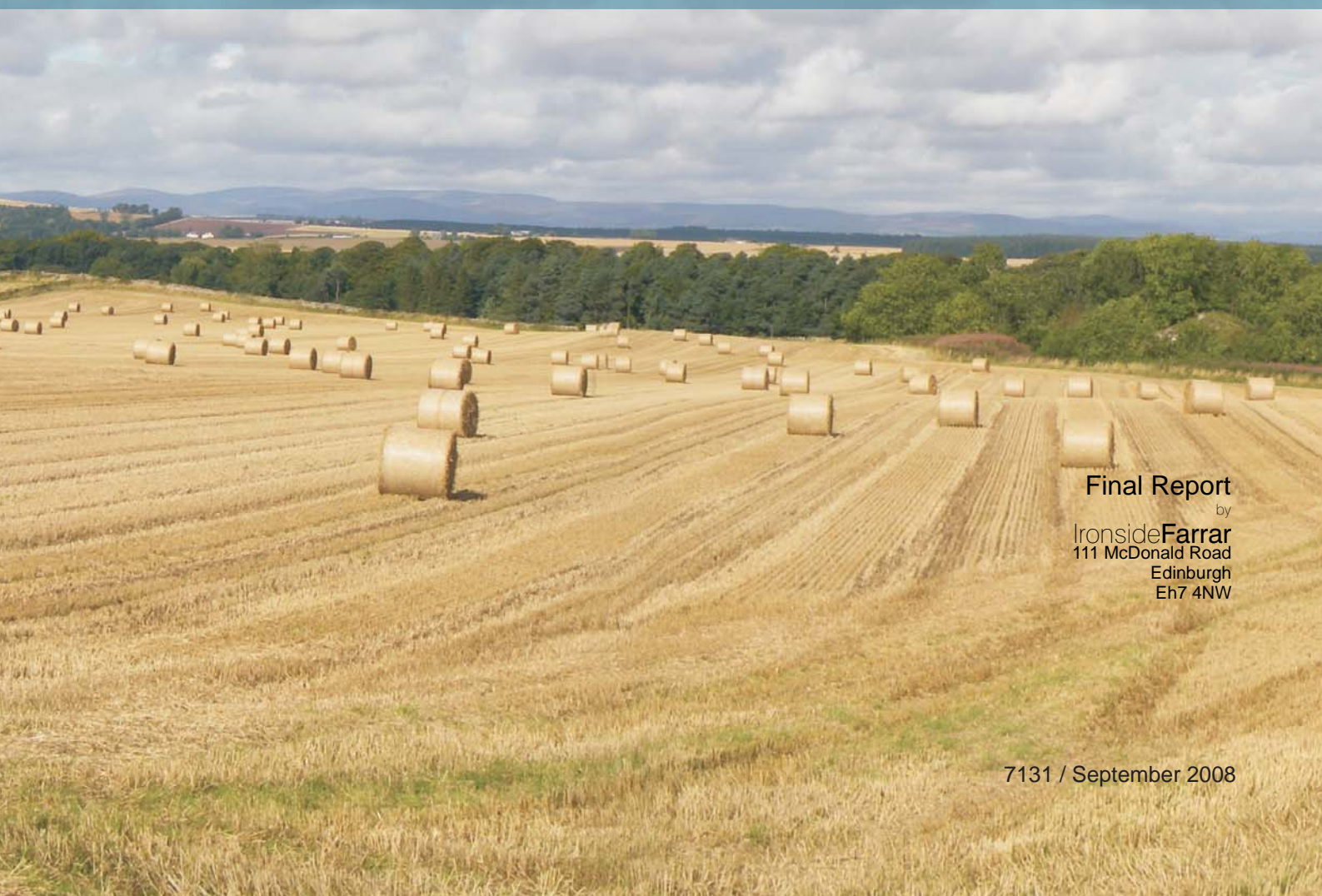


# Angus Windfarms

Landscape Capacity and Cumulative Impacts Study



Final Report  
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**Ironside Farrar**

**Final Report**

**7131/ Sept 2008**



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## **1.0 INTRODUCTION**

### **1.1 Background**

Angus Council has received applications for a number of proposed windfarm developments within its boundaries. The Council requires to undertake detailed consideration of the applications, which include Environmental Statements and supporting information. The applications include:

- Erection of 11 wind turbines at Montreathmont Moor, Friockheim
- Erection of 3 wind turbines at Dusty Drum, Carmyllie;
- Erection of 3 wind turbines at East Skichen, Monikie;
- Erection of 3 wind turbines at Mountboy, Rossie Moor, Montrose; and
- Erection of 6 wind turbines at Mile Hill, Kirkton of Kingoldrum, Kirriemuir

Angus Council wishes to ensure that it has all the necessary information to consider the environmental implications of the proposed developments. An Environmental Statement (ES) or Report (ER) has been submitted with the planning application for each wind farm. In particular Angus Council requires the landscape and visual impact assessment within the ESs/ERs to be reviewed in terms of its methodology and robustness.

In addition, the Council requires to be advised on the cumulative landscape and visual impacts of the developments and the capacity of the landscape to accommodate each application individually and cumulatively.

### **1.2 Appointment**

Ironside Farrar has been appointed by the Council to undertake the review of landscape and visual assessments in the ES/ERs for the above proposals and to advise on cumulative impacts. The need to consider proposed or consented windfarms within Angus and other proposed and consented windfarms in the neighbouring local authority areas is necessary to fully understand the potential for cumulative landscape and visual impacts within Angus.

### **1.3 Public Inquiry**

The promoters of Mountboy windfarm, Novera Energy, and Montreathmont Moor Windfarm, Wind Prospect, have secured a conjoined Public Inquiry on the basis of non-determination of their application by Angus Council. Critical in the Council's consideration of both proposals is the issue of cumulative impacts. The Council were unable to determine the applications due to a lack of information on cumulative

impacts and landscape capacity. The assessment of cumulative impacts and their acceptability is accordingly a critical issue.

## **1.4 Cumulative Impact Assessment**

This study has been prepared to inform the Council on the issues of landscape capacity and cumulative impact. Accordingly it comprises two main themes:

- A strategic landscape capacity study investigating the capacity of landscapes within Angus to accommodate windfarm development
- A cumulative assessment examining the cumulative effect of operating, consented and proposed windfarms on the landscape and visual receptors in Angus.

It is emphasised that this is a strategic level study providing a context for the consideration of the cumulative effects of existing and potential future windfarm developments. No site specific conclusions should be drawn from it in relation to currently proposed windfarms or potential future windfarms. All windfarm proposals should be considered on their own unique locational and design characteristics as well as their strategic context and should be subject to consideration of a full environmental assessment, including a cumulative impact assessment.

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## 2.0 CUMULATIVE ASSESSMENT CRITERIA AND METHODOLOGY

### 2.1 Background

Cumulative impact is the combined impacts of more than one development proposal or change in the environment within a defined area over a defined period of time.

Cumulative impact is a critical consideration in the case of landscape and visual impacts of windfarms in Scotland due to the current number of existing developments in the landscape, proposed developments in the planning system and the long term implications of national policy that encourages the development of renewable energy generation. The characteristics of windfarms that lead to cumulative impacts include:

- The scale and striking visual appearance of wind turbines and windfarms;
- The great extent of their visibility and the potential for intervisibility between windfarm developments and from receptors;

As acknowledged by PAN 45, wind turbines cannot be sited in a landscape without some degree of effect on the character of the landscape and on views:

*‘There are no landscapes into which a wind farm will not introduce a new and distinctive feature’.*

They are prominent, large scale, man-made features and there are few precedents in terms of scale, height and appearance for modern turbines in a rural landscape. Topography aside, they are much taller than any natural features such as trees or most buildings and other structures. Of similar built structures in rural landscapes, electricity pylons are significantly smaller than the largest turbines and although communications masts are often taller they are usually singular whereas wind turbines are built in multiples, often in great numbers. Furthermore, most landscape features are static whereas wind turbines rotate.

This study on behalf of Angus Council requires the assessment of impacts to “*provide advice on the capacity of the landscape to accommodate the scale and number of turbines of each application individually and cumulatively*”. A number of concepts need to be reviewed and the meaning and implications of the word ‘*capacity*’ needs to be defined and interrogated in order to address the question.

Definitions of capacity that apply generally refer to the ability to accept a development without a ‘significant’ or ‘unacceptable’ level of change to the landscape. This implies that criteria must be identified and thresholds must be determined to give meaning to the words ‘significant’ and ‘unacceptable’.

Guidance on the assessment of cumulative impacts and landscape capacity is available from a number of sources, most particularly Scottish Natural Heritage (*Guidance: Cumulative Effects of Windfarms, version 2. SNH, 2005*) but also in UK guidance (eg. *Landscape Character Assessment Guidance for England and Scotland Topic paper 6: Techniques and Criteria for Judging Capacity and Sensitivity. SNH and The Countryside Agency, 2002*) and will be referred to in the following sections.

The determination of 'cumulative impacts' and 'capacity' is subject to debate. No clear guidance is given in the published information beyond the need for the individual impact assessor or Development Plans to determine what the assessment criteria and significance thresholds are. Reasoned argument applicable to the specific circumstances applies, rather than the establishment of an absolute or universal definition. Inevitably this approach is subject to differences of opinion, with thresholds of significance and views on acceptability often differing depending on the background or vested interests of those involved in the debate.

In the absence of any clearly stated or agreed criteria or thresholds and to progress this study some form of threshold or thresholds need to be defined. In order to do this a number of terms and concepts need to be clarified, defining exactly what is being assessed and how. The purpose of the following section is to focus the subsequent assessment and to provide guidance and a basis for decisions to be made by the appropriate authorities.

## **2.2 Defining Terms: Sensitivity, Significance, Capacity and Acceptability of Change**

*Topic Paper 6 of Landscape Character Assessment: Guidance for England and Scotland (2002)* refers to the fact that the terms 'sensitivity' and 'capacity' have often been used in an interchangeable manner in landscape character assessment, essentially referring to the ability of a landscape to absorb change without a significant effect on its character. A landscape of high sensitivity is often considered to have a low capacity for change, and vice-versa. Furthermore sensitivity is used as a key criterion in determining both significance of impact and landscape capacity. In fact there are subtle but important differences between sensitivity and capacity. This section discusses the differences and interrelationships between sensitivity, capacity and significance in landscape character assessment and how the acceptability of change may be determined.

### **2.2.1 Landscape Sensitivity**

The sensitivity of a landscape is a measure of its inherent ability to accept change without significant or unacceptable effect on its character. This can be considered in two ways:

- 1) An inherent part of the landscape's characteristics, regardless of possible types or scales of change; or
- 2) In relation to a specific proposed type and scale of change.

In the former case the assessment of sensitivity would be applied in landscape character assessment where no particular change is being contemplated or assessed, and the landscape is being considered in a resource planning context. In the latter case the assessment of sensitivity would typically be applied in an environmental impact assessment where specific changes are envisaged. In the EIA case the sensitivity of the receiving landscape would be assessed against the magnitude of change in order to determine impact significance.

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### 2.2.2 Landscape Capacity

Landscape capacity is variously described as the ability of a landscape to accommodate (or absorb) change without a significant (or unacceptable) change in fabric or character. This is usually taken to mean whether or not one or more of the key defining characteristics of the landscape is changed such that the overall fabric or character of the landscape is changed, ie. a 'capacity threshold' is crossed. In the case of windfarms it is primarily landscape character that is being considered, particularly in cumulative assessments.

The determination of landscape capacity is closely related to landscape sensitivity and the determination of significance of impact. However assessment of capacity is a not necessarily based around the assessment of known development proposals, but rather the hypothetical ability to accommodate particular types of development, such as windfarms before a threshold or series of increasing thresholds are crossed.

According to *Topic Paper 6*, in determining capacity not only the sensitivity of the landscape to the particular type of development is considered but also the *landscape value* of the area concerned. Value may be determined in a number of ways, including by landscape designations (national, regional or local); cultural and historic associations and in terms of how it is valued by those who live in it or use it in some way.

The determination of capacity is primarily a planning tool rather than a reactive or assessment tool. Nevertheless the determination of capacity thresholds can also be used to assess existing levels of development or potential development scenarios such as is the case with windfarm developments in Angus.

### 2.2.3 Determination of Impact Significance

The principles involved in determining impact significance are the same whether a single or multiple developments are being considered. This involves assessing:

- 1) the sensitivity of the receptor to the type of change proposed; and
- 2) the magnitude of change that would result from the proposals.

Sensitivity and magnitude are considered in combination, leading to an overall assessment of impact. This informs a determination of whether the impact is significant in terms of the EIA regulations. In doing this the considerations about what exactly is being assessed should be taken into account and clearly delineated including baseline, types of impacts and specific developments.

The threshold at which significance is determined in relation to the EIA regulations should also be defined prior to assessment. However, this threshold is particularly open to debate and often subject to the influence of vested interests.

## 2.2.4 The Nature of Impacts

The issue of whether impacts are positive, beneficial or neutral is also an important consideration when making decisions on the acceptability of impacts, regardless of their significance. If an impact were considered positive or neutral in nature it is likely that its level of significance would be considered less critical than were it considered negative. Most windfarm developers equivocate this issue by reference to public opinion polls indicating support for renewable energy and the division of public opinion that is apparent over most windfarm developments. This masks the underlying landscape issue that should be considered independently of a windfarm's primary function or other effects.

The purpose of a windfarm is to provide energy using a method that is renewable and does not involve atmospheric carbon pollution. This accords with current policy and is considered positive and beneficial. Conversely, wind turbines are objects that are unprecedented in scale and appearance in most landscapes, especially the rural ones in which they are mainly located. Many published landscape character assessments of rural areas do not specifically mention wind turbines and windfarms, although increasingly there are guidelines relating to placing them within particular character types. Furthermore, whilst government policy and advice (eg. SPP6, PAN45, SNH advice) and local authority policy (Development Plans) support their development, it is always with a precautionary note relating to balancing benefits and impacts.

The tone of most guidance is that of achieving a balance of impacts against the positive returns of renewable energy. For example SPP6 states in paragraph 25:

*"In all instances, applications should be assessed in relation to criteria based policies to provide clarity on the issues that must be addressed to enable development to take place. This 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."*

And in paragraph 54:

*"Consideration of the significance of any adverse impacts of a renewable generation proposal should have regard to the projected benefits of the proposal in terms of the scale of its contribution to the Scottish Executive's targets for renewable energy."*

PAN 45 states in paragraph 75:

*"A cautious approach is necessary in relation to particular landscapes which are rare or valued, such as National Scenic Areas and proposed National Parks and their wider settings. Here, it may be difficult to accommodate wind turbines without detriment to natural heritage interests. In a regional context*

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*care should also be exercised within Areas of Great Landscape Value and Regional Parks. Other landscapes are not especially valued and a significant change in some landscapes may be considered acceptable”*

Wind turbines are placed in the landscape for a purpose other than landscape enhancement. Given this fact and the nature of Government advice, a precautionary approach should be taken in the assessment of impacts by concluding that the impacts are to some degree negative. The degree of negative impact and level of significance will of course depend on the characteristics of the landscape in which the windfarm is located. It is conceivable that in some degraded landscapes the construction of a windfarm could be considered a neutral or positive change. Indeed Pan 45 states:

*‘For example, areas recovering from past degradation, such as those semi-rural areas of the central belt affected by historic mineral extraction, may be appropriate areas to accommodate wind farm development’.*

In terms of visual impacts the issue of public opinion is more relevant, but a precautionary note applies in this case as well. Particularly the issue of positive responses to the provision of clean energy needs to be separated from the consideration of visual impact of turbines in the landscape.

### **2.2.5 Acceptability of Change**

As discussed above there is some published guidance on methods of assessment of cumulative landscape and visual impacts of windfarms (eg. SNH, 2005) and separate guidance on the factors that determine impact significance (eg. LI & IEMA, 2002). However there is currently no generic guidance that defines how to determine the *acceptability* of impacts. Indeed generic guidance on acceptability may be inappropriate as any judgement on this is contextual and often a case of weighing perceived impacts against perceived benefits. The impacts and benefits will often be different in type and the balance of judgement is to an extent subjective. The acceptability of change in any particular landscape will depend on the nature of the landscape, the significance of the impacts and the purpose of the change. The final judgement is often informed by and weighed against specific development plan policies and material considerations.

The determination of significant change should theoretically be a clearly defined stage in this process, similar to an impact assessment. Nevertheless, as previously discussed, significance in landscape and visual impact assessment is not universally defined and is open to debate. If the significance of change is open to interpretation, then ‘acceptability’ of change is a still less definable term that is often based on opinion and is open to debate.

What is acceptable to one individual or organisation may not be acceptable to another. What may be seen as unacceptable change in a narrow context (eg. landscape and visual impacts) may be seen as acceptable when considering the overall balance of positive and negative impacts (eg. provision of carbon-neutral energy). In a study of windfarms in the Western Isles (SNH, 2004) the idea of a

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predetermined 'carrying capacity' is questioned and the concept of *Limits of Acceptable Change* (LAC) is discussed:

*'LAC is first and foremost a process through which decisions are made on the conditions which are acceptable and then prescriptions are made for the actions needed to protect or achieve those conditions. So the objective of the LAC process is not to prevent change but rather to control it and to decide on the actions required to maintain or achieve the desired conditions. Other key features of LAC are the use of indicators and a monitoring programme. As a process, LAC is always participatory and multi-disciplinary, and may or may not involve a wide range of stakeholders. Whilst the term capacity may still be used in LAC, (recreational) carrying capacity is not a simple, single, absolute value. It is the amount, kind and distribution of use that can occur without causing unacceptable impacts on either natural resources or the perceptions and experiences of the users'.*

This concept requires qualitative judgements about what is important in a landscape or to people using that landscape and what level of change is acceptable (ie. what types and levels of change can take place before the landscape is considered to be critically or significantly changed). In the context of this study, acceptability of change will be related to cumulative landscape and visual impacts judged against landscape capacity as determined by structured a process of judgement; the provisions of criteria-based landscape policies; other material considerations and the wider Scottish picture of windfarm development. No account will be taken of the other potential impacts or benefits of windfarms. The resulting judgements of this study will need to be balanced against the other benefits or disadvantages of the proposals.

## **2.3 National and Local Policy**

The acceptability of proposed windfarms and cumulative landscape and visual impacts of multiple windfarm development has to be considered in the light of national and development plan policy.

### **2.3.1 National Policy and Guidance**

National policy in relation to renewable energy development is expressed in *SPP6 Renewable Energy* with related guidance in *PAN 45*. SPP6 reflects the Scottish Government's commitment to greatly increasing the amount of energy produced by renewable sources. Inevitably it focuses on wind power as, at least in the short term, the most available resource suitable for expansion.

SPP6 is thus very positively disposed to renewable energy production and directs all councils to create development plan policies that encourage renewable energy generation capacity, including onshore wind power.

SPP6 and PAN 45 recognise that wind energy developments are likely to have significant impacts on the environment, including the landscape. SPP6 therefore underlines the need to ensure that developments do not have *unacceptable* impacts.



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In this respect Annex A of SPP6 describes the need for development plans to set out a Spatial Framework for windfarms of more than 20MW capacity. The Annex lists the criteria that should be considered in the location of windfarms. It suggests the extent to which developments below this capacity are considered in this way would depend on the scale of the development proposed.

### 2.3.2 Development Plan Policies

#### ***The Dundee and Angus Structure Plan 2001-2016***

The structure plan policy ER10: Renewable Energy is supportive of renewable energy developments provided '*...they deliver quantifiable environmental and economic benefits and any significant or adverse cumulative impacts on the natural and historic environmental, landscape and local communities can be satisfactorily addressed*' Development will be considered in the context of wider environmental policies of the structure plan and detailed criteria based policies and locational guidance and, where appropriate, areas of search are to be developed by Local Plans.

In respect of landscape Policy *Environmental Resources 1: Natural Heritage Designations* and Policy *Environmental Resources 2: The Wider Natural Heritage* provide for protection of designated landscapes and the wider landscape character of the area. In particular ER2 cites the Tayside Landscape Character Assessment (Land Use Consultants, 1999) as a material consideration for determining development proposals and providing for new development within Local Plans and states that '*All developments must respect main features and characteristics of the natural heritage and contribute to landscape restoration or improvement*'.

The Structure Plan thus carries forward national policy in the encouragement of renewable energy development but recognises the balance to be achieved between the benefits of the development and potentially significant or adverse effects, including cumulative effects, on the natural heritage. It instructs the Local Plans to take account of this by developing specific criteria-based policies.

#### ***The Angus Local Plan***

The Adopted Angus Local Plan (2000) has two policies that are most relevant to renewable energy and windfarms: *INF12: Renewable Energy Development* and *INF13: Wind Power*.

Policy INF12 is positively disposed towards renewable energy when considered against criteria relating to '*the impact of the proposal on the natural and built environment including residential amenity*' and '*on the landscape and visual qualities of the area*'. INF13 requires development of windfarms to meet certain environmental criteria including: '*the proposal would not ....have a significant detrimental effect on residential amenity...*' or '*...result in an unacceptable intrusion into the landscape character of the area*' or '*...contribute to an unacceptable cumulative impact*'.

The justification for Policy INF13 also discusses the potential locations of windfarms in relation to windspeeds and landscape character. Whilst on the one hand upland

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areas, hills and coast may be suitable from a windspeed aspect, it is noted that a number of areas are likely to be sensitive to windpower development:

- *'extensive upland areas where development is sparse and views extensive*
- *designated areas of landscape or nature conservation value and built heritage*
- *small scale landscape and skyline sites*
- *prominent locations used or visited by large numbers of people'*

Accordingly locations such as highland summits and plateaux, the Highland boundary fault line and along the coast are considered unlikely to be suitable for windpower development.

The emerging Local Plan has undergone two inquiry reviews and is close to adoption and therefore a significant material consideration. *The Finalised Angus Local Plan Review 2005* has three policies that are most relevant to wind energy development: *ER5: Conservation of Landscape Character; ER33 Renewable Energy Developments* and *ER34: Wind Energy Developments*. The Reporter has recommended changes to the published policies. A consolidated version of the relevant policies and justifications is appended to this report in Appendix A.

Policy ER5 covers the issue of conserving the landscape character of Angus which is considered one of the greatest assets to the area. In doing so it cites the *Tayside Landscape Character Assessment (SNH 1999)* (TLCA) as the basis for defining landscape character and providing guidance for the assessment of development proposals. It is notable that there are no local landscape designations within Angus, a policy adopted on the advice of SNH.

Policy ER33 adopts a positive approach in principle to all renewable energy development proposals, including wind energy. It recommends they are assessed against a number of environmental criteria, including that there shall be *'no unacceptable landscape and visual impacts'*.

Policy ER34 is the most relevant to this study. It underwent considerable debate and modification in the Local Plan Inquiry process. The policy is referenced to meeting the requirements of ER33 which supports renewable energy development in principle but also requires that there will be no unacceptable landscape and visual impacts. Criterion (e) addresses the issue of cumulative landscape and visual impact in 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.'*

In ER34 the TLCA is used as the basis for considering the effects of development on landscape character and the capacity of the landscape to absorb windfarm development. The policy justification explains that there are three main geographic areas within Angus: *Highland, Lowland & Hills* and *Coast*. It is considered that the character of landscapes within these areas varies in its sensitivity to windfarm

development. The Highland and Coastal areas are considered likely to be less suitable to windfarm development.

In summary national and development plan policy is therefore supportive of windfarm proposals. This is subject to specific developments avoiding unacceptable landscape and visual impacts and with limitations on the cumulative impact of more than one development within Angus or in neighbouring local authority areas.

A particularly important strategic step in the avoidance of potentially unacceptable impacts is the Spatial Framework required by Annex A of SPP6. It is notable that, due to the timing of the Angus Local Plan process relative to SPP6, there is no reference in ER34 to Spatial Frameworks and Supplementary Planning Guidance (SPG) for windfarms. Nevertheless Angus Council is preparing SPG as required by SPP6. The criteria in the local plan policies and the background information such as the TLCA will inform the process.

## **2.4 Developing a Cumulative Impact Assessment Methodology**

### **2.4.1 Cumulative Impacts**

For the purposes of this study, cumulative impacts are taken to be those arising from more than one development of the same type, rather than the accumulation of changes making up one development. In the case of windfarms, cumulative studies concentrate on other windfarms. In practice, other features in the landscape or views should also be taken into account. Nevertheless, given the singular appearance of windfarms and their generally isolated rural locations, the potential for overlap of cumulative impacts with other developments is more limited.

### **2.4.2 Baseline**

The baseline for a cumulative, or indeed any, assessment is usually taken to include the existing landscape and visual receptors in the study area at the time of assessment. The baseline should include all operating windfarms and, arguably, all consented windfarms as this is effectively the 'permitted landscape'. The assessment of change and significance of impact should be carried out relative to this baseline whether carrying out a standard or cumulative assessment.

Nevertheless, a landscape capacity study leading to the determination of an 'acceptable' level of windfarm development requires consideration of a full picture of all the windfarms in the landscape; operating, consented and proposed, in order to determine the extent and acceptability of change. The fact that there are operating or consented windfarms in an area is not necessarily an indication that the landscape is less sensitive to further development and that capacity is available. Indeed, depending on the landscape type, degree of development and objectives of policy in relation to landscape character, it may mean that most or all of the capacity is already occupied. Therefore, despite the existing baseline, the development must also in effect be considered relative to the pre-windfarm landscape.

### 2.4.3 Types of Cumulative Impact

#### *Landscape*

The assessment of cumulative landscape impacts involves an assessment of change in the fabric and character of the landscape as a result of the combined changes of more than one development. The changes are assessed in relation to defined areas of landscape such as a project study area, landscape character area or designated landscape. As previously discussed, it is effects on landscape character that is the primary focus in relation to windfarms from which all other assessments are derived.

#### *Visual*

The assessment of cumulative visual impacts involves an assessment of the change in views and visual amenity as a result of combined changes of more than one development, as experienced by people in their homes and during recreation, travel or work. There are three types of cumulative impact in relation to visual receptors:

- 1) Combined: more than one development is seen from a single static viewpoint in one arc of view (ie. Within the span of one view, without the receptor turning around). This would include particular directional viewpoints or the view from the principal aspect of a residential property.
- 2) Successive: more than one development is seen from a single static viewpoint by a receptor turning around to encompass more than one arc of view, up to 360°. This includes high and open viewpoints, or views from all aspects of a residential property.
- 3) Sequential: more than one development is seen by a receptor visiting a series of viewpoints. This may involve travelling along a linear route or through an area in which views of the developments may be continuous or intermittent and different developments may be seen at different locations. This includes roads, railways, paths and other defined routes or could involve an area such as a designated landscape.

In practice most assessment will include all of these types of impact in order to gain a full picture of how cumulative impacts will be experienced by receptors.

### 2.4.4 Effect of Pattern of Development on Perception of Impact

Cumulative studies tend to focus on the number of windfarms, turbines or output capacities within a particular area as an indication of level of cumulative impact. Nevertheless, there is not necessarily a simple relationship between numbers, areas and cumulative impact. The pattern of windfarm development, in terms of size, layout and proximity may also affect the perception of cumulative impacts.

The effect of proximity of different windfarms to one another has a bearing on impacts. Whilst close proximity of two or more windfarms may reduce the total area visually affected, the level of perceived cumulative impact may be increased by

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juxtaposition of windfarms of significantly different appearance (due for example to differing turbine sizes or site layouts) leading to a jarring visual clash.

Furthermore, studies and planning decisions have indicated that there is less resistance to expansion of existing windfarms than to creation of separate new windfarms. In particular, respondents to a survey on impacts of windfarms on tourism in Scotland (Glasgow Caledonian University and others, March 2008) showed little concern about views being affected by one windfarm compared with more than one windfarm being visible in the same view.

*“A significant proportion of respondents (44%) agreed that they don’t like to see several Wind farms in the same view. These results suggest that those respondents who have indicated having a neutral or even positive perspective on individual Wind farm sites are less likely to have a similar opinion on a landscape that has several developments in view.*

*This clear result compares with analysis in the previous section where there was a small increase in the negative response as the visual impact increased for an individual Wind farm development. This suggests that people see one large scale development in an area as preferable to several smaller scale developments dotted on the landscape.*

*On the other hand, both sets of results also confirm that a definite tipping point exists where Wind farm development becomes untenable for a significant number of visitors”.*

Current guidance and recent planning decisions are tending towards the concept of concentration of wind turbines into large clusters in certain areas. This is on the basis that this reduces the potential for a widespread dispersal of effects over a larger area and allows areas more sensitive to windfarm development to remain free of windfarm development. The reporter for the recently consented 150 turbine Clyde Windfarm noted that SNH favours this approach, although as yet has no formal policy stating so (Gordon, May 2007). The policy may also offer advantages in terms of economies of scale for site servicing and electricity transmission. The disadvantages are likely to be that areas chosen for concentration of the turbines are likely to be significantly and adversely affected by development – this being effectively a ‘sacrificial’ landscape policy.

#### **2.4.5 Setting Assessment Objectives**

What exactly is being assessed depends on the purpose of the cumulative assessment. In the case of an EIA for a single development it is primarily the impacts of the proposal and its contribution to cumulative impacts that is being assessed. Such a study would therefore typically concentrate on areas in which the impact of the windfarm under consideration is significant and give only slight consideration to areas in which it is not, even if there were significant cumulative impacts from other windfarms.

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In the case of a more broad-based cumulative study such as this, it is the overall impact of windfarm developments on a defined study area that is being assessed. Nevertheless this study requires a consideration of the both the full cumulative impact *and* the contribution that specific developments (proposed or operating) make to that impact, in order to inform decisions.

#### 2.4.6 Defining Thresholds of Cumulative Development

The discussion above has defined the terminology and our approach to cumulative assessment. It has isolated the central issues that inform the assessment of acceptability of levels of change. The key requirement is to develop a methodology for defining thresholds of significance and acceptability that are clear and robust enough to be accepted by all sides of the debate. We see this study as a stage in the debate about acceptable levels of change in the landscape of Angus. Whilst we can describe and define what those levels of change might be it is difficult to enforce a universal view as to what levels of change are significant or acceptable.

The methodology proposed therefore seeks to set out defined levels of change to the landscape and visual environment that might occur or be experienced depending on the number, size and location of windfarms to be built within an area.

The descriptions in Table 2.1 below set out a graduated landscape typology that defines the terms of reference for levels of cumulative landscape and visual impact of windfarms. It does this by describing their effect on landscape character and the experience of those living in or travelling through the landscape.

The purpose of this approach is to address the gap between results of cumulative impact assessment and the judgement of acceptability of change. It does not set thresholds of significance or acceptability but it does present a framework that describes levels of change in landscape character and the experience of visual receptors in the landscape. This can then be used to inform and shape a debate concerning the degree of change in a landscape from a particular baseline (which may or may not already include windfarms). This in turn contributes to an assessment of significance of impact and informs arguments concerning the acceptability of cumulative impacts or indeed *Limits of Acceptable Change*.

The following descriptions of levels of windfarm development within a landscape are necessarily simple, factual and generic. They can be applied to any chosen scale of study area, from a region to a landscape type or a single landscape character area. They do not apply to any specific baseline landscape type or types: indeed the character of the landscape is likely to affect judgements on the assignment to a particular level of development. For instance, a large scale landscape may be less dominated and affected than a smaller scale landscape; or a more complex topography, or a densely wooded landscape may reduce the visibility of wind turbines within an area and hence affect the perception by visual receptors. A large landscape character area will require a greater extent and frequency of development than a smaller area to become affected by wind turbines. Furthermore, as discussed in 2.4.4, there are a number of windfarm design factors that affect the perception of cumulative impacts. This includes not only size and number of turbines in any

windfarm but also the juxtaposition of different windfarm layouts including turbine size and positioning.

The descriptions assume conditions of good visibility covering the 30-35km range that windfarm visibility studies and visual impact assessments adopt as best practice.

The descriptions are intended to be neutral in that they are purely descriptions of levels of development and the frequency or proximity at which windfarms and wind turbines may be seen. They do not attempt to define the levels of development as being good, bad, acceptable or unacceptable. This is a judgement that would be made when considering specific cases against the landscape type, its inherent capacity, existing policy and other material considerations. However, it would be appropriate to give detailed consideration to the merits of developing an area which would move up more than one level as a result of proposed development, or an area that reaches one of the higher categories of development, particularly if it is in a landscape with limited capacity for windfarm development.

Section 2.5 follows table 2.1, addressing the issues and method of assessing landscape capacity.

**Table 2.1: Description of Levels of Cumulative Windfarm Development**

<b>Landscape Type</b>	<b>Landscape Character</b>	<b>Visual Experience</b>
<b>Landscape with no Windfarms</b>	A landscape type or area in which no windfarms or wind turbines are present and none are clearly visible from neighbouring areas	There would be no discernable effects on visual receptors.
<b>Landscape with Views of Windfarms</b>	A landscape type or area within which, or immediately adjacent, there are no windfarms or wind turbines physically located, but from which windfarms are clearly visible in a separate landscape character area.  Character may vary considerably according to proximity and scale of neighbouring windfarm(s).	The experience of a visual receptor would be noticeably affected, but windfarms are a background feature clearly not associated with the landscape in which the receptor is located.  Visual effects may vary considerably according to proximity and scale of neighbouring windfarm(s)
<b>Landscape with Occasional Windfarms</b>	A landscape type or area in which windfarms or wind turbines are located or are very close to and visible. However they are not of such a size, number, extent or contrast in character that they become one of the defining characteristics of the landscape's character.	Visual receptors would experience occasional close-quarters views of a windfarm or turbines and more frequent background views of windfarms or turbines. Some turbines may or may not be perceived as being located in the landscape character area. No overall perception of windfarms being a defining feature of the landscape.
<b>Landscape with Windfarms</b>	A landscape type or area in which a windfarm, windfarms or wind turbines are located and visible to such an extent that they become a defining characteristic of the landscape character. However, they are clearly separated and not the single most dominant characteristic of the landscape.	Visual receptors would experience frequent views of windfarms or wind turbines as foreground, mid-ground or background features, affecting their perception of the landscape character. However there would be sufficient separation between windfarms and turbines and sufficient areas from which wind turbines are not visible such that they would not be seen as dominating the landscape over all other landscape features.
<b>Windfarm Landscape</b>	A landscape type or area in which windfarms or wind turbines are extensive, frequent and nearly always visible. They become the dominant, defining characteristic of the landscape. Nevertheless there is a clearly defined separation between developed areas.	Visual receptors would experience views of windfarms as foreground, mid-ground and background features, to the extent that they are seen to dominate landscape character. Few areas would be free of views of wind turbines.
<b>Windfarm</b>	Landscape fully developed as a windfarm with no clear separation between groups of turbines. Few if any areas where turbines not visible.	Visual receptors would always be close to and nearly always in full view of wind turbines.



## 2.5 Capacity Assessment Method

### 2.5.1 Assessment Process

The methodological considerations discussed in 2.2 - 2.4 have been taken into account in the staged methodology. This is illustrated by the flow diagram in Figure 2.1. There are 5 stages in the process as shown in Table 2.2:

**Table 2.2. Stages in Landscape Capacity Assessment**

<b>Scoping:</b>	Define the purpose of the study, the study area and the windfarm development scenario that is to be assessed.
<b>Data Gathering:</b>	Gather information on receptors (visual and/or landscape) and windfarms/ turbines (existing, proposed etc).
<b>Analysis:</b>	Determine landscape character sensitivity, visual sensitivity and landscape value.  Determine visibility, direct and indirect landscape effects of the windfarms.
<b>Assessment:</b>	Determine landscape capacity from landscape sensitivity and value.  Determine level of cumulative change caused by windfarms, leading to a windfarm landscape/ visual typology.
<b>Conclusions:</b>	Determine significance and/ or acceptability of cumulative change to the landscape and visual environment.

This is a flexible framework which can be adapted to include the whole study area or focus on subdivisions of landscape, windfarm groupings or development scenarios as required. In this case local landscape character areas have been considered, then building up to a picture of the whole of Angus. The stages of our assessment are:

- 1) Landscape capacity assessment of landscape character types and areas
- 2) Assessment of cumulative impacts on broad landscape areas of Angus: Highland, Lowland & Hills and Coast
- 3) Assessment of impacts on the visual experience of Angus
- 4) Assessment of landscape capacity and potential cumulative impacts on Angus as a whole

The cumulative impacts will be expressed via the landscape/ visual typologies described in Table 2.1. They are considered at two levels of development:

- 1) Including operating and consented windfarms, where there is a high degree of certainty in the cumulative assessment scenario.

- 2) Including the above plus all windfarms currently under planning application – where there is a level of uncertainty regarding the potential cumulative scenario.

This allows an assessment to be made of change from the existing ‘consented’ landscape to the potential landscape that would result from development of all the planned windfarms. This information can be used to determine the significance and acceptability of change in relation to the capacity of the landscape.

Further comment is made on the extent to which the type and pattern of development (eg. turbine size and windfarm size) affects the cumulative impacts and how a change in the proposed development pattern might change this (eg. by reducing turbine sizes or by not proceeding with all developments).

The assessment is carried out on the basis of the structured methodology in combination with professional judgement, on the basis of a desk analysis of available information on the landscape and on windfarm developments and through site visits. The primary data used to determine the potential levels of change is in the landscape and visual assessment material provided by the windfarm developers in their environmental statements and reports.

*Mountboy Wind Farm Environmental Statement. West Coast Energy, Nov 2006*

*Mountboy Wind Farm Supplementary Environmental Information. LUC, Aug 2008*

*Montreathmont Moor Wind Farm Environmental Statement. Wind Prospect, Nov 2007*

*Dusty Drum Wind Cluster, Landscape and Visual Assessment. Stephenson Halliday, April 2008*

*East Skichen Wind Farm Environmental Report. Entec UK Ltd, Oct 2006*

*East Skichen Windfarm Additional Landscape and Visual Impact Assessment, Entec UK Ltd, June 2008*

*Mile Hill Wind Farm Environmental Statement. Atkins, March 2008*

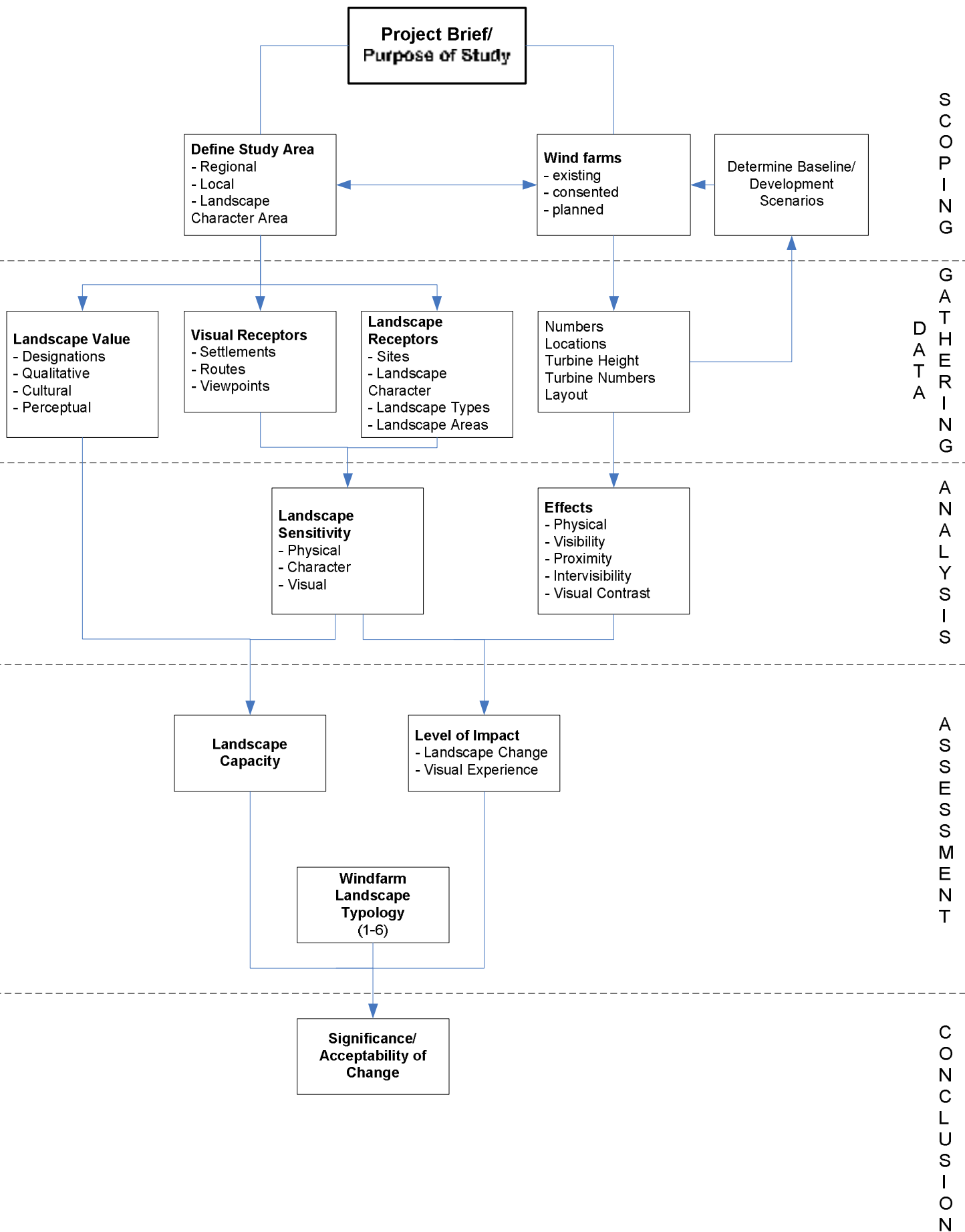
Where suitable data is not available, or is considered to be less than required to make an assessment, further analysis and assessment has been undertaken both through interpretation of other available data and through site visits. This material has been used to inform the assessments given in this report.

The following sections detail the stages in determining landscape capacity.

## **2.5.2 Determining Landscape Character Sensitivity**

The determination of landscape character sensitivity for an area requires a breakdown of the physical and perceptual aspects that contribute to landscape character. This is followed by an evaluation of each of these in turn and how they would relate to patterns of windfarm development to arrive at an overall assessment. The following aspects are considered:

**FIG 2.1 METHODOLOGY FLOWCHART**



**Table 2.3. Determination of Landscape Character Sensitivity**

<b>Landscape Character Factors</b>	<b>Criteria /Thresholds</b>
Scale (primarily in character but also in geographical size of area)	Consideration of horizontal and vertical scale. Larger scale landscapes are generally considered more able to absorb the impacts of commercial wind turbines, although a smaller size of turbine may reduce impacts. A larger physical area would be able to accommodate more development depending on other aspects determining capacity.
Landform	The relationship between wind turbines and landform is complex and also dependent on scale. Generally simple landforms: flat, undulating or gently rolling, are considered less sensitive and complex landforms more sensitive, especially if smaller scale. Landforms of sufficient scale may provide opportunities for screening or backgrounding turbines, reducing their visual sensitivity.
Pattern	The pattern of landcover (woodland, field boundaries, crops, roads, settlements etc). Degree of strength, regularity, fragmentation. Minimal or simple landscape patterns are considered less sensitive to windfarm development. Again the relationship to scale is important.
Development	<p>The degree of built or infrastructure development will affect suitability. In general a greater level of development is more suitable, particularly large scale industrial and extractive industries, or potentially large scale agriculture.</p> <p>Areas with small scale residential development would potentially be more sensitive. Undeveloped areas with remote or wilderness characteristics would also be more sensitive.</p>
Quality	This is a measure of the condition and integrity of the landscape fabric and character. A landscape in good condition with a high degree of integrity is more likely to be sensitive to development. A landscape of poor quality may represent an opportunity to compensate for impacts.
Elements and Features	The elements that make up a landscape, such as woodlands, fields, hedges, buildings and landforms create its pattern but add to its distinctive composition and character. Prominent or distinctive focal features such as steep hills, towers, lochs add further distinctiveness. The relationship of windfarms to these affects overall sensitivity.
Context	The characteristics of surrounding landscape areas provide a context that affects perception of a landscape and may affect how wind turbine developments are perceived. Landscapes acting as a backdrop or foreground to other areas are particularly sensitive.
<b>OVERALL RATING</b>	<b>High/ Medium/ Low</b>

### 2.5.3 Determining Visual Sensitivity

The visual sensitivity of a landscape area is determined by who is likely to see it, (types and numbers of receptors) and how visible in general the area is. The assessment is made in relation to the visibility of tall structures.

**Table 2.4. Determination of Visual Sensitivity**

<b>Visual Sensitivity Factors</b>	<b>Criteria</b>
Receptors	A greater number of potential receptors including higher population densities, visitor attractions or the presence of busy transport routes will lead to a higher visual sensitivity. The sensitivity and expectations of the receptors is also a contributory factor.
Internal Visibility	Views within a landscape area may be open or restricted by landform, vegetation or buildings. The greater the degree of openness and intervisibility the greater the sensitivity.
External Visibility	A landscape area that is visible from surrounding areas by virtue of its prominence or being overlooked is more visually sensitive than an area that is seldom seen.
<b>OVERALL RATING</b>	<b>High/ Medium/ Low</b>

The combination of landscape character and visual sensitivities leads to an overall assessment of landscape sensitivity for an area. No consistent weighting is given to either factor as it is likely that different landscapes will present these to varying extents depending on their unique characteristics. Each case is assessed on its particular characteristics.

### 2.5.4 Determining Landscape Value

Landscape value reflects the value that society and individuals put on a landscape. This can be officially recognised by some form of local or national designation, or simply by its value to a 'community of interest' (this could be for example a local population, recreational users or conservation interest). Other characteristics affecting value of a landscape include its historic and cultural associations, particularly if expressed by surviving features and patterns in the landscape. Finally there are more intangible characteristics generally valued by society, such as tranquillity remoteness and wilderness.

**Table 2.5. Determination of Landscape Value**

<b>Landscape Value Factors</b>	<b>Criteria</b>
Designations	International, national, regional or local designations relating to landscape in particular, although ecological designations also contribute to the landscape value of an area.
Community value	An undesignated area may be particularly valued by a community of interest: local, or activity-based.
Cultural value	Valued landscapes will have historic associations, be rich in historic features and buildings and/or have literary or artistic associations.
Perceptual	Tranquillity, remoteness or wilderness are valued characteristics, whereas landscapes that are highly modified, developed and populated would have low value in this respect. Landscapes regarded as particularly scenic would also be more sensitive.
<b>OVERALL RATING</b>	<b>High/ Medium/ Low</b>

### 2.5.5 Determining Landscape Capacity

The final assessment of capacity combines sensitivity and value and is expressed as **High, Medium** or **Low**:

- Landscapes of high sensitivity and value would be considered to have a low capacity for windfarm development.
- Landscapes of low sensitivity and value would be considered to have a high capacity for windfarm development.

We have not employed the use of a matrix in this study: a balance of judgement is made in each case as landscape value may be a more important factor than sensitivity in some cases; and vice versa in others.

## 2.6 Determining Acceptability of Impacts

The final stage involves bringing together the cumulative impact assessment and the landscape capacity assessment in a reasoned judgement of the effects of windfarm development on the Angus landscape. As explained in 2.4.6 the likely acceptability of a proposed level of development may be determined by considering the inherent capacity of the landscape together with the change in level of development and the absolute level of development. This should also be considered against policy criteria and objectives.

## **2.7 Scope of Assessment**

As explained in 2.5.1 the scope of the assessment can be varied according to the extent of the study area and the purpose of the study. It can also vary according to the depth and detail required to assess impacts within the defined study area. In the case of a detailed study the method should build up to the wider study area from smaller units.

The current study focuses primarily on the local authority area of Angus, although areas beyond the boundary are being considered in terms of the visual influence of nearby windfarms and neighbouring contiguous landscape types. Nevertheless the results of the study will be discussed in terms of Angus and its landscapes.

### **3.0 LANDSCAPE AND VISUAL BASELINE**

The following section defines and describes the study area, including the geographical extent and landscape character of Angus and its surroundings. It also reviews other relevant information including landscape-related designations, SNH natural heritage constraints and visual receptors.

#### **3.1 Study Area**

The study area for this assessment is shown in Figure 3.1. It focuses on the local authority area of Angus for the purposes of assessing the main windfarm applications listed in the brief and in terms of determining landscape capacity. Nevertheless, given the fact that there are a number of existing, consented and proposed windfarms in neighbouring local authority areas, some consideration has been given to these due to the extensive visual influence exerted by most windfarms. In particular windfarms in Perth & Kinross to the west and Aberdeenshire to the north and northeast are considered as the boundaries are entirely land based, with upland and lowland landscape types grading seamlessly across the administrative boundaries. Although predominantly an urban landscape, the City of Dundee is also considered due to its shared land boundary and the presence of wind turbines.

Fife to the south has not been considered as it is clearly separated from Angus by the Firth of Tay and any windfarm visible from Angus would be clearly perceived as being in a separate area. Western Aberdeenshire lying to the north is not considered in detail, as the boundary with Angus lies within the Cairngorms National Park which acts as a wide buffer in which windfarm development is highly unlikely for environmental and accessibility reasons.

#### **3.2 Baseline Landscape Character Assessment**

##### **3.2.1 Landscape Context**

The local authority area of Angus is located in eastern Scotland, between the Firth of Tay and Dundee in the south and the Grampian Mountains in the north. It lies between Perth & Kinross to the west, Aberdeenshire to the north and east. Fife faces it to the south of the Firth of Tay. It has a total area of 2,181km<sup>2</sup> and a population of approximately 100,000.

The landscape of Angus represents a transition from coastal landscapes in the southeast progressing northwest to agricultural lowland and lowland hills, thence to highland landscapes. The bulk of the population lives in small towns and villages in the lowland area, through which the main transport routes pass. The landscape of Angus and of the more extensive Tayside area is described in detail in the TLCA (*Tayside Landscape Character Assessment SNH, 1999*).



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The *Finalised Angus Local Plan* has adopted the TLCA as the base data informing its landscape character related policies. It identifies the landscape types in *Figure 3.2: Landscape Character Zones* as part of the justification for *Policy ER5: Conservation of Landscape Character*. In *Policy ER34: Wind Energy Development*, the zones are amalgamated into three main regional areas shown in the *Local Plan Figure 3.4: Wind Energy Development: Geographical Areas*:

- Highland
- Lowland and Hills
- Coast

These are slightly modified following the inquiry process, with Montrose Basin included in the Coastal area.

### 3.2.2 Landscape Character


Table 3.1 and Figure 3.2 consider the landscape in more detail. There are a total of ten landscape character types from the Tayside assessment: 4 Highland; 4 Lowland and Hills and 3 Coast.

These are further subdivided into a number of individual character areas depending on whether there is more than one example of the landscape type geographically separated or distinct from the other(s).

The coastal area, although important to the character of Angus, covers little of its surface area, being a predominantly narrow strip, with the exception of Montrose Basin. In contrast the Lowland and Highland areas cover most of Angus. The dividing line between the two is the Highland Boundary Fault between Lintrathen in the west and Edzell to the east. To the north of the Highland Boundary Fault lie the extensive rolling uplands and mountains of the Mounth Highlands and the Angus Glens. To the south of the Boundary Fault lie the Tayside Lowlands. In Angus the division between these landscape types is approximately 50:50 in area. Most of the characteristics of the landscape including topography, vegetation cover, land use and settlement patterns are subservient to this major division.

The following section briefly describes the context and character of the landscape in each of these areas. More detailed descriptions and analysis is given in the TLCA.




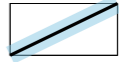
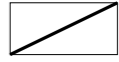
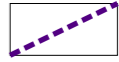
 Angus Local Authority Boundary

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Figure 3.1  
Study Area

IronsideFarrar

Angus Windfarms Study

-  Angus Local Authority Boundary
-  Principal Geographic Areas
-  Type / Area Landscape Boundary
-  Landscape Sub-Type / Area Boundary

**Angus Landscape Types**

From Tayside Landscape Assessment

**Highland**

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

**Lowland and Hills**

- 8 Igneous Hills
- 10 Broad Valley Lowland
- 12 Low Moorland Hills
- (12a Lowland Forest and Farmland Sub Type)
- (12b Low Moorland Hills Sub Type)
- 13 Dipslope Farmland
- (13a Rossie Moor Sub Area)
- 15 Lowland Basin

**Coast**

- 14a Coast with Sand
- 14b Coast with Cliffs

**Aberdeenshire Landscape Types**

From South and Central Aberdeenshire Landscape Assessment

**Agricultural Heartlands**

- 8 Howe of the Mearns
- 9 Gavock & Glenberrie

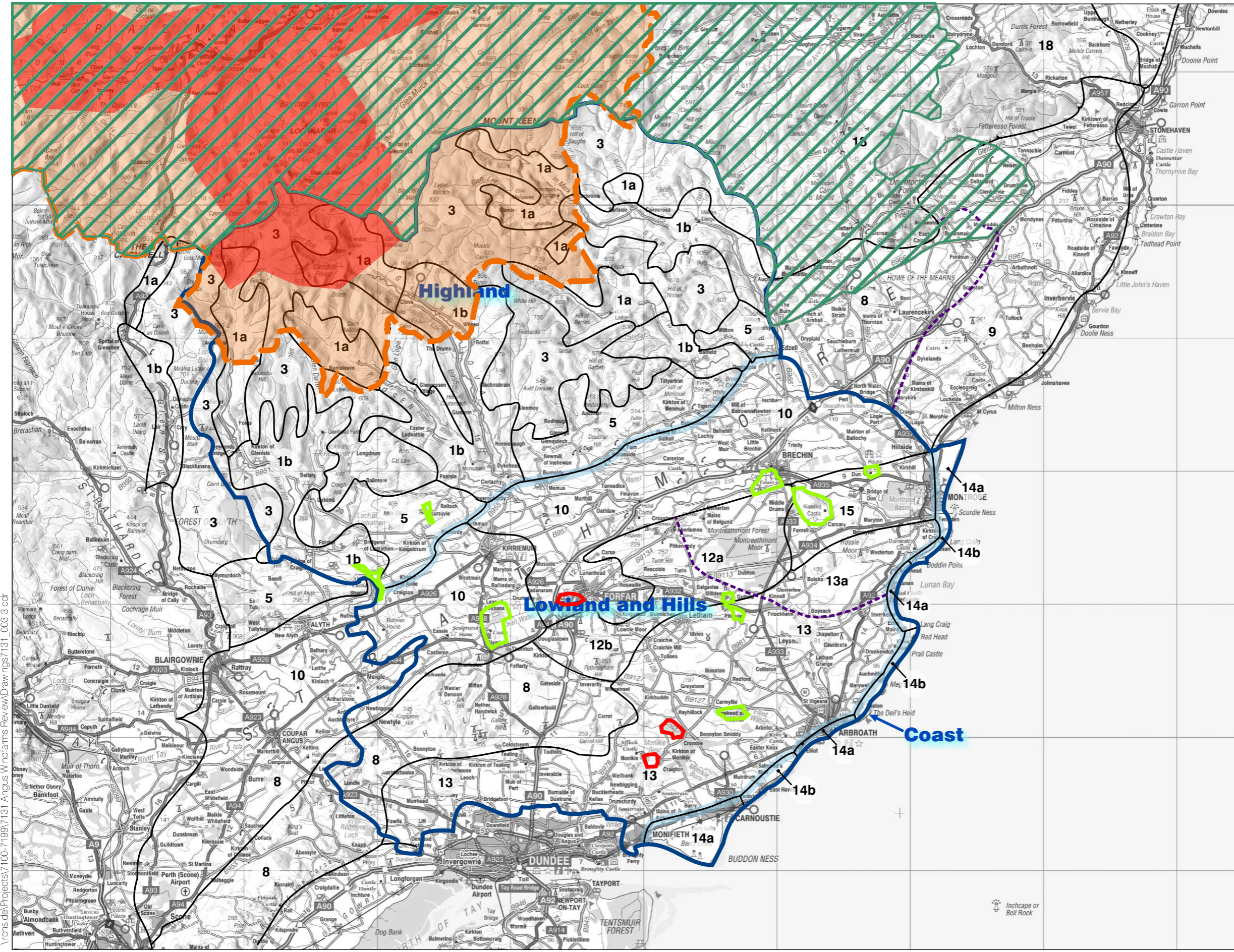
**Moorland Plateaux**

- 18 The Mounth

Figure 3.2  
Landscape Character

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Angus Windfarms Study



Angus Local Authority Boundary

Landscape Designations

- Cairngorms National Park
- Deeside and Lochnagar National Scenic Area
- Historic Gardens & Designed Landscapes
- Country Parks

Area of Landscape Significance (Aberdeenshire)

Landscape Character

- Principal Geographic Areas
- Type / Area Landscape Boundary
- Landscape Sub-Type / Area Boundary

Angus Landscape Types

From Tayside Landscape Assessment

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

- Lowland and Hills**
- 8 Igneous Hills
  - 10 Broad Valley Lowland
  - 12 Low Moorland Hills
  - (12a Low Moorland Forest and Farmland Sub Type)
  - (12b Low Moorland Hills Sub Type)
  - 13 Dipslope Farmland
  - (13a Rossie Moor Sub Area)
  - 15 Lowland Basin

- Coast**
- 14a Coast with Sand
  - 14b Coast with Cliffs

Aberdeenshire Landscape Types

From South and Central Aberdeenshire Landscape Assessment

- Agricultural Heartlands**
- 8 Howe of the Mearns
  - 9 Gavock & Glenbervie

- Moorland Plateaux**
- 18 The Mounth

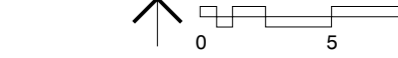


Figure 3.3  
Landscape Planning Designations

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**Table 3.1. Landscape Character Areas in Angus (SNH Tayside Assessment)**

<b>Regional Type</b>	<b>Landscape Type</b>	<b>Landscape Units</b>
<b>Highland</b>	1a. Upper Highland Glens	<i>Glen Isla</i> <i>Glen Prosen</i> <i>Glen Clova</i> <i>West Water Valley</i> <i>Glen Mark</i>
	1b. Mid Highland Glens	<i>Glen Isla</i> <i>Glen Prosen</i> <i>Glen Clova</i> <i>West Water Valley</i> <i>Glen Esk</i>
	3. Highland Summits & Plateaux	<i>Forest of Alyth</i> <i>Caenlochan Forest/ Glendoll Forest</i> <i>Muckle Cairn/ Hill of Glansie/ Hill of Wirren</i> <i>Hills of Saughs/ Mount Battock</i>
	5. Highland Foothills	<i>Kirriemuir Foothills</i> <i>Menmuir Foothills</i> <i>Edzell Foothills</i>
<b>Lowland and Hills</b>	8. Igneous Hills	<i>Sidlaws</i>
	10. Broad Valley Lowland	<i>Strathmore</i> <i>Lower South &amp; North Esk Valleys</i>
	12. Low Moorland Hills	<i>Forfar Hills</i>
	13. Dipslope Farmland	<i>SE Angus Lowland</i>
<b>Coast</b>	14a. Coast with Sand	<i>Montrose</i> <i>Lunan bay</i> <i>Elliott</i> <i>Barry Links</i>
	14b. Coast with Cliffs	<i>Usan</i> <i>Auchmithie</i> <i>Carnoustie</i>
	15. Lowland Basins	<i>Montrose Basin</i>

### **Highland Area**

Within the Highland area there are four landscape character types divided into a total of 17 landscape character areas. This reflects the dissected plateau nature of the Mounth with deep glens penetrating the mountains. The Highland Boundary fault along the southern edge is reflected in the transitional *Highland Foothills* Character type, comprising three areas of smaller scale complex topography and mixed arable and hill farming separated by the mouths of the Angus Glens. This character type extends west into Perth & Kinross.

The Angus Glen character areas comprise *Glen Isla, Glens Prosen & Clova, West Water Valley* and *Glen Esk*. They run from southeast to northwest, dividing the *Highland Summits and Plateaux* into a series of broad, rolling ridges. The *Mid Highland Glens* are shallower and more settled with some agriculture on the flat valley floor, whereas the *Upper Highland Glens* are narrower, deeper and less settled or cultivated.

The *Highland Summits and Plateaux* forms the most extensive Highland character type, separating the glens and merging into broader and higher mountain areas to the north of Angus. This character type continues west into Perth & Kinross and merges with other upland character types, including *Moorland Plateaux*, to the north and to the east in Aberdeenshire.

The northern parts of both the *Upper Highland Glens* and *Highland Summits and Plateaux* fall into the Cairngorms National Park although this designation does not extend into the lower hills northeast of Glen Esk.

### **Lowland Area**

Within the lowland landscape area 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.

Northeast into Aberdeenshire the lowland landscape area is represented by the *Agricultural Heartlands* type (from the *South & Central Aberdeenshire Landscape Assessment, SNH*) which merges with the *Broad Valley Lowlands*.

### **Coastal Area**

There are three Coastal Types: *Coast with Sand* divided into four landscape character areas and *Coast with Cliffs* divided into three. These form a narrow strip along the Firth of Tay and North Sea, with rocky headlands alternating with dunes and sandy beaches. Only the Barry Links area of dunes between Monifieth and Carnoustie has a width of more than a kilometre or two.

Four of the main towns of Angus: Monifieth, Carnoustie, Arbroath and Montrose punctuate these areas and there are main roads and a railway passing along the coast from Dundee to Arbroath and again around Montrose. There are small fishing villages and remains of castles on the rocky sections of coast. Otherwise there is little development with arable land often extending close to cliff edges. There is little in the way of trees, the areas being open and windswept. There are links golf courses located in dunes along the sandy sections of coast and Barry Links is a military firing range.

Between the Forfar Hills and Montrose the landscape lowers in elevation forming the *Lowland Basin* of Montrose Basin, which is part flat agricultural land and parkland and part inland tidal lagoon separated from the North Sea by the spit of land on which lies Montrose.

### ***Further Analysis of Landscape Character***

Further analysis of the lowland *Low Moorland Hills* landscape type south and east of Forfar indicates that, although clearly higher than the Lower Esk Valleys and Montrose Basin, much of it is of lower elevation than the adjacent *Dipslope Farmland*. On analysis we consider it 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, surrounding the east and south sides of Forfar. This subdivision is shown in Figure 3.2 as *Lowland Forest and Farmland* and *Low Moorland Hills*.

The *Dipslope Farmland* covers a wide area and accommodates significant variation within this character type, varying from relatively small scale enclosed farmland to large open fields or small areas of heather moorland. Nevertheless we note that the area around Rossie Moor is separated from the bulk of the *Dipslope Farmland* area to the southwest by the valley of the Lunan Water. To the north it falls steeply to the flat Montrose Basin area and to the east it abuts the low-lying coastal zone. Despite its modest maximum elevation (130-150m AOD as opposed to other areas at nearly 200m AOD) this area appears more prominent than much of the *Dipslope Farmland* due to surrounding lower ground around the Lunan Water, Montrose Basin and the coast. The area is shown in Figure 3.2 but is not considered to be a further sub-type as, other than the topographic separation, it is not considered to be of sufficiently different character from the rest of the *Dipslope Farmland*.

## **3.3 Landscape Designations**

Landscape designations are an indication of landscape value as determined by society and have been taken into account in the assessment of landscape capacity. This section gives a brief indication of what has been taken into account. The principal areas are shown in Figure 3.3

### 3.3.1 National Designations

The only area of national landscape designation within Angus is the Deeside and Lochnagar National Scenic Area (NSA), the southern end of which lies in the northwestern part of Angus, including the highest mountains and Glen Doll at the head of Glen Clova.

The Cairngorms National Park is a landscape-related national designation. It is located in the north of the area and extends beyond into Aberdeenshire. It includes the NSA within its boundaries. The area does not include Perth & Kinross but a boundary extension in that local authority area is currently under consideration. This will not affect the area within Angus. The National Park area includes the northern parts of the *Highland Summits and Plateaux* and *Upper Highland Glens* areas.

It is unlikely that commercial windfarm proposals would be considered acceptable within the NSA or the National Park and whilst buffer areas are not specifically encouraged, the effects of windfarms nearby to the NSA or National Park could be a material consideration (see *SPP6 Annex A*).

Other national designations are primarily related to sites of natural or cultural heritage value (eg. SPAs, SSSIs and Scheduled Ancient Monuments), which are not the subject of this study. Nevertheless some of these areas such as Montrose Basin and the numerous castles, churches, prehistoric monuments and hillforts in Angus are notable for their contribution to landscape character and are considered, where appropriate, in the assessment of landscape value and capacity.

### 3.3.2 Local and Regional Designations

There are no local landscape designations such as AGLVs within Angus. The protection of landscape character outside the National Park is based on local plan policy which is informed by the TLCA. This is taken into account in the assessment of landscape capacity. In Aberdeenshire local landscape designations are Areas of Landscape Significance. One large area extends to include all of the upland area bordering Angus, overlapping with the Cairngorms National Park.

### 3.3.3 Other Designations

There are a number of Historic Gardens and Designed Landscapes (HGDLs) within the study area. Whilst this is not a statutory designation it is a landscape factor that contributes to the assessment of landscape character and value. These are taken into account in the assessment. There are also three country parks in the area between Dundee, Carnoustie and Forfar at Monkie, Crombie and Forfar Loch.

## 3.4 SNH Natural Heritage Sensitivity

SNH have a policy document which includes a map of Scotland showing 'natural heritage sensitivity', based on landscape and natural heritage designations (*Policy Statement no 02/02 updated 2005*). The designations include National Scenic Areas,



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AGLVs, SPAs, SSSIs and Nature Reserves. The map shows three categories of area based on increasing sensitivity:

**Zone 1:** *Lowest natural heritage sensitivity identifies areas at the broad scale with least sensitivity to wind farms, with the greatest opportunity for development, within which overall a large number of developments could be acceptable in natural heritage terms, so long as they are undertaken sensitively and with due regard to cumulative impact.*

**Zone 2:** *Medium natural heritage sensitivity identifies areas with some sensitivities to wind farms. However, by careful choice of location within these areas there is often scope to accommodate development of an appropriate scale, siting and design (again having regard to cumulative effects) in a way which is acceptable in natural heritage terms.*

**Zone 3:** *High natural heritage sensitivity identifies areas of greatest sensitivity to wind farms, which place the greatest constraint on their development, and where, in general, proposals are unlikely to be acceptable in natural heritage terms. There may however be some sites in this zone where wind farm development of appropriate scale and careful design could be accommodated if potential impacts on the natural heritage are fully explored and guarded against by employing the highest standard in siting and design.*

Much of Angus is categorised as Zone 1. This includes most of the lowland and coastal area as well as the southern part of the highland area. Within this area are small areas of higher natural heritage sensitivity. These include Montrose Basin, Barry Links and smaller sites or rivers designated for conservation purposes and categorised as Zone 3 and designed landscapes such as Kinnaird Park, which are designated as Zone 2.

Only in the northern part of Angus are there extensive areas of higher conservation sensitivity. These areas are overlapping and include:

- the NSA and an overlapping area of Wild Land Search which are Zone 3;
- the Cairngorms National Park and a 10km buffer to the NSA (which lies largely within the national park) which are Zone 2;
- the hills further south which are partially Zone 2, relating to sensitive bird interests.

### 3.5 Visual Receptors

Although this is primarily a study of landscape capacity and cumulative landscape impacts it is important to consider the effects of cumulative impact on visual receptors. This not only feeds into the assessment of landscape sensitivity and capacity (see 2.5) but also builds up a picture of how visual receptors in and around Angus would perceive windfarms within the Angus landscape.

The types of potentially sensitive visual receptors within Angus are broadly categorised into three groups, represented by the locations in brackets:

- Residents (dwellings and settlements)
- Travellers (roads, railway, paths and cycle routes)
- Visitors (visitor destinations and viewpoints)

Although it is recognised that people also work in Angus, these have not been included as sensitive visual receptors. This is in accordance with common practice in LVIA, where people at work are considered to be low sensitivity visual receptors

An assessment of effects on principal areas is made in section 5.3 and taken account of in the overall assessment.

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## 4.0 WINDFARMS

The following section lists and describes the operating, consented and proposed windfarm developments in the study area

### 4.1 Windfarm Distribution

The study area includes Angus, eastern Perth & Kinross, southern and western Aberdeenshire and Dundee. There are a total of 17 windfarm sites within this area, including 2 operational, 5 with planning consents and 10 as registered planning applications. There are 7 within Angus, 8 within Aberdeenshire and one each in Perth & Kinross and Dundee.

These are listed, together with details of location, number and height of turbines etc in Table 4.1 overleaf. Their locations are shown in Figure 4.1.

### 4.2 Operating and Consented Windfarms

Considering first the operating and consented windfarms, there are seven within the study area. There are currently no operating windfarms in Angus but one relatively small development of 8x78m turbines is consented at Ark Hill, located in the southwest of Angus on the higher ground of the *Igneous Hills* separating the *Dipslope Farmland* north of Dundee from the *Broad Valley Lowland* of Strathmore. Outwith Angus the nearest operating windfarms are the 16x108m turbines at Drumderg, located in the *Highland Summits and Plateaux* type just to the west of the boundary with Perth & Kinross and the two 120m turbines of the Michelin factory in Dundee, in an urban area, but close to the southern edge of the *Dipslope Farmland*.

To the northeast lie four consented windfarms in Aberdeenshire. Tullo (8x101m) and St John's Hill (9x79m) are located on hills within the lowland *Agricultural Heartlands* Type, 9km and 20km north of the boundary. Two more are located to the north of this: Mid Hill (25x110/125m) in the upland landscape type *Highland Moorland Plateau* and Clochnahill (4x76m) just within the lowland *Agricultural Heartlands* type. These are both over 15km away from the boundary with Angus.

### 4.3 Proposed Windfarms

A further ten windfarms are at the planning applications stage.

Five out of the six proposed windfarms within Angus are located in the lowland area, all south of Strathmore and the North/ South Esk Valley. Inevitably the lowland windfarms are located on areas of higher ground within this regional landscape type. Three of the proposed windfarms (Mountboy, Dusty Drum and East Skichen) have three turbines each and are located on the *Dipslope Farmland*, with the largest proposal for 11x126m turbines at Montreathmont being close by on the edge of the

*Low Moorland Hills.* A single 80m turbine is proposed at Scotston Hill in the Sidlaw Hills near Ark Hill.

Only the proposed 6x100m turbines at Mile Hill in the west are located north of the Highland Boundary, within the *Highland Foothills* landscape type of Kirriemuir Foothills, 6km northwest of Kirriemuir.

Three of the four proposed Aberdeenshire windfarm sites are located in the lowland *Agricultural Heartlands* type. The proposed 3 turbines at Hillhead of Aquhirie are very close to Clochnahill, some 4km SW of Stonehaven and over 20km north and east of the Angus boundary. Droop Hill (3 turbines) and Herscha Hill (one turbine) are either side of Glenbervie, on opposite hills 6-7km west of Clochnahill. They are approximately 15km from the Angus boundary.

The other proposed site at Meikle Carewe comprises 12 turbines located in the upland *Moorland Plateaux* landscape type over 25km north and east of the Angus boundary.

**Table 4.1: Windfarm Database (Operational = Green; Consented = Yellow)** (see Fig 4.1 for locations)

LPA Area	Windfarm Name	Location	Turbine Nos.	Turbine Hub/ Blade Tip	Landscape Type/ Other Comments	
Angus	Ark Hill	10km S of Kirriemuir	8	49	Sidlaw Hills, Igneous Hills	
	Dusty Drum	7km E of Arbroath	3	70	Dipslope Farmland	
	East Skichen	6km N of Monifeith, Dundee	3	60	Dipslope Farmland	
	Mile Hill	6km W of Kirriemuir	6	65	Highland Foothills	
	Montreathmont	6k S of Brechin	11	80	In Montreathmont Forest, Low Moorland Hills	
	Mountboy	6km SW of Montrose	3	65	Rossie Moor, Dipslope Farmland	
	Scotston Hill	3km NE of Auchterhouse	1	??	Sidlaw Hills, Igneous Hills	
	Aberdeenshire	Clochnahill	6km SW of Stonehaven, 22km NE of Angus	4	45	Agricultural Heartlands
		Droop Hill	2km NW of Glenbervie, 18km NE of Angus	3	??	Agricultural Heartlands
		Herscha Hill	3km W of Glenbervie, 15km NE of Angus	1	??	Agricultural Heartlands
Hillhead of Aquhirie		4km SW of Stonehaven, 25km NE of Angus	3	55	Agricultural Heartlands	
Meikle Carewe		5km NW of Stonehaven, 26km NE of Angus	12	44	Moorland Plateaux	
Mild Hill		14km W of Stonehaven, 14km NW of Angus	25	70/85	Moorland Plateaux	
St John's Hill		4km N of Inverbervie, 18km NE of Angus	9	49	Agricultural Heartlands	
Tullo		3km E of Laurencekirk, 10km NE of Angus	8	60	Agricultural Heartlands	
Dundee		Michelin Factory	NE Dundee, 1km S of Angus	2	85	Urban area, close to Dipslope Farmland
		Drumderg	10km N of Blairgowrie, 3km W of Angus.	16	67	Highland Summits and Plateaux

#### 4.4 Landscape of Windfarm Locations

Figure 4.1 and Table 4.2 show the location of existing, consented and proposed windfarms in relation to lowland and upland landscape types.

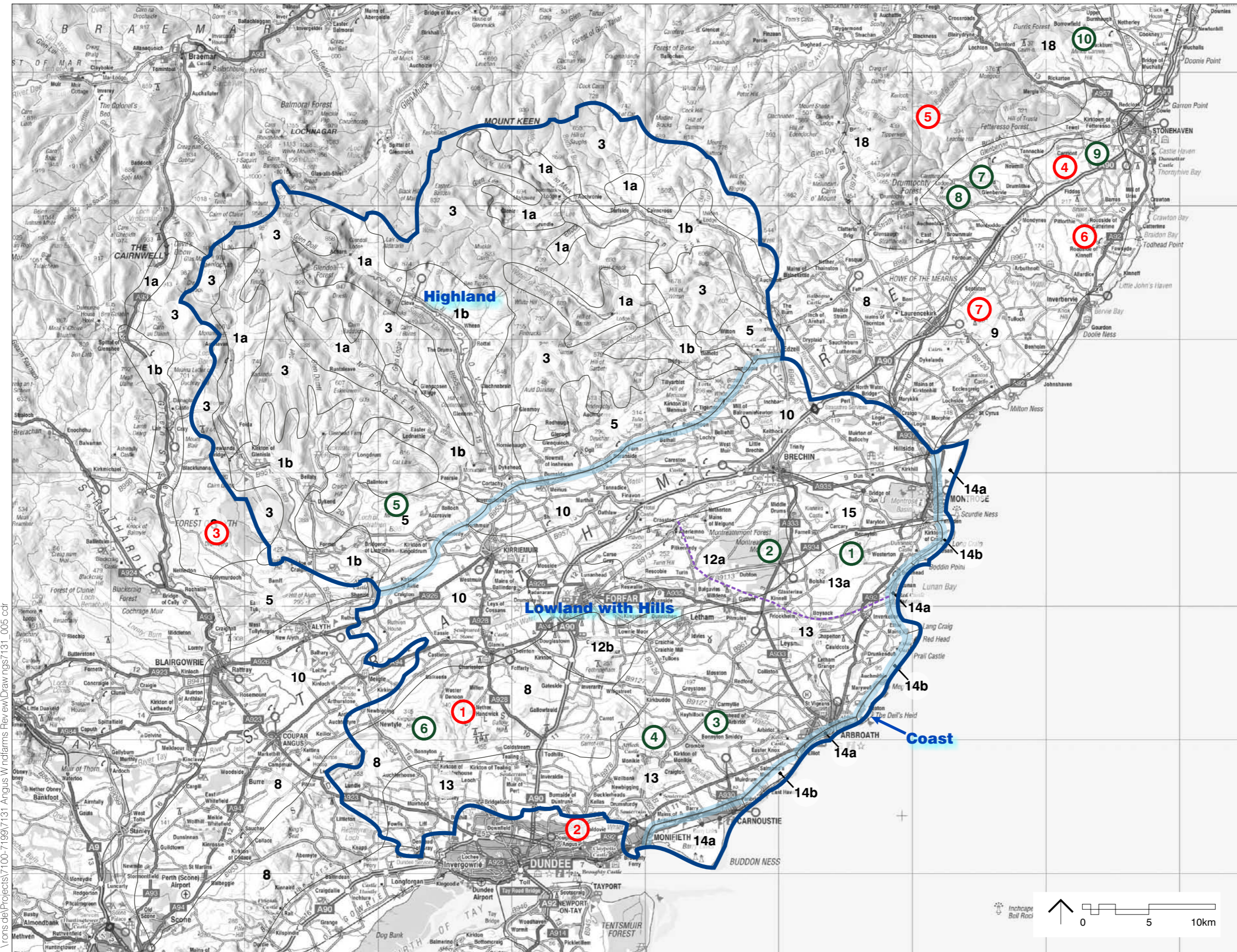
**Table 4.2: Windfarm Location in Relation to Landscape Character**

LOWLAND LANDSCAPES	UPLAND LANDSCAPES
<p><b>Operating/ Consented</b></p> <p>Ark Hill</p> <p>Michelin (Dundee)</p> <p>Tullo (Aberdeenshire)</p> <p>St John’s Hill (Aberdeenshire)</p> <p>Clochnahill (Aberdeenshire)</p>	<p>Mid Hill (Aberdeenshire)</p> <p>Drumderg (Perth &amp; Kinross)</p>
<p><b>Planning Application</b></p> <p>Mountboy</p> <p>Montreatmont</p> <p>Dusty Drum</p> <p>East Skichen</p> <p>Scotston Hill</p> <p>Droop Hill (Aberdeenshire)</p> <p>Herscha Hill (Aberdeenshire)</p> <p>Hillhead of Aquhirie (Aberdeenshire)</p>	<p>Mile Hill</p> <p>Meikle Carewe (Aberdeenshire)</p>

It shows that the majority of operating, consented and proposed applications within the study area are, or would be, located in lowland areas, south of the Highland Boundary fault. This is within a settled, working landscape of fields, plantations, settlements and roads as opposed to the rolling, moorland upland backdrop to the north and west.

In terms of potential effects on the landscape there are both advantages and disadvantages to a lowland location:

- 1) The position within a settled, working landscape with strong patterns of fields, shelterbelts, forests and roads means that the turbines and associated tracks, electricity lines and buildings lie in an area in which human modification and development is already a defining characteristic. In contrast the Highland landscape within Angus is largely devoid of development and has remote and wilderness characteristics meaning that the wind turbines and associated infrastructure, as industrial/ infrastructure built elements, would be in strong contrast.



Angus Local Authority Boundary

**Windfarm Locations**

① Operational & Consented Windfarms

1. Ark Hill
2. Michelin
3. Drumdreg
4. Clochnahill
5. Mid Hill
6. St John's Hill
7. Tullo

① Planning Applications

1. Mountboy
2. Montreatmont
3. Dusty Drum
4. East Skichen
5. Mile Hill
6. Scotston Hill
7. Droop Hill
8. Herscha Hill
9. Hillhead of Aquhirie
10. Meikle Carewe

**Landscape Character**

- Principal Geographic Areas
- Type / Area Landscape Boundary
- Landscape Sub Type / Area Boundary

**Angus Landscape Types**

From Tayside Landscape Assessment

**Highland**

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

**Lowland and Hills**

- 8 Igneous Hills
- 10 Broad Valley Lowland
- 12 Low Moorland Hills
- (12a Lowland Forest and Farmland Sub Type)
- (12b Low Moorland Hills Sub Type)
- 13 Dipslope Farmland
- (13a Rossie Moor Sub Area)
- 15 Lowland Basin

**Coast**

- 14a Coast with Sand
- 14b Coast with Cliffs

**Aberdeenshire Landscape Types**

From South and Central Aberdeenshire Landscape Assessment

**Agricultural Heartlands**

- 8 Howe of the Mearns
- 9 Gavock & Glenbervie

**Moorland Plateaux**

- 18 The Mounth

Figure 4.1  
Windfarm Locations

Irons de\Projects\7100-7199\7131 Angus Windfarms Rev\Draw\Draw ngs7131\_005.cdr

- 2) The location within the lowland area better reflects the relationship between energy production and the consumer as well as generally being easier to service in terms of both access and connection to the electricity grid.
- 3) In terms of disadvantage, the scale of the lowland landscape topography and pattern is generally smaller than that of the highlands, meaning that the large scale wind turbines may appear incongruous and dominating. Furthermore they would dwarf nearby landscape 'reference features' such as trees and buildings. The landscape is better able to accommodate a larger scale of development in the uplands, where the scale of the landscape and general lack of reference features would better accommodate large turbines.
- 4) Although not strictly a landscape issue, the settled lowland areas will have a greater problem of adverse effects on the visual amenity of sensitive receptors in residential properties and on well used roads; whereas in the highland area the affected receptors will be predominantly recreational.

#### 4.5 Turbine Numbers and Windfarm Size

There is no current 'accepted' classification of commercial windfarm sizes in Scotland. Existing and proposed developments vary in turbine numbers and sizes, with windfarms from single turbines to over 150 turbines. Turbines vary in size from below 60m to more than 125m, with maximum outputs from well under 1MW to up to 3MW. For the purposes of this study it is necessary to refer to small, medium and large size developments when describing windfarms and addressing capacity. It is also necessary to refer to turbine heights when considering scale and visibility. For clarity we have adopted windfarm size categories related to published guidance or planning application procedures (see table 4.3 overleaf).

A size of 50m is used by SNH in their criteria for determining whether or not an EIA is required (*SNH, 2008*). However, it is assumed in the current case that, being commercial windfarms, turbines would range in size from ca. 70m minimum to ca.125m maximum height to blade tip but where appropriate turbine size is discussed as a separate but related issue to overall windfarm size.

The windfarms considered in this study area are mostly small to medium size. The largest is Mid Hill, with 25 turbines at 110 and 125m in height. This would be considered large. Drumderg with 16x108m turbines is medium. The largest proposed within Angus is the medium size Montreathmont with 11x126m turbines. By comparison with the range of existing windfarms and applications in Scotland, all but Mid Hill are of a modest scale in terms of turbine numbers.

If all the windfarms in Angus were constructed this would amount to a total of 35 wind turbines. Another three operational and consented windfarms, comprising 26 turbines, lie within 10km of the Angus boundary.

This reflects a dispersed pattern of development, as opposed to a concentrated one such as can be seen in the Scottish Borders and Lanarkshire where windfarms



comprising tens of turbines each are operating, consented or proposed. The smallest windfarms in this study area, with three turbines, are in lowland locations that are constrained by their surroundings, in particular by the proximity of isolated properties and small settlements scattered across this landscape.

**Table 4.3. Windfarm Size Categories**

Size Category	Size Criteria	Comment/ Examples
<b>Small</b>	A development of 3 or fewer turbines of more than 50m height.	As defined by SNH guidance on assessment of small scale wind energy development ( <i>SNH 2008</i> )
<b>Small/Medium</b>	A windfarm of more than 3 turbines up to 20MW output	Windfarms above 20MW are required to be covered by SPG in SPP6 Annex A.  <i>Eg. Between 4 turbines over 50m and 10x2MW turbines or 6x3MW turbines</i>
<b>Medium</b>	A windfarm between 20MW and 50MW output	Windfarms up to 50MW are dealt with as local planning authority applications.  <i>Eg. Between 7x3MW and 16x3MW turbines</i>
<b>Large</b>	Windfarms greater than 50MW output	Windfarms over 50MW are section 36 Applications dealt with by Scottish Ministers.  <i>A minimum size of 20x2.5MW or 17x3MW turbines</i>

## 4.6 Review of Landscape and Visual Assessments

As required by Angus Council, a review has been carried out on each of the ESs or ERs accompanying five of the six windfarm applications within Angus, including Mountboy and Montreathmont. The findings are summarised below and fuller reviews have been issued as separate reports.

No detailed review of the windfarms outwith Angus has been carried out, although the details of their location, turbine number, size etc. have been noted and incorporated into the assessment.

### 4.6.1 Mountboy

*Mountboy Wind Farm Environmental Statement. West Coast Energy, Nov 2006*

*Mountboy Wind Farm Supplementary Environmental Information. LUC, Aug 2008*

This windfarm comprises 3x105m wind turbines located in mixed farmland on Rossie Moor, 6km SW of Montrose. The site lies in a lowland landscape type, *Dipslope Farmland*, which is extensive over Angus. The turbines would be prominently located near a hilltop and consequently have an extensive ZTV within 10km of the site and on higher ground to the north, although this is much reduced over Strathmore and to the southwest, where intervening higher ground screens views.

It is concluded that significant landscape impacts would be limited to the Rossie Moor area of the Dipslope Farmland. Significant visual impacts would be limited to within 3-5km of the site, with 5 out of 28 representative viewpoints experiencing significant impacts, at a maximum distance of 3km from the site. In terms of receptors there would be significant impacts on local residential properties in the Rossie Moor area and on local roads and paths, but no settlements or main roads are considered to be significantly affected. The most affected route is considered to be the A933 Arbroath to Brechin Road.

It is stated that if all the windfarms in the cumulative study area were constructed, this would lead to them being a characterising feature on a broad regional scale. However, it is concluded there would be no significant cumulative landscape or visual impacts resulting from Mountboy being added to the other windfarms in the assessment.

Whilst the assessment is generally competent and reasonable we conclude that some of the information provided on effects on settlements and properties is inadequately detailed and that some of the potential impacts have been underestimated. In particular we consider significant visual impacts to be more extensive than the 3km indicated by the viewpoint assessment and that the cumulative assessment does not properly consider the cumulative impacts between Mountboy and the nearby Montreathmont windfarm proposal.

A further cumulative assessment recently prepared assesses the significance of effects of Mountboy windfarm in addition to the other proposed windfarms in the study area. The study is comprehensive. It identifies that potentially significant cumulative impacts are limited to those with the nearby proposed Montreathmont Moor windfarm and that there is only one location, the A934, where Mountboy would make a significant contribution to the cumulative impacts.

#### **4.6.2 Montreathmont**

*Montreathmont Moor Wind Farm Environmental Statement. Wind Prospect, Nov 2007*

This windfarm proposal comprises 11x126m turbines located 6km south of Brechin. It is located on Montreathmont Moor, on an area of undulating topography within an extensive area of forestry. The landscape character type is *Low Moorland Hills*, although the windfarm site is located in an area of forestry at a lower level than much of the LCA. The ZTV is similar in extent and area covered to that of Mountboy, although slightly less extensive due to the lower elevation of the site.

The SNH landscape character area of *Low Moorland Hills* is further subdivided into forestry, hills and farmland and it is concluded that significant landscape impacts would be limited to the farmland area surrounding the forest, with the forest not sensitive enough to be significantly affected. Significant visual impacts would be limited to high sensitivity receptors within 7.7km of the nearest turbine. A detailed residential assessment includes all properties within 4km, and properties on high ground within 8km and concludes that 8 properties will experience significant visual impacts. Significant visual impacts on other receptors would be limited to users of tracks within the forest, short sections of the A933 north of Friockheim and the A934 west of Little Carcary and the B965 approaching Friockheim from the east. There would be no significant effects on settlements or other receptors.

Significant cumulative impacts would be limited to the area between Montreathmont Moor and Mountboy windfarms, including parts of the Montreathmont Moor, Montrose Basin and Dipslope Farmland LCAs. Visual impacts would be limited to local residents and road users. No other cumulative impacts involving other windfarms are anticipated due to the distance of separation between them.

#### **4.6.3 East Skichen**

*East Skichen Wind Farm Environmental Report. Entec UK Ltd, Oct 2006*

*East Skichen Windfarm Additional Landscape and Visual Impact Assessment, Entec UK Ltd, June 2008*

The proposal comprises 3x91m turbines located 7km north of Monifieth, near Dundee. It is located in pastoral farmland on a rounded hilltop, with nearby areas of forestry plantation. It is located in the *Dipslope Farmland* landscape type.

In the original Environmental Report (October 2006), the ZTV covers a radius of 20km. No hub height ZTV is supplied. Within 5km it covers an extensive area of the surrounding farmland, breaking up as lower ground beyond this distance is screened by intervening landforms. Between 10 and 20km only a few areas of higher ground are affected including parts of Dundee and Rossie and Montreathmont Moors.

The assessment in the ER considers that there would be no significant landscape impacts. It implies that there may be some significant visual impacts on local properties, Monikie Country Park, Monikie and Greystone villages, the NCR1, and possibly the A92 and A930. However the assessment tends to 'average out' these impacts over the whole length or area of the receptor, allowing it to claim that the impacts would not be significant. There are only 6 representative viewpoints, which is too few for a windfarm assessment and does not cover enough locations within the ZTV. Of these two are shown as wireframes only, with a viewing distance of less than 30cm.

No cumulative impact assessment has been carried out despite nearby Dusty Drum (5km east) and Ark Hill (15km west) being in the public domain at the time of the assessment.

Overall the assessment in the ER is inconsistent and unclear in its approach and conclusions. It tends to understate impacts by a process of 'diluting' them over a wider receptor area and is not clear as to what is considered to be a significant impact.

An Additional Landscape and Visual Assessment was submitted in June 2008. This report complements the Environmental Report, in that it addresses some of the key areas in which the latter was lacking, as identified through correspondence with SNH. Further detailed information on mitigation and site design is provided, extra viewpoints are added to the visual assessment, and a cumulative assessment is included.

The new viewpoints are well selected and complement the few viewpoints of the ER. Inconsistencies in the assessment methodology were noted for the new viewpoints. The new photomontages are either poor or poorly reproduced.

No detailed methodology is set out for the cumulative assessment. The presentation of the assessment is brief, with little in-depth discussion of actual cumulative effects. No assessment is made of the likely cumulative effects on landscape character.

The additional document addresses shortcomings of the ER, although again there are issues of consistency and clarity, particularly regarding the methodology for assessing cumulative impacts.

#### **4.6.4 Dusty Drum**

*Dusty Drum Wind Cluster, Landscape and Visual Assessment. Stephenson Halliday, April 2008*

This windfarm proposal comprises 3x110m turbines located 6km north of Carnoustie in mixed farmland in the *Dipslope Farmland* landscape type. The topography is fairly flat and is open with few trees apart from a nearby coniferous shelterbelt to the south. An electricity transmission line crosses the site between the proposed turbine locations.

The ZTV is similar to that of nearby East Skichen. It is very extensive within 5km of the site covering much of the surrounding farmland. It becomes more broken from 5-15km, covering mainly higher ground to the north east and scattered high ground elsewhere. Up to 30km it is fairly broken but is visible from the coastal areas of Fife to the south and higher ground to the north of Strathmore and Montrose.

It is concluded that significant landscape impacts would be limited to within 3-5km in the *Dipslope Farmland* landscape type. Significant visual impacts are noted for a small number of properties within 4km, a short section of the A92 near and users of Monikie Country Park. 5 of the 14 representative viewpoints are assessed as experiencing significant impacts, up to a distance of 5.6km from the nearest turbine. We note that there are a number of moderate impacts considered not significant, up to a distance of 17.1km (Tentsmuir in Fife).

It is concluded that there are no significant cumulative impacts with existing and consented windfarms but that there would be some together with the proposed windfarm at East Skichen. These are limited to two viewpoints (including Monikie Country Park) and a few residents and isolated dwellings lying between the two. The impacts on the landscape are not considered to coalesce and become cumulative, due to the separation of the two windfarm proposals by distance and tree cover. A significant effect of all the existing, consented and proposed windfarms on a section of the A92 would be reinforced by Dusty Drum.

The assessment is comprehensive and technically competent and we consider it to be a fair assessment of the effects of the proposals, although more detail and firm statements could have been made in relation to some of the cumulative impacts.

#### **4.6.5 Mile Hill**

*Mile Hill Wind Farm Environmental Statement. Atkins, March 2008*

This windfarm proposal comprises 6x100m wind turbines located 6km NW of Kirriemuir in semi-enclosed pastureland in the *Highland Foothills* landscape type. The turbines would be enclosed by highland hills to the north and the prominent landform of Mile Hill immediately to the south, beyond which lies the lowland landscape of Strathmore.

Due to its enclosed location the windfarm would have a limited ZTV, mainly to the south along Strathmore and the north slopes of the Sidlaw Hills.

It is concluded that significant landscape impacts would be limited to the unit of Highland Foothills in which the site lies and the southern edge of the Highland Summits and Plateaux immediately to the north from which the site is visible at close proximity. Significant visual impacts would be limited to two nearby sections of minor road and a section of the Cateran Trail long distance path. 4 out of 25 viewpoints would be significantly affected at a maximum of 5.5km from the nearest turbine. No specific assessment of impacts on nearby properties has been undertaken.

It is concluded that there will be no significant cumulative impacts with existing or proposed windfarms on the landscape or on visual receptors.

The assessment is comprehensive and generally of a high quality. Most of the conclusions on magnitude and significance of impacts seem reasonable based on the evidence shown. However, there is a reluctance to acknowledge the landscape impacts as negative, merely as significant. Nevertheless we have concerns regarding the cumulative assessment in that it does not include windfarms current at the time of the assessment (East Skichen, Dusty Drum and Mountboy) and it is not entirely clear why it has arrived at some of its conclusions. We consider that Mile Hill may at least contribute to significant cumulative impacts on the Highland Foothills landscape type.

#### **4.6.6 Overview**

The quality of the assessments we have reviewed is fairly consistent, with the exception of that for East Skichen. Nevertheless our review has identified that widely

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varying levels of cumulative impact assessment have been carried out. This varies from reasonably comprehensive in the case of Mountboy to poor in the case of East Skichen. In all cases however the cumulative assessments are not fully comprehensive, demonstrating a level of inconsistency in terms of which windfarms are included in the assessment and what information relating to each is included. Inevitably most of the assessments are also no longer up to date with the developing range of consents and applications in Angus and the surrounding local authorities of Perth & Kinross and Aberdeenshire.

In our review of cumulative impacts we have compared and contrasted the assessments and undertaken the following:

- 1) Collated the primary and cumulative assessment data from each of the landscape and visual assessments
- 2) Identified shortfalls/ inconsistencies in the assessments and addressed these through reassessment where appropriate
- 3) Identified additional windfarms (other than the five) likely to have a cumulative impact or affecting landscape and visual receptors within Angus
- 4) Identified additional potential cumulative impacts on viewpoints, settlements, roads and routes



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## 5.0 ASSESSMENT OF LANDSCAPE CAPACITY AND CUMULATIVE CHANGE

### 5.1 Assessment Purpose and Method

The purpose of the following assessment is firstly to identify the capacity of the Angus landscape to absorb windfarm development and, secondly, to assess the degree of cumulative change that would result from the operating, consented and proposed windfarms in the study area. A detailed assessment methodology is given in chapter 2.0.

The assessment concentrates on the assessment of cumulative landscape effects, based on the Tayside landscape character areas as modified in section 3.0 of this study. Each of the landscape types is considered, with further division into sub-types or areas as appropriate to account for identifiable variations within landscape character areas and the pattern of windfarm development.

The assessment of landscape effects includes an assessment of visual sensitivity based on settlements, roads, visitor locations and viewpoints combined with potential visibility of turbines. Nevertheless a separate brief assessment of potential cumulative visual effects on settlements, roads and viewpoints is also carried out in order to identify effects on the perception of the Angus landscape by residents, travellers and visitors.

The identification of cumulative effects on each of the identified receptors is then combined to come to an assessment of cumulative effects on each of the three main landscape areas of Angus (*Highland, Lowland with Hills and Coast*) and finally to an assessment of the overall effect on the local authority area.

Further to the cumulative assessment the potential for mitigating cumulative effects is examined. This includes considering reductions in turbine size and number and the effects of changes to the distribution of windfarms.

The information used for this assessment is primarily derived from the visibility data and visualisations within the EIAs as well as from on-site assessment. Zones of Theoretical Visibility map extracts from the landscape and visual assessments are included in Appendix B of this report. Impacts are considered firstly for existing and consented windfarms and secondly in relation to all proposed windfarms in addition to these. For the purposes of this study the first assessment is based on the assumption that consented developments will be built.

The assessment of landscape capacity and cumulative effects on landscape character is summarised in Table 5.1. Landscape capacity in relation to landscape character areas is shown in Figure 5.1. Cumulative effects of windfarms in relation to landscape character are shown in Figure 5.2 (Operational and Consented Windfarms) and Figure 5.3 (Proposed Windfarms).



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## 5.2 Landscape Capacity and Cumulative Landscape Effects

### 5.2.1 Cumulative Effects on Highland Landscapes

#### ***1a. Upper Highland Glens***

The *Upper Highland Glens* are the upper parts of the deeply incised valleys penetrating into the heart of the Mounth Highlands. They are narrower, deeper and steeper sided than the Mid Highland Glens, with even more restricted external visibility.

Despite being medium to large scale these landscapes have little or no capacity for windfarm development. They are mainly located in the Cairngorms National Park, have a largely undeveloped character with a high scenic quality and a degree of remoteness and wildness. They have short range enclosed views or narrow vistas. Commercial scale windfarm development would adversely affect these characteristics

ZTV diagrams indicate there is and will be very limited visibility of windfarms existing or proposed. The Upper Highland Glens are and will remain a *Landscape with no Views of Windfarms*.

#### ***1b. Mid Highland Glens***

The *Mid Highland Glens* are the lower parts of the Angus Glens; deeply incised valleys that penetrate the Mounth Highlands. Within Angus there are five separate landscape character areas: *Glen Isla*, *Glen Prosen*, *Glen Clova*, *West Water Valley* and *Glen Esk*. They are glens with steep sides and broad fertile valley bottoms.

Due to their enclosed, short range or narrow views and medium scale, together with the absence of comparable development and high landscape value the *Mid Highland Glens* have little or no capacity for commercial windfarm development.

#### *Operating and Consented Windfarms*

Currently there are no consented or proposed windfarms located in these character areas. Of the consented windfarms the closest is Drumderg in Perth & Kinross, some 5km west of Glen Isla. Ark Hill is over 10km south of Glen Isla and Tullo 15km east of the mouth of Glen Esk. Due to the steep valley sides offering enclosure and screening there are few views of the windfarms. Even close to Drumderg in Glen Isla views are restricted to the southern end of the glen, with distant views of Ark Hill. Glens Prosen & Clova have restricted visibility of Ark Hill at their southern ends. Tullo is potentially visible at the southern ends of West Water Valley and Glen Esk. Currently the landscape at the southern end is *Mid Highland Glens with Views of Windfarms* but most of the type is *Mid Highland Glens with no Views of Windfarms*.

#### *Proposed Windfarms*

Of the proposed windfarms Mile Hill would potentially have the most significant effect, lying between the mouths of Glen Isla and Glens Prosen & Clova. Nevertheless its visibility is restricted by topography and would be only at the southern end of the

Glens. The proposed windfarms at Montreathmont and Mountboy would be visible from the southern ends of Glen Prosen & Clova, West Water Valley and Glen Esk. At distances of 15-20km there would be little increase in effect from the current situation and these would remain *Mid Highland Glens with views of Windfarms* with the main part remaining unaffected.

### **3. Highland Summits and Plateaux**

The *Highland Summits and Plateaux* form an extensive upland area north of the Highland Boundary Fault in Angus, rising to over 1000m AOD in places and divided by the deeply incised Angus Glens. The four areas within Angus include, from west to east, part of *Forest of Alyth; Caenlochan Forest/ Glendoll Forest; Muckle Cairn/ Hill of Glansie/ Hill of Wirren* and *Hills of Saughs/ Mount Battock*.

#### *Landscape Capacity*

The landscape is large to very large scale. Topography comprises undulating or rolling plateaux and rounded summits, falling steeply at the edges into the glens. Landforms and landcover patterns are large scale and simple. Generally these are characteristics that are suitable for windfarm development and the landscape character would have a low to medium sensitivity. The Mounth is very open and highly visible from the lowlands to the south and further mountains to the north. It forms the backdrop to lowland Angus as well as parts of neighbouring local authority areas of Perth & Kinross and Aberdeenshire. Internally there is extensive visibility although some lower areas are screened by surrounding landforms. As there are also a high number of sensitive recreational receptors using this area, the visual sensitivity is medium to high. This leads to an overall medium landscape sensitivity.

As a backdrop to lowland Angus, an area of high recreational value and an area of remote and wild characteristics the *Highland Summits and Plateaux* are of high landscape value, evidenced by the designation of much of their area as a National Park together with a NSA in the northwest. Due to the high landscape value the Highland Summits and Plateaux have a low capacity for windfarm development. Any windfarm development should be of modest scale, outside designated areas and away from the highest landforms, making use of screening by topography.

#### *Operating and Consented Windfarms*

Of the operating and consented sites Drumderg is located in this landscape type but just 3km west of Angus, in Perth & Kinross. In Aberdeenshire the Mile Hill windfarm is also located in an upland landscape, some 15km to the north east of Angus. Within the *Highland Summits and Plateaux*, Drumderg has extensive visibility, particularly within 5km of the site. Further afield it would be seen mainly from ridges and summits, with no visibility beyond the hills east of Glen Clova.

Windfarms in the lowlands, including Ark Hill and Tullo would be visible from the southern edge and higher parts of this landscape type at distances of 15-20km or more, and therefore as minor background features. Clochnahill and St John's Hill would also be visible to the east but at least 20km distant. Overall the Highland

Summits and Plateaux within Angus are *Highland Summits and Plateaux with views of Windfarms*. However there is variation within this, with the Forest of Alyth area west of Glen Isla and south of the Forter - Glen Shee road as *Highland Summits and Plateaux with Windfarm* due to the significant direct and indirect effects of Drumderg and some of the northern areas too distant to obtain clear views and are effectively *Highland Summits and Plateaux with No Views of Windfarms*.

#### *Proposed Windfarms*

If all the proposed windfarms were consented there would be no more direct effects within the landscape type, but the 6 turbine windfarm at Mile Hill would be directly adjacent to the southern end of the Caenlochan/Glen Doll area. This would have limited visibility in this area and the Forest of Alyth area due to topographic screening. Other windfarms would all be clearly located in the lowlands at minimum distances of 15-20km and would form part of the background in views to the south. The landscape character would remain much the same as the existing situation, with a slightly increased windfarm presence (Mile Hill) affecting the south western areas already affected by Drumderg. It would remain largely *Highland Summits and Plateaux with views of Windfarms*, although the Forest of Alyth area west of Glen Isla and south of the Forter - Glen Shee road and slopes facing Mile Hill could be considered as *Highland Summits and Plateaux with Windfarms*.

### **5. Highland Foothills**

The Highland Foothills are a distinctive and key transitional landscape located on the boundary between lowland Strathmore to the south and the hills and glens of the Mounth Highlands to the north. Within Angus they are divided into three main areas, *Kirriemuir Foothills*, *Menmuir Foothills* and *Edzell Foothills*; in close proximity but separated by the mouths of the Angus Glens. They are a rather varied complex small to medium scale landscape with irregular but often steep topography of small hills and glens. In some locations a high voltage electricity transmission line intrudes on the otherwise scenic landscape composition.

#### *Landscape Capacity*

The modest scale and complexity of this landscape type together with a relative lack of development or infrastructure makes it of medium to high landscape character sensitivity. Visual sensitivity is varied, with a significant degree of screening enclosure afforded by the landforms of the character type and to the north but a highly visible position when seen from the lowlands, settlements and transport routes to the south. Within the areas the main receptors are scattered dwellings, local road users and people using the area for informal recreation. The areas are of medium visual sensitivity and overall medium to high landscape sensitivity.

These areas are of a high recreational value and have a high concentration of historical, archaeological and scenic locations. The landscape value is medium to high. The overall capacity for windfarm development is low, with limited opportunity for a small or small-medium scale of windfarm to be located in carefully selected locations with topographic screening. Some of the capacity for tall structures has

already been taken up by the high voltage electricity line routed through the screened glens of this landscape type.

#### *Operating and Consented Windfarms*

There is currently no consented development within this landscape type in Angus, although the 16 turbine Drumderg windfarm lies within 10km to the west of the Kirriemuir Foothills and very close to a neighbouring *Highland Foothill* area. The consented windfarm of Ark Hill is visible a minimum of 12km to the south of the Kirriemuir Foothills and the windfarms at Tullo and Mid Hill lie 15km east and NE of the Edzell Foothills. These two areas are *Highland Foothills with views of Windfarms* although significant areas will have no views of windfarms.

#### *Proposed Windfarms*

Including all the proposed windfarms would lead to direct impacts on this landscape type, with the 6 turbines of Mile Hill in the Kirriemuir Foothills. Together with the effects of Drumderg this area would become a *Highland Foothills with Windfarm* landscape.

Other proposed windfarms in the lowlands to the south will have limited indirect impacts on *Highland Foothills* areas, although Montreathmont at 10-15km distance would have an extensive visual influence on the Menmuir Foothills. The proposed windfarms in Aberdeenshire to the northeast would have a very limited indirect effect on the Edzell Foothills. Areas outside the Kirriemuir Foothills will remain *Highland Foothills with Views of Windfarms*.

Due to the low capacity and restricted extent of this type, any further significant windfarm development in other *Highland Foothills* areas within Angus would lead to the whole type becoming characterised by windfarms as *Highland Foothills with Windfarms*.

#### **Overall Effects on Highland Landscapes**

The assessment of highland landscape character areas has determined that this area of Angus generally has a low capacity for windfarm development despite extensive areas of large scale landscapes. This is counter to the development pattern that has taken place elsewhere in upland areas of Scotland. This is primarily due to the highland area's high landscape value, both as a backdrop to the lowland area of Angus but as an extensive area of scenic and dramatic landscape with areas of remote and wild land qualities. The area is an important recreational destination and a substantial proportion of it lies in the Cairngorms National Park which extends further north into a wider area of higher mountains and wilderness. Within Angus there would be only limited opportunities for smaller scale developments in suitable areas that have screening topography and a lack of sensitive receptors.

Currently there are no operational or consented developments within the highland area of Angus, although the 16 turbines of Drumderg in Perth & Kinross are within 3km to the west. Mid Hill in upland Aberdeenshire is over 15km to the northeast. Ark Hill in Angus and the other consented Aberdeenshire windfarms are clearly within the

lowland areas. As Drumderg lies within a *Highland Summits and Plateaux* landscape area crossing the local authority boundary a small part of the Angus highland area is effectively a *Highland Summits and Plateaux with Windfarm* and ridges and summits east to Glen Clova are *Highland Summits and Plateaux with Views of Windfarms*. *Highland Foothills* would similarly be partially affected by views. Most of the rest of the highland area is remote enough from windfarms or screened (all of the Glens) to remain virtually unaffected.

If all the proposed windfarms in the study area were constructed one further small windfarm at Mile Hill in the *Highland Foothills* would directly affect the Highland landscape, slightly extending the area of *Landscape with Windfarms* and intensifying the effect in the area of *Landscape with Views of Windfarms* in the south west of the highland area. The additional lowland windfarms will also slightly increase the area of *Landscape with Views of Windfarms* along the southern part of the highland area but these windfarms will be clearly associated with lowland landscapes and barely visible from the northern parts of the highland area.

### 5.2.2 Cumulative Effects on Lowland Landscapes

The majority of windfarms and windfarm applications in Angus are located in the lowland landscape area.

#### **8. Igneous Hills – Sidlaw Hills**

This area of prominent lowland hills clearly separates Dundee and the *Dipslope Farmland* in the south from the *Broad Valley Lowland* of Strathmore in the north. Extending west into Perthshire it is a considerably more extensive and higher hill area than the *Low Moorland Hills* to the east. The hills are of medium landscape character sensitivity. Being of medium scale and fairly complex topography they are clearly farmed and managed with only the upper slopes and hilltops open pasture or heather moor, and the small glens enclosed and populated with small scale settlements and farms connected by a network of roads and tracks. There are a number of large communications masts on the highest hills and power lines cross in some locations. Visually the area is of medium sensitivity, varying from being enclosed with short distance views and a low population within, to being a prominent backdrop to Strathmore and Dundee when seen from without. Overall the landscape is of medium sensitivity.

There are no landscape designations but a number of footpaths, viewpoints and small fishing lochs as well as hillforts, scattered dwellings and settlements giving this area a medium landscape value. Overall the Sidlaw Hills have a medium capacity for development. The scale and type of landscape suggests that careful siting of windfarms of a medium to small scale only would be appropriate.

#### *Operating and Consented Windfarms*

The Sidlaw Hills is currently the one area in Angus directly affected by a consented windfarm: the 8x78m turbines of Ark Hill in the east of the area. Together with the slight visual effects of the operational Michelin turbines in Dundee 10km to the south

and the 16 Drumderg turbines 20km to the north there are slight cumulative visual effects, predominantly of a successive nature to viewers on hilltops. The Sidlaw Hills are currently '*Igneous Hills with Occasional Windfarms*'.

#### *Proposed Windfarms*

The development of all proposed windfarms would add one further 80m turbine to the area above Newtyle and a number of further windfarms that would be viewed from the landscape type - the closest being 1km distant at East Skichen and 6km at Dusty Drum, with Mile Hill some 10km distant across Strathmore. Effectively the area would remain *Igneous Hills with Occasional Windfarms*.

### **10. Broad Valley Lowland – Strathmore and Lower South Esk & North Esk River Valleys**

This landscape type is similar in extent to the *Dipslope Farmland* to the south. It is one of the key lowland features of Angus, not only a broad valley and agricultural heartland but also a population centre and communications corridor. It is also much emphasised by the Highland Boundary Fault and the backdrop of the Angus Glens and Mounth Highlands to the north, providing a foreground to that dramatic landscape. The type is divided into two connected areas: Strathmore in the west and the Lower South & North Esk River Valley in the east.

#### *Landscape Capacity*

The landscape of Strathmore is generally of a medium scale, although some of the extensive views along the Strath and the hills to the north give it a larger feeling. The landform is predominantly gentle: undulating and often flat on the valley floor, but with some areas of more complex, rolling glacial landforms on the valley sides and floor. The predominant land use is agricultural with large rectilinear fields and it is a rich and settled landscape with numerous farms, dwellings and settlements together with some small towns. The landscape sensitivity is medium. The visual sensitivity is medium to high due to the openness of the valley, the high residential and travelling population and overlooking from higher ground on the valley sides. Despite the degradation of hedgerows and trees in some locations the landscape value is medium due to the presence of HGDLs such as Glamis and settlements and buildings of historic and visitor interest. Overall the capacity of the landscape to accommodate wind turbines is medium, with the main constraints being issues of scale and proximity to sensitive receptors.

The Lower South & North Esk River Valley east of Kirriemuir (named as Strathmore on maps) drains to the east and is similar but of a slightly smaller scale and width than Strathmore. It is more tree covered with a stronger landscape structure with more intact field boundaries. The landscape sensitivity is medium. The visual sensitivity is medium as, although the A90 passes through this area and the towns of Brechin and Forfar are located within it, the tree cover restricts receptor views. The landscape value is also medium. Overall capacity for windfarm development is medium.

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### *Operating and Consented Windfarms*

There are no operating or consented windfarms in the *Broad Valley Lowlands*. All impacts are indirect. Currently the consented Ark Hill has visual effects on Strathmore between Alyth and Forfar and the operational Drumderg is visible on the south side of the valley at 15-20km, making it a *Broad Valley Lowland with Views of Windfarms*. In the case of the Lower Esk Valleys the influence of these windfarms is minimal, being a minimum 15-20km distant. At the eastern end the 8 turbines of Tullo are at a minimum distance of 10km. Again this is a *Broad Valley Lowland with Views of Windfarms* but with little visual influence between Forfar and Brechin.

### *Proposed Windfarms*

There are no proposals for windfarms within this landscape type. Considering the proposed windfarms in surrounding areas there would be an increased indirect effect. The most significant would be on the area of the Lower Esk Valley around Brechin from which the turbines of Montreathmont and Mountboy would be visible. Strathmore west of Kirriemuir would experience some increased but scattered impacts from Mile Hill. In both cases the windfarms would be clearly located in other landscape types and the whole character type would become *Broad Valley Lowland with Views of Windfarms*.

## **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.

### *Landscape Capacity*

The simple topography, medium to large scale rectilinear pattern and extensive commercial forestry of the *Lowland Forest and Farmland* sub-type makes it an area of low to medium landscape character sensitivity. Views within are often screened by mature coniferous forestry although the area is highly visible from higher ground within and surrounding it. There is a scattered population within the farmland, but two well used roads and some minor roads cross the area, making it of medium visual sensitivity. Overall the landscape sensitivity of the area is medium to low.

There are no landscape designations but the mature forestry crossed by tracks provides opportunities for informal recreation, giving the area a medium value. Overall the *Lowland Forest and Farmland* area has a medium to high capacity for windfarm development due to forest cover and extensive areas with little habitation. It is mainly constrained by the limited extent of forest and the degree to which it is overlooked from surrounding farmland areas. Windfarm proposals, although

potentially larger than in the surrounding populated farmland areas should be limited by the potential for effects on views from sensitive receptors.

The *Low Moorland Hills* sub-type has a much more complex topography and semi-open appearance, with a network of roads and villages, forming a backdrop to Forfar. It is of medium-high landscape sensitivity to commercial windfarm development due to the complex topography and varied landscape pattern, modest scale of the hills and small scale of some of the elements making up the landscape. Visually it varies from enclosed in the lower lying areas and valleys between the hills to open with extensive views from the hills. As these form the backdrop to Forfar and are prominently visible from the A90, the area is of high visual sensitivity. Overall landscape sensitivity is medium-high. There are no statutory designations and one HGDL near Guthrie Castle. Nevertheless, with its network of lanes and scattered dwellings and settlements, prominent viewpoints and archaeological remains the area is of medium-high landscape value. Overall the *Low Moorland Hills* sub-type has a low capacity for windfarm development. Any windfarm development would have to be carefully sited and small scale to avoid prominent visibility and clashes of scale with the modest size hills.

#### *Operating and Consented Windfarms*

Currently there are no consented windfarms close enough to Montreathmont Moor to significantly affect the *Lowland Forest and Farmland* landscape, with Ark Hill 20km to the southwest and Tullo 20km to the northeast meaning that it would remain a *Landscape with no Windfarms*.

Similarly, much of the Moorland Hills area east of Forfar is currently a *Landscape with no Windfarms*. However Drumderg is visible at 30km and it is possible that at 10-12km from Fotheringham Hill the Ark Hill turbines would be visible, rendering the area south of Forfar a '*Landscape with Views of Windfarms*' (although much of Fotheringham Hill itself is afforested).

#### *Proposed Windfarms*

Considering the proposed windfarms there would be significant effects on the *Lowland Forest and Farmland* sub-type as a result of the 11x126m high turbines of the proposed windfarm within it. There would also be cumulative impacts from the development of the three turbines at Mountboy 5km to the east. Although clearly separate the proposed turbines are in a prominent location and would be clearly visible from roads and houses between the two and from open farmland areas north of the forest, leading to sequential and successive impacts. This would reinforce and extend the impacts of wind turbines on the landscape and on visual receptors, creating a *Lowland Forest and Farmland with Windfarms* landscape.

In the case of the *Low Moorland Hills* sub-type, development of the proposed windfarms would not lead to direct impacts but would lead to significant visual impacts overall. This would include primarily the Montreathmont Moor development at just over 5km to the east but also the more modest effects of the three *Dipslope Farmland* windfarms at Mountboy, Dusty Drum and East Skichen at 5-15km distant,



in addition to the consented windfarms at Ark Hill and Drumderg. The proposed windfarm at Mile Hill 15-20km northwest would also be visible from some of the hilltops but clearly not associated with the lowland landscape types. The whole of this sub-type would become a *Low Moorland Hills with Views of Windfarms*.

### **13. Dipslope Farmland**

This is the largest landscape character area in Angus, covering most of the lowland farmland between the lowland hills, Dundee, Montrose Basin and the coast. It is some 40km from SW to NE and a maximum of 14km wide between Letham and Arbroath.

#### *Landscape Capacity*

Analysis of the landscape character, landscape features and elements suggests that, given its medium to large scale, gentle landform, working agricultural nature and moderately strong rectilinear field pattern it is of medium landscape character sensitivity. Due to the number of settlements and widely distributed population and number of key transport routes, together with a generally open aspect, it is of medium to high visual sensitivity. Overall landscape sensitivity is medium

There are no statutory landscape designations and much of it is a working landscape. There are nevertheless a number of HGDLs, estates and country parks. There are also long sections of the National Cycle Route and many local footpaths. The area is considered to have a medium landscape value. Together with a medium sensitivity this gives an overall medium capacity for windfarm development. Large or medium windfarms would not be appropriate in this area due to scale and visual sensitivity limitations. Any proposed development should be of limited scale and extent, reflecting the scale and pattern of the local landscape and would be limited by proximity of the settlements and scattered residential population.

#### *Operating and Consented Windfarms*

Currently there are no consented windfarms within this landscape type. Adjacent to the area are the two Michelin turbines in Dundee within ca. 2km and the consented 8 turbines on Ark Hill, high in the Sidlaw Hills at ca. 3-4km north of the area to the north of Dundee. The nearest consented turbines in Aberdeenshire are the 8 at Tullo, a minimum 15km to the northeast.

The operational and consented windfarms have a limited indirect effect on the *Dipslope Farmland*, with only the Michelin turbines being extensively visible in the vicinity of Dundee. Visibility of Ark Hill is minimal due to intervening landforms and Tullo is an intermittently visible background feature to the north. Parts of the *Dipslope Farmland* near Dundee and Montrose are a *Landscape with Views of Windfarms*, but most of the area is a *Landscape with no Windfarms*.

#### *Proposed Windfarms*

There are three proposed windfarms within the *Dipslope Farmland*: three turbines each at East Skichen and Dusty Drum in the middle and three at Mountboy in the

north. In addition the proposed 11 turbine windfarm at Montreathmont lies within 3km of this landscape type. There are no other applications that could potentially have a significant direct or indirect impact.

Development of all the proposed windfarms would lead to direct effects and cumulative impacts. Dusty Drum and East Skichen lie within 5km of one another and there would be some cumulative impacts. Due to screening by trees there would be relatively few combined or successive impacts but there would be sequential impacts on users of local roads including the A92, B9128 and B961.

Although the proposed windfarm at Montreathmont is not within the *Dipslope Farmland* it would be close and large enough to exert a significant indirect effect on the area around Rossie Moor. There would also be significant cumulative impacts between Montreathmont and Mountboy, principally of successive and sequential type, especially for travellers on the A933 between Froickheim and Brechin and the A934 from Montrose to the A933, as well as on a number of minor roads between Rossie Moor, Brechin and Letham.

There would be limitations on cumulative impacts of Dusty Drum and East Skichen with Mountboy and Montreathmont 15km to the NE, due to the distance of separation and a ridge of higher ground south of Letham restricting overlap of visibility. Nevertheless, travellers making certain SW-NE journeys between Dundee and Montrose would experience sequential cumulative effects.

On the basis of the combined effects of the Michelin turbines, the three scattered small windfarms and the adjacent larger Montreathmont windfarm, the *Dipslope Farmland* as a whole would become a *Dipslope Farmland with Occasional Windfarms*. However the areas around Monikie and Carmyllie, Rossie Moor and Montreathmont would become *Dipslope Farmland with Windfarms*. The area north of Dundee and west of the A90 would remain little affected by windfarms.

### **Summary of Effects on Lowland Landscapes**

Assessment has determined that the lowland landscape of Angus has an overall medium capacity for windfarm development, with higher capacity in limited locations such as Montreathmont Moor and some areas with very little capacity such as the Low Moorland Hills around Forfar. The landscape is generally of a medium scale and visually sensitive due to widespread settlement and transport routes, together with openness of much of the landscape. Nevertheless, unlike the highland area, this is a settled, working agricultural landscape. There are significant areas of sufficient scale and simplicity in landform and landcover pattern to accommodate some degree of windfarm development. The overall pattern suggests that smaller scale developments are appropriate, with relatively little capacity for medium scale and no capacity for large scale developments such as may be found in upland areas elsewhere in Scotland.

Currently there is one consented development for 8 smaller turbines at Ark Hill within lowland Angus in the Sidlaw Hills. There are two operational turbines in Dundee close to the *Dipslope Farmland* and a consented windfarm at Tullo in Aberdeenshire

10km to the NE of the lowland area and Drumderg in the highland area of Perth & Kinross. As such extensive areas of the lowlands are a '*Landscape with no Windfarms*' with areas to the east and west a '*Landscape with Views of Windfarms*' and only the Sidlaw Hills '*Igneous Hills with Occasional Windfarms*'.

Construction of all the proposed windfarms would lead to 5 further windfarms within the lowland area. Three of these would be in the *Dipslope Farmland* and one in the *Lowland Forest and Farmland* area close by. With the exception of the 11 turbine Montreathmont proposal the windfarms will be small with three turbines and one with a single turbine. Together with the visual influence of the Mile Hill proposal near Kirriemuir this would lead to the lowland area of Angus overall becoming a *Landscape with Occasional Windfarms*. However the *Lowland Forest and Farmland* area and parts of the *Dipslope Farmland* would become a *Landscape with Windfarms*. With the possible exception of Tullo, the windfarms in Aberdeenshire are sufficiently distant and small scale to have little discernable effect on the lowland landscape of Angus. Drumderg and Mile Hill are clearly located in the uplands and have a visual effect only.

### 5.2.3 Effects on Coastal Landscapes

There are no windfarms or proposals located within the Coastal Area

#### ***14a and 14b Coast with Sand and Coast with Cliffs***

These coastal landscape types are of limited extent, low elevation and generally of a medium scale, with uncluttered skylines and views and little development outside the four main towns that punctuate the coast. They would have a medium to high landscape sensitivity to windfarm development. Visual sensitivity would be high due to the proximity of settlements, roads and railway, together with golf links and beaches having high visitor numbers in good weather. There are limited screening features and landforms are modest with long open views available. Overall landscape sensitivity would be medium to high.

Landscape value would also be medium to high due to the presence of golf courses, popularity of the beaches with visitors and number of historic features such as castles and old fishing stations. Overall capacity for commercial windfarm development along the coast would be low

The operational and consented windfarms have a minimal effect on this landscape type. In terms of potentially significant visual impacts the two Michelin turbines in Dundee are potentially visible from Barry Links at 5-10km distant and the 8 Tullo turbines may be visible from Montrose at 10-15km. In both cases the turbines are seen as being clearly located in separate inland landscape character areas.

If all the proposed windfarms were built, ZTVs show that there will be more general visibility of windfarms from coastal areas. In particular the Barry Links and Carnoustie areas would be affected by East Skichen and Dusty Drum at 5-10km.

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## **15. Lowland Basin**

The *Lowland Basin* landscape type is represented by Montrose Basin, lying between Montrose and Montreathmont Moor. This is an area of low lying, largely flat topography which includes a large tidal lagoon. The middle part is taken up by mixed farmland with large open fields, with the western end comprising the extensively tree covered policies of Kinnard Castle HGDL. It is different in quality from the exposed coastal strip, being enclosed with the inland area well tree covered. It represents somewhat of a transition between coastal and lowland landscape types.

### *Landscape Capacity*

The landscape is of medium scale with a degree of enclosure by higher ground on three sides. The landscape character sensitivity of the Montrose Basin area is considered to be medium, although the area would also be subject to the influence of development on the surrounding higher ground. The visual sensitivity is medium to high as it is visible from the town of Montrose, two main roads on either side and from scattered settlements on the higher ground surrounding it. The overall landscape sensitivity is medium to high.

Landscape value is also medium to high due a number of designated features. The unique tidal lagoon at one end is highly protected for its wildlife. The designed landscape of Kinnaird Castle lies at the other end and House of Dun lies to the north of the A935. There are also a high number of scheduled ancient monuments and listed buildings in the area as well as the Caledonian Steam Railway.

The capacity for windfarm development in the Montrose basin area is low, restricted by land availability, designated areas and the potential for visual impact on the settlement of Montrose. The only limited possibilities would be in the farmland area between the Basin and Kinnaird Castle. The possibility of visual impacts from windfarms on surrounding higher ground is also a key consideration.

### *Operating and Consented Windfarms*

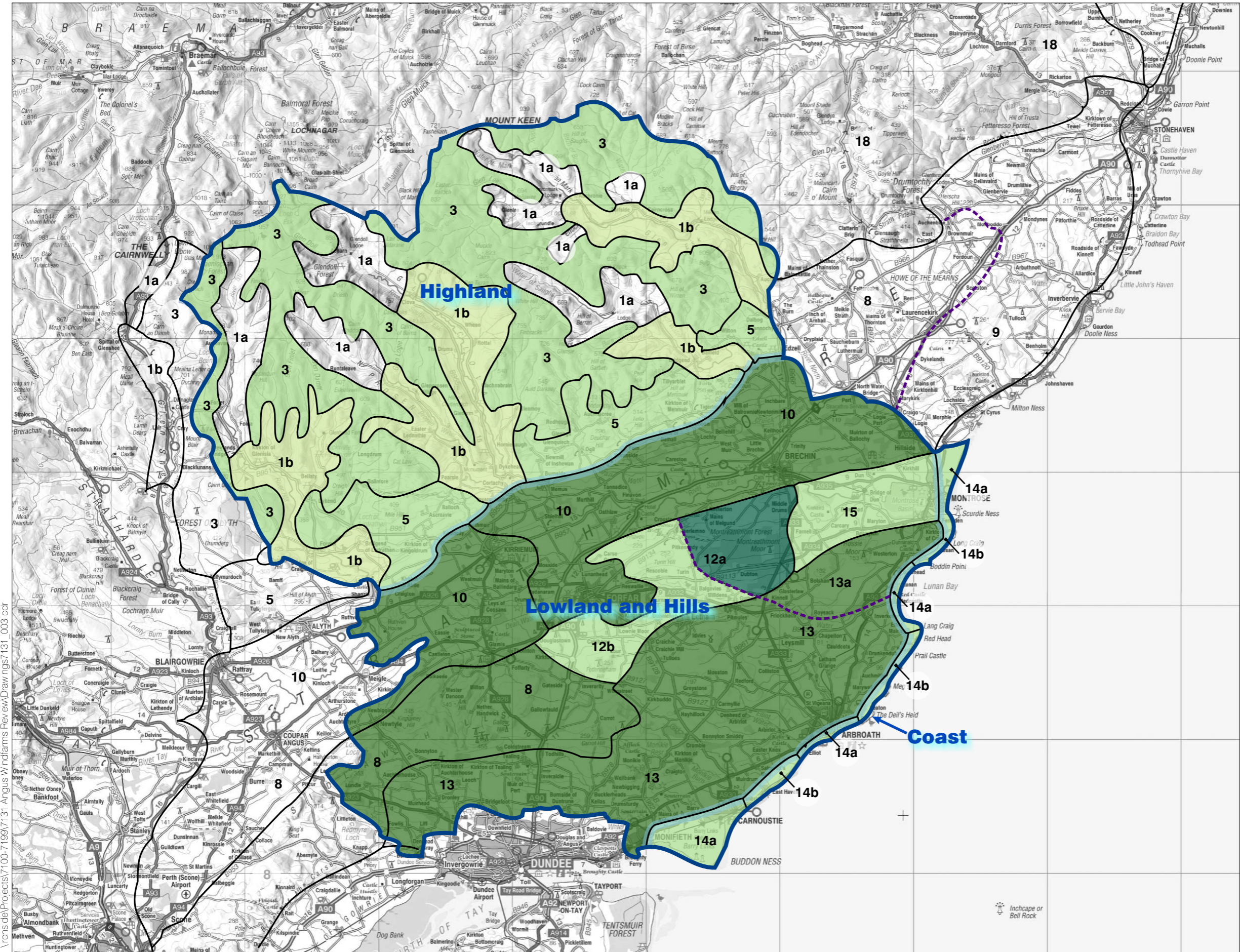
In terms of consented windfarms only Tullo, 12-20km to the north in Aberdeenshire has the potential for visual impacts, with all other consented windfarms being well in excess of 20km distant. This is therefore partially a *Lowland Basin with views of Windfarms*, but at the lower end of the category with partial coverage and views of a fairly distant windfarm.

### *Proposed Windfarms*

Were all the proposed windfarms to be developed there would be no direct impacts. However, the windfarms at Montreathmont and Mountboy would have significant indirect impacts on the landscape, and visual impacts on receptors within the basin area, some significant. The landscape will remain largely a *Lowland Basin with views of Windfarms* but the effects would be significantly increased from the existing situation. Arguably the southwest corner of this area near Farnell, lying between the two windfarms, would become a *Lowland Basin with Windfarms*

***Summary of Effects on Coastal Landscapes***

In terms of cumulative effects it is likely that the consented situation will lead to only the northern and southern end of the Coastal landscape becoming a *Landscape with Views of Windfarms* type. Development of all windfarms would lead to much of the coastal strip and the Montrose Basin becoming a *Landscape with Views of Windfarms* type. The effects on Montrose basin would be the most significant, with the southeastern corner potentially becoming a *Lowland Basin with Windfarms*.



**Landscape Capacity for Windfarms**

- None
- Low - None
- Low
- Low - Medium
- Medium
- Medium - High
- High

**Landscape Character**  
(See fig 3.2 for details of Landscape Types)

- Angus Local Authority Boundary
- Principal Geographic Areas
- Type / Area Landscape Boundary
- Landscape Sub-Type / Area Boundary

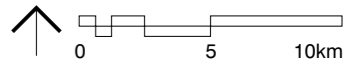
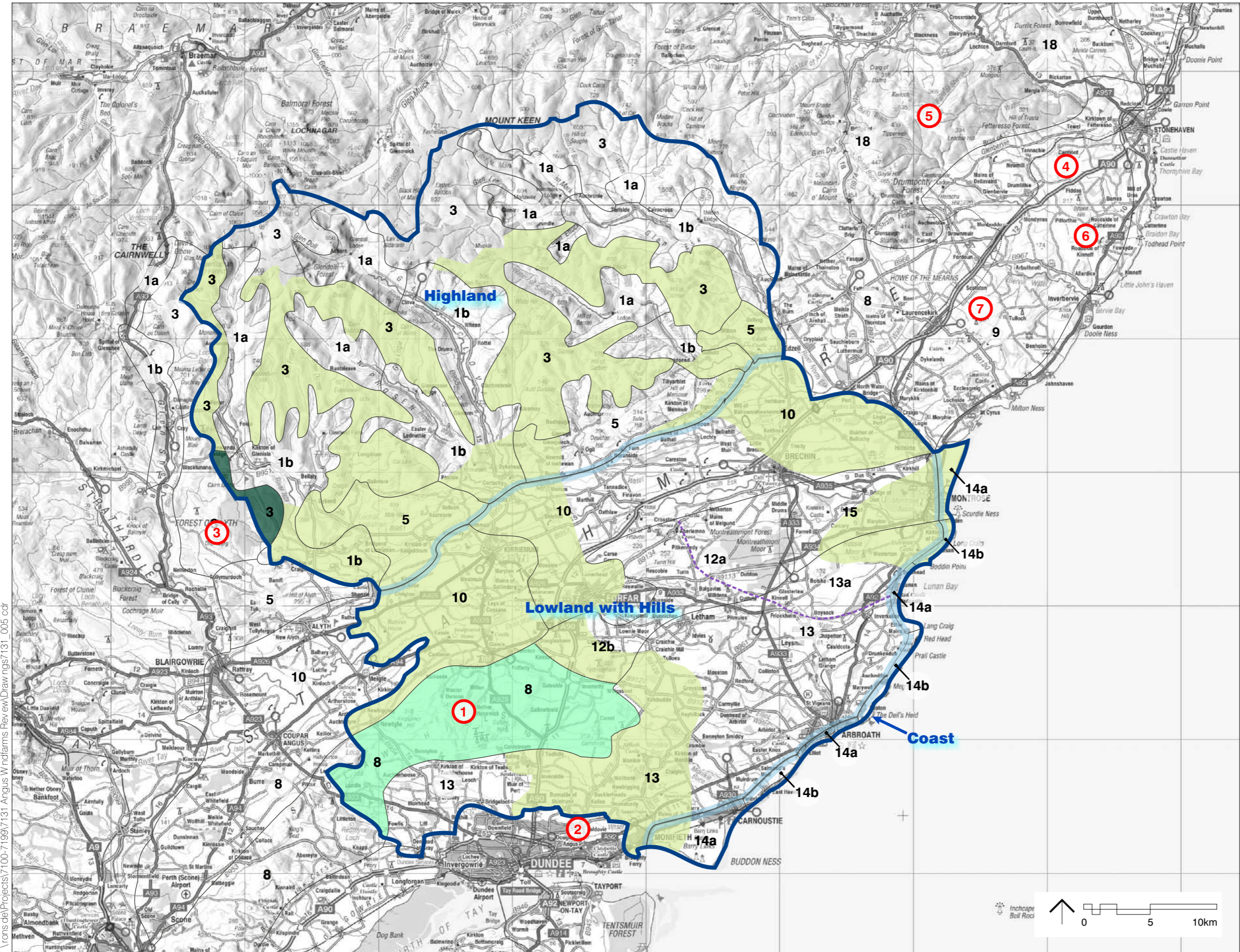


Figure 5.1  
Landscape Capacity

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Angus Local Authority Boundary

**Windfarm Locations**

- ① Operational & Consented Windfarms
- 1. Ark Hill
- 2. Michelin
- 3. Drumdreg
- 4. Clochnahill
- 5. Mid Hill
- 6. St John's Hill
- 7. Tullo

**Windfarm Character Type**

- Landscape with no view of windfarms
- Landscape with views of windfarms
- Landscape with occasional windfarms
- Landscape with windfarms
- Windfarm landscape

**Landscape Character**

(See fig 3.2 for details of Landscape Types)

- ▬ Principal Geographic Areas
- ▬ Type / Area Landscape Boundary
- ▬ Landscape Sub-Type / Area Boundary

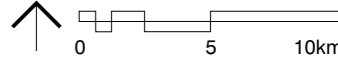
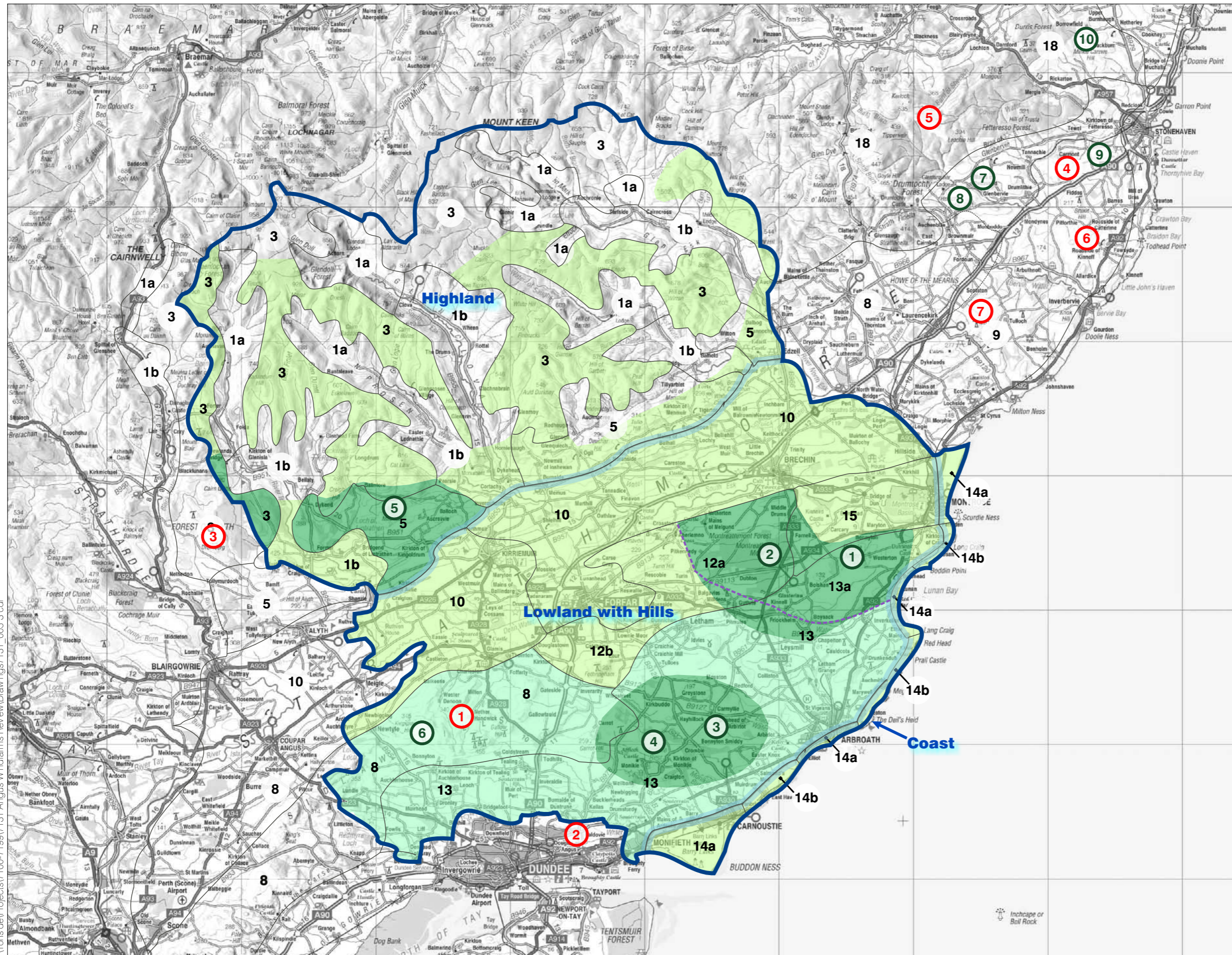


Figure 5.2

Cumulative Landscape Character Effects: Operating & Consented Windfarms

# Angus Windfarms Study



Angus Local Authority Boundary

## Windfarm Locations

Operational & Consented Windfarms

1. Ark Hill
2. Michelin
3. Drumdreg
4. Clochnahill
5. Mid Hill
6. St John's Hill
7. Tullo

Planning Applications

1. Mountboy
2. Montreathmont
3. Dusty Drum
4. East Skichen
5. Mile Hill
6. Scotston Hill
7. Droop Hill
8. Herscha Hill
9. Hillhead of Aquhirie
10. Meikle Carewe

## Windfarm Character Type

- Landscape with no view of windfarms
- Landscape with views of windfarms
- Landscape with occasional windfarms
- Landscape with windfarms
- Windfarm landscape

## Landscape Character

(See fig 3.2 for details of Landscape Types)

- Principal Geographic Areas
- Type / Area Landscape Boundary
- Landscape Sub-Type / Area Boundary

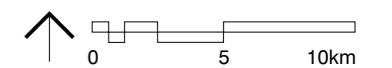


Figure 5.3  
Cumulative  
Landscape Character  
Effects: All Windfarms



**Table 5.1. Summary of Landscape Capacity and Cumulative Effects**

Landscape Type	Landscape Character Sensitivity	Visual Sensitivity	Overall Landscape Sensitivity	Landscape Value	Landscape Capacity	Operational/ Consented Landscape	Operational/ Consented & Proposed Landscape	Comment
<b>HIGHLAND AREA</b>								
1a. Upper Highland Glens	High	Medium	Med-High	High	None	No Windfarms	No Windfarms	Extensive area lies within Cairngorms National Park
1b. Mid Highland Glens	High	Medium	Med-High	High	Low to none	No Windfarms to Landscape with Views of Windfarms	Slight increase in area of Landscape with Views of Windfarms	Angus Glens are important visitor destinations
3. Highland Summits & Plateaux	Low-Med	Med-High	Medium	High	Low	Varies from Landscape with Windfarm in SW to Landscape with Views of Windfarms over most and No Views in northern areas	Slight increase in Landscape with Views of Windfarms and Landscape with Windfarms in SW	No capacity in National Park/ NSA and very limited opportunity in areas to the south and east. Most windfarms distant. Direct effects in SW from Drumderg. Mile Hill will have limited additional effect.
5. Highland Foothills	Med-High	Medium	Med-High	Med-High	Low	Landscape with Views of Windfarms in E & W	Area of Landscape with Windfarms in W. Otherwise an increase in Landscape with Views of Windfarms	Effects of Mile Hill would be significantly adverse but limited in extent. Further development elsewhere would change all of this type
<b>Overall Capacity/ Effect On Highland Area</b>	<b>Med-High</b>	<b>Med-High</b>	<b>Med-High</b>	<b>High</b>	<b>Low</b>	Varied. Some areas of No Windfarms; mostly Landscape with Views of Windfarms to small area of Landscape with Windfarms	Small increase in area of Landscape with Windfarms in SW and increase in area of Landscape with Views of Windfarms	Direct effects limited and mostly outwith Angus boundary. Proposed windfarm development is mainly in lowland areas and clearly separated from the Highlands.

Landscape Type	Landscape Character Sensitivity	Visual Sensitivity	Overall Landscape Sensitivity	Landscape Value	Landscape Capacity	Operational/ Consented Landscape	Operational/ Consented & Proposed Landscape	Comment
<b>LOWLAND AREA</b>								
8. Igneous Hills	Medium	Medium	Medium	Medium	Medium	Landscape with Occasional Windfarms	Landscape with Occasional Windfarms (slightly increased)	Ark Hill is only consented windfarm in Angus. One further turbine proposed within Sidlaw Hills. Increased views of windfarms in other areas.
10. Broad Valley Lowland	Medium	Medium	Medium	Medium	Medium	Landscape with Views of Windfarms (and some areas with no views)	Landscape with Views of Windfarms	Most significant effects would be at eastern end.
12a. Lowland Forest and Farmland	Low-Medium	Medium	Low-Medium	Medium	Med-High	No Windfarms	Landscape with Windfarms	This area has highest capacity for a windfarm but is limited by extent.
12b. Low Moorland Hills	Medium-High	High	Med-High	Med-High	Low	Landscape with no Windfarms/ Views of Windfarms (southern part only)	Landscape with Views of Windfarms (all area – some significant)	This area is sensitive to issues of scale and visibility
13. Dipslope Farmland	Medium	Med-High	Medium	Medium	Medium	Landscape with Views of Windfarms in E. Landscape with No Windfarm W of A90	Landscape with Occasional Windfarms but some areas of Landscape with Windfarms	3 small windfarms, with Montreathmont close by. Significant cumulative effects in NE and some effects to SE but not between the two areas.
<b>Overall Capacity/ Effect on Lowland Area</b>	<b>Medium</b>	<b>Med-High</b>	<b>Medium</b>	<b>Medium</b>	<b>Medium</b>	Landscape with Views of Windfarms and limited area of Landscape with Occasional Windfarms)	Landscape with Occasional Windfarms but with significant areas of Landscape with Windfarms and Landscape with Views of Windfarms	Lowland area is the most affected by proposed windfarms but also has the most capacity

Landscape Type	Landscape Character Sensitivity	Visual Sensitivity	Overall Landscape Sensitivity	Landscape Value	Landscape Capacity	Operational/ Consented Landscape	Operational/ Consented & Proposed Landscape	Comment
<b>COAST AREA</b>								
14a Coast with Sand	Med-High	High	Med-High	Med-High	Low	No Windfarms/ Landscape with Views of Windfarms	Landscape with Views of Windfarms/ No Windfarms	
14b. Coast with Cliffs	Med-High	High	Med-High	Med-High	Low	No Windfarms/ Landscape with Views of Windfarms	Landscape with Views of Windfarms/ No Windfarms	
15. Lowland Basin	Medium	Med-High	Med-High	Med-High	Low	Landscape with no Windfarms/ Views of Windfarms	Landscape with Views of Windfarms (with small area of Landscape with Windfarms)	Likely to be a significant effect on landscape character from Mountboy and Montreatmont together
<b>Overall Effect on Coastal Area</b>	<b>Med-High</b>	<b>High</b>	<b>Med-High</b>	<b>Med-High</b>	<b>Low</b>	No Windfarms/ Landscape with Views of Windfarms	Landscape with Views of Windfarms/ No Windfarms	Significant increase in area of Landscape with Views of Windfarms

## 5.3 Cumulative Visual Effects

The potential for effects on visual receptors has been considered as part of the assessment of landscape sensitivity and capacity. However it is worth briefly reviewing the potential specific impacts on key visual receptor locations: including settlements, dwellings, roads, visitor destinations and viewpoints. This will give a further indication of the visual experience of people living, visiting, working and passing through Angus.

### 5.3.1 Effects on Settlements

There are a number of small towns and larger villages throughout Angus, located in the lowlands and along the coast. The suburbs of Dundee are also in close proximity to the southern boundary of Angus.

Existing and consented windfarms currently have very little impact on views from most settlements. Ark Hill would have significant visibility when seen from parts of Kirriemuir, and to a lesser extent Forfar, both at over 10km distant. Drumderg is visible at 20km. The two Michelin turbines are barely visible from parts of Monifeith and Tullo will be visible from parts of Montrose at a distance of at least 12km.

Examination of the EIAs indicates that the proposed windfarms are mainly more than 5km from significant settlements and visibility is limited. The main exceptions are East Skichen, which lies within 2km of Monikie, and Montreathmont, the nearest turbines of which lie about 4km from Brechin to the north and Friockheim to the south. The location of most settlements on lower ground, often in topographic hollows, tends to limit the exposure of settlements to visual impact due to landform screening. Finally the extent of screening by tree cover and adjacent buildings and structures tends to be greater in and around the settlements compared with the more open exposed areas in the intervening farmland and hills.

Significant impacts on main settlements are therefore limited. The effects of East Skichen on Monikie and Craigton are the most notable, with a significant number of dwellings that would have clear or partially obscured views at distances of 1-2km. Montrose and Hillside would experience some effects from Montreathmont and Mountboy at distances of 6-12km, although due to screening and distance these are unlikely to be significant impacts for the settlements as a whole. The northern edge of Friockheim and higher windows in the east of the village looking north are likely to be affected by views of Montreathmont at 4.5km, especially in winter when trees along the Lunan Water are leafless. Mountboy may also affect the eastern edge at a distance of 6.5km.

### 5.3.2 Effects on Residential Receptors and Dwellings

In between the main settlements there are many small villages, clusters, farms and individual dwellings scattered throughout the lowland landscape of Angus. It is clear from the EIAs that there would be significant visual impacts on many of these, resulting principally from windfarms located within the lowland areas.

Currently the existing and consented windfarms at Drumderg, Ark Hill, and Tullo have a limited effect on Angus dwellings as they are well separated and have no, or relatively few, dwellings within 5km with clear views, where the most significant visual impacts are likely to lie. The Dundee turbines are clearly visible from many dwellings in Angus but lie in an urban context.

The proposed lowland windfarms are however located in areas surrounded by farmland that is populated with farms, clusters, dwellings and minor roads. Each will have significant impacts on a number of receptors in their dwellings as well as the general amenity of those property owners using the curtilage of their properties and local roads, tracks and paths serving the scattered communities.

The locations where local residents outside settlements are likely to be most affected by site specific and cumulative impacts are in the vicinity of Rossie Moor, north of Montreathmont Moor and around Carmyllie and Monikie. These areas all have a network of lanes and a number of small settlements or isolated dwellings.

From north of Montreathmont, farms and houses generally face south and have views towards the Montreathmont site at between 800m and 3km. Many such as East, West and Middle Drums, have elevated panoramic views that include Rossie Moor and the Mountboy site at 6-7km and would experience successive cumulative impacts.

Between Rossie Moor and Montreathmont a number of properties such as Strathella, Carcary Cottages, Whanland and Farnell Mains would potentially have successive cumulative views of Mountboy and Montreathmont.

Properties experiencing successive impacts from East Skichen and Dusty Drum lie on higher ground to the north of the two sites and include Carmyllie, Greystone and West Hills.

### **5.3.3 Effects on Roads**

Users of roads are the most likely receptor type to experience cumulative visual impacts. This may include combined and sequential impacts from any static point but critically also sequential impacts, experienced whilst travelling through the landscape. Whilst cyclists may be more sensitive to landscape than most vehicle drivers it is the latter that represent the highest number of receptors and experience the widest areas in the shortest period of time. This assessment therefore concentrates on vehicle drivers.

It is principally the main roads that are considered in the EIAs as they are the most travelled. Nevertheless some B roads are heavily used by local traffic and pass closer to sites. The roads included in this assessment are shown in Figure 5.4. Minor roads have been considered mainly in the context of residential receptors.

#### ***A90 Trunk Route (Dundee to Stonehaven)***

The principal trunk route through Angus is the A90, linking Dundee with Aberdeen via Forfar and Brechin. This road passes inland north from Dundee, crossing the

*Dipslope Farmland, Igneous Hills and Low Moorland Hills* before passing Forfar and continuing along the Lower Esk Valley. Visibility of consented windfarms is limited between Dundee and Forfar. The Michelin turbines are briefly visible near Dundee, Ark Hill is largely screened by landform and at least 10km distant when visible and Drumderg potentially visible at over 25km distant from the vicinity of Forfar .

Were East Skichen built it would be intermittently visible to the east at distances of 7-10km. Dusty Drum would be less visible and at distances of 11-13km.

North and east of Forfar the A90 passes through the broad Lower Esk Valley. There is extensive east-west visibility and visibility of the uplands to the north and west, although this is often limited by roadside trees. Visual impacts from operational and consented windfarms are limited due to lack of proximity or visibility: currently only Tullo would be visible at a minimum of 11km when travelling east of Brechin. Of the proposed windfarms, Montreathmont is within 5km at its closest and Mountboy within 10km, with actual visibility of Montreathmont more restricted by intervening trees and woodland. Travellers heading west would gain partial views of Mile Hile at a minimum distance of 14km. In Angus visibility of windfarms would be generally intermittent and distant, and travellers on the A90 would experience a '*Landscape with Occasional Windfarms*'.

East of Angus the A90 passes through Aberdeenshire, where Tullo windfarm lies within 3km and Clochnahill within 2km of the road with Mid Hill some 10km to the north. A further three small windfarm proposals lie within 5km. If all of these windfarms were developed it is likely that the traveller would experience a '*Landscape with Windfarms*' in Aberdeenshire.

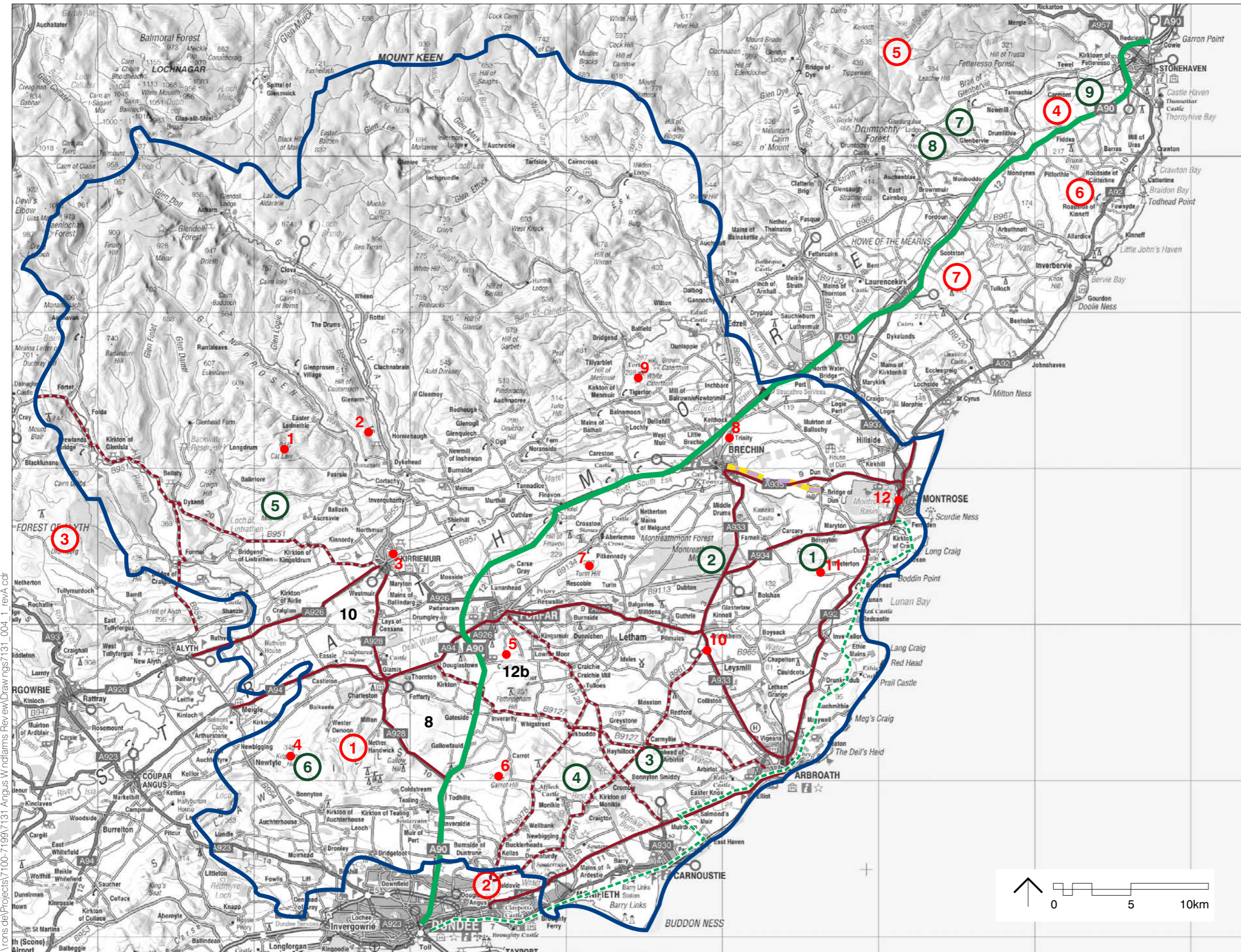
### ***A92 (Dundee to Montrose)***

The A92 between Dundee and Montrose passes through *Dipslope Farmland* close the coast, serving Carnoustie and passing through Arbroath. It is designated a coastal tourist route. Visual effects of windfarms are currently limited to the Michelin turbines at the western end near Dundee and the Tullo turbines will be visible from the northern end at a distance of over 15km.

The four proposed windfarms between Dundee and Montrose are all likely to have a degree of sequential cumulative impact. Of these it is the closest, at Dusty Drum (min. 3km) and Mountboy (min. 3km), that are likely to have the most significant impact: the former between Dundee and Arbroath, the latter between Arbroath and Montrose. Montreathmont would be only briefly visible north of Arbroath and East Skichen intermittently visible between Dundee and Muidrum.

### ***A926 (Kirriemuir to Alyth)***

The A926 passes along the north side of Strathmore between Kirriemuir and Alyth. Drumderg has limited visibility from this section of road but there will be views of Ark Hill 10km to the south. Limited views of Mile Hill would be available near Kirriemuir and Alyth.



Angus Local Authority Boundary

**Road Network**

- Trunk Road
- 'A' Road
- 'B' Road
- National Cycle Route
- Caledonian Railway

**View Points**

1. Cat Law
2. Airlie Monument
3. Kirriemuir Camera Obscura
4. Kinpurney Hill
5. Balmashanner
6. Carrot Hill
7. Turin Hill
8. Trinity, Brechin
9. White Catherthun
10. B961/A933
11. Rossie Moor
12. Montrose Station

**Windfarm Locations**

- Operational & Consented Windfarms
  1. Ark Hill
  2. Michelin
  3. Drumdreg
  4. Clochnahill
  5. Mid Hill
  6. St John's Hill
  7. Tullo
- Planning Applications
  1. Mountboy
  2. Montreatmont
  3. Dusty Drum
  4. East Skichen
  5. Mile Hill
  6. Scotston Hill
  7. Droop Hill
  8. Herscha Hill
  9. Hillhead of Aquhirie
  10. Meikle Carewe

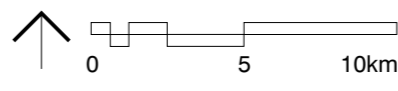


Figure 5.4  
Road & Viewpoint Locations

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***A928 (A90 to Kirriemuir)***

In the west of Angus the A928 passes through the Sidlaw Hills and across Strathmore, between the A90 north of Dundee and Kirriemuir. Drumderg is visible to the west at a minimum 20km. There would be views of Ark Hill at less than 10km travelling south across Strathmore. Partial views of Mile Hill at 10-15km would be available when travelling north through the hills and across Strathmore.

***A94 (Meigle-Forfar)***

The A94 passes along the south side of Strathmore between Meigle and Forfar. Drumderg is readily visible across Strathmore to the north at a minimum distance of 16km. Travellers would be subject to intermittent views of Ark Hill in the Sidlaws to the south at a closest distance of 5km. Of the proposed windfarms, there would be partially screened views of Mile Hill at a minimum 10km to the north.

***A932 - A935***

The roads most affected by cumulative impacts are likely to be the network of the A932, A933, A934 and A935 which all lie between Arbroath, Brechin, Forfar and Montrose. These are currently mainly unaffected by views of windfarms although views of Tullo will be available from some sections.

***A932 (Forfar to Friockheim)***

Travellers on the A932 from Forfar to Friockheim are likely to experience intermittent successive and sequential views of Montreathmont and to a lesser extent Mountboy windfarm at distances of 5-10km when travelling east.

***A933 (Arbroath to Brechin)***

There would be impacts by Dusty Drum, Montreathmont and Mountboy on travellers on the A933 travelling between Arbroath and Brechin. Views of Dusty Drum at 6km or more between Arbroath and Colliston would be oblique and partially obscured by trees. The clearest views of Montreathmont and Mountboy would appear when travelling north of Colliston, with Montreathmont ahead at 10-4km and Mountboy to the northeast and east at 10-5km, leading to combined and successive cumulative impacts. Closer to Montreathmont the turbines would mainly be screened by the trees in Montreathmont forest that line the road although intermittent views of the closest turbine (within 500-800m of the road) may be available. Travelling south from Brechin both windfarms would also be visible but intermittently through gaps between trees and woodlands.

***A934 (Montrose to A933)***

Montreathmont would be intermittently and openly visible from 10km down to 1km to travellers on the A934 travelling west from Montrose. Mountboy would be visible only to travellers heading east and would be visible for a distance of over 5km at a distance of 2-6km. Tullo windfarm would also be visible travelling east at a distance of 15-22km, with other windfarms in Aberdeenshire at a greater distance.



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### **A935 (Montrose to Brechin)**

Travellers on the A935 from Montrose to Brechin would have intermittent views south across Montrose Basin and farmland towards Mountboy and southwest to Montreathmont at distances of 5-10km. The latter is visible obliquely ahead when travelling west. Travelling east there would be intermittent views of Mountboy

### **'B' Roads**

Of the more minor roads there are some that would experience significant cumulative effects.

East of the A90 the **B961** passes northeast from Dundee across *Dipslope Farmland* to the A933 near Friockheim. In doing so it currently passes within a few hundred metres of the Michelin turbines in Dundee. Were all the proposed turbines built, travellers heading north would then pass within 2km of East Skichen and 1km of Dusty Drum with clear sequential views of both. As it passes over high ground at Redford and descends towards Friockheim there would be clear combined and successive views of both Mountboy at 7-10km and Montreathmont at 6-10km. A number of Aberdeenshire windfarms would be visible at more than 30km.

The **B978** passes between Dundee and the B9128. Travelling south, intermittent views of the Michelin turbines are available descending from Carrot Hill into Dundee. At the northern end travellers may catch a view of Ark Hill. Views of East Skichen as close as 1.5km would be prominent on the higher parts of this road and Dusty Drum would be visible 5-6km away. Montreathmont would be visible from the northern end.

The **B9127** passes from Arbroath west to the A94 southwest of Forfar. Drumderg at a minimum 24km and Ark Hill at a minimum 8km are visible from the western end of this road. Considering the proposed windfarms: travelling west from Arbroath views of Dusty Drum would be available to the west at a maximum distance of 7km, interrupted by the trees surrounding the Guynd. The road then passes 1km north of the turbines at Milton of Carmyllie. Views of East Skichen would also be available on much of the route at 5km further distance. West of Carmyllie there would be views of East Skichen rising up between blocks of trees until Whigstreet, the road passing within 3km to the north at the B978 crossroads. Dusty Drum would also be visible when travelling over this stretch of road from the crossroads. Mile Hill would be occasionally visible west of the B961 crossroads, 14km at closest on the A94 junction.

The **B9128** passes from Muirdrum to Forfar, over *Dipslope Farmland* and *Low Moorland Hills*. Travellers in either direction would experience views of Dusty Drum and East Skichen within 1.5-2.5km, although with some screening by mature plantations at the closest points. Oblique views of Montreathmont at ca.10km would be intermittently available near Letham and Forfar.

In the west travellers on the **B951** from Kirriemuir to Glen Isla and the **B954** to Alyth currently experience intermittent views of Drumderg to the west at 7-15km and will experience views of Ark Hill to the south at ca.12-15km. If all windfarms were

developed there would also be views of the Mile Hill turbines as close as 3-5km and the turbine at Scotston hill near Ark Hill.

### ***Summary of Effects on Roads***

Currently there are relatively restricted views of operational and consented windfarms from roads within Angus. Only roads in the west would have occasional views of wind turbines at close hand at Dundee and Ark Hill. Drumderg in the west and Tullo and St Johns Hill in the east would be occasionally visible in the background.

Analysis of views from roads towards proposed windfarms indicates that the most significant cumulative effects within Angus are likely to be in the eastern part, particularly in the area between Brechin, Friockheim and Montrose and journeying between this area and Dundee. Sequential and successive cumulative effects on travellers on these roads would give the impression of a *Landscape with Windfarms*, particularly in the *Dipslope Farmland* and the *Lowland Forest and Farmland* area. Elsewhere, in the *Broad Valley Lowlands* and Sidlaw Hills views of windfarms would be more intermittent or at distance and travellers would gain the impression either of a *Landscape with Occasional Windfarms* or *Landscape with Views of Windfarms*. There are too few road receptors within the highland areas for there to be a noteworthy effect but travellers on some minor roads west of Kirriemuir would get an impression of a *Landscape with Windfarms* as a result of Drumderg and Mile Hill, together with the visual influence of Ark Hill.

It is notable that within Aberdeenshire travellers on the A90 trunk route between Angus and Stonehaven would experience considerably more views of windfarms at close hand than would be the case for the A90 in Angus, even if all the proposed windfarms in Angus were to be developed.

#### **5.3.4 Effects on Cycle Routes**

National Cycle Route 1 passes from Dundee to Montrose via Arbroath along 'B' and minor roads, mainly through *Dipslope Farmland* and Coastal landscape types. From west to east it first passes along the sea front in Dundee, passing within 2km of the Michelin turbines in Dundee, although has limited views of these. It then passes alongside the railway along the coast to east of Carnoustie before turning north and paralleling the A92 into Arbroath. Oblique views of East Skichen (min. 7km) and Dusty Drum (min.3.5km) would be available from much of the route. North of Arbroath the route would have more distant (11km minimum) views of Montreathmont and passes within 3.5km of Mountboy, having views of it over a number of kilometres. Views south west to Dusty Drum (min. 12km) and north to Tullo (min. 16km) would also be available. Sequential and successive cumulative views over the whole route would be sufficient to give the impression of a *Landscape with Windfarms*.

### 5.3.5 Effects on Visitor Destinations

The following includes the key visitor destinations and some representative locations in Angus, whether locally popular or tourism-related. There is a degree of overlap with the representative viewpoints in the following section.

#### ***Cairngorms National Park***

Effects on the Cairngorms National Park would be limited as it is remote from most of the windfarm locations. Only Drumderg currently lies within 20km of the national park and has visual effects on the summits and plateaux from Glen Clova west but is not visible from the glens. Of the proposed windfarms Mile Hill would not be visible and all of the lowland windfarms would be more than 20km distant, clearly located in the lowlands and only visible from the higher or more southerly ridges and summits.

#### ***Angus Glens***

The Angus Glens are a key visitor destination in themselves and a route by which the highland summits are accessed. As discussed in section 5.2 they are only marginally affected by the operating, consented and proposed windfarms. None will be directly affected and they are enclosed from views by the ridges of *Highland Summits & Plateaux*. Only the entrances to the glens are likely to have limited views of windfarms, with the most affected being Glen Isla, passing between Drumderg and Mile Hill. Even here views are limited by landforms and trees.

#### ***Montrose Basin***

As an SAC and Scottish Wildlife Trust reserve this is a popular bird watching location as well as being a unique feature to the setting of Montrose. The effect on this is largely covered in sections 5.2. At present views northeast will be affected by fairly distant views of Tullo windfarm in Aberdeenshire, but both Montreathmont and Mountboy would have significant visual effects from many locations around the Basin, seen in combination, successively or sequentially.

#### ***The Caledonian Railway***

The Caledonian railway is a private steam railway running over 7km from bridge of Dun near Montrose to Brechin. It runs roughly parallel to the A935. There are no views of operational or proposed windfarms. There would be intermittent successive and sequential views of Mountboy and Montreathmont at distances of 5-8km seen from Bridge of Dun and from lengths of the line that are not in cutting. No other proposed windfarm would have significant visibility.

#### ***Historic Landscapes and Houses***

A number of HGDLs and country house are open to visitors and would be attractions to both tourists and local visitors.

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### *Kinnaird Park and Castle*

Kinnaird Park and Castle have theoretical visibility of Tullo at 18km would have successive and sequential views of both Mountboy and Montreathmont at ca. 3km although this would be limited over much of the parklands by extensive mature tree cover. The windfarms would be fully visible from upper windows of the castle.

### *House of Dun*

Views of Mountboy on the skyline at 6km would be available from the house but more limited by trees when viewed from the grounds. Montreathmont would also be visible successively at 8km from the house and some of the eastern grounds but visibility would be limited by topography and trees.

### *Brechin Castle*

Located just south of Brechin, this is surrounded by dense belts of trees on low lying ground by the River South Esk. It has theoretical visibility of up to three windfarms in parts of its grounds but in reality none are likely to be visible due to the trees

### *Guthrie Castle*

This is located 4km southwest of Montreathmont but the turbines will not be visible due to landform and trees. Mountboy at 9km to the east is theoretically visible but this will be restricted by trees.

### *Cortachy Castle*

This house and grounds is located at the foot of Glen Clova. Only Mile Hill and Montreathmont have theoretical visibility and both would be limited by dense belts of trees.

### *House of Pitmuies*

This HGDL is located close to Guthrie Castle. It has a greater theoretical visibility of Mountboy and Montreathmont windfarms but views would be largely screened by trees.

### *Glamis Castle*

Glamis is probably the most internationally renowned of the stately homes in Angus. Centrally located it will have partial views southwest of Ark Hill at 5km and west to Drumderg at 20km, although both limited by tree cover. Mile Hill will also be partially visible to the west. Views east and south east to the other windfarms that would be theoretically visible are severely limited by dense belts of trees.

### *Ascreavie*

This is a designed landscape located northwest of Kirremuir. Views of Ark Hill would be available 13km to the south. Mile Hill 1.5km to the northwest, is theoretically visible but obscured by tree belts.

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### **Country Parks.**

There are three country parks within Angus. These are sites that would be predominantly used by local people.

The country park at Forfar Loch will have a view of Ark Hill at approx. 12km. Mile Hill would be partially visible at 15km. None of the other proposed windfarms are likely to be visible.

Monikie Country Park has no views of operating or consented windfarms. Of the proposed windfarms East Skichen windfarm at 1-2km will be dominant in views north from the reservoir although screened from much of the rest of the park by trees. The blades of Dusty Drum will also be visible above trees to the northeast at 5km, seen in succession to those of East Skichen.

Crombie Country Park, 2km northeast of Monikie has no current views of windfarms. However sequential and successive views of East Skichen and Dusty Drum at distances of between 1 and 3km would be available from parts of the park, particularly at the northern and southern entrances where tree cover is less dense.

### **Summary of Effects on Visitor Destinations**

There would be limited effects on the National Park and Angus Glens as most of the windfarms are located within the lowlands.

The other locations assessed are generally in mature landscape settings, where trees will restrict the visibility of windfarms. It is only in close proximity to the proposed windfarms that potentially significant cumulative impacts would be experienced. This is exemplified by the effects on Monikie and Crombie Country parks near Dusty Drum East Skichen and Montrose Basin and the Caledonian Railway near Mountboy and Montreathmont.

## **5.3.6 Effects on Viewpoints**

The following illustrative viewpoints are primarily extracted from the EIA assessments and serve as examples of locations where there are relatively extensive views and/ or frequent access or usage by visual receptors. These represent in some cases a worst case scenario in that they are mainly the best viewpoints for the maximum number of receptors. Nevertheless, it is open and extensive viewpoints that, in addition to more habitually frequented locations, give an overall impression of an area and, in this case, the extent to which windfarms are affecting or would affect the character of the landscape. Their locations are shown in Figure 5.4

### **1. Cat Law**

Cat Law is representative of hilltop views from the southern edge of the *Highland Summits & Plateaux* in the west of Angus. It has panoramic views of the lowlands and views north and west to the hills and glens of Angus and Perthshire. Drumderg windfarm is noticeable on a ridge 15km to the east and Ark Hill will be visible on the Sidlaw ridge 20km to the south. Windfarms in Aberdeenshire would be at least 40km

distant. Due to the distance to most windfarms the view would generally appear as a *Landscape with Occasional Windfarms* over Angus as a whole.

Of the proposed windfarms Mile Hill would be prominent 3km away at the southern foot of Cat Law and the single turbine of Scotstoun Hill would be visible near to Ark Hill. All of the other lowland windfarms would be visible but at distances of at least 25km. The views would give the impression of a *Landscape with Occasional Windfarms*. However the closer proximity of Mile Hill and prominence of Drumderg may give the impression of this southwest corner of the highland area as a *Landscape with Windfarms*.

## **2. Airlie Tower**

Airlie Tower is a prominent monument located on a ridge in the *Highland Foothills*. The tower itself is not accessible and views are gained from the surrounding open ground, but views are partly obscured by trees. Of the consented windfarms Ark Hill will be visible 18km to the south. Tullo would be nearly 40km to the east. Drumderg is screened by landform to the west. This would appear as a *Landscape with Views of Windfarms*.

Considering the proposed windfarms, Montreathmont would be visible 22km to the east and Mountboy directly behind it at 29km. East Skichen and Dusty Drum would be 24 and 27km to the south east. Mile Hill would be screened by landform. The lowlands would appear as a *Landscape with Occasional Windfarms*.

## **3. Kirriemuir Camera Obscura**

The camera obscura is a viewpoint directly above the town of Kirriemuir with views over the town and Strathmore and Sidlaw Hills beyond. Of consented windfarms Ark Hill will be visible on the horizon 10km to the south and Drumderg is visible on the horizon 20km to the west, giving the impression of a *Landscape with Occasional Windfarms*.

If the proposed windfarms were developed only one turbine of Mile Hill would be partially visible 8km to the west and the three turbines of Dusty Drum 21km to the southeast. The overall impression would remain that of a *Landscape with Occasional Windfarms*.

## **4. Kinpurney Hill**

Kinpurney Hill is a high hilltop viewpoint with hillfort and tower located in the Sidlaw Hills in the west of Angus above Meigle. It has extensive all round views of the Angus lowlands and towards the highlands across Strathmore. Ark Hill windfarm would be highly prominent at 3km to the east. Drumderg is visible in the Perthshire hills at 25km to the northwest. The eastern Sidlaw Hills would appear as a *Landscape with Windfarms*.

Considering proposed turbines the wind turbine at Scotstoun Hill in the Sidlaws would be prominent at 2.5km. To the north Mile Hill would be partially visible in the Alyth Foothills at 16km. Montreathmont would be visible in the east at 30km. Other

windfarms in Angus would be hidden by intervening hills. The main impression gained would be of the eastern Sidlaw Hills as a *Landscape with Windfarms* and the southern edge of the Highlands as a *Landscape with Occasional Windfarms*.

### **5. Balmashanner**

This viewpoint is a hilltop to the south of Forfar. The principal viewpoint has panoramic views over the town and west to Strathmore with trees obscuring other views. Further views to the south and east are available from other locations on the hilltop. Of consented windfarms Drumderg is visible to the west at nearly 30km but Ark Hill is screened. At most this would appear as a *Landscape with Views of Windfarms*.

Of proposed windfarms Montreathmont would be clearly visible 13km to the east with Mountboy at 19km visible in a gap between hills slightly to the south of this. Dusty Drum would be partially visible on the southern horizon at 13km but East Skichen would be screened by trees. If the viewer moved to the west, Mile Hill would be partially visible 16km to the northwest. The overall impression gained would be of a *Landscape with Occasional Windfarms*.

### **6. Carrot Hill**

Carrot Hill is located on the eastern edge of the Igneous Hills, being somewhat lower and more rounded than the Sidlaws to the west. It has panoramic views over the Angus lowlands and towards the highlands in the north, with shorter distance views to the Sidlaws in the west. Of the operational and consented windfarms Drumderg, Michelin and Ark Hill are partially visible, the latter two at 10km and 8km. The experience would be of a *Landscape with Occasional Windfarms*.

Considering the proposed windfarms as well, east Skichen would be prominent at 4km to the east with Dusty Drum noticeable at 9km in the same direction. Montreathmont and Mountboy would be visible to the northeast at distances of 19km and 24km. The impression gained of the *Dipslope Farmland* would be of a *Landscape with Windfarms*, with the lowlands as a *Landscape with Occasional Windfarms*.

### **7. Turin Hill**

Turin Hill is centrally located in the *Low Moorland Hills* to the east of Forfar. It is a prominent hilltop and hillfort with panoramic views across much of Angus. Of existing and consented windfarms, Drumderg is visible at over 30km to the west and Ark Hill would be visible to the southwest at 20km. Tullo would be visible at 30km to the east, with three other windfarms at up to 40km. This is a *Landscape with Views of Windfarms*.

Of the proposed windfarms Montreathmont would be prominent at 7km to the east, with Mountboy behind it at 14km and further small windfarms in Aberdeenshire at over 30km. Dusty Drum and East Skichen would be visible on the horizon to the south at 13km and Mile Hill partially visible to the west at 20km. The Angus lowlands would appear as a *Landscape with Occasional Windfarms* but to the east, looking at

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Montreathmont and other windfarms receding into the distance, an impression may be gained of a *Landscape with Windfarms*.

### **8. Trinity, Brechin**

This viewpoint represents higher ground close to the town of Brechin and the A90 trunk road. Views are to the east and south. No consented windfarms would be visible. Of the proposed windfarms Mountboy would be visible on the southwest horizon at 9km and only the moving blades of some of the Montreathmont turbines would be visible above trees at a distance of 7km. The overall impression would be of a *Landscape with Occasional Windfarms*.

### **9. White Catherthun**

White Cathertun is hilltop fort located in the Menmuir Foothills above Brechin and has extensive all round views of the lowland area as well as the eastern part of the highland area. Considering existing and consented windfarms there would be mainly distant views. Ark Hill would be partially visible at 30km, with Tullo, St John's Hill and Clochnahill visible in Aberdeenshire at 20-30km distant. This is a *Landscape with Views of Windfarms*.

Including all proposed windfarms, Montreathmont at 12km and Mountboy at 16km would be noticeable in the nearer lowlands and Dusty Drum and East Skichen on the distant horizon at over 25km. Mile Hill would be just visible over hills at 25km. Another three small windfarms would be apparent in Aberdeenshire at distances of 23-32km. Overall the windfarms would clearly be associated with the lowlands which in Angus would appear as a *Landscape with Occasional Windfarms* due to the distance to most, but in Aberdeenshire would appear as a *Landscape with Windfarms* due to the number of windfarms.

### **10. B961/A933 Junction**

This road junction is located in *Dipslope Farmland* in eastern Angus, south of Friockheim. It has panoramic views to the north and east, taking in Montreathmont Forest and Rossie Moor with the highland hills and Aberdeenshire beyond. Of consented windfarms only Tullo would be visible at 28km. This is a *Landscape with no Windfarms*.

Of planned windfarms, both Montreathmont (6km) and Mountboy (8km) are close and would be prominent in views spanning from north to northeast, giving the appearance of a *Landscape with Windfarms* in this direction. No windfarms would be visible to the south and east.

### **11. Rossie Moor**

Rossie Moor is the high point of an area of *Dipslope Farmland* in the east of Angus set between Montrose Basin and the Lunan Water. Extensive views are available from various locations on the moor but all round views are only available by moving about the high area. Of the consented windfarms Tullo would be noticeable 20km to



the northeast, with St John's Hill partially visible. All other consented windfarms would be more than 30km distant. This is a *Landscape with Views of Windfarms*.

Considering the proposed windfarms the turbines of Mountboy would dominate the summit of Rossie Moor and Montreathmont would be prominent in views to the west. Dusty Drum and East Skichen would be visible to the south west at 17km and 20km respectively. The impression would be gained of a *Landscape with Windfarms* in the vicinity of Rossie Moor and towards Montreathmont and a *Landscape with Occasional Windfarms* over Lowland Angus.

## **12. Montrose Railway Station**

Montrose Railway Station is located on the edge of Montrose Basin, with open views to the west. Views to the east are restricted by the buildings of Montrose but some views to the north are available from the railway footbridge. Of consented windfarms limited views of Tullo at 14km would be available.

Including all proposed windfarms, Mountboy and Montreathmont would be visible over the Basin to the west at 6.5km and 11.5km respectively, the latter fully visible. Together with views of Tullo this would appear as a *Landscape with Windfarms*.

### **Summary of Effects on Viewpoints**

Considering all the viewpoints the impression gained from most, whether in the highland, lowland or coastal area, is primarily of a lowland *Landscape with Occasional Windfarms*. Nevertheless in the *Dipslope Farmland* and *Lowland Forest and Farmland* or areas close by the impression gained is often that of a *Landscape with Windfarms*.

## **5.4 Overall Assessment of Cumulative Impacts**

### **Existing and Consented Windfarms**

There is only one consented windfarm in Angus, the 8x78m turbines at Ark Hill. Its significant landscape impacts will be limited to within the eastern end of the Sidlaw Hills. Other operational and consented windfarms close to Angus include the 8x101m turbines at Tullo in Aberdeenshire, 16x108m turbines at Drumderg in Perth & Kinross and the two 120m turbines at Michelin in Dundee. The latter is closest to Ark Hill at just over 10km but is not intervisible with it. Drumderg at 20km distance lies in a clearly separate upland landscape. The other consented windfarms in Aberdeenshire are 50-60km distant from Ark Hill. A significant part of Angus has no views of windfarms and small parts are a *Landscape with Windfarms* or *Landscape with Occasional Windfarms*. However the landscape character of Angus is primarily a **Landscape with Views of Windfarms** in which windfarms, although occasionally present or visible, are not located within, or a defining characteristic of, the landscape.

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### ***Existing, Consented and Proposed Windfarms***

If all the potential windfarms in and around Angus were to be developed there would be extensive parts of the lowland landscape affected by individual windfarms and some areas in which these effects combine to give cumulative impacts.

Examining the specific effects of the proposed windfarms, our assessment has concluded that, should all the proposals go ahead, they will not dominate the lowland landscape of Angus (ie create a '*Windfarm Landscape*') but will become a defining characteristic of part of it: creating a **Landscape with Windfarms** in the *Dipslope Farmland* northeast of Dundee and south of Montrose and in the *Lowland Forest and Farmland* area east of Turin. With one additional 80m turbine the Sidlaw Hills would remain a **Landscape with Occasional Windfarms**. In other lowland areas no direct effects would be experienced but they would be a **Landscape with Views of Windfarms**. Overall the Lowland landscape would become a **Landscape with Occasional Windfarms**.

The Highland landscape has fewer existing or proposed windfarms, with Drumderg outside Angus exerting a significant direct and indirect influence on the *Highland Summits and Plateaux* landscape of Forest of Alyth and part of Caenlochan/Glen Doll. Overall the Highland Landscape would become a **Landscape with Occasional Windfarms** west of Glen Clova and south of the National Park and a **Landscape with Views of Windfarms** east of Glen Clova and south of the National Park.

The Coastal area would become a **Landscape with Views of Windfarms**. In the case of Montrose Basin this would be a significant indirect effect due to the size and proximity of the Montreathmont Turbines in combination with visibility of Mountboy and Tullo.

These conclusions represent an assessment of change in the landscape of Angus and people's experience of it. The changes resulting from proposed windfarms in addition to the operating and consented ones would lead to significant changes to a large area of the lowland landscape and a small area of the highland landscape. In relation to Angus as a whole the changes would not be significant. The limited extent of significant impact is despite the number of windfarms involved is very much related to the small scale of most of the proposals and their separation. One proposal is for a single turbine and three have only three turbines each. Windfarms with significantly larger numbers of turbines in the same locations as the proposed windfarms would undoubtedly have a more extensive significant effect on the landscape and on visual receptors experiences. Furthermore, proposals for only one or two more windfarms on high ground in the lowland area would lead to a significant extension of areas of *Landscape with Windfarms*.

Further to the discussions in section 2.2 regarding the nature of change, it is considered that the changes would be adverse in relation to the existing landscape character. Nevertheless, the degree of adversity would be at least partially independent of the magnitude of change and partially dependent on the landscape type in which the changes take place.

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In section 2.2 we have identified that the negative characteristics of turbines in a landscape relate to their large scale, industrial nature and their movement. Some landscapes such as degraded post industrial or mineral extraction landscapes would be less negatively affected than more rural or wilderness landscapes as the turbines would fit within the perception of the landscape as being man-made.

This argument can be extended to consideration of types of rural landscape. In the context of Angus the lowland landscape has features and infrastructure in which human intervention is clearly expressed, whereas the upland landscape, despite being a product of human intervention, carries far less infrastructure or obvious human references. The turbines would therefore appear more appropriate (and less negative) in a working lowland landscape than in an upland landscape with remote and wilderness characteristics. Arguments concerning scale and simplicity of landscape character often work against this perception, with larger scale, simpler upland landscapes considered better able to absorb large scale turbines. Nevertheless in the specific context of Angus there are a number of factors that reduce the strength of this argument:

- 1) The lowland landscape is relatively large scale, dominated by simple landforms and landcover patterns, with large rectilinear arable fields, plantation woodlands and medium size hills, covering an extensive area.
- 2) The highland landscape forms an important and highly visible backdrop to the settled area of Angus and is an important recreational resource of high scenic quality with remote and wilderness characteristics to the north. It is also an important visitor destination and part of it is designated as a National Park.

It is our conclusion that, considering the potential magnitude of effects, appropriateness of character and potential for adverse impacts, the lowland landscape of Angus has more capacity for windfarm development than the highland or coastal landscapes. Nevertheless the form, location and pattern of development must be appropriate to landscape scale and pattern of the affected areas.

Furthermore this is primarily a strategic landscape assessment. It does not detail the effects that any development may have on specific sensitive receptors: residential, visitor and travelling. This is indicated by the individual environmental statements for each of the proposed developments.

This assessment has considered the capacity of the Angus landscape to absorb windfarm development and the potential effects of the operating, consented and proposed developments on the landscape character. Our conclusion on the extent and nature of impacts should be borne in mind when considering the acceptability of proposals. The following section considers potential ways of reducing impacts, should this be considered necessary to make the proposals more acceptable.

## 5.5 Potential Mitigation Strategies

Having defined the effect of the existing and proposed windfarms on the character of the landscape we also consider what factors in the design and location of windfarms could mitigate the potential impacts and whether any of these are feasible in the context of the existing proposals.

In their consideration of the applications Scottish Natural Heritage have suggested two main forms of mitigation to reduce the impacts of the proposed developments:

- 1) **Turbine Size Reduction.** In the case of the lowland developments it has been suggested that turbines are reduced in size by approximately one third. This is because SNH consider the turbines to be out of scale with the lowland landscape and smaller turbines would fit better with its character.
- 2) **Reduction in Turbine Numbers.** This was suggested for Montreathmont, with the original application for 19 turbines having been reduced to 11. The reasons for this included reducing dominance on the landscape and improving the visual composition of the windfarm when seen from surrounding locations by reducing visual overlap between turbines and visual clutter.

### ***Turbine Size Reduction***

Whilst reduced turbine size would lead to something of a reduction in landscape and visual impacts it is clear that even the reduced size turbines remain substantially larger than any other structure in the landscape and remain kinetic, unlike most other landscape features.

We have amended a number of the Mountboy and Montreathmont photomontages by reducing apparent turbine sizes to that suggested by SNH. We note the following:

- 1) There is a clear change in most images, with the turbines appearing smaller.
- 2) There is less of a change in the perception of the turbines: they remain as large structures in the landscape. Locations close to the turbines are still significantly affected and the turbines appear larger than all except foreground landscape features.
- 3) It is only when the viewer is some distance from the turbine locations that it is apparent that reducing turbine size leads to a reduction in impacts on the wider landscape and on visual receptors.
- 4) Size reduction appears more effective when there are reference features of comparable scale within the view. As there are usually none in close proximity to the turbines it is often foreground objects that provide the scale reference. In an open view size reduction is less effective.
- 5) Size reduction appears more effective on the smaller group of three turbines than it does on the group of eleven. The effect of a larger number of turbines remains more apparent, possibly because the ratio of its lateral extent in relation to vertical extent is less apparent than for the group of three. Any reduction in

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turbine size should be accompanied by closer spacing allowed by technical considerations.

We conclude that turbine size reduction has limited value in mitigating landscape and visual impacts. As it has to be balanced against losses in output, size reduction should be used in specific cases where a clearly identified benefit can be achieved, such as mitigating severe impacts on a highly valued or sensitive receptor; allowing a key landform and/or forest to completely screen turbines from certain receptors or to achieve a significant reduction in overall visibility by virtue of relationship to surrounding landform. Where reduction in impact would be a matter of degree rather than a clear quantitative change the benefits are less clear cut.

### ***Turbine Number Reduction***

In the case of turbine numbers we note the overall benefits achieved by reduction of turbine numbers at Montreathmont from 19 to 11. However in comparing Montreathmont with Mountboy we particularly note the difference in visual qualities of a multi-turbine windfarm compared with that of a three turbine windfarm. Despite the wind turbines being of similar size and visibility, the lateral extent of the windfarm is limited and much closer to the vertical dimension. They present a simple, compact, visual image devoid of the 'cluttered' image that larger windfarms usually have. To this extent they would have a disproportionately lesser influence on the landscape.

### ***Turbine Distribution***

When considering cumulative impacts of turbines and windfarms it is not just the number of turbines in the landscape that affects impacts but also the pattern of windfarm development. This has an effect on the ability of the landscape to absorb change and on visual receptors. The dispersal of the turbines in small groups has some advantages in that each grouping is less dominant within the landscape and presents a less cluttered visual image. However, the increased number of windfarms also means that there is an increased likelihood of seeing a windfarm and at closer proximity than if the turbines were concentrated into fewer locations.

As discussed in section 2.3 the emerging trend in Scotland is for the concentration of wind turbines into fewer, larger, windfarms. The pattern of proposed development in Angus is currently the opposite of this, comprising scattered windfarm development of small or medium scale (albeit most are proposing large size turbines). Given the scale and pattern of the landscape in the proposed locations, and the need to avoid unacceptably close proximity to residential property, it would seem that this is an appropriate pattern of development responding to these constraints. Nevertheless there would be limits to the number of windfarms if significant cumulative change over a wide area is to be avoided and the potential changes that have been identified within the *Dipslope Farmland* underline this.

The largest proposal. at Montreathmont. is unusual in this lowland landscape in that it is set within a larger scale area of forestry with few residential properties. This area has less constraint on development than in the surrounding lowland areas but nevertheless has potentially severe adverse impacts on the nearest properties. This

development in itself is of a relatively modest size when compared with a number of consented windfarms in Scotland, reflecting the relatively restricted extent of even this area compared with the very sparsely populated upland plateau landscapes in which windfarms such as Whitelee (Lanarkshire and Ayrshire) and Crystal Rig (Scottish Borders) are located.

### ***Distribution in Relation to Landscape Type***

In a dispersed pattern of development such as is evolving in Angus the likelihood is that windfarms will be located in more than one landscape type and that some landscape types have less capacity for development than others. In this case it would be appropriate to consider the relative merits of guiding development to the areas most capable of absorbing development. Subject to the specific impacts of any particular proposal, this would reduce the potential for the most significant and adverse landscape impacts. It would also restrict the windfarm landscape typology to a more narrowly defined range of landscapes, thereby reducing the perception of unplanned proliferation of windfarms throughout a local authority area. In Angus this approach has been signalled through local plan policy ER34, the justification for which indicates that, within Angus, lowland landscapes would be more suitable for windfarms than highland or coastal landscapes.

## **5.6 Specific Strategies for Reducing Impact**

Taking potential generic mitigation measures into account the following section explores the effects of specific amendments to the proposed developments and development pattern on overall cumulative impacts. This assessment relates only to the six proposed windfarms in Angus. It must be borne in mind that proposed changes involving reduction in turbine size or number may provide landscape and visual mitigation but would also result in a net loss of output and this would need to be considered in the decision making process.

### ***Reducing the Number of Windfarms***

A reduction in the number of windfarms would reduce the extent of windfarm affected landscape and the number of visual receptors, thereby reducing the potential cumulative impacts.

Of the proposed windfarms Montreathmont clearly has the greatest potential for landscape and visual impact, relating mainly to the number and size of turbines; significantly greater than any other of the proposals. Without this proposal there would be significantly reduced landscape effects on *Low Moorland Hills*, Montrose Basin and the northern part of the *Dipslope Farmland* as well as visual effects on properties to the north of the forest and the roads between Brechin, Arbroath, Forfar and Montrose. There would be no cumulative impacts with Mountboy.

The proposed three-turbine windfarms at Mountboy, East Skichen and Dusty Drum individually have a lesser effect on the landscape, with the more important consideration being localised visual impacts.

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Mountboy, although at a lower elevation than East Skichen and at a similar elevation to Dusty Drum, has a prominent position on Rossie Moor relative to its surroundings. Not proceeding with this development would avoid impacts on a number of isolated properties on Rossie Moor and cumulative impacts together with Montreathmont on the Rossie Moor area of *Dipslope Farmland* and on Montrose Basin. There would also be avoidance of visual impacts on the A92 and the coastal side of the *Dipslope Farmland* north of Arbroath.

Cumulative impacts northeast of Dundee could be reduced or avoided by proceeding with only one of East Skichen or Dusty Drum, depending on which was considered to have the greater stand-alone impacts.

Not proceeding with one each of East Skichen/ Dusty Drum and Montreathmont/ Mountboy would avoid all but limited sequential cumulative impacts on the *Dipslope Farmland* area as the two remaining windfarms would be between 13 and 20km apart and separated by a ridge of higher ground.

Mile Hill has little cumulative interaction with the four other windfarms and limited interaction with any other consented or proposed windfarm. Due to topographic screening its effects are relatively limited. However it is located in the more sensitive highland area of Angus, has highly adverse local impacts and would have some potentially significant cumulative impacts with Drumderg.

Careful consideration should be given to the overall number and distribution of the windfarms considering the increasingly favoured strategy of concentrating larger windfarms in fewer locations. This would require careful study of the balance of reduction in cumulative impacts against potentially significant adverse localised impacts.

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## 6.0 SUMMARY AND CONCLUSIONS

This study has considered the capacity of the Angus landscape to absorb windfarm development as well as considering the cumulative impacts that would potentially arise from all of the operating, consented and proposed windfarms in Angus and adjacent local authority areas. In doing so it has addressed a number of concepts and issues that affect the perceived significance and acceptability of cumulative changes caused by multiple windfarms in the landscape.

### 6.1 Landscape Character and Capacity

The landscape of Angus is divided into three main types:

- 1) A coastal strip along the Firth of Tay and North Sea coast, including Montrose Basin
- 2) An extensive area of lowland farmland and hills north and west of the coast and Dundee
- 3) An extensive area of highland summits, plateaux and glens to the north, separated from the lowlands by the Highland Boundary Fault.

An assessment of the landscape character and capacity for windfarm development has determined that the highland and coastal areas have a high landscape value and sensitivity and low capacity for windfarm development. The lowland area of Angus has the greatest capacity for windfarm development. Nevertheless capacity is limited by the medium scale and pattern of the landscape and the presence of high numbers of sensitive visual receptors within the settled, predominantly agricultural landscape.

The assessment of the operating, consented and proposed windfarms has considered landscape capacity and the distribution of windfarms, leading to a characterisation of the landscape in terms of defined windfarm development levels. This has been used to build up a picture of how windfarm development currently affects and could in future affect the landscape.

### 6.2 Cumulative Effects of Operating and Consented Windfarms

The only consented windfarm within Angus is at Ark Hill. This will have significant landscape impacts on a part of the Sidlaw Hills and visual impacts on receptors in the hills and across Strathmore to Kirriemuir. The two Dundee Michelin turbines are close to the southern boundary of Angus and the eight Tullo turbines are some 10km north of the eastern boundary. These will have limited effects on the Angus landscape or on visual receptors within Angus and little in the way of cumulative impact. The 16 turbines of Drumderg lie 3km to the west in the highland area of Perth & Kinross. Whilst having a significant impact on the western edge of the *Highland Summits and Plateaux* area of Angus they have relatively little effect on the lowland area. It is



concluded that the highland and coastal types are predominantly *Landscapes with Views of Windfarms* with some areas currently unaffected. The lowland area varies predominantly between a *Landscape with Views of Windfarms* to a *Landscape with Occasional Windfarms* in the Sidlaw Hills but has significant areas with no windfarm effects.

### 6.3 Cumulative Effects of Proposed Windfarms

The potential for cumulative impacts is significantly increased when considering all of the windfarms at planning application stage in addition to those that are in operation or consented.

The 11 turbines at Montreathmont would have the greatest landscape and visual impact of all the proposed windfarms. They would also contribute to significant cumulative landscape change in combination with the three turbines at Mountboy, 5km to the east.

At 5km separation the proposed three-turbine windfarms at East Skichen and Dusty Drum are close enough to appear cumulatively as significant objects from higher static viewpoints to the north and when travelling on roads in the area between Dundee, Forfar, Arbroath and Friockheim.

The overlap of the Mountboy and Montreathmont ZTVs with those of East Skichen and Dusty Drum is relatively limited as higher ground between the groupings tends to reduce overlap of visibility, in addition to there being separation of some 15km between the two pairs of windfarms. The main cumulative impacts would be sequential visual impacts on road users travelling between Dundee, Brechin and Montrose.

Of other windfarms the presence of Ark Hill some 15km to the west of East Skichen is unlikely to contribute significantly to the cumulative impacts of the four windfarms to the east. Its contribution to cumulative impacts would be that of an occasional background element in views and in extending the experience of views of windfarms to those travelling through the Angus lowlands. The two wind turbines in Dundee are closer to East Skichen and Dusty Drum but are clearly associated with the urban landscape of Dundee and therefore have limited effect on the rural landscape of Angus or indeed on visual receptors.

Other proposed windfarms in a lowland location are to the northeast, in Aberdeenshire. Being relatively small and at least 15km distant from Angus, these would mainly appear as background objects from static viewpoints within Angus. However travellers on the A90 in Aberdeenshire would experience significant cumulative visual impacts.

The windfarms located in the highland landscape types are clearly separated from the lowland windfarms: physically by the wide valley of Strathmore and perceptually by being located on the hills that form the backdrop to lowland Angus. Significant landscape impacts by these on the lowlands are therefore unlikely. Only one of the

proposed windfarms, Mile Hill, is close enough to have potentially significant visual impacts on receptors in lowland Angus and potential cumulative impacts when considered together with Ark Hill, 20km to the south.

The effect of windfarm size on perception of impacts is an important consideration. The number of smaller windfarm applications in Angus is unusual compared with most areas of Scotland, where windfarms that are operating, consented or proposed have turbine numbers ranging from the low teens to well over 100. Larger windfarms are seen to dominate significant areas of landscape and to appear cluttered in views. Small windfarms do not physically dominate large areas and appear as more discrete elements in distant views. Nevertheless the size and appearance of the turbines in closer views still has significant and usually adverse impacts on landscape and visual receptors.

Were all the windfarms in lowland Angus and surrounding areas to be built there would be large areas of the landscape in which wind turbines would be significant features, including some areas in which cumulative impacts would be significant. Nevertheless, there would be clear areas of separation between groupings.

Similarly the experience of visual receptors in static locations would be to see groupings of windfarms from higher viewpoints but mainly single windfarms from lower areas. Travelling receptors in most of Angus would experience occasional views of windfarms at close proximity and fairly frequent views of one or more windfarms in the background or middle ground. There would remain significant areas from which no windfarm is visible.

This would amount to lowland Angus becoming a *Landscape with Occasional Windfarms* due to the limited size of most of the proposed windfarms. However areas of *Dipslope Farmland* and *Lowland Forest and Farmland* between Forfar, Brechin, Montrose and Dundee are likely to become a *Landscape with Windfarms*.

Cumulative effects on the highland landscape would be more limited. The southwestern corner within Angus would become a *Landscape with Windfarms* due to the combined effects of Drumderg and Mile Hill. However, most of the highland area would be a *Landscape with Views of Windfarms*, with most of the visible windfarms clearly in the lowlands and some areas would be remote enough to be practically unaffected by windfarms.

Increased parts of the coastal areas would become a *Landscape with Views of Windfarms* with the Montrose basin most affected.

## 6.4 Potential for Mitigation

The assessment considers a number of ways by which effects on the landscape could be realistically mitigated. This includes reducing turbine size, reducing turbine numbers and reducing the number of windfarms. It is concluded that

- 1) Reduction in turbine size has a limited effect on primary and cumulative impacts but may be useful in addressing specific effects
- 2) Reduction in turbine number has limited effect for a large number but small groups of turbines have a disproportionately lower impact due to lack of lateral extent and reduced 'clutter'
- 3) Reduction in numbers of windfarms or concentration into fewer, larger groupings would significantly reduce the extent of cumulative impacts and would eliminate some significant site-specific impacts.

The spread of small windfarms throughout the area rather than concentration of turbines into a more limited number of locations inevitably contributes to the impression of a landscape with windfarms. This is by increasing the area of landscape in which wind turbines are a feature and increasing the opportunity to see wind turbines successively from a static viewpoint or sequentially as a traveller. Concentration into fewer locations would decrease this occurrence.

## 6.5 Conclusion

It is considered that the current proposed level of development in Angus would not result in a significant or unacceptable level of change in the landscape over Angus as a whole, or over the lowland area as a whole. However there is likely to be significant cumulative change in the lowland area to the east and south of the A90, where windfarms could become a key defining element in the landscape.

The development of windfarms predominantly in the lowland area would be in accordance with local plan policy. However, if this is considered to be an unacceptable level of development it would be possible to significantly reduce the extent of cumulative impacts by not developing all of the windfarms. In doing so first consideration should be given to the windfarms identified as having the most significant impacts for the least benefits.

---

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## **APPENDIX 1: UPDATED LOCAL PLAN POLICIES RELATING TO WINDFARMS AND LANDSCAPE**

### **Finalised Angus Local Plan Review Policies as Modified**

#### **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 ER33 : 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 ER34 : Wind Energy Development**

Wind energy developments must meet the requirements of Policy ER33 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.






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## **APPENDIX 2: ZONE OF THEORETICAL VISIBILITY EXTRACTS FROM ENVIRONMENTAL STATEMENTS**

The following extracts are the basic blade tip ZTVs for Mountboy, Montreathmont, Dusty Drum, East Skichen and Mile Hill, taken from the landscape and visual assessments. Further more detailed ZTVs and cumulative ZTVs in the assessments were also studied.



**Zone of Theoretical Visibility (ZTV) to tip height, showing the potential number of turbines visible**

-  Mountboy Wind Farm
-  30K LVA Study Area Boundary
- Potential number of turbines visible:**
-  1 turbine visible
-  2 turbines visible
-  3 turbines visible

The ZTV is calculated to turbine tip height

Map Scale 1:250,000

**Figure 4.1**





Figure 11

# Montreatmont Moor Wind Farm

## 30km Zone of Theoretical Visibility to Turbine Blade Tip

### Turbine Visibility

1 to 2



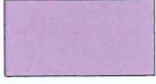
3 to 5



6 to 8



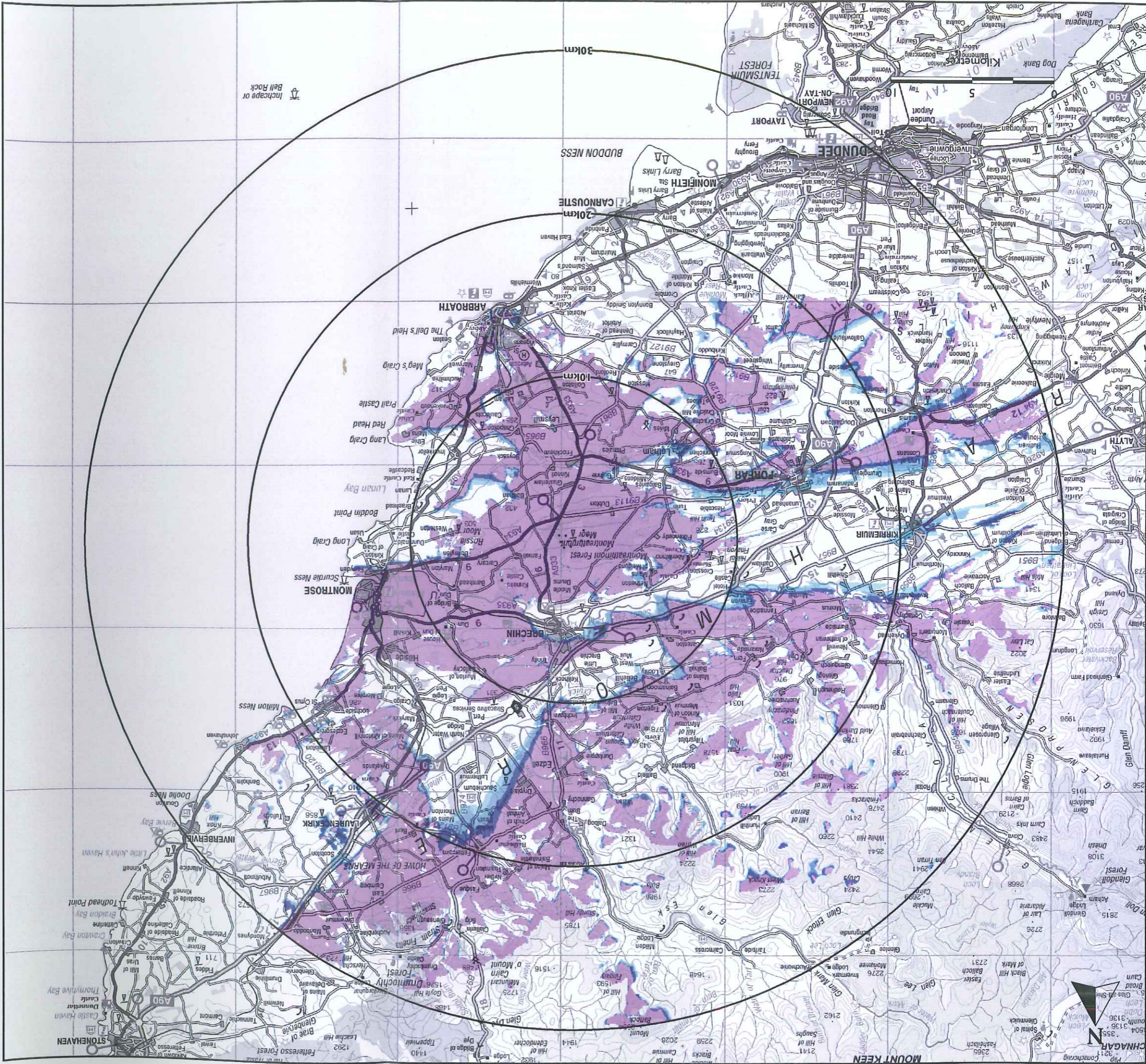
9 to 11



Note: ZTV generated to 126m Turbine Tip Height

Scale = Not to Scale

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# Dusty Drum Wind Cluster

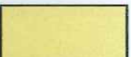

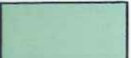
FIGURE 3

Zone of Theoretical Visibility to Blade Tip  
Height to 30km

## KEY

-  Dusty Drum Wind Cluster
-  RadII from Dusty Drum Wind Cluster
-  Viewpoints with Photomontages (1-8)
-  Viewpoints without Photomontages (9-14)

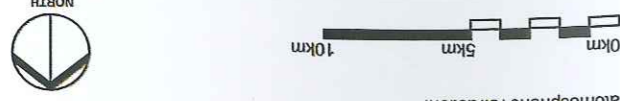
## Dusty Drum Wind Cluster Theoretical Visibility

-  1 turbine may be visible
-  2 turbines may be visible
-  3 turbines may be visible

## Turbine Data:

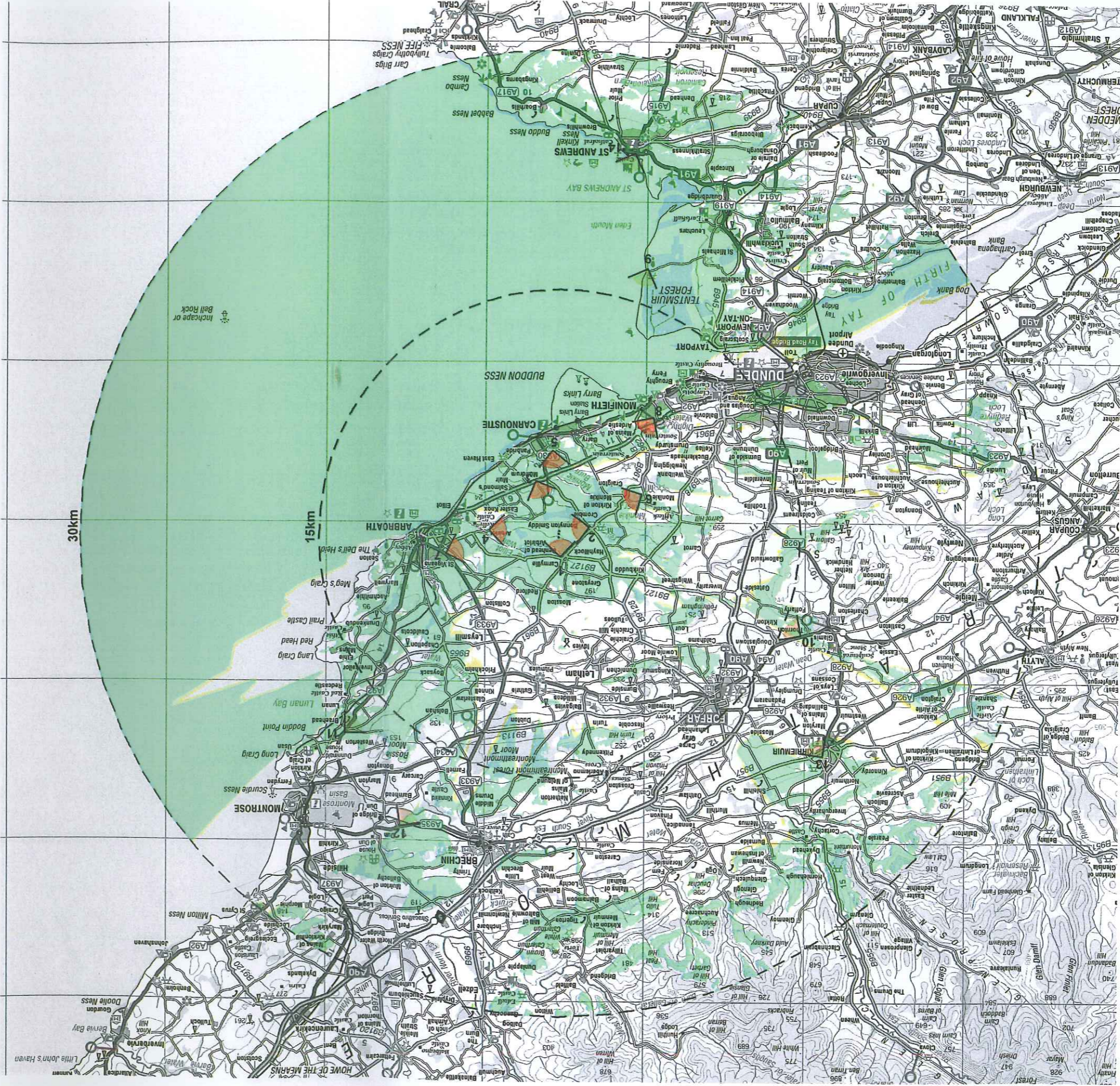
The ZTV has been calculated on the following turbine dimensions and to LDUS001.wtl  
Blade tip height (m): 110  
Hub height (m): 70

Notes:  
The calculations of this map are based on the "bare earth" model of the landform and does not allow for any effects of screening from obstacles such as buildings and vegetation. The landform data was taken from Ordnance Survey Land-Form Panorama 1:50,000 scale digital terrain model - gridded height data at 50m intervals. The visibility maps are calculated for a viewer's eye height level of 2m above ground level to upper blade tip using a calculation grid size of 50m and include curvature of the earth and atmospheric refraction.



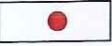
Date Dec 2007  
By SH  
Paper A3  
Scale 1:250,000  
Rev -

Reproduced from Ordnance Survey digital map data © Crown Copyright 2007. All rights reserved.





**Key**



20km radius indicator



10km radius indicator

One turbine visible



Two turbines visible



Three turbines visible



Viewpoints illustrated as photomontages



Viewpoints illustrated as wireframes

**Turbine Parameters:**

The ZVI is based on the following turbine dimensions:

Blade Tip: 95m

Hub Height: 60m

Rotor Diameter: 70m

Blade Tip: 95m

Scale 1:200,000 @ A3

0 km 5 km 10km

renewables

RWE Group












power Renewables East Skichen Wind Farm

Figure 4.4 ZVI to Blade Tip with Viewpoint Locations

December 2004 08037-03-G004.cdr ross

Entec

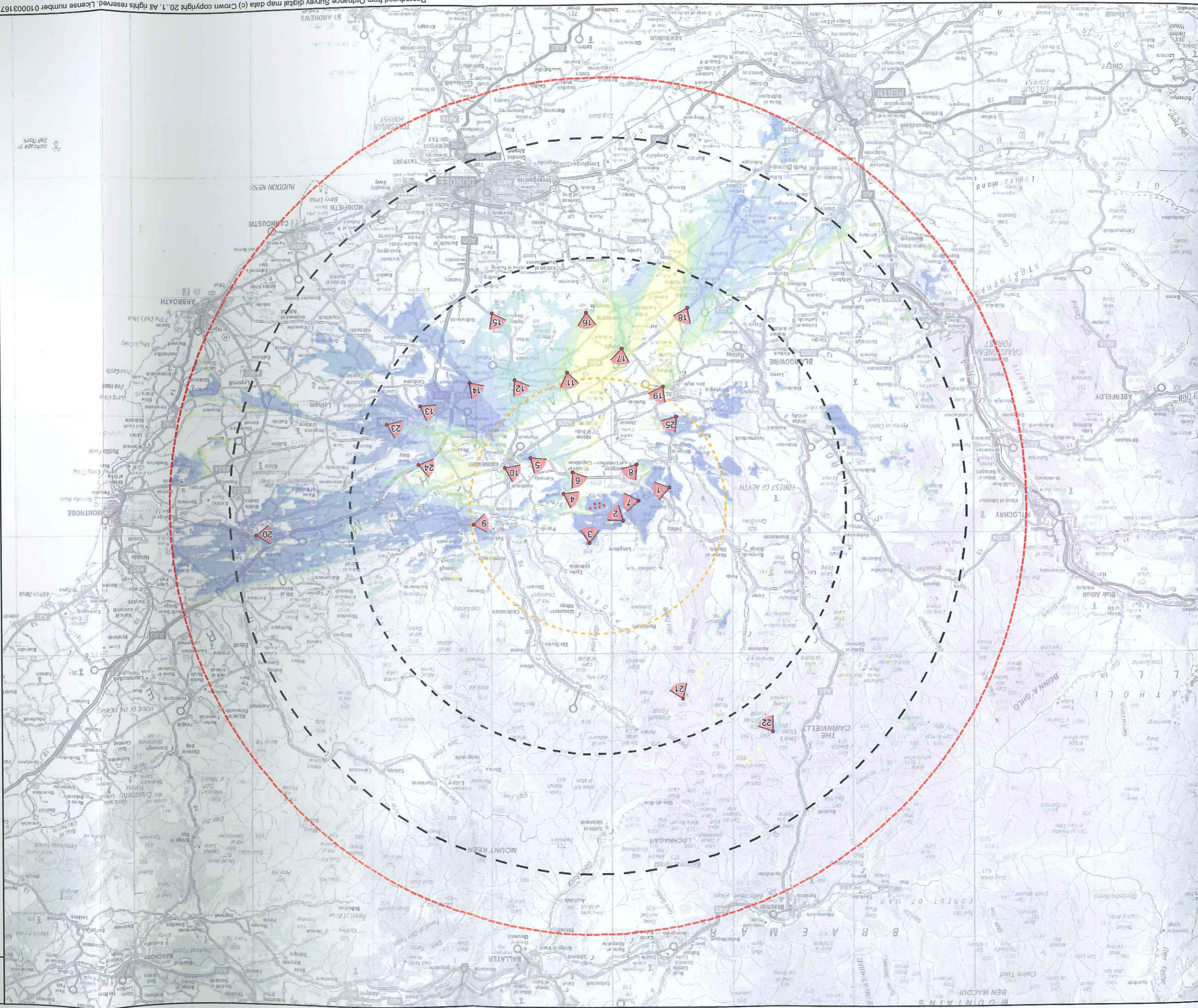
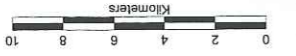
**KEY:**

-  Mile Hill Turbines \*
-  10 km Mile Hill Radius \*
-  20 km Mile Hill Radius
-  30 km Mile Hill Radius
-  35 km Radius Study Area Boundary
-  1 Turbine Visible
-  2 Turbines Visible
-  3 Turbines Visible
-  4 Turbines Visible
-  5 - 6 Turbines Visible
-  Representative Viewpoints

**Viewpoint**

- |    |  |
|----|--|
| 1  | B954 - Craighill Hill                                |
| 2  | Balholm Castle                                       |
| 3  | Cat Law (Summit) (671m)                              |
| 4  | Minor road near Ascreavie (Designed Landscape)       |
| 5  | Loch of Kinordy Nature Reserve                       |
| 6  | Kirkton of Kingoldrum (B951)                         |
| 7  | Minor road to west of site near Braes of Coull       |
| 8  | Loch of Lintrathem Reservoir                         |
| 9  | Minor Road near Cortachy Castle (Designed Landscape) |
| 10 | Hill of Kirmuir (Camera Obscura)                     |
| 11 | A94 near Castleton Hotel                             |
| 12 | A928 near Clamie Castle                              |
| 13 | Forfar (Viewpoint at Hillside)                       |
| 14 | Junction of B9127 and A94                            |
| 15 | A928 Lumley Den                                      |
| 16 | Kinrurney Hill (345m)                                |
| 17 | Melgie / Belmont castle                              |
| 18 | A94 Coupar Angus                                     |
| 19 | A926 Alyth   |
| 20 | Brechin (Tower)                                      |
| 21 | Mayar (828m) muno within NSA and National Park       |
| 22 | Glaz Mael (1068m) muno within NSA and National Park  |
| 23 | A932 near Pescobol Loch                              |
| 24 | A90 southbound near Bogindallo                       |
| 25 | Hill of Alyth / Cateran trail                        |

\* Within the 10 km radius boundary the ZTV has been generated using higher resolution 10 m OS Profile DTM data. Outside the 10 km radius boundary the ZTV has been generated using 50 m resolution OS Panorama DTM data.



DATE:	03.08
GENERATED BY:	MB
DRAWN BY:	MB
CHECKED BY:	SM
AUTHORISED BY:	JW

DRAWING TITLE: Blade Tip ZTV

PROJECT: Mile Hill Windfarm Environmental Statement



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Figure 6.8