

# South Lanarkshire Landscape Capacity Study for Wind Energy



Report by

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## EXECUTIVE SUMMARY

*This landscape capacity study supports South Lanarkshire Council's Supplementary Guidance for wind energy. An essential requirement for this is the assessment of cumulative landscape capacity. This study considers the capacity of the South Lanarkshire landscape to accommodate increasing levels of wind energy development. The study is based on an assessment of landscape sensitivity and value of the different landscape character types and areas in South Lanarkshire. This has involved a staged process:*

- Firstly identifying the underlying capacity of the South Lanarkshire 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 specific landscape areas of South Lanarkshire;*
- Thirdly, assessing the level of further development that could acceptably be accommodated within the landscape areas of South Lanarkshire thereby identifying remaining capacity.*

*The study is based on the premise that, given current renewable energy targets, it is accepted there will be continuing landscape change and effects on visual amenity resulting from wind energy development. However SPP recognises that in meeting renewable energy targets due regard has to be given to environmental, community and cumulative effects and that local authorities require a strategy in order to keep change within acceptable limits. In applying the assessment process, the study has addressed concepts and issues that affect the perceived significance and acceptability of cumulative changes caused by multiple wind energy developments in the landscape.*

*The landscape of South Lanarkshire is highly varied, with extensive urban areas in the northwest giving way to farmland and moorland to the south and north east and rising to the rolling hills of the Southern Uplands in the south of the local authority area and beyond. Topography and drainage is structured around the River Clyde which flows centrally from south to north west. Extensive peripheral upland areas lie on the boundaries of South Lanarkshire to the north, east and west and these mainly drain into the Clyde catchment which forms a broad central valley and farmland area surrounded by the higher hills.*

*At March 2015 there were 745 operational or consented turbines in South Lanarkshire, with a further 939 within a 15km offset from the local authority boundary. The main concentrations of operational and consented wind energy development are in the upland landscapes. These mainly comprise very large, large and medium scale developments, with larger size turbines, located along the boundary of the local authority area, in the west, north east and south east. This development trend has continued since the start of wind energy development in*

*South Lanarkshire and is reinforced by a number of existing and proposed windfarms and extensions beyond the boundaries.*

*Central and lowland areas, largely undeveloped five years ago, are now accommodating a very significant number of smaller scale developments, generally with smaller turbines, singly or in small groups. Many further proposals are at planning application stage. There are also consents and proposals for a number of small or small/medium developments with large turbines in the farmlands around East Kilbride, Hamilton, Larkhall and Rigside, as well as scoping proposals in the northeast.*

*The landscape capacity assessment has determined that the upland areas have the greatest inherent capacity for windfarm development, with more limited capacity for smaller scale developments in the lowland areas, specifically the farmland landscapes. Valleys and prominent isolated hills are considered to have little or no capacity for wind energy development.*

*The assessment of cumulative effects of operational and consented development indicates that much of the development capacity in the upland areas is already occupied by extensive operational/consented medium, large and very large windfarms. Parts of the lowland farmlands are also becoming characterised by a proliferation of turbines in smaller and single turbine developments.*

*Eight areas with future capacity limited by significant cumulative development are identified, with key development guidance given. The Southern Uplands Foothills and Pentland Hills are identified as an area of currently limited development separating a number of the cumulative areas and it is recommended that development in this area is strictly limited so as to avoid physical or visual coalescence of wind energy schemes in cumulative areas and to maintain landscape distinctiveness across the local authority area.*

*Nevertheless, limited landscape capacity for further development to an acceptable cumulative level is identified in upland and lowland landscape types. Principally this comprises the potential for discrete medium scale developments in the Rolling Moorlands on the western fringes of South Lanarkshire and a smaller development (up to 5 turbines) in the Southern Uplands. Further capacity for smaller scale development lies in lowland/ upland fringe landscapes, but scope is strictly limited without incurring a significant change in character, significant cumulative impacts between developments and with the established upland windfarms.*

*Detailed guidance on appropriate types and extents of future development is given for each landscape character type. This includes parameters for suitable turbine size, group size and separation between turbine groups. Areas where particular issues or constraints override other landscape capacity factors are also identified. The principal areas of constraint due to cumulative development and areas with potential for development are detailed in the report.*



## 1.0 INTRODUCTION

### 1.1 Background

#### Supplementary Guidance and Capacity Studies in South Lanarkshire

This landscape capacity study for wind energy in South Lanarkshire has been prepared in the light of policy changes detailed in the June 2014 Scottish Planning Policy (SPP) and to address the continuing development pressure for wind energy in the local authority area. It informs supplementary guidance for renewable energy and supersedes two earlier capacity studies informing earlier supplementary guidance:

- The first capacity study carried out in 2010<sup>1</sup> informed the 2010 Renewable Energy Supplementary Planning Guidance (SPG). This study included a three-stage spatial framework assessment based on guidance current at the time. It also determined the capacity for larger types of wind energy development across South Lanarkshire, based on analysis of landscape character, sensitivity and value and an assessment of significance of landscape change resulting from different potential scales of development. The study identified areas where cumulative factors limit the potential for further development and Broad Areas of Search for windfarms over 20MW, as required by the then current guidance.
- The 2010 study was updated as a draft for consultation in 2013<sup>2</sup> to take account of continuing pressure for wind energy development across South Lanarkshire and the introduction of significant numbers of smaller scale developments including single and smaller size turbines. The study focused on all scales of development and provided significantly more detail than the 2010 spatial framework.

However this study is prepared in line with the requirements of SPP 2014 and draft guidance provided by SNH<sup>3</sup>.

#### Changes to SPP

SPP 2014 continues to emphasise the importance of accommodating renewable energy development. Paragraph 155 states that.

*‘Development plans should seek to ensure an area’s full potential for electricity and heat from renewable sources is achieved, in line with national climate change targets, giving due regard to relevant environmental, community and cumulative impact considerations’.*

Paragraph 161 states that planning authorities should set out in the development plan a spatial framework identifying those areas that are likely to be most appropriate for onshore wind farms as a guide for developers and communities, following the approach set out in

<sup>1</sup> Ironside Farrar (2010) *South Lanarkshire Spatial Framework and Landscape Capacity for Windfarms*

<sup>2</sup> Ironside Farrar (2013) *South Lanarkshire Spatial Framework and Landscape Capacity for Wind Turbines Update*

<sup>3</sup> SNH (June 2015) *Spatial Planning for Onshore Wind Turbines – natural heritage considerations Guidance*

Table 1 of the document. Figure 1.1 below is an extract of Table 1 from SPP, showing the specific designations and other key factors to be mapped and considered in the spatial framework. Development plans are also required to indicate the minimum scale of onshore wind development that their spatial framework is intended to apply to.

**Figure 1.1: Extract from Scottish Planning Policy 2014 on Spatial Frameworks for Windfarms**

**Table 1: Spatial Frameworks**

<b>Group 1: Areas where wind farms will not be acceptable:</b>		
National Parks and National Scenic Areas.		
<b>Group 2: Areas of significant protection:</b>		
Recognising the need for significant protection, in these areas wind farms may be appropriate in some circumstances. Further consideration will be required to demonstrate that any significant effects on the qualities of these areas can be substantially overcome by siting, design or other mitigation.		
<b>National and international designations:</b>	<b>Other nationally important mapped environmental interests:</b>	<b>Community separation for consideration of visual impact:</b>
<ul style="list-style-type: none"> <li>• World Heritage Sites;</li> <li>• Natura 2000 and Ramsar sites;</li> <li>• Sites of Special Scientific Interest;</li> <li>• National Nature Reserves;</li> <li>• Sites identified in the Inventory of Gardens and Designed Landscapes;</li> <li>• Sites identified in the Inventory of Historic Battlefields.</li> </ul>	<ul style="list-style-type: none"> <li>• areas of wild land as shown on the 2014 SNH map of wild land areas;</li> <li>• carbon rich soils, deep peat and priority peatland habitat.</li> </ul>	<ul style="list-style-type: none"> <li>• an area not exceeding 2km around cities, towns and villages identified on the local development plan with an identified settlement envelope or edge. The extent of the area will be determined by the planning authority based on landform and other features which restrict views out from the settlement.</li> </ul>
<b>Group 3: Areas with potential for wind farm development:</b>		
Beyond groups 1 and 2, wind farms are likely to be acceptable, subject to detailed consideration against identified policy criteria.		

Paragraph 162 of SPP states that both strategic and local planning authorities should identify where there is strategic capacity for windfarms, and areas with greatest potential for wind development, considering cross-boundary constraints and opportunities. Development plans are also required to set out the criteria that will be considered in deciding *all* applications for wind farms of different scales – including extensions and re-powering – taking account of detailed considerations.

Paragraph 169 sets out a list of considerations for wind energy developments to be assessed against, which includes cumulative impacts and landscape and visual impacts:

- *'cumulative impacts – planning authorities should be clear about likely cumulative impacts arising from all of the considerations below, recognising that in some areas the cumulative impact of existing and consented energy development may limit the capacity for further development;'* and
- *'landscape and visual impacts including effects on wild land,'*<sup>4</sup>.

## 1.2 National and Local Policy

National and local 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 and South Lanarkshire development plan policy and guidance, including SPP 2014, SLC Supplementary Guidance and a capacity study carried out for the Glasgow and Clyde Valley area<sup>5</sup> in which South Lanarkshire lies.

## 1.3 The Capacity Study

In the light of the current SPP this landscape capacity study does not assess, but makes reference to, the specific designations and interests highlighted in Groups 1 and 2 of the Spatial Framework, mapping of which is a separate process. The study concentrates on landscape and visual capacity through assessing:

- the capacity of the landscape and visual environment of South Lanarkshire to accommodate *all scales* of wind energy development; and
- cumulative impacts of existing and consented wind energy development in the light of the capacity assessment.

As detailed in 1.1 above, these issues are highlighted by paragraph 169 of SPP and are applicable to all areas of South Lanarkshire, including areas lying within Groups 1 and 2 of the Spatial Framework, where they occur.

Critical to the current assessment is the fact that South Lanarkshire already has a large number of operating and consented wind energy developments including several large commercial windfarms and a considerable number of smaller, mainly non-commercial developments. This has created extensive areas of cumulative wind turbine development

and ongoing consents and construction of schemes will continue to add to cumulative pressures.

## 1.4 Landscape Capacity and Cumulative Impacts

This study informs 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 South Lanarkshire to accommodate wind energy development of all but the smallest domestic scale;
- A cumulative assessment examining the level of cumulative wind energy development in South Lanarkshire, based on a March 2015 database of operating, consented and proposed wind turbines and wind farms;
- Guidance on remaining development capacity and on the size and types of wind turbine development throughout South Lanarkshire that would be acceptable in landscape terms, taking into account the first two considerations.

This study specifically assesses landscape capacity and the impact of cumulative wind energy development in order to determine where there is existing capacity and where significant protection from further development may be required through the development management process. The study addresses these requirements through a staged assessment process described in sections 2.0 to 6.0 of this report.

**It is emphasised that this is a strategic level landscape and visual study, providing a context for considering the capacity for, and the cumulative effects of, existing and potential future wind turbine developments in South Lanarkshire. 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.**

<sup>4</sup> SNH 2015 Strategic guidance provides guidance on landscape capacity studies - refer to pp.9 and 10

<sup>5</sup> LUC (2014) *Landscape Capacity Study for Wind turbine Development in Glasgow and the Clyde Valley*

## 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 South Lanarkshire landscape to accommodate wind energy development and to determine the levels of cumulative development that would be acceptable across the local authority area. The assessment takes into account existing cumulative development within and around South Lanarkshire and that future change resulting from onshore wind energy development will require 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, value and capacity of landscapes across South Lanarkshire, 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

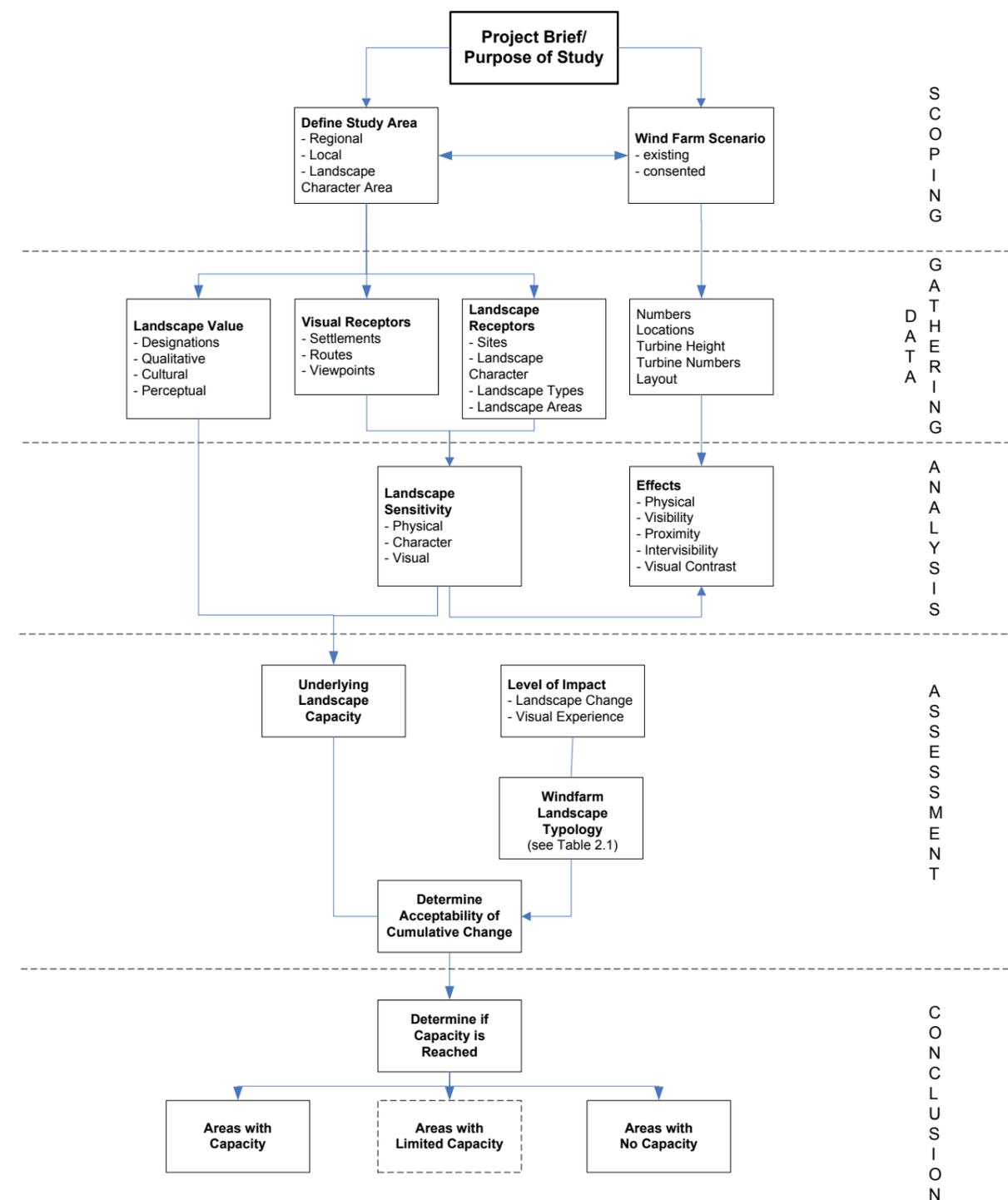
The assessment is a staged process comprising:

- 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 South Lanarkshire. This assessment considers landscape character sensitivity, visual sensitivity and landscape value.
- 3) Assess the capacity of the South Lanarkshire 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 operational and consented wind energy development in South Lanarkshire 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;

- cumulative consented 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 South Lanarkshire. However, an area of a minimum 15km beyond the boundary is considered, because of the potential landscape and visual effects on South Lanarkshire of wind energy developments in 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. This extends the assessment in the original 2010 assessment which concentrated on commercial scale developments.

The height categories of wind turbines reflect those used in the LUC Strategic Landscape Capacity study for Glasgow and the Clyde Valley:

**Under 15m**  
**15m - <30m**  
**30m - <50m**  
**50m - <80m**  
**80m - <120m**  
**Over 120m**

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 of larger turbines with a blade tip higher than 15m. Assessment and guidance for turbines less than 15m to blade tip is limited to localised generic siting and design considerations.

### 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 capacity assessment process is not based on 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 South Lanarkshire described in section 3.2 and Table

3.1 of this report<sup>6</sup>. Further landscape character types in neighbouring areas are also identified. These are detailed in the above publication and others in the national landscape character assessment series.

Landscape value is determined partly through landscape designations. There are local landscape designations in South Lanarkshire and a national designation in neighbouring Scottish Borders. Related designations that can 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 which has recently been assessed across Scotland, with two Wild Land Areas within the 15km study area (but not within South Lanarkshire).

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 to visibility 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, including intervisibility and affected receptor 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 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:

<sup>6</sup> From Ironside Farrar (2010) *South Lanarkshire Landscape Character Assessment*

**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 SNH siting and design guidance<sup>7</sup> and cumulative guidance for onshore wind energy developments<sup>8</sup>. Key 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 and/or turbines themselves (particularly turbine height and windfarm size); and

<sup>7</sup> SNH (2014). *Siting and Designing Windfarms in the Landscape*

<sup>8</sup> SNH (2012) *Assessing the cumulative impact of onshore wind energy developments: March 2012*

- 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, in Table 2.1 below, 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.

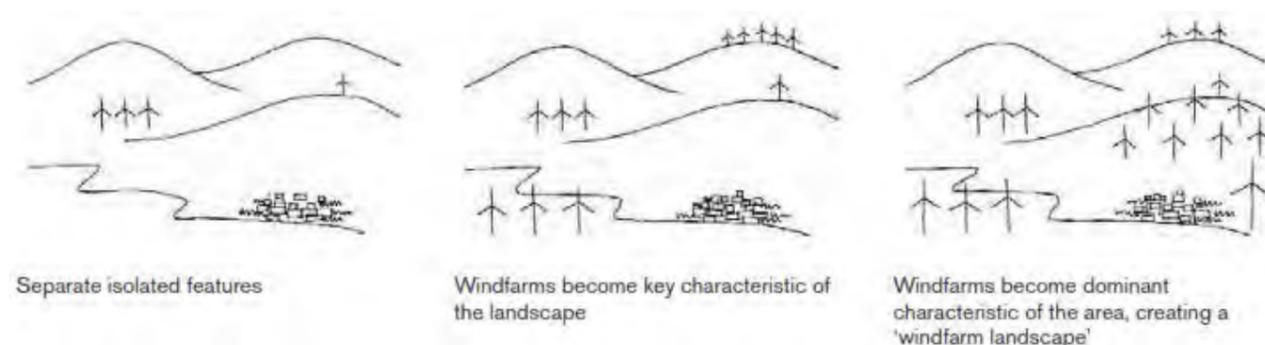
**Table 2.1: Description of Levels of Cumulative Wind Turbine Development**

Landscape Type	Landscape Character	Visual Experience
<b>Landscape with no Wind Turbines</b>	A landscape type or area in which no, or a minimal number/size of wind turbines is present, or clearly visible from neighbouring areas.	There would be no, or negligible, effects on visual receptors.
<b>Landscape with Occasional Wind Turbines</b>	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 very 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.
<b>Landscape with Wind Turbines</b>	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 <i>one</i> 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.
<b>Wind Turbine 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 the principal 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 the principal groupings would appear separated.
<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, with no clear separation between groups of turbines.

The descriptions in Table 2.1 set out a graduated 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 Section 4 of the SNH siting and designing windfarms in the landscape guidance 2014 (see paragraphs 4.5 and 4.6 and illustrative sketches, shown below in Figure 2.2). The extent of current and potential future wind turbine landscape types in South Lanarkshire is described in detail in chapter 6 and illustrated in Figures 6.2 and 6.3.

**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 South Lanarkshire and its surroundings. It also reviews other relevant information including landscape-related constraints, such as wildness, natural heritage and cultural heritage designations.

The assessment of landscape capacity and cumulative landscape change is based on the fourteen South Lanarkshire Landscape Character Types (LCTs) in the South Lanarkshire Landscape Character Assessment. These are divided into further Landscape Character Areas (LCAs) based on the published assessment.

The information in chapter 3 informs the assessment of the sensitivity and value of each landscape character type and areas 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 South Lanarkshire. This involves a computer-based intervisibility assessment, carried out by Central Environmental Surveys, based on different turbine heights and receptor types. The resulting maps are shown in **Appendix 3**.

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 South Lanarkshire at **March 2015**, and the wider study area at January 2015. There is a detailed breakdown of numbers and sizes of turbines and windfarms in South Lanarkshire 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 4** 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 5**

### Chapter 6: Assessment of Landscape Capacity and Cumulative Change

This chapter analyses and assesses the information in the previous chapters to determine the landscape and visual impacts of, and capacity for, wind energy development across South Lanarkshire. The assessment is summarised in **Table 6.1** and **Figures 6.1 to 6.3**. The capacity assessment is informed by the detailed assessment of landscape sensitivity and value in **Appendix 6**. A desk and field based assessment was carried out. 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 fourteen LCTs in South Lanarkshire. The capacity assessment and current cumulative change for each of the LCTs is then combined to come to an assessment of capacity and cumulative effects for the whole local authority area, and for the main regional landscape areas of South Lanarkshire.

## 2.8 Detailed Guidance

Chapter 6 also gives guidance on turbine sizes, 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 15m and taller. As highlighted in 2.3.2, guidance on small turbines below 15m to blade tip applies at a local level and is generic.

**Appendix 4** 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 guidance<sup>9</sup>. 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 the highest underlying landscape capacity
- Areas with some underlying landscape capacity
- Areas with little or no underlying landscape capacity
- Areas of significant cumulative development (which may overlap with parts of some or all of the above 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 impacts on wildlife, impact on residential amenity, tourism and recreation, aviation restrictions or effects on the water environment. These issues are not the subject of this assessment and guidance is provided in the Council's Renewable Energy Supplementary Guidance.**

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<sup>9</sup> SNH (2014). *Siting and Designing Windfarms in the Landscape*



### 3.0 LANDSCAPE BASELINE

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

#### 3.1 Study Area

The study area for this assessment is shown in Figure 3.1. It focuses on the local authority area of South Lanarkshire for the purposes of determining landscape capacity. Nevertheless, given the fact that there are many existing, consented and proposed windfarms in neighbouring local authority areas, consideration has been given to these, due to the extensive visual influence exerted by most windfarms. The study area therefore covers South Lanarkshire, plus a 15km buffer around its boundary.

South Lanarkshire is landlocked, with its landscape merging into those of seven neighbouring council areas:

- To the north, the largely urban landscape continues into Glasgow with urban areas of South Lanarkshire forming part of the greater Glasgow conurbation and, across the shared boundary of the Clyde, into North Lanarkshire.
- To the east, the Pentland Hills are divided between South Lanarkshire, West Lothian and the Scottish Borders.
- The southern part of South Lanarkshire is within the Southern Uplands, which continue east into the Scottish Borders, and south-west into Dumfries and Galloway.
- To the west, the upland landscape continues into East Ayrshire, becoming more lowland in character to the north, where South Lanarkshire borders East Renfrewshire.

#### 3.2 Baseline Landscape Character Assessment

##### 3.2.1 Landscape Context

The local authority area of South Lanarkshire is located in south-central Scotland, to the south-east of Glasgow, and is centred on the valley of the River Clyde. It is bounded by the Scottish Borders to the east, Dumfries and Galloway to the south, East Ayrshire to the west, and West Lothian to the north-east. It has a total area of 1,772 km<sup>2</sup> and a population of approximately 314,850.

The landscape of South Lanarkshire represents a transition from the urban area of greater Glasgow, and its neighbouring large towns, through a largely rural landscape, to the remote hills of the Southern Uplands. The River Clyde flows through South Lanarkshire

from its source at Watermeetings in the south, to Cambuslang, at the edge of the Glasgow conurbation, in the north. The river valley forms one of the distinctive features of the area. Running through or near much of the Clyde Valley are the M74 motorway and West Coast Main Line, the main transport links through the area, which connect Glasgow with north-western England.

The middle and lower Clyde Basin and its tributaries are surrounded by extensive areas of farmland. This is relatively rolling and sheltered in lower areas of the Clyde valley but grades into a more plateau-like and exposed form with lower tree cover as it extends to the upland areas in the north and west. Closer to the settlements in the north the farmland becomes influenced by urban fringe uses and the visual effects of settlements. A number of deeply incised river valleys, including the Clyde itself, cut through the farmlands.

Along the western boundary of the area is an extensive area of moorlands, which separate Lanarkshire from Ayrshire to the west. This band of hills runs south-east from Whitelee Moor, above the new town of East Kilbride, merging into the Southern Uplands at the Lowther Hills around Leadhills. Across the M74 corridor, the Southern Uplands continue past Culter Fell into the Scottish Borders. North of these hills is the town of Biggar, at the south edge of an area of farmland which stretches to the western end of the Pentlands. North-west are the towns of Lanark and Carluke, with a moorland plateau beyond extending into North Lanarkshire and West Lothian.

Tinto is an isolated hill, forming a significant landmark in the Clyde Valley, and is located centrally in South Lanarkshire. The Clyde Valley becomes more enclosed to the north, particularly around New Lanark and the Falls of Clyde. The valley and the M74 corridor become increasingly urban as they converge around Larkhall, and pass between Motherwell and Lanark. The Clyde here becomes a green corridor, linking parks and historic features through Hamilton, Blantyre, Cambuslang and Rutherglen, the latter two being suburbs of Glasgow.

##### 3.2.2 Landscape Character

The landscape character assessment of South Lanarkshire has been updated in the *South Lanarkshire Landscape Character Assessment*. The original 1999 SNH assessment<sup>10</sup> previously described and analysed the South Lanarkshire landscape but covered a wider area than needed for the study, and is outdated in places due to changes in the landscape, including windfarm development. It is also provided a broad scale assessment identifying large regional landscape types and character areas. The landscape character assessment has therefore been updated through a process of site survey and desk analysis, to identify:

- Changes to the landscape which have taken place since 1999, such as urban expansion, major road schemes and wind farms;
- Potential refinements to the broad-scale assessment, which may pick up local variations in the landscape of South Lanarkshire.

<sup>10</sup> LUC (1999) *Glasgow and Clyde Valley Landscape Character Assessment*

The revised assessment within South Lanarkshire broadly reflects the 1999 assessment but divides the area into 14 landscape character types, three more than recognised by the 1999 assessment. It also recognises subdivisions within the basic types based on land use considerations such as the predominance of windfarms or forestry.

The 1999 assessment identifies a total of 11 regional landscape character areas, seven of which are wholly or partly within the boundaries of South Lanarkshire (see Figure 3.3).

- Clyde and Ayrshire Basin Moorlands
- Central Plateau Moorlands
- Southern Uplands
- Clyde Basin Farmlands
- Inner Clyde Valley
- Southern Uplands Foothills
- Pentland Hills

These regional character areas are primarily determined by elevation, landform and landuse. The landscape character types lie within these areas and the revised assessment falls into much the same areas, reflecting the predominant effect of topography over landscape character. For the purposes of this assessment, these areas have been further agglomerated between upland and lowland types, as set out in Table 3.1 below. Landscape character areas are shown in Figure 3.4.

The principal differences between the 1999 assessment and the current assessment are as follows:

- 1) A significant reduction in the area of *Plateau Moorland* with a proportion of the area being reassigned as *Rolling Moorland*, reflecting the distinction between moorland areas with extensive undulating plateau, and areas where the landscape is more rolling with defined hill shapes, higher elevations and more remote character.
- 2) An increase in the area of *Rolling Farmland* at the expense of *Plateau Farmland*, where topography is considered more distinctively undulating and the scale of the landscape smaller with more trees, shelter and settlement.
- 3) A reduction in the area of *Foothills* to north of Biggar in the east. With the exception of certain prominent hills, the landscape here is considered to reflect the lower smaller scale and shelter of the *Plateau* and *Rolling Farmlands*, which extend north into the Scottish Borders.
- 4) The identification of the *Prominent Isolated Foothills* of Tinto, Black Mount and Dungavel Hill in areas formerly identified as *Foothills* to the Southern Uplands. These hills are considered to be of sufficient scale to be distinguished from the general *Foothills* LCT and are isolated from the masses of the Southern Upland and Pentland hills, making them prominent landmarks – especially so in the case of Tinto.

**Table 3.1. Landscape Character Areas in South Lanarkshire (based on revised Glasgow and Clyde Valley Landscape Character Assessment)**

Regional Character Areas	Landscape Character Types	Principal Landscape Units
<b>LOWLAND</b>		
<b>Clyde Basin Farmlands</b>	1. Urban Fringe Farmland	<i>East Kilbride /Hamilton/Cambuslang; Larkhall/ Ferniegair; Carluke</i>
	2. Incised River Valley	<i>River Clyde: Bothwell/ Blantyre; Rotten Calder; Avon Water; River Nethan; Mouse Water</i>
	3. Broad Urban Valley	<i>River Clyde: Hamilton – Bothwell; Kylepark – Carmyle; Carmyle – Dalmarnock</i>
	4. Rolling Farmland	<i>North/ East of Lanark; West of Lanark and Clyde Valley; South of Strathaven; Biggar and Dunsyre</i>
	5. Plateau Farmland	<i>Central Plateau: Carnwath/ Forth Western Plateau: Lesmahagow/ Strathaven</i>
<b>Inner Clyde Valley</b>	2. Incised River Valley	<i>Mid Clyde Valley; Avon Water</i>
<b>UPLAND/ UPLAND FRINGE</b>		
<b>Central Plateau Moorlands</b>	6. Plateau Moorland	<i>Black Law/ Forth</i>
<b>Clyde &amp; Ayrshire Basins Moorlands</b>	6. Plateau Moorland	<i>Whitelee Moor, Coalburn, Douglas Water, Crawfordjohn</i>
	7. Rolling Moorland	<i>Hagshaw/ Dungavel Crawfordjohn/ Cairn Table</i>
	8. Upland River Valley	<i>Avon Water; River Nethan; Douglas Water; Duneaton Water</i>
<b>Southern Upland Foothills</b>	4. Rolling Farmland	<i>Biggar</i>
	9. Broad Valley Upland	<i>Upper Clyde: Abington-Thankerton; Thankerton-Bonnington Linn; Biggar; Medwin Water; Douglas Water</i>
	10. Foothills	<i>Carmichael/ Robertson; Biggar Common; Broomy Law</i>
	11. Prominent Isolated Foothills	<i>Tinto; Black Mount; Dungavel Hill</i>
<b>Pentland Hills</b>	12. Old Red Sandstone Hills	<i>Western Pentland Hills</i>
<b>Southern Uplands</b>	8. Upland River Valley	<i>Duneaton Water</i>
	13. Southern Uplands	<i>Lowther Hills; Southern Uplands east of Abington and the Clyde</i>
	14. Upland Glen	<i>Glengonnar Water; Elvan Water; Daer and Potrail Waters; Clydes Burn and Evan Water; Midlock Water; Camps Water; Culter Water and Cow Gill.</i>

- 5) The identification of Urban Fringe Farmland around the larger settlements in the northwest. This type replaces Plateau and Rolling Farmland in these areas, as the farmland close to towns is considered to show urban fringe influences and land uses relating to leisure activities.
- 6) More extensive characterisation of river valley types and glens in the farmland and upland areas.

These changes are important in distinguishing subtle variations in topography, scale and character that are important in determining landscape sensitivity and capacity and factors that may contribute to the definition of local landscape designations.

### 3.3 Landscape Designations

Landscape designations are an indication of landscape value as determined by society. Landscape designations form part of the baseline for both the assessment of landscape capacity, and the preparation of the spatial framework. Landscape designations within the study area are noted below, and are shown in Figures 3.5 and 3.6.

#### 3.3.1 National Designations

There are no areas of national landscape designation, i.e. National Scenic Areas (NSA) or National Parks within South Lanarkshire. There is one NSA within the study area; the Upper Tweeddale NSA in the Scottish Borders, which is 4km east of the South Lanarkshire boundary at its closest.

There is no nationally important wild land in South Lanarkshire, as shown on the 2014 SNH map of wild land areas. The nearest area is in the Scottish Borders, approximately 5km south-east.

National Scenic Areas are in Group 1 of the spatial framework. Wild land is in Group 2 of the spatial framework.

#### 3.3.2 Local and Regional Designations

Local landscape designations within South Lanarkshire are extensive. There are 6 Special Landscape Areas (SLAs) described in the 2010 study<sup>11</sup>:

- 1) **Lower Clyde & Calderglen SLA** includes the Clyde within the Glasgow conurbation and Calder Glen on the east side of East Kilbride. This reflects the importance of the river corridors in contributing to the setting and cultural heritage of the urban areas as well as their importance in informal and easily accessible recreation.
- 2) **Middle Clyde Valley SLA** is contiguous with the above, being focused around the incised river valleys of the Clyde and Avon, between Hamilton in the Glasgow

conurbation and the towns of Strathaven, Lesmahagow and Lanark in the west and south. The SLA includes the Hamilton High Parks, the New Lanark World Heritage site and the Falls of Clyde.

- 3) **Upper Clyde Valley and Tinto SLA** is contiguous with the above and covers the meandering course of the River Clyde above the Falls of Clyde, between the confluence of the Douglas Water and Abington in the Southern Uplands. The SLA includes the broad upland valley setting of the river, including Tinto Hill and the hills along the northern edge of the Southern Uplands Fault, including the highest point in South Lanarkshire at Culter Fell. The SLA includes the historic burgh of Biggar to the east. The designation is contiguous with a local landscape designation in Scottish Borders covering the course of the Tweed.
- 4) **Douglas Valley SLA** covers the middle part of the Douglas Water valley, between Rigside in the northeast and Glespin in the northwest. This includes the historic village of Douglas and associated estate landscape as well as the hills to the north and south forming the setting to the river and town.
- 5) **The Pentland Hills and Black Mount SLA** is based around the southwestern end of the Pentland Hills in South Lanarkshire. The hills and moorland lie to the east of the A70 but the SLA includes the village of Tarbrax to the west, the pastoral valley of the South Medwin and the prominent outlier hill of Black Mount in the east. The designation is contiguous with local landscape designations in Scottish Borders and West Lothian to the north.
- 6) **Leadhills and The Lowther Hills SLA** covers the Southern Upland hills and glens east of the River Clyde, M74 and Anglo-Scottish Interconnector and is contiguous with the Dumfries & Galloway border to the west and south. To the north it includes part of the Duneaton Water valley and the village of Crawfordjohn. The SLA includes the historic village of Leadhills with its associated legacy of mining as well as the Lowther Hills and Daer Reservoir. The SLA is contiguous with a local landscape designation in Dumfries & Galloway.

There are a number of local landscape designations within the surrounding areas, including the large Special Landscape Area which surrounds the Upper Tweeddale NSA, RSAs in Dumfries and Galloway, Sensitive Landscape Character Areas in East Ayrshire, and Sites of Special Landscape Importance, covering parks and green corridors in Glasgow. Some of these areas merge with the landscape designations in South Lanarkshire.

Local landscape designations are not included in the spatial framework.

There are a number of Historic Gardens and Designed Landscapes (HGDLs) within the study area. Whilst this is not a statutory landscape designation it is a landscape factor that contributes to the assessment of landscape character and value. These are taken into account in the assessment. HGDLs are included in Group 2 of the Spatial Framework.

There are also three country parks in South Lanarkshire, Strathclyde Country Park, Calderglen Country Park, and Chatelherault Country Park.

<sup>11</sup> Ironside Farrar (2010) *South Lanarkshire: Validating Local Landscape Designations*

### 3.4 Other Designations

There are a number of designations that feed into the landscape capacity assessment process outlined in section 2.1. These include natural heritage and cultural heritage designations and are shown on Figures 3.5 and 3.6. Many of these fall into Group 2 of the spatial framework but their description here is for background information only.

#### 3.4.1 Natural Heritage designations

The South Lanarkshire Local Plan (Adopted 2009) lists the following internationally designated sites:

- Braehead Moss SAC
- Clyde Valley Woodlands SAC
- Coalburn Moss Craigengar SAC
- Cranley Moss SAC
- Red Moss SAC
- Waukenway Moss SAC
- Muirkirk and North Lowther Uplands SPA

The local plan also lists 45 SSSIs, and one national Nature Reserve; Clyde Valley Woodlands.. As noted above there are no NSAs or National Parks within South Lanarkshire.

SPA, SAC, SSSI and NNR are included in Group 2 of the spatial framework.

Besides the landscape designations already noted in 3.3 above, there are Local Nature Reserves at Langlands Moss (East Kilbride) and Morgan Glen (Larkhall), and numerous areas of Ancient Woodland and Tree Preservation Orders (TPO).

#### 3.4.2 Historic and cultural designations

New Lanark World Heritage site lies on the River Clyde near the centre of South Lanarkshire. The World Heritage Site covers approximately 1km<sup>2</sup>, and its buffer covers a further 8km<sup>2</sup>, and comprises a collection of sites, monuments, buildings woodland, waterfalls and open space. Large numbers of listed buildings and Scheduled Ancient Monuments occur across the study area, and there are conservation areas covering parts of Hamilton, Bothwell, Strathaven, Uddingston, Cambuslang, Biggar, and several other villages and towns. There are Historic Battlefield designations at Bothwell Bridge and Drumclog. The largest designated areas are the two HGDLs at Falls of Clyde and Hamilton, the historic battlefield at Drumclog and the SAM in the mines around Leadhills.

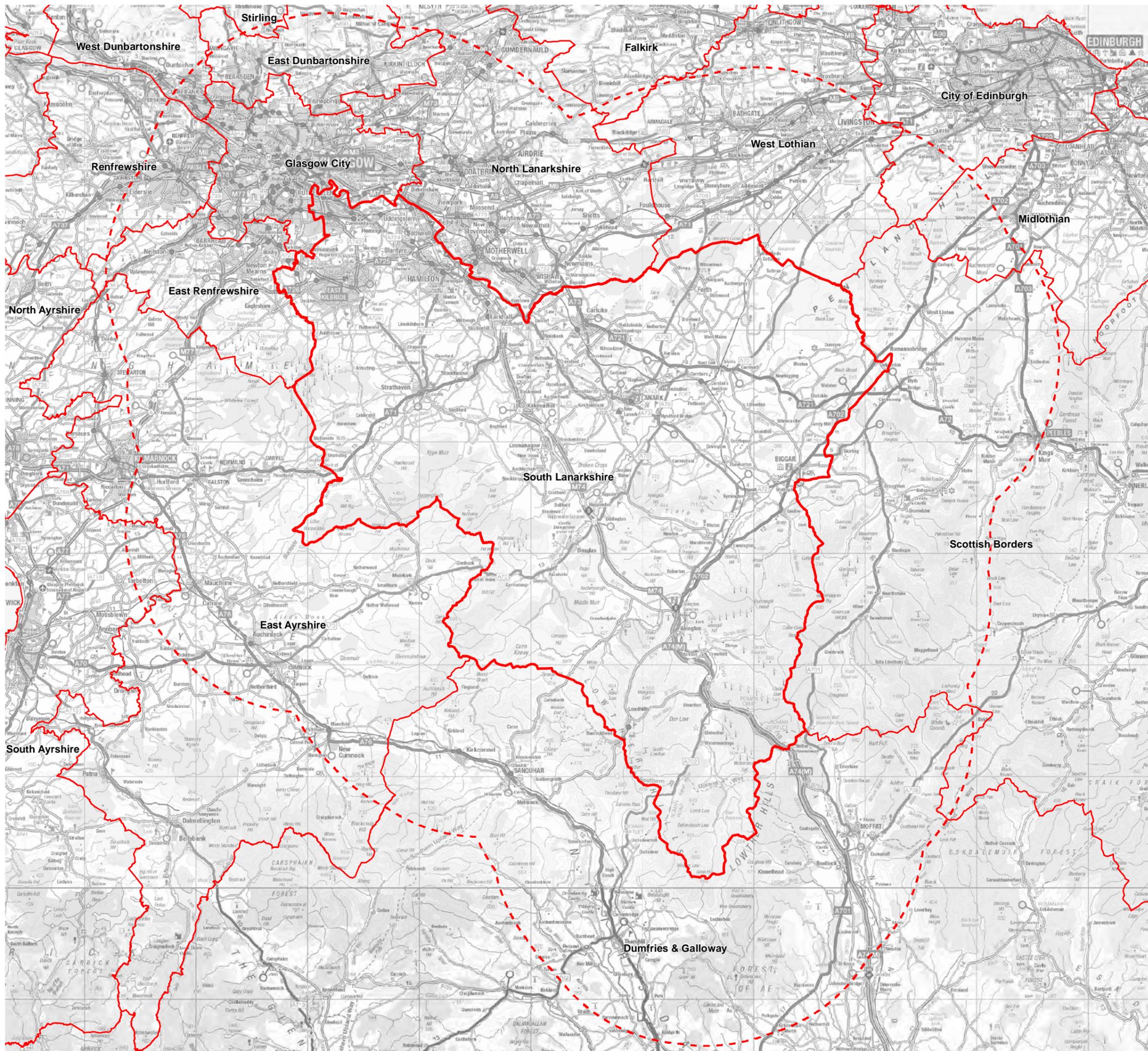
World Heritage Sites, HGDLs and Historic Battlefields are included in Group 2 of the spatial framework.

#### 3.4.3 Tourism and recreational interests

Country parks are noted in 3.3.2 above. The Pentland Hills Regional Park lies close to South Lanarkshire to the north-east. The Southern Upland Way is a coast-to-coast long distance route, which passes through the southern tip of South Lanarkshire. The Clyde Walkway is a walking route which follows the River Clyde from Glasgow to New Lanark. National Cycle Routes 74 and 75 run through the area. The Clyde Valley National Tourist Route runs along the A72, A73 and A702 from Abington via Bigger and Lanark to Hamilton and the M74. The areas around designated landscapes and SAMs are often popular visitor locations (e.g. Leadhills). Tinto Hill is a popular viewpoint and hillwalking route.

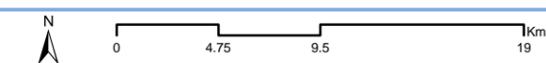
### Legend

- SLC Boundary
- Study Area 15km buffer
- Scottish Local Authority Boundaries



**Figure 3.1**

Study Area



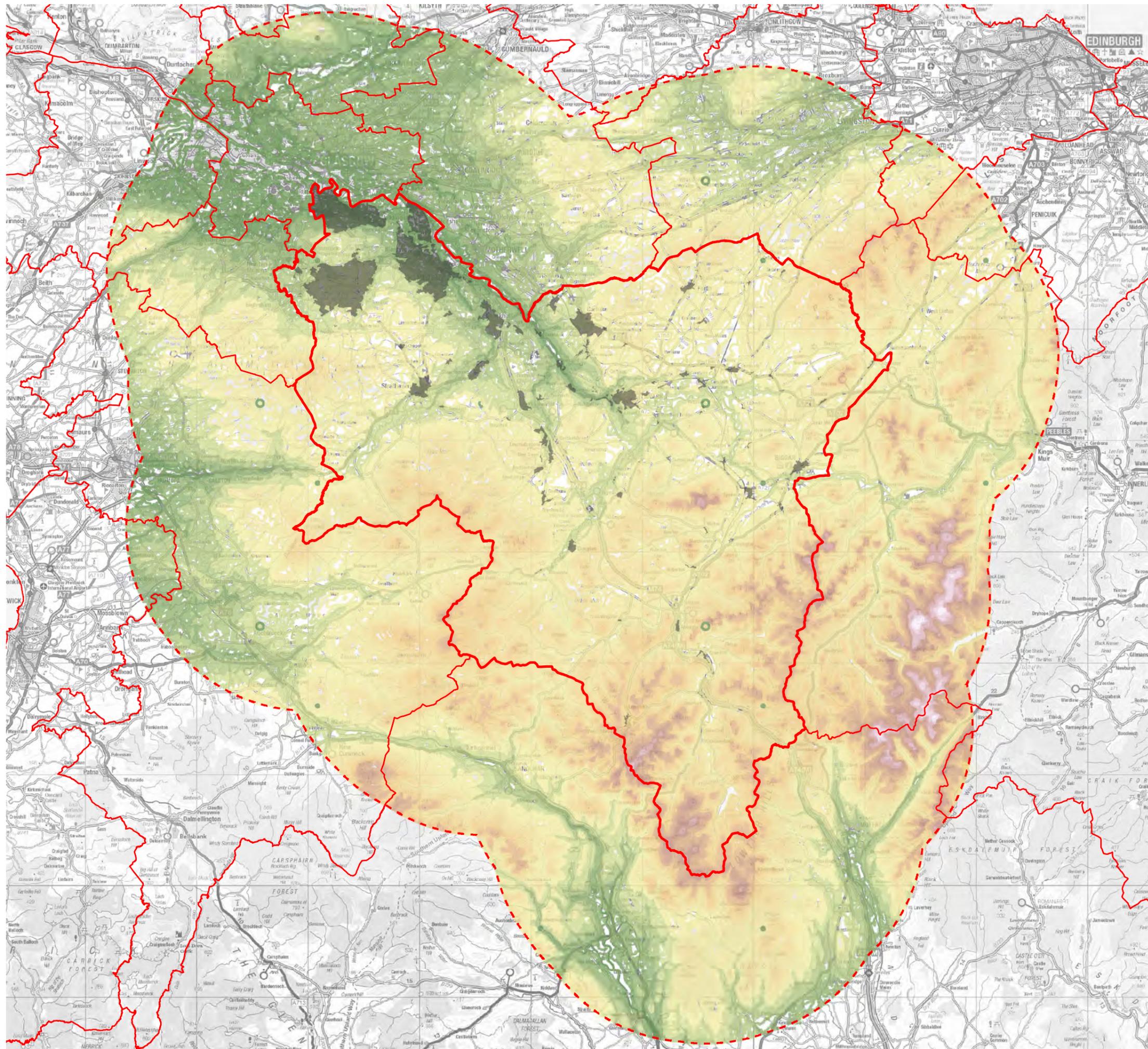




# South Lanarkshire Landscape Capacity Study for Wind Energy

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### Legend

- SLC Boundary
- Study Area 15km buffer
- Scottish Local Authority Boundaries
- Settlements

### Elevation

- 800 - 850m AOD Contours
- 750 - 800m AOD Contours
- 700 - 750m AOD Contours
- 650 - 700m AOD Contours
- 600 - 650m AOD Contours
- 550 - 600m AOD Contours
- 500 - 550m AOD Contours
- 450 - 500m AOD Contours
- 400 - 450m AOD Contours
- 350 - 400m AOD Contours
- 300 - 350m AOD Contours
- 250 - 300m AOD Contours
- 200 - 250m AOD Contours
- 150 - 200m AOD Contours
- 100 - 150m AOD Contours
- 50 - 100m AOD Contours
- 0 - 50m AOD Contours

**Figure 3.2**

Topography

