not being worked will, if required, be either sheeted or treated with a chemical dust suppressant;
- The amount of disturbed surfaces left exposed for significant time periods will be minimised; and
- All operatives working in areas of potential dust emission will be provided with paper type face masks.

18.3.4 Materials deposited on stockpiles on site will be closely monitored for any emission of dust and if required they will be damped down, covered or treated with a dust suppressant.

18.3.5 If finely ground materials are delivered, these will be in bag form or stockpiled in specified locations where the material can be suitably covered or damped down as necessary. All vehicles carrying bulk materials into or out of the site will be covered to prevent dust emission. Minimum drop heights will be used during material transfer.

18.3.6 A temporary wheel and chassis washing facility will be provided adjacent to the site exit and will be used by all heavy commercial vehicles leaving the site, preventing the transmission of soil from the site to the public highway. Vehicles will be encouraged to reduce their speed while moving around the site during dry weather to minimise disturbance.

18.3.7 In addition to dust, there will be emissions associated with the construction machinery and vehicles, such as the exhaust from diesel powered equipment. However these will be easily dispersed by the prevalent winds at the site. It is likely that perhaps seven construction vehicles would be present on site at any one time. Any associated odour would be very minor and local in nature and would again be quickly dispersed.

18.3.8 With suitable techniques employed and a short construction time, the residual impact on air quality is expected to be minor.

18.3.9 During operation, the turbine will not emit any measurable emissions of pollutants or odours to air. Emissions from maintenance vehicles will be insignificant.

18.4 Geology, Hydrogeology and Hydrology

18.4.1 The construction phase of the Wind Energy Project may have minor impacts on the geology, soils and water quality at the site. These impacts are mainly related to the construction phase and will be mitigated in the following ways:

18.4.2 A Site Waste Management Plan (SWMP) will be drafted for the construction phase. The SWMP will focus on the reduction, re-use and recycling of all waste spoil on site. Soils will be segregated according to type and contamination status and re-used where possible to fill excavations (thus also limiting impacts on the groundwater and surface water drainage regimes at the site). As part of the SWMP any additional soil materials that are to be imported to the sites will be required to have certification of their chemical concentrations to ensure that contaminative materials are not being introduced to the area

18.4.3 The SWMP will also provide guidance on good working practices in order to minimise impacts on the soil and geology resulting from the construction of the Wind Energy Project. This will be further developed by the Contractor and agreed with SEPA and local planning authority prior to any works on site. All construction staff would be required to read the procedure and abide by its requirements.

18.4.4 The construction area will be delineated and measures taken to avoid vehicle use outside the working boundary through, for example, the erection of appropriate fencing.

18.4.5 In order to further limit disturbance, the site access tracks will be constructed first to allow movement of vehicles around the site on areas of soft-standing. Any vegetation, topsoil and subsoil will be removed to expose a suitable sub-grade. Any soils, sub-soils or aggregate suitable for reuse will be stockpiled on impermeable liners, in the vicinity of the turbine locations.

18.4.6 Speed restrictions will be imposed on site to minimise disturbance of bare surfaces and the amount of disturbed surfaces left exposed for significant time periods will be minimised. Stockpiles of loose, fine materials will be damped down or covered over if necessary, again to reduce erosion and the production of dust. The control of airborne dust is discussed in Section 7 Air Quality.

18.4.7 The access roads will be constructed to manage drainage of surface water and a temporary wheel washing facility will be installed to prevent transfer of soil onto nearby public roads and discharging into highway drains.

18.4.8 Surface water, perched waters or groundwater from dewatering operations will not be discharged to surface water or drains, without the appropriate consents from the local water or Sewage Company and/or SEPA. The disposal of this effluent will be the responsibility of the contractor. If necessary this water will be taken off-site for disposal at a suitable facility.

18.4.9 Temporary drainage routes and silt fences, constructed of geotextile, will be constructed if deemed necessary. Any pumping will be undertaken at such a rate using an appropriately sized pump in order to avoid disturbance or erosion of the stream banks. The location of dewatering pipework will be carefully positioned. The contractor will regularly inspect all dewatering pumps, pipe work and connections.

18.4.10 Cable trenches will be refilled and compacted to the same condition as the surrounding substrate in order to prevent creation of new sub-surface flow pathways and decrease the likelihood of ponded water in the excavations. Trenches will be back-filled promptly in order to minimise water ingress. If necessary temporary silt traps will be provided. Confirmed mitigation measures such as working to best practice guidance, de-watering of excavations, re-instatement of excavations with similarly graded materials to what has been excavated and lining of excavations with sand and geotextile membranes where necessary will also ensure that any impacts are limited.

18.4.11 If discharge of any water is required as part of the construction process, the contractor will provide a silt trap and/or oil interceptor at a location agreed with the EA to allow solids or immiscible liquids to settle/separate prior to discharge. The contractor will inspect, empty and maintain silt traps/interceptors. A registered waste carrier will remove from site all sludges or residues collected during cleaning operations, to a suitably licensed waste disposal facility.

18.4.12 The storage of fuel, equipment and construction materials will be designed so as to minimise the risk of soil contamination or water pollution for example through the use of bunds, drip trays and oil interceptors in accordance with SEPA guidelines. Storage locations will be defined in the SWMP.

18.4.13 Storage of fuel would be limited and secure. Temporary diesel storage tanks will be double skinned or contained within an impermeable bund, capable of holding 110 percent of the tank's contents.

18.4.14 Construction machinery will be checked regularly. Any maintenance required will occur over hardstanding or on a suitable impermeable ground cover. Refuelling will be limited to a designated area, on an impermeable surface, away from any drains or watercourses. Spill kits, absorbent pads and absorbent sands will be available on site at all times. Any spills will be cleaned up as soon as possible, according to the spill response plan in the SWMP, with any contaminated sands bagged up and disposed of correctly. Parking of staff vehicles will only be permitted in designated areas.

18.4.15 Any impacts will be minimised by restricting vehicle movements to specified routes and controlling the construction areas. In addition, a temporary site compound will be constructed for the parking of construction vehicles and equipment, staff vehicles, and the storage of materials.

18.5 Ecology and Ornithology

18.5.1 The EcIA has been carried out according to current guidance published by the Institute of Ecology and Environmental Management (2006), which is recognized as best practice. These guidelines set out a process of identifying the value of each ecological receptor and then characterizing the effects that are predicted, before discussing the effects on the integrity or conservation status of the receptor, proposed mitigation and residual effects.

18.5.2 A total of eleven habitats are present within the site survey area, of which the majority is arable farmland. No nationally or internationally protected habitats were identified in this assessment. The habitat around the proposed access tracks and turbine location is arable fields.

18.5.3 There are wet ditches onsite, however, no significant impacts on the aquatic environment are anticipated from the location of the proposed development infrastructure. There is the potential of a slight increase in run-off in to ditch systems through the ground disturbance of the construction phase but this is expected to be short lived, minor and further reduced through mitigation.

18.5.4 There was an average breeding birds species list due to the trees and hedgerows around Cotton of Pitkennedy. The species recorded would be considered as typical for arable farmland habitat and of low sensitivity. There was very little breeding on the open fields and no high sensitivity species were recorded in this habitat. The construction footprint will be on existing tracks and a small area of arable fields. No trees are proposed to be removed and no scrub. The magnitude of impact is considered to be negligible and overall the significance of impact to be no more than negligible, therefore, no mitigation is deemed to be required.

18.5.5 Only very small numbers of common pipistrelle bats were recorded. It is expected that roosts are present in farm buildings in the general area, however these are over 500m distant from the proposed turbine. No buildings will be impacted on by the construction footprint. It is considered that arable fields are poor quality foraging and that bats would forage around water and trees offsite. Within the 500m zone around the proposed turbine there is no potential in buildings for bat roosts and very limited potential in trees. No trees are to be removed for construction and the turbine will be placed more than 50m from tip to hedgerows or tree lines.

18.5.6 No signs of badgers were recorded on site, however the following mitigation is proposed as it is likely that badgers are in existence in the general area:

- All contractors should be made aware of badgers and their legal protection;
- All personnel are made aware that badgers may exist close to the site and are at risk from vehicles; On site speed restrictions will be put into place for all vehicles, including construction, maintenance and visitors to the site;
- All trenches dug during construction and exposed open pipes will be covered at the end of each working day to ensure no risk to badgers, otters or any other wildlife that may have the potential to be trapped; and
- Ramps will be located within the trenches or pits that can't be covered to allow an exit for any mammal that has gone into a trench or pit.

18.5.7 Some of the impacts predicted as a result of the proposed scheme can be considered generic impacts, which are typically associated with a development of this nature. The development of the wind turbine scheme at Cotton of Pitkennedy has been assessed as posing no significant impacts on commonly occurring habitats found on site. Therefore no specific prescriptions are recommended other than the general measures recommended below.

- Good construction site management should be implemented to minimise generation of litter, dust, noise and vibration. This should be controlled and monitored through the Contractor's Environmental Management Plan. Through adhering to best practices during construction and operation phases, fragmentation, disturbance and pollution to habitats present can be minimised;
- During construction management of excavated soil will focus on preventing silt runoff into the water environment during rainfall periods through careful design and maintenance of drainage/silt traps.

18.6 Noise

18.6.1 The introduction of wind turbines has the potential to cause impact on the surrounding area and adjacent residential properties. In order to protect the reasonable amenity

of neighbours of the Cotton of Pitkennedy wind turbine, an assessment of the proposed turbine including the measurement of the existing background noise levels has been undertaken.

18.6.2 The methodology for the noise survey, including the selection of receptors and background noise monitoring locations, was discussed and agreed with the Environmental Health Officer (EHO) at the Local Planning Authority prior to commencement.

18.6.3 The results of the background noise survey have been correlated against simultaneously measured wind speed, with correction for wind shear. This has been done in order to establish changes in the noise climate at the proposed site with increasing wind speed. From this data, noise limits for the scheme have been derived for the night-time and amenity hours in accordance with the methodology set out in ETSU-R-97 – The Assessment and Rating of Noise from Wind Farms.

18.6.4 An assessment has been made using manufacturers warranted data for the proposed wind turbine using the Enercon E48 as a candidate wind turbine for the purposes of the assessment. From this assessment, predictions of noise levels that would impact on the nearest residential properties and surrounding area have been identified.

18.6.5 The predicted noise levels as a result of the operation of the proposed Wind Energy Project fall within the ETSU-R-97 noise limits at all of the nearest noise sensitive receptors. Based on this assessment, no further noise monitoring or mitigation is required during either operation or construction of the Wind Energy Project.

18.7 Socio-Economics

18.7.1 It is expected that the construction phase of the proposed Wind Energy Project would employ of the order of 20 construction workers. The construction period will be of approximately 6 duration and is expected to provide some work for local contractors.

18.7.2 The construction of the proposed wind turbine will result in small direct positive economic benefits for local service companies (i.e., cafes, hotels, shops, security) during the construction phase.

18.7.3 On a national scale, and also internationally, there would be socio-economic benefits in terms of job creation and investment cumulatively with other Wind Farms.

18.7.4 Residents living in proximity to other built Wind Farm sites have, over the last few years, participated in several independent surveys with regards to their attitudes to wind energy. These surveys have consistently shown that a clear majority of between 70 and 80 per cent of the general public are in favour of wind energy. This positive feeling is reflected by those living near a Wind Farm and similar numbers do not believe that it spoils the scenery or causes noise nuisance.

18.7.5 Despite this, throughout the operational phase of the development, e-Gen will note any objections from members of the public with regards to the Cotton of Pitkennedy wind turbine.

18.8 Safety

18.8.1 Site security during construction will be strict. Temporary fencing will be installed around any excavations. A compound or container for the temporary storage of equipment or materials would be provided. This would be locked with restricted access. The working area would be fenced to prevent unauthorised access. If appropriate, security staff will be utilised at night and weekends, and during non-working periods.

18.8.2 Public safety will be maintained throughout the construction of the wind turbine with all necessary steps taken to ensure the safety of the public using the rights of way on the site.

18.8.3 Road access to the wind turbine site would comply with Highway Authority Guidelines. All traffic movements would be adequately controlled and supervised in accordance with a Transport Management Plan. Further details are provided in Section 16.

18.8.4 All storage tanks will be bunded to prevent release of potentially hazardous materials.

18.8.5 The wind turbine will be designed and manufactured by an experienced company to meet international engineering design and manufacturing safety standards. Individual components manufactured by subcontractors will also adhere to the appropriate recognised standards.

18.8.6 The turbine will therefore be monitored constantly by internal computers and will incorporate two independent fail-safe breaking mechanisms. These have been described previously in Section 5.4. The fail-safe breaking mechanisms aim to stop the turbine in a couple of blade rotations. Over-speed protection sensors will also be fitted.

18.8.7 If any type of operational benchmark mismatch or error occurs, the wind turbine will be shut down. Depending on the type of error, the turbine will undertake a self-test, restart, or send an error message to the control centre in order for a service team to take further steps

18.8.8 The wind turbine will also be programmed to stop at high wind speeds by the high speed cut out limit controller. This is set to approximately 25 metres per second. The turbine is robust enough in its design and manufacture so as to allow for the buffeting it will endure at these higher speeds without suffering any structural damage.

18.8.9 The turbine will continue to operate if a thin build up of snow or ice occurs, but will shut down if ice builds up to cause aerodynamic or physical imbalance of the rotor assembly.

18.8.10 Periodic changing of lubricating oil and hydraulic fluids would generate very small quantities of potentially hazardous waste. These would be removed from site following each service by a licensed collection service for recycling or disposal under the Environmental Protection (Duty of Care) Regulations 1991. The turbine and transformer will be fitted with containment systems (i.e., bunds) to prevent accidental spill or leakage.

18.8.11 The substation building and tower will be sturdy and resilient to vandalism and be fitted with high security locks.

18.8.12 The impacts of noise and shadow flicker, and their associated safety issues, are addressed in Sections 10 and 14 respectively. These sections note that there are no safety impacts associated with these issues. There have been no studies published in recognised scientific journals, which are subject to peer review, which have indicated that Wind Farms have an impact on human health.

18.8.13 The substation building would be designed and constructed with systems that would protect any operational personnel and minimise potential risks associated with accidental exposure to high voltage electrical equipment. A robust earthing grid would be installed which would divert stray surges and faults. This would comprise a heavy gauge bare copper conductor buried in a grid fashion and welded to a series of multiple underground earthing rods.

18.9 Shadow Flicker

18.9.1 The position of the proposed turbine has been designed to reduce the potential for shadow flicker to occur thereby minimising the impact to the local community.

18.9.2 An assessment has been undertaken using a recognised industry software package that identified that there would be no potential for shadow flicker effects at any residential properties surrounding the Cotton of Pitkennedy turbine.

18.9.3 Although not anticipated to be necessary, potential mitigation measures can be put in place if a significant degree of shadow flicker occurs at local properties. The wind turbine can be switched-off on those dates and at those when shadow flicker could occur, and also if natural light levels are sufficiently strong.

18.10 Telecommunications

18.10.1 The proposed turbine will have a negligible effect on existing EM links within the locality. Where digital television reception is adversely affected, appropriate remedial works will be effected by e-Gen to ensure viewers continue to receive signals as was the case prior to the construction of the wind turbine. No fixed point-to-point or point to area services will be affected by the wind turbine.

18.11 Aviation and Radar

18.11.1 The Civil Aviation Authority (CAA), National Air Traffic Services (NATS and Dundee Airport have been consulted on the proposed development, as have the MOD in accordance with RenwableUK guidelines. It is noted that the site is located within 12km of Carse of Gowrie weather station, and further studies may be required at a later date to determine the impact of the turbine on the weather station.

18.12 Traffic and Infrastructure

18.12.1 The main turbine components are expected to be manufactured overseas and brought to a suitably close port from where they can be transported by road to the proposed site. At present it is expected that Leith Port in Edinburgh or Dundee Port would be the most suitable ports. The larger turbine components (abnormal loads) will be brought from the port via the network of A-roads surrounding either port. Nine (9) abnormal loads are expected over the construction period for the delivery of the blades, tower parts and nacelles.

18.12.2 Due to the remote nature of the site, it is not expected that other construction traffic, including construction staff, would approach the site by any other route. A maximum of 20 construction staff are expected to be working at the site at one time.

18.12.3 Peak traffic movements are expected to occur during the delivery of aggregate for the construction of the on site access roads.

18.12.4 All routes will be agreed with the Highways Authority at Angus Council prior to the commencement of construction.

18.12.5 The impacts of construction traffic would be mitigated through the adoption of specific routing and control measures and the implementation of a Transport Management Plan. The impacts during decommissioning would be less than those encountered during the construction phase.

18.12.6 During the operational phase, very few vehicle movements are expected.

18.12.7 As such, any impacts on the environment and amenity of local communities and road users will be of a short term temporary nature during the construction phase of the wind turbine.

SECTION 19

CONCLUSIONS

19 CONCLUSIONS

19.1.1 e-Gen, in the formation of their proposals for the Cotton of Pitkennedy wind turbine have taken careful consideration of the environmental impacts associated with the installation of the proposed wind turbine and associated infrastructure. This has, wherever possible taken into account the views of the local community and their representatives as well as the views of other interested parties.

19.1.2 It is considered that the project, which has emerged from the environmental studies undertaken, has ensured that the impacts associated with the project have been minimized where possible with particular care taken to minimise the impact to sensitive receptors regarding noise and visual impact whilst retaining a development of a scale that justifies the associated impacts.

19.1.3 The project is strongly supported by national, regional and local planning policy which favours the development of renewable energy projects provided that the environmental impacts will be within acceptable limits. The environmental studies undertaken for the project are considered to have demonstrated that the project will have no unacceptable impacts on the receiving environment and that the project will help the UK meet objectives for generation of electricity from renewable sources.

19.1.4 Additionally the project will help reduce emissions of harmful pollutants from fossil fuelled power stations in the UK improving national air quality whilst helping to guarantee security of supply through use of an indigenous and limitless supply of energy.

SECTION 20

LIST OF ABBREVIATIONS

20 LIST OF ABBREVIATIONS

°C	degree Celsius
AGL	above ground level
AGLV	Area of Great Landscape Value
AL	Advisory Leaflet
AOD	above ordnance datum
AONB	Area of Outstanding Natural Beauty
ASACS	Air Surveillance and Control System
AQMA	Air Quality Management Areas
BAP	Biodiversity Action Plan
BBC	British Broadcasting Corporation
BCT	Bat Conservation Trust
BOCC	Birds of Conservation Concern
BT	British Telecom
BTO	British Trust for Ornithology
BS	British Standard
BWEA	British Wind Energy Association
CAA	Civil Aviation Authority
CBC	Common Bird Census
CD	Compact disk
CDM	Construction Design and Management
CEMP	Construction Environmental Management Plan
CO_2	carbon dioxide
CIRIA	Construction Industry Research and Information Association's
CLVIA	Cumulative Landscape and Visual Impact Assessment
CWSs	County Wildlife Sites
DAP	Civil Aviation Authority
DBA	desk based assessment
dB	decibels
DECC	Department of Energy and Climate Change
DEFRA	Department for Environment, Food and Rural Affairs
DP	Development Plan
DPDs	Development Plan Documents
DTI	Department of Trade and Industry
EA	Environment Agency
EC	European Commission
EH	English Heritage
EHO	Environmental Health Officer
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
EM	electromagnetic
EMI	Electro-Magnetic Interference
EN	Euro Norm
ER	Environmental Report
ETSU	Energy Technology Support Unit
EU	European Union
EWEA	European Wind Energy Association
GCR	Geological Conservation Review
GDP	gross domestic product

GIS	Geographic Information System
GLV	Great Landscape Value
GPS	Global Positioning System
GRP	glass reinforced plastic
GW	gigawatt
GWh	gigawatt-hour
ha	hectare
HER	Historic Environment Record
HGV	heavy good vehicles
Hz	hertz
ICM	ICM Research Establishment
IEC	International Electrotechnical Commission
IEEM	Institute of Ecology and Environmental Management
ITC	Independent Television Commission
JNCC's	Joint Nature Conservation Committee's
km	kilometre
kV	kilovolts
kW	kilowatt
kWh	kilowatt-hour
l	litres
LBAP	Local Biodiversity Action Plans
LVIA	Landscape and Visual Impact Assessment
m	metre
m/s	metres per second
mm	millimetre
MOD	Ministry of Defence
MORI	Market and Opinion Research International
MW	megawatt
MWe	megawatt electric
NATS	National Air Traffic Services
NBMP	National Bat Monitoring Programme
NE	Natural England
NERC	Natural Environment and Rural Communities
NFFO	Non-fossil Fuel Obligation
NGC	National Grid Company
NNRs	National Nature Reserves
NOABL	The DTI UK wind speed database
NOP	National Opinion Poll
NO_x	oxides of nitrogen
NSR	noise sensitive receptors
NWG	Noise Working Group
Ofcom	Office of Communications
PB	Parsons Brinckerhoff Limited
PCBs	polychlorinated biphenyls
PPE	Personal Protective Equipment
PM_{10}'s	particulate mater of less than 10 microns
PPGs	Planning Policy Guidance Notes
PPSs	Planning Policy Statements
PIU	Performance and Innovation Unit
PROW	Public Right of Way

RA	Radiocommunication Authority
RAP	Recognized Air Picture
RF	radio frequency
RICS	Royal Institution of Chartered Surveyors
RO	Renewables Obligation
ROM	read only memory
RPG	Regional Planning Guidance
rpm	rotations per minute
RSPB	Royal Society for the Protection of Birds
RSS	Regional Spatial Strategy
SACs	Special Areas of Conservation
SAM	Scheduled Ancient Monument
SCADA	supervisory control and data acquisition
SNCIs	Sites of Nature Conservation Importance
SNH	Scottish Natural Heritage
SO_2	sulphur dioxide
SPAs	Special Protection Areas
SMR	Sites and Monuments Record
SPDs	Supplementary Planning Documents
SSSIs	Sites of Special Scientific Interest
SUDs	sustainable drainage systems
TTA	Tactical Training Areas
TV	television
TWh	terawatt-hour
UHF	ultra high frequency
UK	United Kingdom
UKLFS	UK Low Flying System
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
US	United States of America
V	volt
VP	Vantage point
VOCs	volatile organic compounds
WRG	Waste Recycling Group
ZTV	Zone of Theoretical Visibility

Cotton of Pitkennedy

AC33

e-Gen
Part of a Clean Energy Community

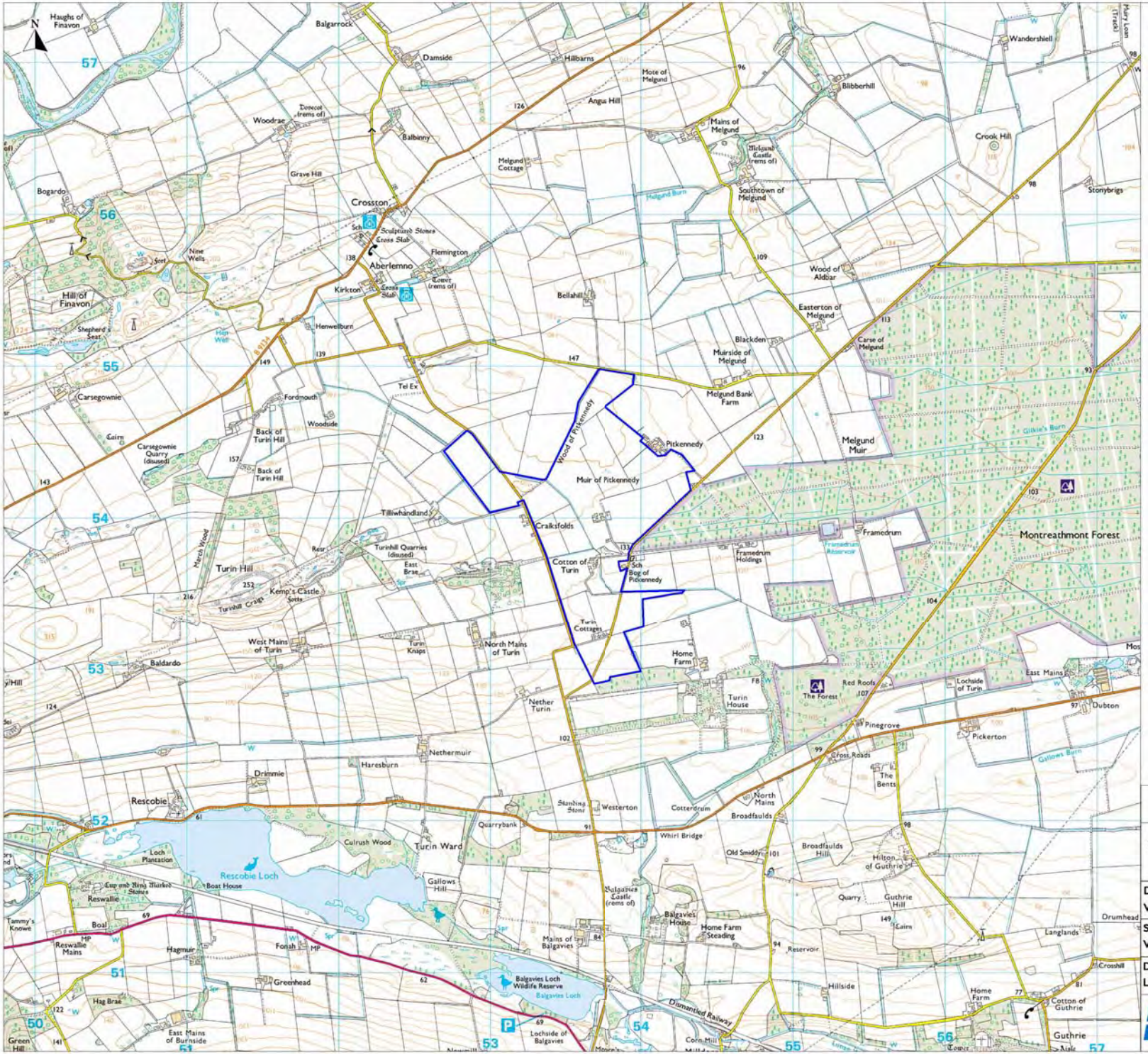
Environmental Report

Figures

April 2013

PARSONS BRINCKERHOFF

COTTON OF PITKENNEDY
LIST OF FIGURES



LEGEND

Landownership boundary

Kilometres 0 0.5 1

COTTON OF PITKENNEDY

Site location plan

DOCUMENT REFERENCE	LAST REVISION DATE
V1	December 2012
SITE DESIGN VERSION	SCALE
V4	1:25k when printed at A3

DRAWN	CHECKED	APPROVED
LT	TR	RW

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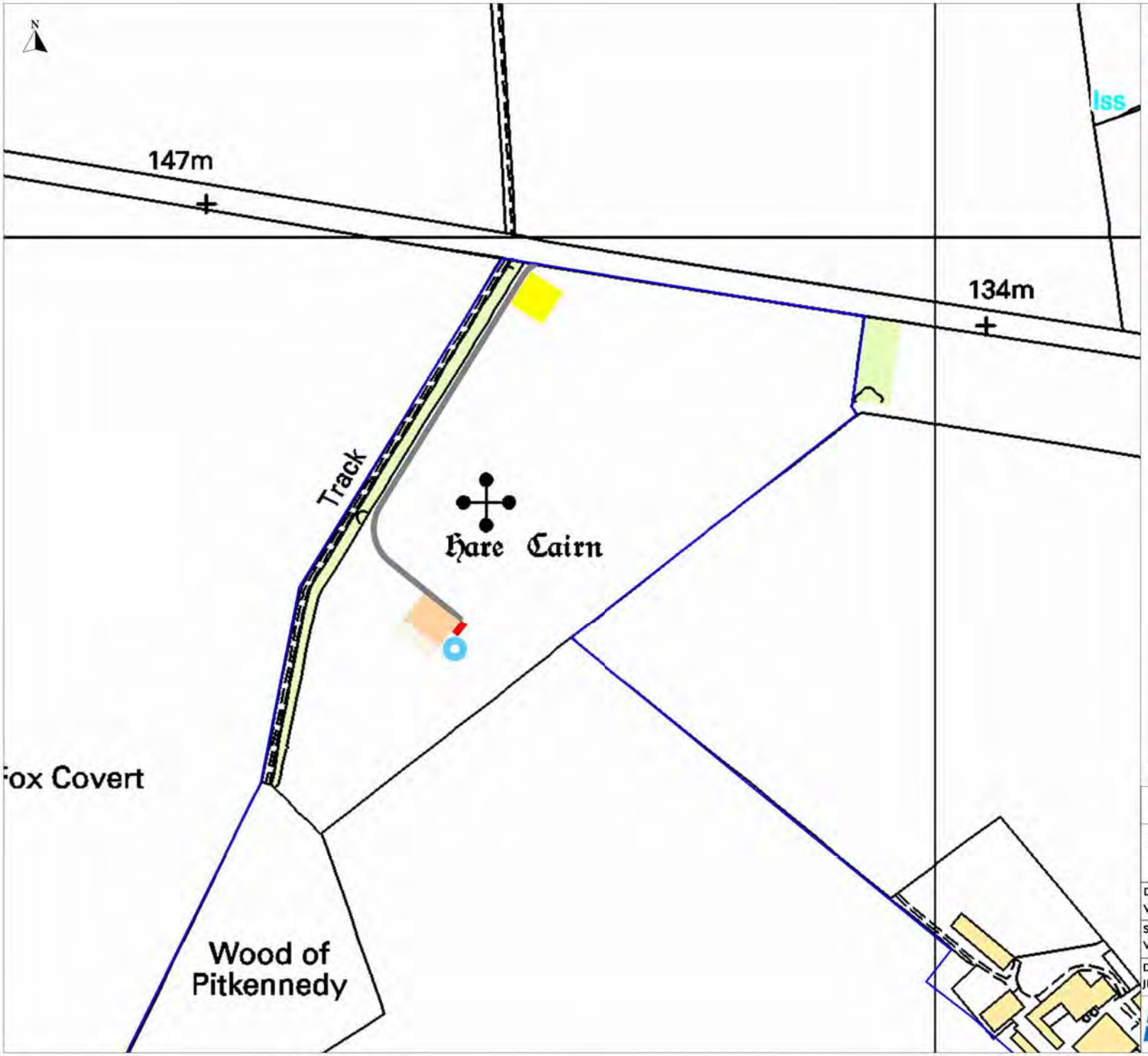
FIGURE 4.1

AC33



LEGEND

- Landownership boundary
- Turbine
- Crane hardstanding
- Blade lay-down area
- Access track
- Construction compound
- Substation

Metres 0 50 100

COTTON OF PITKENNEDY

Outline Design Plan

DOCUMENT REFERENCE	LAST REVISION DATE
V1	December 2012
SITE DESIGN VERSION	SCALE
V4	1:2500 when printed at A3

DRAWN	CHECKED	APPROVED
JM	TR	TR

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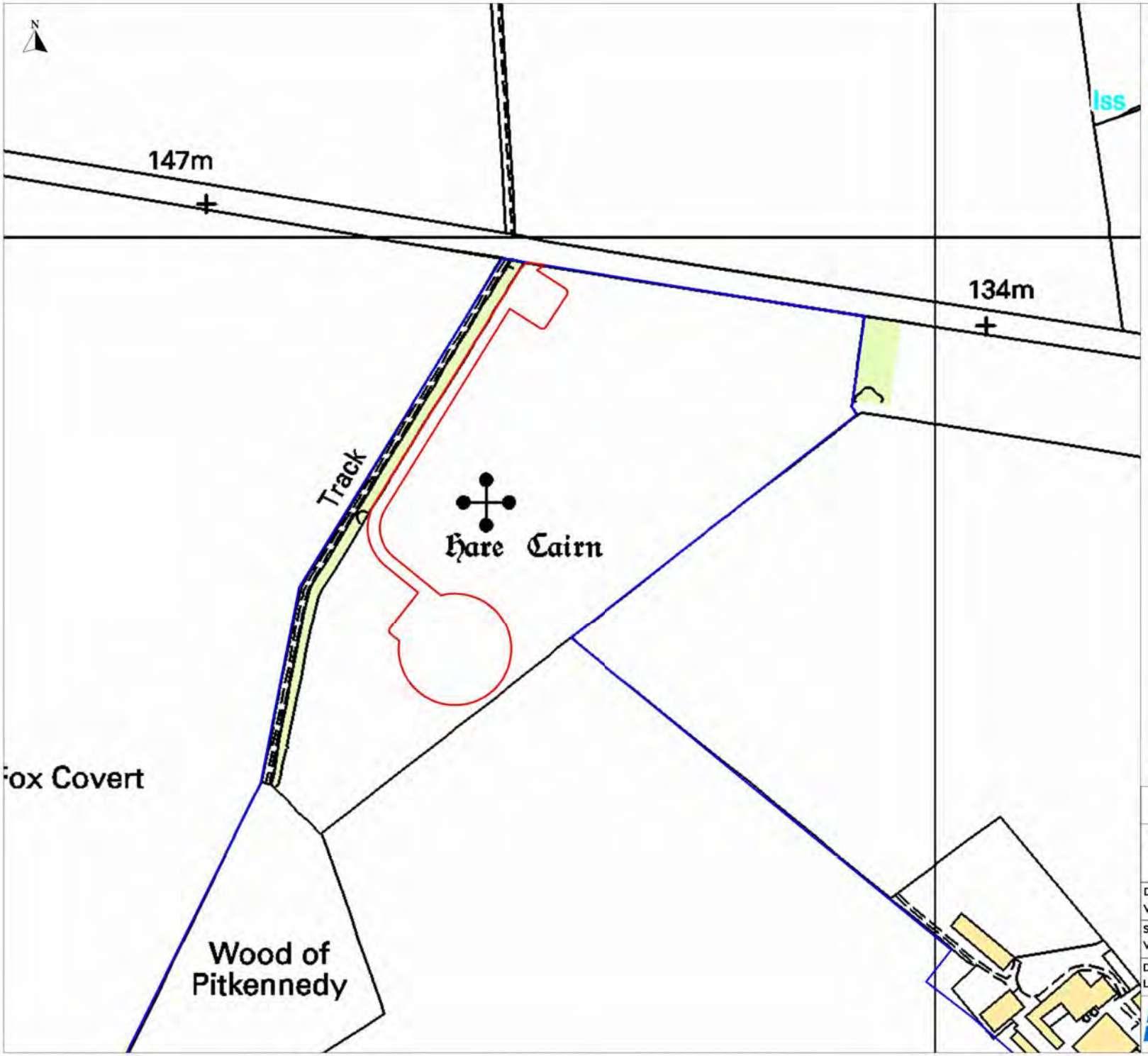
FIGURE 5.1

AC33



LEGEND

Landownership boundary

Planning application boundary

Metres 0 50 100

COTTON OF PITKENNEDY

Plan of planning application boundary

DOCUMENT REFERENCE	LAST REVISION DATE
V1	December 2012
SITE DESIGN VERSION	SCALE
V4	1:2500 when printed at A3

DRAWN	CHECKED	APPROVED
LT	TR	RW

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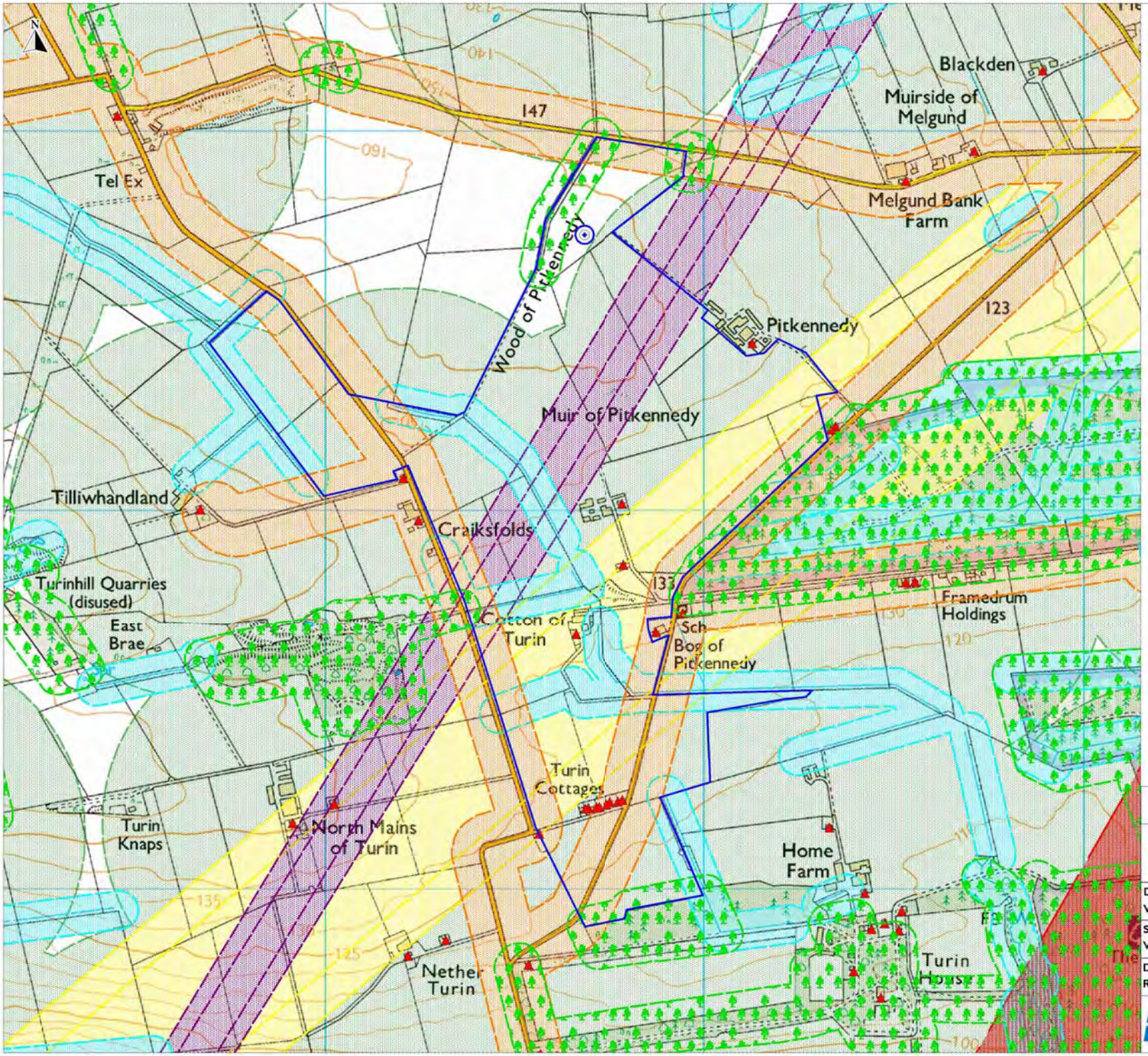
FIGURE 5.2

AC33



LEGEND

- Landownership boundary
- Proposed wind turbine position
- Residential properties
- Residential property buffer (+ 500m)
- Road (+ 81.4m buffer)
- Woodland (+ 50m buffer)
- Water features (+ 50m buffer)

Telecommunication links:

- JRC link (+63.4m buffer)
- Arqiva link (+200 buffer)
- Ericsson link (+200m buffer)

Metres 0 250 500

COTTON OF PITKENNEDY

On-site constraints plan

DOCUMENT REFERENCE	LAST REVISION DATE
V1	December 2012
SITE DESIGN VERSION	SCALE
V4	1:10k when printed at A3

DRAWN	CHECKED	APPROVED
RH	TR	RW

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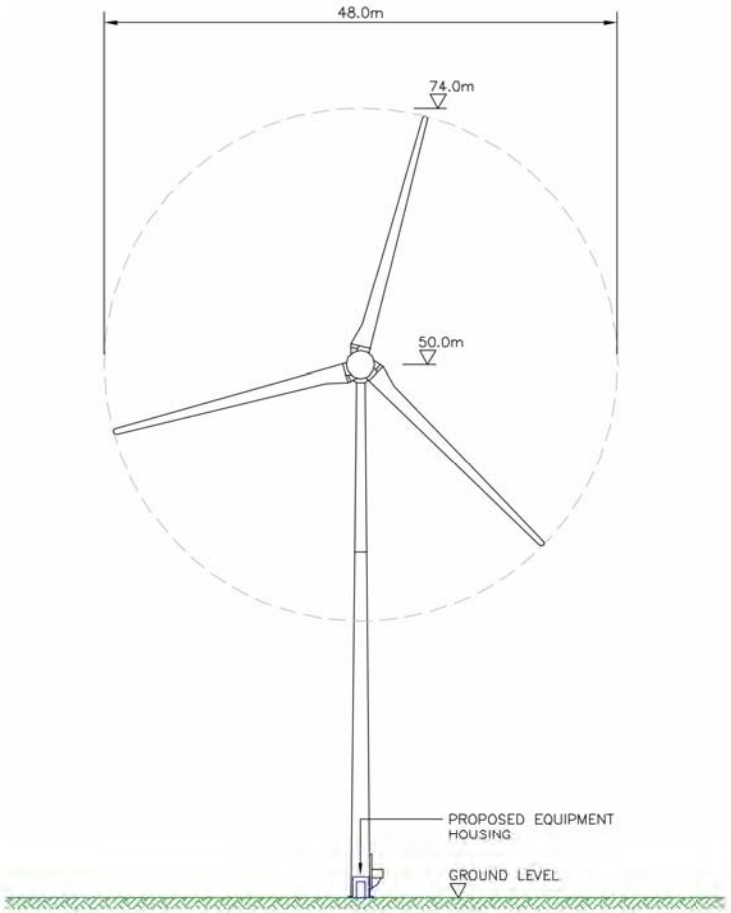
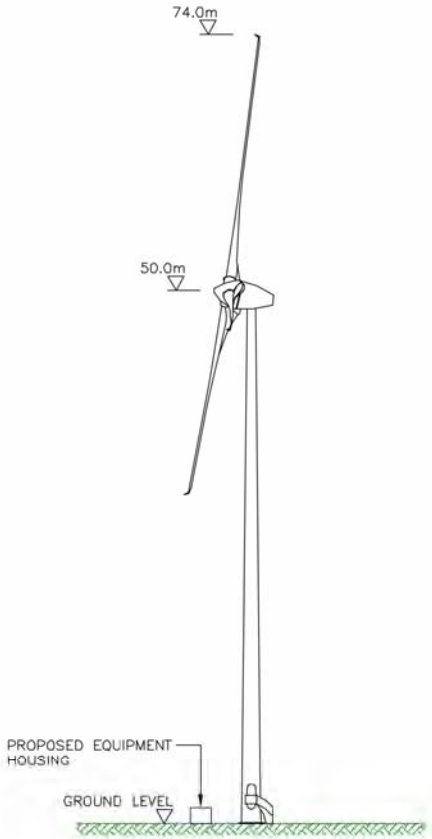
FIGURE 5.3



FRONT ELEVATION
(1:500)



SIDE ELEVATION
(1:500)

PLAN VIEW
(1:500)

COTTON OF PITKENNEDY

Front and side elevations and plan view of proposed wind turbine

DOCUMENT REFERENCE	LAST REVISION DATE
V1	March 2013
SITE DESIGN VERSION	**SCALE**
V1	1:500 when printed at A3

DRAWN	CHECKED	APPROVED
LT	TR	RW

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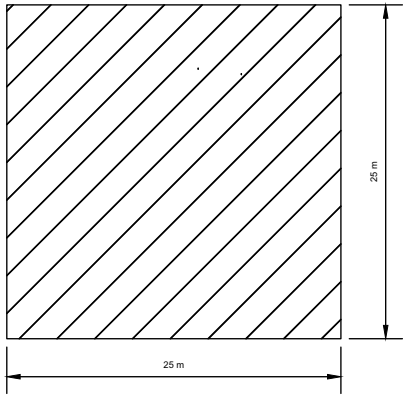
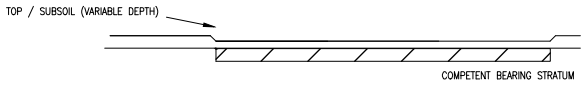
FIGURE 5.4

AC33

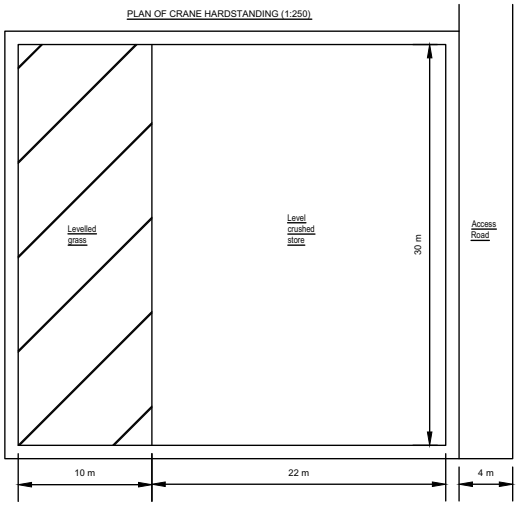
PLAN OF CONSTRUCTION COMPOUND (1:250)



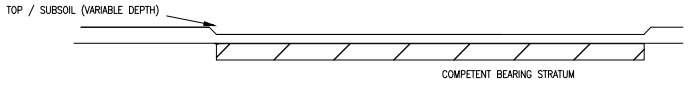
TYPICAL SECTION THROUGH CONSTRUCTION COMPOUND (1:250)

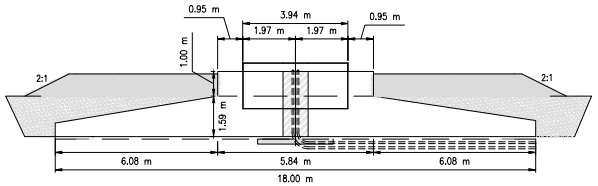


PLAN OF CRANE HARDSTANDING (1:250)

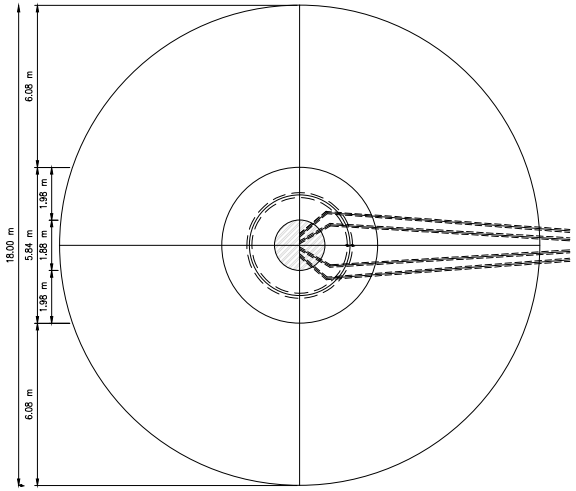


TYPICAL SECTION THROUGH CRANE HARDSTANDING (1:250)

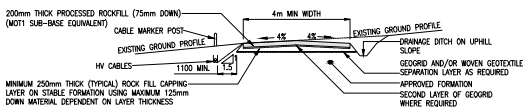




TYPICAL SECTION THROUGH TURBINE BASE (1:200)



PLAN OF TURBINE BASE (1:200)



TYPICAL SECTION THROUGH EXCAVATED ROAD (1:200)

PARSONS BRINCKERHOFF
Amber Court
William Armstrong Drive
Newcastle upon Tyne NE4 7YQ
Tel: 44-(0)191-226-2000
Fax: 44-(0)191-226-2104

Client: E-GEN

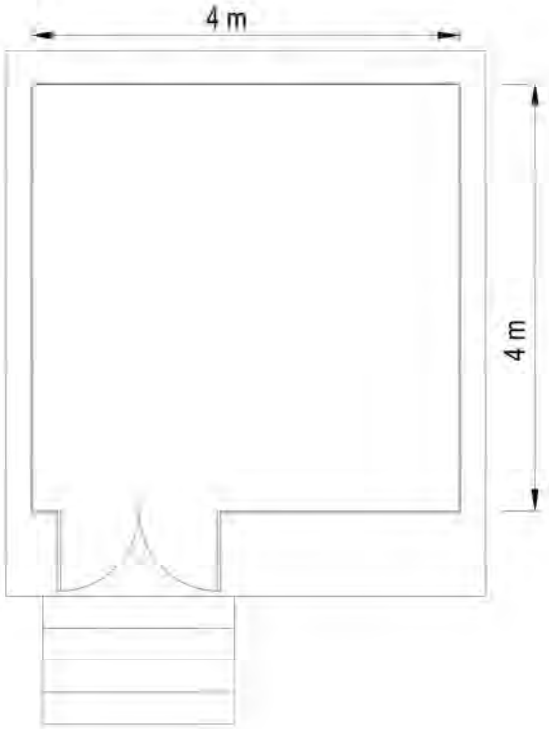
Site/Project: COTTON OF PITKENNEDY WIND ENERGY DEVELOPMENT

Title: PLAN OF TURBINE FOUNDATION AND ANCILLARY INFRASTRUCTURE

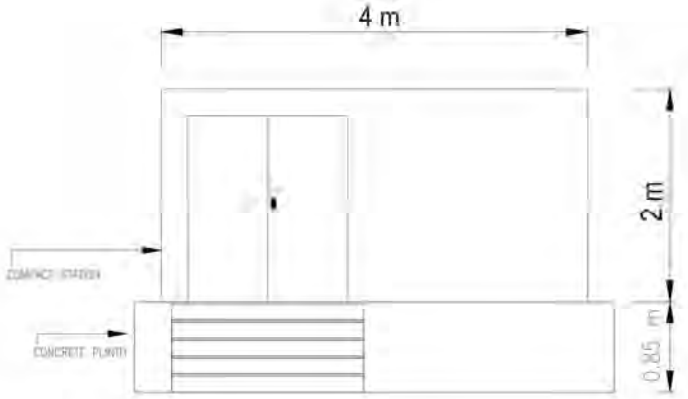
Drawn:	O Powell	Checked:	T Rippon
Designed:	O Powell	Approved:	R Wearmouth
Date:	19/12/2012	Scale:	ALL AT A3 / A3
Sheet:	2 of 3		

Project Number:	Drawing Number:	Revision:
	FIGURE 5.5	P0

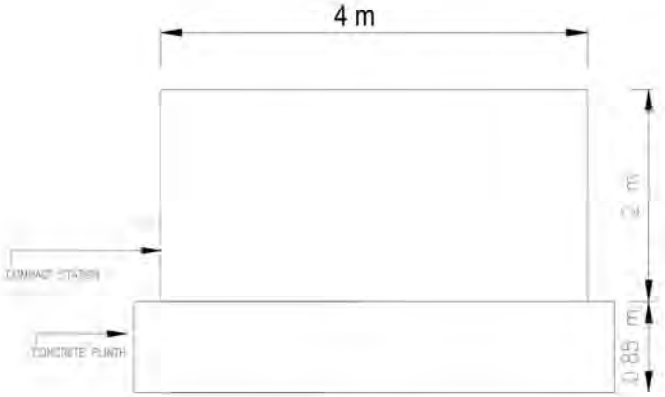
AC33



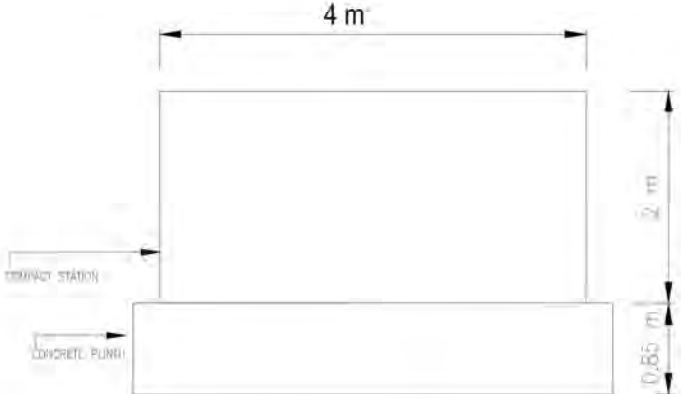
SUBSTATION
PLAN



SUBSTATION
ELEVATION



SUBSTATION
SIDE ELEVATION



SUBSTATION
REAR ELEVATION

PARSONS BRINCKERHOFF
Atkins Client
Wilson Armstrong Drive
Newcastle upon Tyne NE4 7YQ
Tel: 44-(0)191-226-2000
Fax: 44-(0)191-226-2104

Client:
E-GEN

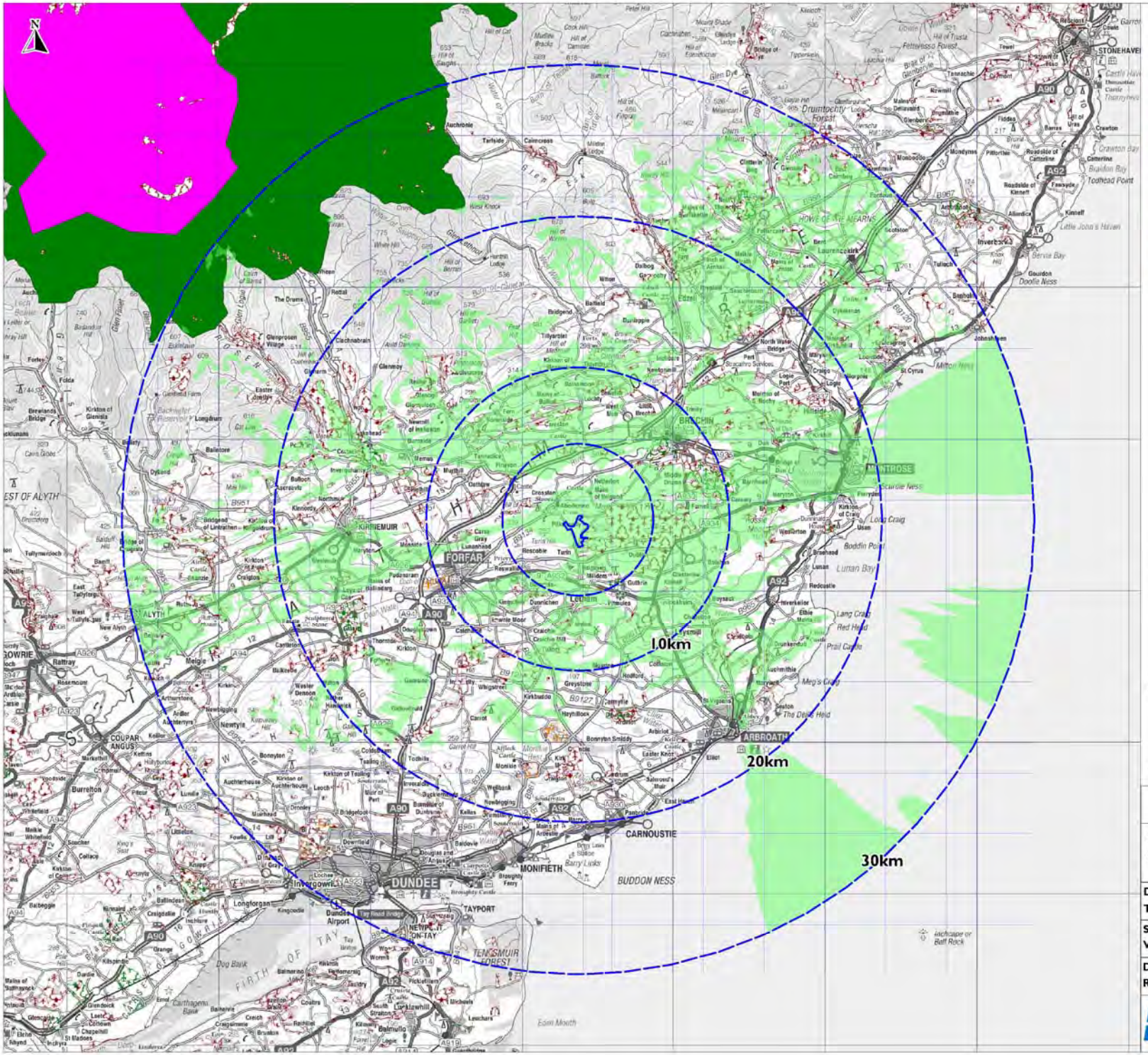
Site/Project:
COTTON OF PITKENNEDY
WIND ENERGY
DEVELOPMENT

Title:
PLAN OF SUBSTATION

Drawn: O Powell		Checked: T Rippon	
Designed: O Powell		Approved: R Wearmouth	
Date: 03/07/2012	Scale: 1:50	A3	Sheet: 3 of 3
Project Number:	Drawing Number:		Revision:
	FIGURE 5.6		P0

Login: Hunter, Richard
Plot Date: 26/07/2012 12:41:15
File Name: W:\Current Projects\E-Gen\Temple\ Hill\autocad turbine layout\site infrastructure.dwg

AC33



LEGEND

- Landownership boundary
- Zone of theoretical tip height visibility
- National Park
- National Senic Areas
- World Heritage Site
- Gardens and Designed Landscapes
- Country Parks
- Ancient Woodland

Please note:

Where a designation is listed in the legend, but does not appear on the figure, the designation does not exist within the area shown.

Kilometres 0 5 10

COTTON OF PITKENNEDY

Plan of regional landscape and cultural heritage designations overlain by tip height 30km non-cumulative ZTV

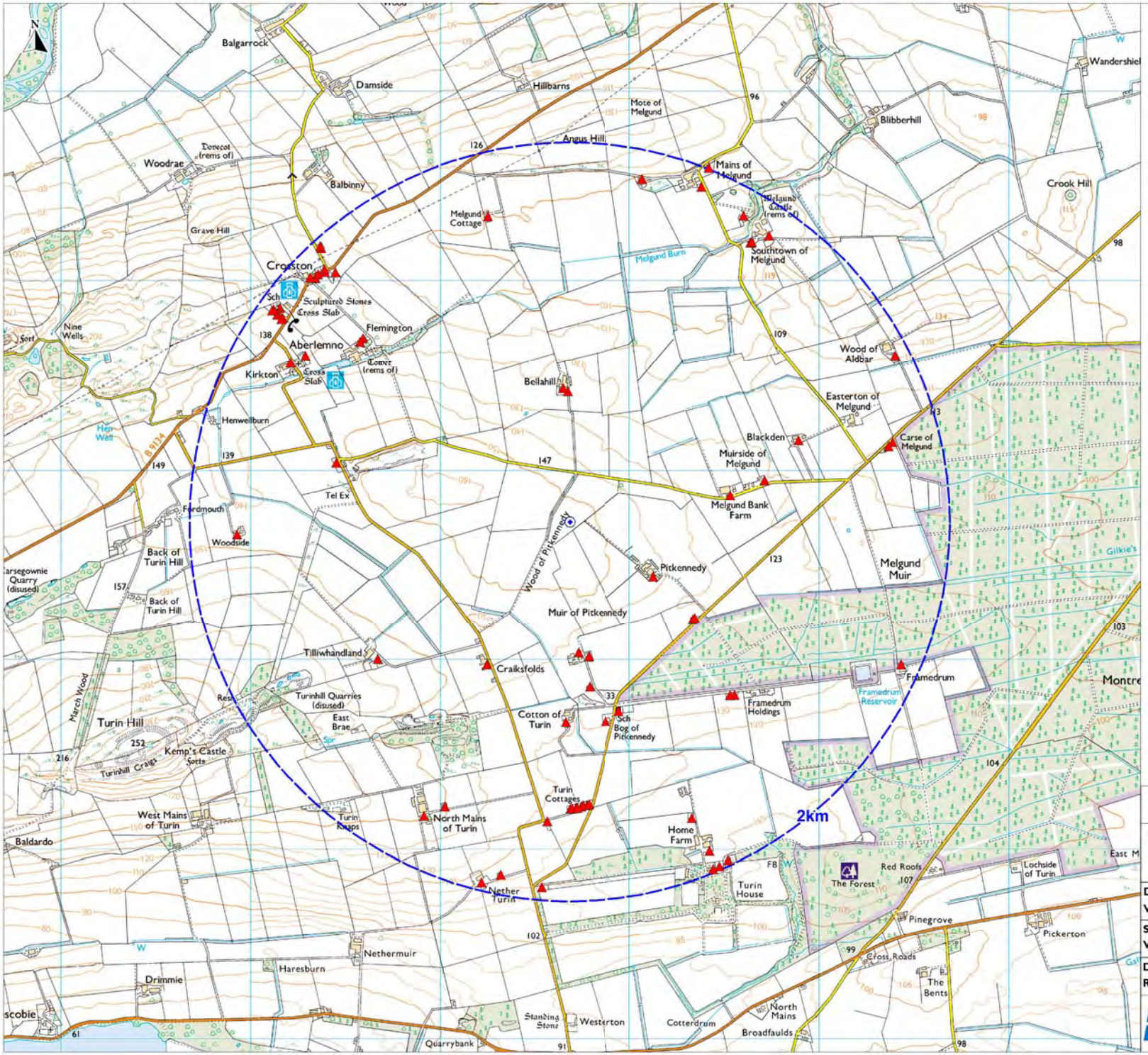
DOCUMENT REFERENCE	LAST REVISION DATE
TH058	19th December 2012
SITE DESIGN VERSION	SCALE
V1	1:250k when printed at A3

DRAWN	CHECKED	APPROVED
RH	TR	LT

PARSONS BRINCKERHOFF

FIGURE 6.1

AC33



LEGEND

- Proposed wind turbine position
- Properties

Kilometres 0 0.5 1.0

COTTON OF PITKENNEDY

Plan of properties within 2km of the turbine position

DOCUMENT REFERENCE	LAST REVISION DATE
V1	March 2013
SITE DESIGN VERSION	**SCALE**
V4	1:20k when printed at A3

DRAWN	CHECKED	APPROVED
RH	TR	RW

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FIGURE 6.2

LEGEND

- Proposed Cotton of Pitkennedy turbine position
- Operational and Consented Wind Farms
- Wind Farm Projects Currently Proposed

COTTON OF PITKENNEDY

Plan of baseline cumulative projects

DOCUMENT REFERENCE	LAST REVISION DATE
V1	March 2013
SITE DESIGN VERSION	**SCALE**
V4	1:200k when printed at A3

DRAWN	CHECKED	APPROVED
RH	TR	RW

PARSONS BRINCKERHOFF

FIGURE 6.3

LEGEND

- Proposed turbine position
- Viewpoint locations
- Zone of theoretical tip height visibility

Kilometres 0 5 10

Reproduced from Ordnance Survey digital map data.

COTTON OF PITKENNEDY

Plan of viewpoint locations

DOCUMENT REFERENCE		LAST REVISION DATE
V1		March 2013
SITE DESIGN VERSION		SCALE
V4		1:200k when printed at A3
DRAWN	CHECKED	APPROVED
RH	TR	RW

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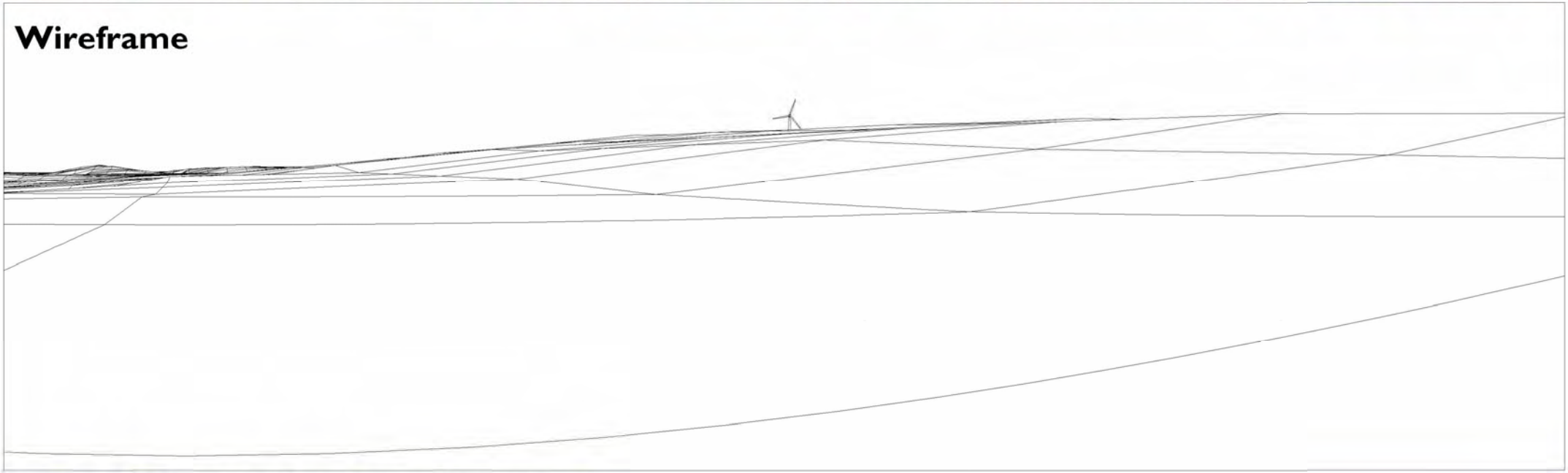
FIGURE 6.4

AC33

Existing View

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 1a

Viewpoint 1 - Aberlemno Parish Church

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 119.3 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:352242 Northing:755546

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 1.65 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 1b

Viewpoint 1 - Aberlemno Parish Church

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 119.3 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:352242 Northing:755546

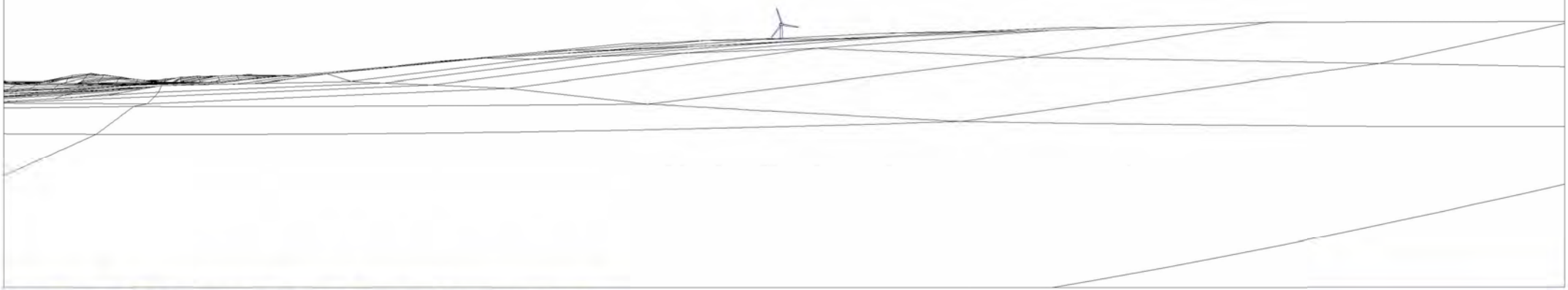
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 1.65 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 2a

Viewpoint 2 - Aberlemno Sculpted Stone

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 119.7 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:352244 Northing: 755869

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 1.83 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 2b

Viewpoint 2 - Aberlemno Sculpted Stone

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing:119.72 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:352244 Northing: 755869

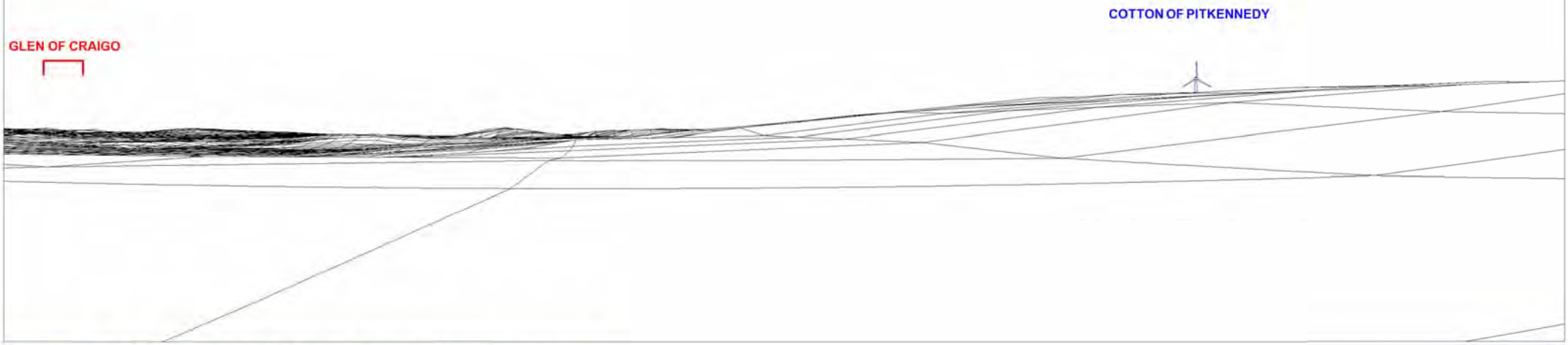
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 1.83 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 2c

Viewpoint 2 - Aberlemno Sculpted Stone

Panorama and cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 99.5 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:352244 Northing: 755869

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 1.83 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 4

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 2d

Viewpoint 2 - Aberlemno Sculpted Stone

Cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 99.5 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:352244 Northing: 755869

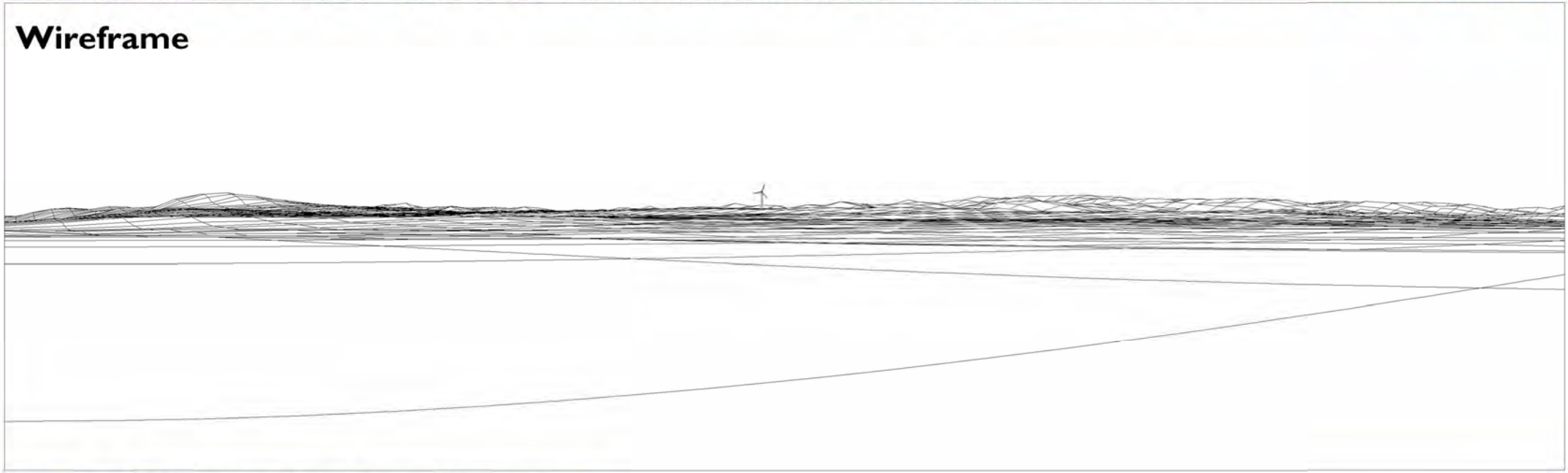
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 1.83 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 4

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 3a

Viewpoint 3 - Mosstonmuir

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 307.5 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:356412 Northing:752714

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 3.38 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 3b

Viewpoint 3 - Mosstonmuir

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 307.5 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:356412 Northing:752714

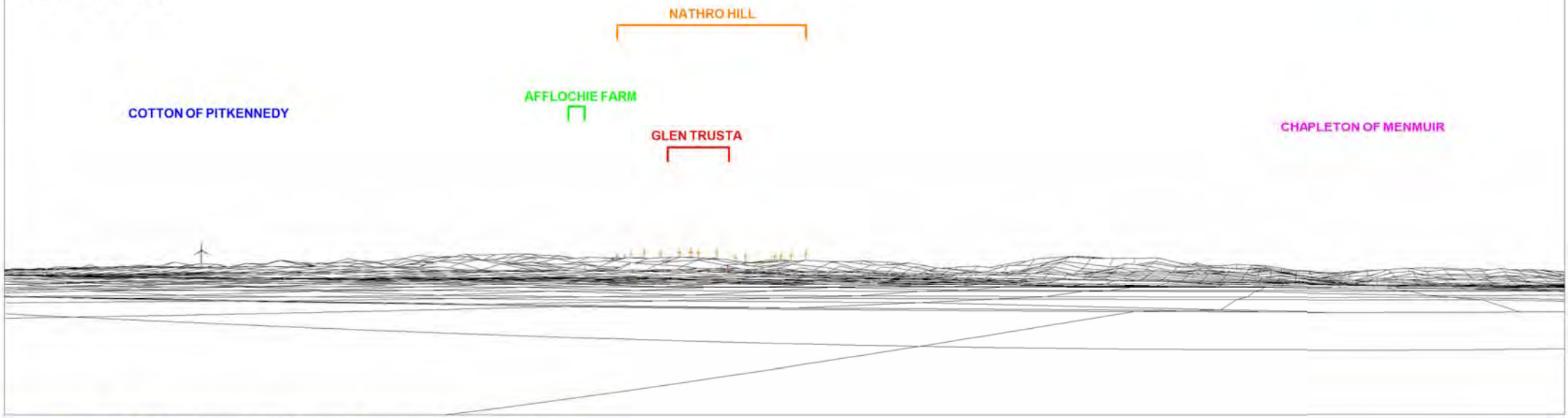
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 3.38 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 3c

Viewpoint 3 - Mosstonmuir

Panorama and cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 335.0 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:356412 Northing:752714

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 3.38 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 22

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 3d

Viewpoint 3 - Mosstonmuir

Cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 335.0 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:356412 Northing:752714

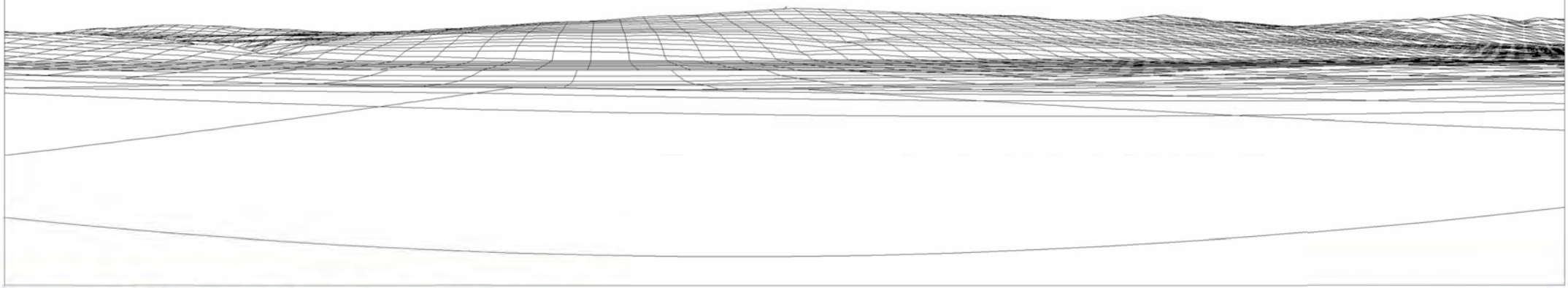
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 3.38 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 22

PARSONS BRINCKERHOFF

Existing View

AC33

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 4a

Viewpoint 1 - A90 north of Pitkennedy

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 189.1 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:353890 Northing: 759020

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 4.30 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 4b

Viewpoint 4 -A90 north of Pitkennedy

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 189.1 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:353890 Northing: 759020

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 4.30 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe

Cotton of Pitkennedy Wind Energy Development

Figure Phom 5a

Viewpoint 5- Letham

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 369.26 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:352817 Northing:749248

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 5.81 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 5b

Viewpoint 5 - Letham

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 369.26 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:352817 Northing:749248

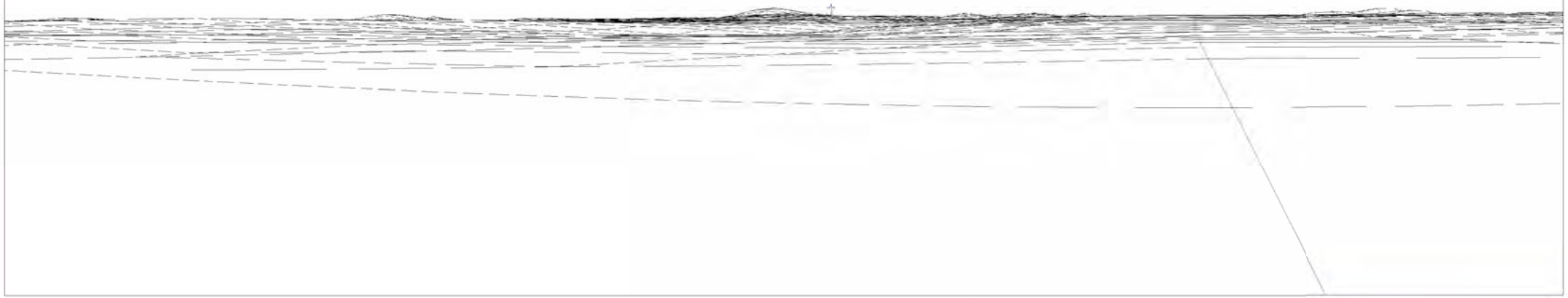
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 5.81 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 6a

Viewpoint 6- Ardovie

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 250.0 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:359230 Northing: 756499

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 5.81 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 6b

Viewpoint 6- Ardovie

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 250.0 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:359230 Northing: 756499

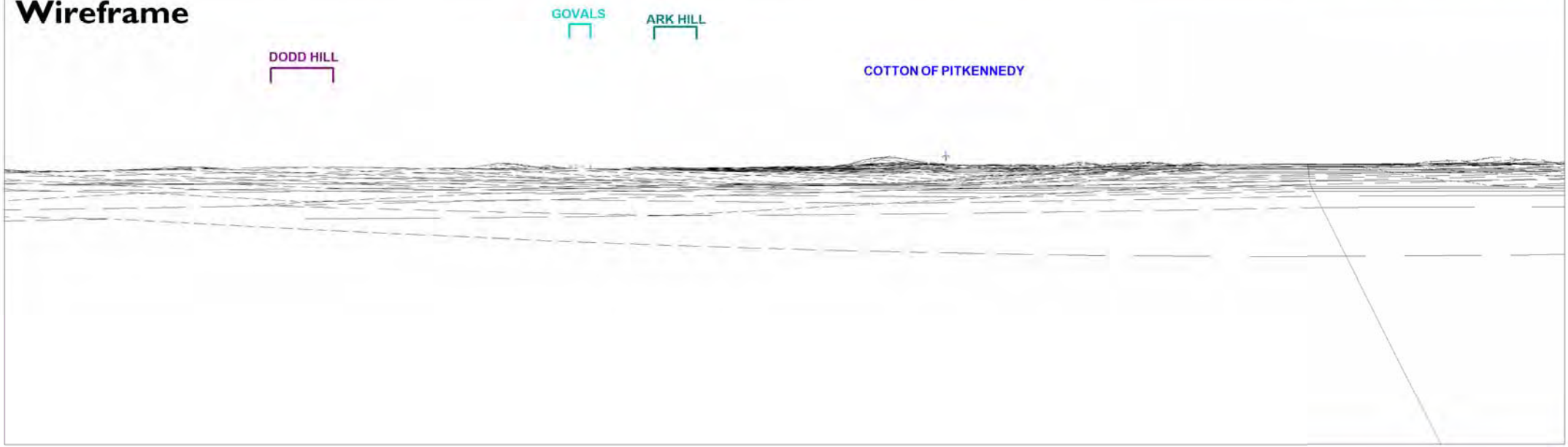
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 5.81 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 6c

Viewpoint 6 - Ardovie

Panorama and cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 244.4 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:359230 Northing: 756499

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 5.81 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 12

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 6d

Viewpoint 6 -Ardovie

Cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 244.4 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:359230 Northing: 756499

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 5.81 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 12

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe

Cotton of Pitkennedy Wind Energy Development

Figure Phom 7a

Viewpoint 7 - Friockheim

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 306.4 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:360438 Northing: 749667

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 8.42 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 7b

Viewpoint 7- Friockheim

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 306.4 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:360438 Northing: 749667

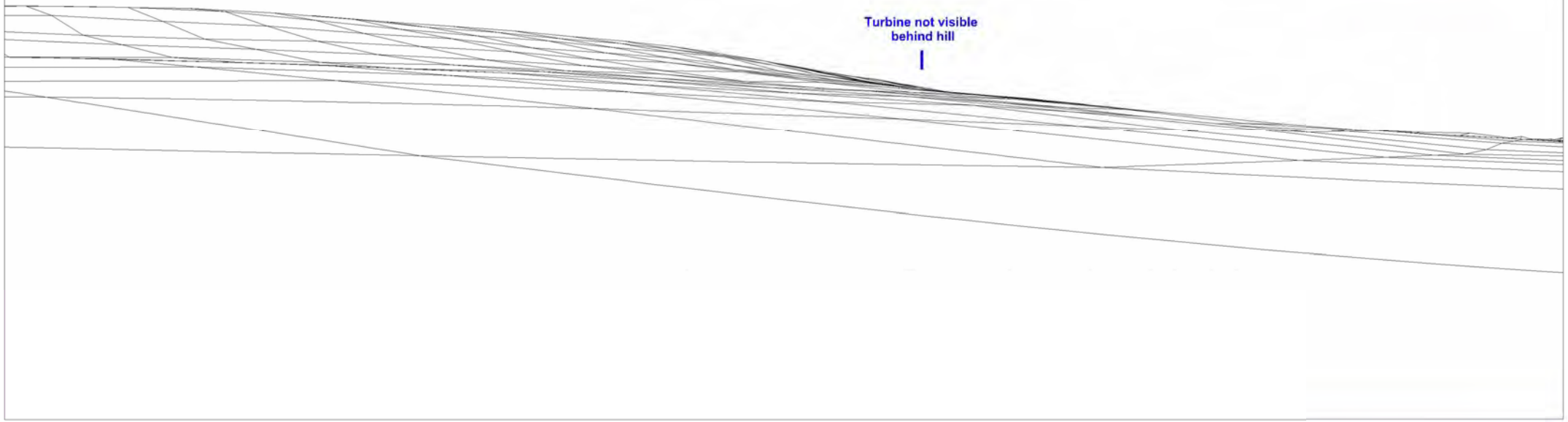
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 8.42 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 8a

Viewpoint 8 - Brechin

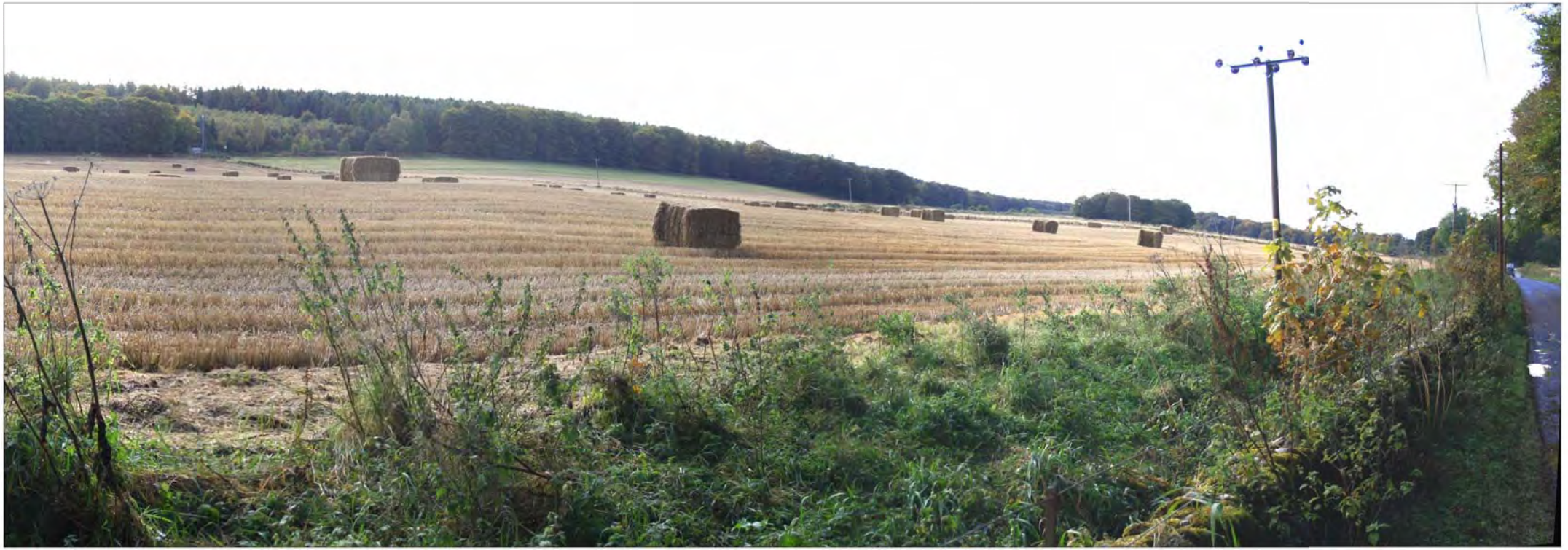
Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 229.9 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:352242 Northing:755546

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 7.99 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View



Cotton of Pitkennedy Wind Energy Development

Figure Phom 8b

Viewpoint 8- Brechin

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 229.9 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:360370 Northing: 759132

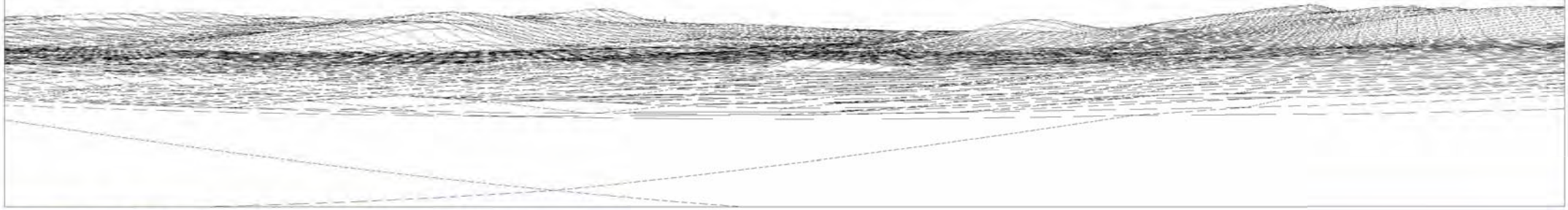
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 7.99 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 9a

Viewpoint 9 - Balmashanner Hill

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 59.7 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:346232 Northing: 749284

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 9.21 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 9b

Viewpoint 9 - Balmashanner Hill

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 59.7 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:346232 Northing: 749284

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 9.21 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe

Cotton of Pitkennedy Wind Energy Development

Figure Phom 9c

Viewpoint 9 - Balmashanner Hill

Panorama and cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 67.5 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:346232 Northing: 749284

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 9.21 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 2

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 9d

Viewpoint 9 - Balmashanner Hill

Cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 67.5 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:346232 Northing: 749284

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 9.21 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 2

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe

Cotton of Pitkennedy Wind Energy Development

Figure Phom 10a

Viewpoint 10 - Kinnaird Castle

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 256.22 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:363348 Northing: 757083

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 9.93 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

AC33

Cotton of Pitkennedy Wind Energy Development

Figure Phom 10b

Viewpoint 10 - Kinnaird Castle

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 256.2 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:363348 Northing: 757083

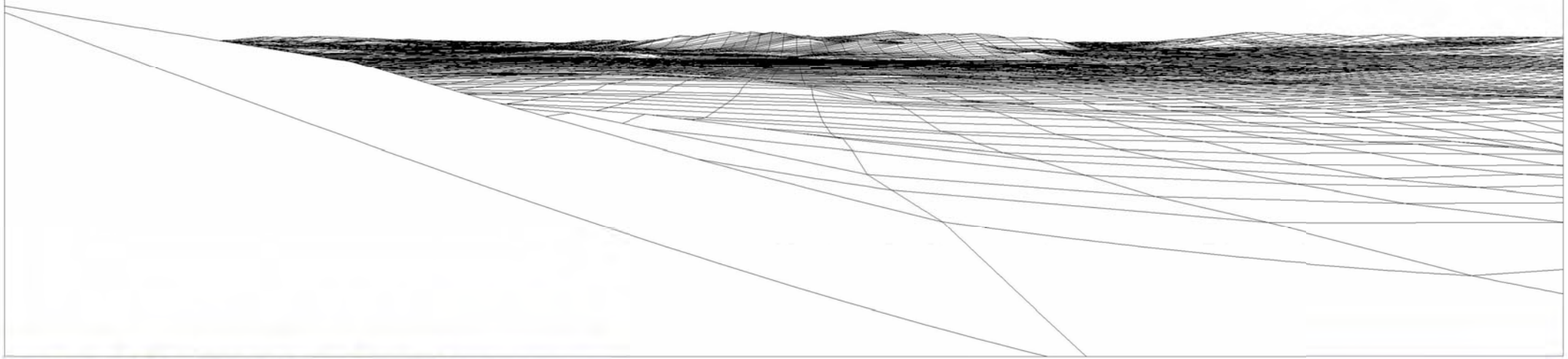
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 9.93 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 11a

Viewpoint 11 - Hill of Kirriemuir

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 89.4 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:339205 Northing: 754612

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 14.45 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 11b

Viewpoint 11 - Hill of Kirriemuir

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 89.4 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:339205 Northing: 754612

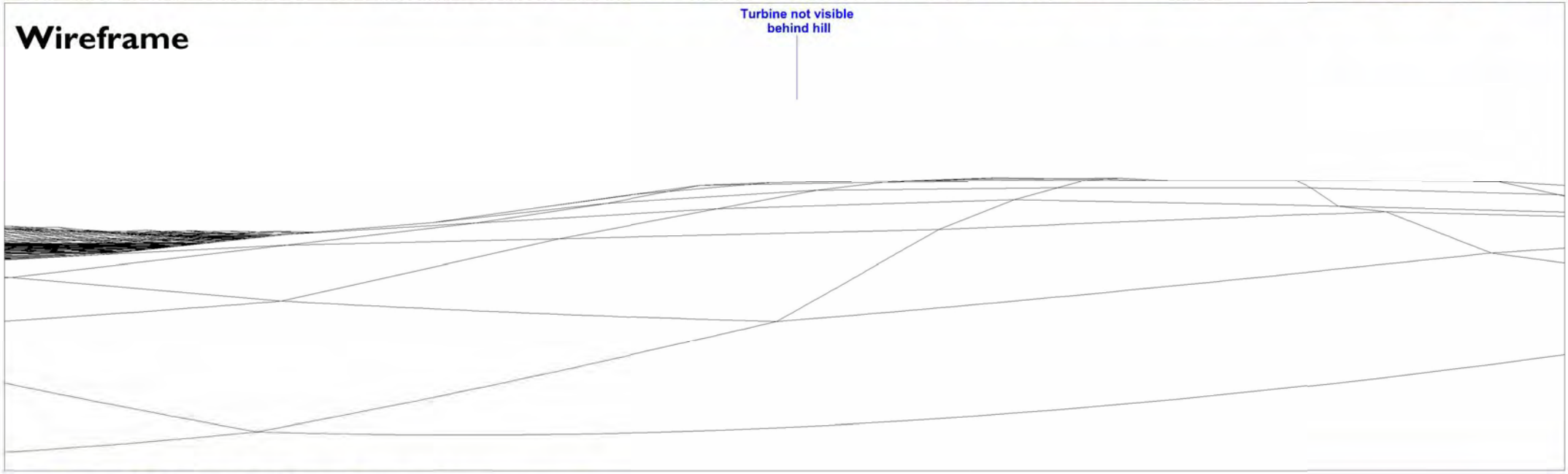
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 14.45 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Existing View

AC33

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 12a

Viewpoint 12 - House of Dun

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 248.9 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:366979 Northing: 759681

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 14.16 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 12b

Viewpoint 1 - House of Dun

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 248.9 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:366979 Northing: 759681

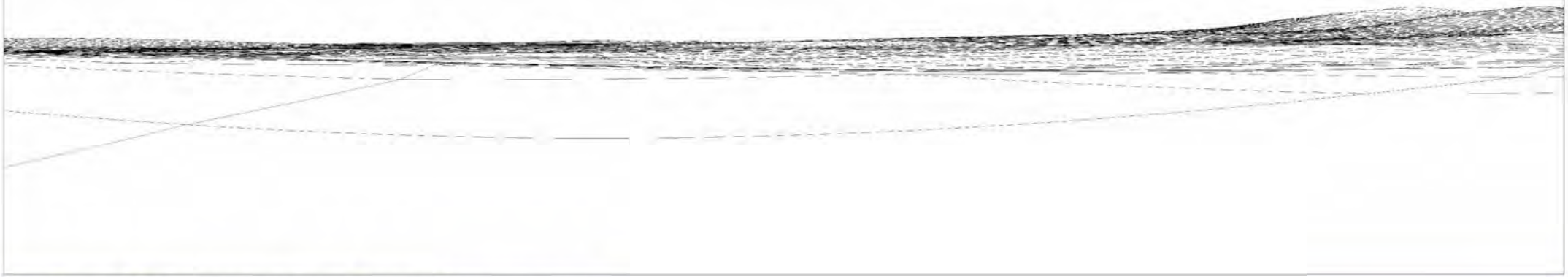
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 14.16 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 13a

Viewpoint 13- Edzell

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 203.6 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:359543 Northing:768167

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 14.66 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 13b

Viewpoint 13 - Edzell

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:359543 Northing:768167

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 14.66 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe

Cotton of Pitkennedy Wind Energy Development

Figure Phom 14a

Viewpoint 14 - Montrose

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 259.5 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:370992 Northing:757477

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 17.49 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 14b

Viewpoint 14 - Montrose

Non-cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 259.5 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:370992 Northing:757477

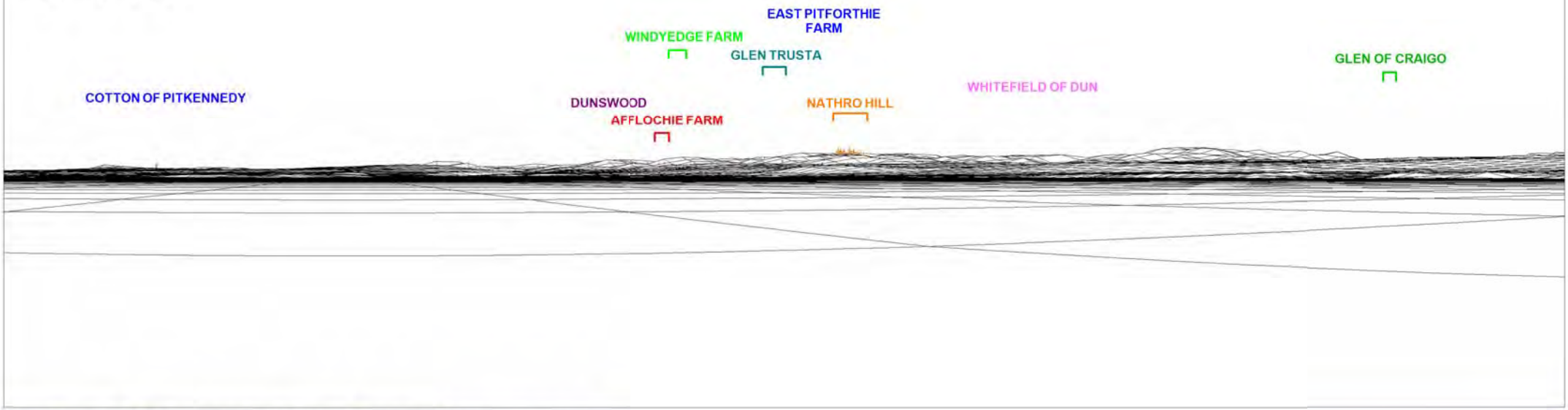
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 17.49 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

AC33

Existing View

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 14c

Viewpoint 14 - Montrose

Panorama and cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 291.6 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:370992 Northing:757477

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 17.49 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 25

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 14d

Viewpoint 14 - Montrose

Cumulative photomontage

Height of camera above ground: 2.0 metres
Bearing: 291.6 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:370992 Northing:757477

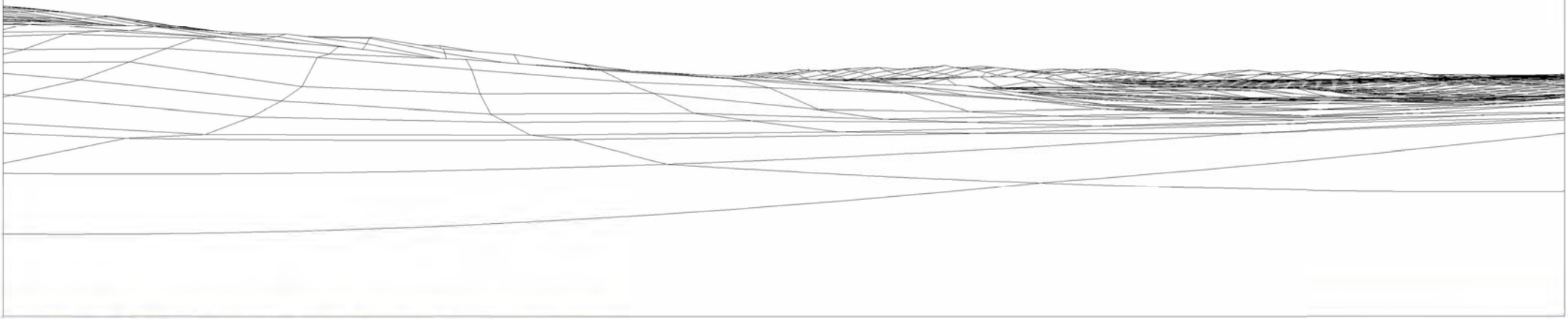
Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 17.49 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 25

PARSONS BRINCKERHOFF

Existing View

AC33

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure Phom 15a

Viewpoint 15 - Cortachy Castle

Panorama and non-cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 107.9 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:339821 Northing: 759517

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 14.64 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Predicted View

Cotton of Pitkennedy Wind Energy Development

Figure Phom 15b

Viewpoint 15 - Cortachy Castle

Non-cumulative photomontage

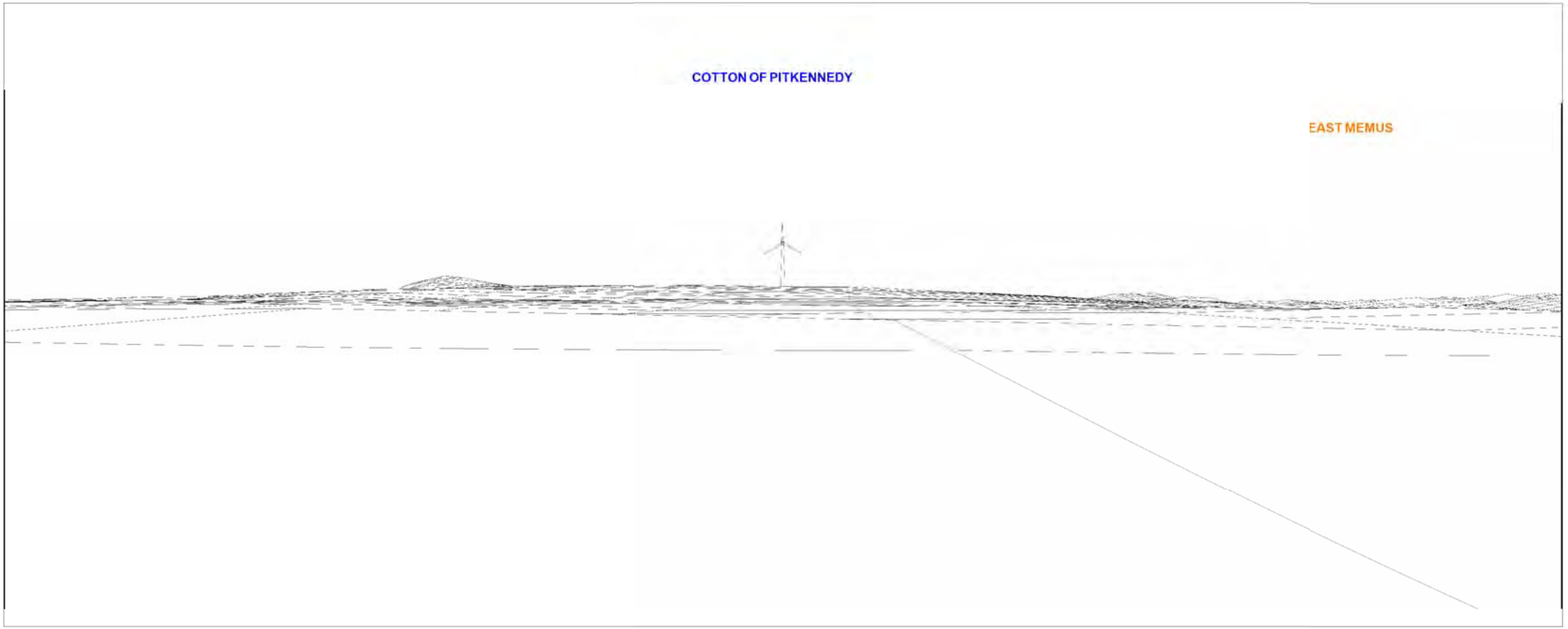
Height of camera above ground: 2.0 metres
Bearing: 107.9 degrees
Included angle: 76.4 degrees
Photograph taken on: 8th February 2013
Easting:339821 Northing: 759517

Recommended viewing distance: 300 millimetres
Distance to nearest turbine: 14.64 kilometres
Turbine blade tip height: 74 metres
Number of turbines visible: 1

PARSONS BRINCKERHOFF

Wireframe

AC33



Cotton of Pitkennedy Wind Energy Development

Figure WF 1

Viewpoint 16 - Public road to the east of Pitkennedy

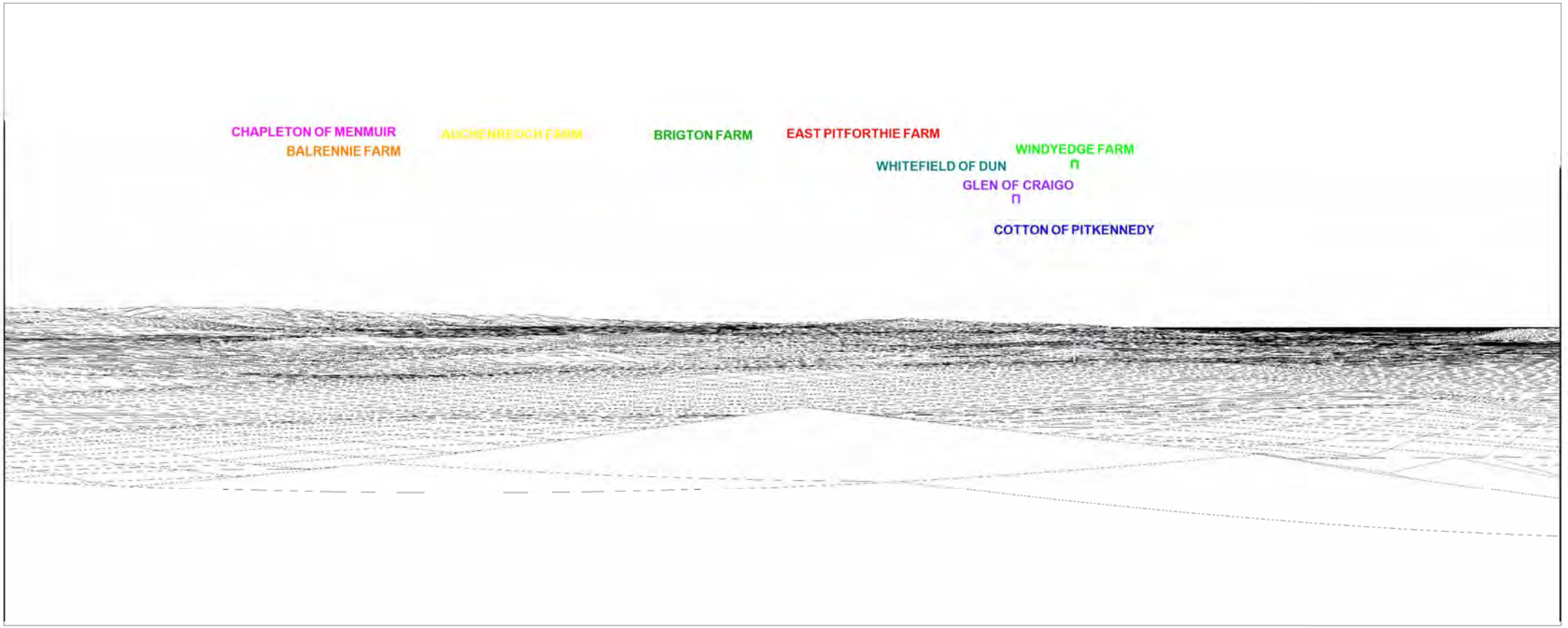
Cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 267.03 degrees
Included angle: 76.4 degrees
Easting:354993 Northing:754796

Recommended viewing distance: 300 millimetres
Turbine blade tip height: 74 metres

PARSONS BRINCKERHOFF

Wireframe



Cotton of Pitkennedy Wind Energy Development

Figure WF 2

Viewpoint 17 - Turin Hill

Cumulative wireframe

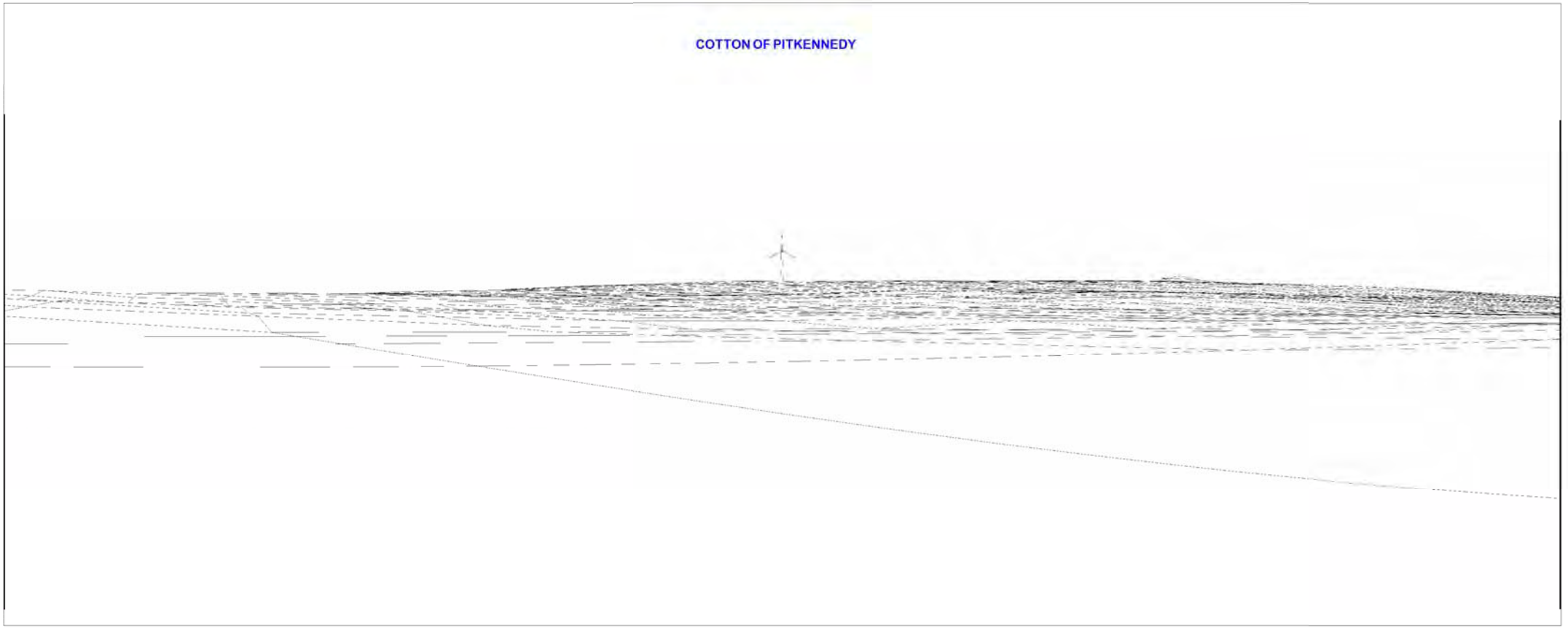
Height of camera above ground: 2.0 metres
Bearing: 47.60 degrees
Included angle: 76.4 degrees
Easting:351507 Northing:753568

Recommended viewing distance: 300 millimetres
Turbine blade tip height: 74 metres

PARSONS BRINCKERHOFF

Wireframe

AC33



Cotton of Pitkennedy Wind Energy Development

Figure WF 3

Viewpoint 18 - Melgund Castle

Cumulative wireframe

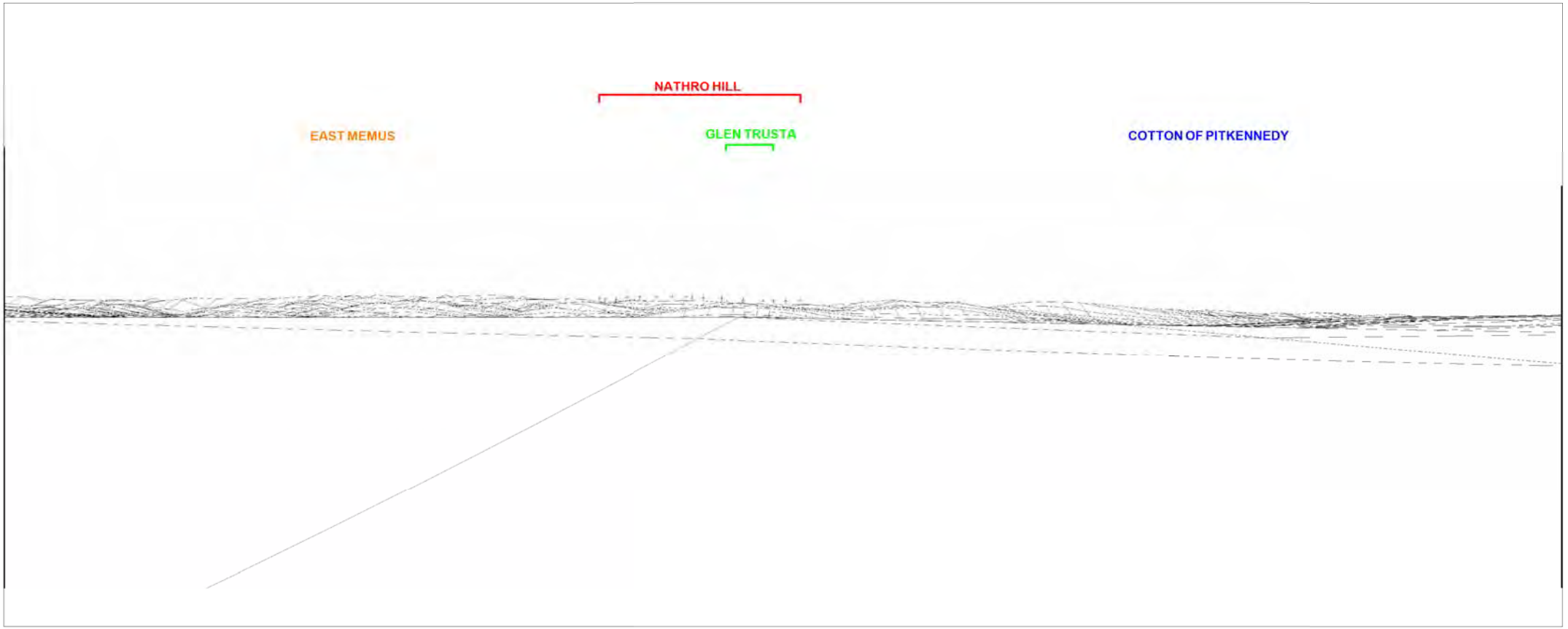
Height of camera above ground: 2.0 metres
Bearing: 208.48 degrees
Included angle: 76.4 degrees
Easting:354562 Northing:756350

Recommended viewing distance: 300 millimetres
Turbine blade tip height: 74 metres

PARSONS BRINCKERHOFF

Wireframe

AC33



Cotton of Pitkennedy Wind Energy Development

Figure WF 4

Viewpoint 19 - Camp at Muir of Lour

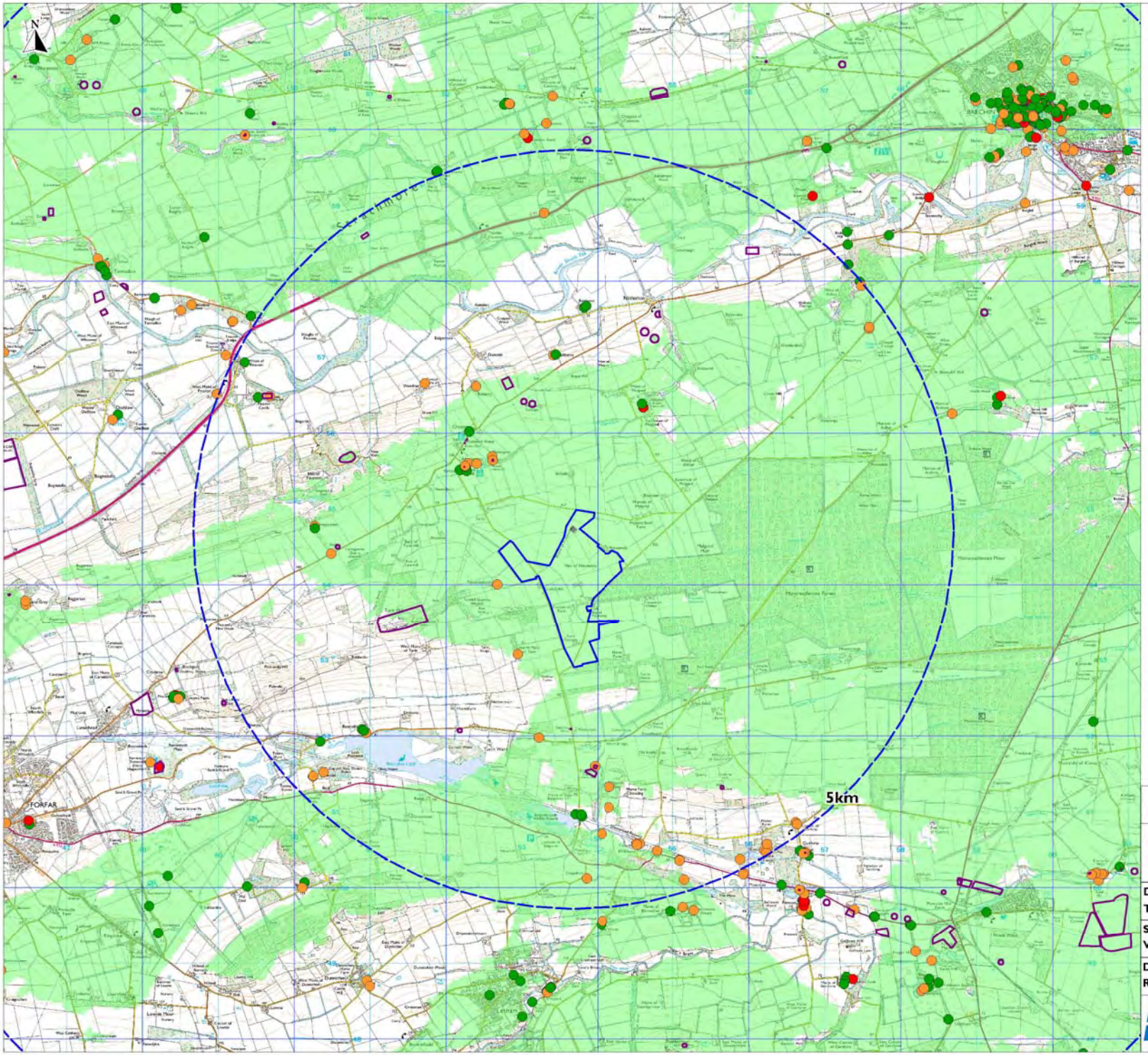
Cumulative wireframe

Height of camera above ground: 2.0 metres
Bearing: 0 degrees
Included angle: 76.4 degrees
Easting:349554 Northing:743895

Recommended viewing distance: 300 millimetres
Turbine blade tip height: 74 metres

PARSONS BRINCKERHOFF

AC33



LEGEND

- Landownership boundary
- Zone of theoretical tip height visibility
- Scheduled monuments
- Listed buildings
  - Grade A
  - Grade B
  - Grade C

Please note:

Where a designation is listed in the legend, but does not appear on the figure, the designation does not exist within the area shown.

Kilometres 0 1 2

COTTON OF PITKENNEDY

Plan of cultural heritage designations overlain by tip height 30km non-cumulative ZTV

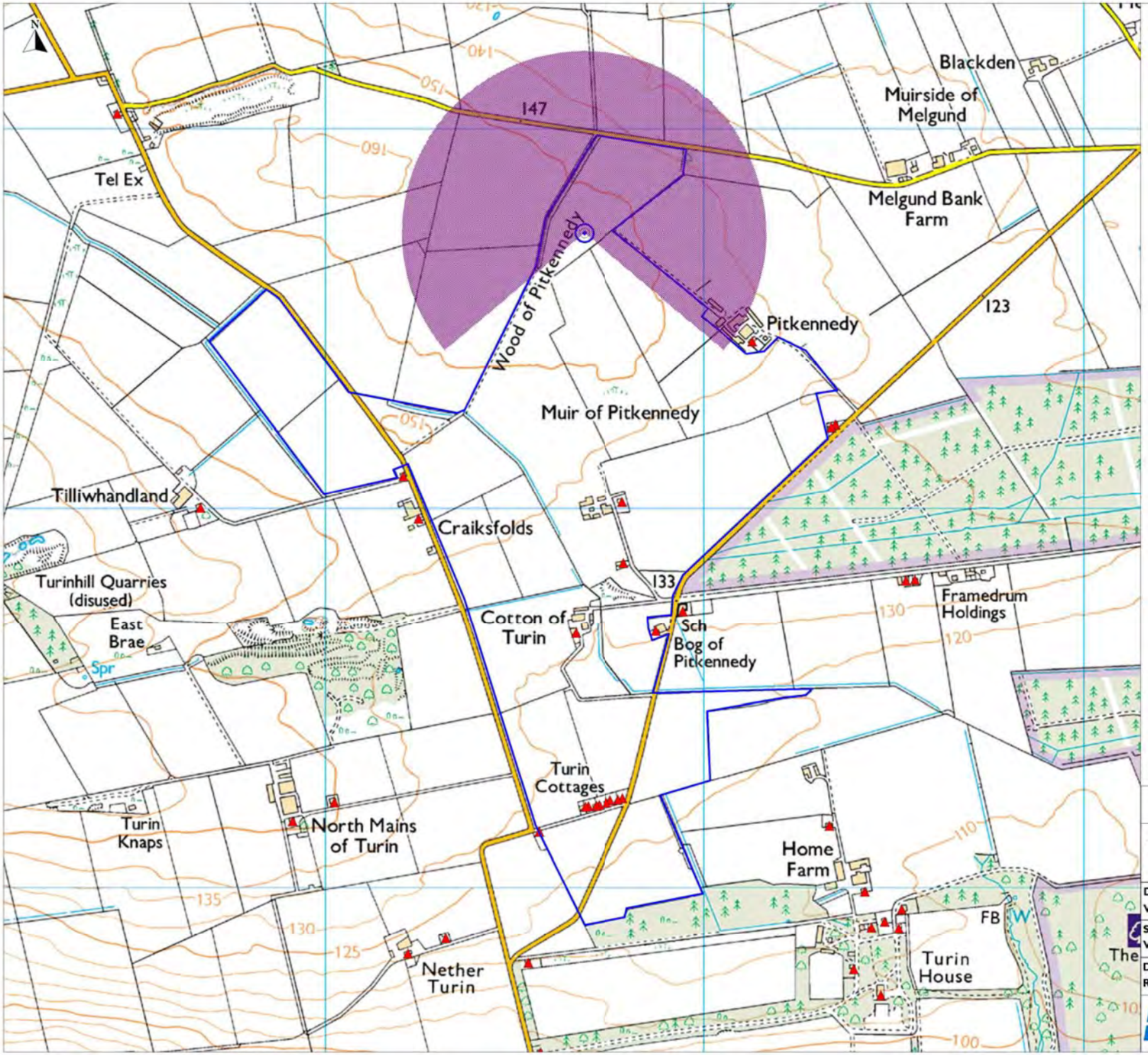
DOCUMENT REFERENCE	LAST REVISION DATE
TH057	June 2012
SITE DESIGN VERSION	SCALE
V1	1:50k when printed at A3

DRAWN	CHECKED	APPROVED
RH	TR	LT

PARSONS BRINCKERHOFF

FIGURE 11.1

AC33



LEGEND

- Landownership boundary
- Proposed wind turbine position
- Shadow flicker impact zone
- Properties

COTTON OF PITKENNEDY

Plan of shadow flicker impact zone

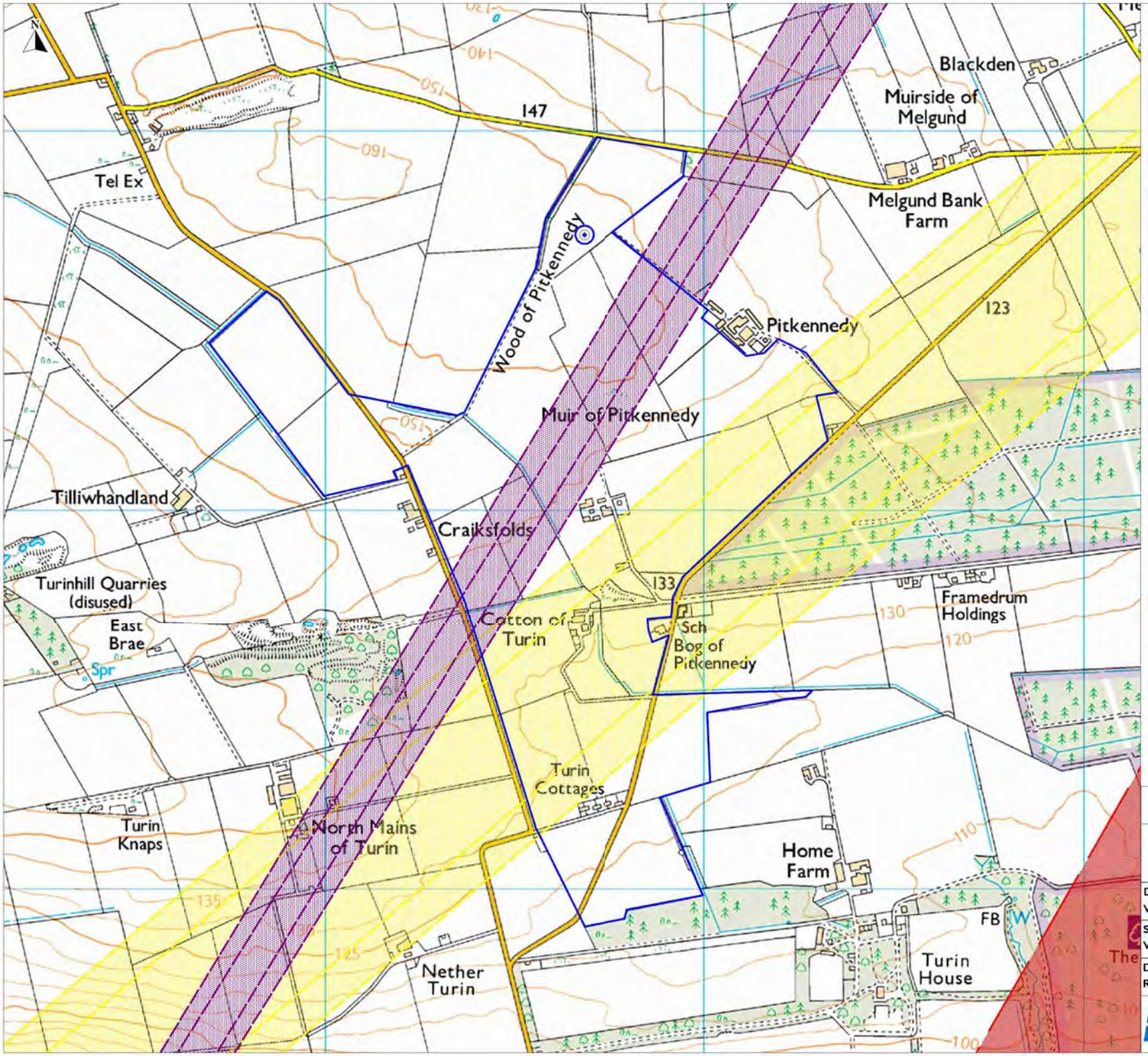
DOCUMENT REFERENCE	LAST REVISION DATE
V1	March 2013
SITE DESIGN VERSION	**SCALE**
V4	1:10k when printed at A3

DRAWN	CHECKED	APPROVED
RH	TR	RW

PARSONS BRINCKERHOFF

FIGURE 14.1

AC33



LEGEND

- Landownership boundary
- Proposed wind turbine position

Telecommunication links:

- JRC link (+63.4m buffer)
- Arqiva link (+200 buffer)
- Ericsson link (+200m buffer)

Metres
0 250 500

COTTON OF PITKENNEDY

Plan of telecommunication links

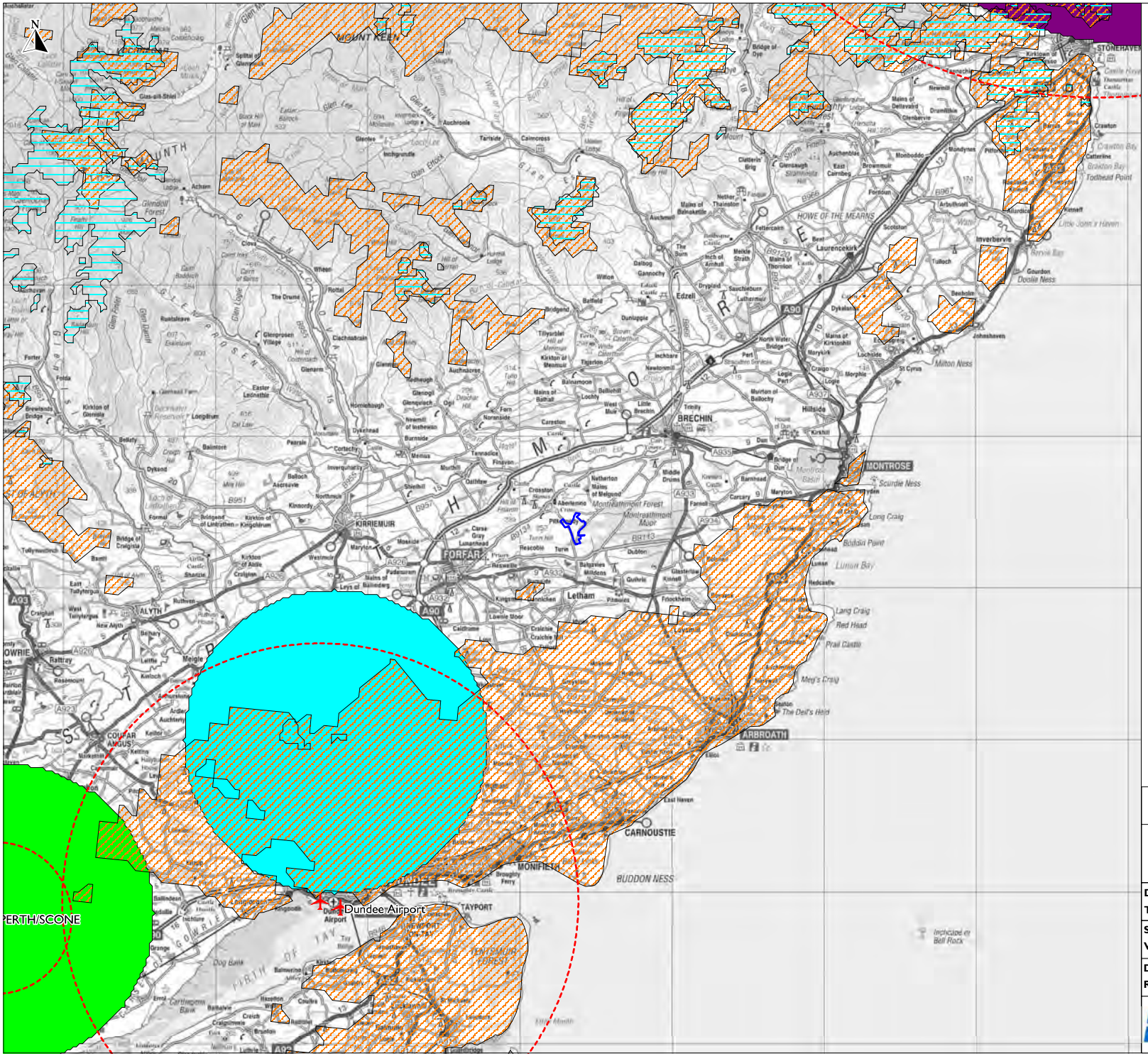
DOCUMENT REFERENCE	LAST REVISION DATE
V1	December 2012
SITE DESIGN VERSION	SCALE
V4	1:10k when printed at A3

DRAWN	CHECKED	APPROVED
RH	TR	RW

PARSONS BRINCKERHOFF

FIGURE 15.1

AC33



LEGEND

- Landownership boundary
- Public airports and civil aviation aerodromes
- Aerodrome suggested buffers
- MOD 120m tip height ATC radar coverage
- NATS 120m PSR coverage
- Eskdalemuir seismic array
- NATS air-ground-air coverage
- NATS navigation aid coverage
- NATS SSR coverage

Please note:

Where a designation is listed in the legend, but does not appear on the figure, the designation does not exist within the area shown.

Kilometres 0 5 10

COTTON OF PITKENNEDY

Plan of regional aviation and radar constraints

DOCUMENT REFERENCE	LAST REVISION DATE
TH059	December 2012
SITE DESIGN VERSION	**SCALE**
V1	1:250k when printed at A3

DRAWN	CHECKED	APPROVED
RH	TR	LT

PARSONS BRINCKERHOFF

FIGURE 16.1

AC34

Cotton of Pitkennedy

e-Gen

Environmental Report

Appendices

April 2013



PARSONS BRINCKERHOFF

CONTENTS

APPENDIX A

SCREENING REPONSE FROM ANGUS COUNCIL

Rippon, Tim

From: WrightJ [WrightJ@angus.gov.uk]
Sent: 11 January 2012 11:11
To: Rippon, Tim
Cc: Agus, Emily
Subject: 11/01110/EIASCR

Screening Request for a Wind Turbine Development at Cotton of Pitkennedy, Angus

Mr Rippon,

I refer to your request for a screening opinion which was received by this Division on 16 November 2011 and my telephone conversation with your colleague this morning. Please note that the EIA regulations (1999) have now been amended by The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 on 1 June 2011 and for the avoidance of doubt I can confirm my Council's response is based on the new legislation.

My Council has considered the type of development proposed; its nature, scale, location and impact on the environment. Account has also been taken of the criteria outlined in Circular 3/2011: The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011. Schedule 2 of the 2011 Regulations states that the likelihood of significant effects will generally depend upon the scale of the development, and its visual impact, as well as potential noise impacts. EIA may be required for developments of two or more turbines, or where the hub height of a turbine exceeds 15 metres.

In this case the proposal is for two wind turbines and from the information provided each turbine would have a height to hub of 50m (74m to blade tip) to produce approximately 800kW of new generating capacity for each turbine.

The Regulations and supplementary guidance indicate that EIA should only be required where it is judged that a development is likely to have significant environmental effects. In screening the proposal regard has been had to the location and characteristics of the development and the potential impacts as required by Schedule 3 of the Regulations. The screening opinion follows the flow chart for establishing whether a proposed development requires EIA found within Planning Circular 3/2011. In this instance I am satisfied that the proposal will not lead to significant environmental effects in terms of the EIA Regulations*.
(*The recipient should be aware that this view is taken for the purposes of screening the application in terms of EIA regulations only and should not be interpreted as indication that the environmental impacts of the proposed development are not significant in terms of any subsequent assessment of a planning application under the Section 37(2) of the Town and Country Planning (Scotland) Act 1997 as amended.) My reasons for this conclusion that an EIA is not required are summarised below. From the information provided and a brief desktop study of the area I consider that:

- The development does not give rise to any unusually complex or potentially hazardous environmental effects; and

- The likely impacts are localised and from the initial information provided do not appear to affect any particularly environmentally sensitive or vulnerable locations in the immediate area.

Accordingly, in terms of Regulation 6(4) of the 2011 Regulations my Council is of the opinion that the proposal does not constitute Environmental Impact Assessment development and will not require the submission of a full Environmental Statement as required by regulation 2(1) and Schedule 4 of the Regulations.

Prior to the submission of a formal application I would request that agreement is reached with this Authority in respect of the scope of the supporting information required to support the proposed development. Specifically I would suggest that early contact be made with Stewart Roberts, Countryside Officer (tel: 01307 473349) with regards to landscape impacts and requirements for further information (ie. ZTVs and visualisations) and also Steve Thomson from EDECP re: noise assessments (tel: 01307 473906). Unfortunately I cannot give any indication at this time of the likely outcome

of any planning application given that detailed supporting information will be required to be submitted and assessed along with the relevant consultee responses.

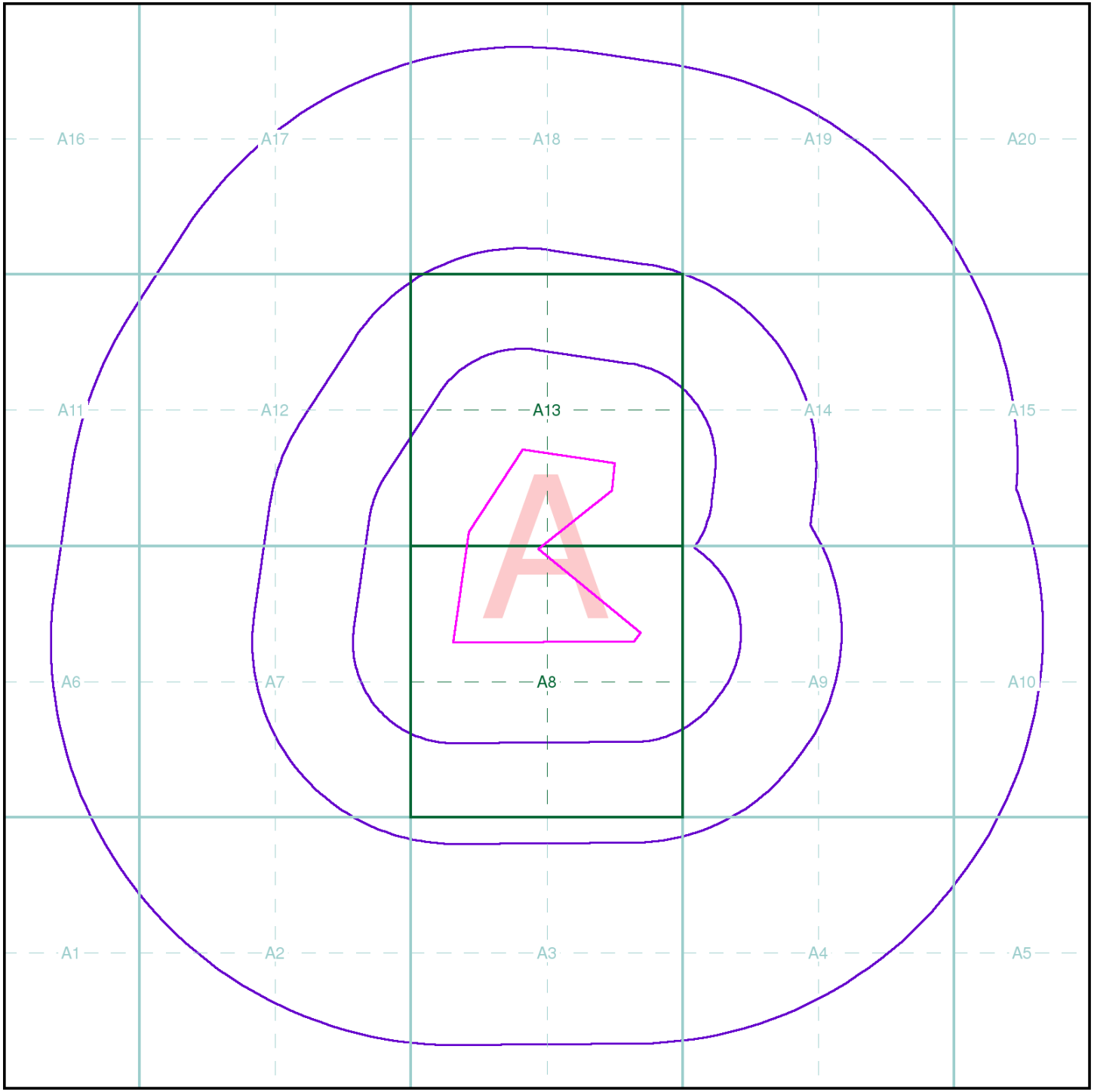
I trust the above proves helpful and clarifies the situation for you. However please do not hesitate to contact me should you wish to discuss.

Regards

James Wright
Planning Officer (Development Standards)
Planning & Transport Division
Infrastructures Services
Angus Council
County Buildings
Market Street
FORFAR
DD8 3LG

T: 01307 473244
E: WrightJ@angus.gov.uk
W: www.angus.gov.uk

APPENDIX B
ENVIROCHECK REPORT



AC34

Envirocheck®

Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:

Ordnance Survey® Licensed Partner

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

SEPA Scottish Environment Protection Agency

SCOTTISH NATURAL HERITAGE

Envirocheck reports are compiled from 136 different sources of data.

Client Details

Mr T Rippon, Parsons Brinckerhoff Ltd, Amber Court,
William Armstrong Drive, Newcastle-Upon-Tyne, NE4 7YQ

Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353750, 754710
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

Full Terms and Conditions can be found on the following link:
http://www.landmarkinfo.co.uk/Terms/Show/430

Landmark® Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Order Details:			
Order Number: 43167633			
Customer Ref: 3512008A			
National Grid Reference: 353780	754710		
Slice:			
Site Area (Ha): 13.45			
Search Buffer (m): 1000			
Site Details:			
Site at 353521	753944		
File Name	Map Series Name	Published Dates	Source Scale
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43167633_1_A8_County_Series_2500_for-2500_ep1-b_73552834.gif	Forfarshire	1861	1:2,500
43167633_1_A13_County_Series_2500_ep5-2500_a5_73552836.gif	Ordnance Survey Plan	1966-1967	1:2,500
43167633_1_A8_County_Series_2500_for-2500_ep2_73552844.gif	Forfarshire	1902	1:2,500
43167633_1_A13_County_Series_2500_for-2500_ep3_73552846.gif	Forfarshire	1924	1:2,500
43167633_1_A8_County_Series_2500_ep5-2500_a5_73552850.gif	Ordnance Survey Plan	1966	1:2,500
43167633_1_A13_County_Series_2500_for-2500_ep1_73552852.gif	Forfarshire	1894	1:2,500
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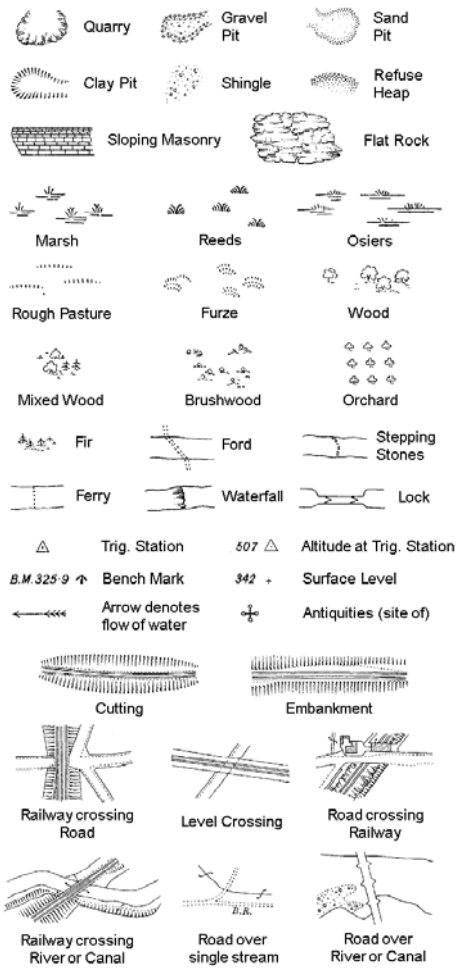
43167633_1_A8_County_Series_2500_for-2500_ep1-a_73552858.gif	Forfarshire	1894	1:2,500
43167633_1_A13_County_Series_2500_for-2500_ep2_73552860.gif	Forfarshire	1902	1:2,500
43167633_1_A13_Superplan_2500_sp-2500_1_73552848.gif	Large-Scale National Grid Data	1995	1:2,500
43167633_1_A8_Superplan_2500_sp-2500_1_73552862.gif	Large-Scale National Grid Data	1995	1:2,500

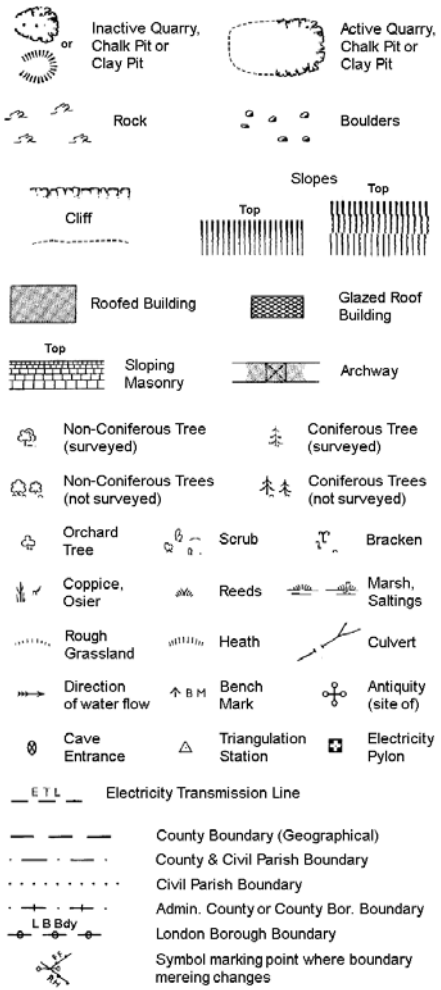
Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



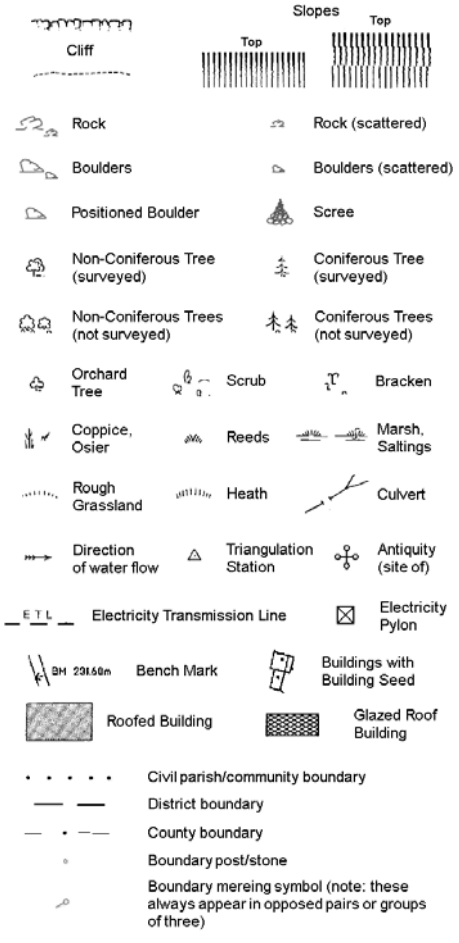
B P B S	Boundary Post or Stone	P.C.B	Police Call Box
B.R.	Bridle Road	P	Pump
E.P	Electricity Pylon	S.P	Signal Post
F.B.	Foot Bridge	St.	Sluice
F.P.	Foot Path	Sp.	Spring
G.P	Guide Post or Board	T.C.B	Telephone Call Box
M.S	Mile Stone	Tr.	Trough
M.P M.R	Mooring Post or Ring	W	Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250



Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governer	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

AC34

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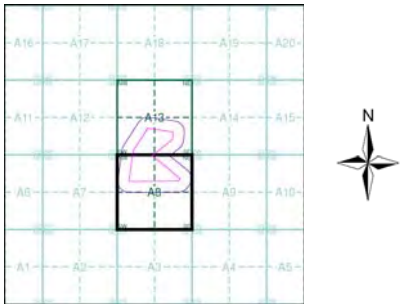
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Forfarshire	1:2,500	1861	2
Forfarshire	1:2,500	1894	3
Forfarshire	1:2,500	1894	4
Forfarshire	1:2,500	1902	5
Forfarshire	1:2,500	1924	6
Ordnance Survey Plan	1:2,500	1966	7
Large-Scale National Grid Data	1:2,500	1995	8

Historical Map - Segment A8



Order Details

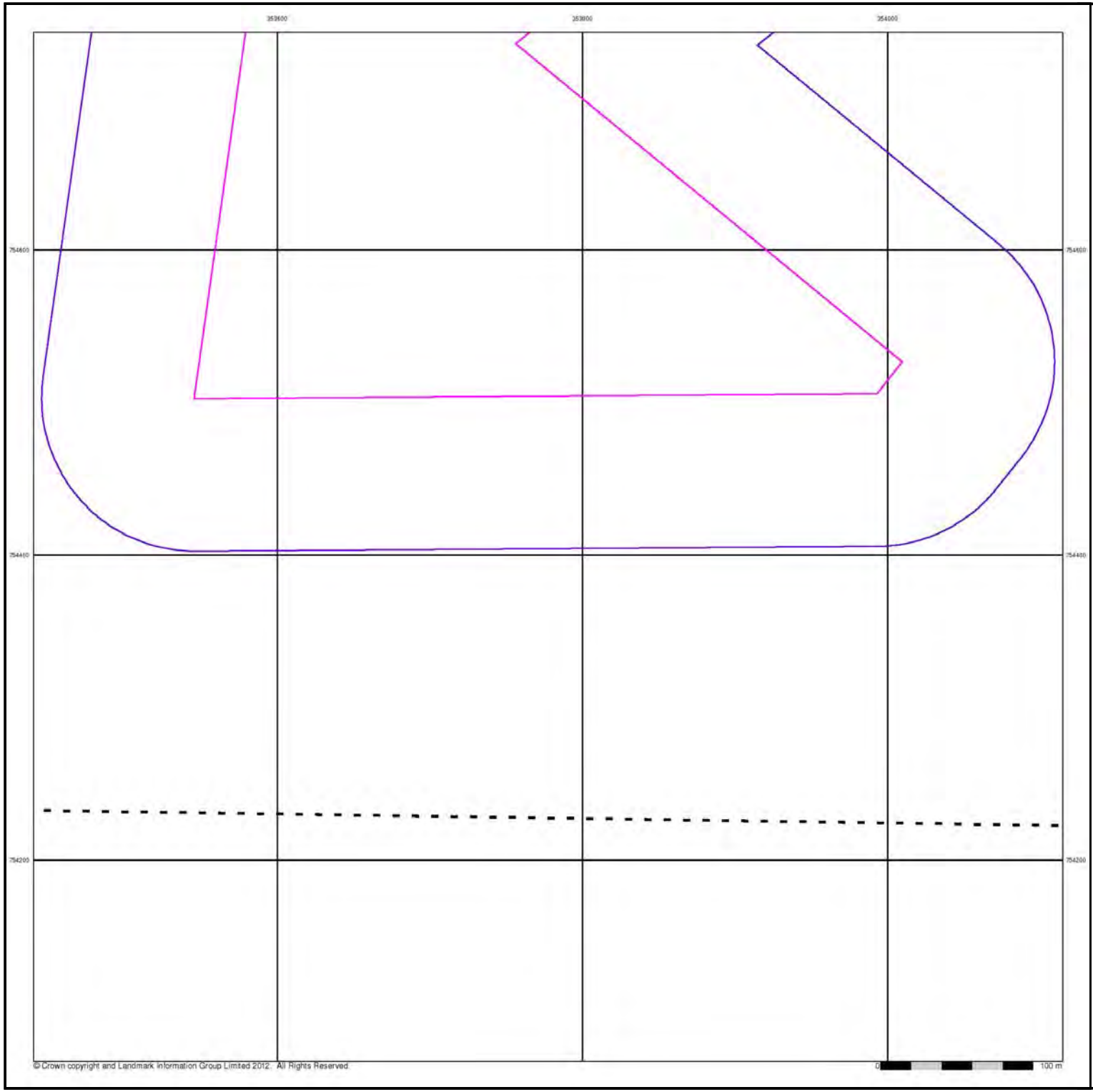
Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	100

Site Details

Site at 353521,753944

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

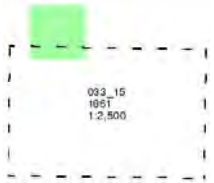
Forfarshire

Published 1861

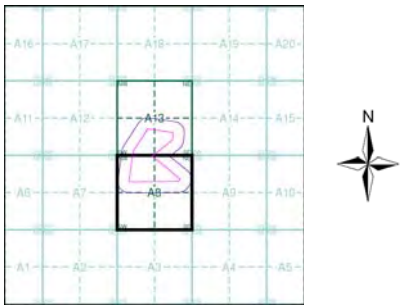
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A8



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
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Site Details

Site at 353521,753944

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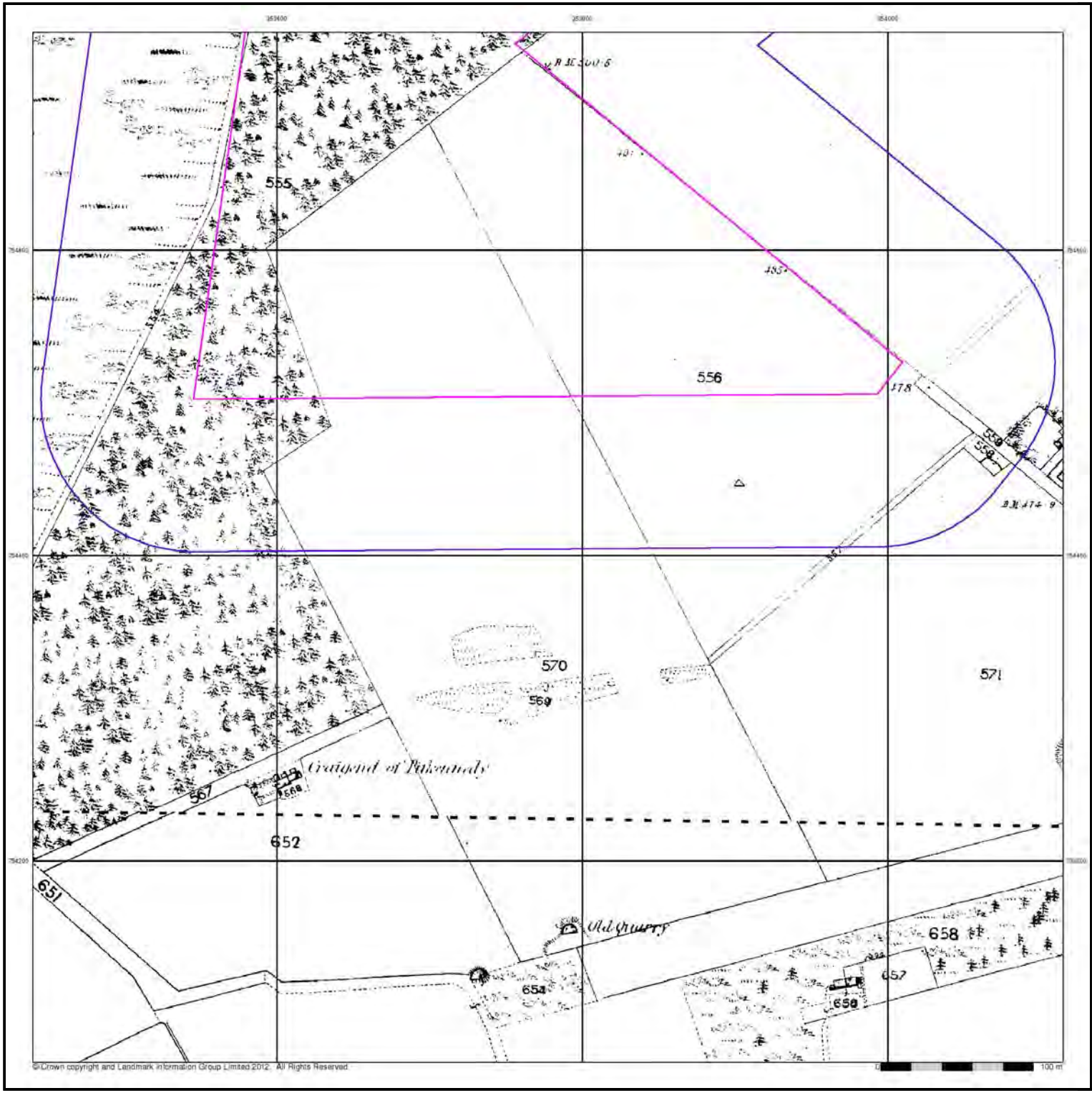

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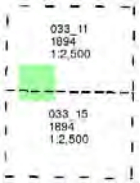
Forfarshire

Published 1894

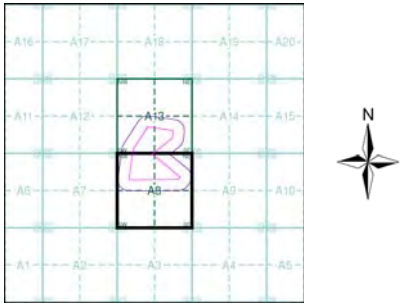
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A8



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	100

Site Details

Site at 353521,753944

Landmark Information Group

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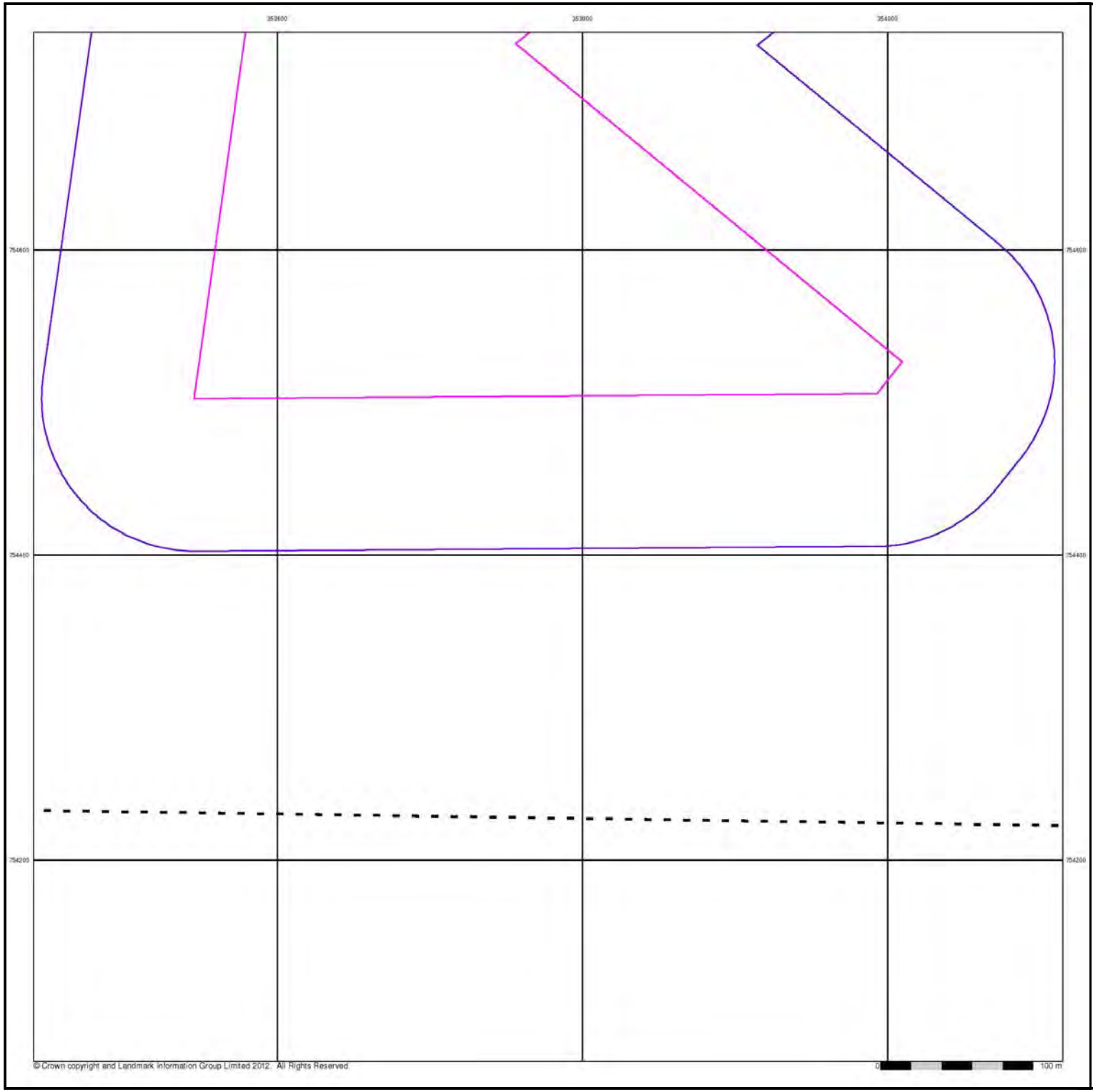


Envirocheck®

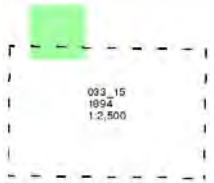
Forfarshire

Published 1894

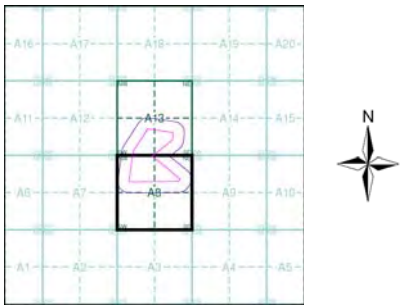
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A8



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	100

Site Details

Site at 353521,753944

Landmark Information Group

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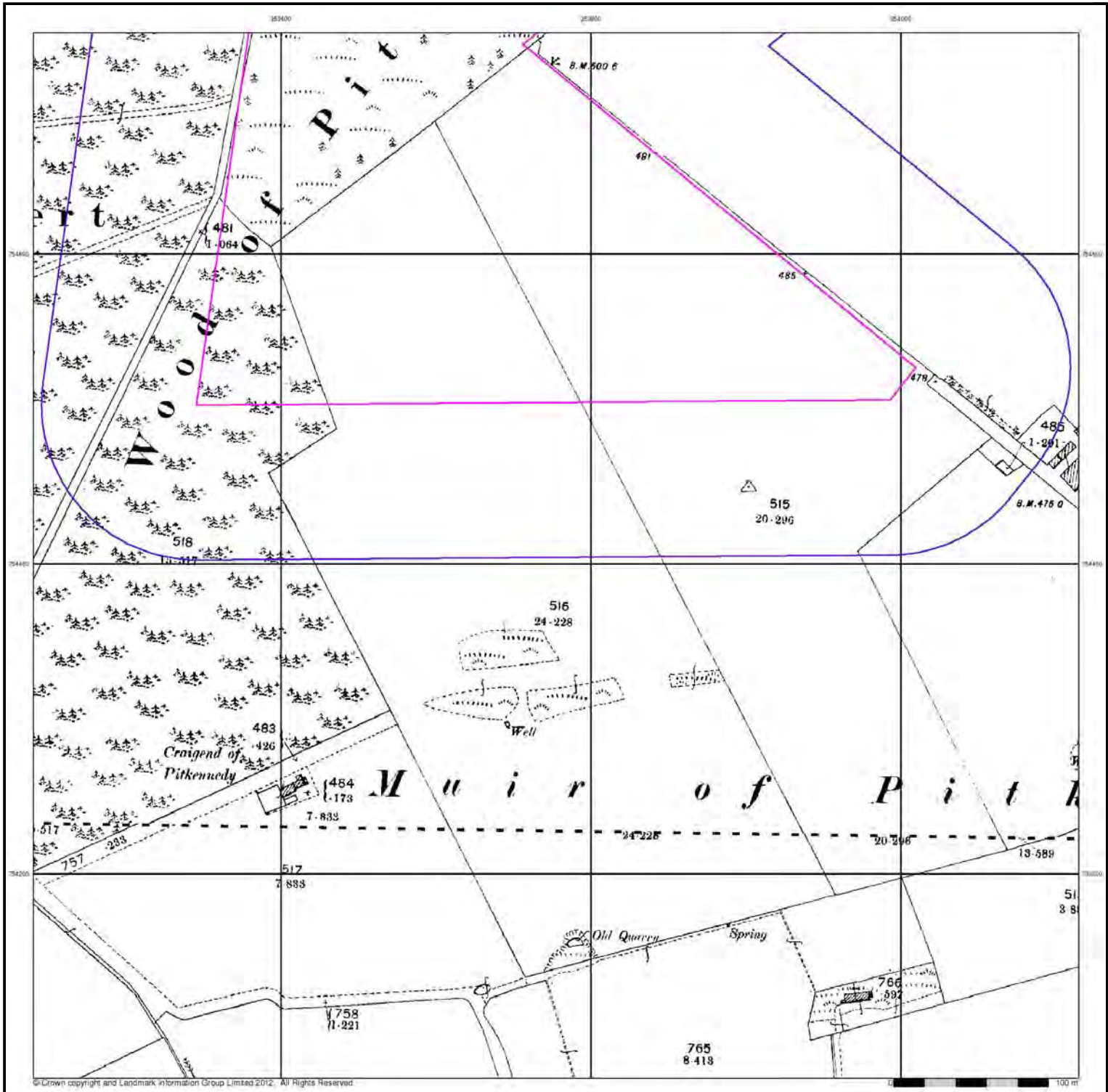


AC34

Envirocheck®

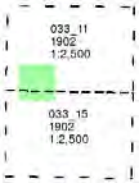
Forfarshire

Published 1902

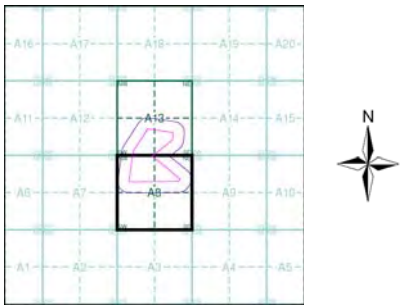
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A8



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	100

Site Details

Site at 353521,753944

Landmark Information Group

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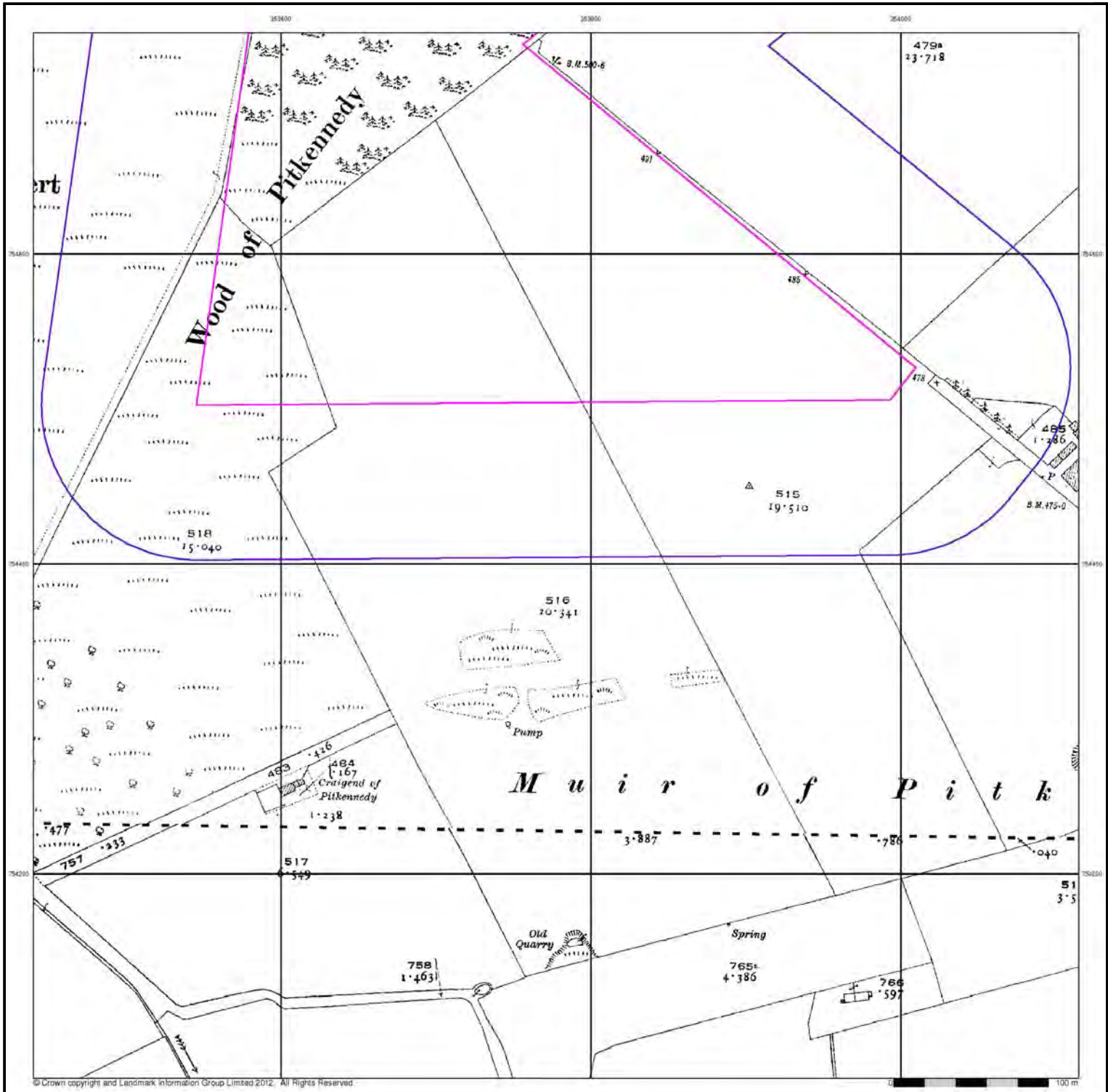


AC34

Envirocheck®

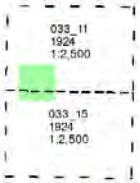
Forfarshire

Published 1924

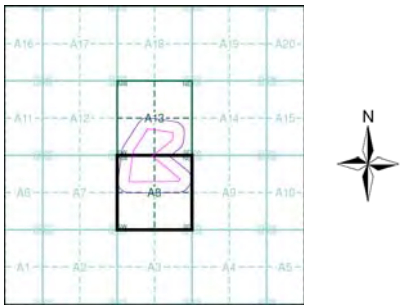
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A8



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	100

Site Details

Site at 353521,753944

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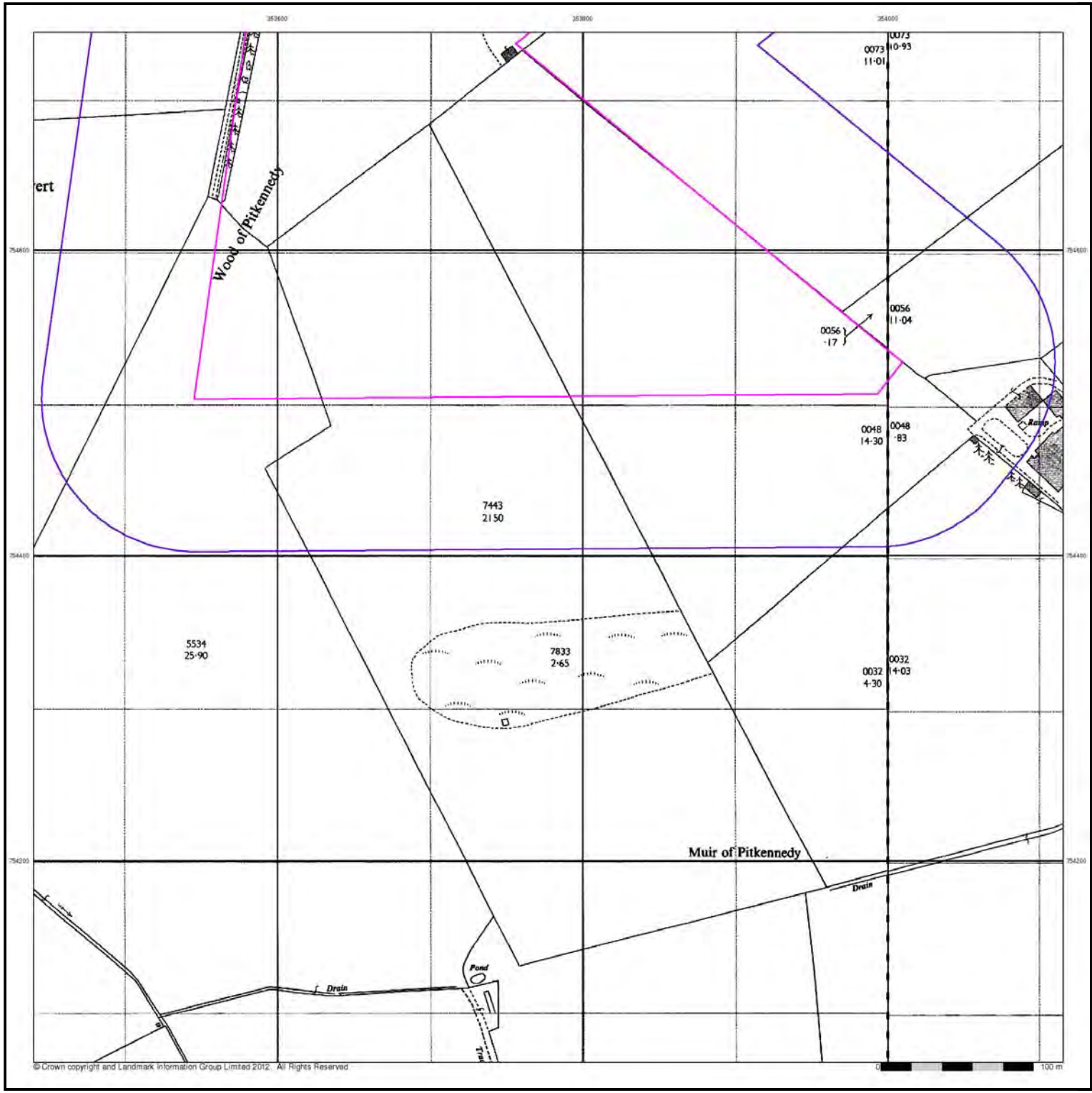


Envirocheck®

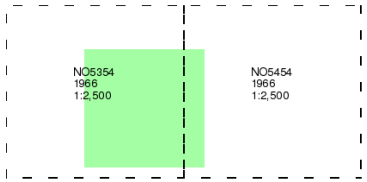
Ordnance Survey Plan

Published 1966

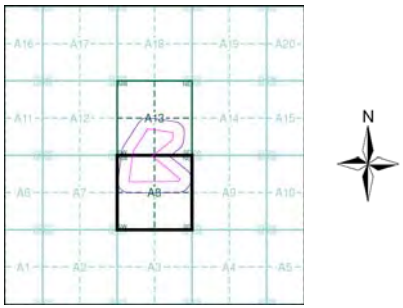
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A8



Order Details

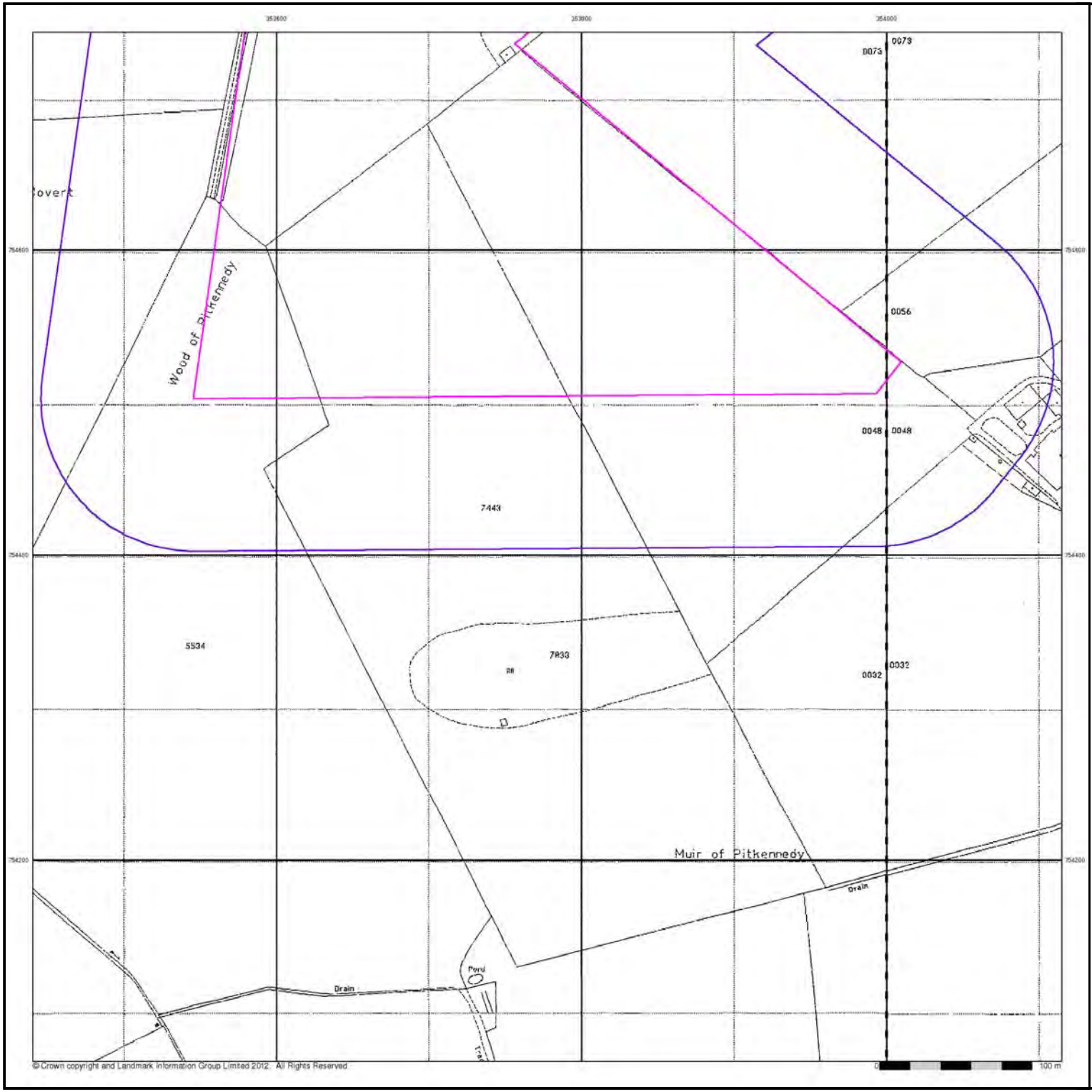
Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	100

Site Details

Site at 353521,753944

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



AC34

Envirocheck®

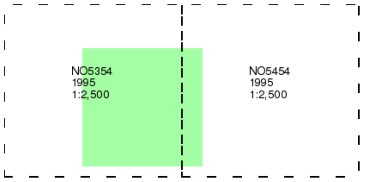
Large-Scale National Grid Data

Published 1995

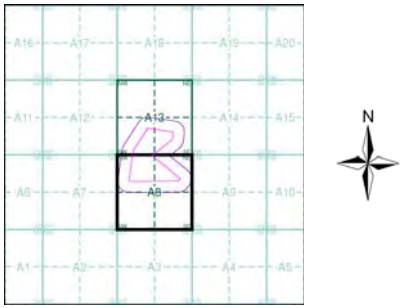
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A8



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	100

Site Details

Site at 353521,753944

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Order Details:			
Order Number: 43167633			
Customer Ref: 3512008A			
National Grid Reference: 353780	754710		
Slice:			
Site Area (Ha): 13.45			
Search Buffer (m): 1000			
Site Details:			
Site at 353521	753944		
File Name	Map Series Name	Published Dates	Source Scale
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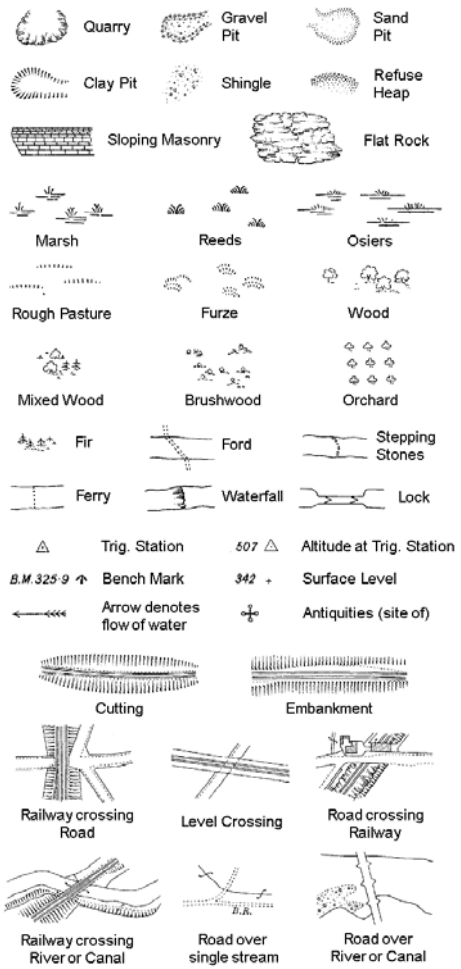
43167633_1_A8_County_Series_2500_for-2500_ep1-b_73552834.gif	Forfarshire	1861	1:2,500
43167633_1_A13_County_Series_2500_ep5-2500_a5_73552836.gif	Ordnance Survey Plan	1966-1967	1:2,500
43167633_1_A8_County_Series_2500_for-2500_ep2_73552844.gif	Forfarshire	1902	1:2,500
43167633_1_A13_County_Series_2500_for-2500_ep3_73552846.gif	Forfarshire	1924	1:2,500
43167633_1_A8_County_Series_2500_ep5-2500_a5_73552850.gif	Ordnance Survey Plan	1966	1:2,500
43167633_1_A13_County_Series_2500_for-2500_ep1_73552852.gif	Forfarshire	1894	1:2,500
43167633_1_A8_County_Series_2500_for-2500_ep3_73552856.gif	Forfarshire	1924	1:2,500
43167633_1_A8_County_Series_2500_for-2500_ep1-a_73552858.gif	Forfarshire	1894	1:2,500
43167633_1_A13_County_Series_2500_for-2500_ep2_73552860.gif	Forfarshire	1902	1:2,500
43167633_1_A13_Superplan_2500_sp-2500_1_73552848.gif	Large-Scale National Grid Data	1995	1:2,500
43167633_1_A8_Superplan_2500_sp-2500_1_73552862.gif	Large-Scale National Grid Data	1995	1:2,500

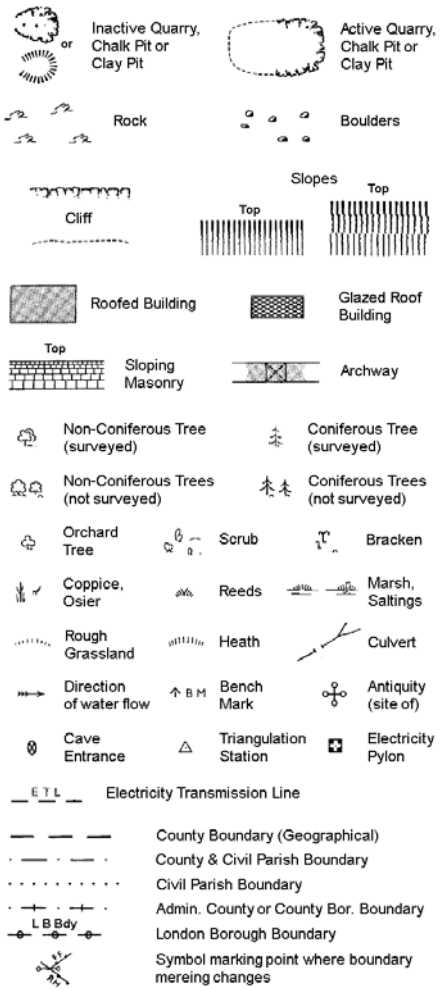
Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



B P B S	Boundary Post or Stone	P.C.B	Police Call Box
B.R.	Bridle Road	P	Pump
E.P	Electricity Pylon	S.P	Signal Post
F.B.	Foot Bridge	St.	Sluice
F.P.	Foot Path	Sp.	Spring
G.P	Guide Post or Board	T.C.B	Telephone Call Box
M.S	Mile Stone	Tr.	Trough
M.P M.R	Mooring Post or Ring	W	Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250

Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governer	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

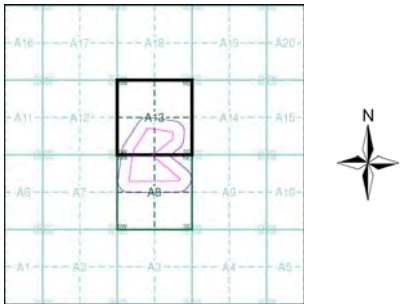
AC34

Envirocheck®

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Forfarshire	1:2,500	1894	2
Forfarshire	1:2,500	1902	3
Forfarshire	1:2,500	1924	4
Ordnance Survey Plan	1:2,500	1966 - 1967	5
Large-Scale National Grid Data	1:2,500	1995	6

Historical Map - Segment A13



Order Details

Order Number: 43167633_1_1
Customer Ref: 3512008A
National Grid Reference: 353780, 754710
Slice: A
Site Area (Ha): 13.45
Search Buffer (m): 100

Site Details

Site at 353521,753944

Landmark® Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

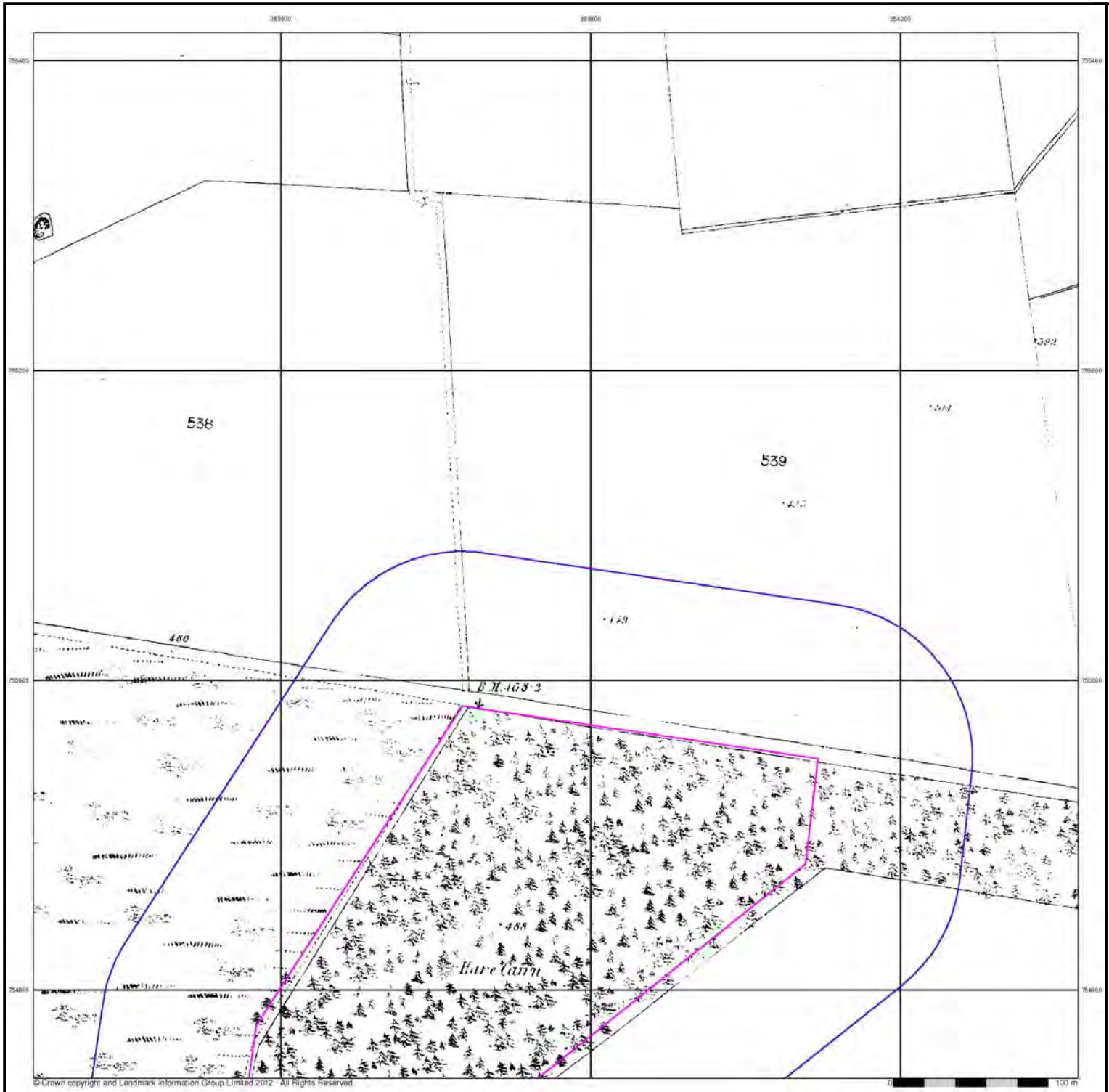
Envirocheck®

Forfarshire

Published 1894

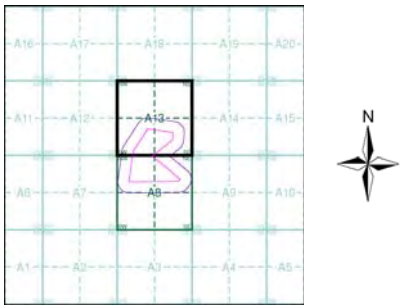
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.



Map Name(s) and Date(s)

Historical Map - Segment A13



Order Details

Order Number:	43167633_1_1
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National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
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Site Details

Site at 353521,753944

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck®

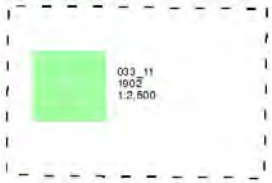
Forfarshire

Published 1902

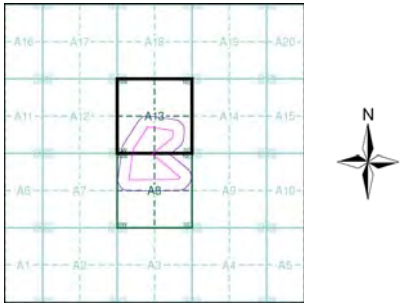
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	100

Site Details

Site at 353521,753944

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck®

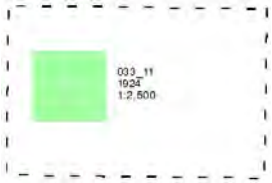
Forfarshire

Published 1924

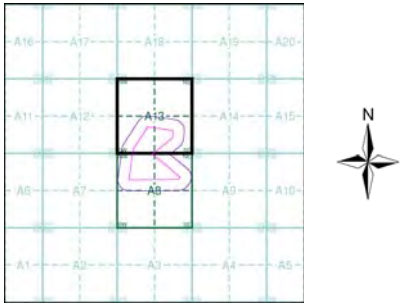
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	100

Site Details

Site at 353521,753944

Landmark Information Group

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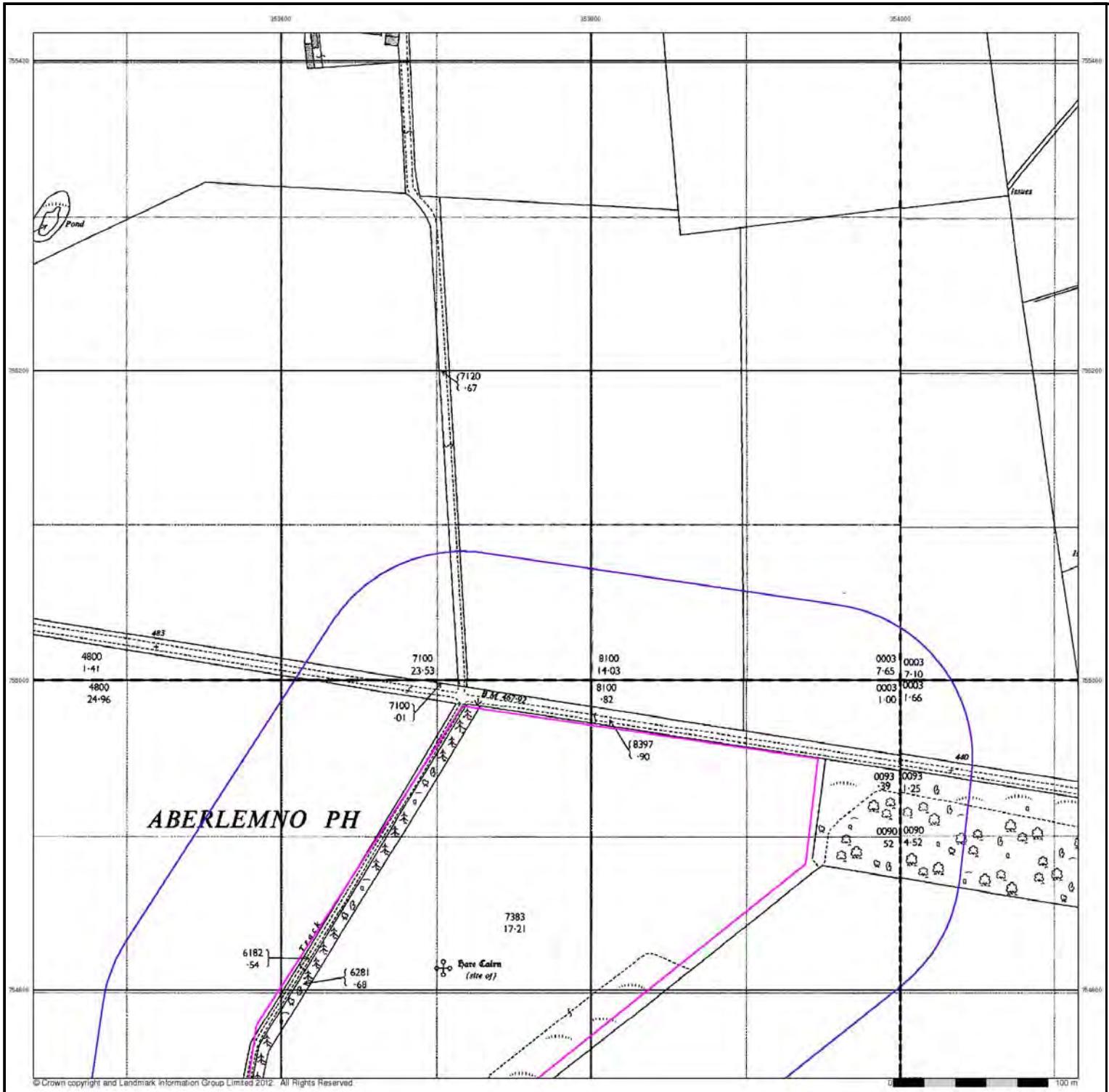
Ordnance Survey Plan

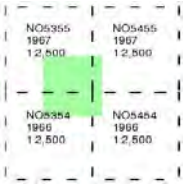
Published 1966 - 1967

Source map scale - 1:2,500

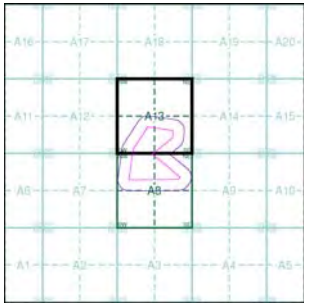
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.



Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	100

Site Details

Site at 353521,753944

Landmark Information Group

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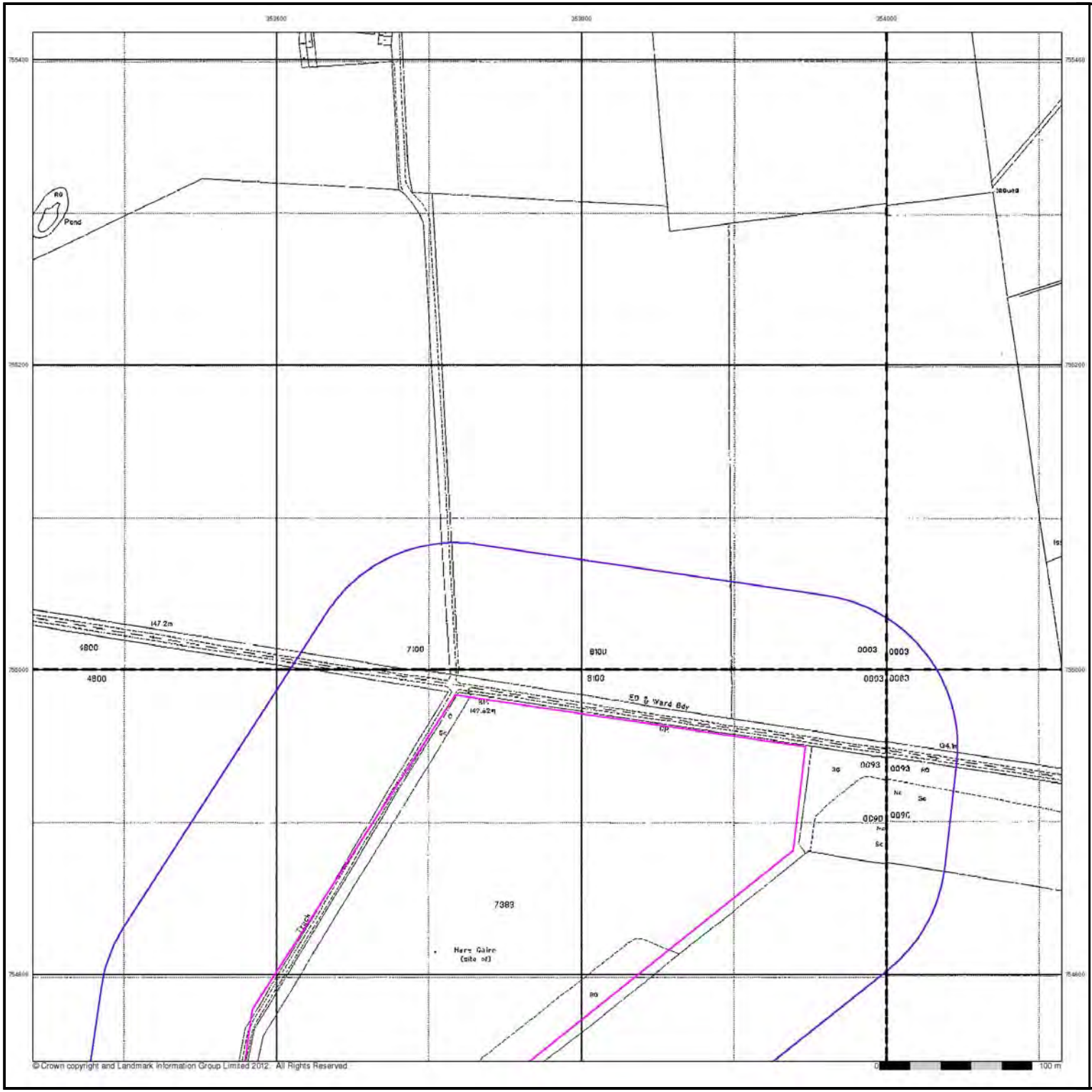
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



AC34

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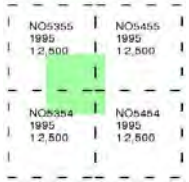
Large-Scale National Grid Data

Published 1995

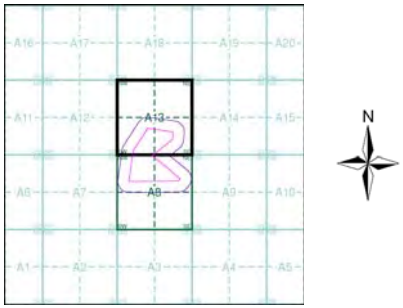
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	100

Site Details

Site at 353521,753944

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Order Details:	
Order Number: 43167633	
Customer Ref: 3512008A	
National Grid Reference: 353780	754710
Slice: A	
Site Area (Ha): 1000	
Search Buffer:	
Site Details: Site at 353521	753944
A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.	
BGS Boreholes	

Envirocheck®

General

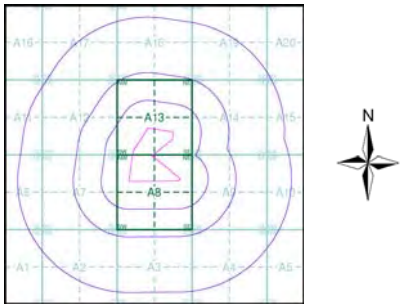
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Arsenic

Arsenic Concentrations mg/kg

- < 15
- 15 - 25
- 25 - 35
- 35 - 45
- 45 - 60
- 60 - 120
- > 120

Estimated Soil Chemistry Arsenic - Slice A



Order Details

Order Details:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

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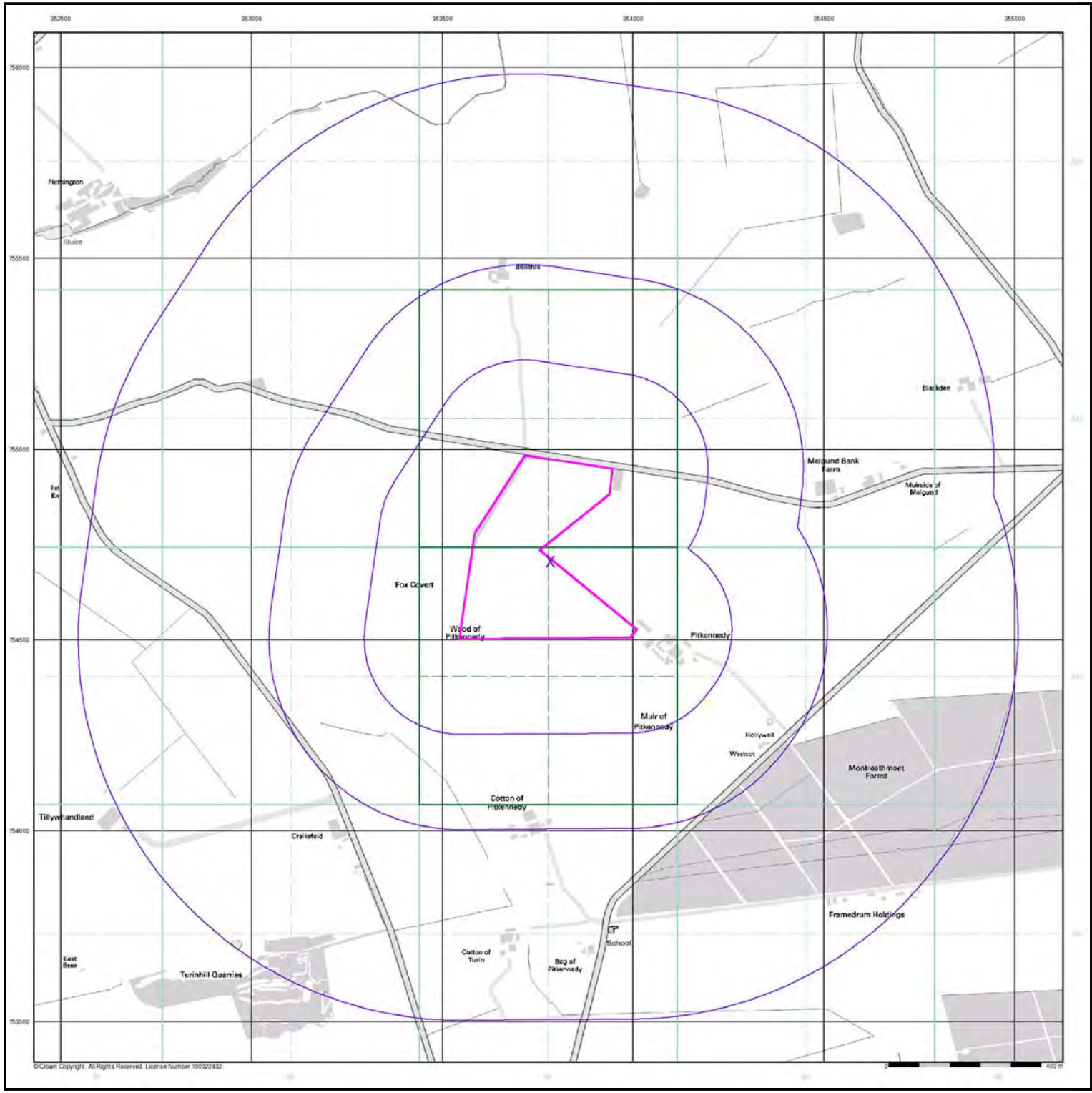


General

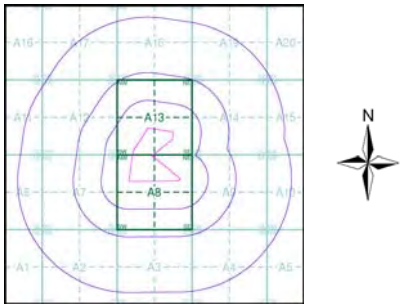
Specified Site | Specified Buffer(s) | Bearing Reference Point

Estimated Soil Chemistry Cadmium

Cadmium Concentrations mg/kg

- < 1.8
- 1.8 - 2.2
- 2.2 - 3.0
- > 3.0

Estimated Soil Chemistry Cadmium - Slice A



Order Details

Order Details:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

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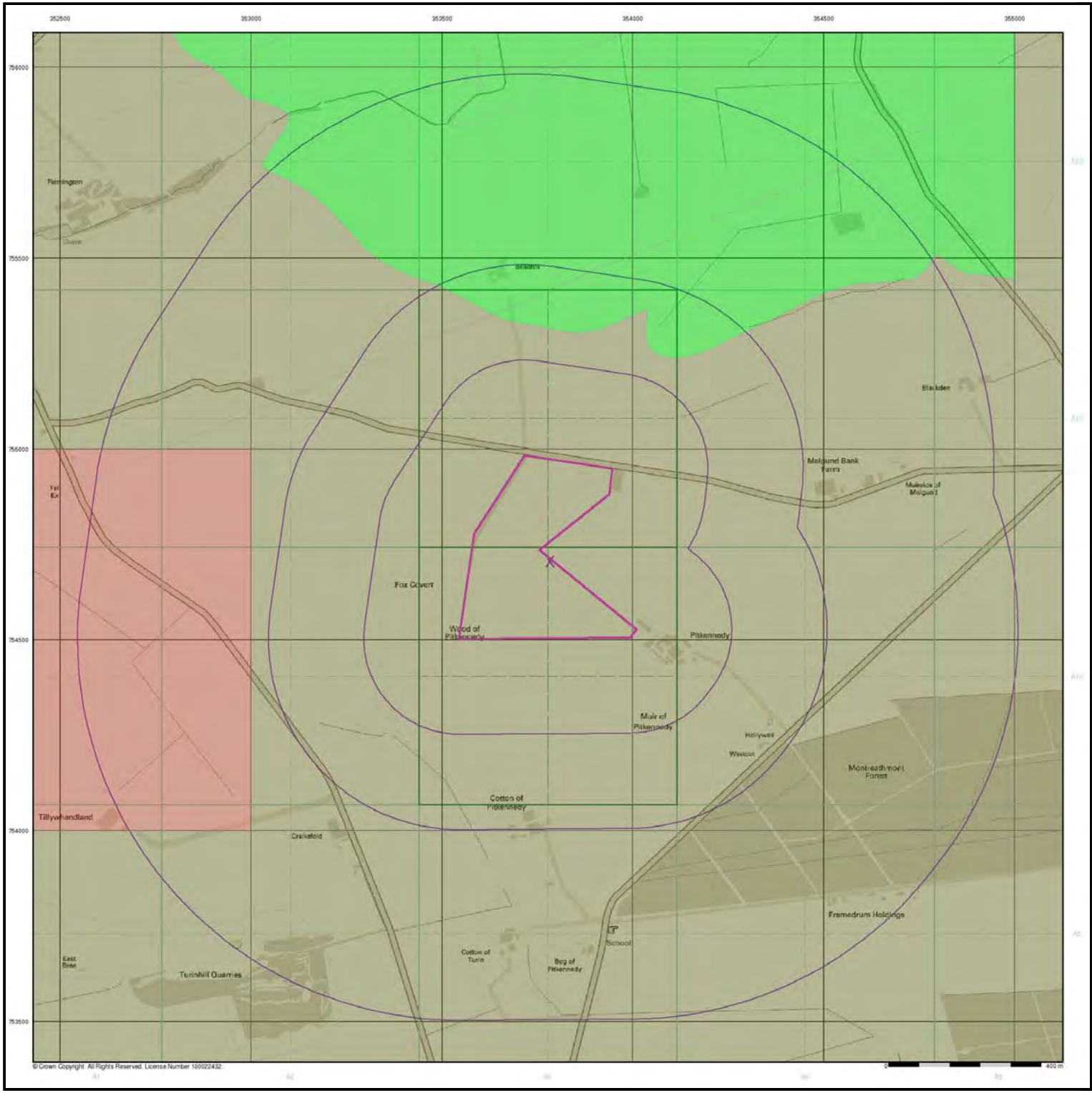
General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

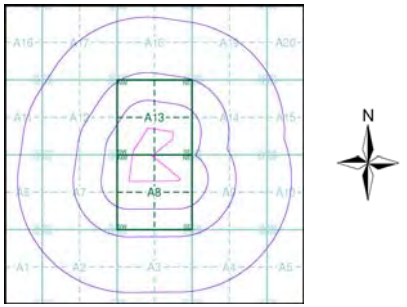
Estimated Soil Chemistry Chromium



Chromium Concentrations mg/kg

- < 20
- 20 - 40
- 40 - 60
- 60 - 90
- 90 - 120
- 120 - 180
- > 180

Estimated Soil Chemistry Chromium - Slice A



Order Details

Order Details:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

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General

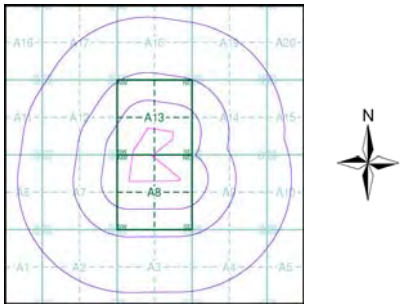
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Lead

Lead Concentrations mg/kg

- < 150
- 150 - 300
- 300 - 600
- 600 - 900
- > 900

Estimated Soil Chemistry Lead - Slice A



Order Details

Order Details:	43167633_1_1
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Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

Landmark Information Group

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Web: www.envirocheck.co.uk

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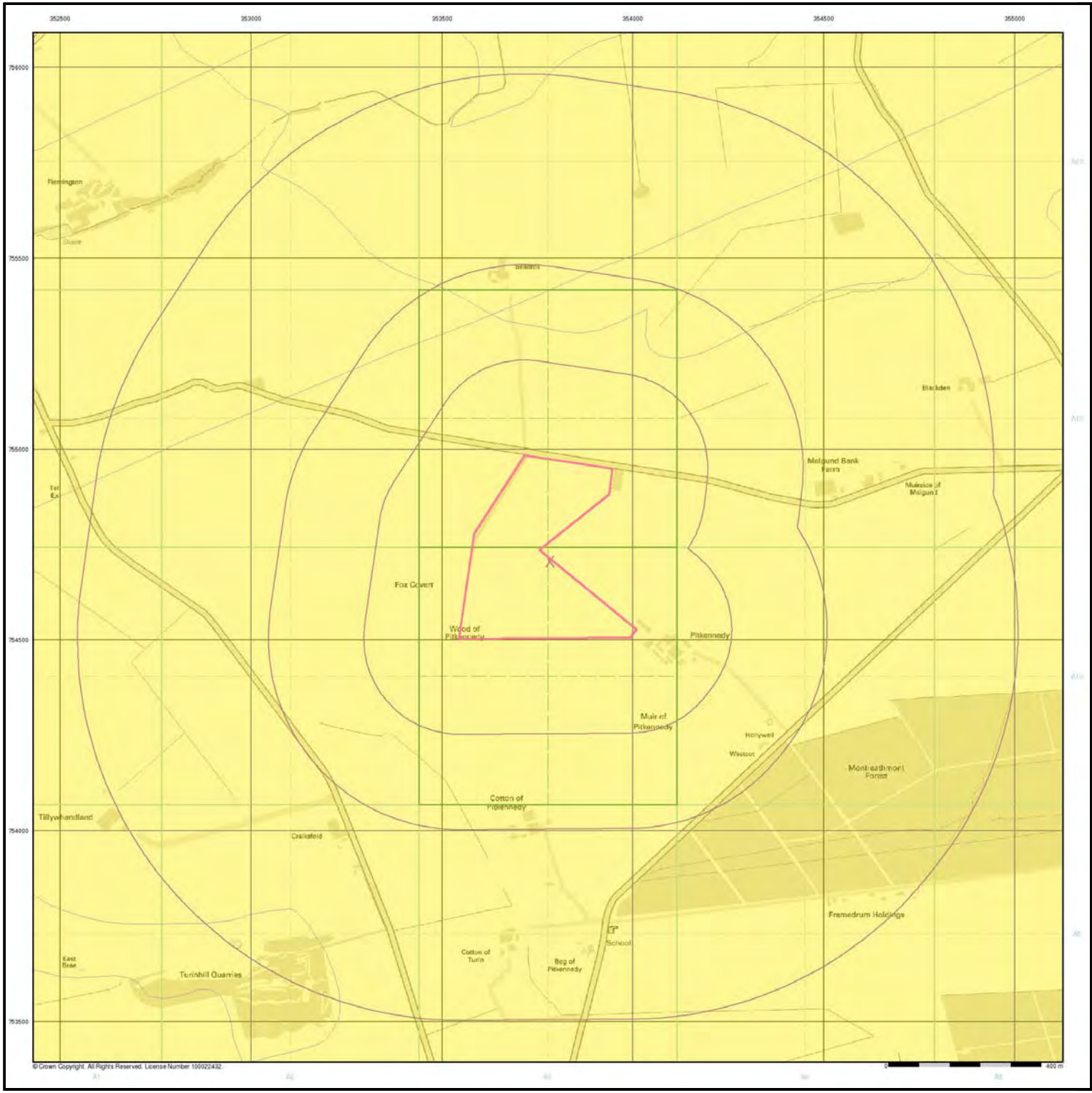
General

Specified Site | Specified Buffer(s) | Bearing Reference Point

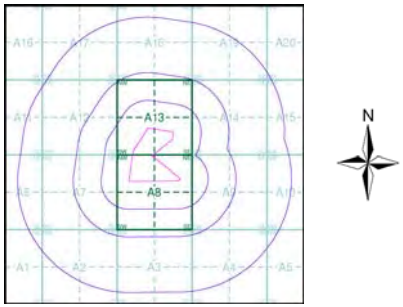
Estimated Soil Chemistry Nickel



Nickel Concentrations mg/kg

- < 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 80
- 80 - 100
- > 100

Estimated Soil Chemistry Nickel - Slice A



Order Details

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Customer Ref:	3512008A
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Slice:	A
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Site Details

Site at 353521,753944

Landmark Information Group

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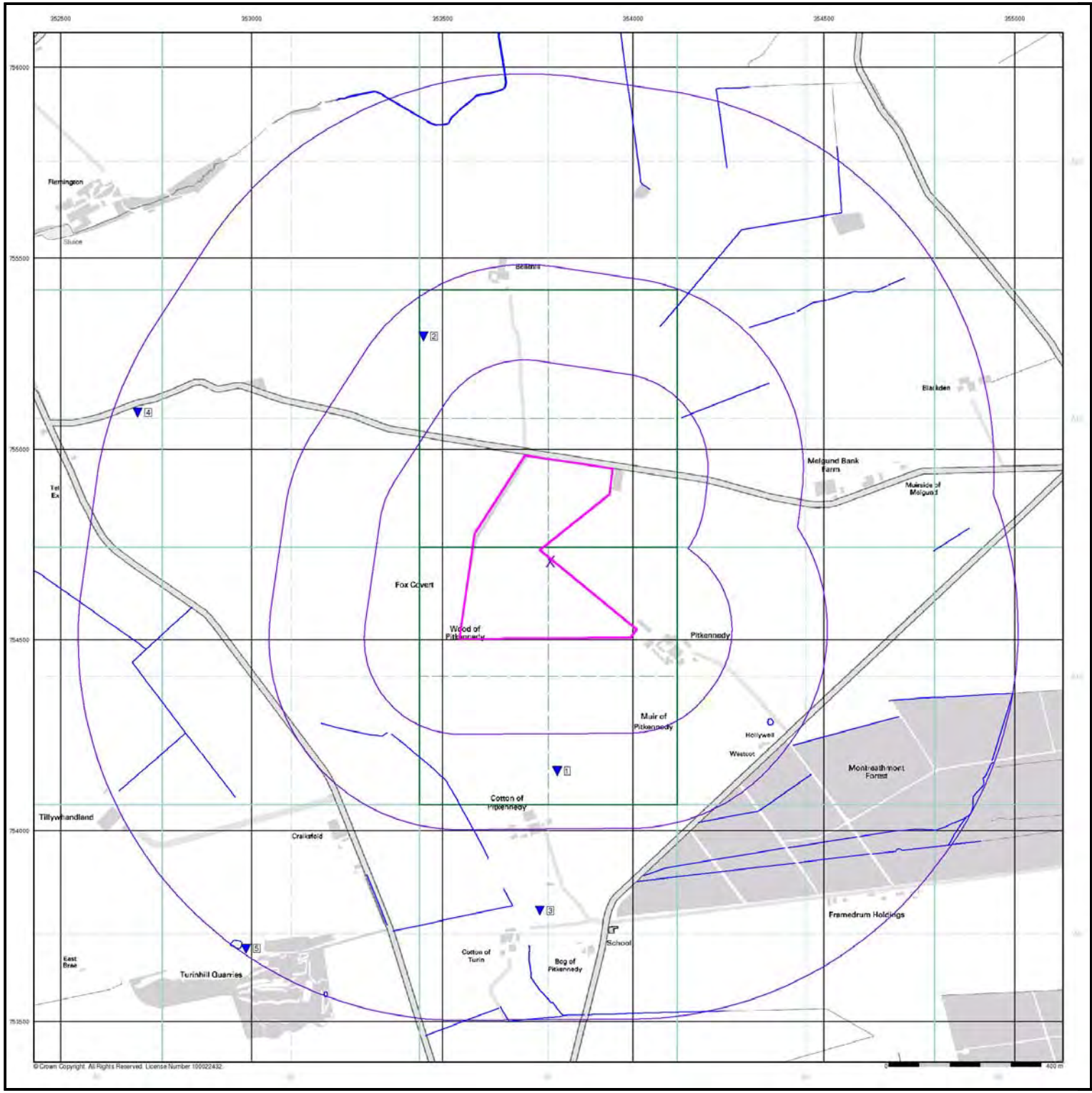


General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- Integrated Pollution Control Registered Waste Site
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Geological

- BGS Recorded Mineral Site

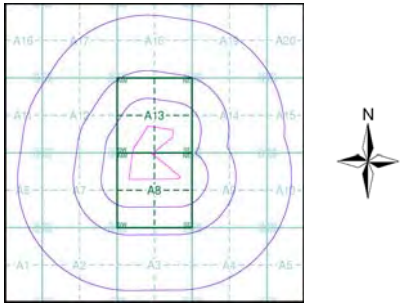
Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

Site Sensitivity Map - Slice A



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

Landmark Information Group

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Web: www.envirocheck.co.uk

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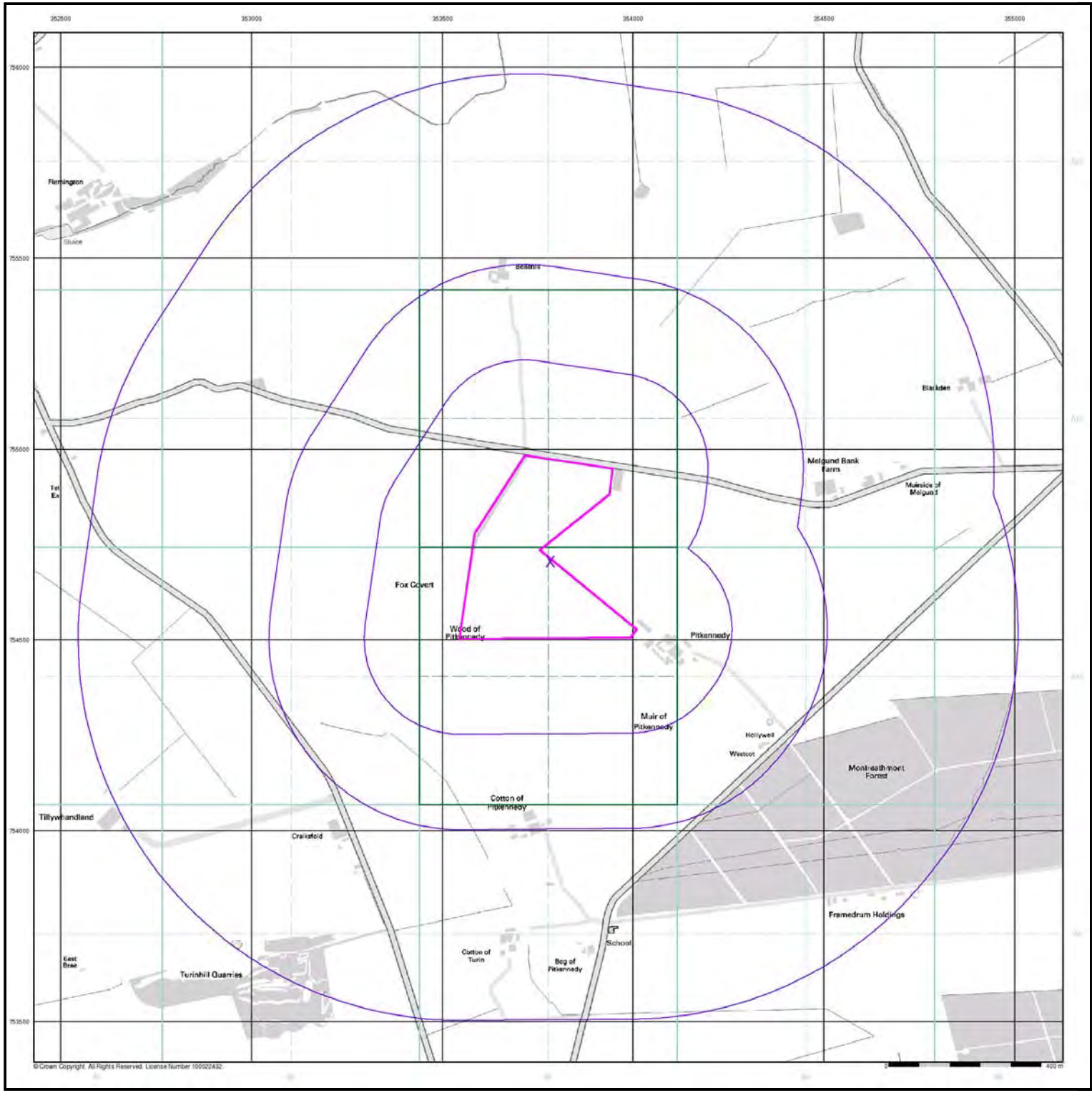


General

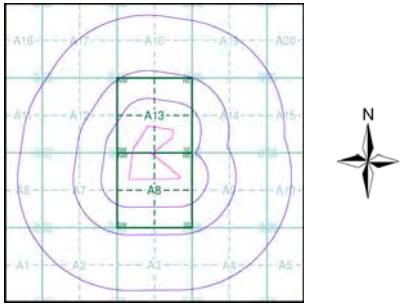
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Agency and Hydrological (Flood)

- 0 - 1m estimated 100yr flood depth
- 1 - 2m estimated 100yr flood depth
- Over 2m estimated 100yr flood depth

The flooded areas have been generated using a generalised technique and should not, by themselves, be used to infer that specific areas are or are not at risk of inundation. Flood risk at any specific location may be influenced by local factors - not least flood defence - that have not been taken into account.

Flood Map - Slice A



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

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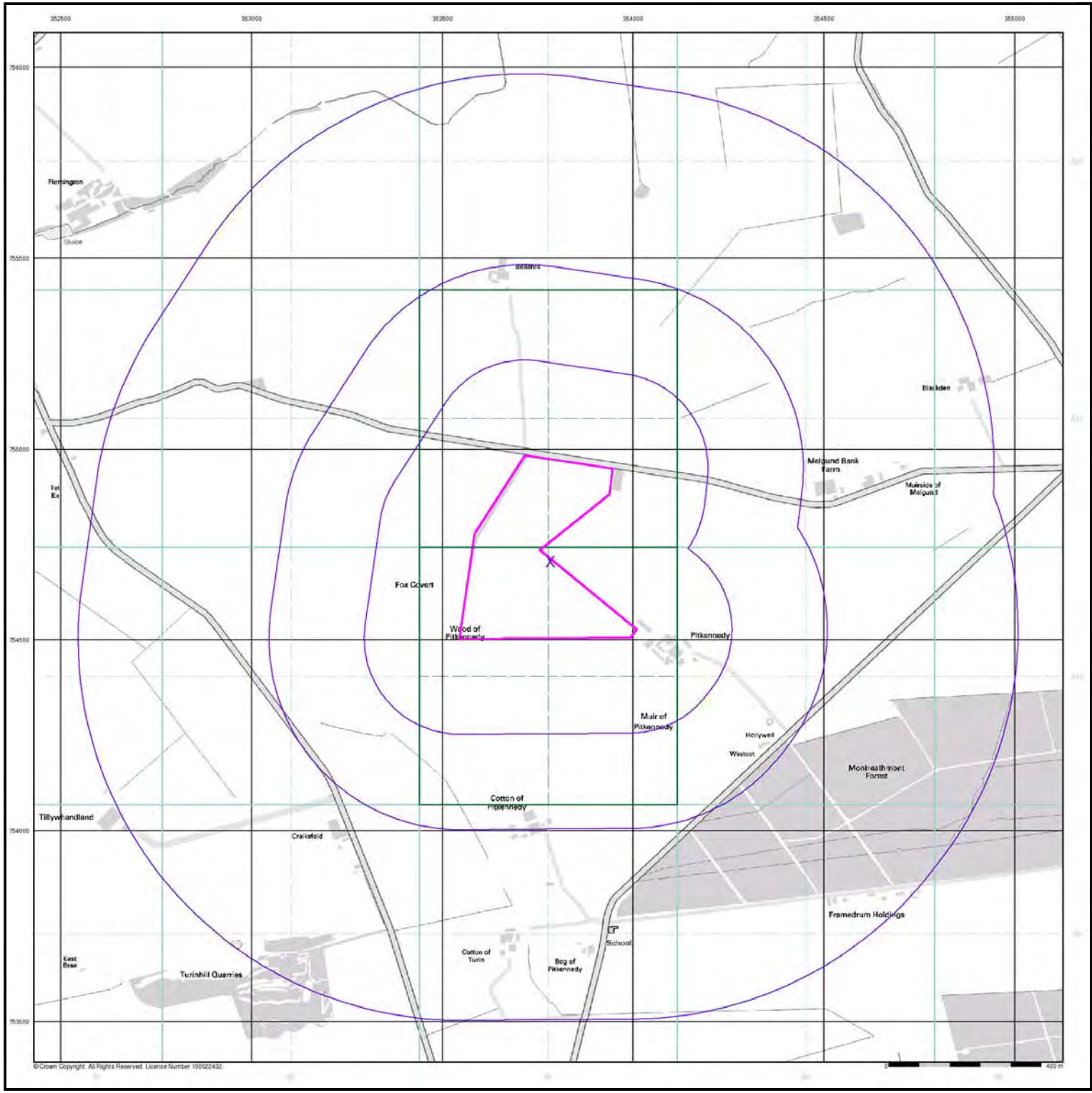


General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

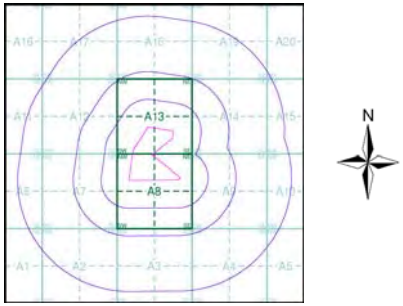
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

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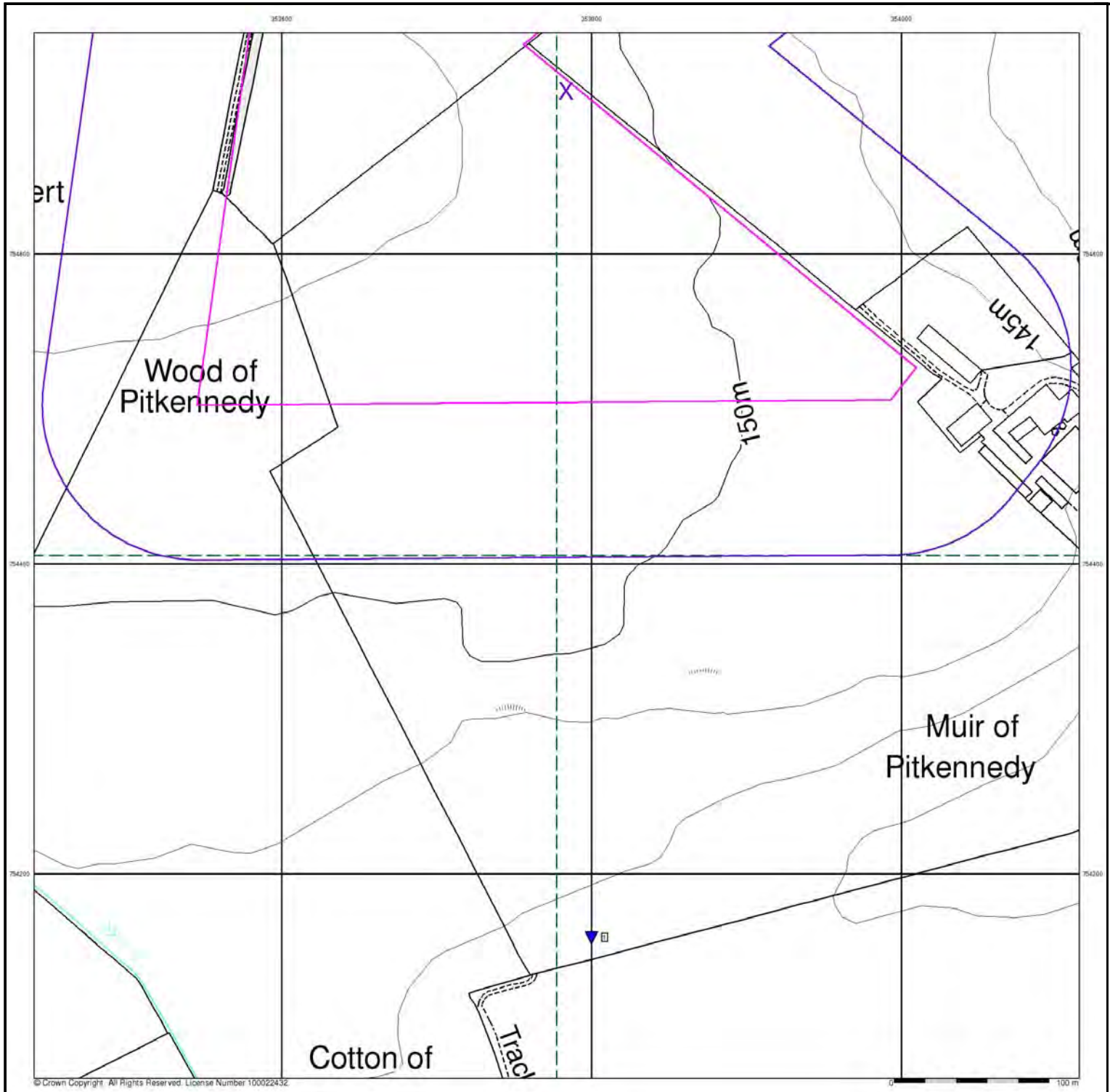
Web: www.envirocheck.co.uk

Envirocheck®



General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- Integrated Pollution Control Registered Waste Site
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Geological

- BGS Recorded Mineral Site

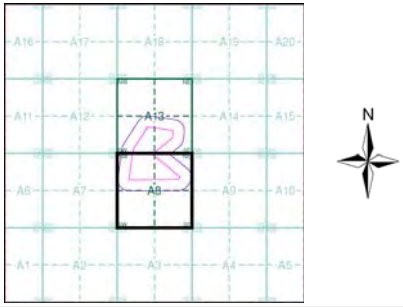
Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

Site Sensitivity Map - Segment A8



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45

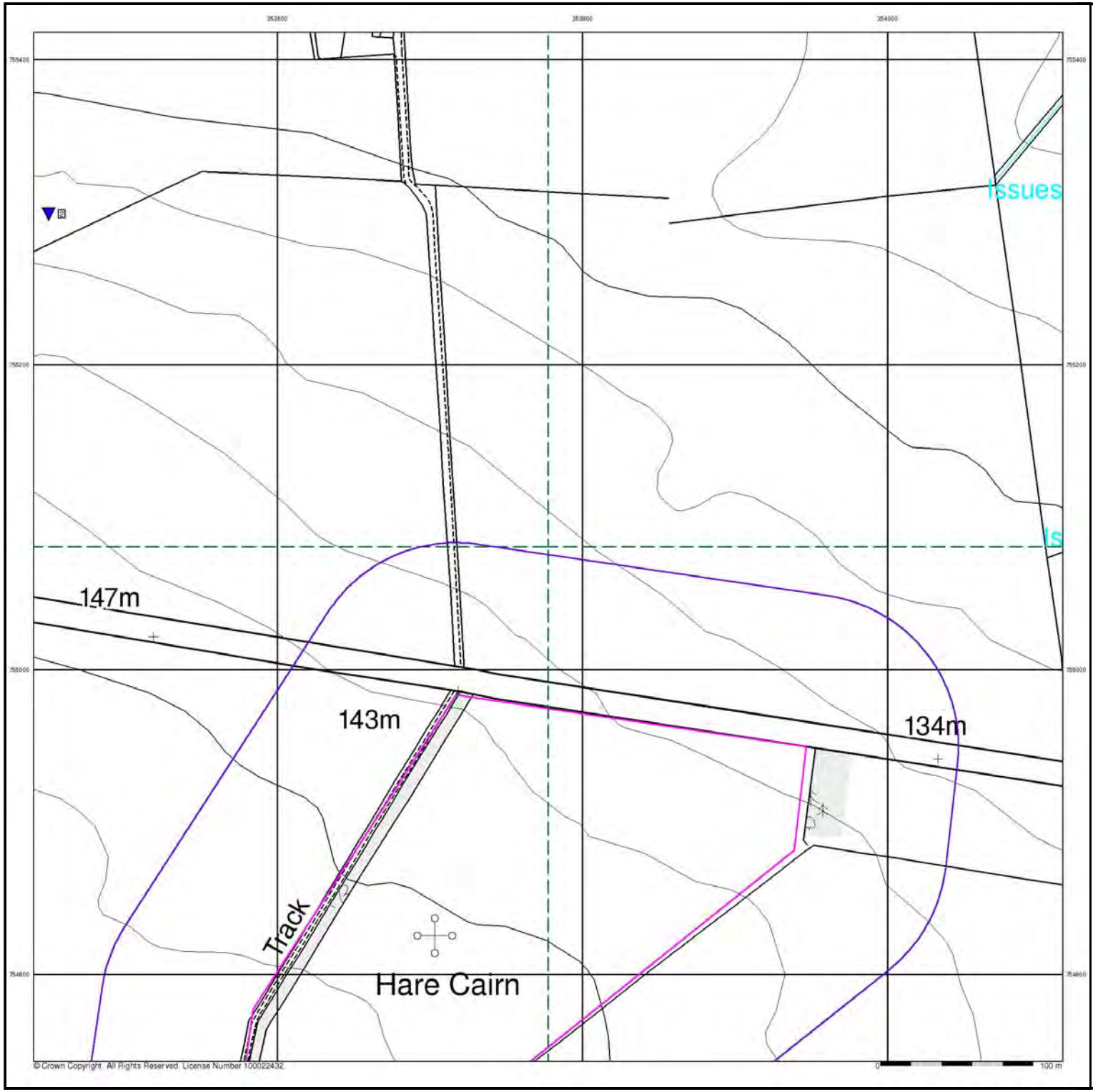
Site Details

Site at 353521,753944

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck®



General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
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- Water Industry Act Referral

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- Integrated Pollution Control Registered Waste Site
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Registered Landfill Site
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Geological

- BGS Recorded Mineral Site

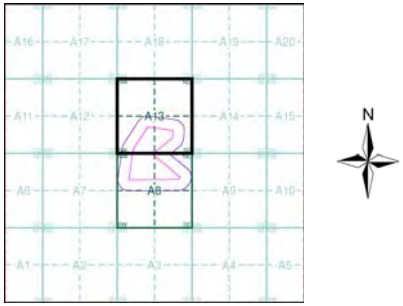
Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

Site Sensitivity Map - Segment A13



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45

Site Details

Site at 353521,753944

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Order Details:			
Order Number: 43167633			
Customer Ref: 3512008A			
National Grid Reference: 353780	754710		
Slice:			
Site Area (Ha): 13.45			
Search Buffer (m): 1000			
Site Details:			
Site at 353521	753944		
File Name	Map Series Name	Published	Source Scale
43167633_1_A_SS_County_Series_10560_ss-for-10560_1-2-1a_73552830.gif	Forfarshire	1903	1:10,560
43167633_1_A_SS_County_Series_10560_ss-for-10560_1-1a_73552842.gif	Forfarshire	1865	1:10,560
43167633_1_A_SS_County_Series_10560_ss-for-10560_1-2-2a_73552854.gif	Forfarshire	1927	1:10,560
43167633_1_A_SS_OS_Plan_10000_ss-ng-10000_4a_73552822.gif	Ordnance Survey Plan	1987-1989	1:10,000
43167633_1_A_SS_OS_Plan_10000_ss-ng-10000_3a_73552824.gif	Ordnance Survey Plan	1970	1:10,560
43167633_1_A_SS_OS_Plan_10000_ss-ng-10000_2a_73552826.gif	Ordnance Survey Plan	1969	1:10,560
43167633_1_A_SS_OS_Plan_10000_ss-ng-10000_1a_73552840.gif	Ordnance Survey Plan	1959	1:10,560
43167633_1_A_10k_CRM_2006_10kcrm_l00003_73552828.gif	10K Raster Mapping	2006	1:10,000
43167633_1_A_10k_CRM_2011_10kcrm_l00025_73552838.gif	10K Raster Mapping	2012	1:10,000

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

Gravel Pit
Sand Pit
Other Pits
Quarry
Shingle
Orchard
Osiers
Reeds
Marsh
Mixed Wood
Deciduous
Brushwood
Fir
Furze
Rough Pasture
Arrow denotes flow of water
Trigonometrical Station
Site of Antiquities
Bench Mark
Pump, Guide Post, Signal Post
Well, Spring, Boundary Post
·285 Surface Level
Sketched Contour
Instrumental Contour
Main Roads
Fenced
Un-Fenced
Minor Roads
Fenced
Un-Fenced
Sunken Road
Raised Road
Road over Railway
Railway over River
Railway over Road
Level Crossing
Road over River or Canal
Road over Stream
Road over Stream
County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
Co. Boro. Bdy. County Borough Boundary (England)
Co. Burgh Bdy. County Burgh Boundary (Scotland)
R.D. Bdy. Rural District Boundary
Civil Parish Boundary

Ordnance Survey Plan 1:10,000

Chalk Pit, Clay Pit or Quarry
Gravel Pit
Sand Pit
Disused Pit or Quarry
Refuse or Slag Heap
Lake, Loch or Pond
Dunes
Boulders
Coniferous Trees
Non-Coniferous Trees
Orchard
Scrub
Coppice
Bracken
Heath
Rough Grassland
Marsh
Reeds
Saltings
Building
Direction of Flow of Water
Shingle
Sand
Glasshouse
Pylon
Electricity Transmission Line
Pole
Sloping Masonry
Cutting
Embankment
Standard Gauge Multiple Track
Standard Gauge Single Track
Road Under
Road Over
Level Crossing
Foot Bridge
Siding, Tramway or Mineral Line
Narrow Gauge
Geographical County
Administrative County, County Borough or County of City
Municipal Borough, Urban or Rural District, Burgh or District Council
Borough, Burgh or County Constituency
Shown only when not coincident with other boundaries
Civil Parish
Shown alternately when coincidence of boundaries occurs

BP, BS	Boundary Post or Stone	Pol Sta	Police Station
Ch	Church	PO	Post Office
CH	Club House	PC	Public Convenience
F E Sta	Fire Engine Station	PH	Public House
FB	Foot Bridge	SB	Signal Box
Fn	Fountain	Spr	Spring
GP	Guide Post	TCB	Telephone Call Box
MP	Mile Post	TCP	Telephone Call Post
MS	Mile Stone	W	Well

1:10,000 Raster Mapping

Gravel Pit
Refuse tip or slag heap
Rock
Rock (scattered)
Boulders
Boulders (scattered)
Shingle
Mud
Sand
Sand Pit
Slopes
Top of cliff
General detail
Underground detail
Overhead detail
Narrow gauge railway
Multi-track railway
Single track railway
County boundary (England only)
Civil, parish or community boundary
District, Unitary, Metropolitan, London Borough boundary
Constituency boundary
Area of wooded vegetation
Non-coniferous trees
Non-coniferous trees (scattered)
Coniferous trees
Coniferous trees (scattered)
Positioned tree
Orchard
Coppice or Osiers
Rough Grassland
Heath
Scrub
Marsh, Salt Marsh or Reeds
Water feature
Flow arrows
MHWS Mean high water (springs)
MLWS Mean low water (springs)
Telephone line (where shown)
Electricity transmission line (with poles)
BM 123.45 m Bench mark (where shown)
Triangulation station
Point feature (e.g. Guide Post or Mile Stone)
Pylon, flare stack or lighting tower
Site of (antiquity)
Glasshouse
General Building
Important Building

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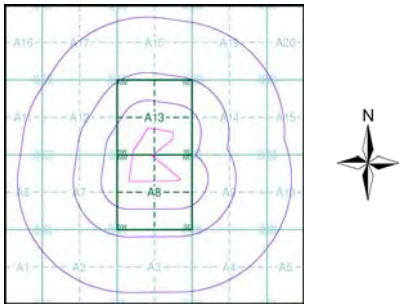
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Forfarshire	1:10,560	1865	2
Forfarshire	1:10,560	1903	3
Forfarshire	1:10,560	1927	4
Ordnance Survey Plan	1:10,000	1959	5
Ordnance Survey Plan	1:10,000	1969	6
Ordnance Survey Plan	1:10,000	1970	7
Ordnance Survey Plan	1:10,000	1987 - 1989	8
10K Raster Mapping	1:10,000	2006	9
10K Raster Mapping	1:10,000	2012	10

Historical Map - Slice A



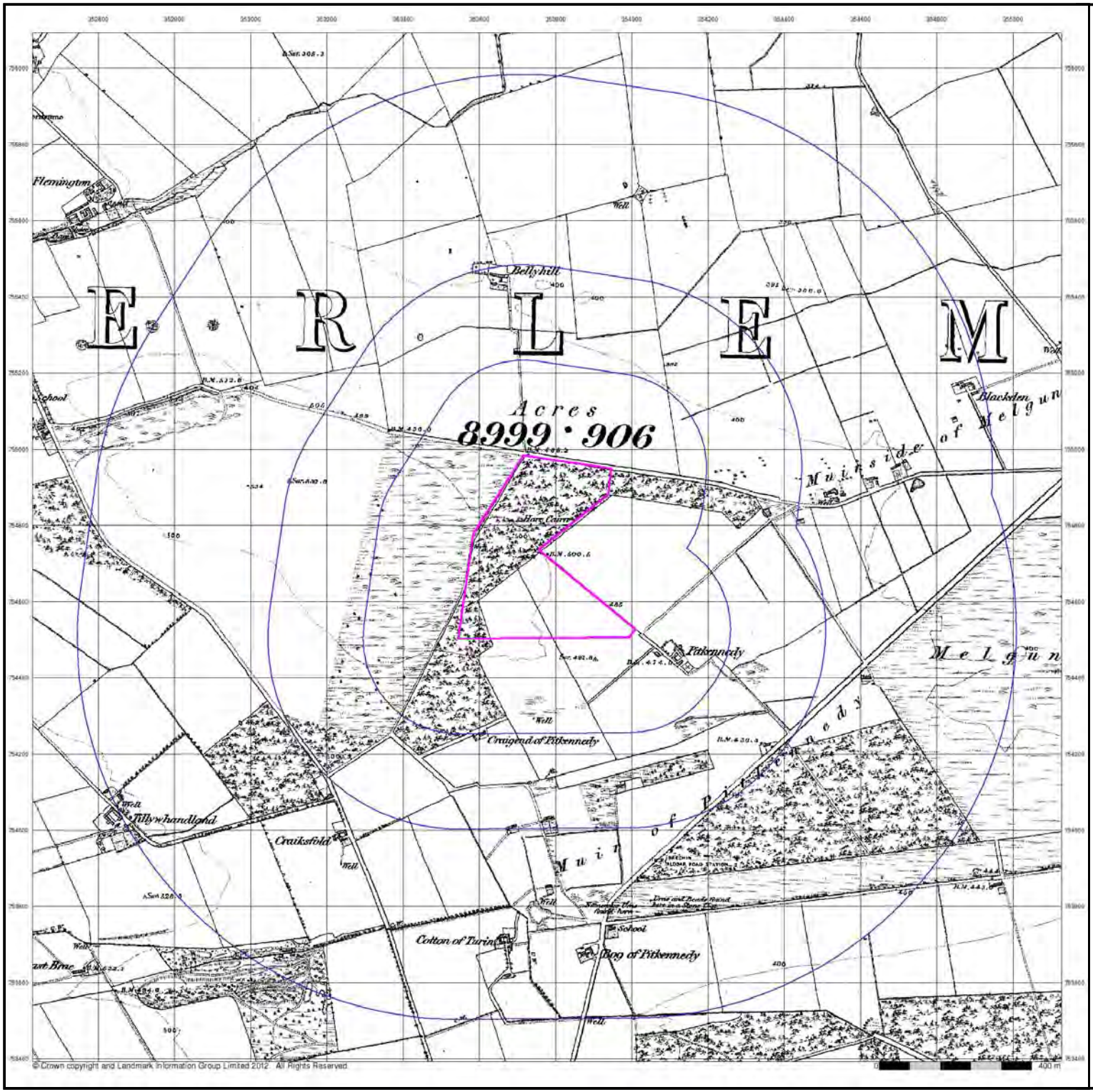
Order Details

Order Number: 43167633_1_1
Customer Ref: 3512008A
National Grid Reference: 353780, 754710
Slice: A
Site Area (Ha): 13.45
Search Buffer (m): 1000

Site Details

Site at 353521,753944

Landmark Information Group
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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Forfarshire

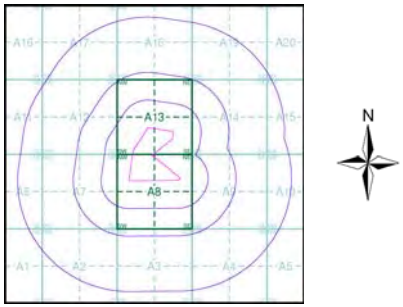
Published 1865

Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

Historical Map - Slice A



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

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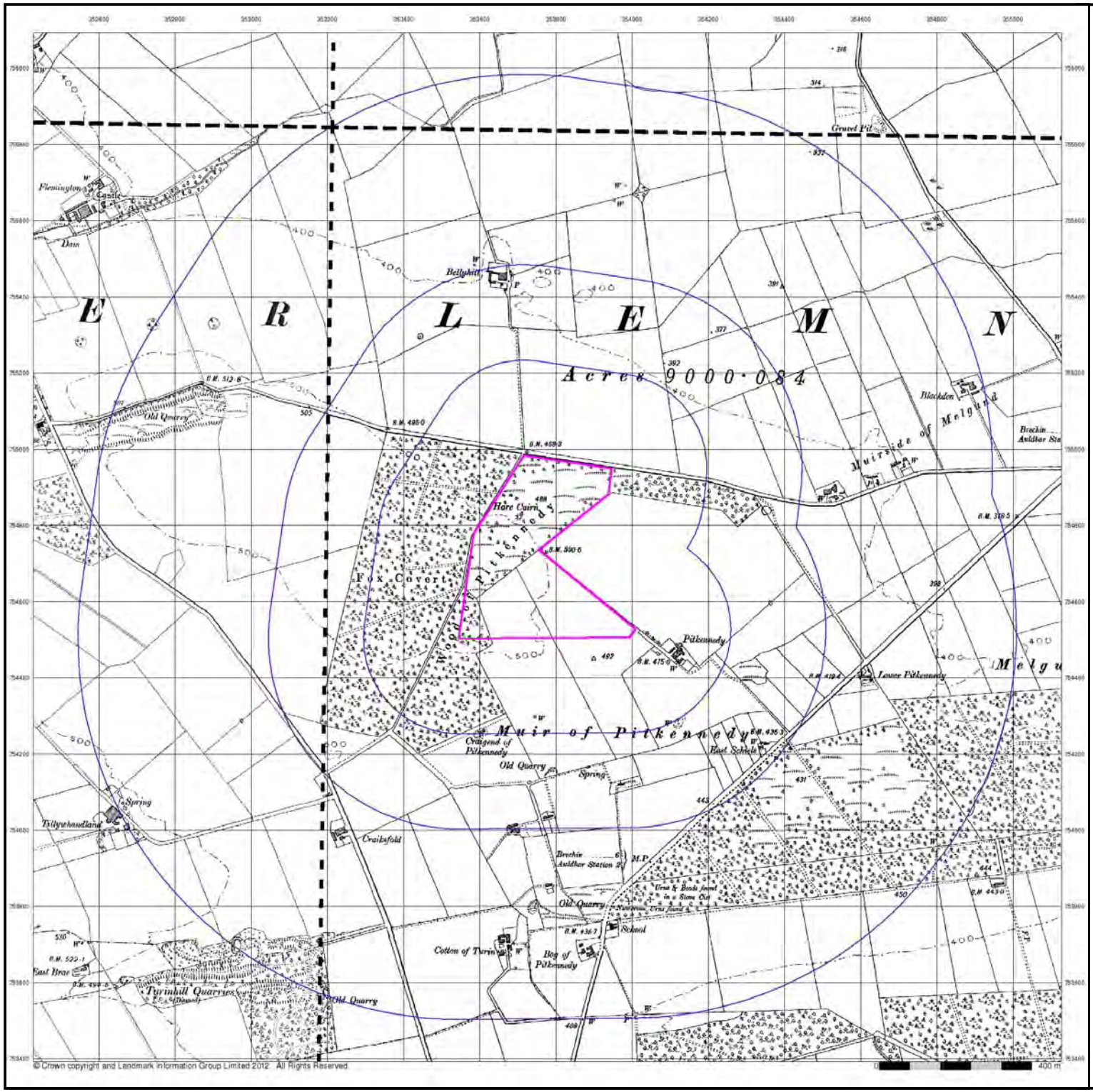

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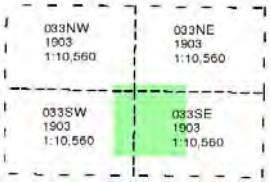
Forfarshire

Published 1903

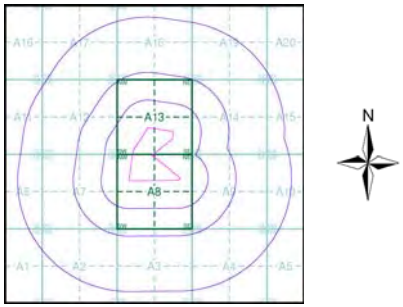
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

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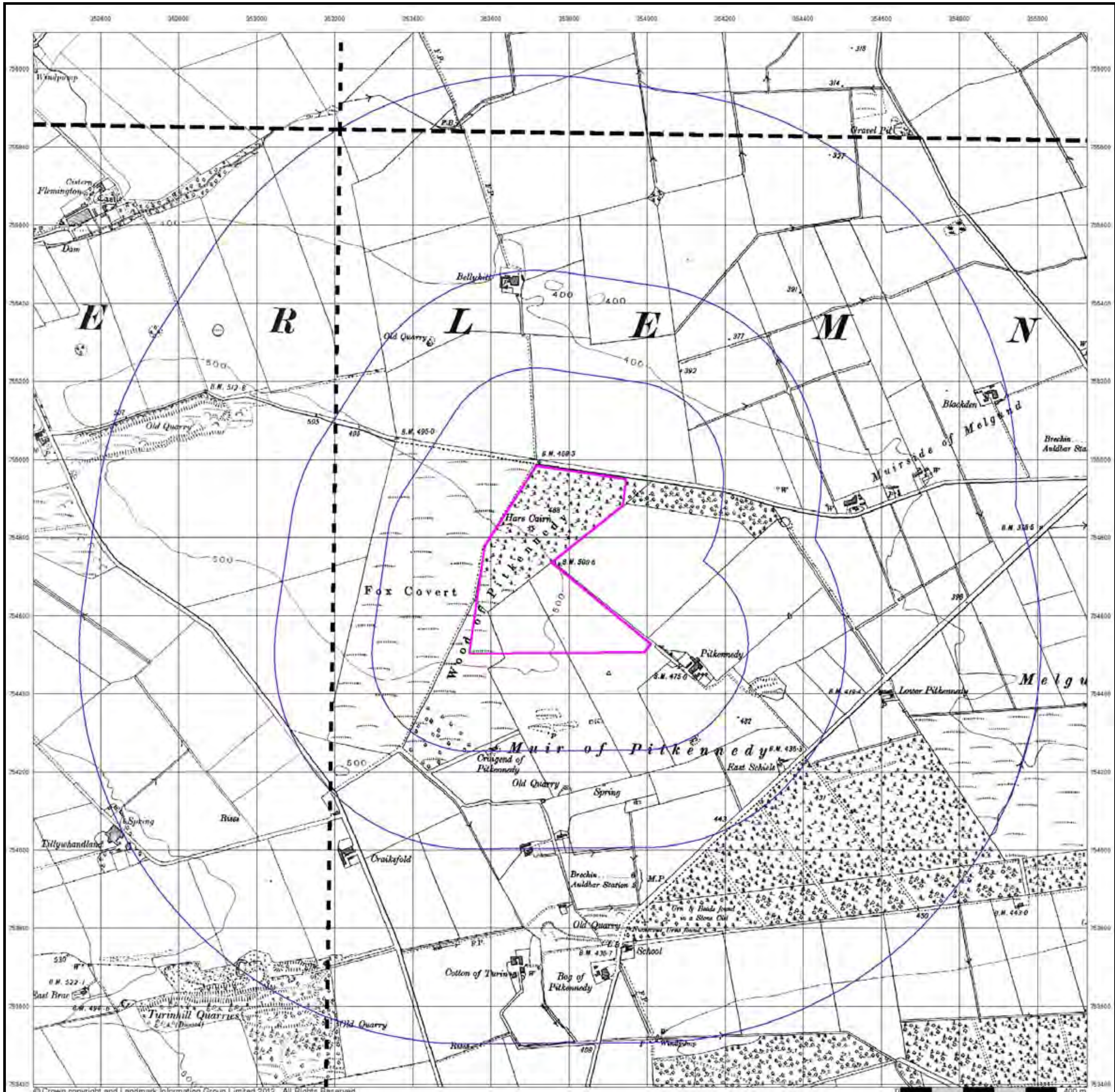

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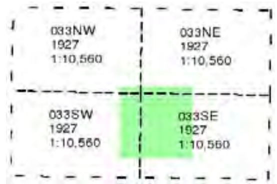
Forfarshire

Published 1927

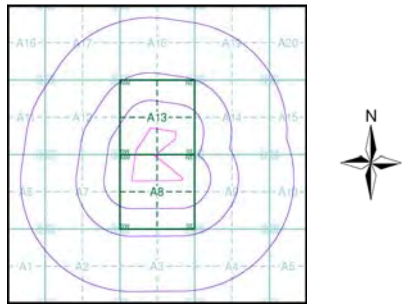
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 43167633_1_1
Customer Ref: 3512008A
National Grid Reference: 353780, 754710
Slice: A
Site Area (Ha): 13.45
Search Buffer (m): 1000

Site Details

Site at 353521,753944

Landmark Information Group

Tel: 0844 844 9952
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Web: www.envirocheck.co.uk

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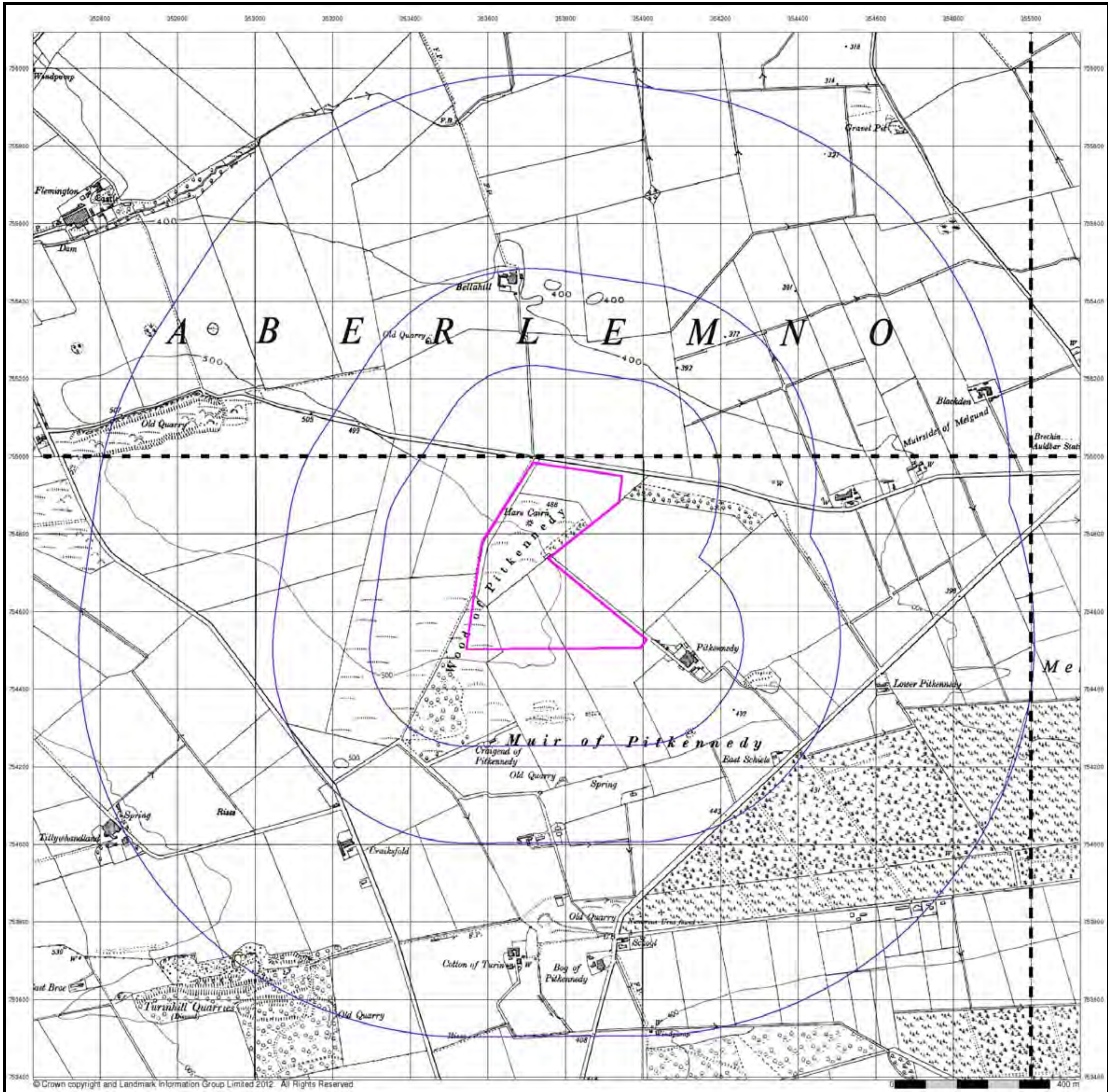
Ordnance Survey Plan

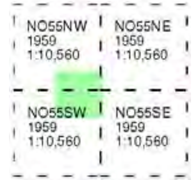
Published 1959

Source map scale - 1:10,000

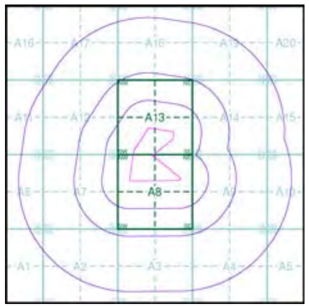
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.



Map Name(s) and Date(s)



Historical Map - Slice A



N

Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
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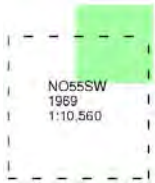
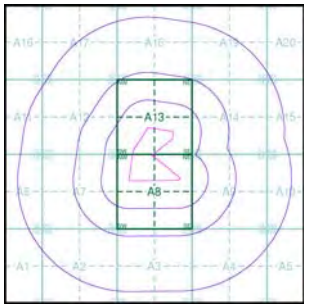
Ordnance Survey Plan
Published 1969
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	43167633_1_1
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Slice:	A
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Site Details

Site at 353521,753944

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Web: www.envirocheck.co.uk

Envirocheck®

Ordnance Survey Plan

Published 1970

Source map scale - 1:10,000

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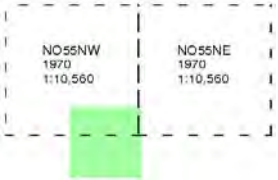
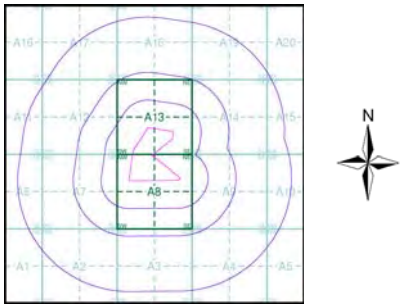
Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

Landmark® Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

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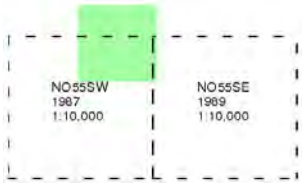
Ordnance Survey Plan

Published 1987 - 1989

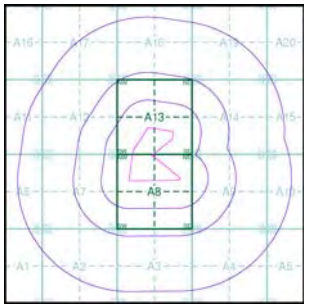
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
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Slice:	A
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Site Details

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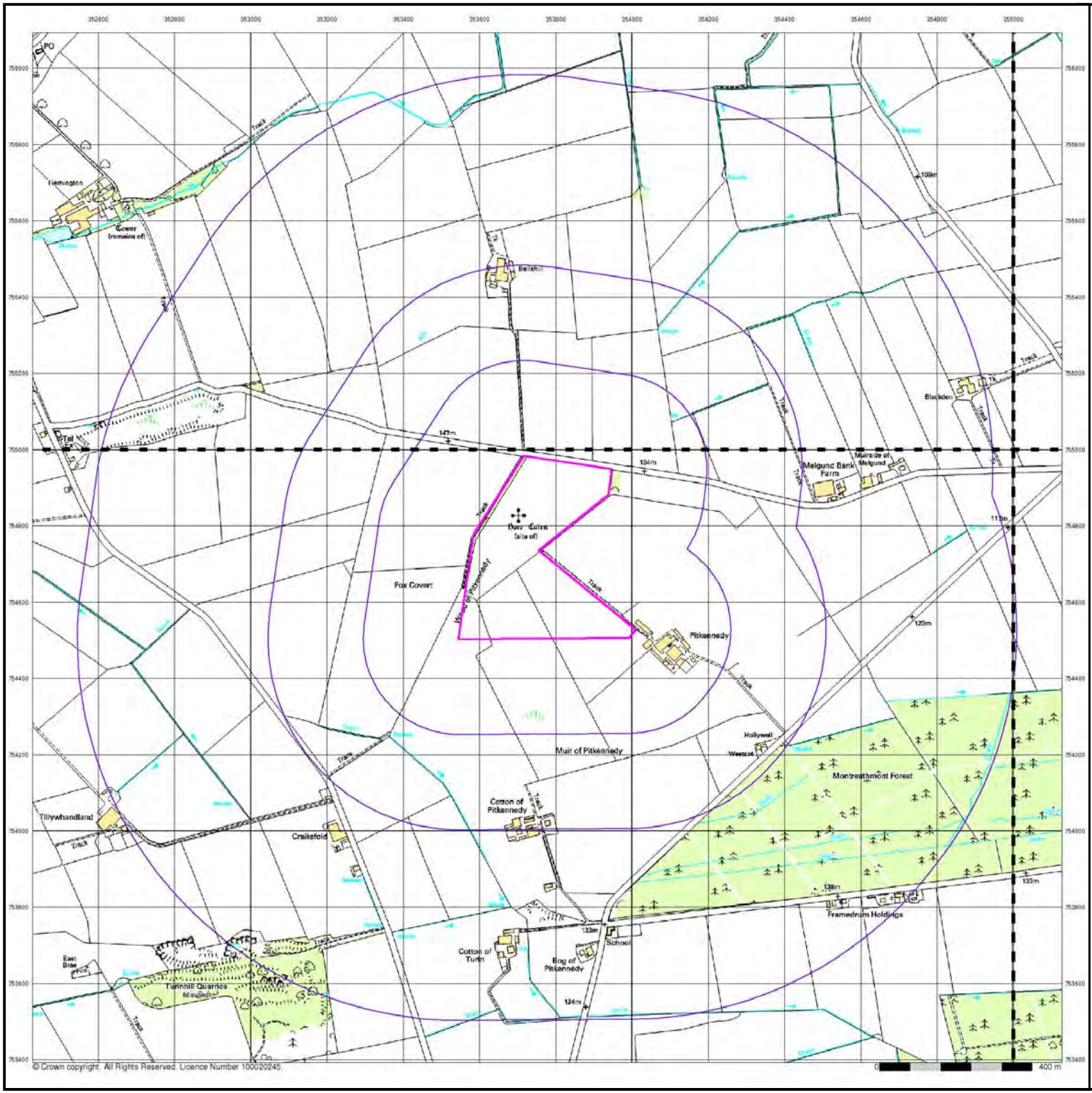


AC34

Envirocheck®

10k Raster Mapping

Published 2006

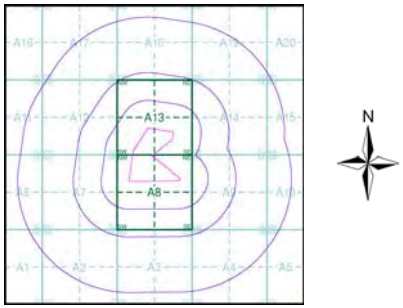
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

NO55NW 2006 1:10,000	NO55NE 2006 1:10,000
NO55SW 2006 1:10,000	NO55SE 2006 1:10,000

Historical Map - Slice A



Order Details

Order Number:	43167633_1_1
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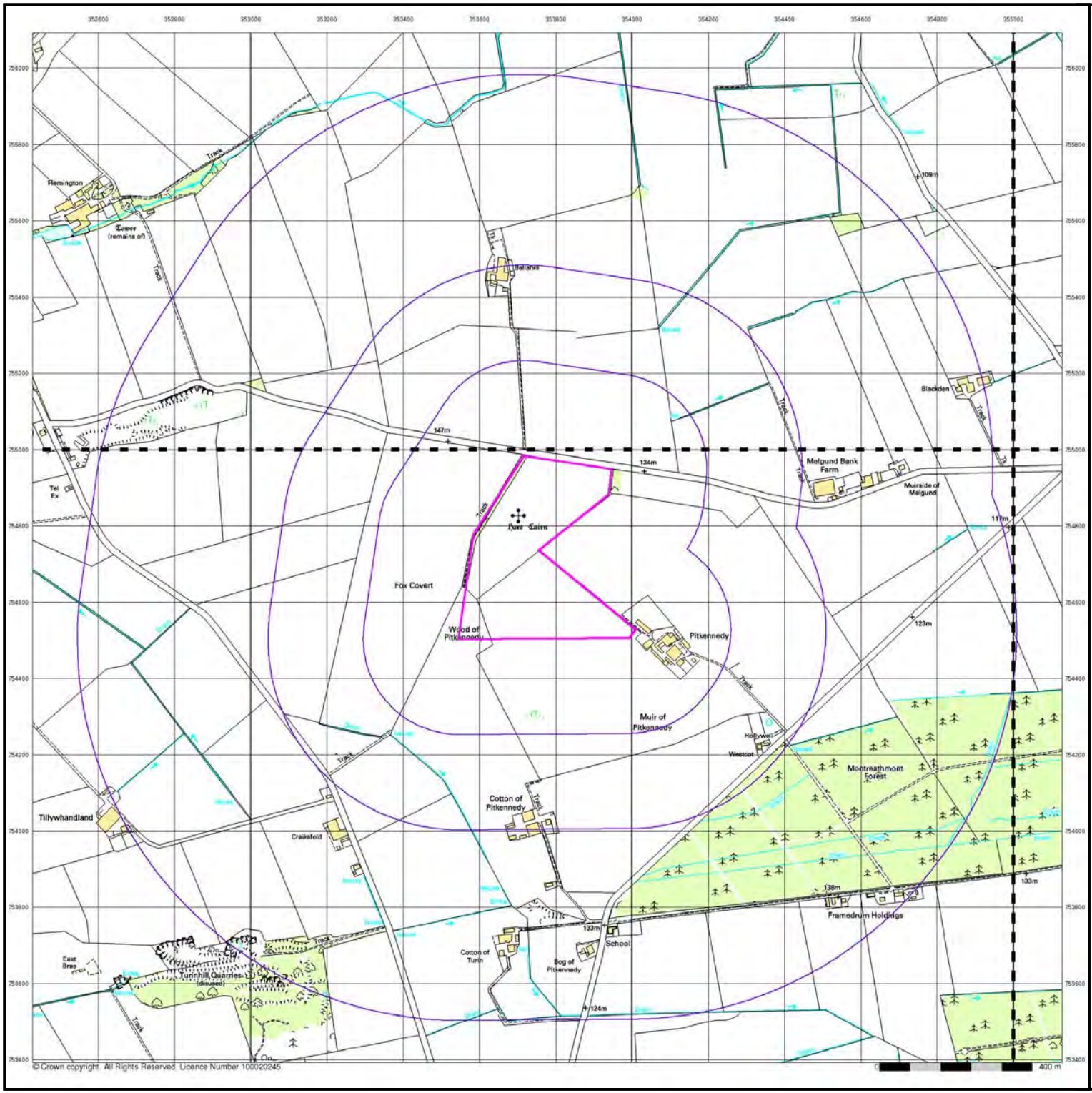


AC34

Envirocheck®

10k Raster Mapping

Published 2012

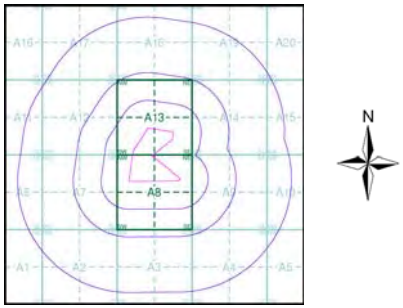
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

NO55NW 2012 1:10,000	NO55NE 2012 1:10,000
NO55SW 2012 1:10,000	NO55SE 2012 1:10,000

Historical Map - Slice A



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
43167633_1_1

Customer Reference:
3512008A

National Grid Reference:
353780, 754710

Slice:
A

Site Area (Ha):
13.45

Search Buffer (m):
1000

Site Details:

Site at 353521,753944

Client Details:

Mr T Rippon
Parsons Brinckerhoff Ltd
Amber Court
William Armstrong Drive
Newcastle-Upon-Tyne
NE4 7YQ

Contents

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

Report Version v47.0

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
Contaminated Land Register Entries and Notices					
Discharge Consents					
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls					
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 1		Yes		
Pollution Incidents to Controlled Waters					
Prosecutions Relating to Authorised Processes					
Prosecutions Relating to Controlled Waters					
Registered Radioactive Substances					
River Quality					
Substantiated Pollution Incident Register					
Water Abstractions					
Water Industry Act Referrals					
Groundwater Vulnerability	pg 1	Yes	n/a	n/a	n/a
Source Protection Zones					
River Flood Data (Scotland)				n/a	n/a
Waste					
BGS Recorded Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Recorded Landfill Sites					
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Geological					
BGS 1:625,000 Solid Geology	pg 3	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 3	Yes	Yes	Yes	Yes
BGS Recorded Mineral Sites	pg 6			2	3
BGS Urban Soil Chemistry					
BGS Urban Soil Chemistry Averages					
Brine Compensation Area			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain	pg 7	Yes	Yes	n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 7	Yes	Yes	n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 7	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 7	Yes	Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 7	Yes	Yes	n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries					
Fuel Station Entries					

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
National Scenic Areas					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones	pg 8	1			
Ramsar Sites					
Sites of Special Scientific Interest	pg 8				1
Special Areas of Conservation					
Special Protection Areas					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Nearest Surface Water Feature	A14NW (NE)	225	-	354128 755082
	Groundwater Vulnerability Geological Classification: Major or Highly Permeable Aquifer - Highly permeable strata usually with a known or probable presence of significant fracturing Soil Classification: Soils of Intermediate Leaching Potential - Soils which have a moderate ability to attenuate diffuse source pollutants or in which it is possible that some non-absorbed diffuse source pollutants and liquid discharges could penetrate the soil layer Map Sheet: Map of Scotland Scale: 1:625,000	A8NE (W)	0	1	353784 754705
	Drift Deposits None				
	River Flood Data (Scotland) None				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authority Landfill Coverage Name: Angus Council - Has no landfill data to supply		0	6	353784 754705

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Lower Old Red Sandstone, including Downtonian	A8NE (W)	0	2	353784 754705
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A8NE (W)	0	3	353784 754705
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A8NE (E)	0	3	354000 754705
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13SE (N)	17	3	353784 755000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13SE (NE)	74	3	354000 755000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (NE)	321	3	354069 755246
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (N)	336	3	353821 755308

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NW (N)	375	3	353554 755322
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NW (N)	380	3	353631 755353
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A3NE (S)	503	3	353784 754000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A3NE (S)	506	3	354000 754000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7NW (W)	546	3	353000 754705
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18SE (N)	560	3	354000 755507

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12SW (W)	625	3	353000 755000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12NW (NW)	666	3	353000 755096
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A2NW (SW)	742	3	353000 754000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A2NE (SW)	833	3	353117 753789
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12SW (W)	841	3	352773 755000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18NW (N)	882	3	353538 755846

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A2NW (SW)	905	3	353000 753781
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A10NW (E)	991	3	355000 754705
1	**BGS Recorded Mineral Sites** Site Name: Muir Of Pitkennedy Location: , Aberlemno, Forfar, Angus Source: British Geological Survey, National Geoscience Information Service Reference: 58382 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Unknown Operator Periodic Type: Devonian Geology: Dundee Flagstone Formation Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A8SE (S)	345	2	353800 754160
2	**BGS Recorded Mineral Sites** Site Name: Bellahill Location: , Aberlemno, Forfar, Angus Source: British Geological Survey, National Geoscience Information Service Reference: 58396 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Unknown Operator Periodic Type: Devonian Geology: Scone Sandstone Formation Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	415	2	353450 755300
3	**BGS Recorded Mineral Sites** Site Name: Cotton Of Turin Location: Bog Of Pitkennedy, Pitkennedy, Aberlemno, Forfar, Angus Source: British Geological Survey, National Geoscience Information Service Reference: 58383 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Unknown Operator Periodic Type: Devonian Geology: Dundee Flagstone Formation Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A3NW (S)	710	2	353755 753795
4	**BGS Recorded Mineral Sites** Site Name: Tillywhanland Location: , Aberlemno, Forfar, Angus Source: British Geological Survey, National Geoscience Information Service Reference: 26827 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Unknown Operator Periodic Type: Devonian Geology: Scone Sandstone Formation Commodity: Sandstone Positional Accuracy: Located by supplier to within 100m	A11NE (W)	942	2	352700 755100

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
5	**BGS Recorded Mineral Sites** Site Name: Turinhill Quarries Location: North Mains Of Turin, Aberlemno, Forfar, Angus Source: British Geological Survey, National Geoscience Information Service Reference: 26849 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Unknown Operator Periodic Type: Devonian Geology: Dundee Flagstone Formation Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A2SW (SW)	984	2	352985 753695
	BGS Measured Urban Soil Chemistry No data available				
	BGS Urban Soil Chemistry Averages No data available				
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Non Coal Mining Areas of Great Britain Risk: Rare Source: British Geological Survey, National Geoscience Information Service	A8NE (W)	0	2	353784 754705
	Non Coal Mining Areas of Great Britain Risk: Rare Source: British Geological Survey, National Geoscience Information Service	A13SE (N)	14	2	353784 754997
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A8NE (W)	0	2	353784 754705
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (N)	14	2	353784 754997
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A8NE (W)	0	2	353784 754705
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (N)	14	2	353784 754997
	Potential for Ground Dissolution Stability Hazards No Hazard				
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A8NE (W)	0	2	353784 754705
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (N)	14	2	353784 754997
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A8NE (W)	0	2	353784 754705
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (N)	14	2	353784 754997
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A8NE (W)	0	2	353784 754705
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (N)	14	2	353784 754997
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A8NE (W)	0	2	353784 754705
	Radon Potential - Radon Affected Areas Affected Area: The property is in a lower probability radon area, as less than 1% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	A8NE (W)	0	2	353784 754705

Sensitive Land Use

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
6	**Nitrate Vulnerable Zones** Name: Strathmore / Fife Description: Groundwater Source: Scottish Executive, Geographic Information Service	A8NE (W)	0	4	353784 754705
7	**Sites of Special Scientific Interest** Name: Turin Hill Multiple Areas: Y Total Area (m2): 187420.52 Source: Scottish Natural Heritage Reference: 1570 Designation Details: Geological Designation Date: 11th July 1989 Date Type: Designated	A12SW (NW)	725	5	352922 755072

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices		
Angus Council - Environmental and Consumer Protection	December 2012	Annual Rolling Update
Discharge Consents		
Scottish Environment Protection Agency - East Region	June 2001	Variable
Enforcement and Prohibition Notices		
Scottish Environment Protection Agency - East Region	January 2012	Not Applicable
Integrated Pollution Controls		
Scottish Environment Protection Agency - Head Office	February 1998	Variable
Scottish Environment Protection Agency - East Region	March 2002	Variable
Local Authority Pollution Prevention and Controls		
Scottish Environment Protection Agency - East Region	March 2002	Variable
Nearest Surface Water Feature		
Ordnance Survey	July 2012	Quarterly
Prosecutions Relating to Authorised Processes		
Scottish Environment Protection Agency - East Region	March 2007	Not Applicable
Prosecutions Relating to Controlled Waters		
Scottish Environment Protection Agency - East Region	March 2007	Not Applicable
Registered Radioactive Substances		
Scottish Environment Protection Agency - East Region	April 1996	Variable
Scottish Environment Protection Agency - Head Office	January 1998	Variable
River Quality		
Scottish Environment Protection Agency - Head Office	December 1990	Not Applicable
Water Abstractions		
Scottish Executive - Agriculture, Environment and Fisheries Department	December 1997	Not Applicable
Water Industry Act Referrals		
Scottish Environment Protection Agency - East Region	April 1996	Variable
Groundwater Vulnerability		
Scottish Environment Protection Agency - Head Office	December 1995	Not Applicable
Drift Deposits		
Scottish Environment Protection Agency - Head Office	December 1995	Not Applicable
Waste	**Version**	**Update Cycle**
BGS Recorded Landfill Sites		
British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Integrated Pollution Control Registered Waste Sites		
Scottish Environment Protection Agency - Head Office	January 1998	Variable
Scottish Environment Protection Agency - East Region	March 2002	Variable
Local Authority Landfill Coverage		
Angus Council - Environmental and Consumer Protection	May 2000	Not Applicable
Local Authority Recorded Landfill Sites		
Angus Council - Environmental and Consumer Protection	May 2000	Not Applicable
Registered Landfill Sites		
Scottish Environment Protection Agency - East Region	December 2005	Not Applicable
Scottish Environment Protection Agency - East Region - Perth Office	December 2005	Not Applicable
Registered Waste Transfer Sites		
Scottish Environment Protection Agency - East Region	December 2005	Not Applicable
Scottish Environment Protection Agency - East Region - Perth Office	December 2005	Not Applicable
Registered Waste Treatment or Disposal Sites		
Scottish Environment Protection Agency - East Region	December 2005	Not Applicable
Scottish Environment Protection Agency - East Region - Perth Office	December 2005	Not Applicable

Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH) Health and Safety Executive	October 2012	Bi-Annually
Explosive Sites Health and Safety Executive	June 2012	Bi-Annually
Notification of Installations Handling Hazardous Substances (NIHHS) Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements Angus Council - Planning Department	November 2012	Annual Rolling Update
Planning Hazardous Substance Consents Angus Council - Planning Department	November 2012	Annual Rolling Update
Geological	**Version**	**Update Cycle**
BGS 1:625,000 Solid Geology British Geological Survey - National Geoscience Information Service	August 1996	Not Applicable
BGS Estimated Soil Chemistry British Geological Survey - National Geoscience Information Service	January 2010	Variable
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	October 2012	Bi-Annually
Coal Mining Affected Areas The Coal Authority - Mining Report Service	January 2012	As notified
Mining Instability Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	February 2011	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	February 2011	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	February 2011	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	February 2011	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	February 2011	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	February 2011	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	February 2011	Annually
Radon Potential - Radon Affected Areas British Geological Survey - National Geoscience Information Service	July 2011	As notified
Radon Potential - Radon Protection Measures British Geological Survey - National Geoscience Information Service	July 2011	As notified
Industrial Land Use	**Version**	**Update Cycle**
Contemporary Trade Directory Entries Thomson Directories	August 2012	Quarterly
Fuel Station Entries Catalist Ltd - Experian	August 2012	Quarterly

Data Currency

Sensitive Land Use	Version	Update Cycle
Environmentally Sensitive Areas Scottish Executive - Geographic Information Service	September 2012	Annually
Forest Parks Forestry Commission	April 1997	Not Applicable
Local Nature Reserves Angus Council	October 2012	Bi-Annually
Marine Nature Reserves Scottish Natural Heritage	February 2012	Bi-Annually
National Nature Reserves Scottish Natural Heritage	October 2012	Bi-Annually
Nitrate Vulnerable Zones Scottish Executive - Geographic Information Service	April 2011	Annually
Ramsar Sites Scottish Natural Heritage	October 2012	Bi-Annually
Sites of Special Scientific Interest Scottish Natural Heritage	October 2012	Bi-Annually
Special Areas of Conservation Scottish Natural Heritage	October 2012	Bi-Annually
Special Protection Areas Scottish Natural Heritage	October 2012	Bi-Annually

Data Suppliers

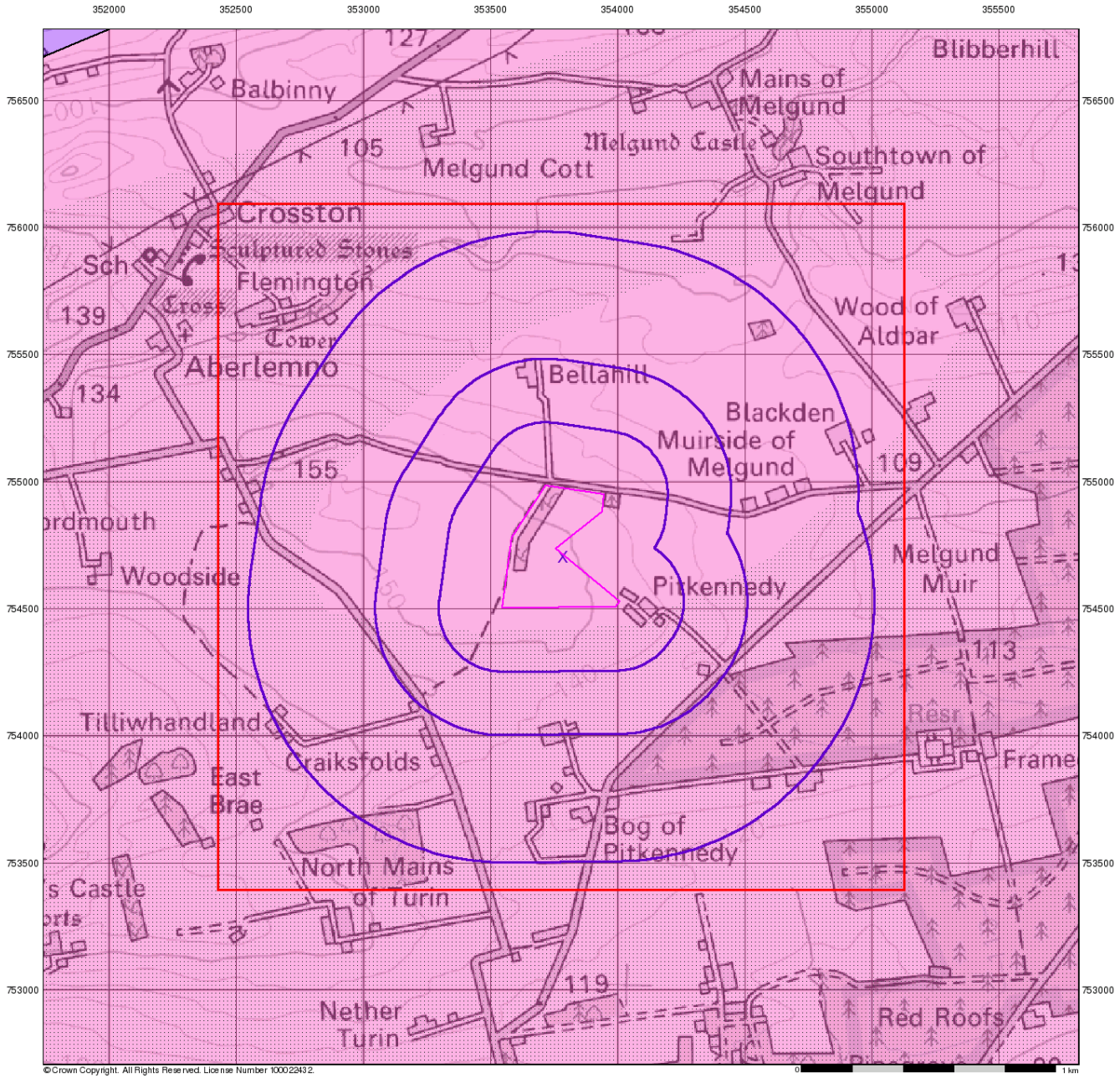
A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	
Centre for Ecology and Hydrology	
Countryside Council for Wales	
Scottish Natural Heritage	
Natural England	
Health Protection Agency	
Ove Arup	
Peter Brett Associates	

Useful Contacts

Contact	Name and Address	Contact Details
1	**Scottish Environment Protection Agency - Head Office** Erskine Court, The Castle Business Park, Stirling, Stirlingshire, FK9 4TR	Telephone: 01786 457700 Fax: 01786 446885
2	**British Geological Survey - Enquiry Service** British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
3	**Landmark Information Group Limited** 5 - 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Telephone: 01392 441761 Fax: 01392 441709 Email: cssupport@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk
4	**Scottish Executive - Geographic Information Service** Area 1J88, Victoria Quay, Edinburgh, EH6 6QQ	Telephone: 0131 5568400 Fax: 0131 2448240 Email: ceu@scotland.gov.uk Website: www.scotland.gov.uk
5	**Scottish Natural Heritage** 12 Hope Terrace, Edinburgh, Midlothian, EH9 2AS	Telephone: 0131 447 4784 Fax: 0131 446 2279
6	**Angus Council** St James House, St James Road, Forfar, DD8 2ZE	Telephone: 01307 461460 Fax: 01307 461874 Website: www.angus.gov.uk
-	**Health Protection Agency - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards** Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@hpa.org.uk Website: www.hpa.org.uk
-	**Landmark Information Group Limited** The Smith Centre, Henley On Thames, Oxfordshire, RG9 6AB	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / SEPA have a charging policy in place for enquiries.



Envirocheck®

Groundwater Vulnerability

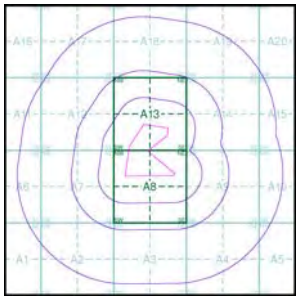
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes	Soil Classes
Highly Permeable	High
	Intermediate
	Low
Moderately Permeable	
Weakly Permeable	
Water or Sea	
Drift Deposit	

Site Sensitivity Context Map - Slice A



Order Details

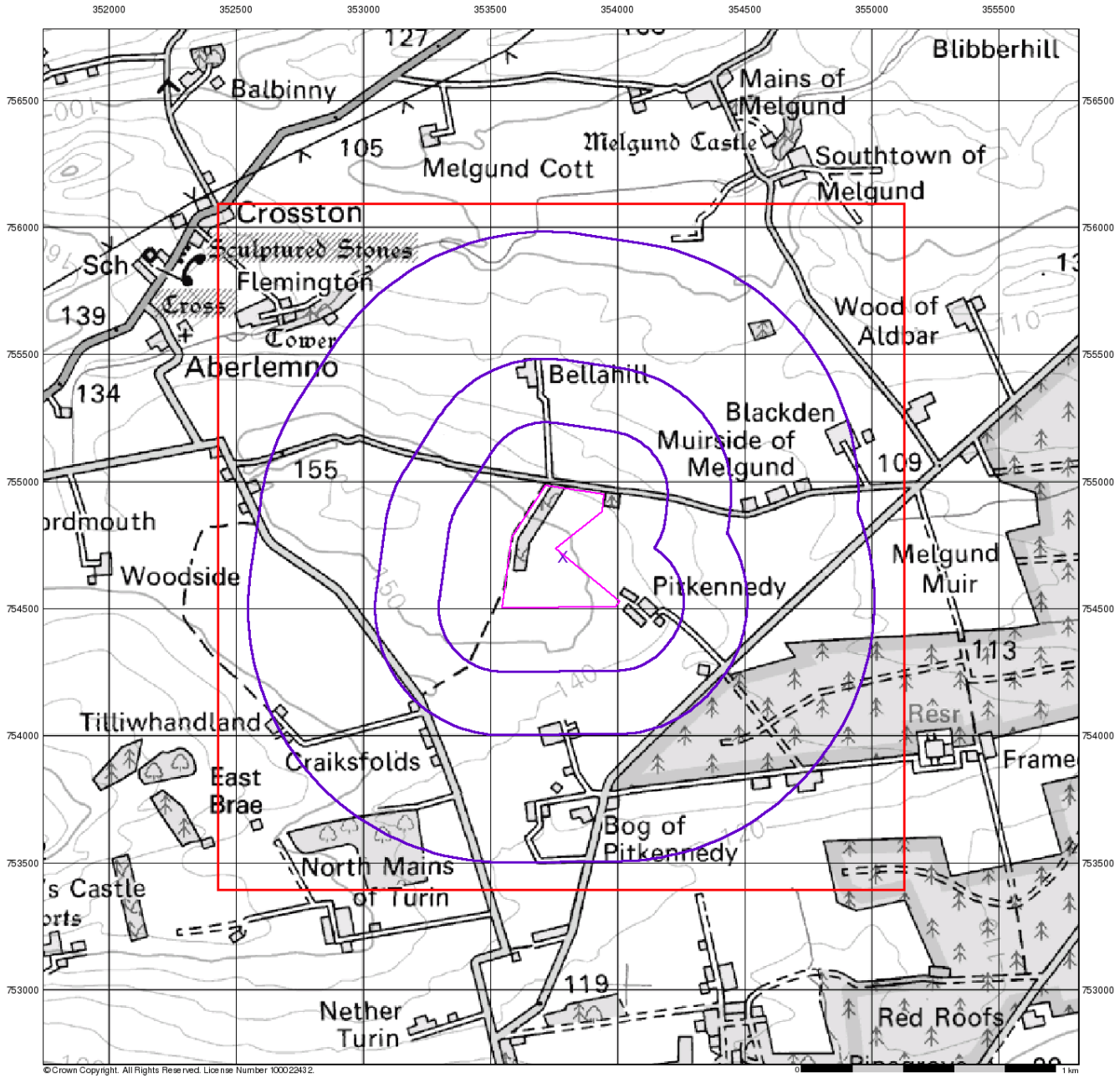
Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

Source Protection Zones

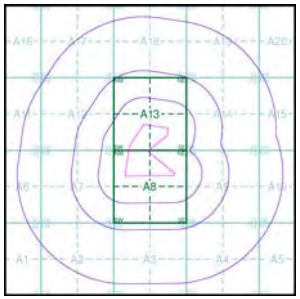
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Agency and Hydrological

- Source Protection Zone I
- Source Protection Zone II
- Source Protection Zone III
- Zone of Special Interest
- Source Protection Zone Borehole

Site Sensitivity Context Map - Slice A



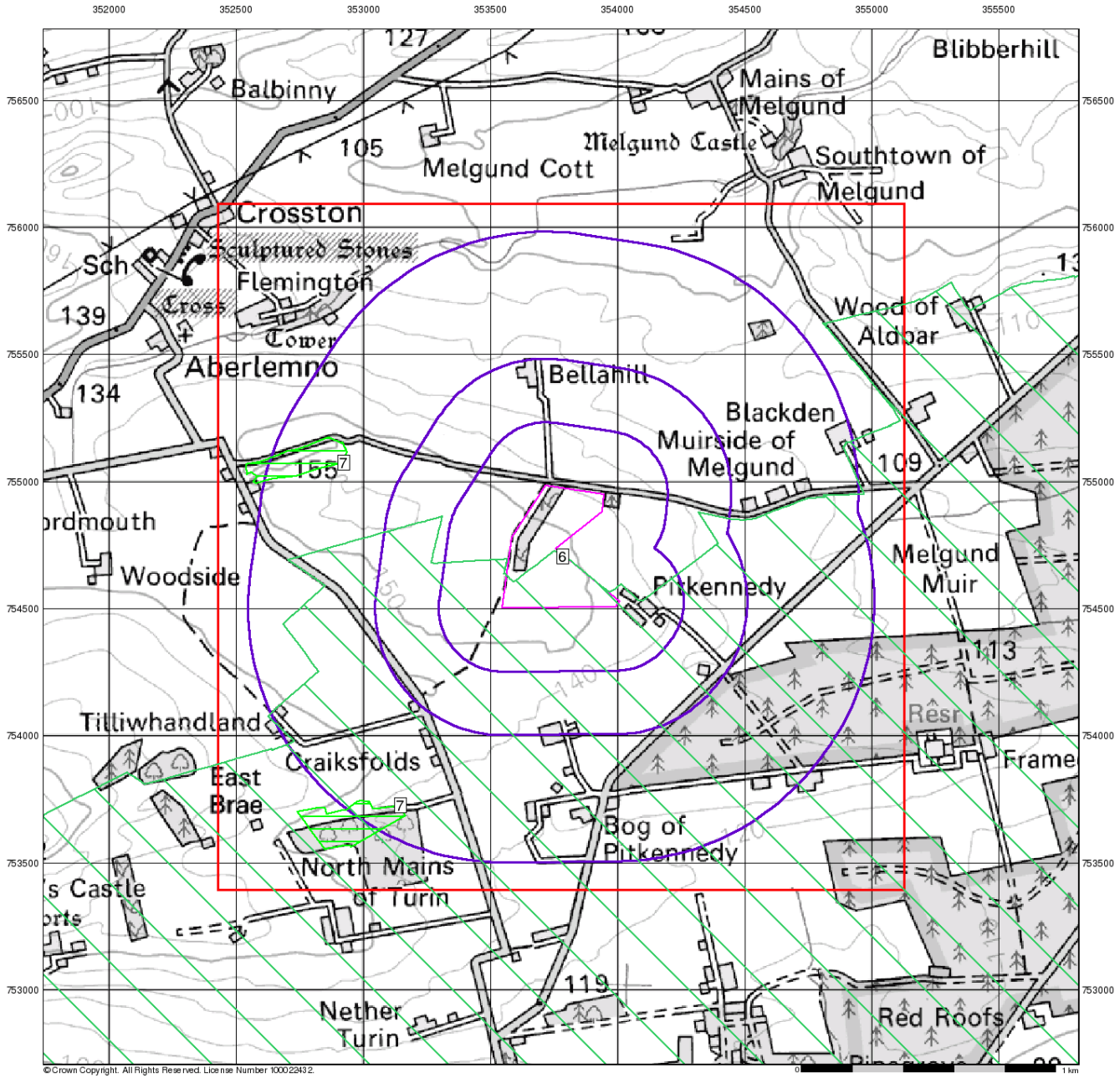
Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

Landmark Information Group
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

Sensitive Land Uses

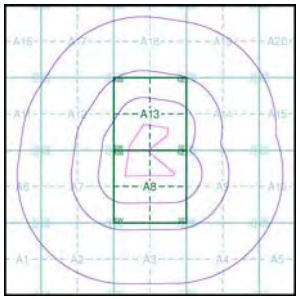
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Sensitive Land Uses

- Area of Adopted Green Belt
- Area of Unadopted Green Belt
- Environmentally Sensitive Area
- Forest Park
- Local Nature Reserve
- Marine Nature Reserve
- National Nature Reserve
- National Park
- National Scenic Area
- Nitrate Sensitive Area
- Nitrate Vulnerable Zone
- Ramsar Site
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area

Site Sensitivity Context Map - Slice A



Order Details

Order Number:	43167633_1_1
Customer Ref:	3512008A
National Grid Reference:	353780, 754710
Slice:	A
Site Area (Ha):	13.45
Search Buffer (m):	1000

Site Details

Site at 353521,753944

Landmark Information Group
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

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APPENDIX C

FULL ACCESS REPORT

AC34

Cotton of Pitkennedy Wind Energy Development

Full Access Report

March 2013

Document prepared by:

PARSONS BRINCKERHOFF

Document prepared on behalf of:

e-Gen
Part of a Clean Energy Community

PARSONS BRINCKERHOFF

PB 125 YEARS

COMMERCIALLY CONFIDENTIAL – PLEASE DO NOT DISTRIBUTE TO THIRD PARTIES

Report Title	**:**	**Cotton of Pitkennedy Wind Energy Development**
		Full Access Report
Report Status	**:**	**Issued**
Document No	**:**	**V2**
Date	**:**	**March 2013**
Prepared by	**:**	**Leila Tavendale**
Technical Check by	**:**	**Richard Hunter**
Approved by	**:**	**Tim Rippon**

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Addressee

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Disclaimer

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CONTENTS

1. INTRODUCTION

1.1 Introduction

Parsons Brinckerhoff Ltd (PB) has been commissioned by e-Gen Ltd to review the transport requirements for the abnormal load vehicles associated with the construction of the proposed Cotton of Pitkennedy wind energy development in Angus.

The aim of this document is to review the existing road structure, assess its suitability and propose a delivery route to site suitable for abnormal load vehicles associated with turbine component delivery vehicles. This report will also identify the extent of any required works identified to improve suitability of the route.

1.2 Assessment methodology

Ordnance Survey map data has been used to assess the proposed delivery route to site at a desk based level. In conjunction with the desk based studies, a proposed delivery route drive-over survey was conducted by a PB engineer to review potential constraints and to identify sections of the route that required swept-path analysis.

In addition to using swept-path analysis tools to assess pinch-points along the proposed access route, this report also highlights other factors that may affect the viability of the proposed access route, such as grounding points, weak road structures, weight restrictions on roads where signposted, and overhead services.

1.3 Scope of works

The suitability of the highway infrastructure has only been assessed for the wind farm's construction phase. The impacts and constraints for the proposed route are presented along with any proposed mitigation measures. It is assumed that the road infrastructure prior to the specified route (A roads and Motorways) present no constraints, and as such have not been assessed in detail in this report.

Transport requirements are based upon general specifications derived from various turbine manufacturers. For the purposes of this report the turbine blade deliveries have been assessed, as they are typically the most problematic components for delivery and are therefore the controlling impact. However, other components such as nacelles and tower sections may pose other constraints.

The following aspects have not been included / considered in this access review:

- A topographical survey of the proposed route;

- The presence of bridge structures or viability of using those bridges;
- Presence of Tree Preservation Orders (TPOs) and similar protective legislation;
- Overhanging trees or vegetation which may require pruning for vehicle manoeuvring;
- Consultation with the Local Highways Authority (LHA), third party landowners, turbine manufacturers and hauliers regarding the suitability of the proposed route and the identified mitigation measures;
- Consultation with Statutory Undertakers (SUs) with regards to safe working heights below any overhead lines.

It is recommended that the relevant bodies are consulted to ascertain whether there are any additional constraints on the proposed access route and any necessary mitigation measures.

2. POTENTIAL IMPACTS

2.1 Sensitive receptors

In accordance with the 'Guidelines for the Environmental Assessment of Road Traffic' (IEMA 1993), traffic sensitive receptors for the proposed access route have been outlined in **Table 1** below. These receptors may be used, along with other criteria, to determine the significance of environmental impact that construction traffic may have on the existing road network. The receptors listed are demonstrative only and are not intended to be exhaustive. If it is necessary to conduct a Transport Assessment for the EIA process, a detailed survey should be conducted to identify all receptors along the proposed route.

Table 1 – Transport sensitive receptors

Receptor Sensitivity	Receptor Type
Major	Receptors of greatest sensitivity to traffic flow: schools, colleges, playgrounds, accident black sports, retirement homes, urban / residential roads without footways that are used by pedestrians.
Moderate	Traffic flow sensitive receptors including: congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, un-segregated cycle-ways, community centres, parks, recreation facilities.
Minor	Receptors with some sensitivity to traffic flow: places of worship, public open space, nature conservation areas, listed buildings, tourist attractions and residential areas with adequate footway provision.
Negligible	Receptors with low sensitivity to traffic flows and those sufficiently distant from affected roads and junctions.

2.2 Construction phase

A number of overhead telecommunication and LV lines were also noted along the proposed delivery route. Clearance heights must be obtained from the relevant statutory undertakers to ensure unobstructed delivery of turbine components.

Due to the vehicles length, escort vehicles will be required to accompany the convoy to the site. It is assumed that the full width of the carriageway would be permitted along the route, including movements against the traffic flow where necessary.

2.3 Operational phase

Traffic associated with the wind farm during the operational phase will be limited to small vans or similar vehicles, which will be required to access the site to conduct maintenance and servicing, including small parts replacement, oil changes, etc. Scheduled maintenance is usually conducted once every three months, with a visual inspection completed once a month.

If unscheduled maintenance is required such as gearbox or generator replacement, it is likely that a single 300 tonne SWL crane will require access to site, in addition to the required replacement component on a standard fixed or articulated Heavy Goods Vehicle (HGV). Hydraulic cranes and HGVs of this capacity are generally able to negotiate public highways with relative ease. In the highly unlikely event that a blade replacement is required, transport requirements to site will be identical to those identified for the construction phase, together with the necessary mitigation works.

2.4 Decommissioning phase

The decommissioning phase of the wind turbines will comprise the same operations used during the construction phase and therefore, similar road alignments and mitigation measures must be implemented at the end of the operational life of the wind farm.

If the resale value of turbine components is negligible, the size of blades and tower sections may be reduced on site to aid transport requirements and ultimately negate the need for abnormal loads. Should resale values be high, turbine components will be removed from the site intact.

At this time, it is not possible to identify where resale turbine components of this size will be transported to. However, the proposed access route identified in this report is likely to be used and, in its present condition, poses no obstructions other than those already identified. It is recommended that a transport survey, similar to this report, is conducted immediately prior to decommissioning works in order that any restrictions are identified on the proposed delivery route from site.

3. PROJECT SPECIFICS

3.1 Wind energy development

The Cotton of Pitkennedy wind energy development is located to the east of Forfar and to the north of Letham in Angus. The site boundary is shown by a red outline in **Appendix 1**.

e-Gen have confirmed that the envisaged wind energy development will consist of an Enercon E48 sized turbine with a 48.95m tower height. Where a particular tower height determines the dimensions and weights of the components, these are identified by light blue fill in **Table 2** and **Table 4** below.

3.2 Vehicle dimensions and weights

Tables 2 – 4 outline the net dimensions and loaded dimensions of turbine components, and associated components weights for an Enercon E48. Information on an appropriate abnormal load vehicle and trailer are also included. Every effort has been made to ensure the vehicle dimension and weights detailed below are accurate, however, they should be confirmed with the haulier and the turbine supplier prior to undertaking the transport of components.

Table 2 - Enercon E48 turbine components

E48 turbine components	Tower height above upper foundation edge			
	48.95m	53.95m	59.00m	74.60m
Tower section				
Max length	19.92 metres	19.92 metres	20.85 metres	25.75 metres
Max diameter	3.74 metres	3.576 metres	3.576 metres	4.13 metres
Max weight	23 tonnes	28 tonnes	29 tonnes	51 tonnes
Foundation basket				
Max length	1.50 metres	1.50 metres	1.50 metres	2.00 metres
Max diameter	3.74 metres	3.656 metres	3.656 metres	4.419 metres
Max weight	2.4 tonnes	3.3 tonnes	3.0 tonnes	9.0 tonnes
Rotor blade				
Max length	24 metres			
Max weight	2.2 tonnes per blade			
Rotor hub				
Max weight	8.5 tonnes			

Generator	
Max weight	16.0 tonnes
Nacelle (main carrier etc)	
Max weight	6.0 tonnes
Recommended clearances for bridges and low / narrow structures	
Max height	4.6 metres
Max width	5.0 metres

It is understood that the proposed turbine at this site will not require a 74.60m tower, and as such the longest turbine component for delivery will be the rotor blade at 24m.

Table 3 - Enercon E48 vehicle and trailer

E48 vehicle and trailer	Tower height above upper foundation edge
Typical vehicle: based on a Volvo FH16 8x4 T Ride Rigid - FH 84R B6HS1	
Gross vehicle weight	28.35 tonnes
Typical trailer: based on Nooteboom Teletrailer – Type 2	
Gross vehicle weight	42 tonnes
Payload	32.6 tonnes

Table 4 – Enercon E48 overall gross weights

E48 overall gross weights	Tower height above upper foundation edge			
	48.95m	53.95m	59.00m	74.60m
Tower section				
Gross combined vehicle weight	93.35 tonnes	98.35 tonnes	99.35 tonnes	121.35 tonnes
Foundation basket				
Gross combined vehicle weight	72.75 tonnes	73.65 tonnes	73.35 tonnes	79.35 tonnes
Rotor blade				
Gross combined vehicle weight	72.55 tonnes			
Rotor hub				
Gross combined vehicle weight	78.85 tonnes			
Generator				
Gross combined vehicle weight	86.35 tonnes			

Nacelle (main carrier etc)	
Gross combined vehicle weight	76.35 tonnes

3.3 Cranes

For wind turbine construction, the recommended crane for an E48 is a 500 tonne telescopic crane, with the following dimensions and weights. For this analysis, the candidate vehicle used is a Liebherr-LTM1500 mobile crane.

Table 5 – 500t telescopic crane delivery vehicle

500t telescopic crane delivery vehicle	Dimensions and weights
Max length	21.4 metres
Max diameter	3.23 metres
Max height	4.0 metres
Total weight	96 tonnes
Number of axles	8
Max axle weight	12 tonnes

4. PROPOSED ROUTE

4.1 Port of entry

Currently, there are no wind turbine manufacturers based in the UK. Turbine components are generally brought into the UK from mainland Europe via ports which are suitable for the deep draft of vessels required for the transport of turbine components.

The nearest ports that are deemed potentially viable for delivery of turbine components are:

- Port of Dundee;
- Port of Aberdeen; and
- Port of Leith, Edinburgh.

It is recommended that e-Gen begins discussions with port operators in due course to confirm the viability of using their port facilities for turbine component deliveries. As this is a commercial consideration, it is not discussed further in this report.

4.2 Preferred access route

From the proposed port of entry, the UK's network of motorways and A-roads will be used to transport wind turbine components to the vicinity of the site. On the basis of detailed desk-based assessment and access route drive-through, the preferred access route to site is proposed as follows:

A90 – A972 – A92 – Westway – A933 – B9113 – unclassified road north past Westerton – unclassified road past Bog of Pitkennedy – site entrance.

A location map detailing this route is contained within **Appendix 1**.

Access to the A92 from the ports of entry is straightforward and is unlikely to pose an issue to abnormal loads. From the ports of entry, the A90 can be reached using the network of A-roads and motorways. PB recommends that e-Gen confirms the acceptability of the proposed route with Transport Scotland and any other relevant consultees.

4.3 Alternative access route

In addition to the proposed access route, several alternative access routes were considered. However, the preferred access route is considered to be the most appropriate route to site having the highest potential to avoid third party land, verge modifications, and street furniture removal.

5. DETAILED ROUTE ASSESSMENT

This section of the report analyses in detail any potential pinch points that may pose an issue to the delivery of wind turbine components to the proposed site entrance. Where possible, third party land, street furniture and off carriageway routes have been avoided. Where unavoidable, PB has endeavoured to propose the most sensible solution which takes account of safety and financial considerations.

In all instances, it is assumed that both sides of the road may be used for vehicle movements, and temporary traffic control measures will be implemented, including police escort, to ensure road safety is not compromised in any way during transport operations.

5.1 Access route survey

For the purposes of this detailed route assessment, the starting point is considered to be the turning from the A92 onto the Westway on the western outskirts of Arbroath. As outlined in sub-section 4.2, the road network from the A92 to the ports of entry is considered suitable for accommodating the delivery of abnormal loads.

Table 5 below lists any points of constraint identified along the preferred access route during the route survey.

Table 5 – Detailed route assessment

	Description	Comments
PP1	Left turn from A92 onto Westway.	Third party land unlikely to be necessary. Street furniture may need to be removed temporarily during vehicle movements. Use of the pavement may be necessary. **Swept-path analysis necessary to determine requirement for use of the pavement.**
PP2	Left turn by cricket grounds on Westway.	Third party land unlikely to be necessary. Street furniture will not need to be removed temporarily during vehicle movements. Use of the pavement may be necessary.

		Swept-path analysis necessary to determine requirement for use of the pavement.
PP3	Left turn from Westway onto A933.	Third party land unlikely to be necessary. Street furniture will not need to be removed temporarily during vehicle movements. Use of the pavement may be necessary. **Swept-path analysis necessary to determine requirement for use of the pavement.**
PP4	Left turn from A933 onto the B9113.	Third party land unlikely to be necessary. Street furniture will not need to be removed temporarily during vehicle movements. Highway verge modification may be necessary. **Swept-path analysis necessary to determine requirement for highway verge modification.**
PP5	Right turn from B9113 onto unclassified road north past Westerton.	Third party land unlikely to be necessary. Street furniture will not need to be removed temporarily during vehicle movements. Highway verge modification may be necessary. **Swept-path analysis necessary to determine requirement for highway verge modification.**
PP6	Right turn onto unclassified road past Bog of Pitkennedy.	Third party land unlikely to be necessary. Street furniture may need to be removed temporarily during vehicle movements. Highway verge modification may be necessary. **Swept-path analysis necessary to determine requirement for highway verge modification.**
PP7	Bend to the left on unclassified road past Bog of	Third party land unlikely to be necessary. Street furniture will not need to be removed temporarily during

	Pitkennedy.	vehicle movements. Highway verge modification may be necessary. **Swept-path analysis necessary to determine requirement for highway verge modification.**
PP9	Gentle right turn on unclassified road by Bog of Pitkennedy	Third party land unlikely to be necessary. Street furniture will not need to be removed temporarily during vehicle movements. Highway verge modification may be necessary. **Swept-path analysis necessary to determine requirement for highway verge modification.**
PP10	Left turn from unclassified road onto unclassified road to site entrance.	Third party land may be necessary. Street furniture will not need to be removed temporarily during vehicle movements. Highway verge modification may be necessary. **Swept-path analysis necessary to determine requirement for third party land take.**

The locations of each of the pinch points described in **Table 5** are indicated on **Appendix 1**.

Photographs of each pinch point are shown on the swept-path drawings and in the **Photographs** section of this report.

5.2 Swept-path analysis

In undertaking swept-path analysis, AutoTrack pro version 9.01A, an AutoCAD plug-in has been used. AutoTrack is a swept-path analysis software package that allows the modelling of all types of steered vehicles and is used in combination with ordnance survey landline mapping to demonstrate the extent of highway modifications for negotiating a corner.

For each pinch point the worst case basis has been adopted, using the transport of a blade at 24m in length. It has also been assumed that the vehicle will have independent rear steering.

In the case of each pinch point identified as requiring swept-path analysis, a corresponding swept-path drawing is shown in the appendices to this report. The pinch point ID numbers (eg. PP1) shown in

Table 5 are used as the identifiers for the swept-path drawings.

The swept-path analysis was undertaken based on a vehicle and trailer deemed suitable for transporting the rotor blades. The dimensions of the trailer relate to the size of the blade needing to be transported and may differ to trailers used in reality. The vehicle's behaviour and manoeuvrability has been modelled to the best of PB's technical ability for the purpose of this assessment.

6. CONCLUSIONS

6.1 Preferred access route

Table 6 summarises the findings of this access report incorporating the findings of the swept-path analysis, and suggests appropriate mitigation measures where applicable.

Table 6 - Conclusions

	Description	Associated Drawing Number	Results / Proposed mitigation
PP1	Left turn from A92 onto Westway.	CP002	There is no requirement for third party land at this corner. No street furniture will need to be removed. No highway verge modifications or temporary paving will be necessary. ***No further action necessary.***
PP2	Left turn by cricket grounds on Westway.	CP003	There is no requirement for third party land at this corner. No street furniture will need to be removed. No highway verge modifications or temporary paving will be necessary. ***No further action necessary.***
PP3	Left turn from Westway onto A933.	CP004	There is no requirement for third party land at this corner. No street furniture will need to be removed. No highway verge modifications or temporary paving will be necessary. ***No further action necessary.***
PP4	Left turn from A933 onto the B9113.	CP005	There is no requirement for third party land at this corner.

			No street furniture will need to be removed. No highway verge modifications or temporary paving will be necessary. ***No further action necessary.***
PP5	Right turn from B9113 onto unclassified road north past Westerton.	CP006	There is no requirement for third party land at this corner. No street furniture will need to be removed. No highway verge modifications or temporary paving will be necessary. ***No further action necessary.***
PP6	Right turn onto unclassified road past Bog of Pitkennedy.	CP007	There is no requirement for third party land at this corner. No street furniture will need to be removed. No highway verge modifications or temporary paving will be necessary. ***No further action necessary.***
PP7	Bend to the left on unclassified road past Bog of Pitkennedy.	CP008	There is no requirement for third party land at this corner. No street furniture will need to be removed. No highway verge modifications or temporary paving will be necessary. ***No further action necessary.***
PP9	Gentle right turn on unclassified road by Bog of Pitkennedy	CP018	There is no requirement for third party land at this corner. No street furniture will need to be removed. No highway verge modifications or temporary paving will be necessary.

			No further action necessary.
PP10	Left turn from unclassified road onto unclassified road to site entrance.	CP019	There is a requirement for third party land in order to negotiate this corner. Land take will be required on the inside of the bend. No street furniture will need to be removed. Highway verge modification will be necessary and temporary paving will need to be installed. Highway verge modification will be necessary on sections of verge on both the inside and the outside of the corner.

Consultation with Transport Scotland, the Local Planning Authority Highways Department, and any other relevant consultees should be undertaken. In particular, any weight restrictions on the proposed access route should be identified and assessed fully.

APPENDICES

AC34

LEGEND

- Site boundary
- Access route
- Pinch points
- PP# Corner reference

COTTON OF PITKENNEDY

Plan of access routes

DOCUMENT REFERENCE	LAST REVISION DATE
CP026	March 2013
SITE DESIGN VERSION	**SCALE**
V1	Not to scale

DRAWN	CHECKED	APPROVED
RH	LT	TR

PARSONS BRINCKERHOFF

APPENDIX 1

SWEPT-PATH DRAWINGS

Cotton of Pitlennedy PP1

Drawn by: RH
Checked by: TR
Approved by: RW

PARSONS BRINCKERHOFF

Drawing reference: CP002

Wheel outline
Body outline
Blade overhang outline

Based on Volvo FH16 8x4 + Broshuis Blade trailer
Enercon E48 blade, 24 m

Approach

Exit

Location

Cotton of Pitlennedy PP2

Drawn by: RH
Checked by: TR
Approved by: RW

PARSONS BRINCKERHOFF

Drawing reference: CP003

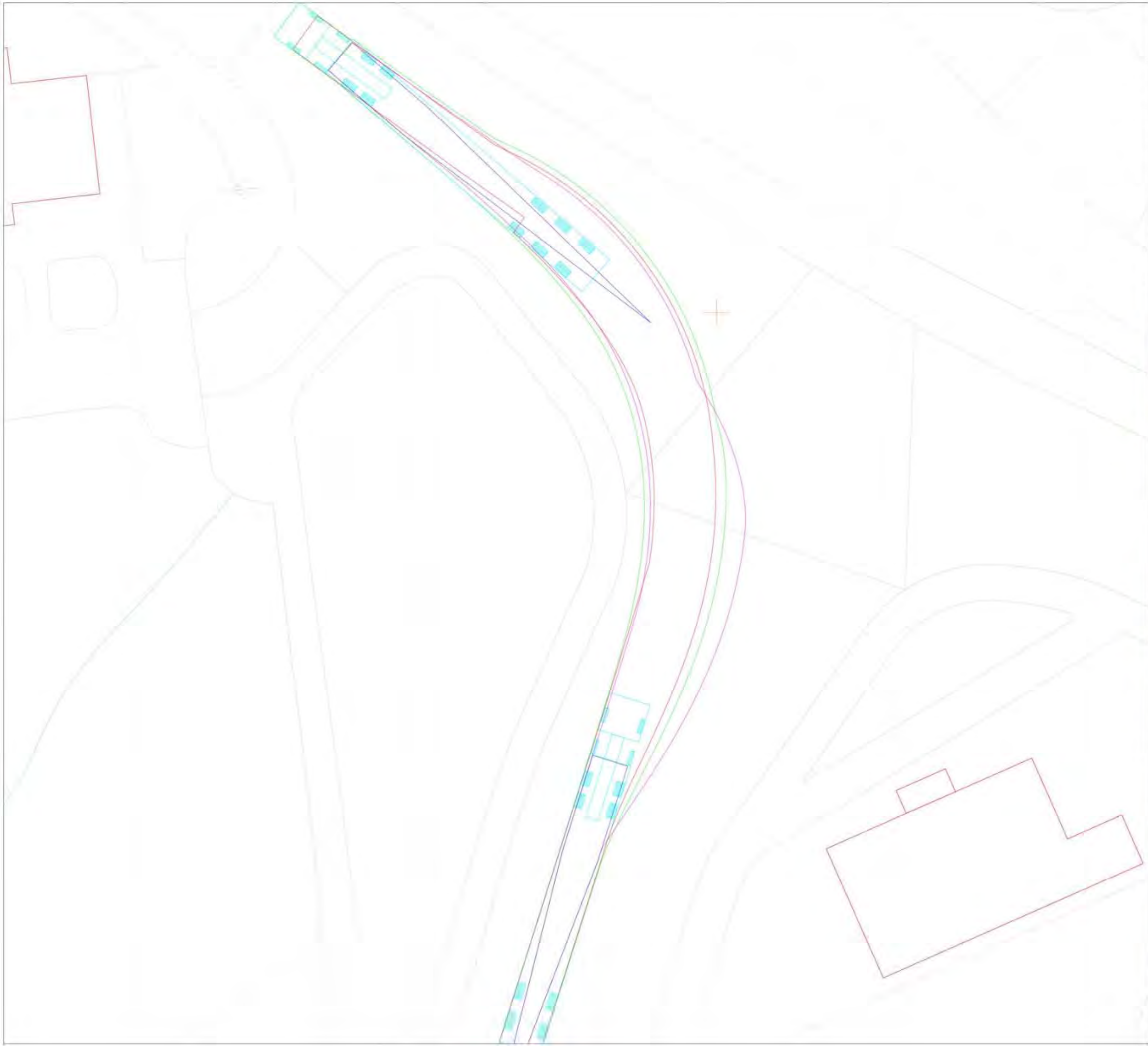
Wheel outline
Body outline
Blade overhang outline

Based on Volvo FH16 8x4 + Broshuis Blade trailer
Enercon E48 blade, 24 m

Approach

Exit

Location



AC34

Cotton of Pitkennedy, PP3

Drawn by: RH
Checked by: TR
Approved by: RW

PARSONS BRINCKERHOFF

Drawing reference: CP004

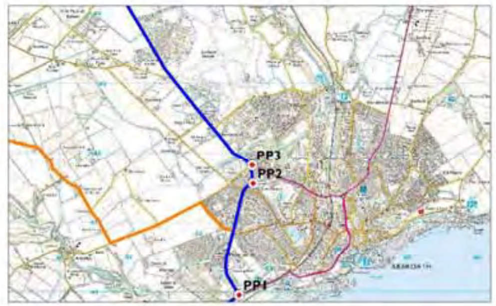
Wheel outline
Body outline
Blade overhang outline

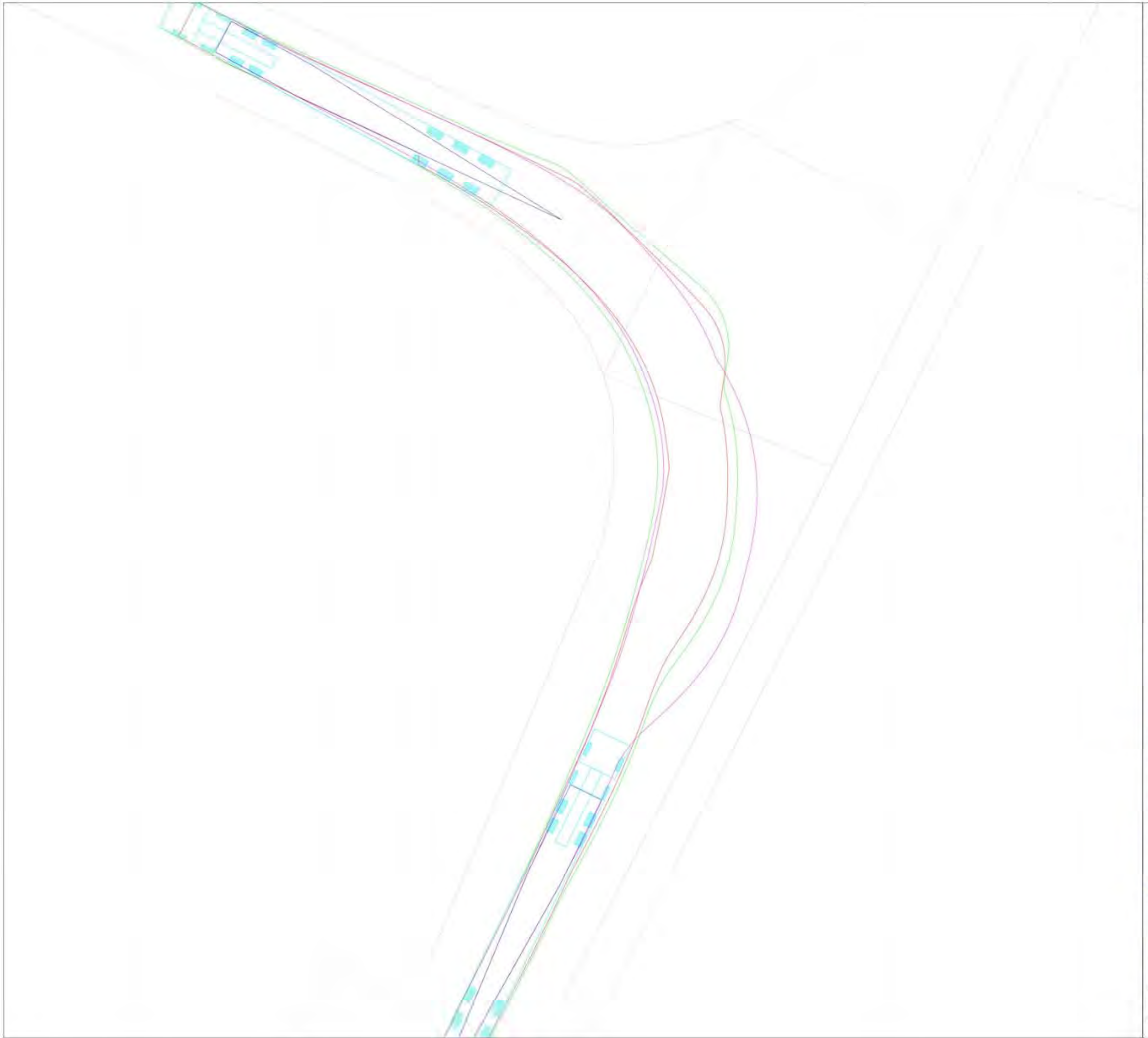
Based on Volvo FH16 8x4 + Broshuis Blade trailer
Enercon E48 blade, 24 m

Approach

Exit

Location





Cotton of Pit[illegible] PP4

AC34

Drawn by: RH
Checked by: TR
Approved by: RW

PARSONS BRINCKERHOFF

Drawing reference: CP004

Wheel outline
Body outline
Blade overhang outline

Based on Volvo FH16 8x4 + Broshuis Blade trailer
Enercon E48 blade, 24 m

Approach

Exit

Location

Cotton of Pitkennedy PP5

Drawn by: RH
Checked by: TR
Approved by: RW

PARSONS BRINCKERHOFF

Drawing reference: CP006

Wheel outline
Body outline
Blade overhang outline

Based on Volvo FH16 8x4 + Broshuis Blade trailer
Enercon E48 blade, 24 m

Approach

Exit

Location

AC34

Cotton of Pitlessie to PP6

Drawn by: RH
Checked by: TR
Approved by: RW

PARSONS BRINCKERHOFF

Drawing reference: CP007

Wheel outline
Body outline
Blade overhang outline

Based on Volvo FH16 8x4 + Broshuis Blade trailer
Enercon E48 blade, 24 m

Approach

Exit

Location

Cotton of Pitkennedy PP7

Drawn by: RH
Checked by: TR
Approved by: RW

PARSONS BRINCKERHOFF

Drawing reference: CP008

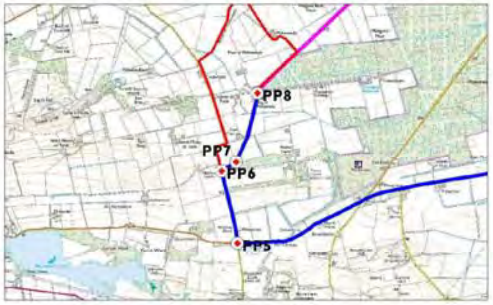
Wheel outline
Body outline
Blade overhang outline

Based on Volvo FH16 8x4 + Broshuis Blade trailer
Enercon E48 blade, 24 m

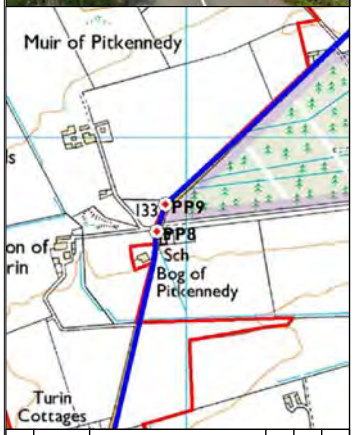
Approach

Exit

Location



AC34



Rev	Date	Description	By	Chk	App

Based on Volvo FH16 8x4 + Broshuis trailer

WHEEL OUTLINE: BODY OUTLINE: LOAD OUTLINE:

PARSONS BRINCKERHOFF

Amber Court
William Armstrong Drive
Newcastle upon Tyne NE4 7YQ

Tel: 44-(0)191-226-2000
Fax: 44-(0)191-226-2104

Client:
EGEN

Site/Project:
COTTON OF PITKENNEDY

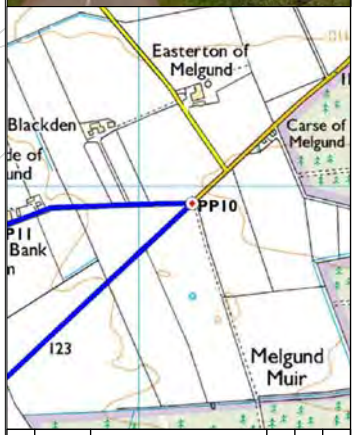
Title:
PP9
24m BLADE

Drawn: R HUNTER		Checked: T RIPPON	
Designed: R HUNTER		Approved: R WEARMOUTH	
Date: 10/12/2012	Scale:	A3	Sheet:

Project Number:	Drawing Number:	Revision:
3511978A	CP018	

Login: Hunter, Richard
Plot Date: 10/12/2012 14:22:44
File Name: W:\Current Projects\E-Gen\Pitkennedy\Access\CAD\Cotton of Pitkennedy PP9.dwg

AC34



Rev	Date	Description	By	Chk	App

Based on Volvo FH16 8x4 + Broshuis trailer

WHEEL OUTLINE: BODY OUTLINE: LOAD OUTLINE:

PARSONS BRINCKERHOFF

Amber Court
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Site/Project:
COTTON OF PITKENNEDY

Title:
PP10
E48, 24m BLADE

Drawn: R HUNTER		Checked: T RIPPON	
Designed: R HUNTER		Approved: R WEARMOUTH	
Date: 10/12/2012	Scale:	A3	Sheet:
Project Number:		Drawing Number:	Revision:
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Plot Date: 10/12/2012 14:19:49
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PHOTOGRAPHS

7. PHOTOGRAPHS

7.1 Preferred access route

7.1.1 PP1

Left turn from A92 onto Westway.

7.1.2 PP2

Left turn by cricket grounds on Westway.

7.1.3 PP3

Left turn from Westway onto A933.

7.1.4 PP4

Left turn from A933 onto the B9113.

7.1.5 PP5

Right turn from B9113 onto unclassified road north past Westerton.

7.1.6 PP6

Right turn onto unclassified road past Bog of Pitkennedy.

7.1.7 PP7

Bend to the left on unclassified road past Bog of Pitkennedy.

7.1.8 PP9

Gentle right turn on unclassified road by Bog of Pitkennedy

7.1.9 PP10

Left turn from unclassified road onto unclassified road to site entrance

PARSONS BRINCKERHOFF

APPENDIX D
PHASE 1 HABITAT SURVEY

AC34

Cotton of Pitkennedy; Extended Phase 1 Survey Report

E-Gen Ltd

March 2012

PARSONS BRINCKERHOFF

125 YEARS

Cotton of Pitkennedy; Extended Phase 1 Survey Report

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CONTENTS

EXECUTIVE SUMMARY

Parsons Brinckerhoff (PB) has been commissioned by E-Gen Ltd to undertake an extended Phase 1 Habitat Assessment to support and inform a planning application for a small scale wind farm at Cotton of Pitkennedy, Forfar, Angus.

The purpose of the assessment was to document the baseline ecological conditions of the site. This was achieved through the recording and mapping of broad habitat types; the investigation and identification of any designated sites in proximity; and the identification of potential for protected and/or species of conservation interest that would require further survey on the basis they might comprise an ecological constraint to the proposed development.

An Extended Phase 1 Habitat survey was undertaken on the 14th February 2012 to assess the ecological value of the site and record any protected habitats. The survey followed standard methodology published by the Joint Nature Conservation Committee.

One designated site was identified within 2 km of the site boundary; and this site was designated for its geological interest not its biological interest. However, 2.5 km to the south-west of the site lies Rescobie and Balgavies Lochs Site of Special Scientific Interest (SSSI). This site is part of the largest expanse of wetland habitats in the local area and supports over 60 species of breeding birds. It was considered unlikely that the development proposals will have a direct impact on the site itself; further targeted bird surveys are recommended in order to ascertain if the proposals could impact on birds that are commuting over the site to the SSSI.

The site walkover revealed the presence of a wide variety of habitats present within the survey area. Most of these habitats were common and widespread in the local area and therefore of negligible conservation concern. The only habitats recorded of higher biodiversity value were standing and running water. Both habitats are listed in the local Biodiversity Action Plans, and in the context of the site are considered to be of local value.

The survey area had the potential to support the following protected species and species of conservation concern: bats, birds and reptiles.

The following further investigations are likely to be required:

- Targeted bird surveys;
- Targeted bat surveys; and
- Precautionary reptile mitigation.

SECTION 1

INTRODUCTION

1 INTRODUCTION

1.1 Overview

1.1.1 Parsons Brinckerhoff (PB) has been commissioned by E-Gen Ltd to undertake an extended Phase 1 Habitat Assessment to support and inform a planning application for a small scale, two turbine wind farm at Cotton of Pitkennedy, Forfar, Angus.

1.1.2 It is understood that there may be a requirement for a full Environmental Impact Assessment (EIA) in relation to this development and the programme for submission has not yet been determined. The following documents regarding the development were used to inform this report:

- Parsons Brinckerhoff (February 2012). Cotton of Pitkennedy Farm Wind Energy Development: Full Viability Report.
- Parsons Brinckerhoff (December 2011). Cotton of Pitkennedy Outline Design Plan.

1.1.3 The purpose of the assessment was to document the baseline ecological conditions by recording and mapping broad habitat types, investigating and identifying any designated sites and the potential for protected and/or species of conservation interest that would require further survey on the basis they might comprise an ecological constraint to the proposed development.

1.2 Site Context

1.2.1 The proposed site, OS Grid reference (NO537539) is situated to the south-west of Forfar, Angus and is surrounded by arable land. To the north, south and west of the site occurs arable land and farmhouses and networks of hedgerows and dry stone walls. To the east lies Montreathmont forest; a large expanse of coniferous woodland which adjoins the east boundary of the site. Further to the south-west occurs a series of lochs, wetlands, standing and running water and pockets of coniferous woodlands.

1.3 Legislation and Planning Context

1.3.1 The Articles of wildlife and countryside legislation, planning policy guidance and references to both local and national biodiversity action plans and regional/local strategies and plans are referred to in this report. Their context and applicability is explained as appropriate in the relevant sections of the report and additional details are presented in Appendix A.

1.3.2 The key articles of relevance are:

- Conservation (Natural Habitats. &c.) Regulations 1994 (as amended in Scotland);
- Conservation of Habitats and Species Regulations 2010 (in relation to reserved matters in Scotland);
- The Wildlife and Countryside Act 1981 (as modified by Nature Conservation (Scotland) Act 2004) (WCA);
- The Protection of Badgers Act 1992 (as modified by Nature Conservation (Scotland) Act 2004);

- Land Reform (Scotland) Act 2003;
- Nature Conservation (Scotland) Act 2004;
- Wildlife and Natural Environment (Scotland) Act 2011;
- Wildlife and Natural Environment (Scotland) Act 2011;
- The UK Biodiversity Action Plan (UKBAP);
- Scottish Biodiversity List; and
- The Local Biodiversity Action Plan (LBAP); the Tayside Local Biodiversity Action Plan.

SECTION 2

METHODOLOGY

2 METHODOLOGY

2.1 Desk-Study

2.1.1 A desk study was undertaken to collect records of protected and notable species and habitats. The "search area" included a radius of up to 2 km from the site for all protected and notable species with the exception of European protected sites for which a radius of 10 km was used.

2.1.2 The desk based study also included a search for the following statutory and non-statutory designated sites:

- Special Areas of Conservation (SAC);
- Special Protection Areas (SPA);
- Ramsar sites;
- Site of Special Scientific Interest (SSSI);
- National Nature Reserve (NNR);
- Local Nature Reserve (LNR);
- Sites of Nature Conservation Importance (SNCI); and
- Local Wildlife Sites (LWS).

2.1.3 The following groups were contacted to request data searches:

- Leisure and Culture Dundee, Dundee Art Galleries and Museum

2.1.4 In addition to the above, the following information sources were used during the desk study exercise:

- The Tayside Local Biodiversity Plan was reviewed for habitats and species considered to be local conservation priorities within the local area.
- The National Biodiversity Network (NBN) Gateway for records of birds and plants;
- The SNH website Site Link for statutory designated sites; and
- The British Trust for Ornithology (BTO) website for bird records

2.2 Field survey

2.2.1 A Phase 1 Habitat survey was undertaken on 14th February 2012 to assess the ecological value of the site and record any protected habitats, or evidence/potential of any notable or protected species within/adjacent to the site (up to 30m from the site boundary).

2.2.2 The survey followed standard methodology published by the Joint Nature Conservation Committee (JNCC) but extended for use in Environmental Assessment (IEEM 2006) with habitat types present recorded on a Phase 1 habitat map. Dominant plant species observed within each habitat type were recorded in accordance with plant species nomenclature in Stace (1997).

2.2.3 The spatial area that was the subject of the survey encompassed an area that included all of the proposed turbine locations and associated infrastructure, henceforth described as the survey area.

2.3 Nature Conservation Evaluation Methodology

2.3.1 The ecological features of the site have been evaluated in accordance with guidelines provided within the Institute of Ecology and Environmental Management (IEEM) 'Guidelines for Ecological Impact Assessment' (EcIA).

2.3.2 The guidance provides a framework for the evaluation of features which takes into account the direct biodiversity value of habitats and species, the indirect value of features which help support the ecological integrity of key features, legal protection for both sites and species and evaluation against national and local planning guidance and objectives.

2.3.3 It uses a geographic frame of reference for assigning value to features of ecological importance that consists of the following categories given in the left hand column of Table 2.1 below. Examples of the types of features that are typically assigned to each geographic scale are given in the right hand column.

Table 2.1: The geographical scale at which features are assessed for nature conservation value

Geographical Scale at which Feature is Important	Example of Feature
International	Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites.
National	Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs).
Regional	County designated wildlife sites supporting a regionally significant area of a UK priority habitat; or large population of species in the UKBAP or of national nature conservation concern protected species level.
County	Non-statutory sites designated at county level. Ancient woodlands, large areas of priority BAP habitat offering a significant wildlife resource at county level. Large populations of a legally protected species or species included in the UK or Local BAP or other species considered to be threatened at a national level.
District	Non-statutory sites designated at district level, Local Nature Reserves (LNRs). Moderately sized examples of priority BAP habitats.
Local	Old hedges, woodlands, ponds, significant areas of species rich grassland or other habitat, small scale examples of priority BAP habitat or areas supporting small populations of protected species, species included in the UK or Local BAP or other species considered to be threatened at a national level.
Of value within the context of the Site or zone of influence of the scheme/project	Woodland plantations, structure planting, small areas of species rich grassland or other species rich habitat that is not included in the UK or Local BAP.
Negligible	Areas of built development, active mineral extraction or intensive agricultural land with low interest for nature conservation and little/no ability to support UK or Local BAP species or species considered threatened nationally.

2.3.4 It should be noted that whilst the evaluation considers the presence of protected species that receive legal protection at various levels (national, international) and non-statutory protection (through policies and plans), the simple presence of a species does not necessarily infer value at the level of protection it receives. Therefore, the value of a site for protected species is dealt with on a species by species basis, taking into account the recorded level of activity, the level of protection it receives the overall value of habitat on that site for that species, and the relative scarcity of the species at the different geographical scales considered.

2.4 Survey limitations

2.4.1 The survey was undertaken outside of the optimal Phase 1 survey timescales. In some instances the identification of plants and habitats was therefore based on dead plant material from the previous growing season. Some species which require flowering heads to be present in order for identification to be valid were identified to genus level only.

2.4.2 It was considered that there were no limitations to the protected species assessments carried out on site, with all areas of the site and its nearby surroundings accessed by surveyors during the survey.

2.4.3 It is considered that although there were some constraints to the survey, the combination of historic records from the desk study and the data gathered during the site visit provides sufficient information to inform the baseline ecological assessment of the site and associated proposals.

SECTION 3

RESULTS

3 RESULTS

3.1 Desk-Study

Designated Sites

3.1.1 Two designated sites were identified through the desk-study. Both sites were Sites of Special Scientific Interest (SSSI) one designated for its geological interest and the other for its fen marsh and swamp habitats and associated vascular plants.

Table 3.1. Designated sites in the local area to the site

Site	Designation	Summary of Designation Features	~ Distance from survey area (km)
Turin Hill	SSSI	Turin Hill Site of Special Scientific Interest (SSSI) is an Iron Age complex consisting of two forts and three possible duns and is designated for its geological interest rather than any biological interest. Turin Hill displays a remarkable range of enclosures and obviously has a long history of use. Although the precise date of the features cannot be determined without excavation, the remains suggest that settlement is likely to have spanned from at least the Late Bronze Age into the Early Historic period with later quarrying activity in the Middle Ages.	~ 0.1 km to the west of the site
Rescobie and Balgavies Lochs	SSSI	Rescobie and Balgavies Lochs Site of Special Scientific Interest lies to the east of Forfar and includes some of the most extensive associations of wetland habitats in Angus, ranging from open water to dense willow and alder carr. The lochs support over 60 species of breeding birds.	~ 2.5 km to the south west of the site

Protected and/or species of Conservation Importance[1]

Badger

3.1.2 One historic record of badger (*Meles meles)* was returned as part of the desk-study. This record was from Aldbar Wood and was for an occupied badger sett. The record was from 1978.

Otter

3.1.3 Three records of otter (*Lutra lutra)* were returned from the desk-study within the 2 km search radius. All three records were historic (over ten years old), and related to individuals recorded as road casualties.

[1] no records of water vole or reptiles were returned from the desk-study records

Bats

3.1.4 Three historic records of bats were returned from the desk-study. Two records were of common pipistrelle bats (*Pipistrellus pipistrellus)* and were from south of Pitkennedy, the third that of a Daubenton's bat (*Myotis daubentoni)* which was returned at a 10 km resolution, not allowing the precise location fo the record to be identified.

Birds

3.1.5 The majority of records received were for common and widespread species. Farmland and woodland birds were recorded within the 2 km square although no waterfowl species were recorded.

3.1.6 Raptor species returned from the desk study include several records of buzzard (*Buteo buteo)*, kestrel (*Falco tinnunculus)* and one record of peregrine falcon (*Falco peregrinus)*. Records of tawny owl (*Strix aluco*) and long eared owl (*Asio otus)* were returned for Montreathmont Forest which adjoins the eastern boundary of the site.

3.1.7 Ground nesting birds recorded within the 2 km search radius included grey partridge (*Perdix perdix*), quail (*Coturnix coturnix)* and skylark (*Alauda arvensis)*.

Amphibians

3.1.8 One historic record of a palmate newt (*Triturus helveticus)* was returned from the desk-study; the record was from Craiksfold and recorded in 1979.

Invertebrates

3.1.9 Records of invertebrates returned from the desk-study were limited to Coleoptera (beetles) and Lepidoptera (butterflies). Notable and protected species included dark green-fritillary (*Argynnis aglaja)* and small pearl-bordered fritillary (*Boloria selene*) both these records were returned for Middleton Woods ~2 km to the south-east of the site.

Flora

3.1.10 No records of protected or notable flora have been identified within the 2 km search area.

3.2 Field Survey

Phase 1 Habitat Types

3.2.1 The survey area supported a number of Phase 1 habitat types, as set out below. The JNCC code used for categorisation is included in brackets after each habitat type to allow cross-referencing with the Phase 1 Handbook. The nature conservation evaluation is included within this section separately for each habitat type found on site. Habitats found outside the proposed development boundary have not been evaluated unless it is considered they could be significantly affected by the currently proposed development. An indication of the relative abundance of the plant species recorded is provided in some instances, through use of the DOFAR scale. This grades the relative abundance of the species recorded by categorising them as either dominant, abundant, frequent, occasional or rare. The Phase 1 Habitat map is provided in Appendix B.

Broadleaved semi-natural woodland (A.1.1.1)

3.2.2 A pocket of broadleaved semi-natural woodland was present in the centre of the site adjacent to the Cotton of Turin. This woodland was dominated by silver birch (*Betula pendula)* with frequent ash (*Fraxinus excelsior)* and occasional hawthorn (*Crataegus monogyna)*.

Coniferous plantation woodland (A.1.2.2)

3.2.3 This habitat type was recorded in two locations at the time of survey. A small pocket of coniferous plantation woodland was identified to the south of the site with a further narrow strip present alongside a track just inside the northern site boundary. These habitats were recorded as being dominated by Douglas fir (*Pseudotsuga menziesii*) with frequent Norway spruce (*Picea abies)* and occasional Sitka spruce (*Picea sitchensis)*. The understoreys of these woodlands were species poor with limited understorey structure.

3.2.4 Mixed woodland was recorded outside of the site boundary to the east of the site. This was part of Montreathmount Woodland, which is a large expanse of predominantly coniferous woodland with a series of burns running through it.

Dense scrub (A.2.1)

3.2.5 Areas of dense scrub were recorded in the centre of the site and were dominated by gorse (*Ulex europaeus)* and occasional broom *(Cytisus scoparius)*. These habitats were uniform in structure and generally species poor with a reduced understorey.

Scattered broadleaved trees (A.3.1)

3.2.6 Scattered broadleaved trees were recorded along the roadside to the west of the site; dominated by ash and pedunculate oak (*Quercus robur).*

Semi-improved acid grassland (B.1.2)

3.2.7 This habitat was found in several locations on site; in the centre of the site surrounding the area of scrub, adjacent to the wall running through the western boundary of the site and running the length of the northern section of the site. This habitat was dominated by cock's-foot (*Dactylis glomerata)* with abundant ribwort plantain (*Plantago lanceolata)* and tufted hair-grass (*Deschampsia cespitosa),* frequent meadow grass species (*Poa sp.),* dock species (*rumex sp.)* and bramble (*Rubus fruticosus agg.)*, occasional creeping bent (*Agrostis stolonifera)*, false oat grass (*Arrhenatherum elatius)* and black knapweed (*Centaurea nigra)* with rare gorse.

Tall ruderal (C.3.1)

3.2.8 Areas of tall ruderal habitat were mapped in the centre of the site and adjacent to Turin Cottages in the south of the site. These habitats were dominated by common nettle (*Urtica dioica)* with occasional lesser burdock (*Arctium minus)* and bramble.

Standing water (G.1)

3.2.9 One area of standing water was identified on site; Pond 1. Pond 1 was mapped in the north-east of the site and was a duck pond in the gardens of Hollywell House. The pond was approximately 6 x 4 m across, with no aquatic vegetation evident at the time of survey. Habitats surrounding the pond were amenity grassland and gardens.

Running water (G.2)

3.2.10 Several wet ditch systems were recorded on site. These were generally man-made ditches draining agricultural land. These were characterised by having bare earth banks and limited or no aquatic and marginal vegetation.

Arable (J.1.1)

3.2.11 This was the dominant habitat present on site. The arable fields were Italian rye-grass (*Lolium multiflorum*) dominated with few additional species present and narrow species poor field margins. Areas of recently ploughed bare ground were mapped adjacent to several of the arable fields.

Amenity grassland (J.1.2)

3.2.12 Areas of amenity grassland were identified adjacent to the houses on site; Turin Cottages and Pitkennedy Cottages. These habitats were generally species poor and dominated by meadow grass species.

Introduced shrub (J.1.4)

3.2.13 Areas of introduced shrub were identified in the gardens of the buildings and houses present on site. These habitats were dominated by ornamental species.

Species poor intact hedgerow (J.2.1.2)

3.2.14 A species poor intact hedgerow was mapped in the centre of the site adjacent to the track leading to Cotton of Pitkennedy. This habitat was a recently planted blackthorn *(Prunus spinosa)* hedgerow.

Species poor defunct hedgerow (J.2.2.2)

3.2.15 A species poor defunct hedge was mapped running adjacent to the road in the north west of the site adjacent to the area of broadleaved semi-natural woodland. This was dominated by blackthorn with sycamore (*Acer pseudoplatanus)* and ash also recorded.

Fences (J.2.4)

3.2.16 Most of the field boundaries recorded on site were stock-proof post and wire fences. Sometimes these were in combination with flag stone or dry stone walls in varying states of repair.

Walls (J.2.5)

3.2.17 There were both vertical flag stone walls and dry stone walls present on site. These were present throughout the site separating field boundaries, gardens and roadside verges.

Buildings and hard-standing (J.3.6)

3.2.18 There were several buildings recorded on site; residential housing such as Turin Cottages, farm buildings such as Cotton of Turin; and warehousing and machinery stores such as at Cotton of Pitkennedy. Some of these buildings presented opportunities for roosting bats/nesting birds.

Bare ground (J.4)

3.2.19 Bare ground was recorded on site in farm yards and along the network of tracks intersecting the site.

3.3 Target Notes

3.3.1 Target notes were made for notable features and/or areas that were not able to be mapped, or which required further description beyond the Phase 1 habitat categorisation. Table 3.3 below summarises the features of interest that have been target noted (TN) on the Phase 1 habitat map.

Table 3.3. Target notes for the Extended Phase 1 Assessment and their descriptions.

Target Note Number	Description
TN 1	Area of rubble identified as having potential to support reptiles, including for hibernation.
TN 2	Mature ash tree with cracks and fissures identified as having potential to support bats.
TN 3	Underground metal storage unit.
TN 4	Area of dense scrub & tussocky grassland identified as having potential to support reptiles.

3.4 Protected Species and species of Conservation Concern

Badger

3.4.2 No evidence of badger was found during the Extended Phase 1 survey and habitats present on site were of limited potential to support foraging by the species. Further to this records of badger in the area were limited, with only historic records being identified. No optimal habitats for sett construction or foraging were identified, with the arable land being considered highly sub-optimal. Due to the nature of the habitats on site and the likely absence of the species, badgers have not been considered further in this report.

Otter

3.4.3 The site contained habitats considered sub-optimal, but with some minor potential to support otter. It is possible that otter may sporadically commute along the ditch network through the site to further habitats off site although this is considered unlikely to occur on more than an irregular basis. There was an absence of features suitable to be used for lying up site/holt construction, and the watercourses were too shallw to support a significant prey resource for the species. No evidence of otters was recorded during the survey. Therefore, this species is not considered further in this assessment.

Water Vole

3.4.4 The site contained negligible habitats considered to have potential to support water vole (*Arvicola amphibius),* although a thirty metre long stretch of the watercourse west of Cotton of Pittkennedy had sufficiently steep banks for excavation of burrows. However, the water was less than 5cm in depth and there was a complete lack of luxuriant aquatic vegetation, in common with all other watercourses at the site. It is

therefore highly unlikely that water voles will be present at the site, therefore this species will not be considered further in this assessment.

Red Squirrel

3.4.5 The site itself did not contain habitat likely to support red squirrel (*Sciurus vulgaris).* Coniferous woodland to the east of the site was considered more suitable for this species, but there was a lack of suitable connecting habitat within the site, and combined with the lack of other woodland blocks in the surrounding area, it is unlikely that the species would make even irregular use of the site. Red squirrel is not therefore considered further in this assessment.

Bats

3.4.6 The survey area and its surrounds provide suitable habitat for use by roosting, foraging and commuting bats in the form of woodland, grassland and water bodies.). Due to the type of development, which could result in potentially significant effects on the local bat population during the operational phase of the wind farm, targeted surveys may be required. This should be established through further consideration of the detailed design and through consultation with SNH.

Birds

3.4.7 The survey area contained suitable habitat for foraging, roosting and breeding birds. Buildings presented opportunities for nesting birds as did areas of woodland, mature trees and scrub. Some suitable foraging habitat for a variety of species was identified on site.

3.4.8 The following bird species were recorded during the course of the Phase 1 survey; blackbird (*Turdus merula)*, buzzard (*Buteo buteo)*, chaffinch (*Fringilla coelebs)* magpie *(Pica pica,)* pheasant (*Phasianus colchicus*) and woodpigeon (*Columba palumbus)*. Further to this, skylark (*Alauda arvensis*) were observed in fields to the north of the site boundary.

Reptiles

3.4.9 The survey area contained limited habitats which were considered to have the potential to support reptile species, however, some areas of rubble, dry stone walls and semi-improved grassland provided more opportunities for this species. Areas of rubble were identified as having some potential to support hibernating reptile species, and also provided sheltered basking locations.

Amphibians

3.4.10 The survey area contained negligible habitats to support amphibian species, with the only standing water being an artificial duck pond with no aquatic vegetation. An examination of OS mapping did not identify any other standing waterbodies within 250 m of the site, and it is therefore considered unlikely that great crested newts, or significant populations of other amphibian species, will be present at the site. This species group is not therefore considered further in this assessment.

Invertebrates

3.4.11 The majority of habitats on site were species poor and uniform without any mosaics of habitats or variation in habitat composition. Therefore, it is considered that

invertebrate assemblages present on site are likely to be those associated with common and widespread habitats and are unlikely to support protected or notable species/assemblages. This species group is therefore not considered further in this assessment.

Flora

3.4.12 The habitats recorded in the survey area are common and widely represented in the local area, and the locations for the proposed wind farm comprise predominantly heavily managed arable fields. It is likely that the flora of the site is limited to common and widespread species, and further consideration to this group will not therefore be given in this assessment.

3.5 Nature Conservation Evaluation (Habitats)

3.5.1 The nature conservation interest of the habitats recorded in the survey area is evaluated below, notwithstanding their potential to support protected species and species of conservation concern, for which further survey may be necessary:

- Broadleaved semi-natural woodland: This habitat contained limited species diversity and was isolated in only one location on site; however, this habitat is not common or widespread in the local area; therefore this habitat was assessed to be of value in the context of the site.
- Coniferous plantation woodland: Due to the low species diversity and the regular occurrence of this habitat in the wider landscape this habitat was considered to be of negligible conservation value in the context of the site.
- Dense scrub: Due to the low species diversity, frequent occurrence in the wider landscape, and the limited extent on site, this habitat was considered to be of negligible conservation value.
- Scattered broadleaved trees: This habitat was relatively scarce in the wider local landscape, but was also a relatively limited resource in the context of the site. Scattered trees within the survey area were therefore considered to be of importance in the context of the site.
- Semi-improved acid grassland: This habitat was generally species poor and common and widespread in the local area. However, bands of rough semi-improved grassland on field margins may allow connectivity of surrounding habitats of higher ecological value; therefore this habitat was considered to be of value in the context of the site.
- Tall ruderal: Due to the low species diversity this habitat was considered to be of negligible conservation value.
- Standing water: Although the pond on site supported minimal aquatic and emergent species, the pond on site is likely to fall under the ponds action plan in the LBAP. Therefore, this habitat has been assessed as being of local value.
- Running water: Although the wet ditches on site were man made drainage ditches with some running water, this habitat is identified as a broad habitat type in the UK BAP and the network on site is therefore considered to be of local value.
- Arable: Due to the low species diversity this habitat was considered to be of negligible conservation value.

- Amenity grassland and introduced shrub: Due to the low species diversity this habitat was considered to be of negligible conservation value.
- Species poor intact hedgerow: Due to the low species diversity this habitat was considered to be of negligible conservation value.
- Species poor defunct hedgerow: Due to the low species diversity this habitat was considered to be of negligible conservation value.
- Fence: This habitat was artificial and supported a low diversity of species. It was therefore considered to be of negligible conservation value
- Wall: Common habitat both within the survey area and wider area, however potentially of some value as wildlife corridors and therefore was considered to be of potential value within the context of the survey area.
- Buildings and hardstanding: Buildings within the site were considered to be of negligible conservation value, although it should be noted these could potentially be used by roosting bats/nesting birds.
- Bare ground: This habitat was artificial and supported a low diversity of species. It was therefore considered to be of negligible conservation value.

SECTION 4

DISCUSSION AND RECOMMENDATIONS

4 DISCUSSION AND RECOMMENDATIONS

4.1 Discussion and specific recommendations

4.1.1 The proposed wind farm development is likely to result in some habitat loss (both temporary and permanent). This should be limited in extent and restricted to common habitats of at most local value. The proposed wind farm has the potential to have more significant effects on some species groups, but further survey work would be required to confirm this.

4.1.2 The legislative and policy requirements for the habitats and species described in this section are presented in detail within Appendix A.

Statutory Designated Sites

4.1.3 Two designated sites were returned from the desk-study, only one of these sites was designated for its biological interest. Rescobie and Balgavies Lochs SSSI is designated for its wetland habitats and associated breeding bird species and is located 2.5 km to the south-west of the site. This designated site forms part of the most extensive wetland habitats in the local area. It is considered unlikely that this habitat will be affected by the developmental proposals; however, targeted bird surveys are recommended to inform any impacts to birds which may commute over the site between the SSSI and the River South Esk and other habitats to the north of the site.

UK and Local BAP Habitats

4.1.4 Standing water is listed as a habitat on the local BAP and running water on both the local BAP and UK BAP. Under the current proposals no works will take place in close proximity to the pond or any of the drainage ditches on site, and no significant impacts on these habitats are anticipated provided this remains the case during any subsequent revisions to the proposals for the site.

Birds

4.1.5 The site contained a range of suitable habitats for breeding birds and the current development proposals will affect some of these habitats. The site may also be on a relatively frequently used flyway between the Rescobie and Balgavies Lochs SSSI and the River Esk. It is recommended that any revisions to the turbine layout continue to avoid direct impacts on the woodland belt in the north of the site as far as possible. Given the nature of the development where there could be significant effects on the local bird population during the operational phase of the wind farm, further detailed surveys are recommended.

4.1.6 Detailed Phase 2 surveys likely to be needed include an initial reconnaissance survey to establish the context of the site in relation to surrounding habitats, breeding bird survey based on the Common Birds Census technique, and vantage point surveys are also likely to be required.

Bats

4.1.7 The survey area and its surrounds provide suitable habitat for roosting, foraging and commuting bats. Due to the type of development, which could result in potentially significant effects on the local bat population during the operational phase of the wind

farm, targeted surveys may be required. This should be established through further consideration of the detailed design and through consultation with SNH.

4.1.8 The survey should cover all suitable interest features to ensure that a robust level of information is collected to inform any future assessments and should follow current best practice guidance in respect of wind farm development (Bat Conservation Trust Good Practice Guidelines (2007); Natural England Technical Note TIN051: Bats and Onshore Wind Turbines) in consultation with the relevant statutory bodies.

4.1.9 At this stage there are no proposals to affect any of the buildings within the site and the proposed turbine locations are in excess of 300 m from existing buildings. Therefore surveys of these for roosting bats are not considered necessary.

Reptiles

4.1.10 The survey area had the potential to support reptiles, principally in the semi-improved field margins and scrub habitats in the centre of the site. At the current level of resolution of the proposals, it is difficult to judge the exact level of potential impacts. It is recommended that the access track for the turbine construction is not routed through the woodland edge/field margins along the north-western site boundary, as these areas were also highlighted as being of greater potential value for reptiles. If these areas will be affected by construction of the proposed access track surveys may be needed, as there is limited suitable habitat in the vicinity into which reptiles could be displaced. Furthermore, construction-phase mitigation measures, including sensitive vegetation clearance and potentially destructive searching are recommended where the proposed access tracks require breaches across field margins and associated stone walls.

SECTION 5

CONCLUSIONS

5 CONCLUSIONS

5.1.1 The following species specific surveys/mitigation measures are recommended on the basis of the current proposals, given that further detail is required to determine the magnitude of any constraint to development and to identify any mitigation measures that may be needed to secure consent for the proposed development:

- Bird surveys;
- Bat surveys; and
- Reptile mitigation measures.

5.2 General recommendations

5.2.1 All the species surveys recommended above should be undertaken prior to submitting any planning applications for the site, with the scope of such surveys confirmed with SNH. Where necessary, mitigation and/or compensation measures should be identified following the findings of the surveys and in consideration of the proposed scheme design.

5.2.2 It is recommended that the information provided within this report is used to inform the design of the development. This will help to minimise or avoid any adverse impacts to the protected and notable species identified on site.

SECTION 6

REFERENCES

6 REFERENCES

6.1 References

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Institute of Ecology and Environmental Management (2006): Guidelines for Ecological Impact Assessment. www.ieem.net

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Scottish Natural Heritage Site Link. http://gateway.snh.gov.uk/sitelink/

APPENDIX A

LEGISLATION

Summary of Legislation and Guidance for Notable and Protected Species and Habitats in the UK 2010

Introduction

The following Appendix sets out details of legislation within the UK and how this legislation applies to particular species groups. The key pieces of international and national legislation are described after which specific legislation pertaining to species or species groups are described in turn.

International and national legislation

EC Habitats Directive

In 1992 the then European Community adopted Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, known as the Habitats Directive. The main aim of the EC Habitats Directive is to promote the maintenance of biodiversity by requiring member states to introduce protection for these habitats and species of European importance. The mechanism for protection is through designation of Special Areas of Conservation (SACs), both for habitats and for certain species listed within Annex II. There are a number of species listed within Annex II of the Habitats Directive that are present within the UK; these include four lower plant species, nine higher plant species, six species of molluscs, six species of arthropods, eight species of fish, two species of amphibian, and nine species of mammal.

The Bern Convention

The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) came into force in 1982. The principal aims of the Convention are to ensure conservation and protection of wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase cooperation between contracting parties, and to regulate the exploitation of those species (including migratory species) listed in Appendix 3. To this end the Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1000 wild animal species.

Bonn Convention

The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention or CMS) was adopted in Bonn, Germany in 1979 and came into force in 1985. Contracting Parties work together to conserve migratory species and their habitats by providing strict protection for endangered migratory species (listed in Appendix 1 of the Convention), concluding multilateral agreements for the conservation and management of migratory species which require or would benefit from international cooperation (listed in Appendix 2 of the Convention), and by undertaking co-operative research activities.

Convention on Biological Diversity

The Convention on Biological Diversity (Biodiversity Convention or CBD) was adopted at the Earth Summit in Rio de Janeiro, and entered into force in December 1993. It was the first treaty to provide a legal framework for biodiversity conservation. Contracting Parties are required to create and enforce national strategies and action plans to conserve, protect and enhance biological diversity.

Wildlife and Countryside Act 1981 (as amended)

The Wildlife and Countryside Act 1981 (as amended) is the principle mechanism for the legislative protection of wildlife in Great Britain. However it does not extend to Northern Ireland, the Channel Islands or the Isle of Man. This legislation is the means by which the Convention on the Conservation of European Wildlife and Natural Habitats (the 'Bern Convention') and the European Union Directives on the

Conservation of Wild Birds (79/409/EEC) and Natural Habitats and Wild Fauna and Flora (92/43/FFC) are implemented in Great Britain.

Conservation of Habitats and Species Regulations 2010
In the UK the Council Directive 92/43/EEC has been transposed into national laws by means of the Conservation (Natural Habitats, & c.) Regulations 1994 (as amended), and the Regulations (Northern Ireland) 1995 (as amended). The Regulations came into force on 30 October 1994, and have been amended several times. Subsequently the Conservation of Habitats and Species Regulations 2010 was created which consolidates all the various amendments made to the 1994 Regulations in respect of England and Wales and is commonly known as the 'the Habitats Regulations'. In Scotland the Habitats Directive is transposed through a combination of the Habitats Regulations 2010 (in relation to reserved matters) and the 1994 Regulations. The Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) transpose the Habitats Directive in relation to Northern Ireland.

The Regulations contain five Parts and four Schedules, and provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites.

Other Legislation

Deer Act 1991
The Deer Act 1991 protects deer from poaching, taking or killing of certain deer in close season, taking or killing deer at night, and the use of prohibited weapons for the trapping or killing of deer.

Wild Mammals (Protection) Act 1996
The Act protects wild mammals from malicious or intentional harm.

Species and Habitat Specific Legislation

Plants
Wild plants are protected under Section 13 of the Wildlife and Countryside Act 1981 (as amended). It prohibits the unauthorised intentional uprooting of any wild plant species and forbids any picking, uprooting or destruction of plants listed on Schedule 8 of which there are over 150.

The Conservation of Habitats and Species Regulations 2010 have nine plants listed within Annex IV these are; shore dock, (*Rumex rupestris*), killamey fern (*Trichomanes speciosum*), early gentian (*Gentianella anglica*), lady's slipper (*Cypripedium calceolus*), creeping marshwort (*Apium repens*), slender naiad (*Najas flexilis*), fen orchid (*Liparis loeselii*), floating-leaved water plantain (*Luronium natans*), and yellow marsh saxifrage (*Saxifraga hirculus*). It is an offence to deliberately pick, collect cut, uproot or destroy any protected plant, or keep, transport, sell, or exchange, any live or dead such plant species, this applies to all stages of its life cycle.

Invasive Species
Schedule 9, Section 14 of the Wildlife and Countryside Act (1981, as amended) prohibits the introduction into the wild of any species that is not ordinarily resident in and is not a regular visitor to Great Britain in a wild state, or any species of the 39 plants listed on Schedule 9.

The frequently encountered invasive species within proposed development sites include Japanese knotweed (*Fallopia japonica*); Giant hogweed (*Heracleum mantegazzianum*); Himalayan balsam (*Impatiens glandulifera*); Floating pennywort (*Hydrocotyle ranunculoides*); New Zealand pygmyweed (*Crassula helmsii*); Rhododendron (*Rhododendron ponticum*); and certain hybrids of the above, some species may be native yet are listed for conservation purposes.

Plant or soil material contaminated by Japanese knotweed that is to be discarded is considered to be a 'controlled waste' under the Environmental Protection Act 1990 (EPA 1990). It is an offence to deposit, treat, keep, or dispose of controlled waste without a licence. Furthermore knotweed that has been cut down and removed must be received by an authorised person to be disposed of correctly. A licence can be obtained from the Environment Agency (EA). The release or planting of a listed species in the wild can be permitted under a licence granted by the relevant statutory body.

Fungi

There are five species of fungi protected under Schedule 8 of the Wildlife and Countryside Act 1981 (as amended). These include the sandy stilt puffball (*Battarrea phalloides*), royal bolete (*Boletus regius*), and the hedgehog fungus (*Hericium erinaceus*). It is an offence to pick, uproot, trade in, or possess for the purpose of trade, any species listed under schedule 8.

Invertebrates

A number of invertebrates such as stag beetles (*Lucanus cervus*), silver studded blue butterfly (*Plebejus argus*) or white letter hairstreak (*Stymondia w-album*) are fully protected under Schedule 5 of the Wildlife and Countryside Act (1981, as amended). This legislation makes it illegal to intentionally kill, injure, or take a protected invertebrate, or to damage, destroy, or obstruct access to any structure or place used for shelter or protection by such a species; and disturb any protected species occupying such a structure or place**.**

Three invertebrates are listed under Schedule 2 of the Conservation of Habitats and Species Regulations 2010, the large blue butterfly (*Maculinea arion*), fisher's estuarine moth (*Gortyna borelii lunata*), and lesser whirlpool ram's-horn snail (*Anisus vorticulus*). It is an offence deliberately to kill, capture, or disturb a listed species, or to damage or destroy the breeding site or resting place of such an animal.

White-clawed crayfish

White-clawed crayfish (*Austropotamobius pallipes*) are Britain's only native freshwater crayfish. The white clawed crayfish is listed under Annex II and V of the Habitats Directive and therefore member states are required to designate Special Areas of Conservation to protect important populations of this species. White-clawed crayfish are protected under Schedule 5 of the Wildlife and Countryside Act (1981, as amended). It is illegal to take the animals from the wild or to sell them.

All surveys for white clawed crayfish must be carried out by, or under the supervision of, an experienced licence holder, and all licence conditions must be complied with. In England and Wales trapping also requires the approval of the Environment Agency, with application for a licence to use traps within the watercourse being surveyed. Licences to permit taking (for example during relocation exercises) are not available in respect of development activities and usually need to be covered under a conservation licence which is issued by the relevant statutory body subject to approval of a method statement.

Amphibians
There are four common species amphibian species, common frog (*Rana temporaria*), common toad (*Bufo bufo*), palmate newt (*Triturus helveticus*), and smooth newt (*Triturus vulgaris*). All of the four common species are protected under Schedule 5 of the Wildlife and Countryside Act (1981, as amended) against deliberate and/or intentional killing, injuring and trade.

Great Crested Newts and Natterjack Toads
Great crested newts (*Triturus cristatus*) (GCN) and natterjack toads (*Bufo calamita)* are fully protected under Schedule 5 of the Wildlife and Countryside Act (1981, as amended) and the Conservation of Habitats and Species Regulations 2010. It is illegal to posses a protected species (alive or dead), deliberately capture, injure or kill, to intentionally or recklessly disturb, or to deliberately take or destroy the eggs of these protected species. It is also illegal to damage, destroy or intentionally or recklessly obstruct access to a breeding or resting place used by these protected species. All life stages of great crested newts and natterjack toads are afforded the same level of protection.

In order to undertake any activity which would otherwise result in any of the above offences being committed, it may be necessary to obtain a European Protected Species (EPS) licence from the relevant statutory body (Natural England (NE), Countryside Council for Wales (CCW) or Scottish natural Heritage (SNH)). It is possible to undertake surveys which would otherwise involve unlawful acts, such as disturbance, by obtaining a survey license which provides authorisation for scientific and educational purposes

Reptiles
The four common reptile species, adder (*Vipera berus*), grass snake (*Natrix natrix*), common lizard (*Zootoca vivipara*) and slow worm (*Anguis fragilis*), are protected under Schedule 5 of the Wildlife and Countryside Act (1981, as amended) against deliberate and/or intentional killing, injuring and trade.

If common reptile species are found to be present or considered potentially present within a proposed development site. To ensure that no subsequent offence will be committed a precautionary method of working (written by a suitably qualified ecologist) and submitted to the relevant authority may be required to enable works to proceed with limited risks of offences being caused.

Birds
All birds, their nests and eggs are protected by the Wildlife and Countryside Act (1981, as amended). It is an offence to intentionally kill, injure, or take any wild bird, or take or destroy an egg of any wild bird. It is also an offence to damage or destroy the nest of any wild bird (whilst being built, or in use). Therefore, clearance of vegetation within the site boundary, or immediately adjacent to the site during the nesting season could result in an offence occurring under the Act. The bird breeding season can be taken to run between the 1 February and 31 August and is subject to geographical and seasonal factors. There are 79 species of birds listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). I t is an offence to intentionally or recklessly disturb any wild bird listed on Schedule 1 while it is nest building, or at a nest containing eggs or young, or disturb the dependent young of such a bird.

Barn Owls
Barn owls (*Tyto alba*) are listed as ‘Amber’ status under the Birds of Conservation Concern (BoCC) and are categorised as a species of European Conservation Concern. The Barn Owl is given the highest level of legal protection possible under Schedule 1 of the Wildlife and Countryside Act 1981. It is therefore illegal to kill, injure or take a barn owl, or to take or destroy its eggs. It is also illegal to intentionally or recklessly take, damage, or destroy the nest of any wild bird while it

is in use or being built, release or allow the escape of a barn owl into the wild or posses any bird (dead or alive) or part of bird without a licence which is obtainable through the country agencies (EN, SNH, and CCW).

Mammals
All wild mammals are protected under the Wild Mammals (Protection) Act 1996 from certain cruel acts; and for connected purposes. It is an offence to mutilate, kick, beat, nail, or otherwise inflict unnecessary suffering on any wild mammal.

Badgers
Badgers (*Meles meles*) are protected under the Protection of Badgers Act (1992). As such it is an offence to wilfully take, kill, injure or ill-treat a badger, or posses a dead badger or any part of a badger. Under the Act their setts are also protected against obstruction, destruction, or damage in any part.

Sett interference includes damaging or destroying a sett, obstructing access to a sett, and disturbing a badger whilst it is occupying a sett. The Act defines a badger sett as 'any structure or place, which displays signs indicating the current use by a badger' and Natural England takes this definition to include seasonally used setts.

Work that may disturb badgers or their setts is illegal without a development licence from the relevant statutory body (NE, CCW, SNH). As a precautionary principle, a buffer distance between a badger sett and the works will be determined, based upon guidance from an appropriately experienced ecologist. This buffer distance should be based upon the size and activity levels at the sett, the topography between the sett and the works and the nature of the works.

Bats
All native UK bat species are fully protected by UK law under Schedule 5 and 6 of the Wildlife and Countryside Act (1981, as amended), and under Schedule 2 of the Conservation of Habitats and Species Regulations 2010. It is illegal to deliberately capture, injure or kill a bat or to intentionally or recklessly disturb bats. It is also illegal to damage, destroy or intentionally or recklessly obstruct access to a breeding or resting place used by a bat.

Any activity that would result in a contravention of the above legislation would likely require an EPS licence from the relevant statutory body (NE, CCW or SNH). Works or mitigation activities involving interference with bats or bat shelters must be carried out by a licensed bat worker.

Otters
The otter (*Lutra lutra*) is fully protected under Schedule 5 of the Wildlife and Countryside Act (1981, as amended) and are listed under Schedule 2 of the Conservation of Habitats and Species Regulations 2010. It is therefore illegal to deliberately capture, injure or kill an otter, posses an otter (dead or alive), or any other part of an otter, or intentionally or recklessly disturb otters. It is also illegal to damage, destroy or intentionally or recklessly obstruct access to a holt or other resting place used by an otter.

Any activity that would result in a contravention of the above legislation would likely require an EPS licence from the relevant statutory body (NE, CCW or SNH).

Red squirrels
The red squirrel (*Sciurus vulgaris*) is included in Schedule 5 of the Wildlife and Countryside Act (1981, as amended). Under the current legislation it is an offence to: intentionally kill, injure or take (capture) a red squirrel; intentionally or recklessly damage or destroy any structure or place used for shelter or protection or disturb while it is occupying such a place; possess a dead or live wild red squirrel, or any

part of a red squirrel; and sell, or offer for sale, a wild red squirrel or any part of a wild red squirrel.

There is, provision within the legislation to kill, take, disturb or possess red squirrels, to damage, destroy or obstruct their breeding places or to use prohibited methods to kill or take red squirrels under a licence from the relevant statutory body in certain defined circumstances, if the issue cannot be resolved by any alternative means.

Water voles
Water voles (*Arvicola terrestris*) are protected under the Wildlife and Countryside Act (1981, as amended). It is an offence to possess, control or sell water voles or to intentionally kill, injure or take water voles. It is also an offence to intentionally or recklessly damage, destroy or obstruct access to a place that water voles use for shelter or protection or disturb water voles whilst using such a place.

A licence is required for catching/handling water voles, or for field surveys that are intrusive or disturbing where the surveyor suspects' water voles are present. A licence can be obtained by applying to the relevant statutory body (NE, SNH, and CCW,)

Tree Preservation Order (TPO)
Part VIII of the Town and Country Planning Act (1990) and the Town and Country Planning (Trees) Regulations (1999) allows tree preservation orders (TPO) to be made by a Local Planning Authority in respect of trees or woodlands. This prohibits the cutting down, uprooting, topping, lopping, wilful damage, or wilful destruction of a preserved tree. Any tree is eligible for protection, regardless of age, species or size, no trees are automatically protected.

Tree Felling
Up to 5m³ of standing timber can be felled per quarter without requirement for a felling licence provided that no more than 2m³ is sold. There are a number of exemptions, refer to the Forestry Authority Website.

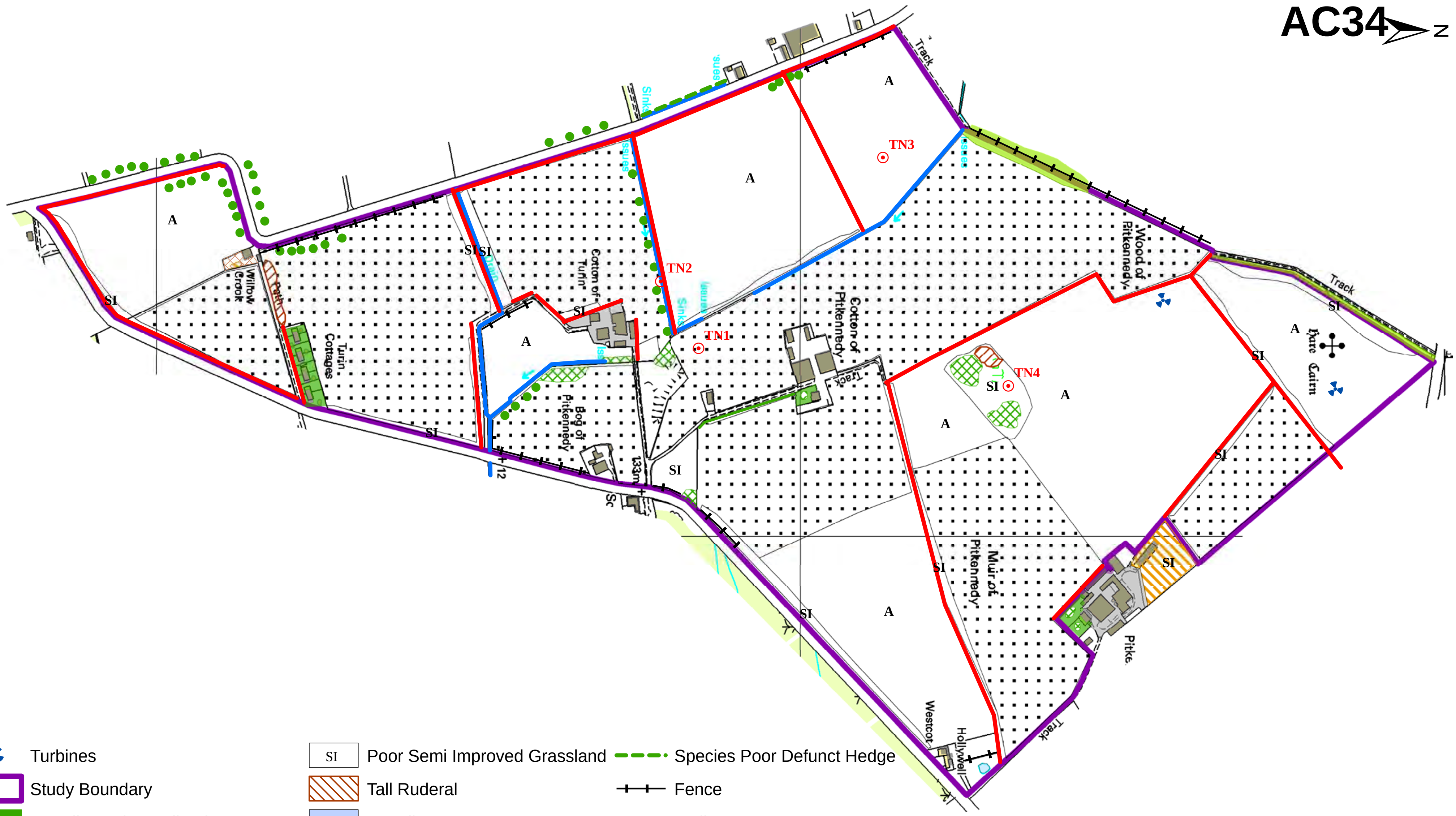
General Guidance on European Protected Species Licence Applications
Should a European Protected Species (EPS) be found on a development site, and where best practice guidance either cannot be followed or is not applicable an EPS licence will be required. The licence permits operations that fall outside the Good Practice Guidance an application for such a licence should be made to the relevant statutory body (NE, CCW or SNH) before any works can proceed. It is also possible to obtain a general licence that may cover an area rather than applying in each individual case for a separate specific/individual licence

Should the survey information be considered insufficient or the statutory body is not satisfied with the application, the licence application may be refused. This could potentially result in significant delays to a project, if not considered in time; however, early consideration of the potential presence of EPS on a site and an assessment of suitable mitigation measures to derogate such possibilities early in a project will negate this potential delay.

APPENDIX B

PHASE 1 HABITAT MAP

User: desouzaj Date Saved: 08/03/2012 14:48 Path: N:\35115\3511514A - E-Gen Feasibility and Consent\Z Dwgs\GIS\Mxd\3511514A-ZWF-Temple Hill-F01.mxd



Turbines	Study Boundary
Broadleaved Woodland	Coniferous Semi Neutral Woodland
Dense Scrub	Broadleaved Scattered Trees
SI Semi Improved Acid Grassland	SI Poor Semi Improved Grassland
Tall Ruderal	Standing Water
Running Water	A Arable
Species Poor Intact Hedge	Introduced Shrub
Species Poor Defunct Hedge	Fence
Wall	Buildings
Bare Ground	Hard Standing
Target Note	

0 125 250 500
Metres

Rev	Date	Description	By	Chk	App	Notes:

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Client: E-GEN Limited

Project: E-GEN Feasibility and Consent
Cotton of Pitkennedy

Title: Phase 1 Habitat Survey

Drawn: JSdS		Checked: LM	
Designed: LM		Approved: ZC	
Date: 09/03/2012	Scale 1:6,000	A3	
Project Number: 3511514A-ZWF		Drawing Number: Figure 1	Revision

APPENDIX E
CLIMATE CHANGE AND INTERNATIONAL LEGISLATION

Appendix E – Climate Change and International Legislation

1.1 Climate Change

1.1.1 Climate change is one of the most serious environmental problems faced by the world today. It is internationally recognized that the global climate is changing as a result of increasing levels of 'greenhouse' gases in the Earth's atmosphere. Over the last two centuries global atmospheric concentrations of carbon dioxide have grown by nearly 30 per cent, methane concentrations have more than doubled, and nitrous oxide concentrations have risen by about 15 per cent (United States Environmental Protection Agency). This growth is a direct effect of mankind's increased burning of fossil fuels, which, during processing and combustion, give rise to greenhouse gas emissions. These greenhouse gases prevent heat escaping into space, raising the global temperatures as their presence increases.

1.1.2 The 1990s were the warmest decade since records began in 1861. The average global surface temperature has risen by 0.6°C over the 20th century, and could rise by 2.5°C in the next 50 years, and by up to 5.8°C during this century, as a direct result of the greenhouse effect, though the impact on global regions will be varied. In some regions these changes could lead to drought, in others increased flooding. It is already evident that the polar icecaps are receding as global temperatures rise, which may lead to an increase in sea levels. In the 20th century, records show that the global mean sea level rose by an average of 1-2 mm a year (United Nation (UN) Working Group of the Intergovernmental Panel on Climate Change).

1.1.3 A report issued by the UK's Office of Science and Technology – Foresight Future Flooding in 2004 estimated that by the end of this century, up to 4 million Britons face the prospect of their homes being inundated directly as a result of climate change. In the UK it is likely that our winters will become warmer and wetter whilst our summers become hotter and drier. Extreme weather events will become more frequent.

1.1.4 The RSPB highlighted in 1998 that "a staggering number of species could be committed to extinction as a result of climate change – a third or more of land-based plant and animal species by the 2050s s if we take no action to limit global warming. Climate change is now the greatest long-term threat to wildlife worldwide".

1.1.5 Worldwide the consequences could be devastating with many millions of people exposed to the risk of disease, hunger and flooding. By the middle of the century, 200 million more people may become permanently displaced due to rising sea levels, heavier floods, and more intense droughts.

1.1.6 In 2006 the UK Government commissioned 'Stern Review on the Economics of Climate Change' (Stern Review) in to the potential impacts of climate change to the UK and global economies. This review concluded that not combating climate change could reduce global gross domestic product (GDP) by 5 per cent year on year 'now and forever' whilst the costs associated with combating global climate change could be as little as 1 per cent of global GDP. The report identified the investment that takes place in the next 10-20 years as having a profound effect on the climate in the second half of this century and in the next. It concluded that "our actions now and over the coming decades could create risks of major disruption to economic and social activity, on a scale similar to those associated with the great wars and the economic depression of the first half of the 20th century" but that "there is still time to avoid the worst impacts of climate change, if we take strong action now."

1.2 Tackling Climate Change

1.2.1 The problem of climate change was first addressed in the international arena at the United Nations Conference on the Environment and Development, the Earth Summit, in Rio de Janeiro in 1992. One of the major themes of the meeting was promoting sustainable economic development in the face of global climate change. Another was that industrial nations who have contributed the bulk of the greenhouse gas emissions should assume the burden of leadership.

1.2.2 This was followed by further international action in 1997 when worldwide Governments took a further step and agreed on the Kyoto Protocol, which upon ratification, would establish legally binding targets for the reduction of greenhouse gases emitted by industrialized countries. Under the Protocol all industrial nations are required to reduce collective greenhouse gas emissions by just over 5.2 per cent from 1990 levels by 2008-12. The European Union, a leading voice in the Kyoto negotiations, agreed to an 8 per cent reduction, which was subsequently shared between the Member States. As part of this the UK Government made a commitment to reduce greenhouse gases by 12.5 per cent by 2008-2012 and, in addition, to move towards a target of a 20 per cent reduction of carbon dioxide by 2010, with an aspirational target of 60 per cent by 2050. The protocol came in to force in February 2005, although the US have not ratified the protocol and Canada have since pulled out in late 2011.

1.2.3 In December 2005 the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) met for the eleventh time marking the entry into force of the Kyoto Protocol following the enactment of the Protocol into Russian Law. The conference represented a shift in recent climate change discussions with the conference agreeing to negotiations to extend the Kyoto Protocol beyond 2012. The conference also saw the launch of "open and non-binding talks" with countries yet to ratify the protocol including the United States of America (US) a development that represented a significant shift in US Policy.

1.2.4 The Kyoto Protocol will expire in 2012. In December 2009, the Copenhagen UN Climate Summit led to the outline of a global agreement “Copenhagen Accord” recognising the scientific case for keeping temperature rises to no more that 2ºC. Whilst falling short of an agreement on future emission reduction targets, President Obama indicated that the US would end its previous exclusion from the Kyoto Protocol.

1.2.5 The 2010 UN Climate Change Conference in Cancun resulted in further agreement focusing on reducing global average temperatures rises to 1.5ºC and calls upon richer countries to reduce their emissions in accordance with the Copenhagen Accord and for developing countries to plan for emission reductions.

1.3 European Climate Change Programme

1.3.1 The European Commission (EC) published its European Climate Change Programme in 2000 with the aim of meeting the requirements of the Kyoto Protocol. This combined a strengthening of existing measures with a range of new initiatives including a European Union (EU)-wide greenhouse gas emissions trading scheme which started in 2005. As most industries would have difficulty in altering their processes to reduce their greenhouse gas emissions by significant amounts without becoming uneconomical and as power generation is major producer of carbon dioxide, promoting the increased use of renewable energy forms one of the cornerstones of the EU’s strategy for meeting the Kyoto target and beyond.

1.3.2 The EU historically promoted the generation of electricity from renewable energy sources through the Renewables Directive (Directive: 2001/77/EC) which has since been effectively replaced by The Renewable Energy

Directive (2009/28/EC). The promotion of electricity from renewable sources of energy is a high priority in the European Union for several reasons in addition to combating climate change, including the security and diversification of energy supply, environmental protection and social and economic development. Under the Renewable Energy Directive Member States are required to adopt national targets for renewables that are consistent with reaching the Commission's overall European Union target of 20 per cent of energy across the EU coming from renewable sources. The Project will help achieve the stated aims of the European Union's 'Directive on the promotion of the use of energy from renewable sources' (2009/28/EC) which sets a target for the UK that renewable energy constitutes 15% of gross final consumption of energy by 2020.

1.4 Renewables Obligation, Renewables Targets and the Feed-In Tariff

1.4.1 A key part of the UK's Climate Change Programme is the Renewables Obligation (RO), which was introduced in April 2002. The Obligation requires licensed electricity suppliers to source specified percentages of the electricity that they supply from renewable sources. The level of the RO is set to increase each year from 5.5 per cent for 2005-6 to reach 10.4 per cent by 2010-11. In December 2003, the Government announced their intention to provide for the level of the Obligation to continue to rise in years beyond 2010-11 so that it would reach 15.4 per cent for 2015-16. The scheme will remain in place until at least 2027.

1.4.2 Certain renewable energy projects are not eligible for the RO, such as existing large scale hydro and energy from waste projects (other than pyrolysis or gasification). The percentage make up of renewable energy in the UK electricity market is therefore calculated slightly differently for the RO as opposed to the Renewables Directive, as the latter includes large scale hydro.

1.4.3 In the 8 years that the RO has been in force it has proved a positive incentive in bringing forward new renewables generation and in encouraging investment.

1.4.4 The recommendations of the energy white paper were carried forward in to "The Energy Challenge (Energy Review Report)" published by the government in July 2006. According to the Energy Challenge, large scale electricity generation will need to increase to cope with the capacities of future power demand. The government identifies in the review that approximately 25 GW (gigawatt) of new electricity generation capacity over the next two decades is required to meet the UK's electricity needs as coal and nuclear plant start to approach the end of their operational lifetimes and start to close. The review concluded that a substantial new investment, which is the equivalent to one third of today's generation capacity, is required in the UK energy market and reaffirmed the government's aim of generating 20 per cent of the UK's electricity from renewable sources by 2020.

1.4.5 The targets for renewable energy generation in the UK were reaffirmed in 'Meeting the Energy Challenge - A White Paper on Energy' published by the government May 2007. The paper identified the need for significant amounts of additional generation in the UK and again identified the government's aim of generating 20 per cent of the UK's electricity from renewable sources by 2020, and ultimately 60 per cent by 2050.

1.4.6 The "Renewable Energy Strategy", published in 2009, now asks industry and public to consider the implications of increasing the Renewables Obligation to 30 to 35 per cent of electricity sales by 2020 in order to meet EU targets. Meeting the targets would require the construction of at least 4,000 new 3 MW onshore turbines. This compares to the ca. 3847 (as at 24 July 2012 from RenewableUK) turbines already installed in the UK which includes both onshore and offshore wind farms. This has recently been supplemented by the draft National Renewable Energy Action Plan (July 2010) which suggests

some changes to the delivery mechanisms for renewable energy but highlights the UKs ongoing commitment to the targets outlined in the Renewable Energy Strategy and Renewable Energy Directive.

1.4.7 In April 2010, under the Energy Act 2008, the Feed-in Tariff (FiT) scheme was introduced as a means to encourage the deployment of additional small-scale (less than 5MW) low-carbon electricity generation, particularly by organisations, businesses, communities and individuals that have not traditionally engaged in the electricity market. Wind, solar PV, hydro, anaerobic digestion and domestic scale microCHP are all eligible for the Feed-in Tariff, which works alongside the Renewables Obligation and Renewable Heat Incentive (RHI).

1.4.8 Technologies eligible for the Feed-in Tariff benefit from two revenue streams – the generation tariff, where the owner of the project is paid a set rate for each unit (or kWh) of electricity is generated, and the export tariff, where the project owner receives a set rate per kWh for each unit of electricity not used on site and exported to the electricity grid. While the export tariff is currently fixed at 3.2 pence per kWh, the generation tariff varies from technology to technology and changes with the size of the project.

1.5 Climate Change and Local Planning Policy

1.5.1 Measures to introduce combating climate change into planning policy was first set out in the Government's Planning Policy Statement (PPS) 'Planning and Climate Change' which is complimented by Planning and Climate Change, a supplement to PPS1 Delivering Sustainable Development. In the section of the PPS document relating to Local Development plans, the advice is that planning authorities should:

- Consider allocating sites for renewable and low-carbon energy sources, and supporting infrastructure, taking care to avoid stifling innovation;
- Look favourably on proposals for renewable energy including on sites not identified on development plan documents;
- Not require applicants to demonstrate either the overall need for renewable energy and distribution or for a particular proposal for renewable energy and therefore to be sited in a particular location; and
- Avoid policies that set stringent requirements for minimising impact on landscape and townscape if these effectively preclude the supply of certain types of renewable energy and, therefore, other than in the most exceptional circumstances, such as within nationally recognized designations, avoid such restrictive practices.

1.6 Renewable Energy in the UK

1.6.1 The UK still needs to make huge strides to a more sustainable energy economy. Latest figures available from the Department for Energy and Climate Change (DECC) indicate that about 6 per cent of UK electricity is generated by RO eligible sources well below the target of 10 per cent by 2010.

1.6.2 With long lead times for offshore wind and biomass fired power stations both of which are significantly more costly than on-shore wind farms it is considered that on-shore wind will be vital to helping ensure that the UK makes more substantial inroads to renewable energy targets in the new decade.

1.7 Wind Energy in the UK

1.7.1 In the UK wind power has been commercially harnessed since the early 1990s, when early projects were supported by the Government's Non-Fossil Fuel Obligation (NFFO). There are currently 4158 wind turbines in operation at 362 sites around the UK, providing approximately 7777 MW of the UK's

electricity supply. Of these, there is a total of 2679 MW installed capacity at 18 sites off the UK Coast. Both the current wind energy and energy from projects under construction or at the consented stage will meet the needs of approximately 9 million UK households. However, this capacity must continue to increase if the Government's targets are to be reached by 2020.

1.7.2 Although on-shore wind energy is the fastest growing energy resource in the UK, the utilisation of wind power has developed considerably faster in other European countries, such that the UK thus far has a relatively poor uptake of the technology. In fact, Britain has the largest wind resource in Europe with over 40 per cent of the realisable wind energy potential. Wind turbines now provide more than 238,351 MW of renewable energy globally (as of end 2011) with Europe (96,616 MW), China (62,733MW) and North America (52,184 MW) housing the bulk of this generation.

1.8 Economic Benefits

1.8.1 The development of renewable energy schemes presents an economic opportunity both nationally and at a regional and local level. The "World Energy Council" predicts that renewable energy will lead to the investment of some £400 bn to the Global economy between 2000 and 2010. Other EU nations have taken advantage of the opportunities available in this emerging market, for example Denmark now employs more than 20 000 people in its wind energy industry and meets over 28 per cent of its domestic electricity demand from wind turbines.

1.8.2 A study undertaken by the DTI, the 'Renewables Supply Chain Gap Analysis' found that in 2004 just 8000 people were employed by the renewable energy industry in the UK. The majority of these jobs were wind turbine related with 4000 jobs associated with on and offshore wind turbine projects. The study concluded that by 2020 there is the potential to create between 17 000 and 35 000 new jobs in the sector. A report published by Greenpeace, "Offshore wind, onshore jobs" put this figure much higher showing that a growing wind energy industry could bring up to 76 000 jobs to the UK.

1.8.3 More recently the UK Renewable Energy Strategy of 2009 suggested that achieving the UK targets could provide £100 billion worth of investment opportunities and up to half a million jobs in the renewable energy sector by 2020. To this end the Government has put in place the mechanisms to provide financial support for renewable electricity and heat worth around £30 billion between now and 2020: through the extension and expansion the Renewables Obligation for large-scale renewable generation amongst other measures.

1.8.4 The potential for investment in new and emerging renewable energy technologies must also be seen against the potential impacts of not taking action to combat climate change. As noted above, the 'Stern Review' of November 2006 concluded that climate change could perhaps reduce global GDP by 5 per cent year on year 'now and forever' whilst the costs associated with combating global climate change could be as little as 1 per cent of global GDP. The risks to the UK economy if the Stern Review predictions are correct are plain to see and it is considered that it is through projects such as the proposed Project that this threat can be combated.

1.8.5 e-Gen will strongly encourage the contractor who will construct the project to use locally sourced materials and locally based contractors as part of their proposals so as to maximise the benefit to the local economy (see further discussions in Section 11: Socio-Economics).

1.9 Power Supply Benefits

1.9.1 The use of renewable energy such as that which would be generated by the proposed Project will add to the diversity of the UK electricity generation sector helping to maintain the reliability of supplies and represents an

inexhaustible supply. Renewable energy also has advantages relating to slowing the depletion of finite fossil fuel reserves. The UK has been self sufficient in energy for the past 3 decades, due to North Sea oil and gas, but will become net importers of both gas and oil over the next decade, leaving the country potentially vulnerable to price fluctuations and interruptions to supply caused by regulatory failures, political instability or conflict in other parts of the world.

1.9.2 Wind turbines, contrary to common misconception, do not necessitate a large spinning reserve that leads to the inefficient use of other fuels. Generation from wind turbines does fluctuate depending on the wind speed encountered at a specific site, however this does not mean that a lull in wind speeds at one site will coincide with lull in wind speeds at all Project sites across the UK. It is already the case that many power stations in the UK generate at reduced loads to allow the National Grid Company (NGC) to meet peak demand associated with either a sudden fluctuation in electricity demand or the failure of a large power station unit. During such events power stations increase load rapidly to stabilize the grid and prevent power cuts. The UK electricity supply network is therefore more than adequately equipped to accommodate the installation of large numbers of wind turbines over the coming years.

1.9.3 The annual electrical output of the Cotton of Pitkennedy Wind Farm is predicted to be of the order of 2 102 400 kWh. It is calculated (using the methodology in Section 7: Air Quality) that the wind turbine will produce enough electricity to power between 447 and 637 households with renewable energy annually.

1.10 Environmental Benefits

1.10.1 The emission reduction benefits are in accordance with the objectives of Agenda 21, a document which arose from the 1992 Earth Summit in Rio de Janeiro. The document sets an international agenda for the 21st Century, which aims to promote sustainable development. Sustainable development is generally defined as “development that meets the need of the present without compromising the ability of future generations to meet their own needs” (Bruntland Sustainable Development, Opportunities for Change, 1987).

1.10.2 The document was endorsed by over 150 nations including the UK. It emphasizes the need to “think globally, act locally” by encouraging local action to implement many of the aims of global environmental policy. The development of wind energy projects can contribute to the following sustainability objectives:

- Environmentally - it can reduce pollution by providing an alternative to fossil fuels
- Socially – it can contribute to protecting human health by reducing pollution
- Strategically, it can help to maintain a safe and secure supply of electricity

1.10.3 With regard to local environmental issues the project will of course have an impact to the existing environmental baseline at the proposed site, which has been assessed as part of the environmental assessment undertaken for the project which is summarized in this ER. Mitigation measures will be employed to help minimise the impact of the project and in some cases improve on the existing environment. Key mitigation measures that are proposed will guarantee that development is done outside of important ecological seasons and ensure that there are no impacts to watercourses in the area by effective management of stockpiles and excavated materials throughout the construction period. A summary of all mitigation measures proposed for the project are included in Section 17.

PARSONS BRINCKERHOFF

APPENDIX F
NATIONAL, REGIONAL AND LOCAL PLANNING POLICY

Appendix F – National, Regional and Local Planning Policy

1.1.1 When making any determination under the Planning Acts, the bodies taking those decisions must have regard to Section 38 (6) of the Planning and Compulsory Purchase Act 2004 which states:

"If regard is to be had to the plan for the purpose of any determination to be made under the planning Acts the determination must be made in accordance with the plan unless material considerations indicate otherwise".

1.2 UK Planning Policy

The Plan-Led System

1.2.1 Planning (Scotland) Act 1997 with changes introduced by the Planning (Scotland) Act 2006, which is now the incumbent planning Act. The philosophy behind the planning system is of a plan led process, which is faster, more adaptable and compatible to sustainable development, which empowers local decision making, increases community planning and encourages stakeholder involvement.

1.2.2 The Scottish Government issues planning policy guidance documents to cover land use and other planning matters which in turn inform the policies and spatial strategies used by the Council in making their own plans and when evaluating planning decisions.

1.2.3 The Planning Act introduced the National Planning Framework (NPF) - a document that identifies the key issues and drivers for change in Scotland over the next 25 years. It sets out a long term vision for development and highlights a class of important and often large scale 'National' developments.

1.2.4 Planning policies in Scotland can be found in a single reference document known as the Scottish Planning Policy (SPP), a consolidation of policy documents formerly known as National Planning Policy Guidelines (NPPGs). The SPP includes concise subject planning policies, including the implications for development planning as well as statutory guidance on sustainable development.

1.2.5 In addition, Planning Advice Notes (PANs) provide advice on good practice and other relevant information with Circulars providing guidance on policy implementation.

1.2.6 Each council area in Scotland is covered by a Local Development Plan (LDP), which sets out where most new developments are proposed and the policies that will guide decision-making on planning applications. Some LPAs also have Strategic Development Plans (SDPs). The SDP sets out the long-term development of the city region and deals with region-wide issues such as housing and transport.

1.3 Scottish Planning Policy 6: Renewable Energy

1.3.1 Annex A of SPP 6 details the spatial framework for wind farms over 20 megawatts, which includes guidance on how development plans should be structured to include broad areas of search within which proposals are likely to be supported, areas which can be afforded significant protection and the criteria upon which applications will be judged. It is noted that the framework given in Annex A should not be used by Local Authorities to put in place a sequential approach to determining applications.

1.3.2 The extent to which considerations set out in Annex A are relevant to proposals below 20 megawatts will be dependent on the scale of development proposed, whilst recognising that the design and location of any development must reflect the scale and character of the landscape. The SPP6 notes that this should be recognised in development plans produced by Local Authorities but the existence of natural heritage designations and other

constraints should not be incompatible with the need to encourage smaller-scale wind developments, particularly community and decentralised energy schemes or those within urban and industrial settings.

1.4 National Planning Policy Guideline 6: Renewable Energy

1.4.1 Last revised in 2000, NPPG 6 was designed to assist the development of future renewable energy projects in Scotland and defines the factors to which the Scottish Ministers will have regard when considering policies for renewable energy developments in development plans, and when considering applications for planning permission which come before them. The document relates primarily to new renewable energy projects connecting with the electricity distribution grid system.

1.4.2 The NPPG recognises that Scotland has one of the best wind regimes in Europe, which represents a very significant, albeit under-utilised, renewable energy resource. This is likely to be the technology most widely used in the expansion of renewable energy in Scotland. The capacity of the transmission and grid system will be an important influence on the siting of future wind farms.

1.4.3 The guidelines make reference to further policy guidance set out in NPPG 14: Planning and Natural Heritage and PAN 45: Renewable Energy which has now been revoked. The document refers to a number of issues relating to wind power plants, including noise, visual impact and cumulative effects.

1.4.4 Regarding noise, the guidelines recommend that while British Standard BS4142 may be appropriate as a means of determining potential or actual perceived noise, the combined effect of turbines should be determined by reference to the particular character or sensitivity of the area. This should be assessed by reference to the nature and character of neighbouring or nearby developments. "The assessment & Rating of Noise from Wind Farms" ETSU for DTI September 1996 is cited as the most appropriate methodology for noise impact assessment.

1.4.5 Consideration is given to shadow flicker, driver distraction and aviation impacts and the document recommends that projects are well designed to avoid these issues. Developers are advised to ensure that through good design the visual impact of the proposed wind turbines is appropriate to the location. Public preference is for a wind farm to be controlled and contained within a landscape, so as to appear less dominating. There is however no preferred wind farm layout; different layouts will be appropriate in different circumstances.

1.4.6 The cumulative impact of a number of neighbouring developments may also be a relevant consideration. The nature and character of the location, and the landscape in which a development is located, will in part determine the acceptability or otherwise of siting proposals close together. Separation distances are also stated as a general guide of equating to 10 rotor diameters between the turbine and the nearest residential property.

1.4.7 The guidelines recommend that a cautious approach is adopted in relation to particular landscapes which are rare or valued, such as National Scenic Areas and proposed National Parks and their wider setting, where it may be more difficult to accommodate wind turbines without detriment to natural heritage and tourism interests. In order to assess the landscape impact of wind energy developments, Scottish Natural Heritage carried out a comprehensive national programme of Landscape Character Assessment. Together these assessments document the variety of Scotland's landscape types. While not directed specifically at potential wind farm developments, within such broad areas there will be areas of varying landscape characteristics with different implications for wind farm development.

1.5 Planning Advice Note 1/2011 – Planning and Noise

1.5.1 PAN 1/2011 provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise. It supersedes Circular 10/1999 Planning and Noise and PAN 56 Planning and Noise. Details and advice on noise impact assessment (NIA) methods is provided in the associated Technical Advice Notes.

1.5.2 The PAN is designed to promote the principles of good acoustic design and a sensitive approach to the location of new development. It promotes the appropriate location of new potentially noisy development, and a pragmatic approach to the location of new development within the vicinity of existing noise generating uses, to ensure that quality of life is not unreasonably affected and that new development continues to support sustainable economic growth.

1.5.3 The PAN also deals with the potential noise issues from wind developments and specifies that good acoustical design and siting of turbines is essential to minimise the potential to generate noise. Web based planning advice on renewable technologies for onshore wind turbines (mentioned below) provides advice on 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97) published by the former Department of Trade and Industry [DTI].

1.6 Specific Advice Sheet – Onshore Wind Turbines

1.6.1 The Specific Advice Sheet relating to Onshore Wind Turbines was last updated in May 2012 and identifies suggested areas of focus for planning authorities, which include detailing the criteria to be applied in assessing wind turbine applications, identifying proportionate levels of information to service pre-application discussions and to assess applications on wind turbines and to provide greater clarity on where groups of wind turbines can be located by ensuring that a spatial framework for wind farms > 20MW has been set out in the development plan.

1.6.2 The sheet includes typical planning considerations for use by local authorities in determining planning applications for onshore wind turbines, including the landscape impact, wildlife, habitat and biodiversity impact, separation distances, aviation matters and cumulative impacts.

1.7 SNH Policy Statement 01/02 – SNH's Policy on Renewable Energy

1.7.1 This document provides SNH's broad overview on where there is likely to be greatest scope for wind farm development, and where there are the most significant constraints, in natural heritage terms. It is emphasised that, at the strategic scale at which is it presented, the guidance cannot be prescriptive at the level of an individual site.

1.8 SNH Policy Statement 02/02 – Strategic Locational Guidance for Onshore Wind Farms in Respect of the Natural Heritage

1.8.1 This document provides SNH's broad overview on where there is likely to be greatest scope for wind farm development, and where there are the most significant constraints, in natural heritage terms. It is emphasised that, at the strategic scale at which is it presented, the guidance cannot be prescriptive at the level of an individual site.

1.9 2020 Routemap for Renewable Energy in Scotland

1.9.1 Published in 2011, the 2020 Routemap was designed as an update and an extension to the Scottish Renewables Action Plan 2009 and reflects the challenge of Scotland's new target of meeting an equivalent of 100% demand for electricity from renewable energy by 2020.

1.9.2 The new target, roughly equating to 16 GW of installed capacity, compliments the aim of meeting at least 30% of demand for energy from renewable sources by 2020.

1.9.3 The document details the current challenges to deployment of onshore wind energy, which include the cost of renewables, secure grid access and public engagement, and the actions planned the Scottish Government plan to reduce these barriers. These actions include one based on planning and the role of Planning Authorities with regard to meeting Scotland's renewables targets, where the Scottish Government have set themselves the action of continuing to encourage planning authorities to meet the requirement to produce spatial frameworks, to look for solutions in technical challenges around aviation, noise, proximity to communities, cumulative impacts in the landscape and to encourage best practice through the wind project when complete.

1.10 Local and Regional Planning Policy

TAYplan Strategic Development Plan (June 2012)

1.10.1 Policy 6: Energy and Waste/Resource Management Infrastructure of the TAYplan states that:

A. Local Development Plans should identify areas that are suitable for different forms of renewable heat and electricity infrastructure and for waste/resource management infrastructure or criteria to support this; including, where appropriate, land for process industries (e.g. the co-location/proximity of surplus heat producers with heat users).

B. Beyond community or small scale facilities waste/resource management infrastructure is most likely to be focussed within or close to the Dundee and/or Perth Core Areas (identified in Policy 1).

C. Local Development Plans and development proposals should ensure that all areas of search, allocated sites, routes and decisions on development proposals for energy and waste/resource management infrastructure have been justified, at a minimum, on the basis of these considerations:

- The specific land take requirements associated with the infrastructure technology and associated statutory safety exclusion zones;
- Waste/resource management proposals are justified against the Scottish Government's Zero Waste Plan and support the delivery of the waste/resource management hierarchy;
- Proximity of resources (e.g. woodland, wind or waste material); and to users/customers, grid connections and distribution networks for the heat, power or physical materials and waste products, where appropriate;
- Anticipated effects of construction and operation on air quality, emissions, noise, odour, surface and ground water pollution, drainage, waste disposal, radar installations and flight paths, and, of nuisance impacts on off-site properties;
- Sensitivity of landscapes (informed by landscape character assessments and other work), the water environment, biodiversity, geo-diversity, habitats, tourism and listed/scheduled buildings and structures;
- Impacts of associated new grid connections and distribution or access infrastructure;
- Cumulative impacts of the scale and massing of multiple developments, including existing infrastructure;

- Impacts upon neighbouring planning authorities (both within and outwith TAYplan); and,
- Consistency with the National Planning Framework and its Action Programme.

Angus Local Plan Review (February 2009)

1.10.2 The Angus Local Plan Review was adopted in February 2009, and provides considerable amounts of guidance on renewable energy developments.

Renewable Energy

1.10.3 3.73 The Dundee and Angus Structure Plan acknowledges the advantages of renewable energy in principle but also recognises the potential concerns associated with development proposals in specific locations. Angus Council supports the principle of developing sources of renewable energy in appropriate locations. Large-scale developments will only be encouraged to locate in areas where both technical (e.g. distribution capacity and access roads) and environmental capacity can be demonstrated.

1.10.4 3.76 All renewable energy production, including from wind, water, biomass, waste incineration and sources using emissions from wastewater treatment works and landfill sites will require some processing, generating or transmission plant. Such developments, that can all contribute to reducing emissions will have an impact on the local environment and will be assessed in accordance with Policy ER34.

Policy ER34 : Renewable Energy Developments

1.10.5 Proposals for all forms of renewable energy development will be supported in principle and will be assessed against the following criteria:

- (a) the siting and appearance of apparatus have been chosen to minimise the impact on amenity, while respecting operational efficiency;
- (b) there will be no unacceptable adverse landscape and visual impacts having regard to landscape character, setting within the immediate and wider landscape, and sensitive viewpoints;
- (c) the development will have no unacceptable detrimental effect on any sites designated for natural heritage, scientific, historic or archaeological reasons;
- (d) no unacceptable environmental effects of transmission lines, within and beyond the site; and
- (e) access for construction and maintenance traffic can be achieved without compromising road safety or causing unacceptable permanent and significant change to the environment and landscape.

Wind Energy

1.10.6 3.77 Onshore wind power is likely to provide the greatest opportunity and challenge for developing renewable energy production in Angus. Wind energy developments vary in scale but, by their very nature and locational requirements, they have the potential to cause visual impact over long distances. Wind energy developments also raise a number of environmental issues and NPPG 6 advises that planning policies should guide developers to broad areas of search and to establish criteria against which to consider development proposals. In this respect, Scottish Natural Heritage Policy Statement 02/02, Strategic Locational Guidance for Onshore Wind Farms in Respect of the Natural Heritage, designates land throughout Scotland as being of high, medium or low sensitivity zones

in terms of natural heritage. Locational guidance is provided to supplement the broad-brush zones.

1.10.7 3.78 A range of technical factors influence the potential for wind farm development in terms of location and viability. These include wind speed, access to the distribution network, consultation zones, communication masts, and proximity to radio and radar installations. Viability is essentially a matter for developers to determine although annual average wind speeds suitable for commercially viable generation have been recorded over most of Angus, other than for sheltered valley bottoms. Environmental implications will require to be assessed in conjunction with the Council, SNH and other parties as appropriate.

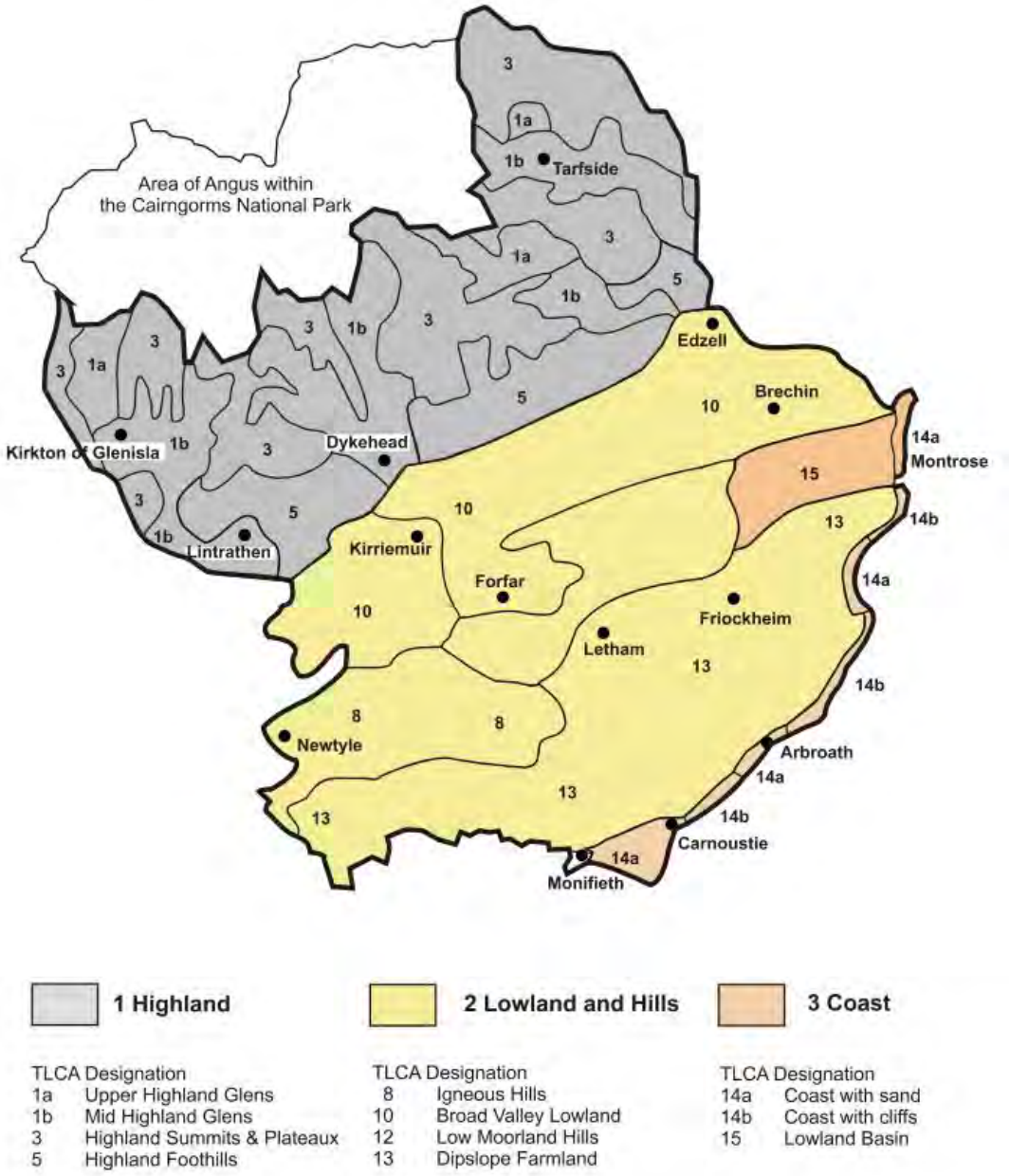
1.10.8 3.79 Scottish Natural Heritage published a survey of Landscape Character, the Tayside Landscape Character Assessment (TLCA), which indicates Angus divides naturally into three broad geographic areas – the Highland, Lowland and hills and the Coast. The Tayside Landscape Character Assessment provides a classification to map these areas based on their own particular landscape characteristics (Fig 3.4).

1.10.9

Area	TLCA Classification	Landscape Character
1 Highland	1a, 1b, 3, 5	Plateaux summits, glens and complex fault line topography
2 Lowland and hills	8, 10, 12,13	Fertile strath, low hills and dipslope farmland.
3 Coast	14a, 14b, 15	Sand and cliff coast and tidal basin

1.10.10 The impact of wind farm proposals will, in terms of landscape character, be assessed against the TLCA classifications within the wider context of the zones identified in SNH Policy Statement 02/02.

Figure 3.4 : Geographic Areas



1.10.11 3.80 The open exposed character of the Highland summits and the Coast (Areas 1 and 3) is sensitive to the potential landscape and visual impact of large turbines. The possibility of satisfactorily accommodating turbines in parts of these areas should not be discounted although locations associated with highland summits and plateaux, the fault line topography and coast are likely to be less suitable. The capacity of the landscape to absorb wind energy development varies. In all cases, the scale layout and quality of design of turbines will be an important factor in assessing the impact on the landscape.

1.10.12 3.81 The Highland and Coast also have significant natural heritage value, and are classified in SNH Policy Statement 02/02 as mainly Zone 2 or 3 - medium to high sensitivity. The development of large scale wind farms

in these zones is likely to be limited due to potential adverse impact on their visual character, landscape and other natural heritage interests.

1.10.13 3.82 The Lowland and Hills (Area 2) comprises a broad swathe extending from the Highland boundary fault to the coastal plain. Much of this area is classified in Policy Statement 02/02 as Zone 1- lowest sensitivity. Nevertheless, within this wider area there are locally important examples of higher natural heritage sensitivity such as small- scale landscapes, skylines and habitats which will influence the location of wind turbines. In all cases, as advocated by SNH, good siting and design should show respect for localised interests.

1.10.14 3.83 Wind farm proposals can affect residential amenity, historic and archaeological sites and settings, and other economic and social activities including tourism. The impact of wind farm developments on these interests requires careful assessment in terms of sensitivity and scale so that the significance can be determined and taken into account.

1.10.15 3.84 Cumulative impact occurs where wind farms/turbines are visually interrelated e.g. more than one wind farm is visible from a single point or sequentially in views from a road or a footpath. Landscape and visual impact can be exacerbated if wind turbines come to dominate an area or feature. Such features may extend across local authority, geographic or landscape boundaries and impact assessments should take this into account. Environmental impacts can also be subject to cumulative effect – for example where a number of turbine developments adversely affect landscape character, single species or habitat type.

1.10.16 3.85 SNH advise that an assessment of cumulative effects associated with a specific wind farm proposal should be limited to all existing and approved developments or undetermined Section 36 or planning applications in the public domain. The Council may consider that a pre-application proposal in the public domain is a material consideration and, as such, may decide it is appropriate to include it in a cumulative assessment. Similarly, projects outwith the 30km radius may exceptionally be regarded as material in a cumulative context.

Policy ER35 : Wind Energy Development

1.10.17 Wind energy developments must meet the requirements of Policy ER34 and also demonstrate:

- (a) the reasons for site selection;
- (b) that no wind turbines will cause unacceptable interference to birds, especially those that have statutory protection and are susceptible to disturbance, displacement or collision;
- (c) there is no unacceptable detrimental effect on residential amenity, existing land uses or road safety by reason of shadow flicker, noise or reflected light;
- (d) that no wind turbines will interfere with authorised aircraft activity;
- (e) that no electromagnetic disturbance is likely to be caused by the proposal to any existing transmitting or receiving system, or (where such disturbances may be caused) that measures will be taken to minimise or remedy any such interference;
- (f) that the proposal must be capable of co-existing with other existing or permitted wind energy developments in terms of cumulative impact particularly on visual amenity and landscape, including impacts from development in neighbouring local authority areas;

- (g) a realistic means of achieving the removal of any apparatus when redundant and the restoration of the site are proposed.

1.10.18 3.86 Where renewable energy schemes accord with policies in this local plan there may be opportunities to secure contributions from developers for community initiatives. Such contributions are not part of the planning process and as such will require to be managed through other means than obligations pursuant to Section 75 Planning Agreement. Community contributions are separate from planning gain and will not be considered as part of any planning application.

Implementation Guide for Renewable Energy Proposals (June 2012)

1.10.19 The Implementation Guide clarifies and expands on Local Plan Review Policies ER34 Renewable Energy Development and ER35 Wind Energy Development and those factors that will be taken into account in considering and advising on proposals for renewable energy projects in Angus.

1.10.20 The Local Plan Review identifies areas 1 Highland and 3 Coast as having a greater potential sensitivity to the landscape and visual impact of large turbines. This principle is developed in the Landscape Capacity and Cumulative Impacts Study undertaken by Ironside Farrar on behalf of the Council in 2008.

1.11 The Primacy of the Development Plan as a Material Consideration

1.11.1 The starting point for determining this planning application is Section 54A of the Town and Country Planning Act 1990 ('the 1990 Act' – as amended by the Planning and Compensation Act, 1991). This requires that planning applications should be determined in accordance with the provisions of Local Plans and Development Plans unless material considerations indicate otherwise.

1.11.2 It is considered that the policies discussed above in the Local Plan Review are supportive in principle of the proposed Cotton of Pitkennedy wind turbine.

1.12 Summary of Material Considerations

1.12.1 As demonstrated above, there are many policies identifying the material considerations to be addressed in the determination of the proposed Cotton of Pitkennedy turbine. Considered in the context of other broader issues, these are summarised below:

Comment on Planning Policy

1.12.2 Having analysed the relevant planning policy framework, it can be seen that all the issues, which are highlighted in the Local Plan Review, are fully addressed within this ER.

Environmental Protection

1.12.3 In relation to the landscape, the site is not covered by any landscape designations, however, the sites proximity to the Cairngorms National Park to the north-west of the site may be a matter for due consideration during the planning stages.

Residential Amenity

1.12.4 The need to protect residential amenity is a key concern in the determination of all planning applications.

1.12.5 In order to fully assess potential impacts on residential amenity both noise and visual impacts have been assessed from a number of locations surrounding the site and are presented in Sections 6 and 10 of this ER respectively. All locations chosen for monitoring the potential noise and visual impacts have been agreed with relevant representatives of Angus Council and monitoring has been undertaken with reference to current best practice guidance. These assessments have found that neither the visual impact of

the proposed turbine, nor the noise generated from the turbine will have an unacceptable impact on the amenity of local residents.

Transport Infrastructure

1.12.6 The construction of site roads to facilitate the construction and maintenance of the Project will be undertaken in a manner that will cause minimal disturbance to existing flora and fauna, as described in Section 9 and Section 16 of this ES.

Cumulative Impact

1.12.7 Wind energy developments within the 35 km study area considered by the ER are identified in Section 1 which details Project locations as well as the turbine dimensions and output.

1.12.8 Although a few of these developments are in relatively close proximity to the proposed Cotton of Pitkennedy site, the addition of one turbine to the landscape is not considered to represent a significant cumulative impact. The site is set within an undulating landscape, so careful thought has been taken to avoid positioning the turbine in a location which would result in a large visual impact. The photomontage viewpoints have been agreed with Angus Council and are assessed in detail in Section 6 of this ER. Very little cumulative impacts are expected between the proposed turbine and wind energy developments already installed in the area is predicted, due to the undulating landscape and the separation distance between the developments. Further information is presented in Section 6 of this report.

1.12.9 Additionally, the closest turbines to the proposed Cotton of Pitkennedy site have been considered in relation to cumulative effects on noise, ecology and geology. The timing of construction periods so as to not coincide with other proposed developments in close proximity will ensure that there are no cumulative impacts on the transport network of the area. The cumulative socio-economic impacts of the proposed development are likely to be positive as it will provide the opportunity for construction and maintenance staff who will also contribute to the local economy, particularly during the construction period.

1.13 Contribution to National Renewables Targets

1.13.1 The need for and benefits of renewable energy development at a national and global level are highlighted in Section 2 of this ES. These benefits are acknowledged with the identification of a UK target of generating over 10 per cent of the UK's electricity requirements by 2010, and the target of increasing this to 20 per cent by 2020.

1.13.2 The project will also help Scotland meet its national target of providing 40 per cent of electricity through renewable generation by 2020.

1.13.3 If these targets are to be met a quick, sustained and substantial acceleration is needed in the development of renewable energy projects, with onshore wind energy making a critical contribution.

1.14 Contribution towards Sustainable Development

1.14.1 The Cotton of Pitkennedy turbine's maximum output of 0.8 MW would provide approximately between 447 and 637 homes within Angus with electricity (based on RenewableUK recommended calculation methodology and figures). Renewable energy developments such as wind energy, which provide local supplies from 'green' carbon neutral sources, are very much a demonstration of sustainable development in action. The development of renewable energy is essential if the UK is to achieve our global obligations to reduce greenhouse gasses and safeguard our environment for future generations.

1.14.2 The undoubted benefits of electricity generated from renewable sources, and therefore from the proposed Cotton of Pitkennedy turbine, is therefore a further highly significant material consideration.

APPENDIX G
THE PROJECT

Appendix G – The Project

1.1 Project Description

1.1.1 Wind turbines consist of three main components – the tower, nacelle and rotor blades. The nacelle is the enclosed portion of the wind turbine mounted at the hub of the three bladed rotor at the top of the tubular steel tower and houses the generator and gearbox. The proposed wind turbine will each have an output of up to 0.8 MWe.

1.1.2 Modern wind turbines are fully automatic, turning into the prevailing wind direction and shutting down when necessary. The minimum wind speed for the turbine to begin electricity generation would be approximately 4 metres per second (m/s) at hub height rising to the full rated output at 15 m/s. The turbine would be shut down in the rare event that the wind speeds at the site exceed approximately 25 m/s. This will prevent damage to the turbine components. The portion of the time the turbine will generate electricity will therefore correspond to the frequency of winds between 4 and 25 m/s. The amount of energy generated varies with the seasons, with highest sustained wind speeds generally occurring in winter when electricity demand is also highest.

1.1.3 Whilst turbines are designed to withstand much higher wind speeds than 25 m/s, the design of the turbines would be such that should average wind speeds consistently exceed 24 m/s at the hub, the turbine would automatically stop for safety reasons and also to avoid excessive wear on the components. These very high wind speeds are only expected to occur for a very small percentage of the year.

1.1.4 The tower would be painted white or light grey as these colours are the most inconspicuous under most lighting conditions. The turbine will have a semi-matt surface that minimises reflectance. The surface treatment of the turbine will be agreed with the local planning authority, through a planning condition.

1.1.5 The blades will face into the wind, with the tower and nacelle behind. A door at the base of the tower would lead to an internal ladder to allow for access to the nacelle for turbine maintenance. The tower would be equipped with interior lighting. The foundations would be flush with the ground and reseeded up to the turbine base.

1.1.6 The nacelle is the unit located at the top of the tower, attached to the rotor hub. It houses the main mechanical components of the wind turbine generator. These include the drive train, gearbox and generator. An anemometer and wind vane on the nacelle will send wind speed and direction information to an electronic controller or computer system that monitors and controls various aspects of the turbine. This will then use electric motors (the yaw mechanism) to rotate the nacelle and rotor to point the turbine into the wind to maximise energy capture. The electronic controller has the ability to shut down the turbine if a fault occurs. The nacelle housing will consist of a steel-reinforced fibreglass shell to protect the internal machinery from the weather.

1.1.7 The turbine will have a three bladed rotor of the order of 48 m in diameter. However, as before, the exact dimensions are dependent on the successful tender. The rotor blades are the elements of the turbine that capture the wind energy and convert it into a rotational form of energy in the low speed shaft. The rotor blades would turn at approximately 6 to 16 revolutions per minute (rpm). Generally, larger machines have slower rotating blades, but the specific rpm depends on the aerodynamic design of the turbine and varies from model to model. The rotor blades would typically be made from glass-reinforced polyester composite.

1.1.8 The gearbox takes the rotational energy from the low speed shaft and transforms it into faster rotations on the high-speed shaft. The generator is connected to the high-speed shaft and is the component of the system that converts the rotational energy of the shaft into an electrical output.

1.1.9 A cooling system is used to ensure that the components do not overheat and cause damage to themselves or any other component. A typical cooling system is either an electrical fan or a radiator system.

1.1.10 Electrical power generated by the turbines would be collected at between 575 and 690 volts (V) depending on the type of turbine used. Switchgear located in the turbine base, nacelle or an adjacent enclosure, will transform the voltage to that required for connection to the local electrical distribution network. The substation building would be approx 5 m x 10 m and approximately 3 m in height. Electrical cables will be installed to connect the wind turbine to the on-site substation building. The on-site electrical lines would be buried underground in cable runs. Any communication cables would also be run in these trenches. The trenches would typically be 1 m deep, depending on the underlying ground conditions and up to 1.5 m wide.

1.1.11 The proposed substation building would be a small single storey building measuring approximately 5 m by 10 m, located within 10m of the turbine position. This would typically have a rendered exterior and grey slate roof. However, the external appearance of the building will be agreed with the local planning authority subject to an appropriate planning condition. The building would include control hardware, switchgear, junction boxes, in-door breakers, relaying equipment and steel support structures. Metering and protection equipment would be included. Switches would allow particular the collector line and turbine to be turned off. This would allow maintenance and repair of the turbine to take place.

1.1.12 The foundations of the substation building would have an underground vault about 1 m deep where the underground electrical cables from the turbine enter. A buried earthing ring and earthing rods tied to the collection system and a common neutral would also be fitted.

1.1.13 Indicative elevations of the proposed substation building are shown in Figure 5.6. However, the exact details of the substation building will be agreed with the local planning authority through an appropriate planning condition.

1.1.14 The indicative route of the cable linking the site to the Scottish and Southern Energy distribution network is described in more detail in Section 5.7 of this ER, although this would be the subject of a separate planning application by Scottish and Southern Energy.

1.1.15 To construct and service the wind turbine, approximately 0.36 km of new access tracks will be constructed to link the turbine to the existing site entrance. Construction roads will be 4 m nominal width and will be placed to avoid known ground hazards and environmental constraints at the site, in addition to steep gradients. This may require micro-siting to take account of access tracks, etc. The site roads will be constructed of compacted stone, with a nominal thickness of 750 millimetres (mm). Passing places, a turning circle and a turbine laydown area will also be provided. These will be of a similar construction to the site roads, and will be of increased width in corners.

1.1.16 The wind turbine would be equipped with sophisticated computer control systems that would continuously monitor variables such as wind speed and direction, air and machine temperatures, electrical voltage and current, vibrations, blade pitch and rotation. The computer control system would be used to automatically control the operation of the nacelle and power generation. This Supervisory Control and Data Acquisition (SCADA) system would rotate the nacelle into the wind and apply the brakes when necessary and permit the wind turbine to be unmanned. In addition, the operators would

be able to monitor information remotely, including fault diagnostics, and control the turbines as necessary from a central off-site host computer or from a remote personal computer. In the event of any fault on the system the SCADA system would be able to alert operations staff. The control system would always run to ensure that the machines operate efficiently and safely.

1.1.17 A geotechnical survey of the site will be undertaken in order to identify the underlying geology for the preliminary design of the turbine foundations, underground trenching and electrical grounding systems and to identify more precisely the location of the wind turbine, site roads, electrical cables and substation building. Before construction can commence, it is intended that a more detailed site survey would be undertaken at the turbine location and also at the substation building.

1.2 Safety

1.2.1 The turbine would have two fully independent braking systems that could operate together or independently to stop the rotor blades turning. This would be a fail-safe system allowing the rotor to be brought to a halt under all foreseeable conditions. One system would operate aerodynamically by the pitch of the rotor blades and one would utilise a hydraulic disc system.

1.2.2 The normal way of stopping a turbine, for any reason, is to use the aerodynamic braking system. Aerodynamic braking systems have been found to be extremely safe, stopping the turbine in a couple of rotations at the most. In addition, they offer a very gentle way of braking the turbine without any major stress or wear and tear on the tower and the machinery. The aerodynamic braking system would have a back-up supply either from battery power or nitrogen accumulators depending on the exact turbine design.

1.2.3 The hydraulic disc system comprises brake pads that are spring loaded to put pressure on the discs and therefore when the rotor is operational, power would be used to keep the brake pads away from the disc. If power is lost the brakes operate automatically on a fail-safe basis. This mechanical braking system rarely needs to activate, except for maintenance work, as the rotor cannot turn once the aerodynamic system has been activated.

1.2.4 The brakes are used when servicing the equipment in order to keep the rotor stationary while maintenance or inspection is undertaken. It is not possible to remotely start a turbine following an emergency stop or when the brakes are employed for servicing. In the event of certain key faults, the turbine must be inspected in person and the stop-fault reset manually before operation can be reactivated.

1.2.5 A lightning protection system will be provided that connects the blades, nacelle, and tower to an earthing system at the base of the tower. The earthing system would comprise a copper ring conductor connected to earthing rods driven down in the ground at diametrically opposed points outside the tower foundation. The blades would have an internal copper conductor and an additional lightning rod that extends above the wind vane and anemometer at the rear of the nacelle.

1.2.6 The wind turbine would be equipped with sensors to automatically detect loss in fluid pressure and / or increases in temperature. These sensors would enable the turbine to be shut down in case of a fluid leak. The turbine would be designed with fluid catch basins and a containment system to prevent accidental releases from leaving the nacelle. Any accidental gear oil or other fluid leaks from the wind turbine would be contained inside the tower as the tower is sealed around the base.

1.2.7 The proposed wind turbine will utilise a conical tubular steel tower rather than a lattice tower. This permits service personnel to access the wind turbine for repair and maintenance more safely and more comfortably.

1.2.8 The primary danger in working with wind turbines is involved with working at heights above ground during installation and maintenance work. Wind turbines are required to have fall protection devices and the person climbing the turbine has to wear a safety harness. The safety harness is connected with a steel wire to an anchoring system, which comprises a lifeline that follows the person while climbing or descending the turbine. The wire system has to include a shock absorber, so that persons are reasonably safe in case of a fall.

1.2.9 The onsite substation building will be designed to meet stringent electricity industry standards. The oil filled transformers will have a specifically designed containment system (i.e., a bund), to ensure that any accidental fluid leak does not result in a discharge to the environment. The transformer will also be equipped with oil level indicators to detect potential spills. If the oil level inside the transformer dropped due to a leak in the transformer tank, an alarm would be activated at the substation building and into the main wind turbine control SCADA system.

1.2.10 Waste fluids would be removed from site following each service by a licensed collection service for recycling or disposal.

1.2.11 Warning signs would be installed to alert the public to the danger of entering the substation building or turbine tower.

1.2.12 Safety issues with respect to the general public are further addressed in Section 12.

1.3 Energy Balance

1.3.1 The comparison of energy used in the manufacture of a wind turbine and the energy produced during its operating lifetime is known as the energy balance. This can be expressed in terms of energy payback time. The energy payback time is the time needed to generate the equivalent amount of energy used in manufacturing the turbine.

1.3.2 A life cycle analysis of wind turbines undertaken by the Danish Wind Industry Association has found that modern wind turbines rapidly recover all the energy spent in manufacturing, installing, maintaining, and finally scrapping them. Under normal wind conditions it only takes between two and three months for a turbine to recover all of the energy involved. The study included the energy content in all components of a wind turbine, and it includes the global energy content in all links of the production chain, including the concrete foundations.

1.4 Construction

1.4.1 Following receipt of the planning permission and award of construction contracts, it is anticipated that it could take approximately 6 months to construct the wind turbine and associated infrastructure.

1.4.2 E-Gen will retain the services of specialist advisors with regards to ecology and archaeology for the construction period, for example for assistance with micro-siting.

1.4.3 The contract for supply, construction and commissioning of the wind turbine will be awarded through a competitive tendering process to one or more contractors who may in turn appoint specialist subcontractors. The main contractors and subcontractors will be responsible for all the detailed design, civil construction, manufacture, supply, delivery to site, off-loading, erection, installation and commissioning of the wind turbines and associated structures. The selection of the construction contractor will include an assessment of the contractor's record in dealing with environmental issues and require provision of evidence that it has incorporated environmental requirements into its methods statements.

1.4.4 The main contractors will be responsible for organising the site construction and installation works to the required safety standards and the programme.

1.4.5 E-Gen will require, among other things, that the site contractor nominates an Environmental Site Manager and Site Waste Manager for the duration of the construction and commissioning phase.

1.4.6 Construction activities will be undertaken in accordance with a Working Practices Procedure for the Control of Pollution (Working Practices Procedure) that will be developed by the contractor. This will be agreed with the EA and Local Planning Authority prior to any works on site. The aim of the Working Practices Procedure would be to provide guidance on good working practices on site in order to minimise impacts on the soil, geology, hydrology and hydrogeology resulting from the construction of the Project. Additional Procedures will be developed to cover other environmental impacts, such as ecology and noise. The Working Practices Procedures will ensure compliance with: the Projects planning permission; relevant mitigating measures identified by this ER; the EA; and, the Construction Industry Research and Information Association's (CIRIA) guidance for the work and operations to be undertaken. The Contractor will be obliged to comply with the Working Practices Procedure as part of the contract.

1.4.7 The contractor would also be responsible for training its personnel in spill prevention and control and, if an incident occurs, would be responsible for containment and cleanup. Spills would be addressed in accordance with the Working Practice Procedures.

1.4.8 The details of a Transport Management Plan governing vehicle movement in and out of the site would also be developed and agreed with the Highways Authority prior to the commencement of the development. This is discussed further in Section 16 of this ER.

1.4.9 An individual will be nominated who will be responsible for the site management and all aspects of the work. An information board will be displayed in a publicly accessible location at all times and will give the name and telephone number of the developer's site representative. Warning signs would be erected to inform and protect members of the general public of the construction works being undertaken.

1.4.10 Construction working hours will be restricted to the following, with no working on Sundays or Bank Holidays:

Monday to Saturday 08:00 to 18:00

1.4.11 Any deviations from these times, e.g., for the erection of the turbines, will be agreed in advance with Angus Council.

1.4.12 The major activities during the construction of the Project include:

1. Constructing the site access tracks, site compound / laydown area and crane pad at the wind turbine location;
2. Excavating and constructing the turbine tower foundations and substation building pad foundations;
3. Constructing and installing the substation building;
4. Installing the electrical collection system – underground and overhead lines as required;
5. Transporting and assembling the wind turbine;
6. Commissioning and energising the Project;
7. Site re-instatement; and
8. Site restoration and enhancement measures.

1.4.13 In order to limit disturbance, the site access tracks will be constructed first. This is estimated to take between six to eight weeks. A cross section of a typical on site access track is shown in Figure 5.5. The stone for use in the site access tracks will be imported from local quarries. It is not proposed to borrow pit to obtain materials, and no crushing plant will be used on the site. Bridging structures will be required where the access tracks cross any surface drains.

1.4.14 A temporary wheel washing facility will be installed on site to prevent transfer of soil onto nearby public roads.

1.4.15 A temporary site compound would then be constructed for the parking of construction vehicles and equipment, staff vehicles, and the storage of materials including turbine blades and other components. An indicative layout of the site compound is included as Figure 5.5. A temporary office and welfare facility, including a portaloo would also be installed. A crane pad would also be constructed at the base of the turbine location.

1.4.16 Trenching, installation of underground services and provision of temporary construction facilities and services can then take place.

1.4.17 Once the access tracks and site compound are in place, turbine foundation construction will commence.

1.4.18 Construction of the foundations would comprise: excavation of a hole using a digger; outer form setting; rebar and bolt cage assembly; casting and finishing concrete; removing the forms; backfilling; compacting; and, foundation site restoration. Excavation and foundation construction would be conducted in a manner that would minimise the size and duration of the excavated area. On site excavated materials will be used for backfill as far as is possible. The piling of foundations (where concrete piles are driven in to the ground to a sufficient depth to provide a firm foundation for the turbine) are not expected to be necessary. Figure 5.6 shows an indicative turbine foundation though the final foundation can only be confirmed once geotechnical surveys have been undertaken by the contractor appointed.

1.4.19 The excavation and construction of the turbine base is expected to take approximately 3 to 4 weeks.

1.4.20 The delivery of the turbine will be dependent on the manufacturer's production schedule and may not follow directly on from the civil works. The turbine should take approximately three days to assemble depending on weather conditions. Turbine erection would be performed in multiple stages including: erecting the tower (usually in three or four sections); erecting the nacelle; assembling and erecting the rotor; connecting and terminating the internal cables; and, inspecting and testing the electrical system prior to operation. A high lift crane would be required for the final stages.

1.4.21 After construction has been completed, the laydown area will be restored as closely as possible to its original condition or in accordance with the proposed restoration plan. Road verges and turbine foundations will be covered up to the base and reseeded where appropriate. Where feasible and desirable, reinstatement will be undertaken as the Project progresses and begins operation.

1.4.22 The construction contractor will provide his own skips which will be clearly labelled and designated for a specific type of waste. Any recyclable waste will be taken off site for reprocessing where possible. All skips will be kept covered to reduce dust being blown around the site. As part of the site clearance works, all inert and excess soil material that needs to be removed from the site, will be used in the restoration of the neighbouring landfill site. In the unlikely event that any material not deemed to be inert or recyclable and required disposal, this likely to be disposed within the neighbouring landfill site.

1.4.23 A construction workforce of up to 20 personnel is expected. However, it is not expected that all workers would be on site at any one time. The peak workforce would be on site during the busiest construction period when multiple disciplines of contractors complete work simultaneously. Local contractors will be encouraged to tender for the civil and electrical works. Electricians, riggers, crane operators and heavy equipment operators will also be required.

1.4.24 The turbine will have a requirement for non-renewable resources to be used. These resources will include: fuel for construction vehicles; water; steel; concrete; and, aggregate. Steel will be required to construct the turbine and the tower. Where practical, concrete and aggregate would be obtained from existing permitted suppliers close to the site. In order to ensure the integrity of the turbine structure the use of recycled materials would not be possible.

1.5 Operation and Maintenance

1.5.1 The Project is expected to have an operational life of approximately 25 years.

1.5.2 The operation of the Project will be undertaken in accordance with an Operational Environmental Management Plan (EMP).

1.5.3 The Project will be unmanned. Its performance would be automatically monitored from a centralised control room, which would be off site.

1.5.4 On average, on shore wind energy developments have a capacity factor of approximately 30 per cent. However, this does not mean that they only generate for 30 per cent of the time. The capacity factor is the ratio of the actual annual output to the theoretical maximum if the turbine was generating at maximum output for the complete year. In practice, an average wind energy development will operate for 70 to 80 per cent of the time, at varying levels of output.

1.5.5 Typically modern wind turbines operate with an availability of 95 to 99 per cent (i.e., the turbines are available to operate for this percentage of the year). Forced outages can occur due to the malfunction of mechanical or electrical components or computer controls. These are generally due to the malfunction of auxiliaries and controls rather than malfunction of the heavy rotating machinery, as the latter are routinely inspected during planned maintenance or by condition monitoring.

1.5.6 Following the more frequent and detailed initial turbine inspections and maintenance in the first year of operation, a programme of six monthly services is expected. This generally takes the wind turbine off-line for a day and consists of: inspecting and testing safety systems; inspecting wear and tear on components such as seals and bearings; lubricating the mechanical systems; performing electronic diagnostics on the control systems; verifying pre-tension of the mechanical fasteners; gearbox oil change; and, inspecting the overall structural components of the wind turbines. In addition, the blades would be inspected. Blade washing is not anticipated to be a requirement as regular rainfall would remove most, if not all, of the dirt.

1.5.7 The turbines would be visited typically once per month for routine visual inspections, giving a total manpower requirement, when servicing is included, of approx 40 hours per year per turbine. As far as is practical, short term routine maintenance procedures would be undertaken during periods of little or no wind to minimise the impact on electricity generation. Major maintenance / servicing are planned where practical during the summer months.

1.5.8 In the event of a fault, the modular design of modern wind turbines allows most of the parts to be rapidly replaced, especially in the electrical and control systems.

1.5.9 The electrical equipment (such as the breakers, relays and transformers) will require annual visual inspections. This does not affect availability of the turbines. On a 3 yearly basis, testing and calibration of the equipment would require a short break in operation.

1.5.10 A sign would be located at the access point to site and would provide information about the turbine and contact telephone numbers.

1.6 The Cable Route for the Export Connection

1.6.1 The cable route for the export of electricity to the local electricity distribution network will run from the substation building to be located next to the turbine in the west of the site, to a connection to be agreed with Scottish and Southern Energy.

1.7 Decommissioning

1.7.1 Compared to other power generation technologies, wind turbines can be easily and economically decommissioned and removed from site at the end of their economic life and the site returned to its original condition. There would be little or no trace that the wind turbine had been there following decommissioning.

1.7.2 There are several aspects of the decommissioning phase which may have environmental effects. The main activities will comprise:

- Removal of tower, nacelle, blades;
- Reuse / disposal of foundations, tower, nacelle, blades; and
- Removal of cable and ancillary structures.

1.7.3 Decommissioning must take account of the environmental legislation and the technology available at the time. Notice will be given to the Local Authority in advance of the commencement of the decommissioning work. Any necessary licences or permits would be acquired.

1.7.4 E-Gen would develop a decommissioning plan, and the works would be undertaken in accordance with a Working Practices Procedure. The details of the Working Practices Procedure would be agreed not less than 12 months prior to decommissioning. This would be the subject of a planning condition.

1.7.5 The first step of decommissioning would be to make the site safe for work in accordance with the normal safety procedures, such as the issue of permits to work. The turbine would be de-energised in conjunction with the Distribution Network Operator. Once the site is completely disconnected, it will be handed over to a competent contractor (or contractors) to complete the dismantling and demolition work. The lead contractor would produce safety and environmental management plans for the work.

1.7.6 It is probable that most of the equipment will be at the end of its useful operating life and will be obsolescent or obsolete and unsuitable for further use. It will therefore need to be dismantled for recycling. Decisions on reuse of plant items, recycling of materials or the disposal to waste will be made at the time of decommissioning in the light of the technology then available, environmental and economic considerations and legislation. Unsalvageable material will be disposed of at a licensed landfill. A crane would be required to dismantle the turbine.

1.7.7 The turbine foundations would be removed to a depth of 1 m below grade and the soil surface would be restored to its original condition. Disturbed areas would be re-vegetated.

1.7.8 Disposal of all waste materials will only be via appropriate and authorised routes.

1.7.9 The access tracks would be removed or left in place depending on the landowners' preferences.

1.7.10 Decommissioning would be timed to minimise its environmental impact, for example by avoiding the bird breeding season.

APPENDIX H
ECOLOGY REFERENCES AND DISCLAIMER

Appendix H – Ecology References and Disclaimer

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DISCLAIMER

This report has been prepared by Dr Garry Mortimer of GLM Ecology, with all reasonable skill and care within the terms of the agreement with the client. Dr Mortimer disclaims any responsibility to any parties in respect of matters outside this scope.

Best efforts were made to meet the objectives of this study through desktop study and field survey.

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It should be noted, that whilst every endeavour is made to meet the client's brief, no site investigation can guarantee absolute assessment or prediction of the natural environment. Numerous species are extremely mobile or only evident at certain times of year and habitats are subject to seasonal and temporal change.

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APPENDIX I
SOCIO-ECONOMICS

Appendix I – Socio-Economics

1.1 Introduction

1.1.1 The Angus economy has for years been built upon the agriculture and fishing industries. The tourism industry is well established in the area, with Angus Council 'leading the regional agenda for sustainable tourism development'. Angus Ahead (www.angusahead.com) have produced the 'Sustainable Strategy for Growth through Tourism 2009 to 2012' which details how Angus Council will support and stimulate tourism development in Angus, and identifies and delivers key tourism opportunities for Angus. The plan follows the 'Tourism Framework for Change' strategy published by VisitScotland which has an industry ambition of increasing tourism revenue by 50%. Realising the 50% national growth target means that Angus and Dundee tourism sector must grow from a £130 million revenue to one worth more than £200 million per annum by 2015.

1.1.2 The population of the District is approximately 110 600 (2011) with employment rates in the District standing at approximately 73.4 percent. These are higher than the employment rate across the rest of the Scotland (70.9 per cent) and greater than the average across Great Britain (70.3 per cent).

1.1.3 The District has a workforce of approximately 51 200. This can be broken down into a number of sectors – as Shown in Table 11.1.

Table 11.1 workforce sectors in the ANGUS Area1

Sector	Employees (%)	Employees
Manufacturing	14.8	5500
Construction	5.8	2100
Services	71.8	26 500
Distribution / Hotel / Restaurants	23.3	8600
Transport / Communications	3.3	1200
Finance / IT / Other Business	10.2	3800
Public Admin / Education / Health	29.0	10 700
Other Services	6.0	2200
Tourism-related*	9.7	3600
	Total Employee Jobs	36 900

**Tourism consists of industries that are also part of the services industry (distribution/hotel/restaurants/etc).*

1.2 Construction

1.2.1 The contract for supply, construction and commissioning of the plant will be awarded to one or more contractors who may in turn appoint specialist subcontractors.

1.2.2 The details of the chosen turbine manufacturer will not be known until contracts are awarded following the receipt of planning permission.

1.2.3 It is likely that the wind turbine will be manufactured overseas although it is are likely to include UK manufactured components. Most wind turbines installed in the UK have been manufactured in Denmark or Germany as, due

[1] https://www.nomisweb.co.uk/reports/lmp/la/2038432123/report.aspx

to the higher utilisation of wind energy on the continent and the relatively slower uptake of wind power in the UK, turbine manufacturers have historically been based here. However, there are now several manufacturers in the UK at Kirkcaldy, Loughborough, and Kintyre.

1.2.4 Due to European tendering and contracting regulations the contract for the proposed Project must be awarded by open and competitive tender and thus the decision to use local labour and materials will be made by the selected contractor. However, the specification will request information on where the contractor will source labour and sub-contractors, and e-Gen will encourage tenderers to use local contractors wherever possible. Notwithstanding this, it is expected that the civil and electrical contractors will be based locally and the proposed Project will therefore have a minor positive impact on the rate of local unemployment and local economic activity, through purchase of construction materials such as concrete for the foundations and staff wages.

1.2.5 There will be a positive economic benefit for local contractors (e.g. haulage) and local service companies (i.e. cafes, hotels, shops, security) during the construction phase.

1.2.6 During the construction phase the proposed Project would employ of the order of 20 construction workers at peak periods during the pouring of concrete for the foundations and during turbine assembly. The construction period will be of approximately 6 months duration.

1.2.7 More specialised skills are required for certain construction activities such as turbine erection and testing. These skills may not be available locally. Such staff would commute or seek temporary accommodation in local hotels, guesthouses, or privately, helping to support this section of the local economy and increase spending in the area. With a peak workforce of approximately 20 construction workers, there would be little conflict with other users of temporary accommodation. The site is within commuting distance of a number of large conurbations.

1.2.8 Positive minor indirect impacts would therefore result from increases in indirect and induced income and jobs added to the local economy. However, project-induced economic activity will not result in indirect population growth and a related demand for housing capacity.

1.2.9 Construction activities are not anticipated to interfere with the existing use of the site. The estimated amount of land temporarily disturbed will be approximately 0.1 ha, including the construction compound and laydown area.

1.2.10 Services, such as electricity, gas, water, underground telecommunications cables and pipes crossing the site have been examined and the proposed Project is not expected to affect any such interests.

1.2.11 On a national scale, and also internationally, there would be positive socio-economic benefits in terms of job creation and investment cumulatively with other wind energy developments. Estimates by the European Wind Energy Association (EWEA) value the European wind energy market at £50 billion by 2020. Furthermore, RenewableUK estimates that wind energy projects representing an investment of some £60 billion will have to be built over the next decade in order to meet UK Government targets, creating up to 160 000 ‘green collar jobs’ by 2020. In addition, a report published by Greenpeace in 2004, ‘Offshore Wind, Onshore Jobs’2, shows that the growing industry could bring up to 76 000 new jobs to the UK. Cumulatively this represents a positive major impact.

[2] *http://www.greenpeace.org.uk/MultimediaFiles/Live/FullReport/6702.pdf*

1.3 Operation

1.3.1 The Project will be unmanned. Its performance would be automatically monitored from a centralised off site control room. A staff of two would be required. However, these staff would be part-time, and would also operate and maintain a number of other wind projects in the area. The two additional staff may be in addition to staff already working in the area. However, this will only be determined following tendering of the Project. Turbine manufacturers tend to employ local maintenance staff and train them as necessary. Staff will have a background appropriate to their discipline and will be trained in the operation of the Project. Staff training requirements will be regularly appraised.

1.3.2 Wind energy uses land sparingly. Wind energy developments may extend over a large geographical area, but their actual "footprint" covers only a very small portion of the land. The disturbance associated with the construction phase is temporary, and areas (such as the site compound) are generally returned to their prior usage / made available for future use as soon as construction has finished. As fencing will not be required around the turbines, land can be used for other purposes right up to the base of the towers though there will be some access requirements that could limit potential uses to some extent.

1.3.3 Indirect land use changes off-site are not expected as the proposed Project is not expected to substantially induce regional growth to change off-site land uses. Additionally, no conflicts with offsite commercial activities are expected.

Public Attitudes to Wind Farms

1.3.4 Residents living in proximity to wind farm sites have been regularly consulted with regard to their attitudes to wind energy. Surveys of public attitudes have consistently shown that between 70 and 80 per cent of the general public are in favour of wind energy3. This positive feeling is reflected by those living near a wind farms, and similar numbers do not believe that wind farms spoil the scenery or cause noise nuisance. The results of numerous surveys and polls are summarised below.

1.3.5 People understand the implications of climate change, and the requirement for renewable energy. It is not unreasonable to expect that the general population of the area surrounding the site will view the Project in the same way. While there will be individuals who will be unhappy, this may be balanced by those who are in favour and will see the Project as a sign of progress and environmental quality.

1.3.6 Documentary evidence also indicates that support for wind farms from local residents generally increases following installation. Furthermore, the problems that were anticipated by local residents did not have as great an impact as was initially feared4.

7.1.1 In 2003, MORI Scotland undertook a study of ten wind farms with the number of turbines per farm ranging from 9 to 46. The study recorded the view of the immediate communities in proximity to the wind farm sites. Over 1800 interviews were conducted with persons who were in residence before individual wind farms were constructed. The following chart demonstrates the difference between anticipated problems before the wind farms were constructed and the problems as observed by the interviewees after the wind farms had become operational.

1.3.7

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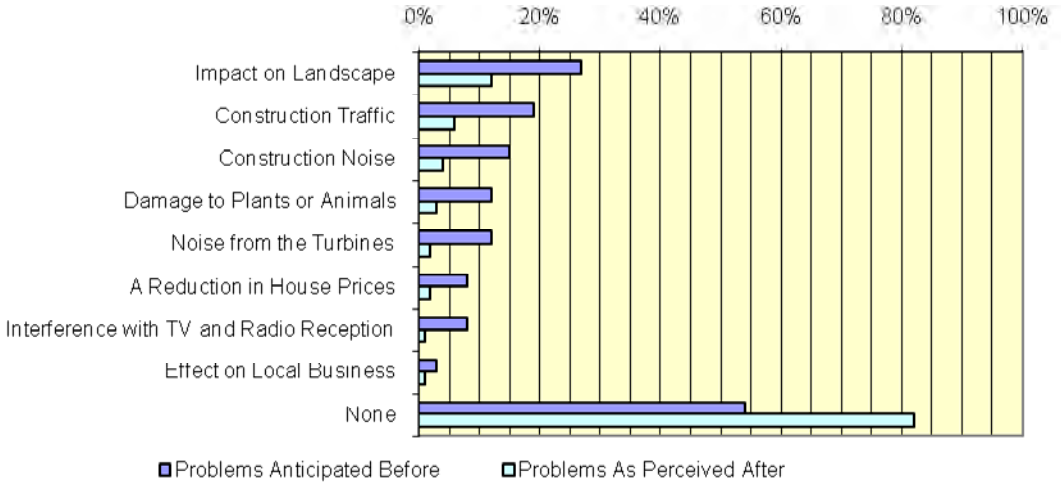
[3] *'Public Attitudes to Wind Energy in the UK' BWEA Briefing Sheet, October 2005, available from http://www.bwea.com/pdf/briefings/attitudes-2005.pdf*

[4] *'Public Attitudes to Wind Energy in the UK' BWEA Briefing Sheet, October 2005, available from http://www.bwea.com/pdf/briefings/attitudes-2005.pdf*

MORI SCOTLAND RESULTS

FIGURE 11.1: ANTICIPATED VERSUS OBSERVED PROBLEMS



1.3.8 The results shown in Figure 11.1 demonstrate that when questioned upon the same concerns after construction of the wind farms, the percentage of residents identifying problems was reduced in all areas. More significantly, the number of residents that thought the wind farms presented no problems rose from approximately 54 per cent to 82 per cent.

1.3.9 The study concluded:

"Once reminded of the fact that there is a wind farm nearby, and asked what they think its impact has been, most say that it has had neither a positive nor negative effect (51 per cent), or say that they do not know what impact it has had (23 per cent). Of those that do pass comment one way or the other, three times as many say that they feel the wind farm has had a positive impact (20 per cent) as say that they think it has been negative (7 per cent). Views are very similar in the inner (0 to 5 km) and middle (5 to 10 km) zones, with those in the outer zone particularly likely to have a neutral stance. Those living in the inner and middle zones are more likely to be positive about the impact of the wind farm."

1.3.10 System Three conducted a survey in 2000 with residents near operational wind farms. Over 400 people living near four of the ten wind farms surveyed by the MORI Scotland study were interviewed. The survey found that "any fears held before the farm was built were allayed once it was up and running". Indeed, whilst 40 per cent of those interviewed before construction anticipated associated problems, this percentage dropped to 9 per cent after construction. In addition, the number of people (living within 5 km of the wind farms) who liked wind farms increased from 67 per cent before construction to 73 per cent after construction.

1.3.11 A survey of 1000 adults undertaken by NOP on behalf of BWEA in August 2004 similarly demonstrated a strong public endorsement for wind[5]. The findings highlighted differences in opinion between those who have and haven't seen a wind farm, with those who have being more supportive. 74 per cent of those surveyed agreed that wind farms are necessary in order to produce renewable energy to help meet current and future energy needs in the UK, with only 12 per cent in disagreement.

[5] *Information from http://www.bwea.com/ref/embracenopsep04.html*

1.3.12 A survey of 1000 adults, undertaken in August 2004, by ICM on behalf of Greenpeace found that 79 per cent supported wind farms in the UK generally and 69 per cent would support wind farms in their area6.

1.3.13 At the Lambrigg Wind Farm in Cumbria, over 230 residents were questioned at the end of 2002 after the wind farm had been in operation for 16 months. Support for the wind farm was high, with 74 per cent voicing support for the local scheme. A small percentage of 8 per cent did not support the wind farm. Furthermore, from the group of local residents initially opposing the wind farm, 60 per cent responded they were now supportive of the wind farm.

1.3.14 Similar results were returned for the Novar Wind Farm, near Inverness. Over 200 residents participated in interviews. Over two thirds positively supported the Novar Wind Farm, and more than half did not identify negative effects of the wind farm. Around 15 per cent identified the visual impact of the wind farm as a drawback. Of those residents aware of alternative energy sources from gas, coal and oil, 89 per cent said more power should be generated by renewable sources.

1.3.15 The RSPB has also undertaken quantitative research in September and October 2001 to investigate the public's attitudes on energy issues as part of their campaign on climate change7. The study aimed to discover to what extent people associated fossil fuels with climate change. Almost all of the interviewees (a total of 2100 interviews were conducted) had heard of climate change and 74 per cent were concerned about its effects. Over half of those interviewed were aware of the term 'renewable energy'. Wind and hydroelectricity were the most popular means of generating electricity favoured by the survey sample. Only 3 per cent were opposed to the building of on shore wind farms in Britain over the next ten years, and only 14 per cent do not want on shore wind farms within 3 miles of their home.

1.3.16 In summary, all of the above studies suggest that the opposition to wind farms reduces significantly following construction. In many cases, people with negative views prior to the construction of a wind farm changed their mind once the wind farms began operation. In addition, support has been demonstrated to increase during operation once the community has had a chance to live with them nearby. Reservations about noise, traffic and other concerns were mostly misapprehensions of the unfamiliar.

1.4 Decommissioning Impacts

1.4.1 During decommissioning, the impacts on socio-economics are expected to be similar to those during construction, and will involve the creation of opportunities for local contractors to be involved in the non-technical aspects of the work (for example: restoration of access tracks for pasture).

1.4.2 The direct and indirect job creation during decommissioning is expected to have positive minor impacts.

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[6] *Information from http://www.bwea.com/ref/embracenopsep04.html*

[7] *'RSPB Market Research Project 0136 : The GB Public's Views on Energy Issues', October 2001.*

APPENDIX J
SAFETY

Appendix J - Safety

1.1 Introduction

1.1.1 The proposed turbine will comply with the British Wind Energy Association's "Guidelines for Health and Safety in the Wind Energy Industry", which were re-issued in 2008. The guidelines aim to maintain the health and safety of those working in the wind energy industry, in addition that of the general public through construction, operation and decommissioning of the Project through the use of appropriate project design.

1.1.2 Wind turbines are designed to operate to very high standards of safety and are extensively tested prior to commercial operation. Full Health and Safety / Risk Assessments will be carried out for the design, construction and operational phases of the Project and all recommended actions will be undertaken. Suitable training in the associated risks will be given to all construction and operation personnel.

1.2 Construction

1.2.1 The risk of injury occurring during construction will be minimal due to the use of experienced site staff and the high safety standards to be employed on site. The chosen contractor will be required to adhere to the CDM Regulations 2007.

1.2.2 No blasting is envisaged at the Project site.

1.2.3 Site security during construction will be strict. Temporary fencing will be installed around any excavations. The type of fencing used will be agreed with the Local Planning Authority. A compound or container for the temporary storage of equipment or materials would be provided. This would be locked with restricted access. The working area would be fenced to prevent unauthorised access. If appropriate, security staff will be utilised at night and weekends, and during non-working periods.

1.2.4 Road access to the Project site would comply with Highway Authority Guidelines. All traffic movements would be adequately controlled and supervised in accordance with a Transport Management Plan. Further details are provided in Section 16 of this ER.

1.2.5 A number of organisations, including JRC, Atkins and Ofcom have been consulted as part of pre-planning discussions held whilst preparing this ER. This has ensured that there is no conflict with any existing services, and that there is no danger to site staff or the public during both construction and operation.

1.2.6 All storage tanks will be bunded to prevent release of potentially hazardous materials. However only very small quantities of oil will be held on site and these will not cause a risk to health or safety. Further details on this matter are discussed in Section 8 of this ER.

1.2.7 The Project transformer will need to be filled with mineral oil prior to its commissioning. There will be one transformer containing approx 4.5 m3 of oil, located within bunded Glass Reinforced Plastic (GRP) housing. This would be situated adjacent to the turbine or inside the turbine base / nacelle. Implementation of appropriate spill prevention and control measures would ensure the risk of accidental release of potentially hazardous materials would be low throughout construction. These oils would not contain polychlorinated biphenyls (PCBs).

1.3 Operation

1.3.1 The wind turbine would be designed and manufactured by an experienced company to meet international engineering design and manufacturing safety standards. There is an international quality control assurance program for

turbines, and a number of relevant safety and design standards, including the British Standard BS EN 61400-1:2005 "Wind Turbines – Design Requirements". A European Safety Standard has been established (EN 50308:2004), based on the Danish, Dutch and German Standards. This has been reflected in the British Standard BS EN 50308:2004 "Wind Turbine – Protective Measures – Requirements for Design, Operation and Maintenance". In addition, most modern wind turbines undergo test certification procedures which must conform to the guidelines laid down by the International Electro-technical Commission (IEC)

1.3.2 Individual components manufactured by subcontractors will also adhere to the appropriate recognised standards. For example, the electrical generator of a wind turbine manufactured in Germany would be manufactured in accordance with the appropriate German standard on generator design, which includes, for instance, the correct material selection for flame retardation, etc.

1.3.3 The wind turbine to be used at the site will be a generic machine in wide use and will already be type tested and certified by the manufacturer in order to ensure compliance with all appropriate safety guidelines.

1.3.4 Since wind turbine production is a mature industry, employing more than 100 000 people worldwide, it is treated as any other industry from a safety and quality point of view. High safety standards and large wind turbine numbers in Northern Europe, where the vast majority of the wind turbines are designed and produced, show that the technology meets the appropriate standards.

1.3.5 An important component of wind turbine safety philosophy is redundancy or the use of back-up systems or components. Modern turbine control and monitoring systems have several layers of redundancy to protect the turbines from damage in addition to protecting the safety of the personnel working on the Project and the general public in the vicinity of the Project.

1.3.6 It is essential that wind turbines stop automatically in case of malfunction of a critical component. The turbines will therefore be monitored constantly by internal computers and will incorporate two independent fail-safe breaking mechanisms. These have been described previously in Section 5.4 of this ER. The fail-safe breaking mechanisms aim to stop the turbine in approximately two blade rotations. Over-speed protection sensors will also be fitted.

1.3.7 If any type of operational benchmark mismatch or error occurs, the wind turbine will be shut down. Depending on the type of error, the turbine will undertake a self-test, restart, or send an error message to the control centre in order for a service team to take further steps. There are various procedures to shut down the wind turbine. If severe errors occur, a brake-activated emergency shutdown will be performed.

1.3.8 Wind turbines are also programmed to stop at high wind speeds by the high speed cut out limit controller. This is set to approximately 25 metres per second. The turbines are robust enough in their design and manufacture so as to allow for the buffeting they endure at these higher speeds without suffering any structural damage.

1.3.9 Concerning electrical safety, wind turbines have an electrical protection system which is part of the overall turbine control system. The electrical protection system monitors the internal and external electrical parameters and reports to the overall turbine control system if any deviations of accepted ranges occur. For instance, the loss of grid voltage (external problem) would be a severe electrical error, upon which the turbine would perform an emergency shutdown.

1.3.10 Lightning protection will be installed in the turbines to prevent damage in the event of a strike. The blade protection system comprises two major components: the receptors on the surface of the blade; and, a conductive cable system leading down the inside of blade itself. When lightning strikes, the receptors intercept the lightning and the cable system conducts the charge through the blade to the tower and then down to the earth.

1.3.11 Surge protection will be supplied for the protection of electrical components.

1.3.12 Strict maintenance procedures will be employed, including a 'Permit to Work' system. Occupational health and safety regulations will apply, as in any other industry.

1.3.13 The primary safety concerns of the public are with regards to wind turbines shedding part or the whole of a blade or the shedding of ice. There have been very few instances of this type of accident worldwide and we are not aware of any cases where this has lead to personal injury. The proposed Project is located on open land, well away from residential properties and roads and even further away from densely populated areas. This makes the likelihood of personal injury via blade throw or ice shedding extremely low.

1.3.14 Blade throw is defined as blade fragments being thrown from a rotating machine. The above-mentioned safety and quality systems are designed to prevent such failures. International experience indicates that the risk of blade throw is low and the risks are continually decreasing as wind energy technology improves. Modern blades are made from a glass fibre or wood-epoxy composite in a mould such that the reinforcement runs along the length of the blade. Blade failure is therefore highly unlikely. Even for blades with separate control surfaces on or comprising the tips of the blade, separation is highly unlikely. In the unlikely event that any damage occurs the blade will stay attached and the turbine would automatically shut down and send alarm signals to the maintenance team. Any vibration is usually detected early due to the sensitivity settings of the controllers. A visual blade inspection would also be undertaken during any planned maintenance and the monthly inspections.

1.3.15 Under freezing conditions there is the possibility that exposed parts of the wind turbine will experience a build-up of ice. Ice throw occurs as stationary turbine blades begin to rotate. Any ice shed prior to blade rotation would fall directly below the blade. In addition, anecdotal evidence indicates that the tendency is for ice fragments to be dropped off rather than thrown off the blades. Turbines can continue to operate if a thin build up of snow or ice occurs, but will shut down if ice builds up to cause aerodynamic or physical imbalance of the rotor assembly. The initial slow rotational speed of the rotor will limit the throw to an area in the immediate vicinity and fragments would have to be sufficiently lightweight for the rotor assembly to be in balance before the rotors start rotating.

1.3.16 Turbines are fitted with vibration sensors. Therefore if a blade were to become damaged or unbalanced, for example due to a build up of ice, it would automatically stop. If a turbine were to be shut down due to an imbalance, a maintenance engineer would make a visual inspection prior to re-start.

1.3.17 Modern wind turbines are designed to withstand storms, local weather conditions and, more importantly, extreme gust magnitudes which could possibly be expected at a specific wind farm site (i.e., design limits calculated from statistical analysis of measured wind data). Furthermore, wind turbines are designed to meet the structural design standards for the country of use (as is any other physical structure).

1.3.18 As is the case with any complex machine, there is potential for fire (caused by mechanical malfunction) inside the wind turbine generators. Electrical fires can also result from both shorts in equipment and surges due to lightning

strikes. Hand-held fire extinguishers would be installed in the turbines for use when staff are present on site.

1.3.19 There is also the potential, as in any process, for human error to result in turbine fires. Implementation of suitable design measures, operational procedures and staff training will ensure that the risk of mechanical fire is minimised and would not pose a risk to health and safety and the environment. It is considered that risks to health and safety from any fire are negligible.

1.3.20 Periodic changing of lubricating oil and hydraulic fluids would generate very small quantities of potentially hazardous waste. These would be removed from site following each service by a licensed collection service for recycling or disposal under the Environmental Protection (Duty of Care) Regulations 1991. The turbines and transformers would be fitted with containment systems (i.e., bunds) to prevent accidental spill or leakage.

1.3.21 The substation building and towers will be sturdy and resilient to vandalism and be fitted with high security locks.

1.3.22 There are no footpaths within the proposed Project site boundary, with the closest public right of way being located some 0.9km to the south-east of the proposed turbine location. There is no distinction in Scottish legislation between footpaths and bridleways and as such, due to the distance between the nearest PROW and the proposed turbine location, the turbine will comfortably comply with the British Horse Societies recommended minimum separation distance of 200 m between turbines and Bridleways. There are no 'core paths' within the site boundary or adjacent to the site, with the closest approximately 0.9km to the south-east of the proposed turbine location, running through Montreathmont Forest.

1.3.23 There are many examples of wind turbines which have been built close to footpaths and bridleways. These include:

- The Coldham Wind Farm in March which is located within 45 m of a footpath that runs along the north bank of the River Nene;
- A wind farm near to Sunderland, operated by AMEC Wind, where one turbine lies immediately adjacent to a bridleway; and
- A turbine at McCain Foods site at Whittlesey that is located within 30 m of a footpath.

1.3.24 Since these wind farms, and indeed all other wind energy developments in the UK, were commissioned there has been no evidence of conflict between the users of local public rights of way and wind turbines.

1.3.25 The impacts of visual intrusion, noise and shadow flicker, and their associated safety issues, are addressed in Sections 6, 10 and 13 respectively. These sections note that there are no safety impacts associated with these issues. In addition there have been no studies published in recognised scientific journals, which are subject to peer review, which have indicated that wind energy developments have an impact on human health.

1.3.26 Driver distraction is often raised as a concern by local residents prior to the installation of a wind turbine. NPPG 6 notes that specific considerations relating to driver distraction are "predictable and careful site design can avoid them", and also noted that "where appropriate, the view from nearby roads should be considered".

1.3.27 The substation building would be designed and constructed with systems that would protect any operational personnel and minimise potential risks associated with accidental exposure to high voltage electrical equipment. A robust earthing grid would be installed which would divert stray surges and faults. This would comprise a heavy gauge bare copper conductor buried in a grid fashion and welded to a series of multiple underground earthing rods.

1.3.28 There are no cumulative effects with regards to safety.

1.4 Decommissioning

1.4.1 The risk of injury occurring during decommissioning will be minimal due to the use of experienced site staff and high safety standards employed on site. These would be similar to risks during construction, discussed in Section 1.2.

1.4.2 A risk assessment of the decommissioning phase would be undertaken and any of its findings implemented.

APPENDIX K
TRAFFIC AND INFRASTRUCTURE

Appendix K – Traffic and Infrastructure

1.1 Introduction

1.1.1 This section presents an assessment of the impacts of the proposed development on local traffic and infrastructure. The assessment describes both the volume and composition of the traffic that will be generated during the construction, operation and decommissioning of the turbines and associated facilities.

1.2 Assessment Methodology

1.2.1 A desk based assessment of the potential impact of the development on the local traffic and infrastructure was undertaken. It is assesses the baseline conditions in the area by analysing the existing road network and public transport links. It quantifies existing traffic volumes using the Department for Transport (DfT) Annual Average Daily Traffic (AADT) estimates for roads along the proposed route.

1.2.2 The volume of traffic likely to be generated by the proposed development was then calculated based on worst case assumptions of vehicle trip generation. These figures were then added to the baseline flows in order to provide an estimate of the impact on traffic flows within the study area.

1.3 Significance Criteria

1.3.1 For the purpose of this study the significance of effects has been measured by classifying each impact as being in one of the following categories: negligible, minor, moderate or major. It is assumed that all identified effects of the proposed development on transport routes are adverse. In Table 16.1 a definition of each level of significance is given.

TABLE 16.1: IMPACT SIGNIFICANCE CATEGORIES

Significance	Definition
Negligible	No perceivable impact
Minor	Low disruption that requires no mitigation
Moderate	Moderate disruption requiring mitigation
Major	High, lasting disruption requiring mitigation

1.4 Baseline Conditions and Receptors

1.4.1 The road network in the vicinity of the site is shown in Figure 6.1. It is anticipated that the main turbine components will be imported from Europe and transported to UK via ship to the nearest port (at present this is estimated to be the port of Leith, Edinburgh or Dundee Port). Upon arrival to the UK, the turbines components, where possible, would be transported using the Scottish motorway network.

1.4.2 For further information on the proposed access route, please refer to the Full Access Report in Appendix C to this ER.

1.4.3 The Department for Transport (DfT) calculates traffic estimates for each link of Great Britain's major road network and presents them as two-way Annual Average Daily Traffic (AADT) flows. AADT data for key points on the A933 and A92 are presented in Table 16.2.

TABLE 16.2: ANNUAL AVERAGE DAILY TRAFFIC (2011)

Road Number	Start -End Point	AADT
A933	A932 - A934	2877
	Road from Hunter Rd, Arbroath -A932	5449
	A933 Cairnie Rd/Keptie Road – road from Hunter Rd	6049
A92	B962 – A930	15 307
	A930 – A933	15 573

1.4.4 The proposed site entrance will utilise an existing track in the south of the site. This will require modification in order to provide access for HGVs and abnormal loads.

1.4.5 This area is poorly served by public transport. The nearest railway station to the site is in Arbroath approximately 16 km to the south. There are several bus routes which run to Forfar, approximately 5 km from the site, and Brechin, approximately 4km from the site. These services include the number 20 which runs between Dundee and Forfar, and the number 21 which runs between Forfar and Brechin.

1.4.6 There are no footpaths within the proposed Project site boundary, with the closest public right of way being located some 0.9km to the south-east of the proposed turbine location. There are no 'core paths' within the site boundary or adjacent to the site, with the closest approximately 0.9km to the south-east of the proposed turbine location, running through Montreathmont Forest.

1.5 Impact Assessment

Construction

Construction Staff

1.5.2 Daily construction at the site is anticipated to commence at 07:00 and finish at 18:00 and a maximum of 20 construction staff are expected on-site at any one time. There would be no night time working, unless agreed in advance with the local authority.

1.5.3 The worst case scenario will be for each staff member to travel to and from site in their own vehicle and that all vehicles arrive during the morning peak hour and leave during the evening peak hour. Therefore the worst case scenario would represent a maximum of 20 vehicles or 40 traffic movements per day. This represents a minimal increment to the existing levels of car traffic currently experienced on the A933.

1.5.4 The use of mini-buses and car sharing would be encouraged to reduce the number of vehicular movements. Construction staff vehicles will park on a dedicated area of the site and thus would not block any access tracks or exiting roads in the vicinity of the site.

Construction Equipment

1.5.5 It is expected that construction equipment will comprise of: an excavator, bulldozer, compactor, trencher and dump truck which will be brought to site by low loader. Additional site vehicles may be required to expedite the construction phase.

1.5.6 In addition, a vehicle would be required to bring two cranes to site and other vehicles would be required to bring the associated counterweights. It is expected that for construction of the turbine, two mobile cranes, (500 tonnes and 120 tonnes capacity) will be required.

1.5.7 There is also the possibility that a crane would be assembled on site for use of construction of the turbine. In this case there would be additional HGV

movements associated with the transport of the crane components to site. This would include approximately 40 deliveries of crane parts to site, with an additional 40 trips to site to allow for removal of these at the end of the construction phase.

1.5.8 The majority of the construction equipment will be brought to site in the first few weeks of the construction programme, with the exception of the cranes which would arrive following the installation of access tracks and crane pads.

Access Road Construction

1.5.9 The existing track running along the southern edge of the site will allow for access to the site with minimal modification to land outside the landholding. From the entrance, approximately 0.36 km of tracks to access and service the wind turbine will be constructed.

1.5.10 Construction access tracks will be 5 m nominal width and will be placed to avoid known ground hazards, steep gradients and environmental constraints at the site. This may require micro siting to take account of field boundaries, etc. The access tracks will be constructed of compacted stone, with a nominal thickness of 750 mm and will be of increased width at corners. Passing places, turning circles and turbine laydown areas will also be provided and will be of a similar construction to the site access tracks.

1.5.11 Standard 20 tonne tipper trucks will be used for the delivery of aggregate for the construction of the access tracks, foundations, crane pads and site compound areas. Approximately 245 lorry loads of aggregate will be required.

1.5.12 There are a number of places which are local to the site in Angus which would be able to supply the necessary aggregate materials for construction.

1.5.13 Trucks bringing deliveries of aggregate to site are likely to be spread throughout the working day and are not expected to impact significantly on local traffic levels.

Foundation Pouring

1.5.14 Approximately 70 conventional concrete mixer trucks are expected to bring concrete to site (each carrying 5 m3 of concrete) and approximately 5 HGVs are expected to bring reinforced steel.

1.5.15 There are a number of places which are local to the site in Angus which would be able to supply the necessary concrete materials for construction, therefore limiting excess traffic movements.

1.5.16 Trucks bringing deliveries of concrete and reinforced steel to site are likely to be spread throughout the working day and are not expected to impact significantly on local traffic levels.

Cabling

1.5.17 Of the order of 6 HGVs would visit the site to deliver cabling to connect the turbine to the on site substation building. The cables would be buried with sand. Approximately 25 HGVs would bring the sand to site over the course of approximately two months.

1.5.18 Sand would be sourced from local sand suppliers in the vicinity of the turbine site if suitable.

Abnormal Loads

1.5.19 A total of 10 articulated low loader lorries would be expected to bring the prefabricated turbine components to site. The tower will arrive in three sections, the nacelle in two sections and the hub as a whole. All such traffic movements would constitute abnormal loads. Miscellaneous equipment such as nose cones, control panels, ladders, cables, etc would be brought to site by HGV.

1.5.20 In addition to construction staff transport for the proposed Project, Table 16.2 and Table 16.3 list the number of abnormal loads and HGVs / concrete mixers respectively which are expected over the 5 month construction period.

TABLE 16.2: EXPECTED NUMBER OF ABNORMAL LOADS

	Number of Loads	Approximate Length	Approximate Unit Weight (Tonnes)
Tower Sections	3	19.92 (longest section)	23 (max)
Blades	3	24	2.2
Hub	1		8.5
Nacelles (Assuming 2 parts)	2		6
Total Abnormal Loads	9		

TABLE 16.3: EXPECTED NUMBER OF HEAVY GOODS VEHICLES

	Number of Loads
Concrete	70
Aggregate	245
Construction Equipment	80
Steel Reinforcing Bars	5
Miscellaneous Turbine Equipment	10
Crane Parts (in the event that the crane is constructed on site)	80
Control Room Equipment	30
Cabling	6
Sand (to cover cabling)	25
Total	506

The Construction Programme

1.5.21 An indicative construction programme is provided in Table 16.4. The construction programme assumes a worst case scenario of a 5 month construction programme which increases the number of vehicles arriving at site during the peak of the construction phase.

TABLE 16.4 INDICATIVE CONSTRUCTION PROGRAMME

	Month					
Construction Activity	***1***	***2***	***3***	***4***	***5***	***Total***
Aggregate for road stone and hardstanding areas	245					**245**
Delivery of construction equipment	80					**80**
Delivery of cabling		6				**6**
Delivery of sand		13	12			**25**
Delivery substation building equipment and materials		15	15			**30**
Delivery of concrete			70			**70**
Delivery of steel reinforcing bars			5			**5**
Delivery of crane			40			**40**
Delivery of turbines (large components				5	4	**9**
Delivery of other turbines components				5	5	**10**
Removal of construction equipment and crane					40	**40**
Total	**325**	**34**	**142**	**10**	**49**	**560**

1.5.22 As can be seen in Table 16.4 peak traffic is likely to occur during the delivery of the aggregate and the construction equipment which would be spread over approximately 4 weeks. From the above construction programme, a worst case figure of 325 deliveries spread over 4 weeks (Month 1) is expected. This is equivalent to appoximately 2 deliveries, or 4 traffic movements, per hour. These movements represent a minimal increment to the existing traffic levels on the A92. The concrete would then be delivered for the turbine foundations over a 4 week period. Any inconvenience caused to local road users will be temporary in nature.

1.5.23 The construction traffic will be required to use the route, or routes, agreed with the Highways Authority. These will be enforced by formal instructions in the construction contract and through the use of road signs locally.

1.5.24 Timings of construction traffic movements would be restricted to daylight hours. Therefore any construction traffic movements would be between 8 am and 6 pm. However peak hours, such as those for school journeys (typically between 8 am to 9 am and 3 pm to 4 pm), would be avoided if the Highways Authority consider this to be necessary once the final routes are agreed, with an equivalent delivery rate of approximately 3 deliveries, or 6 traffic movements, per hour.

Logistics

1.5.25 The details of a Transport Management Plan governing vehicle movement in and out of the site would also be developed and agreed with the Highways Authority prior to the commencement of the development of the wind turbine.

In addition, a construction timetable would be agreed with the relevant authorities prior to construction commencing. In formulating the Transport Management Plan, consideration will be given to any existing Transport Management Plans in the vicinity of the wind turbine site.

1.5.26 The contractor will make the final arrangements for abnormal load transportation with the highways authorities, the Highways Agency and the Forth Road Bridge. Escorts will be required for the abnormal load transportation, in addition to temporary traffic diversions and the closure of the Forth Road Bridge which may also be necessary. The main contractor will be responsible for surveying all routes to ensure that abnormal loads can be transported to the required destination. The contractor would select transportation plant appropriate to the routes to site.

1.5.27 A trial run with an extendable turbine blade trailer may be carried out to test out the suitability of the proposed route. It may be necessary to temporarily remove street furniture to allow the long loads to pass. Warning signs would be erected for other road users and communication with local residents would be carried out.

1.5.28 The transport of abnormal loads may lead to delays and cause inconvenience to other road users. However, due to the relatively small number of abnormal loads (9 in total over a 7 week period) any such disruption will be minimal. Transport of these abnormal loads would be during daylight hours. There will be no movements of construction traffic during the night.

1.5.29 It is possible that along some parts of the route the abnormal loads could span both carriageways. However, it is not considered that additional passing places are necessary or desirable, and therefore the potential associated additional impacts are avoided. It is considered that for the short time periods that abnormal loads would be negotiating the route, existing traffic could be routed via alternative roads without significant inconvenience.

1.5.30 Cleanliness of the existing roads will be maintained at all times. Construction plant and vehicles will not be permitted to deposit mud or other debris onto the existing road system. Temporary wheel-washing facilities will be provided on site.

1.5.31 The environment and amenity of communities should not be unduly affected by the impacts of traffic resulting from the development of the wind turbine as the majority of the potential access routes are away from major settlements. 'Before and After Surveys' would be commissioned by e-Gen to identify the condition of the road infrastructure with appropriate measures put in place to ensure that any damage caused by the construction of the wind turbine was rectified by the contractor or developer.

Operation

1.5.32 During the operational phase of the wind turbine, traffic will generally be associated with site visits by maintenance and operations personnel. These visits are likely to be limited and infrequent. At present it is estimated that twice yearly visits could be expected for servicing and once monthly visits for routine inspection. Servicing would require staff on site for up to a week. This will involve very few vehicular movements. Impacts on traffic levels during operation are therefore expected to be negligible.

1.5.33 Parking for site associated traffic during the operational phase will be on site, either on the on-site access roads or adjacent to the turbine.

1.5.34 Once operational, there will be no significant impacts on users of the footpaths and other rights of way in the vicinity of the wind turbine site.

1.5.35 Tourism induced traffic, which could include visits to the wind turbine site by interested locals, may be expected during the construction and operational

phase. Whilst the extent to which the wind turbine would attract visitors is not known, in line with other wind energy developments already in the area, it is expected to be low.

Decommissioning

1.5.36 Decommissioning of the wind turbine will require access for heavy goods vehicles to the site to remove all items of plant, including the turbine and associated infrastructure. The number of vehicles expected during decommissioning would be considerably less than the number of vehicles expected during the construction phase. This is due to the fact that a proportion of the foundations would remain in situ. The foundations would be removed to approximately 1 m below ground level, and then buried using topsoil. This is expected to cause less environmental impact than removing them in their entirety. Therefore, there will not be traffic corresponding to the removal of the concrete and steel reinforcements. The access tracks may also remain, depending on the wishes of e-Gen and the landowner at the time of decommissioning.

1.5.37 The impacts during decommissioning will be temporary in nature and would be unlikely to give rise to significant impacts to local traffic and infrastructure.

1.6 Conclusions

1.6.1 The construction phase of the wind farm will require on the order of 560 traffic movements, associated with the delivery of cranes, concrete and hardstanding and turbine components. Additionally, there will be approximately 40 traffic movements per day associated with construction staff during peak periods of construction activity. These excess traffic movements are not anticipated to have a dramatic effect on existing traffic levels in the vicinity of Glenfarg and would be mitigated by an appropriate Traffic Management Plan. No construction vehicles would be allowed to deposit mud on the roads, and although some street furniture may need to be removed to allow large loads to pass through, this would be replaced after construction and all roads ‘made good’.

1.6.2 Very few, infrequent traffic movements are associated with the operational phase of the wind turbine and will be associated with maintenance staff. These maintenance visits will have a minimal impact on the road network of the surrounding area.

AC35

Cotton of Pitkennedy

e-Gen

Part of a Clean Energy Community

Environmental Report

Non-Technical Summary

April 2013

PARSONS BRINCKERHOFF

COTTON OF PITKENNEDY WIND ENERGY DEVELOPMENT

NON TECHNICAL SUMMARY

1.1. Introduction

E-Gen Partners Ltd ('the Applicant') are proposing to develop a wind turbine at Cotton of Pitkennedy ('the Development'), located in Angus, approximately 8km north-east of Forfar. The Development will consist of one wind turbine with associated infrastructure, including a substation building and 0.36km of access tracks.

This Environmental Report accompanies an application for planning consent to construct and operate a single small scale wind energy development consisting of a single turbine at Cotton of Pitkennedy, to the north-east of Forfar in Angus.

The location of the Cotton of Pitkennedy Wind Turbine has been carefully considered and assessed to ensure its design and location minimises environmental impacts and impact on local amenity. The turbine would be a three bladed upwind model with a tubular steel tower, and would not exceed 74m to tip height. It would have an anticipated installed capacity of 800kW.

This Environmental Report is intended to provide the Local Planning Authority with sufficient environmental information to allow determination of the planning application. The following subject areas are addressed in this Environmental Report and the main findings summarised under the headings below:

- UK Planning Policy and the Development Plan;
- Landscape and Visual Impacts;
- Air Quality;
- Geology, Hydrology and Hydrogeology;
- Ecology and Ornithology;
- Noise and Vibration;
- Socio-Economics;
- Cultural Heritage;
- Safety;
- Shadow Flicker;
- Telecommunications;
- Aviation and Radar; and
- Traffic and Infrastructure.

1.2. Summary of Environmental Impacts

The below section summarises the environmental impacts of the proposed Cotton of Pitkennedy wind energy development.

Landscape and Visual Impacts

The landscape and visual impact assessment has identified that the Cotton of Pitkennedy single turbine will only have a localised impact (approximately for a 2km radius from the turbine). This impact will be of Moderate significance for the majority of receptors within the local area. However, due to the containment of effects to the local area, the cumulative impacts are predominantly considered to be Slight in Nature.

Carbon Emission Reductions

The use of RenewableUK methodologies suggests that the proposed Development will provide between 447 and 637 households with renewable energy annually, and directly

prevent the generation of the following emissions:

- Between 778 and 2268 tonnes of CO2 per year
- Up to 34 tonnes of SO2 per year; and
- Up to 11 tonnes of NOx per year.

Geology, Hydrology & Hydrogeology

The effect of the proposed Development on geology, hydrology and hydrogeology has been assessed as neutral, once reasonable mitigation measures have been put in place. The cumulative impact assessment concludes that during construction there are not considered to be any cumulative impacts on soils, geology, hydrology and hydrogeology due to the small areas involved with excavation of foundations for turbines, control buildings and access tracks, along with the neutral residual impacts and the unlikely event that two wind farms would be constructed at the same time.

Ecology

A range of ecological assessments have been undertaken to investigate the ornithological and other ecological interest of the site and it is concluded that potential for this to be adversely affected by the current proposal is extremely unlikely.

Noise

An assessment of the likely noise impact due to the construction and decommissioning phase of the Development has shown that no significant noise levels are predicted at the nearest receptors due to the distances involved. An assessment has also been made of the level of turbine noise during operation and the cumulative effect of other wind developments in the vicinity. The cumulative turbine noise has been compared against the ETSU-R-97 derived noise limits. The ETSU-R-97 noise limits are predicted to be met in all cases.

The operation of the proposed Temple Hill Wind Farm is compliant with the ETSU-R-97 methodology, and that it can meet the relevant ETSU-R-97 noise limits. This can be achieved and controlled by the council through a suitable planning condition based on the ETSU-R-97 limits described.

Shadow Flicker

It is anticipated that no properties will be affected by shadow flicker from the Development due to the separation distance between the turbine and the nearest residential properties. Once coated in a light grey, matt colour, the reflectivity of wind turbine blades and the potential impact of glinting are minimised and the issue is not considered to be a particular concern. The surface treatment of the turbines will be agreed with the local planning authority, through a planning condition.

Telecommunications

The proposed wind turbine will have a negligible effect on existing EM links within the locality. Where digital television reception is adversely affected, appropriate remedial works will be effected by The Applicant to ensure viewers continue to receive signals as was the case prior to the construction of the wind turbine. No fixed point-to-point or point to area services will be affected by the wind turbine.

Aviation

The aviation assessment concludes that the proposed Development will not have major impacts on aviation or radar equipment in the area. Informal, pre-planning consultations have been attempted with the CAA, MOD and Dundee Airport; however these consultees have not responded. The site is located within 12km of Carse of Gowrie weather station, and further studies may be required to determine the impact of the turbine on the weather station. Although NATS state that they will look into potential impacts once the proposal has been formerly submitted for planning permission, no issues in this regard are anticipated.

Traffic

The construction phase of the wind farm will require on the order of 560 traffic movements, associated with the delivery of cranes, concrete and hardstanding and turbine components.

Additionally, there will be approximately 40 traffic movements per day associated with construction staff during peak periods of construction activity. These excess traffic movements are not anticipated to have a dramatic effect on existing traffic levels in the vicinity of Forfar and would be mitigated by an appropriate Traffic Management Plan. Very few, infrequent traffic movements are associated with the operational phase of the wind turbine and will be associated with maintenance staff. These maintenance visits will have a minimal impact on the road network of the surrounding area.

1.3. Conclusion

The proposed Development of a single 74m turbine at Cotton of Pitkennedy has very few significant adverse impacts with the exception of localised impacts on visual amenity within 2km. e-Gen, in the formation of their proposals for the Cotton of Pitkennedy wind turbine have taken careful consideration of the environmental impacts associated with the installation of the proposed wind turbine and associated infrastructure. This has, wherever possible taken into account the views of the local community and their representatives as well as the views of other interested parties.

It is considered that the project, which has emerged from the environmental studies undertaken, has ensured that the impacts associated with the project have been minimized where possible with particular care taken to minimise the impact to sensitive receptors regarding noise and visual impact whilst retaining a development of a scale that justifies the associated impacts.

The project is strongly supported by national, regional and local planning policy which favours the development of renewable energy projects provided that the environmental impacts will be within acceptable limits. The environmental studies undertaken for the project are considered to have demonstrated that the project will have no unacceptable impacts on the receiving environment and that the project will help the UK meet objectives for generation of electricity from renewable sources.

Additionally the project will help reduce emissions of harmful pollutants from fossil fuelled power stations in the UK improving national air quality whilst helping to guarantee security of supply through use of an indigenous and limitless supply of energy.

PARSONS BRINCKERHOFF

June 2013

Noise Assessment for Proposed Wind Turbine at Cotton of Pitkennedy, Angus

E-Gen

3512025A

Issue 2

Noise Assessment for Proposed Wind Turbine at Cotton of Pitkennedy, Angus

3512025A

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CONTENTS

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EXECUTIVE SUMMARY

This report considers the noise effects of the proposed wind turbine at Cotton of Pitkennedy, Angus. The assessment considers the impact of the scheme on the surrounding area and adjacent residential properties during the construction, operational and decommissioning stages. This report presents the approach and findings of this assessment including recommended planning noise limits.

The methodology for the noise survey, including the selection of receptors and background noise monitoring locations, was discussed and agreed during meetings and a site visit with Louise Akroyd, an Environmental Health Officer (EHO) at Angus Council prior to commencement.

The results of the background noise survey have been correlated against measured wind speed data. This has been done in order to establish changes in the noise climate at the proposed site with increasing wind speed. From this data, noise limits for the scheme have been derived for the night-time and amenity hours in accordance with the methodology set out in ETSU-R-97 – The Assessment and Rating of Noise from Wind Farms.

An assessment has been made using manufacturers guaranteed data for the candidate turbine, the Enercon E48. From this assessment, predictions of noise levels that would impact on the nearest residential properties and surrounding area have been identified.

The predicted noise levels as a result of the operation of the proposed wind turbine fall within the noise limits advised as appropriate in ETSU-R-97 noise limits at all of the nearest noise sensitive receptors.

1 INTRODUCTION

1.1.1 The introduction of wind turbines has the potential to cause disturbance to the surrounding area and adjacent residential properties through noise emissions. In order to protect the reasonable amenity of neighbours of the wind turbine, an assessment of the proposed wind turbine including the measurement of the existing background noise levels has been undertaken. This report presents the approach and findings of this assessment, including recommended planning noise limits.

1.1.2 The methodology for the noise survey, including the selection of receptors and background noise monitoring locations, was discussed and agreed during a site visit with Louise Akroyd, Environmental Health Officer (EHO) at Angus Council, prior to commencement.

1.1.3 The results of the background noise survey have been correlated against hub height wind speed, calculated from simultaneously measured wind speed at various heights, with correction for wind shear. This has been done in order to establish changes in the noise climate at the proposed site with increasing wind speed. From this data, noise limits for the scheme have been derived for the night-time and amenity hours in accordance with the methodology set out in ETSU-R-97 'The Assessment and Rating of Noise from Wind Farms'.

1.1.4 A glossary of terms used is included in Appendix A.

2 LEGISLATION / POLICY / GOOD PRACTICE

2.1 General

2.1.1 The following Legislative framework and published guidance has been used for this assessment:

- Planning Advice Note (PAN) 1/2011: Planning and Noise
- Planning Advice Note (PAN) 45: Renewable Energy Technologies
- ETSU-R-97 The Assessment & Rating of Noise from Wind Farms
- Prediction and Assessment of Wind Turbine Noise: Agreement about relevant factors for noise assessment from wind energy projects – Bowdler et al, Acoustics Bulletin, Vol 34 No 2 March/April 2009, Institute of Acoustics
- BS5228:2009 Noise and vibration control on construction and open sites
- BS7445: 2003 Description and measurement of environmental noise
- ISO9613, 1996 Acoustics – Attenuation of Sound During Propagation Outdoors, Part2: General Method of Calculation
- IEC 61400-11 Wind Turbine Generator Systems Part 11: Acoustic Noise Measurement Techniques. International Electro-technical Commission, 2002

2.2 Planning Advice Note (PAN) 1/2011: Planning and Noise

2.2.1 Planning Advice Note 1/2011 relates to noise in general. It replaced previous guidance (Circular 10/1999 and PAN56) and provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development. PAN 1/2011 itself contains no quantitative

recommendations relevant to the circumstances of siting wind turbines into an existing noise environment and accordingly has not been considered further. However, this document does endorse the use of ETSU-R-97 "The Assessment and Rating of Noise from Wind Farms".

2.3 Planning Advice Note (PAN) 45: Renewable Energy Technologies

2.3.1 This Planning Advice Note and its Annex has been replaced by web based renewables advice which will be regularly updated; the current advice on Onshore Wind Turbines specifies the issues that should be taken into account by local planning authorities in Scotland. The "noise section" of the web advice refers to ETSU-R-97 "The Assessment and Rating of Noise from Wind Farms" and it is stated that the methodology of ETSU-R-97 "This gives indicative noise levels thought to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable burdens on wind farm developers, and suggests appropriate noise conditions."

2.4 ETSU-R-97, The Assessment and Rating of Noise from Wind Farms

2.4.1 In August 1993 the Department of Trade and Industry (DTI) facilitated the establishment of a Noise Working Group (NWG) to investigate the assessment of noise from Wind Farms. The culmination of the efforts of the NWG resulted in a report in September 1996, which is referred to as ETSU-R-97.

2.4.2 The NWG recommended that the current practice of controlling Wind Farm noise by the application of noise limits at the nearest noise-sensitive properties is the most appropriate approach. This approach has the advantage that the limits can directly reflect the existing noise environment at the nearest properties and the impact that the Wind Farm may have on these levels.

2.4.3 The ETSU-R-97 report recommends the following aspects of Wind Farm noise be considered:

- The LA90 index should be used to describe both prevailing background noise levels and the predicted Wind Farm noise levels (correlated to 10 m high wind speed);
- Measurements and predictions should be undertaken using 10-minute time intervals;
- The noise limit should be set for the whole Wind Farm;
- The wind turbine noise limits should be limited to 5 dB(A) above the measured background for both quiet day and night time periods, except in low noise environments where a lower fixed limit may also apply.

2.4.4 In low noise environments the night time lower fixed limit $L_{A90,10min}$ of wind turbine noise should be limited to an absolute level of 43 dB, or a 45 dB fixed limit for financially involved properties. During amenity hours, it should be limited within the range of 35 – 40 dB. The actual value chosen should depend upon a number of factors:

- The number of dwellings in the neighbourhood of the Wind Farm;
- The effect of noise limits on the number of kWh generated;
- The duration and level of exposure.

2.4.5 The character of the noise from modern wind turbines is normally not considered to be tonal, and manufacturers will warrant a turbine selection to this effect. ETSU-R-97 does contain an extensive procedure for determining the tonal properties of a turbine should this become necessary, and a penalty would be applied to the noise output to compensate in the event of a tonality problem.

2.4.6 Background noise levels upon which relative limits are based and the noise limits themselves, are based upon typical or average levels rather than extreme values at any given wind speed.

2.4.7 The noise limits referred to in ETSU-R-97 take into account the fact that all wind turbines exhibit to some extent the character of noise described as blade swish and amplitude modulation (AM). ETSU-R-97 also recognises that through design improvements, turbine manufacturers have been able to design out the source of low frequency noise and infrasound as it is the mechanical noise that gives rise to this structure-borne noise source.

2.4.8 A 2007 report produced by Salford University 'Research into Aerodynamic Modulation of Wind Turbine Noise' concluded that AM was only apparent at four Wind Farm sites, and a possible factor at a further 8 of the 133 operational UK sites considered. At the four identified sites it was considered that AM may occur between 7 and 15% of the time. Following the report by Salford University the Government advised that the assessment and rating guidance in ETSU-R-97 should continue to be used. No alternations to the guidance were proposed to take account of aerodynamic modulation.

3 ASSESSMENT METHODOLOGY

3.1 Construction / Decommissioning Phase

3.1.1 Construction / decommissioning activity inevitably leads to some degree of noise disturbance at locations in close proximity to the construction activities. It is however a temporary source of noise. The noise levels generated by construction activities would have the potential to impact upon nearby neighbouring dwellings. Noise levels at any one location will vary as different combinations of plant machinery are used, and throughout the construction of the proposed plant as the construction activities and locations change. These would depend upon a number of variables.

3.1.2 In the absence of specific information regarding the proposed construction plant and activities, potential construction noise impacts have been assessed using the methodology set out in BS 5228 in conjunction with general information regarding proposed activities.

3.1.3 The significance of constructional noise impacts has been assessed based on the Category 'A' daytime threshold of 65 dB(A) from Table E.1 of BS5228-1: 2009. The significance of construction noise will relate to the degree of exceedance of this value. Exceedances will be rated as negligible (<1 dB), minor (1<3 dB), moderate (3<5 dB), major (5<10 dB) and severe (>10 dB).

3.2 Choice of Noise Monitoring Locations

3.2.1 In order to determine the locations where noise monitoring is required, all residential properties within 1km of the proposed turbine location were identified, and those where turbine noise levels were predicted to exceed 35 dB(A) were acknowledged. The noise contour plot is shown in Figure 1.

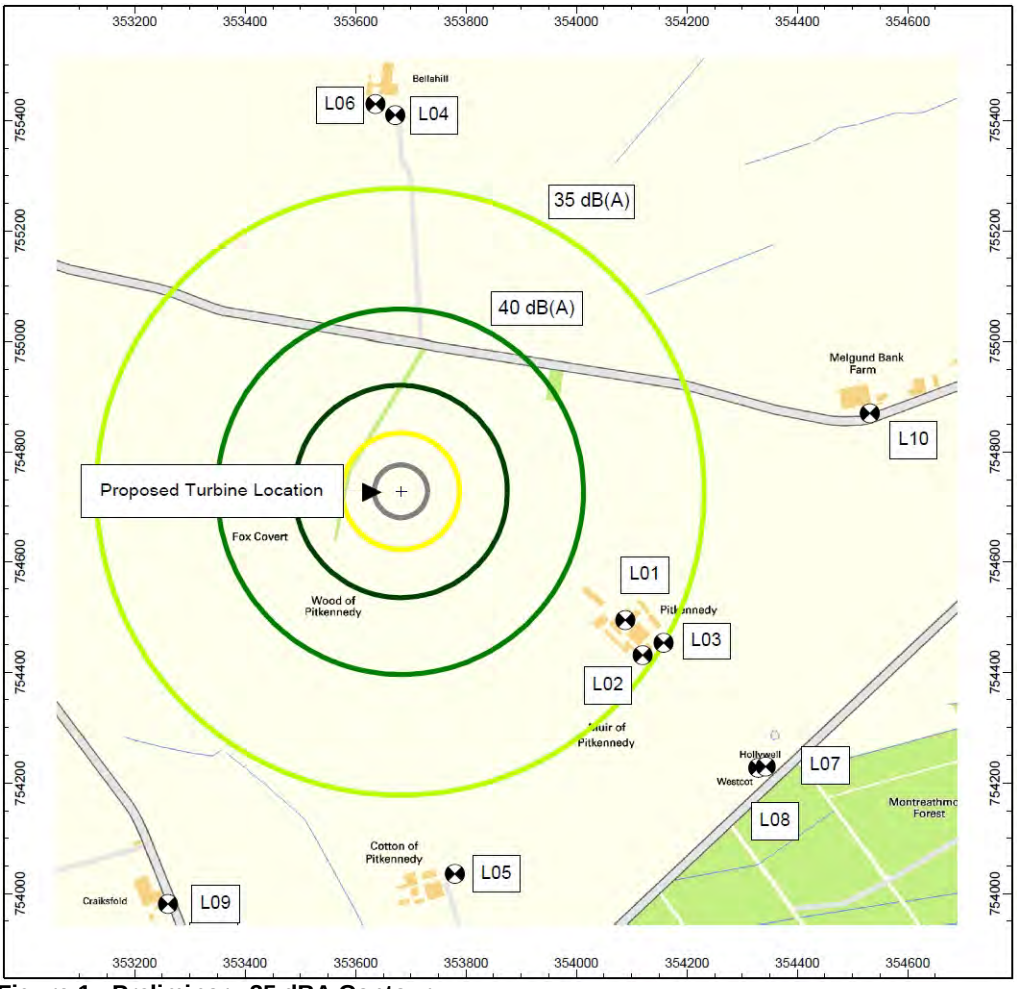


Figure 1 - Preliminary 35 dBA Contour

3.2.2 The location of each monitoring station was discussed and agreed with Louise Akroyd, an Environmental Health Officer at Angus Council, prior to survey work commencing in email and phone correspondence and also during a site visit.

3.2.3 Property L01 was chosen for the noise monitoring as it is the closest property from the proposed turbine. This monitoring location also serves as an adequate proxy for L02 and L03, which was confirmed by Louise Akroyd. It should be noted that property L01 has not been built but currently has planning permission.

Table 1 - Noise Monitoring Locations

Ref	Address	Easting	Northing
L01	Pitkennedy Farm Development in Planning, Pitkennedy, Angus DD8 2UH	354088	754494

Figure 2 - Pitkennedy Farm Development in Planning (L01)

3.2.4 The monitoring location at L01 would be the closest property to the proposed turbine location at approximately 465m.

3.2.5 Ambient noise levels at this location are typically low and influenced by wind through the surround vegetation and buildings. These effects have been minimized in the choice of monitoring location, which was agreed with the EHO during the site visit.

3.2.6 This location provides a sheltered and screened location with buildings on each side, adequately representing the possible amenity spaces for the planned development.

3.3 Measurement Procedure

3.3.1 In order to gain a robust data set, the sound level meters were set to log the parameters L_{A90}, L_{A10}, L_{Aeq}, L_{Amax} and L_{Amin} over 10 minute intervals for a period of approximately 35 days between the 5th September 2012 and 10th October 2012. This allowed for later correlation between noise levels and wind speeds. Results were stored at synchronised 10-minute intervals between the sound level meters and the on site anemometry data logger. All simultaneous wind speed and direction measurements were taken on site at a height of 10 metres. The temporary meteorological mast was installed at: E 353682, N 754728. Levels of precipitation were also measured at ten minute intervals using a Davis Rain Collector located at the base of the anemometry mast. Periods with recorded precipitation were removed from the dataset. Where two or more 10 minute periods consecutively recorded precipitation, the subsequent two periods were also omitted.

3.3.2 The prevailing background noise levels, were recorded in terms of $L_{A90,10min}$ continuously over this period. In accordance with the ETSU-R-97 guidelines, the survey was carried out in order to identify the existing ambient noise levels during the 'quiet daytime' and night periods. 'Night' is defined in ETSU-R-97 as 11 pm to 7 am, and 'quiet daytime', which is described as amenity hours and are comprised of the following periods:

- All evenings from 6 pm to 11 pm
- Saturday afternoon from 1 pm to 6 pm,
- All day Sunday, 7 am to 6 pm.

3.4 Instrumentation

3.4.1 The noise survey was undertaken using a single Class 1 Sound Level Meter (SLM): Rion NL-52. This was connected to a half inch microphone type UC-53A, and fitted with a double skin foam ball wind shield type WS-15. The microphone was mounted at a height of 1.2m from ground. Site calibration was carried out using a Rion NC-74 calibrator. All calibration certificates are in Appendix B.

3.5 Wind Shear

3.5.1 The relationship between the 10 metre height wind speed and hub height wind speed is 'standardised' within IEC 61400-11 Wind Turbine Generator Systems Part 11: Acoustic Noise Measurement Techniques. However, there is often a disparity in this 'standardised' relationship.

3.5.2 In order to account for potential wind shear on site, the main assessment presented in this report is based on sound power data that has been 'shifted' by -2m/s, which represents the situation where the wind speed at the hub height is 2m/s greater than that assumed by the 'standardised' relationship within IEC 61400-11. This approach is recommended in the paper "Prediction and Assessment of Wind Turbine Noise: Agreement about relevant factors for noise assessment from wind energy projects" published in the Institute of Acoustics Bulletin, and represents current good practice when accounting for potential wind shear.

3.6 Correction of Baseline Data for Non Representative Events

3.6.1 Graphs of the noise data from the measurement location were analysed to identify time periods where the measurements may have been influenced by unusual,

temporary or otherwise extraneous noise sources which are not considered to be part of the representative background noise climate.

3.6.2 Graphs showing the baseline noise data histories are shown in Appendix C. Please note that the rain and extraneous noise data before 22nd September 2012 was manually removed from the dataset, hence the non-continuity in the graphs.

3.7 Noise Predictions

3.7.1 The International Standard ISO 9613, Acoustics – Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation has been used to calculate the predicted noise levels of the turbines.

3.7.2 Noise predictions have been undertaken using a calculation height of 4m, and a ground coefficient of G=0.5, a temperature of 10 degrees Celsius and a relative humidity of 70%, as recommended in the IOA Bulletin article.

3.7.3 A three dimensional noise model of the proposed site has then been built using Datakustik Cadna/A noise modelling package in order to graphically present contours of the ISO 9613 calculated levels. Calculation tables verifying the noise model results using Cadna/A are presented in Appendix D.

3.8 Source Noise Data

3.8.1 This proposal is based around a candidate turbine, the Enercon E48, which has a nominal power of 800kW at a hub height of 50m, a tip height of 74m and is located at 353682 Easting and 754728. Northing. Noise limits should be conditioned to ensure that if a different turbine is selected, its output will not exceed the ETSU derived limits subsequently presented.

3.8.2 The sound power data for the E48 has been obtained from the datasheet provided by the turbine manufacturer presented in Appendix E. In order to take account of any measurement uncertainty and to present a worst case assessment, the values provided by Enercon have been increased by 1 dB. This is consistent with current good practice.

3.8.3 The data provided by Enercon is valid for wind speeds between 4 – 10 m/s. However, in accordance with 2/2012 Wind turbines distances and noise calculations, sound power levels up to 12 m/s have been detailed. As the Enercon E48 reaches rated power at 9m/s, it is reasonable to assume that the sound power output of the turbine does not increase in higher wind speeds.

Table 2: Enercon E48 Sound Power Levels

Wind Speed at 10m height (m/s)	Sound Power Level as provided by Enercon $L_{W(A)}$, dB	Sound Power Level Corrected by 1 dB for Uncertainty $L_{W(A)}$, dB	Corrected & Shifted Sound Power Level Used In Assessment $L_{W(A)}$, dB
1	-	-	-
2	-	-	90
3	-	-	94.3
4	89.0	90	98.5
5	93.3	94.3	101.5
6	97.5	98.5	102.5
7	100.5	101.5	103.5
8	101.5	102.5	103.5
9	102.5	103.5	103.5
10	102.5	103.5	103.5
11	102.5	103.5	103.5
12	102.5	103.5	103.5

3.8.4 The following octave band spectrum shape has been used for all the noise calculations, which has been taken from test report WICO 439SEC04/07 dated 2006-01-24.

Table 3: Enercon E48 Octave Band Spectrum

Octave Band Centre Frequency (Hz) / Sound Power (dB)								Overall dB(A)
63	125	250	500	1000	2000	4000	8000	
106.2	101.9	103.3	101.4	99.3	92.6	88.0	87.1	103.5

3.9 Assessment Locations

3.9.1 The noise impact of the development has been assessed at L01 as well as a number of other properties. Assessment locations (L01 – L10) have been selected to represent the points closest to the proposed development that represent local populations. The assessment locations are presented in Figure 1.

3.9.2 Table 4 shows the assessment locations, and the measurement position that has been selected to represent the receiver location for each property, for the purpose of 3D noise modelling.

Table 4: Assessment Locations

Ref	Name	Coordinates		Distance to closest turbine (m)
		Easting	Northing	
L01	Pitkennedy (in Planning)	354089	754494	465
L02	Pitkennedy	354117	754432	520
L03	Broadview	354158	754453	548
L04	Buttermilk Cottage	353672	755409	680
L05	Cotton of Pitkennedy Farm	353780	754036	695
L06	Bellahill Farm	353636	755430	710
L07	Hollywell	354329	754227	820
L08	Westcote	354343	754230	830
L09	Craiksfold Farm	353260	753981	850
L10	Melgund Bank	354531	754870	860

4 BASELINE CONDITIONS

4.1 Measurement Results

4.1.1 Figure 3 - Figure 8 present the results of the background noise measurements for the day and night periods at L01, L02 and L03, using the background noise data collected at measurement location L01 as a proxy. This is plotted against the wind speeds at 10m derived from the calculation of wind shear for each measurement period and the 50m hub height.

4.1.2 Included on the plots is a second order polynomial regression line that has been calculated through the background noise data to give a trend line of prevailing background noise vs. standardised wind speed (including wind shear) as required for the derivation of the ETSU-R-97 noise limits.

4.1.3 Properties L04 – L10 were found to be outside of the predicted 35 dBA noise contour and therefore have sufficient protection from noise generated by the proposed wind turbine and do not require noise monitoring, in accordance with ETSU-R-97.

4.2 ETSU-R-97 Limits

4.2.1 The lower daytime fixed limit of 35 dB(A) is deemed applicable to this development because of its proximity to other existing and proposed wind developments.

4.2.2 The noise limits derived from ETSU-R-97 for this assessment are therefore:

- Daytime: The higher of 35 dB(A) or 5 dB(A) above the derived quiet daytime background noise level
- Night-time: The higher of 43 dB(A) or 5 dB(A) above the derived night time background noise level

4.2.3 A summary of the ETSU-R-97 derived noise limits is shown in Table 5 and Table 7.

4.3 Table 6: ETSU Derived Noise Limits (Day Periods)

Assessment Location	Measured 10m Wind Speed								
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10m/s	11m/s	12m/s
L01	35.0	35.0	36.1	37.3	38.5	39.7	39.7	39.7	39.7
L02	35.0	35.0	36.1	37.3	38.5	39.7	39.7	39.7	39.7
L03	35.0	35.0	36.1	37.3	38.5	39.7	39.7	39.7	39.7

Table 7: ETSU Derived Limits (Night Periods)

Assessment Location	Measured 10m Wind Speed								
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10m/s	11m/s	12m/s
L01	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
L02	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
L03	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0

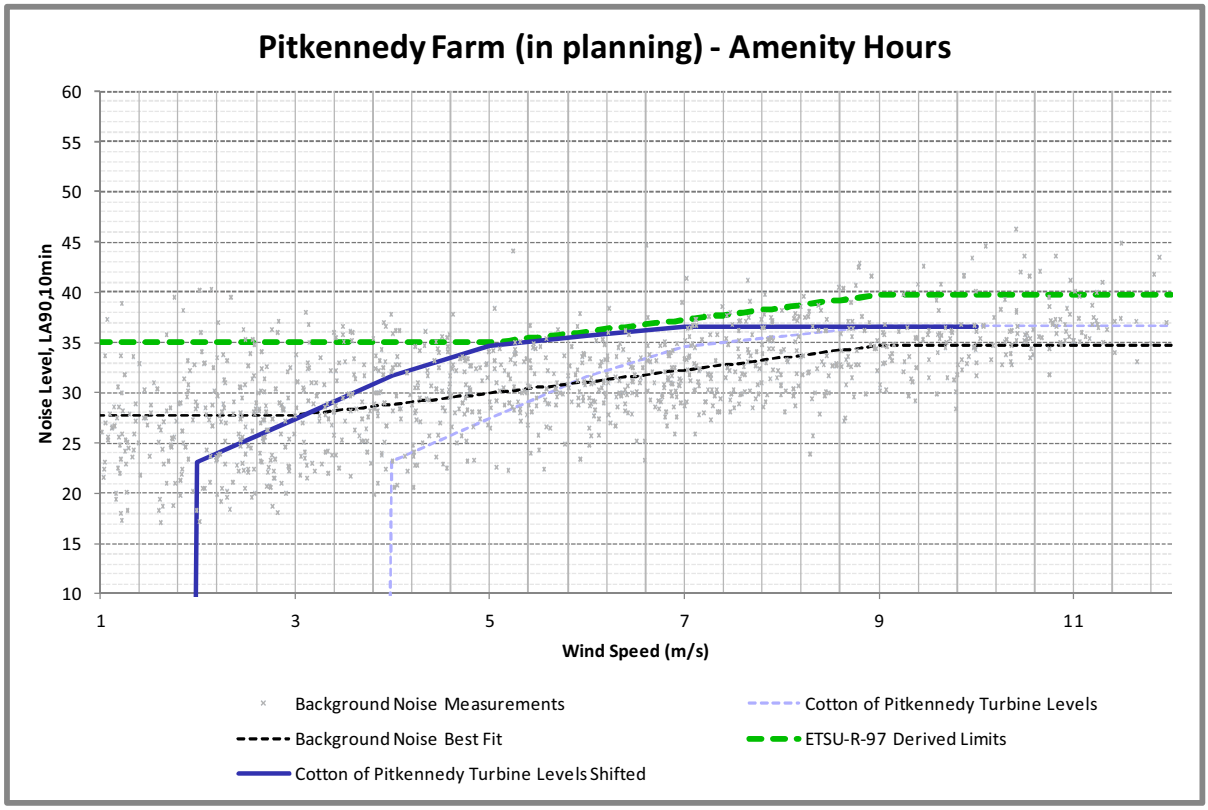


Figure 3 - Graph showing ETSU-R-97 Limits & Turbine Noise at L01

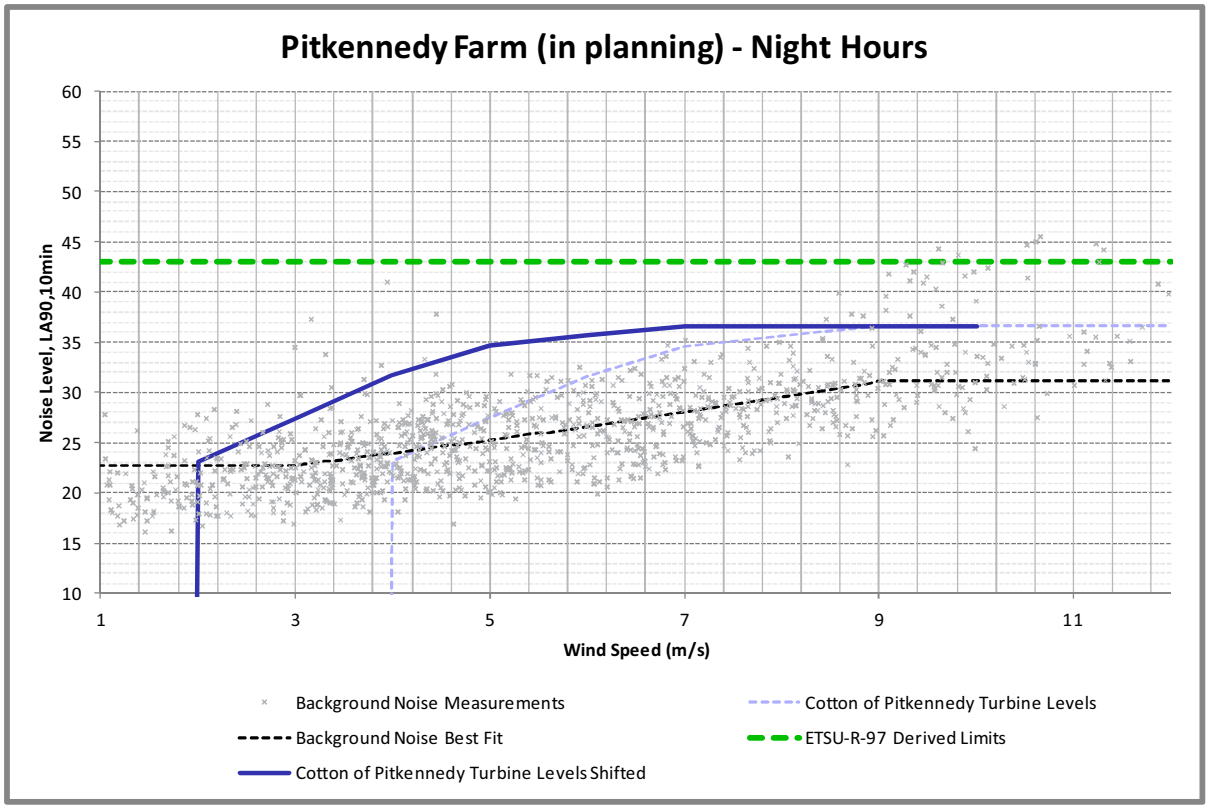


Figure 4 - Graph showing ETSU-R-97 Limits & Turbine Noise at L01 – Night Hours

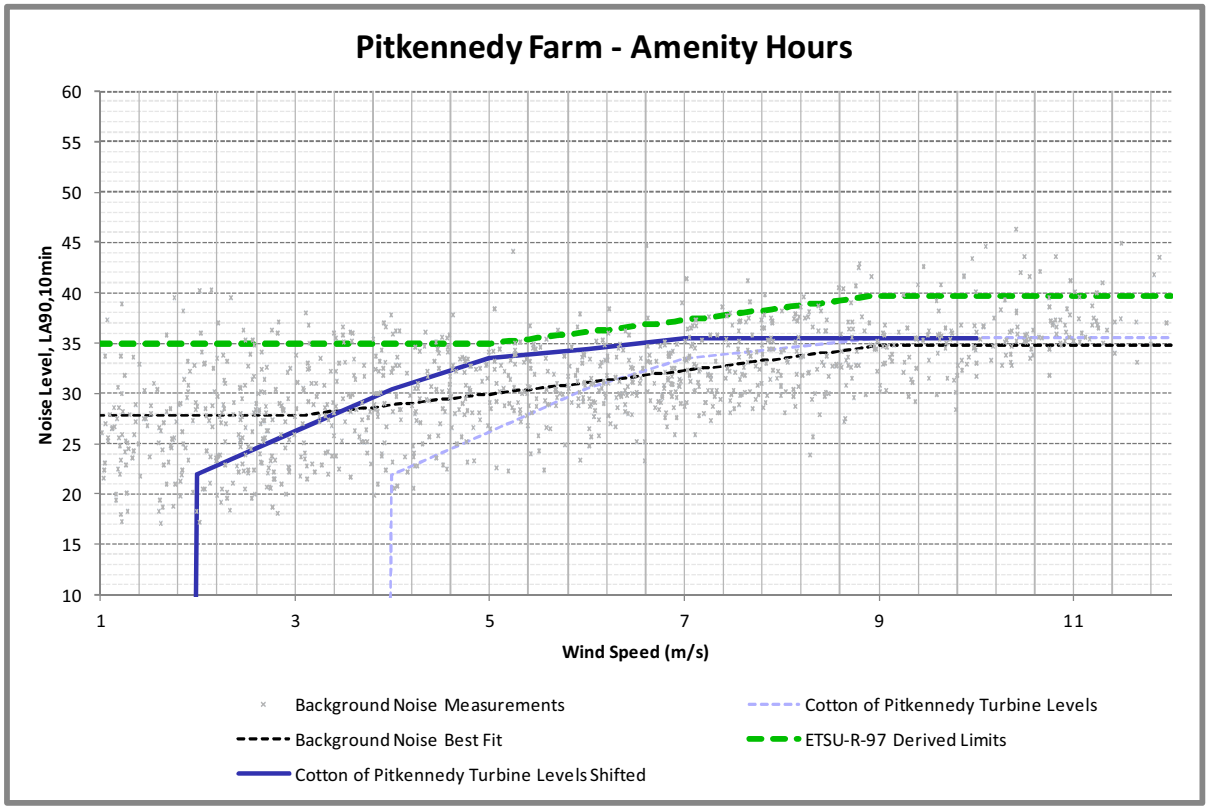


Figure 5 - Graph showing ETSU-R-97 Limits & Turbine Noise at L02 – Amenity Hours

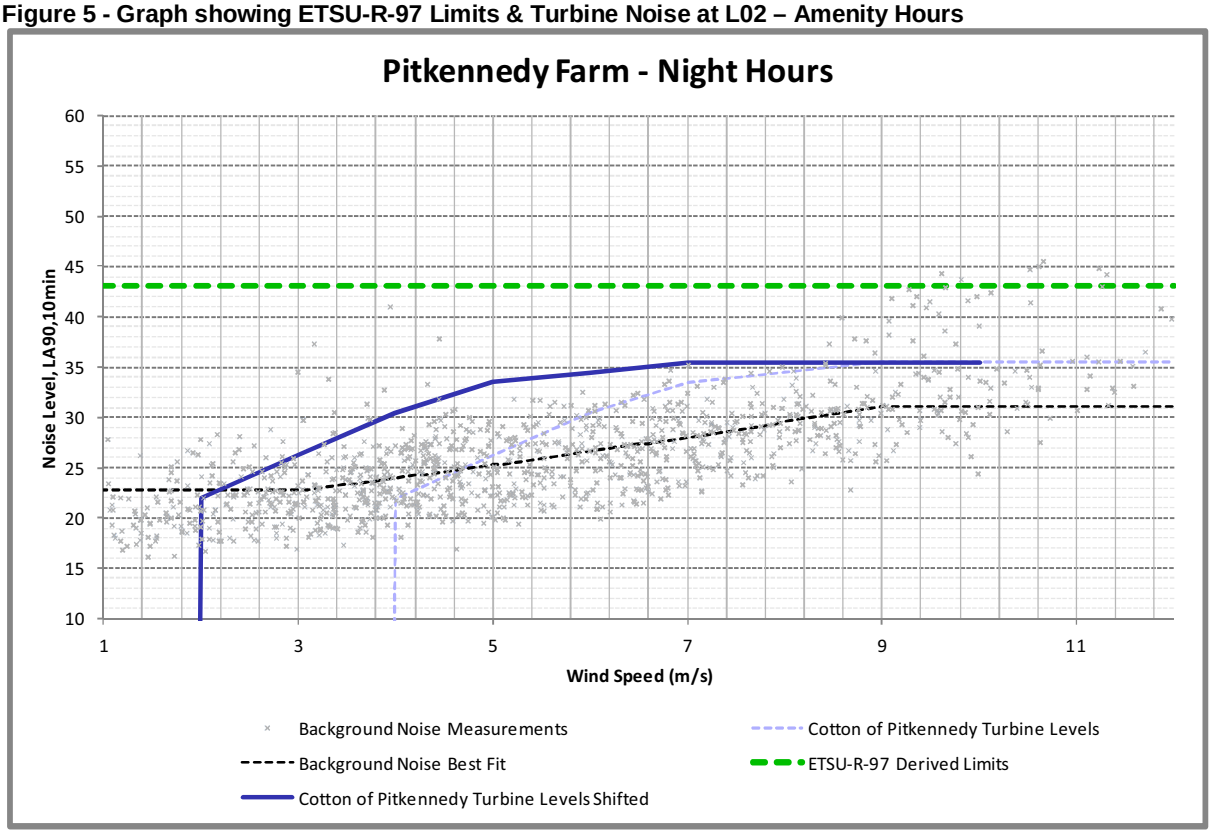


Figure 6 - Graph showing ETSU-R-97 Limits & Turbine Noise at L02 – Night Hours

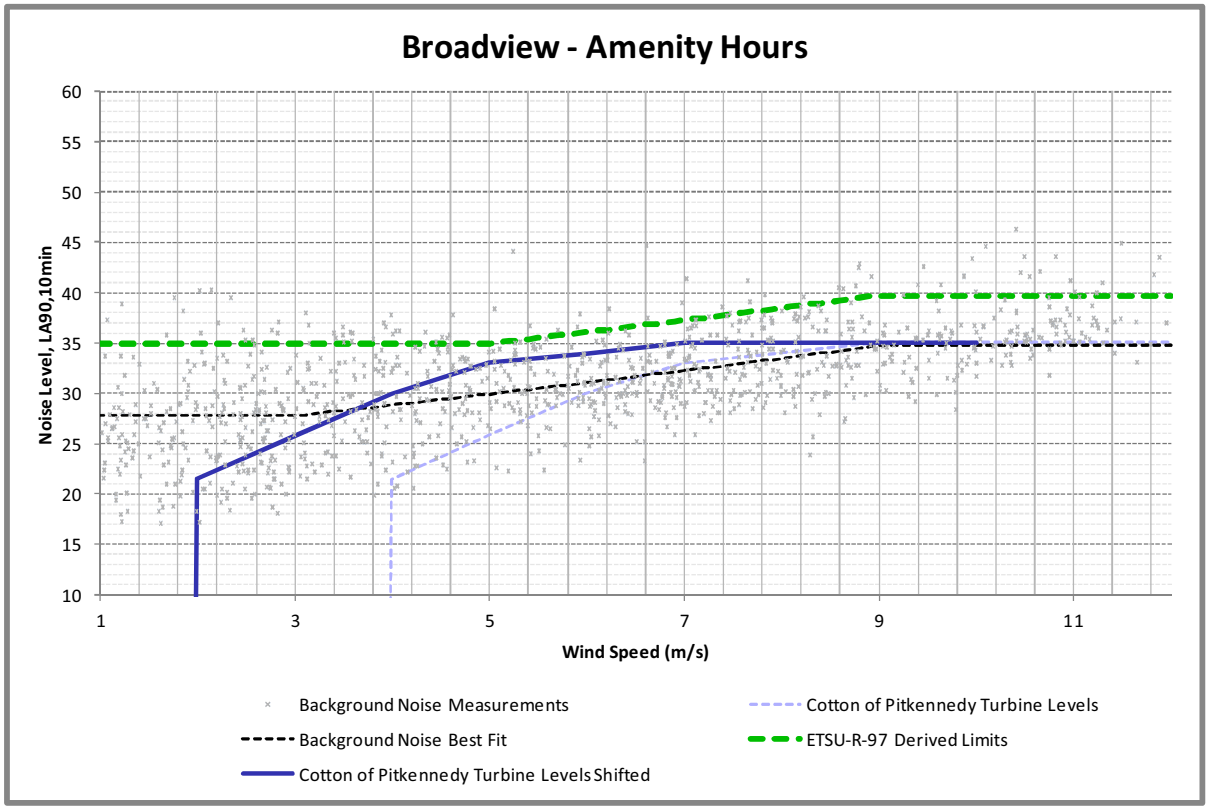


Figure 7 - Graph showing ETSU-R-97 Limits & Turbine Noise at L03 – Amenity Hours

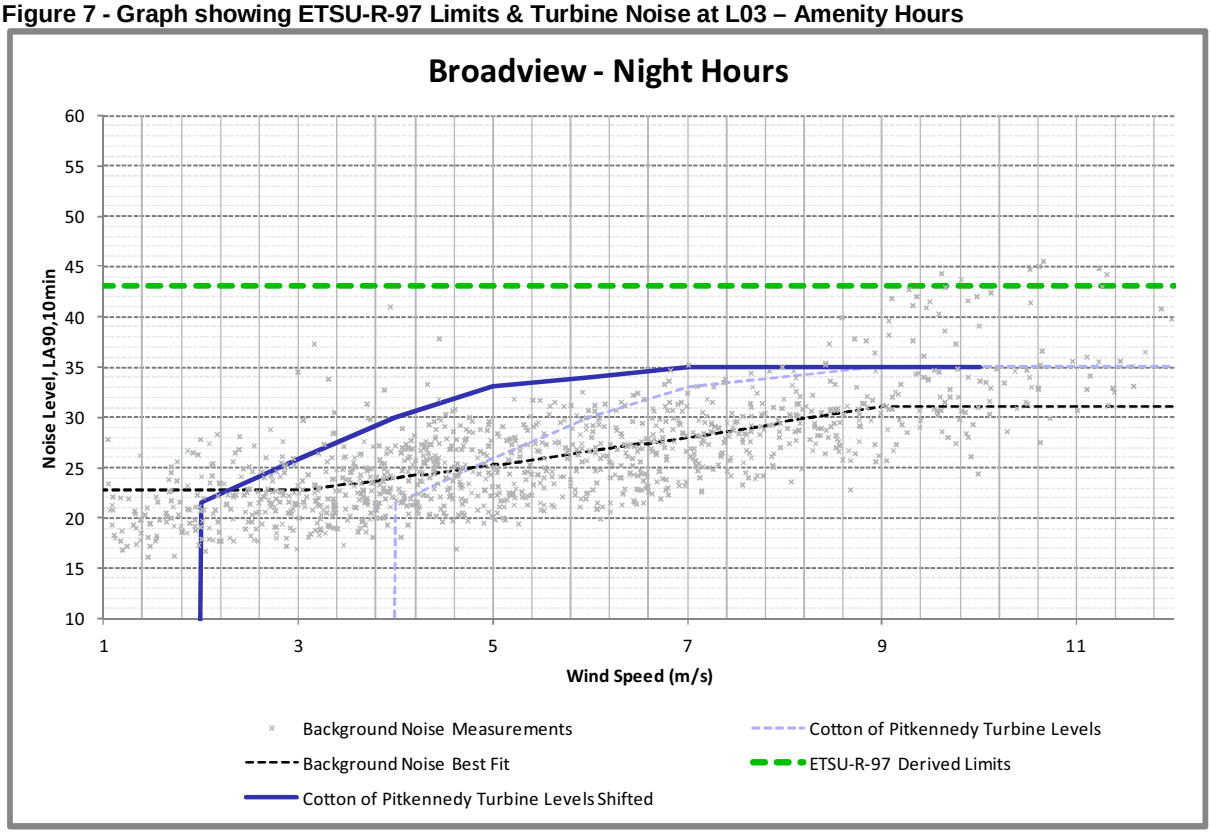


Figure 8 - Graph Showing ETSU-R-97 Limits & Turbine Noise at L03 - Night Hours

5 ASSESSMENT OF OPERATIONAL NOISE LEVELS

5.1 Assessment of Noise during Operation of Cotton of Pitkennedy

5.1.1 The calculated immission level of the proposed Cotton of Pitkennedy Wind Turbine at a height of 4m at each receptor is shown in Table 8 below.

Table 8: Predicted Immission Levels for Cotton of Pitkennedy Wind Turbine

Assessment Location	Measured 10m Wind Speed								
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10m/s	11m/s	12m/s
L01	31.6	34.6	35.6	36.6	36.6	36.6	36.6	36.6	36.6
L02	30.5	33.5	34.5	35.5	35.5	35.5	35.5	35.5	35.5
L03	30.0	33.0	34.0	35.0	35.0	35.0	35.0	35.0	35.0

5.1.2 The margin between the immission values (from Table 8) and the derived ETSU-R-97 limits for each receptor (from Table 6 & Table 7) are shown in Table 9 and Table 10 for the day and night periods respectively.

Table 9: Margin between Immission values and Day Limits

Assessment Location	Measured 10m Wind Speed								
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10m/s	11m/s	12m/s
L01	3.4	0.4	0.5	0.6	1.9	3.1	3.1	3.1	3.1
L02	4.5	1.5	1.6	1.8	3.0	4.3	4.3	4.3	4.3
L03	5.0	2.0	2.1	2.2	3.4	4.7	4.7	4.7	4.7

Table 10: Margin between Immission values and Night Time Limits

Assessment Location	Measured 10m Wind Speed								
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10m/s	11m/s	12m/s
L01	11.4	8.4	7.4	6.4	6.4	6.4	6.4	6.4	6.4
L02	12.5	9.5	8.5	7.5	7.5	7.5	7.5	7.5	7.5
L03	13.0	10.0	9.0	8.0	8.0	8.0	8.0	8.0	8.0

5.1.3 It can be seen from the tables above that the predicted turbine immission levels for Cotton of Pitkennedy Wind Turbine are below the noise limits derived following the guidance of ETSU-97 for both amenity day time and night time periods. Sufficient uncertainty is built into the predictions to ensure the noise limits will not be breached in practice.

5.2 Assessment of Cumulative Wind Farm Noise

5.2.1 A cumulative assessment has been undertaken to consider operational noise levels from nearby existing and proposed Wind Farms.

5.2.2 No developments were found to cumulatively impact the properties assessed in this noise assessment.

6 CONSTRUCTION / DECOMMISSIONING NOISE IMPACT ASSESSMENT

6.1 Construction Noise

6.1.1 It is considered that the principal sources of potential construction noise impact are likely to be associated with the construction of the turbine foundations, the traffic movements to and from the site, and the erection of the turbines.

6.1.2 Predictions of the worst-case construction noise for these activities have been carried out based on the methodology outlined in BS5228:2009 'Noise and vibration control on construction and open sites'. Estimates of the source sound power and the associated levels at the Assessment Locations are presented in Table 11 and Table 12.

Table 11: Example Sound Power Levels Associated With Typical Construction Activities

Plant	LAeq @ 10m, dB(A)	Number	Sound Power Level, dB(A)
Turbine Foundation Construction			
30t tracked excavator	75 dB(A)	1	103 dB(A)
Dump truck (tipping)	74 dB(A)	2	105 dB(A)
Dump truck (moving)	81 dB(A)	2	112 dB(A)
Site Dumper	76 dB(A)	2	107 dB(A)
Large rotary bored piling rig	83 dB(A)	1	111 dB(A)
70t mobile crane	70 dB(A)	1	98 dB(A)
Concrete mixer truck	80 dB(A)	2	111 dB(A)
Diesel generator	74 dB(A)	2	105 dB(A)
Vibrating poker	69 dB(A)	2	100 dB(A)
Total			**117 dB(A)**
Access Track Construction			
Tracked Excavator	85 dB(A)	3	118 dB(A)
Dump Truck	85 dB(A)	2	116 dB(A)
Tipper Lorry	79 dB(A)	4	113 dB(A)
Dozer	81 dB(A)	1	109 dB(A)
Vibratory Roller	74 dB(A)	1	102 dB(A)
Total			**121 dB(A)**
Turbine Erection			
120t crane	67 dB(A)	1	95 dB(A)
600t mobile crane	71 dB(A)	1	99 dB(A)
Articulated HGV	81 dB(A)	3	114 dB(A)
Diesel generator	65 dB(A)	1	93 dB(A)
Total			**114 dB(A)**

Table 12: Predicted Construction Noise Levels At Assessment Locations

Ref	Closest Distance to work site (m)	Worst Case Construction Noise Level		
		Turbine Foundation Construction	Access Track Construction	Turbine Erection
L01	465	56	59	53
L02	520	55	59	52
L03	548	54	58	51
L04	580	54	58	51
L05	695	52	56	49
L06	460	52	60	49
L07	820	51	55	48
L08	830	51	55	48
L09	850	50	54	47
L10	790	50	55	47

6.1.3 The estimated sound pressure levels shown are worst-case estimates based on propagation attenuation only, and do not consider any screening, directivity or absorptive effects. The access track provision has yet to be finalised, and therefore if this has to be changed to bring it closer to properties, then some short term, temporary impacts may occur due to traffic movements, although this is not considered to be significant. Table 12 shows that the adopted construction noise criterion of 65 dB(A) is not predicted to be exceeded at any of the Assessment Locations.

6.1.4 Considering the short-duration, temporary and changing nature of the proposed construction works and the large distances between the majority of construction activities and NSR locations, construction noise is unlikely to cause a disturbance to local residents.

6.1.5 Notwithstanding this, the appointed contractor will minimise the impact of construction activities through successful implementation of an agreed Construction Environmental Management Plan (CEMP) and proper communication with local residents.

6.2 Construction Vibration

6.2.1 Some construction activities can be a source of ground-borne vibration, which can be a cause for concern at the nearest receptors. Typical activities that would lead to vibration effects include compaction and breaking.

6.2.2 The impact at the nearest properties from any vibration activities is a function of the vibration source and the propagation path to the receptor; larger distances reduce the impact. Due to the large distances involved (over 421m), it is unlikely that construction vibration will be noticeable at the receptor locations.

6.3 Mitigation

6.3.1 Aside from the implementation of an agreed Construction Environmental Management Plan (CEMP) by the appointed contractor in order to minimise the impact of construction activities no further mitigation measures are proposed.

7 CONCLUSIONS

7.1.1 An assessment of the likely noise impact due to the construction and decommissioning phase of the proposed Cotton of Pitkennedy Wind Turbine has been undertaken. No significant noise levels are predicted at the nearest receptors from construction and decommissioning activities due to the distances involved. If an alternative access is required bringing the access track closer to properties, a short term noise exceedance during traffic movements to and from the site is possible. This exceedance would be infrequent, and of limited duration, and is considered to be of negligible significance.

7.1.2 Background noise data at the nearest receptors has been collected and analysed in accordance with current accepted practice, and ETSU-R-97 noise limits have been derived. The background noise data has been corrected for the influence of rainy periods and other extraneous noise events.

7.1.3 No nearby wind farm developments have been shown to cause a cumulative noise impact at any of the assessed noise sensitive receptors.

The operation of the proposed Cotton of Pitkennedy Wind Turbine is compliant with the ETSU-R-97 methodology, and that it can meet the relevant ETSU-R-97 noise limits. This can be achieved and controlled by the council through a suitable planning condition based on the ETSU-R-97 limits described.

7.1.4 An additional planning condition should be raised to cover the potential for tonality, as measured at the nearest receptors is negligible.

Appendix A:

Glossary of Terms

GLOSSARY OF TERMS

Ambient Noise	The total sound in a given situation at a given time, usually composed of sound form may sources near and far.
A – Weighting	A-weighting has been found to give the best correlation between perceived and actual loudness. Measurement to which this weighting has been applied are described as being in dB(A).
Attenuation	The reduction in level of a sound between the source and a receiver due to any combination of effects including; distance, atmospheric absorption, barriers, etc.
Background Noise Level, $L_{A90,T}$	The dB level exceeded for 90% of a given time interval, T.
Cut-In wind speed	The wind speed at which a turbine starts to produce power. This is usually at hub height wind speeds of around 4m/s.
Decibel (dB)	A logarithmic unit for measuring the relative loudness of noise, i.e. the sound level.
Environmental Noise	Noise governed by environmental legislation, and usually enforced by local authorities.
Facade Effect	The phenomenon of sound energy (noise) being reflected form the hard rigid, external surface of a building or structure. Where a facade is present, this effect adds approximately 2.5 or 3 dB(A) to the free field noise level (at a distance of 1 metre from the facade).
Free Field Noise Level	The noise level measured away from any reflecting surfaces.
Hertz (Hz)	Unit of frequency, equal to one cycle per second. Frequency is related to the pitch of the sound.
Hub	The centre of a turbine rotor.
Hub Height Wind Speed	The wind speed at the hub height of the turbine.
$L_{Aeq, T}$	The equivalent continuous sound level. It provides an "average" sound level over a defined period of time (T). The L_{Aeq} is the main measurement used in making assessments according to Planning Policy Guidance 24.
$L_{A90, 10mins}$	The L_{A90} is the sound level exceeded 90 per cent of the time and it is used to define background noise, and windfarm noise. In the case of windfarm noise, the L_{A90} level is usually 2 dB less than the L_{Aeq} level.
L_{WA}	Sound power is the total sound energy radiated by a source per unit time. The subscript 'A' refers to an A-weighted sound power level.
Rated Power	The maximum steady output power of a wind turbine.
Vs,10 Standardised wind speed at 10m agl	A notional value of wind speed, taking into account the estimated hub height wind speed and the on-site wind shear. The wind speed is corrected to a height of 10m above ground level (agl) for consistency with BS EN 61400-11 wind turbine sound power level data and to allow an assessment in accordance with ETSU-R-97
Wind Shear	A descriptor used to correlate the change in wind speeds at varying heights above ground level.

Appendix B:

Calibration Certificates

MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

Certificate Number	**CAL041207**
Date of Issue	**10/04/2012**
Customer	**Parsons Brinkerhoff Ltd**
	Description of Instrument Including Manufacturer / Supplier
Sound Level Meter	Rion NL-52 Sound Level Meter [Serial No. 00320638] with Rion UC-59 Microphone [Serial No. 03387] and Rion NH-25 preamplier [Serial No. 10646] Fitted with a WS-10 foam windshield. The instrument conforms to Class 1 of BS EN 61672-1:2003 The instrument was running Version 1.2 Firmware
Associated Calibrator	B & K 4226 S/N 2590976.
Date of Calibration	10/04/2012
Test Procedure	..\..\Calibration Results Sheets\Current Approved Results Sheets\NL-52 Master 61672 Approved Issue 1 (BK 2590976).xlsx Test procedures in accordance with BS EN 61672-3:2006 NOTE: Test 10.1 (Self Generated Noise with Microphone Installed) omitted.
Test Engineer	Amrat Patel

APPROVED SIGNATO[redacted]
Les Je

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL
☎ 01908 642846 🖷 01908 642814
✉ info@noise-and-vibration.co.uk 🖳 www.noise-and-vibration.co.uk

ANEMOMETER CALIBRATION REPORT

630 Peña Drive, Suite 800
Davis, CA 95618-7726
Office: (530) 757-2264
http://www.otechwind.com

Test Date: 7 February 2012 **Revision No: 0**

Customer Information

NRG Systems, Inc.
110 Riggs Road
Hinesburg, VT 05461
USA

Instrument Under Test (IUT)

Model No: NRG #40 Sine
Serial No: 179500196380
Output: Sine Wave
IUT Power: 0 VDC
Heater Power: 0 VDC
Mount Diameter: 12.7 mm
Test Procedure: OTECH-CP-001

Wind Tunnel Test Facility

Otech Tunnel ID: WT1C
Type: Eiffel (open circuit, suction)
Test Section Size: 0.61 m x 0.61 m x 1.22 m
Manufacturer: Engineering Laboratory Design, Inc.

Data Acquisition

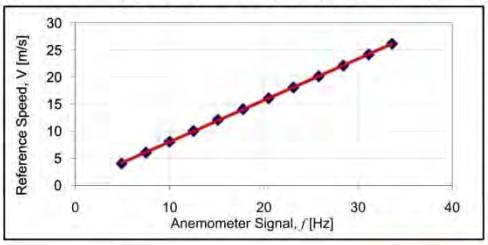
Hardware: National Instruments CDAQ-9172 USB 2.0 chassis with NI 9205 32-chan 16-bit AI module
Software: National Instruments LabVIEW 2010
Signal Reduction Method for IUT: FFT Analysis

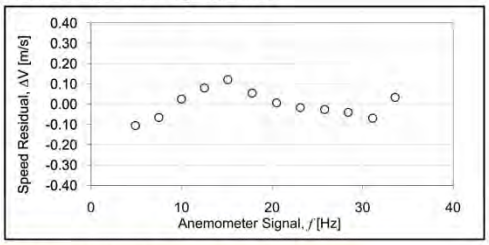
Measuring Equipment

Reference Speed: Four United Sensor Type PA Pitot-static tubes sensed by an MKS Barotron Type 220D Differential Pressure Transducer (NIST traceable)
Amb. Pressure: Setra Model 270 Barometer (NIST traceable)
Amb. Temperature: OMEGA HX94 SS Probe (NIST traceable)
Relative Humidity: OMEGA HX94 SS Probe (NIST traceable)

Test Conditions

Reference Speed Position Correction = 1
Reference Speed Blockage Correction = 1.00735
Mean Ambient Pressure = 101,058 Pa
Mean Ambient Temperature = 22.0 deg C
Mean Relative Humidity = 39.3% RH
Mean Density = 1.1884 kg/cubic meter



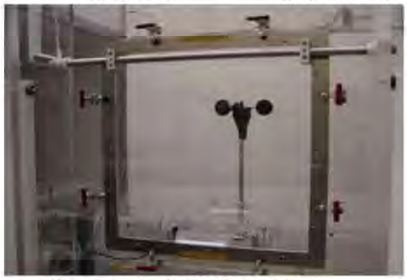


Transfer Function Test Results: **V [m/s] = 0.766 f [Hz] + 0.37**

Regression Parameters

r = 0.99996
slope =0.766 m/s per Hz
offset =0.37 m/s
std. err. estimate =0.0697 m/s
std. err. slope =0.00222 m/s per Hz
std. err. offset =0.04715 m/s

Reference Speed [m/s]	Anemometer Output [Hz]	Residual [m/s]	Ref. Speed Uncertainty
4.025	4.902	-0.105	0.604%
8.059	9.995	0.025	0.606%
12.084	15.122	0.121	0.601%
16.093	20.502	0.007	0.593%
20.129	25.812	-0.026	0.595%
24.150	31.114	-0.069	0.603%
26.154	33.594	0.034	0.601%
22.107	28.411	-0.040	0.592%
18.083	23.130	-0.017	0.598%
14.071	17.801	0.055	0.596%
10.056	12.530	0.080	0.608%
6.044	7.485	-0.065	0.606%



Note: Generic photo of test set-up

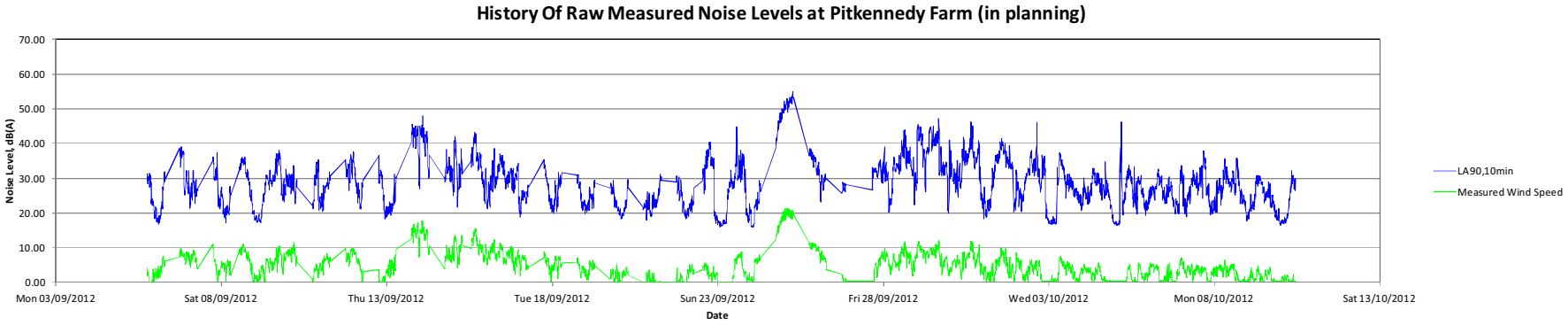
Approved by: John Obermeier, President

This document reports that the above IUT was tested at Otech Engineering, Inc., a wind tunnel laboratory accredited in accordance with the recognised International Standard ISO/IEC 17025:2005 (Certificate number CL-126). This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated January 2009). Uncertainties estimated at 95 % confidence level. This report shall not be reproduced except in full, without written approval from Otech Engineering, Inc.

ACCREDITED

Appendix C:

Time History of Measured & Filtered Noise Levels


History Of Raw Measured Noise Levels at Pitkennedy Farm (in planning)
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Noise Level, dB(A)
Mon 03/09/2012
Sat 08/09/2012
Thu 13/09/2012
Tue 18/09/2012
Sun 23/09/2012
Fri 28/09/2012
Wed 03/10/2012
Mon 08/10/2012
Sat 13/10/2012
Date
LA90,10min
Measured Wind Speed

Appendix D:

Verification of ISO9613 Calculation

Project:	Cotton of Pitkennedy		
Title:	Verification of noise model at 10 m/s using ISO 9613 algorithms		
Author:	JDW	**Job Number:**	351025A
Checked By:	RAP	**Date:**	10/06/2013

Location	**Coordinates**		
	X	**Y**	**Z**
L01 Pitkennedy (in Planning)	354089	754494	4
L02 Pitkennedy	354117	754432	4
L03 Broadview	353682	754728	4
L04 Buttermilk Cottage	353672	755409	4
L05 Cotton of Pitkennedy Farm	353780	754036	4
L06 Bellahill Farm	353636	755430	4
L07 Hollywell	354329	754227	4
L08 Westcote	354343	754230	4
L09 Craiksfold Farm	353260	753981	4
L10 Melgund Bank	354531	754870	4
Turbine	353682	754728	50

Temperature (°C)	10
rel. Humidity (%)	70
Ground Absorption G	0.5

Receptor	**Octave Band Centre Frequency (Hz)**	**Sound Power, dB**	**Distance (m)**	**A_{div}**	**A_{gr}**	**A_{bar}**	**A_{atm}**	**L_{eq} at Receptor (dB)**	**L_{90} at Receptor (dB)**
L01 Pitkennedy (in Planning)	63	106.2	472.27	64.5	-3	0.0	0.06	44.7	42.66
	125	101.9	472.27	64.5	0.14	0.0	0.19	37.1	35.09
	250	103.3	472.27	64.5	-0.48	0.0	0.49	38.8	36.81
	500	101.4	472.27	64.5	-1.5	0.0	0.91	37.5	35.51
	1000	99.3	472.27	64.5	-1.5	0.0	1.73	34.6	32.59
	2000	92.6	472.27	64.5	-1.5	0.0	4.56	25.1	23.06
	4000	88.0	472.27	64.5	-1.5	0.0	15.48	9.5	7.54
	8000	87.0	472.27	64.5	-1.5	0.0	55.2	-31.2	-33.18
L02 Pitkennedy	63	106.2	525.76	65.4	-3	0.0	0.06	43.7	41.72
	125	101.9	525.76	65.4	0.19	0.0	0.22	36.1	34.07
	250	103.3	525.76	65.4	-0.48	0.0	0.55	37.8	35.81
	500	101.4	525.76	65.4	-1.5	0.0	1.01	36.5	34.47
	1000	99.3	525.76	65.4	-1.5	0.0	1.92	33.5	31.46
	2000	92.6	525.76	65.4	-1.5	0.0	5.08	23.6	21.6
	4000	88.0	525.76	65.4	-1.5	0.0	17.23	6.8	4.85
	8000	87.0	525.76	65.4	-1.5	0.0	61.45	-38.4	-40.37
L03 Broadview	63	106.2	551.35	65.8	-3	0.0	0.07	43.3	41.3
	125	101.9	551.35	65.8	0.22	0.0	0.23	35.6	33.62
	250	103.3	551.35	65.8	-0.48	0.0	0.58	37.4	35.37
	500	101.4	551.35	65.8	-1.5	0.0	1.06	36.0	34.01
	1000	99.3	551.35	65.8	-1.5	0.0	2.02	33.0	30.95
	2000	92.6	551.35	65.8	-1.5	0.0	5.33	22.9	20.94
	4000	88.0	551.35	65.8	-1.5	0.0	18.07	5.6	3.6
	8000	87.0	551.35	65.8	-1.5	0.0	64.44	-41.8	-43.77
L04 Buttermilk Cottage	63	106.2	685.33	67.7	-3	0.0	0.08	41.4	39.4
	125	101.9	685.33	67.7	0.32	0.0	0.28	33.6	31.58
	250	103.3	685.33	67.7	-0.48	0.0	0.72	35.3	33.34
	500	101.4	685.33	67.7	-1.5	0.0	1.32	33.9	31.86
	1000	99.3	685.33	67.7	-1.5	0.0	2.51	30.6	28.57
	2000	92.6	685.33	67.7	-1.5	0.0	6.62	19.8	17.76
	4000	88.0	685.33	67.7	-1.5	0.0	22.46	-0.7	-2.68
	8000	87.0	685.33	67.7	-1.5	0.0	80.1	-59.3	-61.32
L05 Cotton of Pitkennedy Farm	63	106.2	701.67	67.9	-3	0.0	0.09	41.2	39.19
	125	101.9	701.67	67.9	0.33	0.0	0.29	33.4	31.36
	250	103.3	701.67	67.9	-0.48	0.0	0.73	35.1	33.13
	500	101.4	701.67	67.9	-1.5	0.0	1.35	33.6	31.63
	1000	99.3	701.67	67.9	-1.5	0.0	2.57	30.3	28.31
	2000	92.6	701.67	67.9	-1.5	0.0	6.78	19.4	17.4
	4000	88.0	701.67	67.9	-1.5	0.0	22.99	-1.4	-3.41
	8000	87.0	701.67	67.9	-1.5	0.0	82.01	-61.4	-63.43

L06 Bellahill Farm	63	106.2	707.25	67.9	-3	0.0	0.09	41.2	39.19
	125	101.9	707.25	67.9	0.34	0.0	0.29	33.4	31.35
	250	103.3	707.25	67.9	-0.48	0.0	0.74	35.1	33.12
	500	101.4	707.25	67.9	-1.5	0.0	1.36	33.6	31.62
	1000	99.3	707.25	67.9	-1.5	0.0	2.59	30.3	28.29
	2000	92.6	707.25	67.9	-1.5	0.0	6.83	19.4	17.35
	4000	88.0	707.25	67.9	-1.5	0.0	23.18	-1.6	-3.6
	8000	87.0	707.25	67.9	-1.5	0.0	82.66	-62.1	-64.08
L07 Hollywell	63	106.2	820.96	69.3	-3	0.0	0.1	39.8	37.81
	125	101.9	820.96	69.3	0.4	0.0	0.34	31.9	29.87
	250	103.3	820.96	69.3	-0.48	0.0	0.86	33.6	31.63
	500	101.4	820.96	69.3	-1.5	0.0	1.58	32.0	30.03
	1000	99.3	820.96	69.3	-1.5	0.0	3	28.5	26.51
	2000	92.6	820.96	69.3	-1.5	0.0	7.93	16.9	14.88
	4000	88.0	820.96	69.3	-1.5	0.0	26.9	-6.7	-8.69
	8000	87.0	820.96	69.3	-1.5	0.0	95.96	-76.8	-78.75
L08 Westcote	63	106.2	830.1	69.4	-3	0.0	0.1	39.7	37.72
	125	101.9	830.1	69.4	0.41	0.0	0.34	31.8	29.77
	250	103.3	830.1	69.4	-0.48	0.0	0.87	33.5	31.53
	500	101.4	830.1	69.4	-1.5	0.0	1.6	31.9	29.92
	1000	99.3	830.1	69.4	-1.5	0.0	3.04	28.4	26.38
	2000	92.6	830.1	69.4	-1.5	0.0	8.02	16.7	14.7
	4000	88.0	830.1	69.4	-1.5	0.0	27.2	-7.1	-9.08
	8000	87.0	830.1	69.4	-1.5	0.0	97.02	-77.9	-79.9
L09 Craiksfold Farm	63	106.2	859.58	69.7	-3	0.0	0.1	39.4	37.41
	125	101.9	859.58	69.7	0.42	0.0	0.35	31.4	29.44
	250	103.3	859.58	69.7	-0.48	0.0	0.9	33.2	31.19
	500	101.4	859.58	69.7	-1.5	0.0	1.66	31.6	29.55
	1000	99.3	859.58	69.7	-1.5	0.0	3.14	28.0	25.97
	2000	92.6	859.58	69.7	-1.5	0.0	8.31	16.1	14.1
	4000	88.0	859.58	69.7	-1.5	0.0	28.17	-8.4	-10.36
	8000	87.0	859.58	69.7	-1.5	0.0	100.47	-81.7	-83.66
L10 Melgund Bank	63	106.2	863.74	69.7	-3	0.0	0.11	39.4	37.36
	125	101.9	863.74	69.7	0.42	0.0	0.35	31.4	29.4
	250	103.3	863.74	69.7	-0.48	0.0	0.9	33.2	31.15
	500	101.4	863.74	69.7	-1.5	0.0	1.67	31.5	29.5
	1000	99.3	863.74	69.7	-1.5	0.0	3.16	27.9	25.91
	2000	92.6	863.74	69.7	-1.5	0.0	8.35	16.0	14.02
	4000	88.0	863.74	69.7	-1.5	0.0	28.3	-8.5	-10.53
	8000	87.0	863.74	69.7	-1.5	0.0	100.96	-82.2	-84.19

Receptor	Calculated	Cadna/A Result	Discrepancy
L01 Pitkennedy (in Planning)	36.6	36.6	0.0
L02 Pitkennedy	35.4	35.4	0.0
L03 Broadview	35.0	35.0	0.0
L04 Buttermilk Cottage	32.8	32.8	0.0
L05 Cotton of Pitkennedy Farm	32.5	32.5	0.0
L06 Bellahill Farm	32.5	32.5	0.0
L07 Hollywell	30.8	30.8	0.0
L08 Westcote	30.7	30.7	0.0
L09 Craiksfold Farm	30.3	30.3	0.0
L10 Melgund Bank	30.3	30.3	0.0

Appendix E:

Enercon E48 Sound Power Datasheet

ENERCON ENERGY FOR THE WORLD	Sound Power Level E-48	page 1 of 1

Guaranteed Values of the Sound Power Level for the E-48 with 800 kW rated power

V_{Wind} in 10m height \ Hub height	50 m	56 m	65 m	76 m
4 m/s	89.0 dB(A)	89.2 dB(A)	89.5 dB(A)	89.9 dB(A)
5 m/s	93.3 dB(A)	93.7 dB(A)	94.2 dB(A)	94.7 dB(A)
6 m/s	97.5 dB(A)	97.9 dB(A)	98.3 dB(A)	98.8 dB(A)
7 m/s	100.5 dB(A)	100.7 dB(A)	101.0 dB(A)	101.3 dB(A)
8 m/s	101.5 dB(A)	101.7 dB(A)	101.8 dB(A)	101.9 dB(A)
95% rated power	102.5 dB(A)	102.5 dB(A)	102.5 dB(A)	102.5 dB(A)
10 m/s	102.5 dB(A)	102.5 dB(A)	102.5 dB(A)	102.5 dB(A)

Measured values at 95% rated power				**101,9 dB(A)** WICO 439SEC04/07 **101,1 dB(A)** KCE 29349-1 003 **102,2 dB(A)** MBBM 64550/07

1. A tonality value of 0-1 dB is guaranteed over the whole operational range (valid in the near vicinity of the turbine according to IEC).
2. An impulsivity value K_{IN} of 0 dB is guaranteed over the whole operational range (valid in the near vicinity of the turbine according to IEC).
3. The sound power values given in the table are valid for the **Operational Mode I** (defined through the rotational speed range of 16 – 30 rpm). The respective power curve is the Calculated Power Curve dated August 2004 (Rev. 1.x).
4. The guarantee is based on official and internal measurements of the sound power level. The official measured values are given in this document as a reference. The extracts of the official measurements are available and are valid in combination with this guarantee document. The measurements are being carried out according to the recommended national and international standards and norms (mentioned on the respective extracts).
5. In order to account for the uncertainties of measurement and sound prediction calculations, to increase the acceptance at the authorities and to avoid eventual verification measurements ENERCON recommends a safety factor of 1 dB(A) on the guaranteed values when carrying out sound propagation calculations. In countries where safety factors are already mandatory due to local regulations, the ENERCON recommendation is not applicable.

   Should this recommendation be neglected for any reasons, it is hereby explicitly referred to 6.
6. Due to the measurement uncertainties of sound measurements the verification of the guaranteed values is successful, if the measurement result of a measurement that has been carried out according to the accepted standards is in the range of +/- 1dB(A) of the guaranteed values [guarantee fulfilled when measurement result = guaranteed value +/- 1dB(A)].
7. For noise-sensitive sites it is possible to operate the E-48 with reduced rotational speed and reduced rated power during the night. The reduced sound power levels are given in a separate document.

Document information:		ENERCON reserves the right to technical modifications	
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Department:	SA	Translator / date:	MK / 19.05.05
Approved / date:		Revisor / date:	
Revision / date:	4.2 / 16.02.07	Reference:	SA-04-SPL Guarantee E-48-Rev4_2-gen-eng

AC37

Cotton of Pitkennedy

Environmental Report

Additional Photomontages

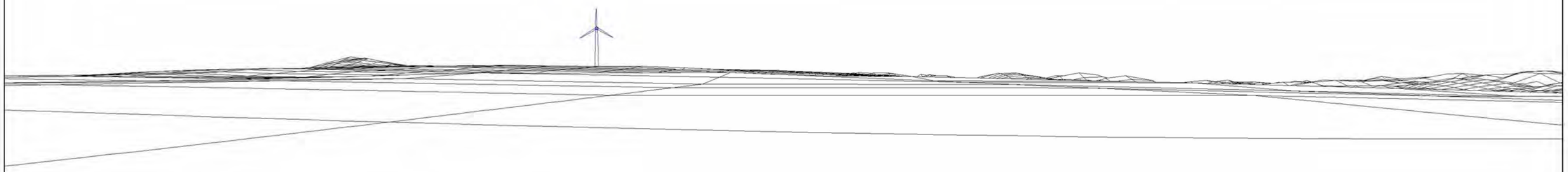
May 2013

PARSONS BRINCKERHOFF

COTTON OF PITKENNEDY
LIST OF FIGURES

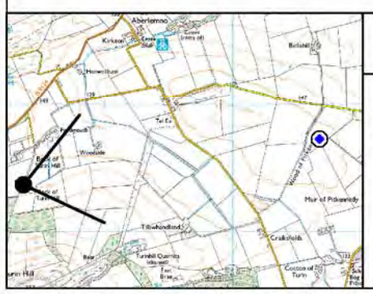
EXISTING VIEW

WIREFRAME



COTTON OF PITKENNEDY WIND TURBINE

Viewpoint 16 - Public Road to the east of Pitkennedy
Panorama and non-cumulative wireframe



VIEWPOINT INFORMATION		PHOTOGRAPHY INFORMATION		WIND FARM INFORMATION	
Grid Reference:	355137, 754963	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	112 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	270 degrees	Time:	11:30	Distance to nearest turbine:	1.47km
Viewing Distance:	300mm				

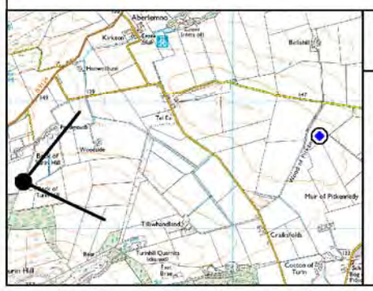
DOCUMENT REFERENCE	LAST REVISION DATE
COP 13/00290/FULL	May 2013
SITE DESIGN VERSION	**SCALE**
V1	

DRAWN	CHECKED	APPROVED
LT	RH	RW

PARSONS BRINCKERHOFF | e-Gen

FIGURE PHOM 16a

PREDICTED VIEW



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Grid Reference:	355137, 754963	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	112 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	270 degrees	Time:	11:30	Distance to nearest turbine:	1.47km
Viewing Distance:	300mm				

COTTON OF PITKENNEDY WIND TURBINE

Viewpoint 16 - Public Road to the east of Pitkennedy
Non-cumulative photomontage

DOCUMENT REFERENCE	LAST REVISION DATE
COP 13/00290/FULL	May 2013
SITE DESIGN VERSION	**SCALE**
V1	

DRAWN	CHECKED	APPROVED
LT	RH	RW

PARSONS BRINCKERHOFF | e-Gen Part of a Clean Energy Community

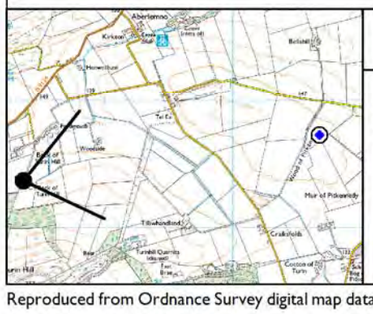
FIGURE PHOM 16b

EXISTING VIEW

WIREFRAME

COTTON OF PITKENNEDY WIND TURBINE

Viewpoint 16 - Public Road to the east of Pitkennedy
Panorama and cumulative wireframe



VIEWPOINT INFORMATION		PHOTOGRAPHY INFORMATION		WIND FARM INFORMATION	
Grid Reference:	355137, 754963	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	112 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	290 degrees	Time:	11:30	Distance to nearest turbine:	1.47km
Viewing Distance:	300mm				

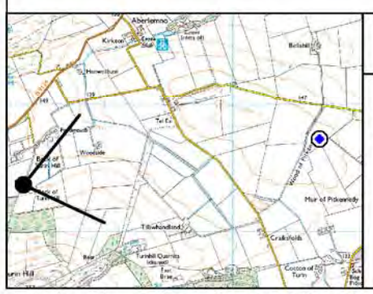
DOCUMENT REFERENCE	LAST REVISION DATE
COP 13/00290/FULL	May 2013
SITE DESIGN VERSION	**SCALE**
V1	

DRAWN	CHECKED	APPROVED
LT	RH	RW

PARSONS BRINCKERHOFF | e-Gen

FIGURE PHOM 16c

PREDICTED VIEW



VIEWPOINT INFORMATION		PHOTOGRAPHY INFORMATION		WIND FARM INFORMATION	
Grid Reference:	355137, 754963	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	112 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	290 degrees	Time:	11:30	Distance to nearest turbine:	1.47km
Viewing Distance:	300mm				

COTTON OF PITKENNEDY WIND TURBINE

Viewpoint 16 - Public Road to the east of Pitkennedy
Cumulative photomontage

DOCUMENT REFERENCE	LAST REVISION DATE
COP 13/00290/FULL	May 2013
SITE DESIGN VERSION	**SCALE**
V1	

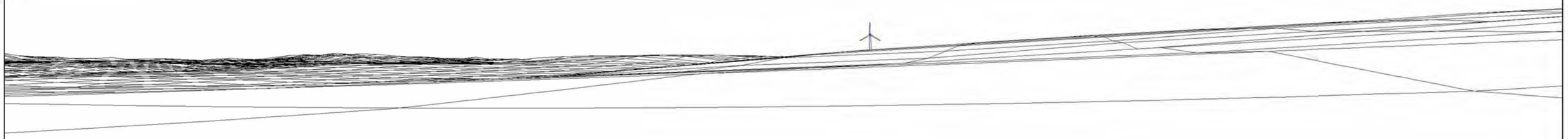
DRAWN	CHECKED	APPROVED
LT	RH	RW

PARSONS BRINCKERHOFF | e-Gen

FIGURE PHOM 16d

EXISTING VIEW

WIREFRAME



VIEWPOINT INFORMATION		PHOTOGRAPHY INFORMATION		WIND FARM INFORMATION	
Grid Reference:	351350, 754369	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	158 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	77.0 degrees	Time:	12:27	Distance to nearest turbine:	2.36km
Viewing Distance:	300mm				

COTTON OF PITKENNEDY WIND TURBINE

Viewpoint 17 - Turin Hill (taken from Turin Hill Farm)
Panorama and non-cumulative wireframe

DOCUMENT REFERENCE	LAST REVISION DATE
COP 13/00290/FULL	May 2013
SITE DESIGN VERSION	**SCALE**
V1	

DRAWN	CHECKED	APPROVED
LT	RH	RW

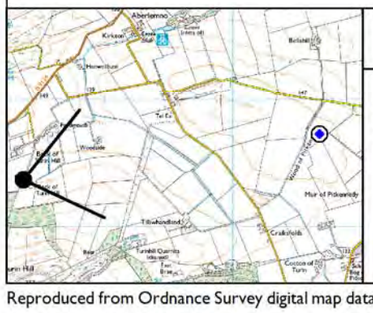
PARSONS BRINCKERHOFF | e-Gen

FIGURE PHOM 17a

PREDICTED VIEW

COTTON OF PITKENNEDY WIND TURBINE

Viewpoint 17 - Turin Hill (taken from Turin Hill Farm)
Non-cumulative photomontage

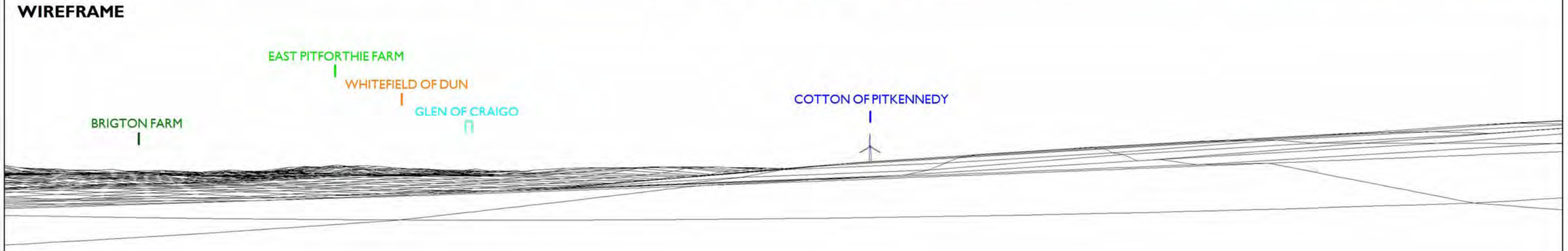


VIEWPOINT INFORMATION		PHOTOGRAPHY INFORMATION		WIND FARM INFORMATION	
Grid Reference:	351350, 754369	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	158 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	77.0 degrees	Time:	12:27	Distance to nearest turbine:	2.36km
Viewing Distance:	300mm				

DOCUMENT REFERENCE	LAST REVISION DATE	
COP 13/00290/FULL	May 2013	
SITE DESIGN VERSION	SCALE	
V1		
DRAWN	CHECKED	APPROVED
LT	RH	RW
PARSONS BRINCKERHOFF	e-Gen Part of a Clean Energy Community	FIGURE PHOM 17b

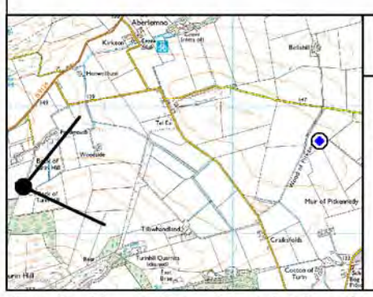
EXISTING VIEW

WIREFRAME



COTTON OF PITKENNEDY WIND TURBINE

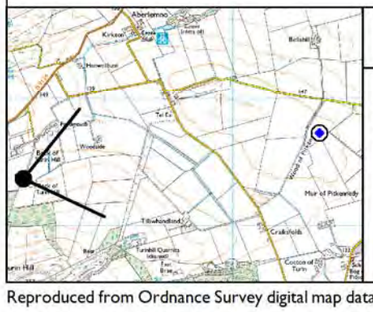
Viewpoint 17 - Turin Hill (taken from Turin Hill Farm)
Panorama and cumulative wireframe



VIEWPOINT INFORMATION		PHOTOGRAPHY INFORMATION		WIND FARM INFORMATION	
Grid Reference:	351350, 754369	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	158 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	77.0 degrees	Time:	12:27	Distance to nearest turbine:	2.36km
Viewing Distance:	300mm				

DOCUMENT REFERENCE COP 13/00290/FULL		**LAST REVISION DATE** May 2013
SITE DESIGN VERSION V1		**SCALE**
DRAWN LT	**CHECKED** RH	**APPROVED** RW
PARSONS BRINCKERHOFF	e-Gen	**FIGURE PHOM 17c**

PREDICTED VIEW



VIEWPOINT INFORMATION		PHOTOGRAPHY INFORMATION		WIND FARM INFORMATION	
Grid Reference:	351350, 754369	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	158 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	77.0 degrees	Time:	12:27	Distance to nearest turbine:	2.36km
Viewing Distance:	300mm				

COTTON OF PITKENNEDY WIND TURBINE

Viewpoint 17 - Turin Hill (taken from Turin Hill Farm)
Cumulative photomontage

DOCUMENT REFERENCE	LAST REVISION DATE
COP 13/00290/FULL	May 2013
SITE DESIGN VERSION	**SCALE**
V1	

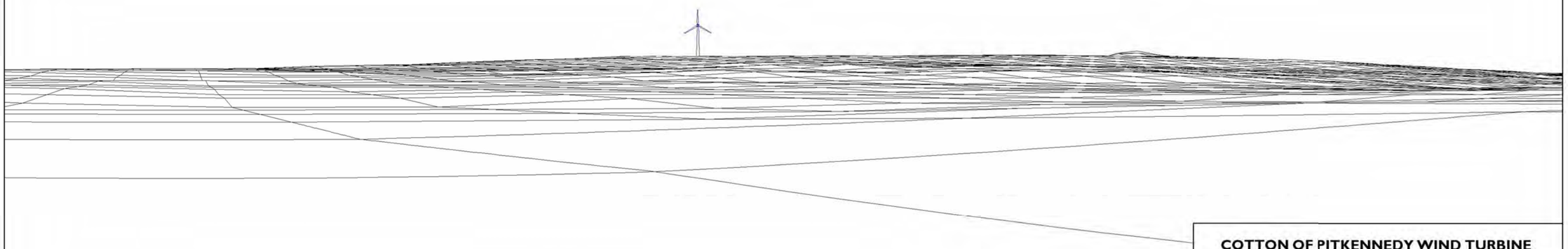
DRAWN	CHECKED	APPROVED
LT	RH	RW

PARSONS BRINCKERHOFF | e-Gen

FIGURE PHOM 17d

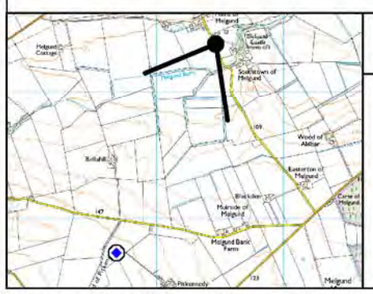
EXISTING VIEW

WIREFRAME



COTTON OF PITKENNEDY WIND TURBINE

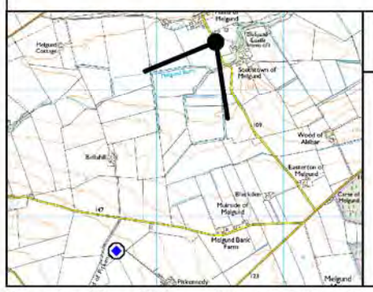
Viewpoint 18 - Melgund Castle
Panorama and non-cumulative wireframe



VIEWPOINT INFORMATION		PHOTOGRAPHY INFORMATION		WIND FARM INFORMATION	
Grid Reference:	354462, 756378	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	91 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	209.5 degrees	Time:	11:48	Distance to nearest turbine:	1.83km
Viewing Distance:	300mm				

DOCUMENT REFERENCE	LAST REVISION DATE	
COP 13/00290/FULL	May 2013	
SITE DESIGN VERSION	**SCALE**	
V1		
DRAWN	**CHECKED**	**APPROVED**
LT	RH	RW
PARSONS BRINCKERHOFF	e-Gen	**FIGURE PHOM 18a**

PREDICTED VIEW



VIEWPOINT INFORMATION		PHOTOGRAPHY INFORMATION		WIND FARM INFORMATION	
Grid Reference:	354462, 756378	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	91 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	209.5 degrees	Time:	11:48	Distance to nearest turbine:	1.83km
Viewing Distance:	300mm				

COTTON OF PITKENNEDY WIND TURBINE

Viewpoint 18 - Melgund Castle
Non-cumulative photomontage

DOCUMENT REFERENCE	LAST REVISION DATE
COP 13/00290/FULL	May 2013
SITE DESIGN VERSION	**SCALE**
V1	

DRAWN	CHECKED	APPROVED
LT	RH	RW

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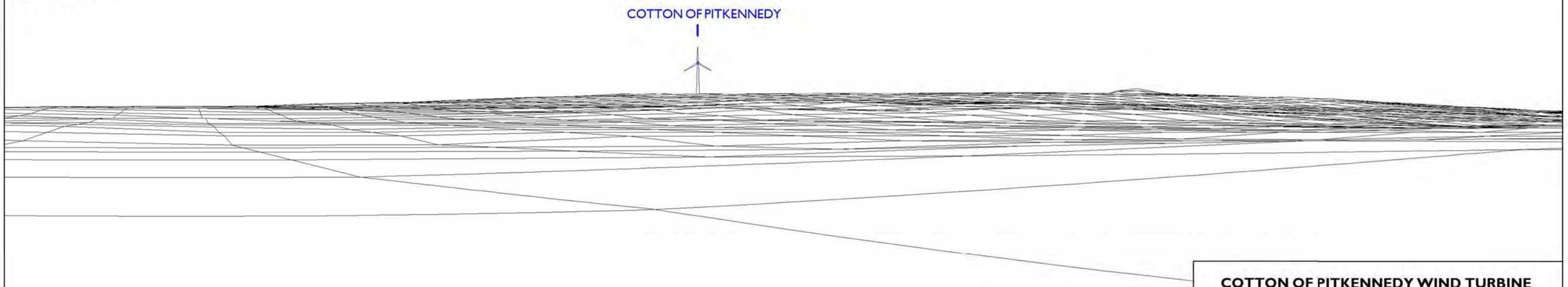
FIGURE PHOM 18b

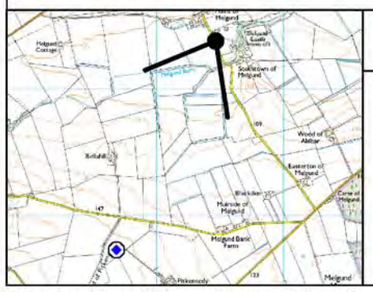
EXISTING VIEW

WIREFRAME



COTTON OF PITKENNEDY WIND TURBINE

Viewpoint 18 - Melgund Castle
Panorama and non-cumulative wireframe



VIEWPOINT INFORMATION		PHOTOGRAPHY INFORMATION		WIND FARM INFORMATION	
Grid Reference:	354462, 756378	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	91 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	209.5 degrees	Time:	11:48	Distance to nearest turbine:	1.83km
Viewing Distance:	300mm				

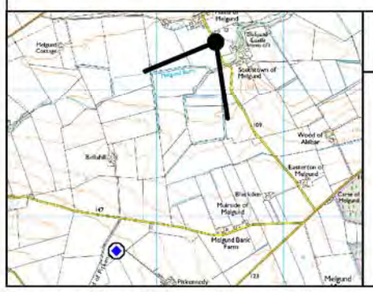
DOCUMENT REFERENCE	LAST REVISION DATE
COP 13/00290/FULL	May 2013
SITE DESIGN VERSION	**SCALE**
V1	

DRAWN	CHECKED	APPROVED
LT	RH	RW

PARSONS BRINCKERHOFF | e-Gen

FIGURE PHOM 18c

PREDICTED VIEW



VIEWPOINT INFORMATION		PHOTOGRAPHY INFORMATION		WIND FARM INFORMATION	
Grid Reference:	354462, 756378	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	91 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	209.5 degrees	Time:	11:48	Distance to nearest turbine:	1.83km
Viewing Distance:	300mm				

COTTON OF PITKENNEDY WIND TURBINE

Viewpoint 18 - Melgund Castle
Cumulative photomontage

DOCUMENT REFERENCE	LAST REVISION DATE
COP 13/00290/FULL	May 2013
SITE DESIGN VERSION	**SCALE**
V1	

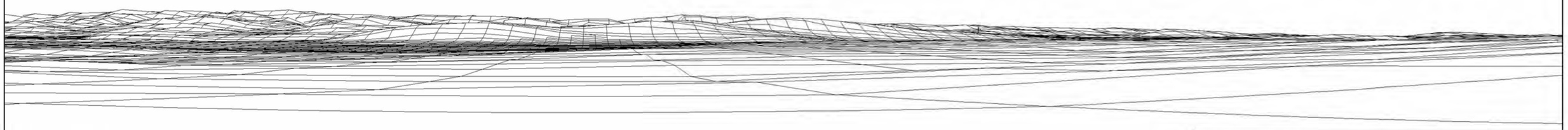
DRAWN	CHECKED	APPROVED
LT	RH	RW

PARSONS BRINCKERHOFF | e-Gen

FIGURE PHOM 18d

EXISTING VIEW

WIREFRAME



COTTON OF PITKENNEDY WIND TURBINE

Viewpoint 19 - Roman Camp at Muir of Lour
Panorama and non-cumulative wireframe

VIEWPOINT INFORMATION		PHOTOGRAPHY INFORMATION		WIND FARM INFORMATION	
Grid Reference:	349928, 743847	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	149 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	9.5 degrees	Time:	13:35	Distance to nearest turbine:	12.1km
Viewing Distance:	300mm				

DOCUMENT REFERENCE COP 13/00290/FULL		**LAST REVISION DATE** May 2013
SITE DESIGN VERSION V1		**SCALE**
DRAWN LT	**CHECKED** RH	**APPROVED** RW
PARSONS BRINCKERHOFF	e-Gen Part of a Clean Energy Community	**FIGURE PHOM 19a**

PREDICTED VIEW

VIEWPOINT INFORMATION		PHOTOGRAPHY INFORMATION		WIND FARM INFORMATION	
Grid Reference:	349928, 743847	Viewer Height:	2m	Turbine Tip Height:	74m
Ground Height:	149 mAOD	Date:	08/04/2013	Turbine Hub Height:	50m
Bearing:	9.5 degrees	Time:	13:35	Distance to nearest turbine:	12.1km
Viewing Distance:	300mm				

COTTON OF PITKENNEDY WIND TURBINE

Viewpoint 19 - Roman Camp at Muir of Lour
Non-cumulative photomontage

DOCUMENT REFERENCE	LAST REVISION DATE
COP 13/00290/FULL	May 2013
SITE DESIGN VERSION	**SCALE**
V1	

DRAWN	CHECKED	APPROVED
LT	RH	RW

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FIGURE PHOM 19b