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Strategic Landscape Capacity Assessment for Wind Energy in Aberdeenshire

Final Report

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EXECUTIVE SUMMARY

OBJECTIVES AND METHOD

This study has considered the capacity of the Aberdeenshire landscape to accommodate onshore wind energy development. The landscape capacity assessment is based on an assessment of landscape sensitivity and value of the different landscape character types and areas in Aberdeenshire together with the evolving wind energy development scenario in Aberdeenshire and a surrounding 30km buffer area. This has involved a staged process:

- *Firstly assessing the underlying capacity of the Aberdeenshire landscape to accommodate wind turbine development;*
- *Secondly, assessing the degree of cumulative change resulting from operating and consented wind turbines in the study area and in Aberdeenshire;*
- *Thirdly, assessing the extent to which cumulative consented development has reached the limit of the landscape's capacity to acceptably accommodate wind energy developments.*
- *Finally, assessing residual capacity and the level of further development that could acceptably be accommodated within areas of Aberdeenshire.*

The study is based on the premise that, given current renewable energy targets, it is accepted there will be a degree of landscape change and effects on visual amenity resulting from wind energy development that will require careful management. In applying the assessment process, the study has addressed a number of concepts and issues that affect the perceived significance and acceptability of cumulative changes caused by multiple wind energy developments in the landscape.

STRUCTURE OF THE REPORT

The main report is divided into 6 chapters describing the assessment process, findings and conclusions. There are a number of appendices containing detailed information relevant to the asessment.

***Chapter 1 Introduction** describes the background to the project.*

***Chapter 2 Method** describes the basis of the assessment of cumulative effects and landscape capacity. It describes the key criteria used in assessing landscape sensitivity and value and determining the degree of cumulative impacts on the landscape. The method is a staged, transparent process, balanced between objective assessment and informed professional judgement. Chapter 2 navigates the reader through the rest of the assessment process, outlining the purpose of each chapter and the relevant tables and figures.*

***Chapter 3 Landscape Baseline** describes the physiography, landscape character and landscape designations of the study area. It focuses on Aberdeenshire, with a 30km buffer zone that includes significant parts of Angus, Moray and the Cairngorms National Park.*

***Chapter 4 Visual Baseline** describes the visual sensitivity assessment. This involves a computer generated intervisibility assessment across the study area, focussing on visibility of the Aberdeenshire landscape to settlements, transport routes and key viewpoints.*

***Chapter 5 Wind Turbines in the Study Area** describes the distribution of consented and proposed wind energy developments, from single turbines to windfarms, across Aberdeenshire and the wider study area.*

Chapter 6 Assessment** is a detailed capacity and cumulative impact assessment. It assesses the underlying capacity of the landscape for wind energy development; the extent to which current development has utilised the underlying capacity and the remaining or residual capacity for wind energy development. The assessment process for each of the landscape character types in Aberdeenshire is detailed in **Table 6.1.** Chapter 6 also gives detailed guidance on the appropriate size and siting of wind turbines and windfarms in the landscape character areas. The analysis of capacity and cumulative development across Aberdeenshire is shown spatially on maps in **Figures 6.1 to 6.3.

*The study concludes with two summary maps Figure 6.4 and Figure 6.5. **Figure 6.4**, indicates areas with underlying capacity for wind energy development and overlapping areas in which consented development limits the potential for future such development due to occupying the underlying capacity. This summary figure is also shown as **Figure A** following this executive summary. **Figure 6.5** shows where development in some areas has exceeded the underlying capacity of the landscape to accommodate wind turbines.*

SUMMARY OF FINDINGS

The Aberdeenshire Landscape

The landscape of Aberdeenshire is located on the junction between three distinct types of landscape; the Highland Mountains, the flat north-east coastlands of Banff and Buchan and the low-lying rift valley of Strathmore. This transition results in a great diversity of landscapes, from the high granite plateaux of the Grampian mountains in the west, which project out into the gently rolling agricultural lowlands before progressing eastwards down to the flatter coastal plain farmland and thence to the coastal landscapes. The bulk of the population lives in towns and villages in the lowland and coastal areas, through which the main transport routes pass. These trunk routes radiate out from Aberdeen City which is the main centre of the north-east of Scotland.

The landscape of Aberdeenshire is characterised by this transition from coastal landscapes in the north and east progressing west to agricultural land and then rising to the moorland and highland landscapes in the far west. These upland areas are great rounded spurs extending out into the surrounding lower farmland and are the ever present backdrop to much of Aberdeenshire and the city of Aberdeen itself. They are distinctive landmarks often with rocky summits and are integral to the landscape identity of the north-east.

Assessment of Underlying Capacity

The assessment has determined that there are no areas of Aberdeenshire suitable for extensive windfarms with large scale turbines. In contrast with much of Scotland there is no capacity for wind turbines in the highest moorland areas, beyond a domestic scale (less than 15m in height) and associated with farm buildings or tourist facilities at the base of slopes. This is due to the high visual sensitivity and landscape value of these areas within Aberdeenshire. Larger scale lowland farming areas have the greatest underlying capacity for wind turbine development. Some smaller scale lowland areas and the coast have more limited capacity.

Some areas such as the Coastal Farmland and parts of the Agricultural Heartlands have capacity for small groups of larger turbines greater than 80m height. However, most areas have more limited

capacity. There are limits on cumulative development in all areas if significant adverse levels of landscape change are to be avoided.

Consented Wind Energy Developments at Spring 2013

Current operational and consented wind turbines in Aberdeenshire comprise a total of 792 turbines over 15m high. Most of these are turbines grouped singly or in small clusters in Coastal Farmland and Agricultural Heartland areas. Some small windfarms are on the Grampian Outliers. The main concentrations of wind turbines are in the north and east in the lowland areas.

In the 30km area surrounding Aberdeenshire including Moray, Aberdeen, Angus and Cairngorm National Park, there are 220 consented turbines and several significantly sized windfarms, including one at Dorenell in Moray and eleven 195m high turbines at the European Offshore Wind Deployment Centre (EOWDC) Site 2.4km off the coast. There are no turbines over 15m in the Cairngorms National Park to the west.

Wind Energy Proposals at Spring 2013

At spring 2013 there were within Aberdeenshire a total of 314 turbines pending consideration/approval. Two windfarms are located in the north of Aberdeenshire in the vicinity of Peterhead, with eight 100m turbines at Hill of Braco and twelve 99.5m turbines at Mormond Hill. Two are proposed close to Alford, at Tibberchindy with six 115m turbines and Cairnborrow with nine 110m high turbines.

In the 30km area beyond Aberdeenshire there are applications for 109 turbines. This includes a number of windfarms proposed in Moray and Angus.

CAPACITY FOR FURTHER WIND ENERGY DEVELOPMENT

This assessment has demonstrated that the landscape of Aberdeenshire has the underlying capacity to accommodate wind energy development of an appropriate type and extent. Appropriate development relates to the varied characteristics of the landscape; the visual sensitivities of the population spread across lowland Aberdeenshire and the higher value or sensitive context of some areas of landscape. The particular characteristics of Aberdeenshire mean that there is no scope for the larger scale of windfarm development seen elsewhere in Scotland.

The main underlying capacity for development lies within some of the larger scale more extensive lowland areas which can accommodate larger turbines sizes, but not the largest sizes and not in large groupings. Other areas have a more limited underlying capacity, which would not be appropriate for larger turbines sizes, and some areas have very limited or no capacity for wind energy development.

However with current levels of development there is no remaining capacity left in large parts of Aberdeenshire. *There are some areas with residual capacity in Aberdeenshire for further appropriate wind energy development and future development in each landscape type or area should follow the guidance given in Chapter 6. The aim of the guidance is to ensure that the acceptable capacity for development in terms of turbines sizes, group sizes and spacing between turbines and groups is not exceeded, and that other issues guiding or limiting development are taken into account.*

The main opportunities and limitations on capacity are discussed below and the areas concerned illustrated in schematic form in ***Figure A*** *at the end of this summary.*

Areas with Highest Underlying Capacity

Figure A identifies in dark green areas which have the highest underlying capacity in Aberdeenshire for wind energy development. The main areas are:

1) *The Coastal Farmland LCTs.*
2) *Some of the Agricultural Heartland LCTs*

These areas have the capacity to accommodate larger sizes of turbine and/or greater numbers and concentrations ***relative to other areas*** *of landscape in Aberdeenshire. This is based on a combination of one or more factors including suitable landscape character, lower visual sensitivity or lower value. Not all of these factors are present in every area identified and the analysis and guidance in Chapter 6 should be followed.*

Wind turbines are already located in many of these areas, utilising some of the underlying capacity and therefore reducing residual capacity. The limitations resulting from this are discussed below.

Areas with Limited Underlying Capacity

Most of the remaining lowland and coastal areas of Aberdeenshire have some underlying capacity for wind energy development but are generally not suited to larger turbines, large groupings or extensive concentrations of wind turbine development. Capacity varies from the ability to accommodate only very occasional small or small/medium wind turbines in some of the Coastal LCTs to more frequent medium turbines across some of the Straths and River Valley LCTs. The areas are shown in light green in Figure A.

Wind turbines are already located in some of these areas, utilising some of the available capacity and limiting development. The limitations resulting from this are discussed below. Guidance in Chapter 6 is intended to steer any future development in these areas to an acceptable level.

Areas with No Underlying Capacity

Significant areas of Aberdeenshire have no underlying capacity for wind turbine development beyond a domestic scale (less than 15m in height) and associated with buildings and tourist facilities. These are left uncoloured in Figure A:

1) *All of the Moorland Plateaux LCAs, primarily due to their importance to the Aberdeenshire landscape, high visual prominence, high relative wildness and recreational value;*
2) *Some parts of Straths and River Valleys LCT which have high value, quality and sensitivity;*
3) *Some Coast LCAs which are of high value due to recreation potential and high scenic quality;*
4) Area *7 (iv): Sandstone Ridges and Valleys South of Troup* in *Coastal Farmland* which is locally rare and has high value, quality and sensitivity;

It is recommended that these landscape types and areas remain undeveloped with turbines greater than 15m to protect their character, avoid widespread visibility, protect key viewpoints and features and particularly to protect the key features of the Grampian Outliers and the Mounth.

When assessing the acceptability of larger turbine proposals in neighbouring landscape character areas, proximity to the sensitive areas described above should be taken into account.

Areas Where Cumulative Impact Limits Further Development

As described above, a number of landscape types and areas in Aberdeenshire have the underlying capacity to accommodate wind energy development. However, existing and consented development in or nearby some of these areas means that further significant development may exceed the acceptable cumulative capacity of the landscape. It is recommended that no further turbine development beyond a domestic scale (less than 15m in height) occurs in these areas.

The areas where current cumulative impact limits capacity for further development are shown as hatched areas in Figure A. They are defined by:

1) *The developed areas of windfarms and turbines (operational and consented) and the cumulative extent of their impacts on the surrounding landscape;*

2) *The underlying landscape capacity within the landscape areas and for those surrounding them;*

3) *The extent of area within which further significant development should be limited to avoid extending significant adverse cumulative landscape and visual impacts between the groups of turbines within the cumulative area and other turbines outside the area.*

The boundaries shown in Figure A are indicative. In the case of specific development proposals there should be an assessment relating to these criteria.

Areas between and Adjacent to Areas Where Cumulative Impact Limits Further Development

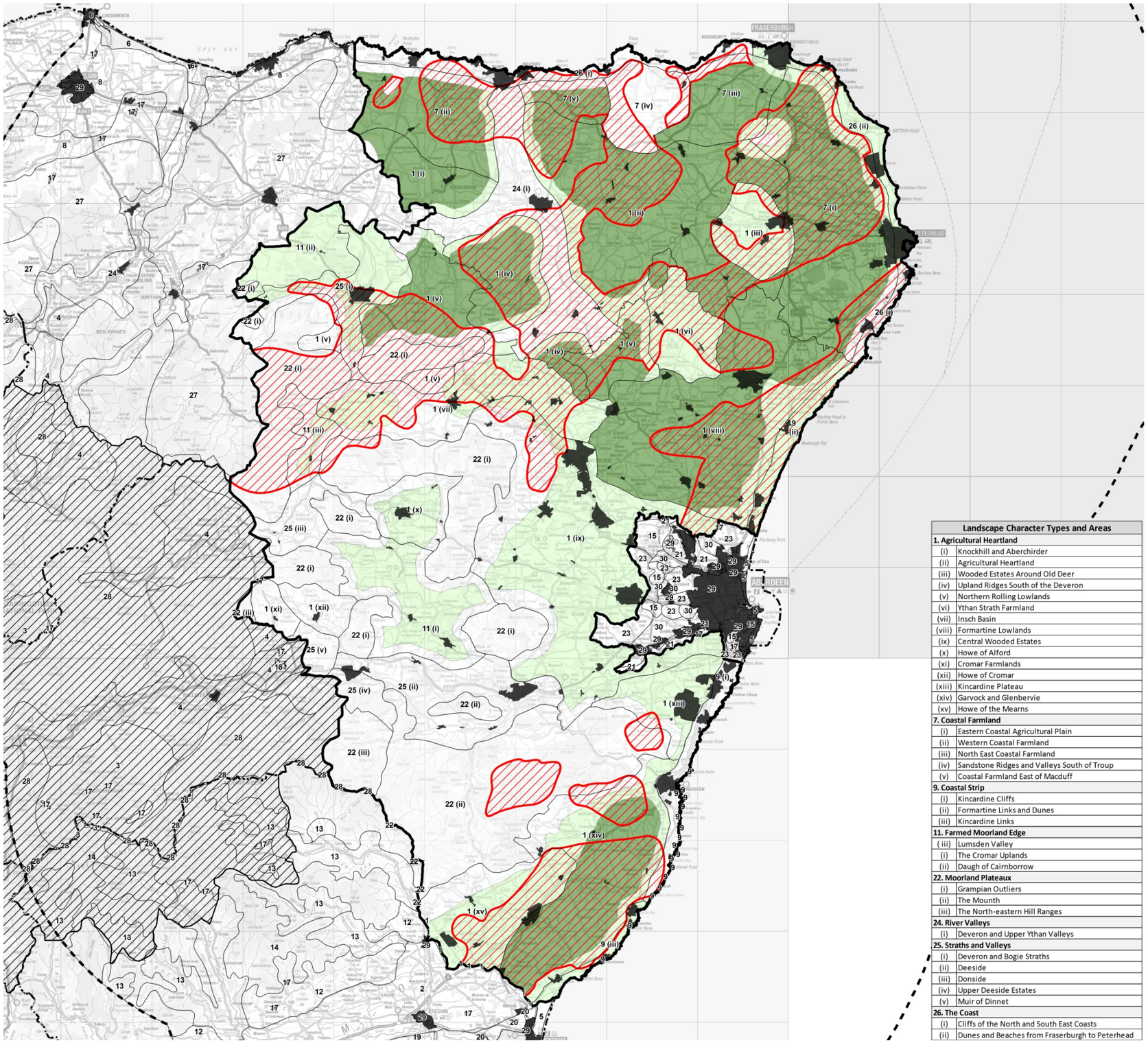
Development in some areas has exceeded the underlying capacity of the landscape to accommodate wind turbines. These over capacity areas are shown as cross-hatched areas in Figure 6.5. The issues lie in what to do in the areas where there is still residual capacity left that are located either between or close to these 'over capacity' areas. This study examined three different scenarios and developed computer generated wire-frame models of these to determine potential unacceptable cumulative landscape and visual impacts of three different approaches. The options considered included;

1. ***Strictly Limit Further Development***
   Tightly control further development, even where there is remaining capacity left, as a counterbalance to areas already at or over capacity.

2. ***Strategically Planned Development***
   Accept further development where there is inherent capacity left, but apply good siting and design practice in these areas in terms of turbine typology, size, spacing etc, acknowledging features of higher than average value and sensitivity, and do not exceed acceptable capacity in these remaining areas.

3. ***Continue Existing Approach***
   Accept further development on its own merits where there is remaining capacity even if in close proximity to the over capacity areas (site and development specific planning criteria would still apply e.g proximity to residential property).

Examples of the three approaches applied in selected locations are shown in Figure 6.6a and 6.6b



Landscape Character Types and Areas	
1. Agricultural Heartland	
(i)	Knockhill and Aberchirder
(ii)	Agricultural Heartland
(iii)	Wooded Estates Around Old Deer
(iv)	Upland Ridges South of the Deveron
(v)	Northern Rolling Lowlands
(vi)	Ythan Strath Farmland
(vii)	Insch Basin
(viii)	Formartine Lowlands
(ix)	Central Wooded Estates
(x)	Howe of Alford
(xi)	Cromar Farmlands
(xii)	Howe of Cromar
(xiii)	Kincardine Plateau
(xiv)	Garvock and Glenbervie
(xv)	Howe of the Mearns
7. Coastal Farmland	
(i)	Eastern Coastal Agricultural Plain
(ii)	Western Coastal Farmland
(iii)	North East Coastal Farmland
(iv)	Sandstone Ridges and Valleys South of Troup
(v)	Coastal Farmland East of Macduff
9. Coastal Strip	
(i)	Kincardine Cliffs
(ii)	Formartine Links and Dunes
(iii)	Kincardine Links
11. Farmed Moorland Edge	
(iii)	Lumsden Valley
(i)	The Cromar Uplands
(ii)	Daugh of Cairnborrow
22. Moorland Plateaux	
(i)	Grampian Outliers
(ii)	The Mounth
(iii)	The North-eastern Hill Ranges
24. River Valleys	
(i)	Deveron and Upper Ythan Valleys
25. Straths and Valleys	
(i)	Deveron and Bogie Straths
(ii)	Deeside
(iii)	Donside
(iv)	Upper Deeside Estates
(v)	Muir of Dinnet
26. The Coast	
(i)	Cliffs of the North and South East Coasts
(ii)	Dunes and Beaches from Fraserburgh to Peterhead

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Legend

- Study Area
- Study Area 30km Buffer
- Scottish Local Authority Boundaries
- Landscape Character Type / Area Boundary (see Table 3.1 for list)
- Cairngorms National Park
- Settlements
- Areas where cumulative impact limits development
- Areas with Highest Underlying Capacity
- Areas with Limited Underlying Capacity
- Areas with No Underlying Capacity

Note:
Further guidance found in section 6.1

Figure A

Wind Turbine Development Opportunitites and Constraints

N 0 5 10 20 Km

1.0 INTRODUCTION

1.1 Background

Scottish Planning Policy (*SPP 2010*) states that local authorities should make positive provision for the development of windfarms in locations where the technology can operate efficiently and environmental and cumulative impacts can be satisfactorily addressed. The Scottish Government has strongly stated its support for renewable energy developments and encouraged Planning Authorities to ensure appropriate planning guidance is in place.

Aberdeenshire Council's wind energy guidance is being reviewed in the light of the recent increase in proposals for wind energy projects, particularly single or small groupings of turbines as a result of the introduction of the Feed in Tariff. Given this factor and existing levels of development in upland areas, Scottish Government web based guidance (*Onshore Wind Turbines, July 2013*) states:

'Planning authorities are more frequently having to consider turbines within lower-lying more populated areas, where design elements and cumulative impacts need to be managed'.

Scottish Government policy in SPP and web based guidance clearly indicates that cumulative development within areas may lead to eventual limits on further development and that this should be considered as a significant constraint. Areas where cumulative development has reached a threshold of acceptability are a Stage 1 constraint in a Spatial Framework, requiring significant protection from further development:

Figure 1.1: Extract from Current Scottish Government Guidance on Preparing Spatial Frameworks

Stage 1 – Identify areas requiring significant protection
- Sites designated for their national or international landscape or natural heritage value
- Green belt
- Where the cumulative impact of existing and consented wind farms limit further development

↓

Stage 2 – Identify areas with potential constraints
- Consider matters relating to the historic environment; regional and local landscape and natural heritage designations; tourism and recreational interests; communities; aviation and defence interests; and broadcasting installations
- Where proposals will be considered on their individual merits against identified criteria

↓

Stage 3 – Identify areas of search
- Where there are no significant constraints on development
- Where appropriate proposals are likely to be supported subject to detailed consideration against identified criteria

1.2 Consultancy Appointment

Ironside Farrar has been appointed by SNH, Aberdeenshire and Angus Councils to undertake a strategic landscape capacity assessment with respect to wind energy development across the two neighbouring local authority areas. The key purpose of this study is to provide detailed guidance on the capacity of the landscape across both areas to accommodate wind turbine development and to inform the review of the Development Plans' spatial frameworks and supplementary guidance.

The key study objectives are:

- To identify the sensitivity of the landscape to different types and scales of wind energy development;
- To identify viewpoints, routes and features, and the views from these, which are particularly sensitive to wind energy development.;
- To advise on the capacity and potential for the landscape to accommodate different types or scales of wind energy development;
- Identify areas where cumulative impact is potentially at, or near, capacity, and provide an indication of when the capacity threshold would be reached for these areas;
- Identify areas, in landscape terms, unsuitable for wind energy developments;
- Provide clear siting and design guidance for landscape character areas that are identified as having some capacity for specific scales of development.

This study specifically assesses landscape sensitivity, value and capacity together with the impact of cumulative wind energy development in order to determine where significant protection from further development may be required. This study addresses these requirements through a staged assessment process detailed in sections 2.0 to 6.0.

1.3 National Policy

National planning policies in Scotland are well disposed towards the development of onshore wind energy. However it is accepted that there are limitations imposed by environmental sensitivities and the capacity of areas to accept cumulative development. Therefore the acceptability of multiple windfarms and turbines and the cumulative landscape and visual impacts of development has to be considered in the light of national and development plan policy. **Appendix 1** reviews current national policy and guidance.

Emerging Policy

Emerging Scottish Planning Policy (*SPP Consultation Draft 2013*) continues to strongly support onshore wind energy. It continues to support the undertaking of Spatial Frameworks and capacity studies. Key changes in emphasis are the recommendation for inclusion of all scales of wind energy development in spatial frameworks and the provision

of a more detailed hierarchy and explanation of constraints to and opportunities for wind energy development.

1.4 Landscape Capacity and Cumulative Impacts

SPP and Scottish Government guidance identifies cumulative impacts and landscape capacity as being critical to the identification of areas of search. This study has thus been prepared to inform the Council on the issues of landscape capacity and cumulative impact. Accordingly it comprises three main themes:

- A strategic landscape capacity study, investigating the underlying capacity of landscapes within Aberdeenshire to accommodate wind energy development;
- A cumulative assessment examining the level of cumulative development of operating, consented and proposed wind turbines and wind farms in Aberdeenshire.
- Guidance on the levels and types of wind turbine development throughout Aberdeenshire that would be acceptable in landscape terms, taking into account the first two considerations.

It is emphasised that this is a strategic level landscape and visual study, providing a context for consideration of capacity for, and the cumulative effects of, existing and potential future wind turbine developments in Aberdeenshire. No site specific conclusions should be drawn from it in relation to current proposed or future wind turbines and windfarms.

As a strategic landscape and visual study this does not address specific localised impacts such as effects on individual residential receptors or other sensitive receptors. All wind energy proposals should be considered on their own unique locational and design characteristics as well as their strategic context. All proposals should be subject to landscape, visual and cumulative impact assessment including (if required) a full environmental assessment.

1.5 Use of Report by Planners for Specific Sites

To consult this Report for specific sites the following is recommended:

The specific site should be identified in Figure 3.4a (Landscape Character Areas in Aberdeenshire) and the Landscape Character Area, its title and number noted.

Go to section 6.0 of the Report and identify the information relating to the Landscape Character Area that covers the site of specific interest. Each Landscape Character Area's information is identified by it's name and number annotated on Figure 3.4a. Detailed information relating to the landscape capacity of the area that covers particular sites is provided in section 6.0 of the Report including Guidance.

For further information on landscape capacity for wind energy development, Figure 6.1b (i-v) provides mapped information on Aberdeenshire's remaining landscape capacity for different sizes of wind turbine, with Figure 6.4 providing mapped information on Wind Turbine Development Opportunities and Constraints.

For issues relating to site specific sites these sources of information should provide an immediate indication of landscape capacity issues and specific wind energy proposals.

2.0 CUMULATIVE IMPACT AND CAPACITY METHODOLOGY

2.1 Purpose of Methodology

The purpose of the following assessment is to determine the capacity of the Aberdeenshire landscape to accommodate wind energy development and to determine the levels of cumulative development that would be acceptable across Aberdeenshire. The assessment takes into account existing cumulative development within and around Aberdeenshire and is based on the premise that current renewable energy policies will lead to a future level of landscape change within Aberdeenshire that requires careful management.

The key objectives of the study are outlined in section 1.2 above. The methodology serves these objectives through a clear assessment of sensitivity and capacity of landscapes across Aberdeenshire, together with an assessment of the cumulative effects of current consented wind energy development and the potential for accommodating further development in the future.

Nevertheless, it is recognised in published guidance that the assessment of landscape capacity and cumulative impacts is not a straightforward exercise. The background considerations and detailed methodology for this process are detailed in **Appendix 2** of this report. The following is a summary of the methodology, key considerations and guide to the presentation of findings and recommendations.

2.2 Study Stages

The assessment is a staged process comprising:

1) Define study area and characterise landscape and visual baseline and scope of wind energy types to be included in the strategic study.

2) Assess landscape sensitivity based on landscape character types (LCTs) and landscape character areas (LCAs) in Aberdeenshire. This assessment considers landscape character sensitivity, visual sensitivity and landscape value.

3) Assess the capacity of the Aberdeenshire landscape to acceptably accommodate wind energy development of different types and scales based on the assessment of sensitivity and value of the LCAs and LCTs. This is an assessment of the *underlying* landscape without taking the effects of existing wind turbines into account.

4) Record the current type and extent of consented wind energy development in Aberdeenshire and the surrounding local authorities.

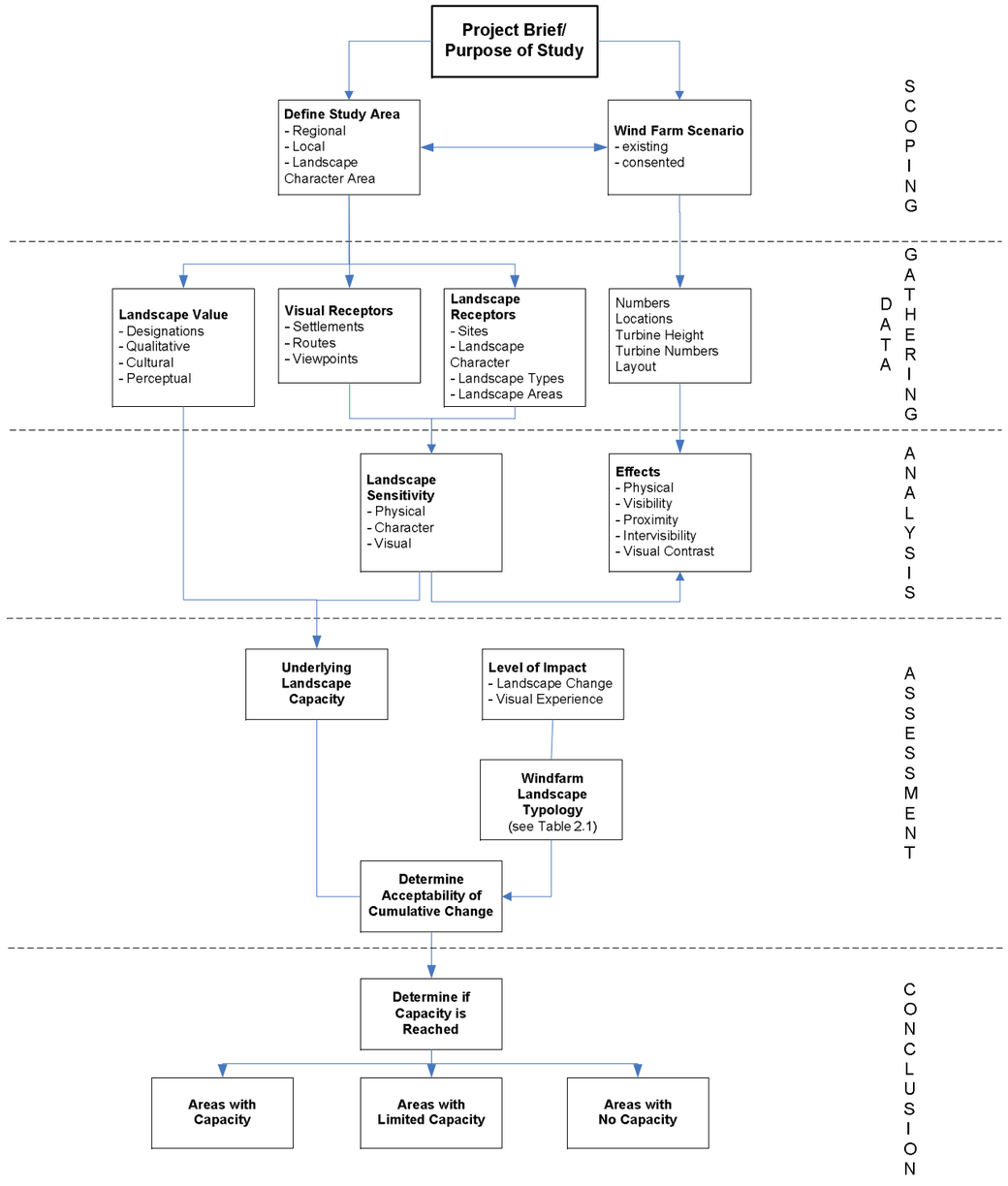
5) Determine the extent to which cumulative consented development has occupied the underlying capacity of the landscape to accommodate wind energy developments.

6) Further to the assessment of landscape capacity and cumulative development, identify areas in which:

   - there is no underlying landscape capacity for wind energy development;
   - consented cumulative development limits landscape capacity for further wind energy development.
   - there is remaining landscape capacity for wind energy development.

The assessment process is summarised as a flow chart in Figure 2.1 below.

Figure 2.1. Cumulative Impact and Landscape Capacity Methodology Flowchart



The assessment and spatial strategy is followed by guidance on appropriate types and levels of wind energy development for the areas in which there is remaining capacity.

2.3 Scope of Assessment

2.3.1 Area Covered

The study focuses primarily on the local authority area of Aberdeenshire. However, an area 30km beyond the boundary is considered in terms of the potential extended visual influence of wind energy developments on neighbouring landscape areas.

2.3.2 Wind Energy Development Types

The study considers all sizes of turbines and developments operating, consented or proposed, as well as potential future scenarios where appropriate. However the capacity assessment and guidance for turbines under 15m to blade tip is limited to localised generic siting and design considerations. Turbines less than 15m to blade tip are not considered to have the same qualities of scale, prominence and widespread visibility that lead to the wider cumulative impacts that characterise larger turbines (blade tip higher than 15m).

2.3.3 Use of Geographical Information Systems

The study has used the GIS application; Arcview 10.2. It is emphasised that this application is used only as a tool to manage, map and illustrate spatial data. The assessment process does not use GIS and is described in the following sections.

2.4 Landscape and Visual Baseline

The landscape baseline assessment includes a description and classification of landscape character and record of designations and features that contribute to landscape value. The landscape character assessment is based on landscape character types (LCTs) and landscape character areas (LCAs) in Aberdeenshire identified and described in the *South and Central Landscape Character Assessment* (SNH, 1997) and *National Programme of Landscape Character Assessment: Banff & Buchan* (SNH 1997) - see section 3.2 and Table 3.1 below . Further landscape character types in neighbouring areas are also identified. These are detailed in the above publication and others in the national series.

Some refinements were made by Aberdeenshire Council for their Local Plan including rationalising boundaries (due to changes highlighted during digitisation) and two new areas created adjacent to Cairngorm National Park Authority to reflect anomalies created by boundary changes since 1997. It is these revised boundaries that have been used as the baseline for the study.

Landscape value is determined partly through landscape designations. There are no local designations in Aberdeenshire and the national designations are outside the study area, although they are adjacent to it. Related designations that contribute to landscape value and character are recorded. These include natural and cultural heritage designations, recreational/ visitor facilities and core paths. Other factors affecting perceptions of value include wildness and remoteness which have recently been assessed across Scotland.

The visual baseline assessment involves a computer-based intervisibility assessment based on different turbine heights and receptor types. Whilst a simplistic approach, this helps to identify the areas that are most likely to be sensitive and areas in which wind turbines might be least visible.

2.5 Method for Determining Landscape Sensitivity and Capacity

The method for determining landscape sensitivity and capacity is detailed in **Appendix 2**. This involves consideration of the two main elements discussed in 2.4 above:

1) The sensitivity of the landscape fabric and character to turbine development, which includes landscape features, elements and characteristics and its visual sensitivity which includes intervisibility and receptors types.

2) The value of the landscape as determined by stakeholders. This may include national or local recognition by landscape designation or cultural association, or value to a community of interest such as a local residents or an interest group.

Appendix 2 describes a breakdown of the physical and perceptual characteristics that contribute to landscape character, visual sensitivity and value. Each criterion is described and evaluated in terms of its sensitivity to wind energy development. An overall assessment of **high, medium** or **low** is derived from a composite of all the criteria. There is no consistent relative weighting of criteria as, in the case of each landscape type or area, different criteria are likely to be critical in the sensitivity assessment.

Following the above assessment, an overall professional judgement on capacity for developments of different types is made on the basis of sensitivity and value. Landscape capacity is rated according to the degree to which wind turbines may be accommodated without significant and/or adverse effects on sensitivity and value. The descriptive criteria below for **high, medium** and **low** describe the main thresholds on a continuum between no capacity and high capacity.

Low Capacity: A landscape that is both sensitive to wind turbine development and has a high value, where only a slight level of change can be accommodated without significantly affecting any of the key defining criteria

Medium Capacity: A landscape that has some sensitivity to wind turbine development and has some aspects of value, where a moderate level of change can be accommodated which may significantly affect some of the defining criteria

High Capacity: A landscape that has low sensitivity to wind turbine development and has low value, and can accommodate change that significantly affects most of the key defining criteria

Broadly speaking there is an inverse relationship between landscape sensitivity/value and capacity. However, this is not a simple relationship that can be expressed in a matrix: 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.

Turbine height and the size and layout of types of turbine development may relate better to some LCTs than others and the geographical extent of LCAs within some otherwise suitable LCTs may limit capacity for development.

2.6 Defining Landscape Change and Cumulative Capacity

An understanding of cumulative impacts and change in the landscape is key to determining acceptable levels of development and whether or not areas have reached cumulative capacity. This is discussed below and in further detail in Appendix 2.

2.6.1 Cumulative Change

Appendix 2, section 2.7 discusses in detail the issues involved in determining cumulative change thresholds and the acceptability of these changes. It refers to Scottish Government web based Guidance *(2013)* and SNH siting and design guidance (*2009*) for onshore wind energy developments. Key factors factors that affect the perception of cumulative change include:

- the distance between individual windfarms and/or turbines;
- the distance over which they are visible;
- the overall character of the landscape and its sensitivity to windfarms;
- the siting and design of the windfarms themselves (particularly turbine height and windfarm size); and
- the way in which the landscape is experienced.

In determining an acceptable level of development, it is necessary to clearly define what differing levels of development actually entail. The methodology therefore sets out defined levels of change to the landscape and visual environment that might occur or be experienced depending on the size, number and location of turbines to be built within an area.

The descriptions in Table 2.1 set out a gradated landscape typology that defines increasing levels of cumulative landscape and visual impact of turbines by describing their effect on landscape character and the experience of those living in or travelling through the landscape. These descriptions are used without prejudice as a tool to illustrate cumulative landscape change to all parties involved in planning wind energy development.

Further generic illustration of the concept is provided in Part 1 section 5 of the SNH guidance (see guidance paragraphs 5.5 and 5.6 and illustrative sketches, also shown below Table 2.1). The extent of current and potential future wind turbine landscape types in Aberdeenshire is described in detail in chapter 6 and illustrated in Figures 6.2 and 6.3.

Table 2.1: Description of Levels of Cumulative Wind Turbine Development

Landscape Type	Landscape Character	Visual Experience
Landscape with no Wind Turbines	A landscape type or area in which no, or a minimal number/size of wind turbines is present, or visible from neighbouring areas.	There would be no, or negligible, effects on visual receptors.
Landscape with Occasional Wind Turbines	A landscape type or area in which windfarms or wind turbines are located and/or are close to and visible. Turbines 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 of the turbines would not be perceived as being located in the landscape character type or area. No overall perception of wind turbines being a defining feature of the landscape.
Landscape with Wind Turbines	A landscape type or area in which a windfarm, windfarms or wind turbines are located and/or visible to such an extent that they become *one* of the defining characteristics 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.
Wind Turbine Landscape	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 discrete developments.	Visual receptors would experience views of windfarms and wind turbines as foreground, mid-ground and background features, to the extent that they are seen as the most dominant aspect of landscape character. Few areas would be free of views of wind turbines, although groupings would appear separated.
Windfarm	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, with no clear separation between groups of turbines.

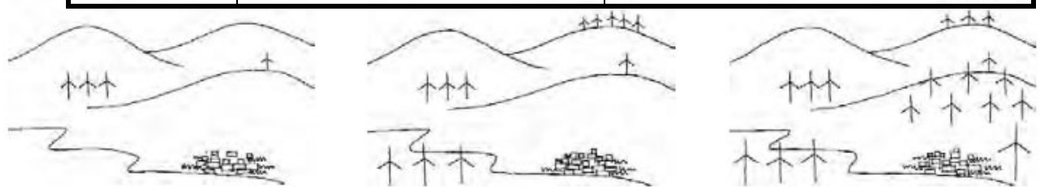


Figure 2.2: Illustrative Sketches of Wind Turbine Development (from SNH)

2.6.2 Determining Acceptable Levels of Change

The SNH siting and design guidance identifies three broad levels of cumulative change in the landscape that may be set by local authorities depending on landscape sensitivity and value and local policy objectives:

- **Landscape Protection:** Maintain existing landscape character.
- **Landscape Accommodation:** Accept a degree of change providing this does not fundamentally alter key landscape characteristics and visual resources.
- **Landscape Change:** Accept large amounts of change that may fundamentally alter key landscape characteristics and visual resources.

The descriptions in Table 2.1 provide a basis on which to understand and determine levels of change. However it is the collective decision of stakeholders including local authorities and their population that ultimately determines the levels of cumulative landscape change that are acceptable across their area, and thereby the capacity.

2.7 Presentation of Assessment and Findings

The study assessment and findings are presented in the following chapters:

Chapter 3: Landscape Baseline

This chapter defines and describes the study area, including the geographical extent and landscape character of Aberdeenshire and its surroundings. It also reviews other relevant information including landscape-related constraints, including natural heritage and cultural heritage designations.

The assessment of landscape capacity and cumulative landscape change is based on the eight landscape character types, which is then sub-divided into the thirty-seven Aberdeenshire landscape character areas in the Landscape Character Assessments. The figures incorporate slight modifications to the 1997 originals resulting from changes by Aberdeenshire Council in the *Aberdeenshire Local Development Plan* associated supplementary guidance, *Appendix 1.* This document formally maps the amalgamated revisions of these Landscape Character Assessments and it is these revised areas that will provide the baseline maps in the study.

The information in chapter 3 informs the assessment of the sensitivity and value of each landscape character area detailed in chapter 6.

Chapter 4: Visual Baseline

This chapter details the analysis carried out to establish the relative visibility and visual sensitivity of different parts of Aberdeenshire. This involves a computer-based intervisibility assessment based on different turbine heights and receptor types. The resulting maps are shown in **Appendix 4.**

The information in chapter 4 informs the assessment of landscape sensitivity as detailed in Chapter 6.

Chapter 5: Wind Turbines in the Study Area

This chapter describes the operating, consented and proposed wind turbine developments in the study area at a point in time, Spring 2013. There is a detailed breakdown of numbers and sizes of turbines and Windfarms in Aberdeenshire and the surrounding study area. Locations of turbines are illustrated in Figures 5.1 and 5.2. There is also an analysis of turbine size ranges and distribution in relation to landscape character.

Appendix 5 reviews the factors involved in wind turbine location, size, design and distribution that affect landscape, visual and cumulative impacts.

Details of individual developments are given in **Appendix 6**

Chapter 6: Assessment of Landscape Capacity and Cumulative Change

This chapter analyses and assesses the information in the previous sections to determine the landscape and visual impacts of, and capacity for, wind energy development across Aberdeenshire. The assessment is summarised in **Table 6.1a-i** and **Figures 6.1 to 6.3.** The capacity assessment is informed by the detailed assessment of landscape sensitivity and value in **Appendix 7**. The assessment informs the subsequent spatial strategy and includes guidance on turbine size and distribution. Further details of how to use Table 6.1 together with the figures are given at the start of Chapter 6.

The assessment is carried out for each of the 37 landscape character areas in Aberdeenshire. These are grouped together into five sections, then an assessment of capacity and cumulative effects on each of the landscape character areas of Aberdeenshire:

1) **Coast**
    a. Coast
    b. Coastal Strip
2) **Coastal Farmland**
3) **Agricultural Heartland**
4) **Moorland**
    a. Farmed Moorland Edge
    b. Moorland Plateaux
5) **Straths and River Valleys**
    a. River Valleys
    b. Straths and Valleys

Further spatial and design guidance for locating wind turbines in areas with residual capacity for further development and areas with restricted capacity is given in Chapter 6.

2.8 Detailed Guidance

Chapter 6 also gives guidance on turbine sizes and where different sizes would be most appropriate, cluster sizes and separation between groups of turbines for each landscape type and/or area that would limit cumulative development to the proposed acceptable level. This relates to turbines of small/medium and larger. As highlighted in 2.3.2, guidance on small turbines below 15m to blade tip applies at a local level and is generic.

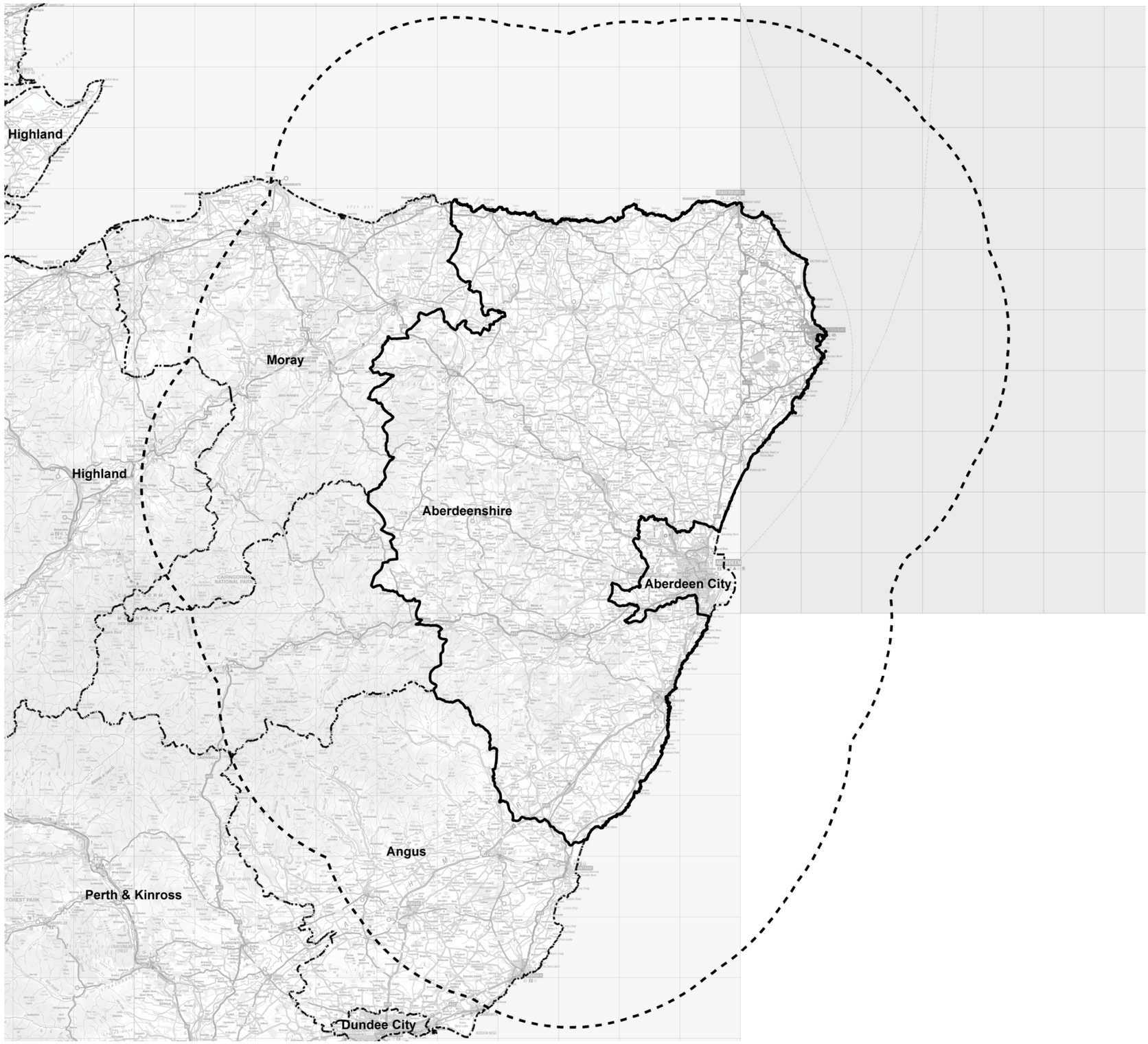
Appendix 5 of this report contains detailed discussion of how turbine size, group size and group separation affects perceptions of wind energy and landscape character. Further guidance is given in SNH's *Siting and Designing Windfarms* publication. Chapter 6 also briefly outlines the main considerations in developing the specific guidance.

2.9 Potential Opportunities and Constraints

The main spatial findings of the detailed assessment are summarised on a map in Figure 6.4. This shows the distribution of the following areas:

- Areas with significant underlying landscape capacity
- Areas with limited underlying landscape capacity
- Areas with no underlying landscape capacity
- Areas where capacity is limited by cumulative development (which would overlap with parts of the first two bullet pointed areas)

Finally it is emphasised that this assessment is focused on landscape and visual issues. Areas which have been identified as suitable on this basis may be restricted by other unrelated factors such as protection of wildlife, proximity to dwellings, aviation restrictions or lack of grid connection. These issues are not the subject of this assessment and are covered by the SPG.



Aberdeenshire COUNCIL

Strategic Landscape Capacity Assessment for Wind Energy in Aberdeenshire

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Legend

- Study Area
- Study Area 30km Buffer
- Scottish Local Authority Boundaries

Figure 3.2

Study Area

N 0 5 10 20 30 Km