



www.landuse.co.uk

Sunderland Wind and Solar Landscape Sensitivity Assessment

Prepared by LUC
October 2015



Project Title: Sunderland Wind and Solar Landscape Sensitivity Assessment

Client: Sunderland City Council

Version	Date	Version Details	Prepared by	Checked by	Approved by
1	9 July 2015	First Draft	LUC	PDM	
2	19 September 2015	Draft	AB	PDM	SCO
3	7 October 2015	Final report	AB	PDM	NJ



www.landuse.co.uk

Sunderland Wind and Solar Landscape Sensitivity Assessment

Prepared by LUC
October 2015

Planning & EIA
Design
Landscape Planning
Landscape Management
Ecology
Mapping & Visualisation

LUC EDINBURGH
28 Stafford Street
Edinburgh
EH3 7BD
T +44 (0)131 202 1616
edinburgh@landuse.co.uk

Offices also in:
London
Bristol
Glasgow



Land Use Consultants Ltd
Registered in England
Registered number: 2549296
Registered Office:
43 Chalton Street
London NW1 1JD
LUC uses 100% recycled paper

Contents

1	Introduction	1
	Background	1
	Study area	2
	Development types	4
2	Methodology	8
	Introduction	8
	Potential effects of wind and solar energy development on the landscape	8
	Assessment of landscape sensitivity	11
3	Assessment Findings	16
	Introduction	16
	LCT 1: Coalfield Ridge	17
	LCT 2: Coalfield Lowland Terraces	22
	LCT 3: Incised Lowland Valley	28
	LCT 6: Limestone Escarpment	33
	LCT 7: Clay Plateau	40
	LCT 8: Coastal Limestone Plateau	46
	LCT 10: Urban Limestone Gorge	53
	LCT 11: Limestone Coast	59
4	Summary	66
	Sensitivity to wind energy development	66
	Sensitivity to solar energy development	67

Tables

Table 1.1 Landscape classification (shaded areas not included in this study)	3
Table 1.2 Wind energy development within Sunderland	4
Table 1.3 Wind energy development within 5km of Sunderland	4
Table 1.4 Range of development types assessed	5
Table 2.1 Sensitivity assessment criteria for wind turbine development	12
Table 2.2 Sensitivity assessment criteria for solar energy development	13
Table 2.3 Sensitivity definitions	14
Table 4.1 Summary table: sensitivity to wind energy development	66
Table 4.2 Summary table: sensitivity to solar energy development	67

Figures

Figure 1.4 Commercial-scale solar energy scheme	6
Figure 1.5 Indicative sizes for solar development types	6
Figure 1.6 Great Eppleton wind turbines	7
Figure 1.7 Nissan wind turbines	7
Figure 3.1 Location of Coalfield Ridge	17
Figure 3.2 Location of Coalfield Lowland Terraces	22
Figure 3.3 Location of Incised Lowland Valley	28
Figure 3.4 Location of Limestone Escarpment	33
Figure 3.5 Location of Clay Plateau	40
Figure 3.6 Location of Coastal Limestone Plateau	46
Figure 3.7 Location of Urban Limestone Gorge	53
Figure 3.8 Location of Limestone Coast	59

1 Introduction

- 1.1 LUC was commissioned by Sunderland City Council to undertake an assessment of the sensitivity of the landscape within the City to wind and solar energy development at a range of scales. The findings of the *City of Sunderland Landscape Character Assessment* (LUC, 2015) were used as the basis for this assessment.
- 1.2 It is noted that there are a number of constraints to potential wind and solar energy development within the City, including natural and cultural heritage, noise, and technical considerations. The scope of this assessment is restricted to landscape and visual issues. It is intended primarily as guidance for the Council on evaluating the landscape impact of any future applications, but can also assist developers and others in understanding the likely sensitivity of potential sites.
- 1.3 The assessment provides guidance on:
 - the key landscape issues associated with onshore wind and solar energy developments;
 - the relative landscape sensitivities of different areas within the City to wind and solar energy developments; and
 - the siting and design of wind and solar energy schemes.
- 1.4 The assessment presents the results of a strategic assessment of the landscape, and the findings do not preclude the need for detailed project-specific assessments of individual proposals. All developments will continue to be assessed on their individual merits against the Development Plan and other material planning considerations.

Background




- 1.5 The installation of wind turbines and solar panels at a commercial scale may have significant impacts on landscape character, and landscape impact is a key aspect of determining applications for these development types. Different landscapes present different opportunities for renewable energy, and landscape sensitivity studies have become an important tool in assisting both planners and developers in guiding projects to the right locations.
- 1.6 The Sunderland City Council area, like the rest of the UK, is faced with a range of challenges arising from a changing climate. Balancing the need to make a meaningful contribution towards reducing harmful emissions from our energy use (through cleaner energy production) with the management of the landscape is one of these key challenges.
- 1.7 The landscape has an economic, social and community value, contributing to a sense of identity, well-being, enjoyment and inspiration and being a contributor to the tourism industry. It also has an environmental value, as a home for wildlife and a cultural record of society's use of the land.
- 1.8 At the same time, certain parts of Sunderland may have favourable conditions for the production of wind and solar energy, and indeed wind turbines have already been successfully deployed in the area. The National Planning Policy Framework (NPPF) makes it clear that local authorities should take a positive approach towards renewable and low carbon developments. One of the core principles that underpin the NPPF is that: "*planning should support the transition to a low carbon future in a changing climate, .and encourage the use of renewable resources.*"
- 1.9 NPPF also states that local planning authorities should "*have a positive strategy to promote energy from renewable and low carbon sources*" and should "*design their policies to maximise renewable and low carbon energy development while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts)*" (para. 97).
- 1.10 The Council recognises these opportunities and understands the need to provide a positive framework for renewable energy generation (which can have environmental, economic, social and

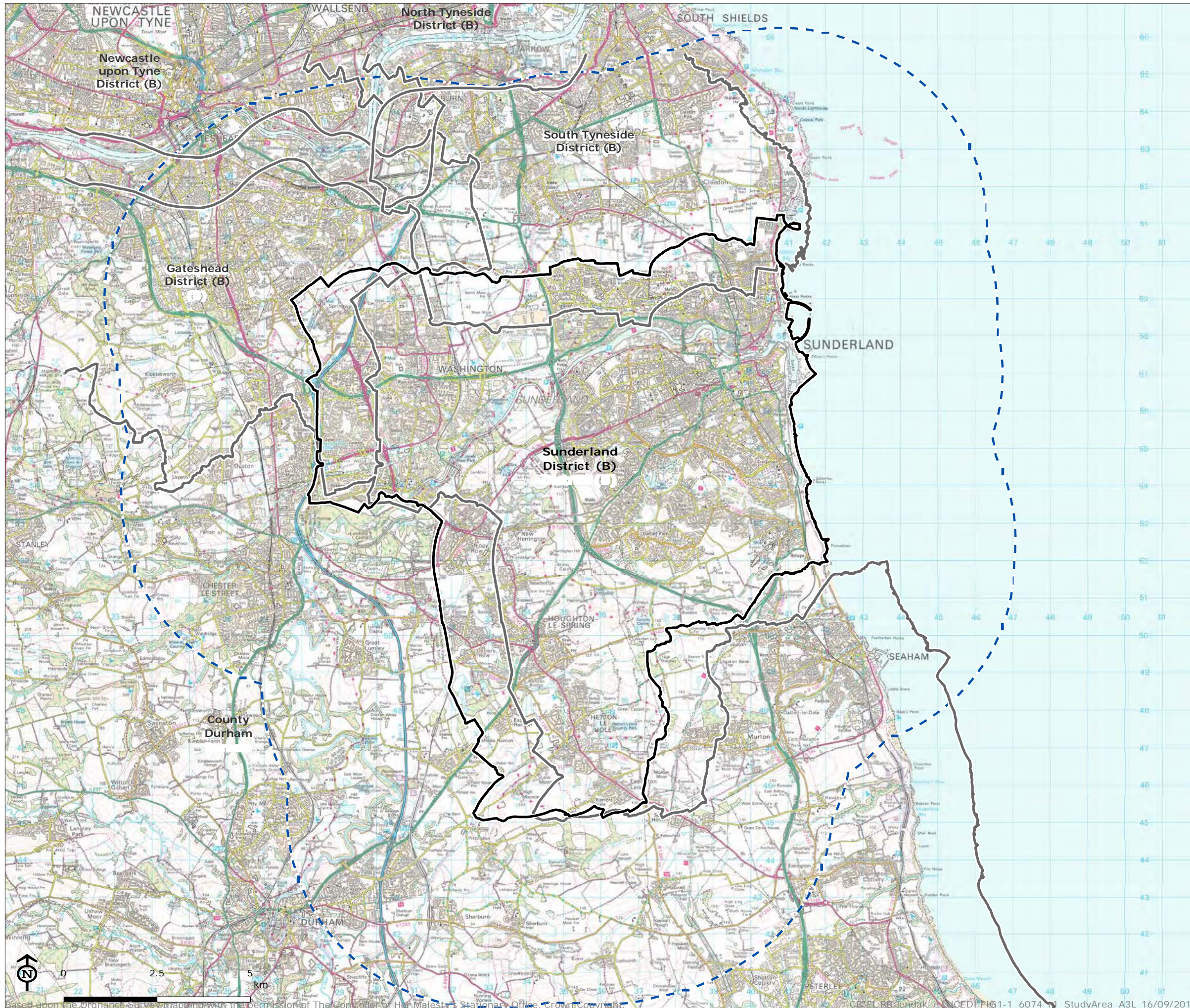
other benefits). However, the development of wind and solar electricity generating installations within the City needs to be managed carefully to achieve the greatest contribution towards energy needs, while at the same time ensuring that the important characteristics of the landscape are not unacceptably harmed.

Study area

- 1.11 The core study area for the landscape sensitivity assessment is the Sunderland City Council area, as shown in Figure 1.1. The landscape of the study area is described in the *City of Sunderland Landscape Character Assessment (CSLCA)*.
- 1.12 The findings of the CSLCA, and a review of existing schemes elsewhere in the UK, indicate that proposals for large scale renewables are unlikely to come forward in predominantly residential built up areas. The CSLCA classifies the landscape of Sunderland into 11 landscape character types (LCTs), and 30 character areas, as listed in Table 1.1 and illustrated in Figure 1.2. Of these, LCTs 4, 5 and 9 represent primarily residential areas, and they have consequently been excluded from the sensitivity study. The other LCTs form the basis for the sensitivity assessments, and this is broken down by character area when necessary, as described in the methodology (section 2).
- 1.13 An outer study area of 5km around the Sunderland City Council boundary was used to understand relationships between the study area and its adjacent landscapes, as well as the landscape and visual impacts of existing or consented wind and solar energy developments outside the district boundary. The outer study area is shown in Figure 1.1.

Figure 1.1: Study Area

-  Sunderland Council boundary
-  5km from Council boundary
-  Other Local Authority boundary

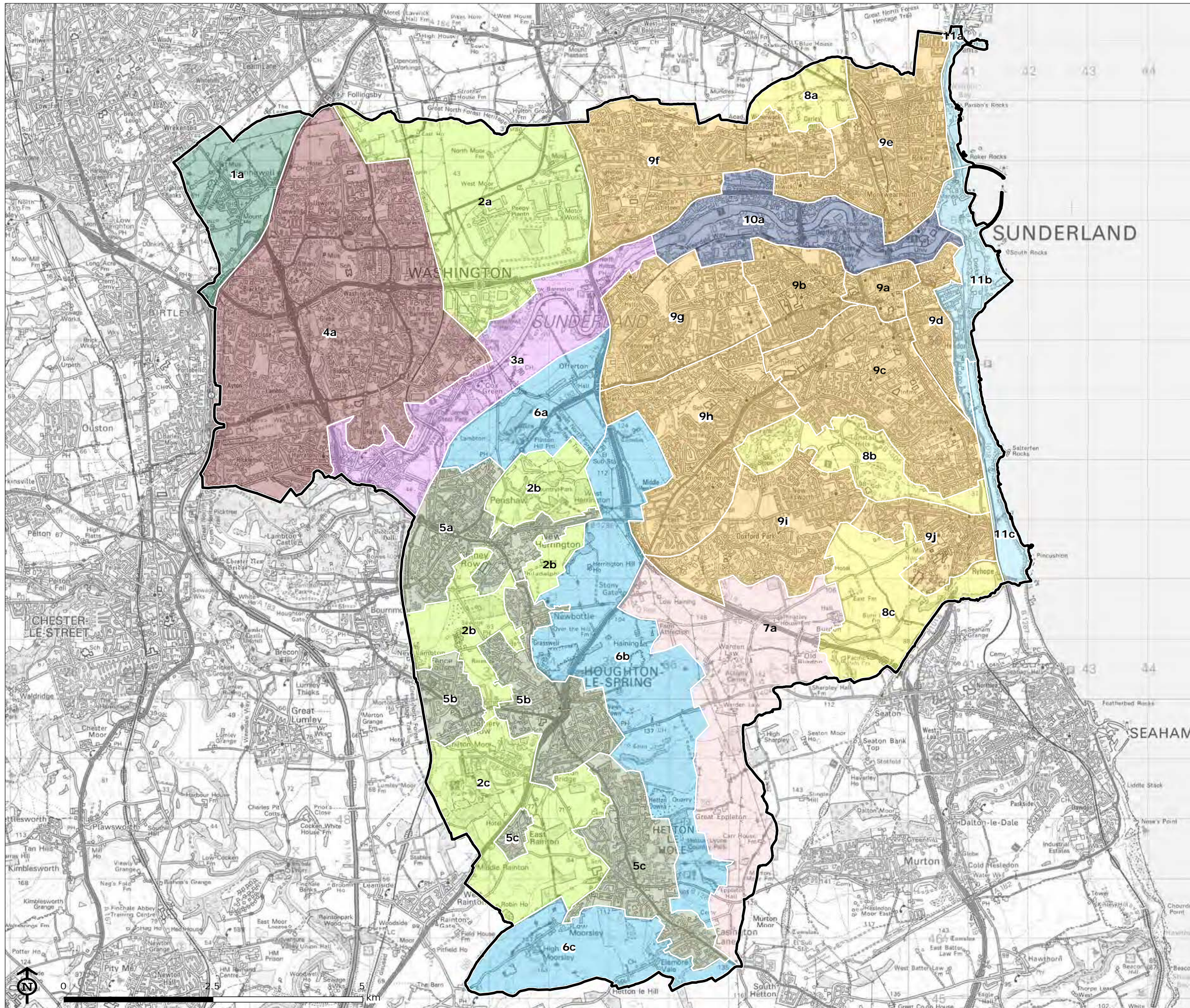


Map Scale @ A3: 1:100,000



Sunderland Wind and Solar Energy Landscape Sensitivity Assessment

Figure 1.2: Landscape Character Assessment



▭ Sunderland Council boundary

Landscape Character Types

- ▭ Clay Plateau
- ▭ Coalfield Lowland Terraces
- ▭ Coalfield Ridge
- ▭ Coalfield Villages
- ▭ Coastal Limestone Plateau
- ▭ Incised Lowland Valley
- ▭ Limestone Coast
- ▭ Limestone Escarpment
- ▭ Urban Limestone Gorge
- ▭ Urban Limestone Plateau
- ▭ Urban New Town

Landscape Character Areas

- 1a: Springwell Rise
- 2a: Usworth Lowland
- 2b: Penshaw to Houghton Open Spaces
- 2c: Rainton Lowland
- 3a: Weardale
- 4a: Washington
- 5a: Penshaw and Herrington
- 5b: Houghton-le-Spring, Fence Houses and Newbottle
- 5c: Hetton-le-Hole, Easington Lane and East Rainton
- 6a: Penshaw Hill
- 6b: Hastings Hill and Copt Hill
- 6c: High Moorsley
- 7a: Warden Law and Eppleton Moor
- 8a: Carley Hill
- 8b: Tunstall Hills
- 8c: Burdon to Ryhope
- 9a: Sunderland City Centre
- 9b: Millfield
- 9c: Ashbrooke, Hillview and Grangetown
- 9d: East End and Hendon
- 9e: Southwick, Fulwell, Monkwearmouth and Roker
- 9f: Hylton, Downhill and Castletown
- 9g: South Hylton, Pennywell and Ford
- 9h: Thorney Close, Herringdon and Grindon
- 9i: Silksworth and Tunstall
- 9j: Ryhope
- 10a: River Wear Gorge
- 11a: North Sunderland Coast
- 11b: Sunderland Docks
- 11c: South Sunderland Coast

Map Scale @ A3: 1:62,500



Table 1.1 Landscape classification (shaded areas not included in this study)

Landscape Character Type	Landscape Character Areas
National Character Area: Tyne and Wear Lowlands	
1. Coalfield Ridge	1a. Springwell Rise
2. Coalfield Lowland Terraces	2a. Usworth Lowland
	2b. Penshaw to Houghton Open Spaces
	2c. Rainton Lowland
3. Incised Lowland Valley	3a. Weardale
4. Urban New Town	4a. Washington
5. Coalfield Villages	5a. Penshaw and Herrington
	5b. Houghton-le-Spring, Fence Houses and Newbottle
	5c. Hetton-le-Hole, Easington Lane and East Rainton
National Character Area: Durham Magnesian Limestone Plateau	
6. Limestone Escarpment	6a. Penshaw Hill
	6b. Hastings Hill and Copt Hill
	6c. High Moorsley
7. Clay Plateau	7a. Warden Law and Eppleton Moor
8. Coastal Limestone Plateau	8a. Carley Hill
	8b. Tunstall Hills
	8c. Burdon to Ryhope
9. Urban Limestone Plateau	9a. Sunderland City Centre
	9b. Millfield
	9c. Ashbrooke, Hillview and Grangetown
	9d. East End and Hendon
	9e. Southwick, Fulwell, Monkwearmouth and Roker
	9f. Hylton, Downhill and Castletown
	9g. South Hylton, Pennywell and Ford
	9h. Thorney Close, Herringdon and Grindon
	9i. Silksworth and Tunstall
	9j. Ryhope
10. Urban Limestone Gorge	10a. River Wear Gorge
11. Limestone Coast	11a. North Sunderland Coast
	11b. Sunderland Docks
	11c. South Sunderland Coast

Development types

Current patterns of renewable energy development in and around Sunderland

- 1.14 As far as we are aware, there are no operational solar farms within the Sunderland City Council area or the 5km buffer. There are currently two solar energy schemes that have been granted planning permission but are not yet operational. These include a 4.7MW solar farm to be built on land within the centre of the Nissan test track within the Nissan Motor Manufacturing complex; and a solar tracking system consisting of 36 photovoltaic panels mounted on 7m high mast to replace the existing small wind turbine at the Wearfield Enterprise Park.
- 1.15 At the time of writing this assessment there are two operational wind farms within the City, these are the Nissan Wind Farm and Great Eppleton Wind Farm. Details of these schemes are listed in Table 1.2 below and shown in Figure 1.3.

Table 1.2 Wind energy development within Sunderland

Name	Number of turbines	Turbine height (blade tip)	Landscape Character Type	Landscape Character Area
Nissan Wind Farm	10	73m	2. Coalfield Lowland Terraces	2a. Usworth Lowland
Great Eppleton Wind Farm	4	115m	7. Clay Plateau	7a. Warden Law and Eppleton Moor

- 1.16 Located within the 5km buffer there are currently 6 operational wind energy developments, all of which are within County Durham. These are listed in Table 1.3 below and shown in Figure 1.3.

Table 1.3 Wind energy development within 5km of Sunderland

Name	Number of turbines	Turbine height (blade tip)
High Sharpley	2	90m
South Sharpley	2	100m
Little Coop House Farm	1	61m
Hallfield Farm	1	78m
Junction House Farm	1	46m
High Haswell	1	100m
Haswell Moor	4	110m

Types of development considered in the study

- 1.17 A range of scales of wind and solar energy development have been considered in the sensitivity assessment. The scale of a wind energy development can be defined by the height of turbines, the number of turbines or by reference to installed capacity. Although the number of turbines and installed capacity are important, it is turbine height which is most likely to be the determining factor for the assessment of landscape sensitivity. Consequently, the assessment focuses on height rather than number of turbines. Number of turbines, including cumulative impacts, remains a factor when considering development, and this is addressed within the siting and design guidelines.

Sunderland Wind and Solar Energy Landscape Sensitivity Assessment

Figure 1.3: Renewable Energy Development



C::J Sunderland Council boundary

1--- 5km from Council boundary

Turbine size

- Large (100-130m)
- Medium (40-99m)
- Small (<40m)

Wind farm status

- Operational
- Approved

Note
 There are no solar energy developments within the project area.
 The map contains wind turbine locations from Durham County Council. The DECC Planning Database (Aug 2015) was cross-referenced for further schemes, but none was identified.

Map Scale @ A3: 1:100,000



- 1.18 Turbines below 30m have not been considered, since their landscape and visual impacts are likely to be more limited, particularly in urban areas. Above 30m, a turbine will overtop most other built development in the area, and would potentially have more widespread effects.
- 1.19 The size of a solar energy development can also differ greatly, in terms of power output and area covered. Schemes in the UK range in area from less than 1 hectare, up to well over 100 hectares. However, it is highly unlikely that solar energy developments at the very large end of this spectrum would be proposed in the Sunderland City Council area. Solar energy developments below 1 hectare have not been considered as their landscape and visual impacts are likely to be very localised. No consideration has been given in this assessment to roof-mounted solar panels.
- 1.20 Table 1.4 sets out the range of development types considered in the assessment.

Table 1.4 Range of development types assessed

Development type	Definition
Small solar energy development	1 – 5 ha in area
Medium solar energy development	5 – 10 ha in area
Large solar energy development	>10 ha in area up to 20 ha – schemes larger than this are unlikely to be proposed in Sunderland
Small wind energy development	One or more wind turbines, between 30 and 50m to tip
Medium wind energy development	One or more wind turbines, between 50 and 100m to tip
Large wind energy development	One or more wind turbines, over 100m to tip

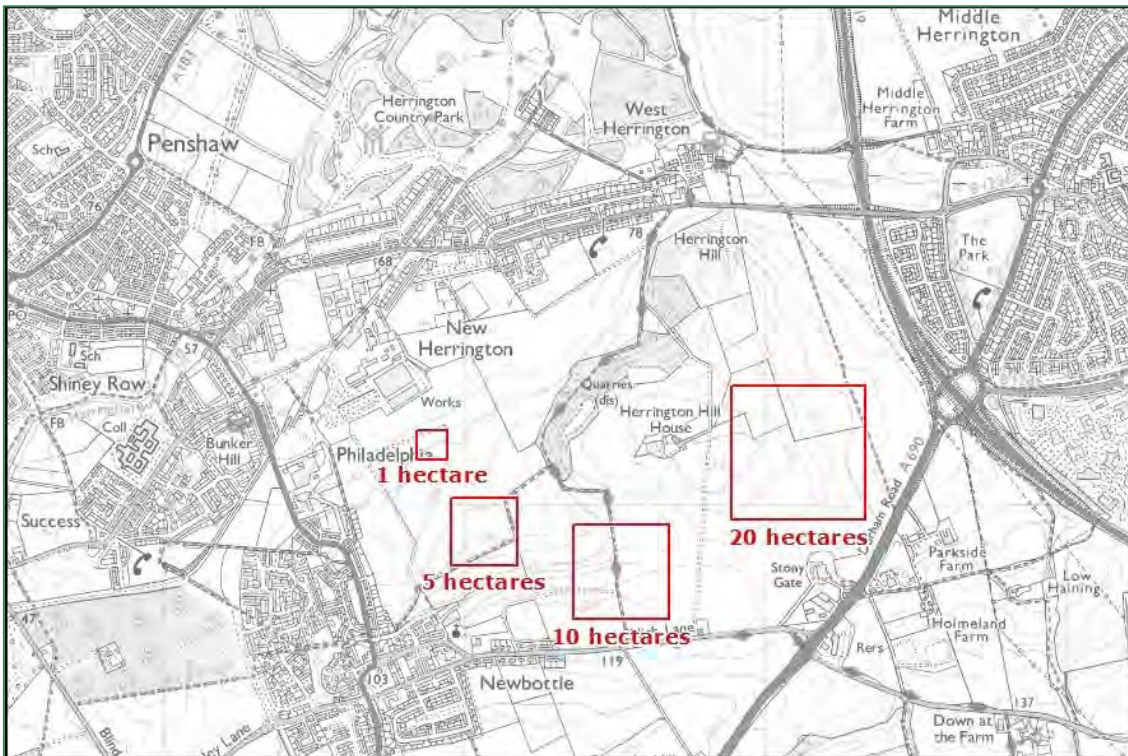
Examples: Solar energy development

- 1.21 An example of a commercial scale solar energy development is shown in Figure 1.4. Figure 1.5 provides an indication of the relative sizes of scheme being considered, overlaid onto an extract from a map of the area.

Figure 1.4 Commercial-scale solar energy scheme



Figure 1.5 Indicative sizes for solar development types



Examples: Wind energy development

- 1.22 Figure 1.6 shows the turbines of Great Eppleton Wind Farm, which are 115m to tip and fall into the large category. They are seen here in the context of electricity pylons, which are assumed to be the standard height of *circa* 55m. Figure 1.7 shows the Nissan turbines which are 51m to tip, falling into the medium development type.

Figure 1.6 Great Eppleton wind turbines



Figure 1.7 Nissan wind turbines



2 Methodology

Introduction

- 2.1 The assessment of landscape sensitivity has involved the following key stages:
1. Identification of the key characteristics of wind and solar energy development and their potential effects on the landscape, to inform the development of a methodology;
 2. assessment of the sensitivity of the assessed LCTs to wind turbine and solar energy development at a range of scales; and
 3. preparation of siting and design guidelines for wind turbine and solar energy development in each of the assessed LCTs, taking account of the assessed sensitivity of the landscape, and the effect of any operational or consented development.
- 2.2 Each of these stages is discussed in more detail in the following sections.

Potential effects of wind and solar energy development on the landscape

- 2.3 In order to seek to minimise effects on the landscape through siting and design, it is important to understand the characteristics of wind and solar energy development and how they may affect the landscape.
- 2.4 In undertaking any landscape sensitivity assessments it is necessary to acknowledge that varying attitudes to wind and solar energy development are expressed by different individuals and constituencies. Aesthetic perceptions can be positive or negative depending on individual attitudes to the principle and presence of renewable energy.

General features and landscape effects of wind energy development

- 2.5 The key components of wind energy development are the wind turbines, which may be single isolated turbines or grouped together into a wind farm. The majority of wind turbines consist of horizontal-axis three-bladed turbines, mounted on a steel tower. Other turbines, including two bladed turbines and vertical axis turbines, are available but less commonly deployed. Wind turbines are generally given planning permission for 25 years, although re-powering may take place after this period has elapsed, subject to further permission.
- 2.6 The main visible components of a horizontal-axis wind turbine are:
- the tower, generally a tubular steel structure though lattice towers are occasionally used for smaller turbines;
 - the nacelle, which contains the generating equipment;
 - the rotor blades, mounted on the hub at the front of the nacelle; and
 - depending on the scale and design of the turbine, the transformer may be located near the tower base.
- 2.7 In addition to the turbines themselves, developments involving large scale wind turbines typically require additional infrastructure as follows:
- road access to the site and on-site tracks able to accommodate specialised heavy goods vehicles (HGVs);
 - a temporary construction compound and lay-down area for major components;

- construction of a buried concrete foundation and an area of hardstanding next to each turbine to act as a base for cranes during turbine erection;
- underground cables connecting the turbines (buried in trenches, often alongside tracks);
- anemometer mast(s) to monitor wind direction and speed, usually a slender lattice tower of the same height as the turbine hubs; and
- a control building to enable monitoring and operation, often combined with a small substation.

2.8 For single turbines, the requirements will be less but still typically include road access, hardstanding and foundations.

2.9 Wind energy development may affect the landscape in the following ways:

- construction of large turbines and associated infrastructure may result in direct loss of landscape features;
- wind turbines are tall vertical features that may alter the perception of a landscape, potentially affecting the apparent scale of landforms;
- movement of rotor blades may affect characteristics of stillness and solitude, as well as drawing the eye to turbines which may be a relatively small feature in the landscape;
- the presence of turbines may increase the perceived human influence on the landscape, particularly in terms of overt modern development, and this can particularly affect landscapes which have a strong sense of naturalness or tranquillity, or which form a setting to heritage assets;
- wind turbines, even at relatively small sizes, can appear large in the context of human-scale features such as domestic buildings and trees – at the largest scales turbines can be perceived as ‘overwhelming’ when close to residential properties;
- turbines on skylines may compete with existing landmark features for prominence where prominent skylines or landmark features are characteristic of the landscape; and
- in order to be as efficient as possible, turbines are often placed in elevated locations, where they may affect views from wide areas.

General features and landscape effects of solar energy development

2.10 Free-standing solar photovoltaic (PV) developments consist of panels that are usually mounted around 0.7m-3m above ground level allowing the growth of vegetation beneath and between the arrays and the associated grazing of stock. Panels are arranged in groups or ‘arrays’ of around 20 panels. The panels are encased in an aluminium frame, supported by aluminium or steel stands, and positioned at a fixed angle between 20-40 degrees from the horizontal, facing south. These arrays usually fixed in linear rack of panels that are arranged in parallel rows with gaps between the rows for access and prevent shading. The arrangement of the arrays within the landscape varies from scheme-to-scheme although layouts tend to be of a regular shape.

2.11 Solar glare from the arrays is minimised through the use of translucent coating materials to improve light transmittance through the glass. Nevertheless panels do change under different atmospheric conditions, tending to reflect the light and colour of the sky. The appearance of the panels under different atmospheric conditions is an important consideration in terms of the visual effects of proposed schemes.

2.12 Similar to wind energy, solar energy developments are generally given planning permission for 25 years. In addition to the panels themselves, solar developments typically require additional infrastructure as follows:

- road access to the site and on-site construction and permanent maintenance tracks;
- a substation which is often contained within a small building;
- a temporary construction compound for major components;
- underground cables connecting the panels to the substation;
- permanent security fencing, CCTV and signage; and

- lighting, depending on the required site security levels.

2.13 Solar energy development may affect the landscape in the following ways:

- construction of solar panels and associated infrastructure may result in direct loss of landscape features such as hedgerows, woodland, farmland and other habitat;
- solar energy developments can cover large areas and the presence of solar panels may increase the perceived human influence on the landscape, particularly in terms of overt modern development, and this can particularly affect landscapes which have a strong sense of naturalness, or which form a setting to heritage assets; and
- at certain times of day and from certain viewing angles solar panels can reflect the sunlight, causing glint and glare which can draw the eye.

Cumulative issues

2.14 As larger numbers of wind and solar energy developments are built, it is increasingly necessary to consider their cumulative effects. Guidance on the siting and design of wind farms and wind turbines suggests that a key consideration is understanding how different developments relate to each other, their frequency as one moves through the landscape, and their visual separation, with the aim of allowing experience of the character of the landscape in-between.¹ Where appropriate, based on the data presented in Section 1, these issues have been considered in the assessment. This does not affect the sensitivity of the landscape, but is given consideration in the siting and design guidelines. It is recognised that cumulative effects may place a limit on the potential for further development, even where landscape sensitivity is relatively low.

¹ Scottish Natural Heritage (2014) Siting and Designing windfarms in the landscape: Version 2.

Assessment of landscape sensitivity

- 2.15 There is currently no published method for evaluating sensitivity of different types of landscape. The method within this assessment therefore builds on available guidance published by Natural England (formally the Countryside Agency) and Scottish Natural Heritage including the *Landscape Character Assessment: Guidance for England and Scotland*²; and *Topic Paper 6* that accompanies the Guidance³; as well as LUC's extensive experience gained from previous and ongoing assessments of a similar nature.
- 2.16 In this study the following definition of sensitivity has been used, which is based on the principles set out in Topic Paper 6. It is also compliant with the third edition of the *Guidelines for Landscape and Visual Impact Assessment* (GLVIA3, 2013) as well as definitions used in other landscape sensitivity studies of this type:
- Sensitivity is the relative extent to which the character and quality of the landscape is susceptible to change as a result of wind or solar energy development.***
- 2.17 The definition of susceptibility, in the context of the above definition of landscape sensitivity, is as given in GLVIA3, i.e. "*the ability of a defined landscape to accommodate the specific proposed development without undue negative consequences*".

Assessment criteria

- 2.18 Wind and solar energy development will affect different characteristics of the landscape in different ways. It is therefore important to understand the nature and sensitivity of different components of landscape character, and to set these out and assess them in a consistent and transparent fashion. In order to do this, two sets of criteria have been used to highlight specific landscape and visual characteristics which are most likely to be affected by wind and solar energy development. Tables 2.1 and 2.2 set out the criteria used to evaluate the sensitivity of LCTs to the principle of wind energy and solar energy developments respectively. The tables include justification and guidance for applying the criteria, which are then verified through professional judgement and field verification to apply to the particular LCT in question.

² Countryside Agency and Scottish Natural Heritage (2002) *Landscape Character Assessment: Guidance for England and Scotland* CAX 84. Note this guidance has been superseded by Natural England Guidance however, Topic Paper 6 remains current and useful.

³ The Countryside Agency and Scottish Natural Heritage (2004). *Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity*.

Table 2.1 Sensitivity assessment criteria for wind turbine development

Characteristic	Aspects indicating lower sensitivity to wind turbine development		Aspects indicating higher sensitivity to wind turbine development
Landform and scale	Larger scale landform Simple, and lacking topographical variety	↔	Smaller scale landform Distinctive and complex, with topographical variety
A smooth, gently sloping or flat landform is likely to be less sensitive to wind energy development than a landscape with a dramatic rugged landform, distinct landform features (including prominent hills or cliffs) or pronounced undulations. Turbines may appear out of scale, detract from visually important landforms or appear visually confusing (due to turbines being at varying heights) in complex or smaller scale landscapes.			
Land cover and scale	Simple and regular patterns Uniform landcover Lacking in human scale features	↔	Complex and irregular patterns Varied landcover Numerous human scale features
Simple, regular landscapes with extensive areas of consistent ground cover are likely to be less sensitive to wind energy development than landscapes with more complex or irregular land cover patterns, smaller and / or irregular field sizes and landscapes with frequent human scale features, ⁴ such as domestic buildings and trees. Larger wind turbines in particular may dominate smaller scale traditional features within the landscape.			
Perceptual qualities	Areas with extensive development or infrastructure Prominent movement, busy	↔	Relative lack of development Semi-natural settings Limited movement, quiet
Landscapes that are relatively tranquil tend to be more sensitive to wind energy development compared to landscapes that contain movement, noise and overt modern development. Within Sunderland there are few areas without modern human influences, though areas of relative naturalness do occur and these may be of particular value given the urban context.			
Skylines	Simple or indistinct skylines No landmarks	↔	Complex or distinctive skylines Important landmark features
Prominent and distinctive and/or undeveloped skylines, or skylines with important landmark features, are likely to be more sensitive to wind energy development because turbines may detract from these skylines as features in the landscape, or draw attention away from existing landform or landmark features on skylines. Important landmark features on the skyline might include historic features or monuments.			
Intervisibility	Limited views in and out A self-contained area	↔	A visible landscape Prospects in and out
An elevated landscape such as a ridge, which is viewed from other landscapes, may be more sensitive than a low-lying landscape, since any turbines will be more widely seen. Landscapes which have important visual relationships with other areas, for example where one area provides a backdrop to a neighbouring area, are considered more sensitive than those with few visual relationships.			

⁴ 'Human scale features' are elements such as trees, walls, hedges or buildings that give a 'human scale' to the landscape.

Table 2.2 Sensitivity assessment criteria for solar energy development

Characteristic	Aspects indicating lower sensitivity to solar energy development		Aspects indicating higher sensitivity to solar energy development
Landform	Flat landscapes Lowlands or plateaux	↔	Exposed, visible slopes Steep landforms
A flat or gently undulating lowland landscape or extensive plateau is likely to be less sensitive to solar energy development than a landscape with prominent landforms and visible slopes. This is because arrays of solar panels will be less easily perceived in a flat landscape than on a slope.			
Land cover	Urban fringe Previously developed landscapes	↔	Semi-natural landcover Rural landscapes
Since solar panels introduce a new land cover (of built structures), landscapes containing existing hard surfacing or built elements (e.g. urban fringe locations or brownfield sites) are likely to be less sensitive to field-scale solar energy development than more rural or wooded landscapes.			
Perceptual qualities	Areas with extensive development or infrastructure	↔	Relative lack of development Semi-natural settings
Landscapes that are relatively tranquil tend to be more sensitive to solar energy development compared to landscapes that contain overt modern development. Within Sunderland there are few areas without modern human influences, though areas of relative naturalness do occur and these may be of particular value given the urban context.			
Sense of enclosure	Enclosed landscape with trees or buildings that contain views	↔	Unenclosed or lacking in trees Open plateaux
A landscape with a strong sense of enclosure (e.g. provided by land cover such as woodland or hedges) is likely to be less sensitive to solar energy development than an open and unenclosed landscape, because the development will be less easily perceived, especially at a distance, in an enclosed landscape.			
Intervisibility	Limited views in and out A self-contained area	↔	A visible landscape Prospects in and out
An elevated landscape such as a ridge, which is viewed from other landscapes, may be more sensitive than low-lying landscape, since solar panels will be more widely seen. Landscapes which have important visual relationships with other areas, for example where one area provides a backdrop to a neighbouring area, are considered more sensitive than those with few visual relationships.			

Assessment process

- 2.19 The key characteristics of each LCT were assessed against each of the criteria to arrive at a judgement as to their potential sensitivity to wind turbine and solar energy development.
- 2.20 For each LCT, the assessment provides:
- a summary description of the LCT against each of the assessment criteria;
 - an overall discussion and judgement on landscape sensitivity for the LCT, in relation to each of the development types;
 - siting and design guidelines for different solar and wind energy development sizes (area and turbine numbers), and cumulative issues.
- 2.21 Each LCT assessment includes a judgement on landscape sensitivity to each of the development types being considered, (Table xx) with full justification. Sensitivity is judged on a five-point scale from 'high' to 'low' as set out in Table 2.3.
- 2.22 The relationship between the evaluations against the individual criteria in Tables 2.1 and 2.2, and the judgements of landscape sensitivity, is not a linear one. The process is based on professional judgement, using the individual criteria as indicators of sensitivity only. The relative importance of each criterion varies between LCTs; key characteristics may identify where a particular criterion is more important, and should therefore be given greater weight in the judgement of sensitivity.

Table 2.3 Sensitivity definitions

Sensitivity	Level Definition
High	Key characteristics and qualities of the landscape are highly vulnerable to change from wind/solar development. Such development is likely to result in a significant change in character.
High-moderate	Key characteristics and qualities of the landscape are vulnerable to change from wind/solar development. There may be some limited opportunity to accommodate wind/solar development without significantly changing landscape character. Great care would be needed in locating development.
Moderate	Some of the key characteristics and qualities of the landscape are vulnerable to change from wind/solar development. Although the landscape may have some ability to absorb development, it is likely to cause a degree of change in character. Care would be needed in locating wind/solar development.
Moderate-low	Fewer of the key characteristics and qualities of the landscape are vulnerable to change from wind/solar development. The landscape is likely to be able to accommodate wind/solar development with limited change in character. Care is still needed when locating development to avoid adversely affecting key characteristics.
Low	Key characteristics and qualities of the landscape are robust in that they can withstand change from introduction of wind/solar development. The landscape is likely to be able to accommodate development without a significant change in character. Care is still needed when locating development to ensure best fit with the landscape.

- 2.23 The assessment was carried out based on information in the CSLCA and other sources, as well as field work. The sensitivity assessment identifies the underlying sensitivity of the landscape, as it appears at the time of the survey. It therefore considers operational development but not consented or proposed schemes.

Guidance for development

- 2.24 A series of siting and design guidelines have been developed for each LCT, based on:
- The landscape strategy statements developed for each character area in the CSLCA;
 - The assessed level of underlying sensitivity to each development type; and
 - Any consented or proposed developments located in or adjacent to the LCT.
- 2.25 For each character area, the landscape strategy set out in the CSLCA is based around either *landscape protection* or *landscape enhancement*, or in some cases a combination of the two. The distinction is based on an evaluation of landscape value, with those areas identified for landscape protection being of higher landscape value. This is used as an indicator of landscape value in the sensitivity assessment: areas identified for landscape protection will generally be less able to accommodate wind or solar energy development, and this is brought out in the siting and design guidelines.

3 Assessment Findings

Introduction

- 3.1 The following section sets out the findings of the assessment for each LCT and presents:
- The location, key characteristics and 'sensitive features, issues and trends' of the LCT, as defined in the CSLCA;
 - The tabulated findings of the sensitivity assessments for wind energy and solar energy developments, including a summary description of the LCT against each of the assessment criteria;
 - An overall discussion and judgement on landscape sensitivity for the LCT, in relation to each of the development types; and
 - Siting and design guidelines, which make reference to the landscape strategies for the character areas within each LCT to inform some observations about how wind and solar energy development could be accommodated in each. The guidelines also refer to any potential for cumulative impacts.

LCT 1: Coalfield Ridge

3.2 There is one landscape character area within the Coalfield Ridge LCT; 1a Springwell Rise.

Figure 3.1 Location of Coalfield Ridge



3.3 Key characteristics of the Coalfield Ridge LCT, as described in the CSLCA:

- Prominent outcrop of sandstone within the otherwise low-lying Tyne and Wear Lowlands;
- A mix of pastoral and arable land at settlement edges;
- Sandstone-built vernacular dwellings;
- Industrial heritage of railways and quarrying; and
- Elevated position provides long open views across adjacent areas.

3.4 The key sensitive features, issues and trends within this LCT as described in the CSLCA:

- Bowes Railway (scheduled monument) and Museum.
- Negative impact of A194(M) running along the southern and eastern edge of the LCA
- Recreational value of Great North Forest Heritage Trail, footpaths and bridleways.
- Distinct character of sandstone houses in the village core.
- Long-term restoration or reuse of Springwell Quarry.
- Open panoramic views over neighbouring landscapes.

Sensitivity assessment: wind energy

3.5 The following table sets out commentary on the sensitivity of this LCT to the wind energy assessment criteria. Where relevant, the key characteristics have been used to inform the character descriptions. Refer to Table 2.1 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform and scale			
	The outcrop of sandstone creates a prominent ridge with a relatively small-scale landscape within the otherwise larger scale low-lying Tyne and Wear Lowlands.		
Land cover and scale			
	Agricultural land cover within areas of lower elevation to the north consists of large arable fields bounded by weak remnant hedgerow and sparse tree cover with a lack of enclosure. Smaller pastoral fields and paddocks are located at higher elevations closer to the settlement edge adding complexity in parts.		
Perceptual qualities			
	The village of Springwell is located on the south east side of Heugh Hill. Springwell Quarry, which is still active, is immediately west of the village. The A194(M) motorway forms a dominant feature in the south and east, with a high level of apparent movement. The character area is bounded by settlement in Washington to the south east, and Wrekenton in the north west. A number of local roads pass through the area, including the busy B1288, adding further movement. Away from roads there are quieter areas.		
Skylines			
	This elevated area has open skylines visible from neighbouring urban areas. Skylines on the lower elevations are interrupted in parts by overhead power lines.		
Intervisibility			
	The outcrop forms a prominent and highly visible landform in the north west of the council area and often contributes to the horizon of views from the surrounding areas. The elevated ridge provides open panoramic views out across neighbouring areas, within Sunderland and beyond.		

Sensitivity assessment: solar energy

The following table sets out commentary on the sensitivity of this LCT to the solar energy assessment assessment criteria. Where relevant, the key characteristics have been used to inform the character character descriptions. Refer to

3.6 Table 2.1.2 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform			
	The steep sided ridge suggests higher sensitivity to solar panels, though there are lower-lying, flatter areas around this LCT where panels may be less easily perceived.		
Land cover			
	The area has a rural land cover for the most part, with areas of brownfield land associated with former transport and mineral extraction. There are few areas of semi-natural land cover.		
Perceptual qualities			
	The village of Springwell is located on the south east side of Heugh Hill and Springwell Quarry, which is still active is immediately west of the village. The A194(M) motorway forms a dominant feature in the south and east. The character area is bounded by settlement in Washington to the south east, and Wrekenton in the north west. A number local roads pass through the area, including the busy B1288. Away from roads there are quieter areas.		
Sense of enclosure			
	This is a relatively open landscape, with little tree cover, though there are some plantations and dense hedges on the upper ridge. The area comprises large fields with limited enclosure for the most part.		
Intervisibility			
	The outcrop forms a prominent and highly visible landform in the north west of the council area and often contributes to the horizon of views from the surrounding areas. The elevated ridge provides open panoramic views out across neighbouring areas within Sunderland and beyond.		

Landscape sensitivity summary

- 3.7 This LCT is of higher landscape sensitivity to wind energy development and of varied sensitivity to solar energy development. It is already a strongly human-influenced landscape containing buildings, a quarry and is on the edge of a major transport corridor. Introduction of small turbines or small to medium solar energy development would not significantly alter the character of this landscape. Larger turbines would be highly visible on this elevated ridge.
- 3.8 The following table summarises the underlying sensitivity of this LCT to the development types outlined in Table 1.4.

Development types	Sensitivity				
	Low	ML	Mod.	HM	High
1 – Small Solar Parks					
2 – Medium Solar Parks					
3 – Large Solar Parks					
4 - Small wind turbines (< 50m)					
5 - Medium wind turbines (50 to 100m)					
6 - Large wind turbines (> 100m)					

Siting and design guidelines: Coalfield Ridge

- 3.9 There is only one character area within this LCT. The landscape strategy for area 1a *Springwell Rise* is based around both **landscape enhancement** and **landscape protection**. Of relevance to wind and solar energy, features identified for landscape protection including the open landscape surrounding the village and the Bowes Railway scheduled monument and the open views across the surrounding landscape.

Wind energy

- 3.10 This prominent ridge of outcropped sandstone is sensitive to wind energy development due its intervisibility with the adjacent landscapes, including residential areas. Areas of open arable farmland at lower elevations to the north could potentially accommodate small turbines if community involvement could be secured. Single turbines would be more readily accommodated and should be sited with suitable offset from residential areas, and so that they do not substantially alter the skyline of Springwell Rise in views from surrounding areas. The settings of Springwell and the Bowes Railway should be respected. It would be preferable that a clear visual relationship be maintained between small scale turbines associated with buildings (e.g. single turbines on/ near farm buildings) to maintain a simple image and reinforce links between landscape character and design response. Visibility and visual impact of wind energy development in this area from urban areas of South Tyneside and County Durham will be a key consideration. There is potential for larger turbines to give rise to adverse cumulative effects in combination with the existing turbines within the Nissan plant to the east.

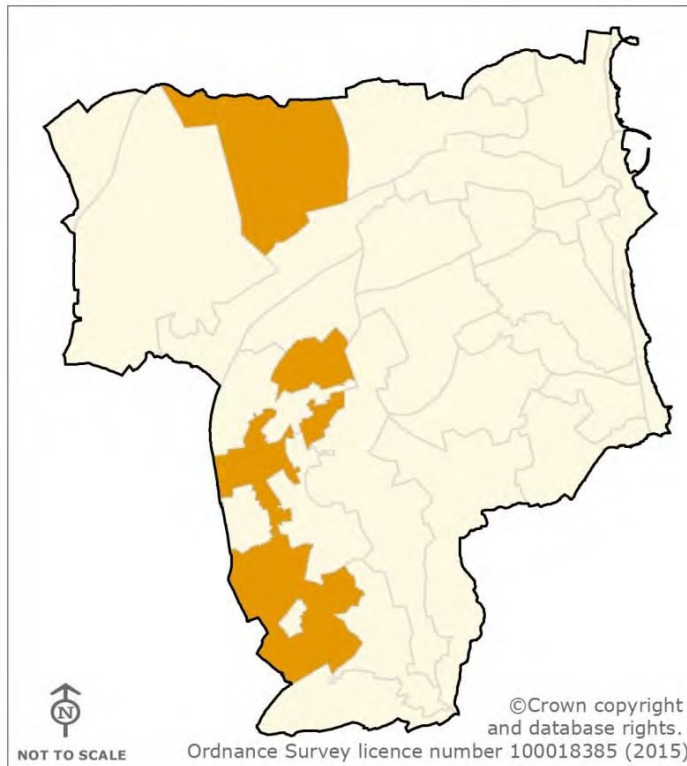
Solar energy

- 3.11 Areas of open arable farmland at lower elevations to the north could potentially accommodate small to medium solar parks. The impact of solar development on the undeveloped steeper slopes to the north should be carefully considered, with regard to the break between the settlements of Gateshead and Washington. In the long term small to medium solar parks could also be accommodated on the restored site of Springwell Quarry.

LCT 2: Coalfield Lowland Terraces

- 3.12 There are three landscape character areas within the Coalfield Lowland Terraces LCT; 2a Usworth Lowland; 2b Penshaw to Houghton Open Spaces; and 2c Rainton Lowland.

Figure 3.2 Location of Coalfield Lowland Terraces



- 3.13 Key characteristics of the Coalfield Lowland Terraces LCT, as described in the CSLCA:
- A lowland transitional landscape between the Magnesian Limestone escarpment to the east and Wear Valley to the west;
 - A mixed agricultural land use but predominantly arable with semi-regular patterns of medium and large-scale fields and pockets of recently planted woodland;
 - Reclaimed former colliery workings and spoil heaps and large tracts of recently restored land;
 - Fragmented by industrial and residential development;
 - The presence of large industrial complexes and industrial estates; and
 - Emergence of the International Advanced Manufacturing Park (IAMP) to the north of Nissan.
- 3.14 The key sensitive features, issues and trends within this LCT as described in the CSLCA:
- The Great North Forest Heritage Trail between Washington and West Boldon
 - Barmston Pond LNR, Hetton Bogs LNR and SSSI
 - Rainton Meadows nature reserve and visitor attraction
 - Herrington Country Park; and
 - Habitat networks of planted woodlands

Sensitivity assessment: wind energy

The following table sets out commentary on the sensitivity of this LCT to the wind energy assessment assessment criteria. Where relevant, the key characteristics have been used to inform the character character descriptions. Refer to

3.15 Table 2.1.1 for full details of the evaluation criteria.

Usworth Lowland LCA

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform and scale			
	<p>The Usworth Lowland LCA is composed of generally flat, open, and simple agricultural landscape that is of a larger scale.</p> <p>The Penshaw to Houghton Open Spaces LCA is composed of lowland, partly man-made landscape with gentle undulations that has a medium-large scale, but with areas of smaller scale within the restored landscapes and country park.</p> <p>The Rainton Lowland LCA is composed of a gently rolling generally agricultural landscape of a medium-large scale, but with areas of smaller scale located closer to the urban edge.</p>		
Land cover patterns			
	<p>Land cover across the northern part of the Usworth Lowland LCA consists of large scale arable fields bordered by remnant and weak hedgerows with sparse tree cover.</p> <p>The Penshaw to Houghton Open Spaces LCA has a peri-urban land cover with a limited amount of productive agricultural land. The area comprises large areas of reclaimed land, country parks, areas of woodland planting, and industrial estates.</p> <p>Land cover within the Rainton Lowland LCA predominantly comprises large to medium size arable fields with smaller fields of pasture or grassland, numerous recent woodland plantations, areas of reclaimed land and important nature conservation sites.</p>		
Perceptual qualities			
	<p>This landscape is strongly man-modified, with substantial modern features including the Nissan factory, industrial estates, major roads, overhead power lines and urban fringe. There are important areas of more natural character, some of which are on reclaimed land, including country parks and nature reserves, as well as remaining agricultural land.</p>		
Skylines			
	<p>The flat low-lying landscape does not contribute to distinctive skylines. Skylines within the LCA are interrupted by a number of overhead power lines, built development and by the tall wind turbines at Nissan. Skylines tend to be located outside the area.</p>		
Intervisibility			
	<p>This landscape is overlooked from the adjacent residential areas and Magnesian Limestone escarpment to the east, from locations including Boldon Downhill, the Penshaw Monument and High Moorsley. There are important views out of this landscape towards the escarpment.</p>		

Sensitivity assessment: solar energy

The following table sets out commentary on the sensitivity of this LCT to the solar energy assessment criteria. Where relevant, the key characteristics have been used to inform the character descriptions. Refer to

3.16 Table 2.1.2 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform			
	Low-lying flatter areas and areas of gentle undulations have a relatively large scale, though this is reduced within the various country parks and areas closer to settlement edges.		
Land cover			
	The Usworth Lowlands and Rainton Lowlands have a mostly agricultural land cover of large to medium size arable fields. The Penshaw to Houghton Open Spaces have an urban fringe type land cover with a limited amount of productive agricultural land and large areas of reclaimed land.		
Perceptual qualities			
	This landscape is strongly man-modified, with substantial modern features including the Nissan factory and industrial estates, the emerging IAMP development, major roads, overhead power lines and urban fringe. There are important areas of more natural character, some of which are on reclaimed land, including country parks and nature reserves, as well as remaining agricultural land.		
Sense of enclosure			
	Agricultural areas within the LCT are display a relatively open landscape consisting large and medium size fields bounded be weak remnant hedgerows. There is little tree cover, though there are some areas of recent woodland plantation associated with reclaimed land.		
Intervisibility			
	This landscape is overlooked from the adjacent residential areas and Magnesian Limestone escarpment to the east, from locations including Boldon Downhill, the Penshaw Monument and High Moorsley. There are important views out of this landscape towards the escarpment.		

Landscape sensitivity summary

3.17 This LCT is of higher landscape sensitivity to wind energy development and of lower sensitivity to solar energy development. Large areas of the landscape have an urban fringe character that is strongly influenced by a number of overt modern development, including large factory buildings, tall wind turbines, numerous busy roads, and large areas of reclaimed land. The introduction of small turbines would or small to medium solar energy development would not significantly alter the character of this landscape.

- 3.18 The following table summarises the underlying sensitivity of this LCT to the development types outlined in Table 1.4.

Development types	Sensitivity				
	Low	ML	Mod.	HM	High
1 – Small Solar Parks					
2 – Medium Solar Parks					
3 – Large Solar Parks					
4 - Small wind turbines (< 50m)					
5 - Medium wind turbines (50 to 100m)					
6 - Large wind turbines (> 100m)					

Siting and design guidelines: Coalfield Lowlands

- 3.19 The landscape strategy for area 2a *Usworth Lowland* is based around **landscape enhancement**. Of relevance to wind and solar energy, features identified for landscape enhancement include the existing limited hedges and tree cover in the north should be maintained and this structure enhanced, the open aspect of land between Sunderland and South Tyneside should be retained in line with green belt purposes where applicable, and views to Boldon Downhill enhancing the sense of place of this location.
- 3.20 The landscape strategy for area 2b *Penshaw to Houghton Open Spaces* is based around **landscape enhancement**. Of relevance to wind and solar energy, features identified for landscape protection include the high-quality open spaces of Herrington Country Park and Elba Park, and their settings in relation to the limestone escarpment to the east.
- 3.21 The landscape strategy for area 2c *Rainton Lowland* is based around **landscape enhancement**. Of relevance to wind and solar energy, features identified for landscape enhancement include the opportunity for new development to provide stronger settlement boundaries in place of urban fringe.

Wind energy: 2a Usworth Lowlands

- 3.22 The landscape forms part of a wider area of undeveloped agricultural land that separates the urban areas of Sunderland, Washington, Gateshead and South Tyneside. The International Advanced Manufacturing Park to the north of Nissan is founded on low carbon principles, and it is expected that new wind turbines may feature in/alongside the development. Careful consideration will be needed as to the impact turbines could have on this open area, together with the cumulative effects that new turbines would have in relation to the existing operational wind farm at Nissan. Small to medium wind turbines would have less of a landscape impact than 100m+ turbines. There are also large-scale power lines crossing the area which could also give rise to cumulative effects.

Wind energy: 2b Penshaw to Houghton Open Spaces and 2c Rainton Lowlands

- 3.23 The landscape sensitivity assessment indicates that the Penshaw to Houghton Open Spaces and Rainton Lowlands have higher sensitivity to wind energy development. Small scale turbines could potentially be accommodated in western parts of the Rainton Lowlands, but it is unlikely that larger turbines higher than 50m or groups of turbines would be adequately accommodated. The

settings of key open spaces should be taken account of, as well as views from the adjacent limestone escarpment.

- 3.24 A clear visual relationship should be maintained where 'small' turbines are associated with buildings (e.g. single turbines on/ near farm buildings) and single/ small groups (no more than 3) of 'medium' turbines with sufficient separation from residential properties/ settlement edges. A wide proliferation of varying heights and styles of turbine should be avoided.

Solar energy

- 3.25 Areas of open arable flat farmland at lower elevations within this LCT could potentially accommodate small to medium solar parks. Careful consideration must also be given to the impacts of siting solar development on undeveloped land close to settlement edges, within the Penshaw to Houghton Open Spaces and Rainton Lowlands, in order not exacerbate the vacant land blur between the urban/rural boundaries. It is unlikely the open spaces of Herrington Country Park and Elba Park or Rainton Meadows nature reserve would suitably accommodate solar development.
- 3.26 With regard to cumulative effects there is currently a medium scale solar park (4.7MW) with planning permission to be built on land within the centre of the Nissan test track located within the southern part of the Usworth Lowlands. It is unlikely that this development would be seen from outside the Nissan compound, and cumulative effects with this proposal are unlikely to be an issue. IAMP, to the north of Nissan, is considering a larger scale solar farm development. Large solar parks would have a higher landscape impact, though it is recognised that the lowland farm landscape in this locality is more extensive than in the remainder of the Coalfield Lowland Terraces, and with careful design could potentially accommodate a larger development.

LCT 3: Incised Lowland Valley

3.27 This LCT comprises character area 3a Weardale.

Figure 3.3 Location of Incised Lowland Valley



3.28 Key characteristics of the Incised Lowland Valley LCT, as described in the CSLCA:

- Steeply incised lowland valley
- Densely wooded river banks with native and ancient woodland
- Occasional riverside buildings and landmark bridges, though limited settlement;
- River terraces with medium sized arable and pastoral fields; and
- Distinct area with a quiet enclosed character

3.29 The key sensitive features, issues and trends within this LCT as described in the CSLCA:

- grade II* listed Victoria Viaduct;
- Penshaw Road Bridge;
- Wooded skyline when viewed from the river banks; and
- Recreational value of trails, paths and cycleways.

Sensitivity assessment

The following table sets out commentary on the sensitivity of this LCT to the wind energy assessment assessment criteria. Where relevant, the key characteristics have been used to inform the character character descriptions. Refer to

3.30 Table 2.1.1 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform and scale	Steeply incised river valley with intimate small scale, within more gently sloping farmland that is medium in scale.		
Land cover and scale	A dense woodland network found along the steep river banks with undeveloped areas comprising pasture and amenity grassland located on the north side of the river. Areas of arable fields, pastoral fields and horse paddocks bounded by remnant hedgerow cover along the south side of the river, and in the north east. Some small areas of development along the river banks.		
Perceptual qualities	Relatively undeveloped area with the strong sense of seclusion and limited human influence. The steep changes in level and narrow lanes limits vehicle access giving a quiet area with a strong sense of tranquillity.		
Skylines	Distinctive wooded skylines when viewed from the river banks. The area does not provide a skyline from other areas. There are locations where development in adjacent areas appears on the skyline.		
Intervisibility	Enclosed character with limited views into or outwards from the LCA.		

Sensitivity assessment: solar energy

- 3.31 The following table sets out commentary on the sensitivity of this LCT to the solar energy assessment criteria. Where relevant, the key characteristics have been used to inform the character descriptions. Refer to Table 2.2 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform			
	Small scale steeply incised river valley, within more gently sloping farmland that is medium in scale.		
Land cover			
	The area has as rural and naturalistic land cover of dense woodland network found along the steep river banks with semi-natural undeveloped areas with some pasture and amenity grassland located on the north side of the river. There are some areas of riverside development.		
Perceptual qualities			
	Relatively undeveloped quiet area with a strong sense of seclusion and tranquillity with limited human influence and vehicle access.		
Sense of enclosure			
	Incised valley is an enclosed intimate landscape. Areas of arable fields, pastoral fields and horse paddocks along the south side of the river, and in the north east are more open bounded by remnant hedgerow cover.		
Intervisibility			
	Enclosed character with limited views into or outwards from the LCA.		

Landscape sensitivity summary

- 3.32 This LCT is of higher landscape sensitivity to all sizes and scales of wind energy and to medium or large solar energy. It remains a relatively undeveloped, naturalistic, secluded landscape with parts unlikely to accommodate wind or solar energy developments without introducing a significant change to landscape character.
- 3.33 The following table summarises the underlying sensitivity of this LCT to the development types outlined in Table 1.4.

Development types	Sensitivity				
	Low	ML	Mod.	HM	High
1 – Small Solar Parks					
2 – Medium Solar Parks					
3 – Large Solar Parks					
4 - Small wind turbines (< 50m)					
5 - Medium wind turbines (50 to 100m)					
6 - Large wind turbines (> 100m)					

Siting and design guidelines: Incised Lowland Valley

- 3.34 There is only one character area within this LCT. The landscape strategy for area 3a *Weardale* is based around **landscape protection**. Of relevance to wind and solar energy, features identified for landscape protection including the largely undeveloped wildlife and recreation corridor through the area; and maintenance of the open skyline as seen from the riverside to preserve the quiet, tranquil character of the riverside walks.

Wind energy

- 3.35 As noted above this landscape is unlikely accommodate any wind energy developments without introducing a significant change to landscape character. The only exception would be for small turbines at the developed fringes of the valley landscape, though these would have to be very carefully sited.

Solar energy

- 3.36 The incised wooded valley has a higher sensitivity to solar energy and is unlikely accommodate developments of any size without introducing a significant change to character of landscape. Areas of arable fields along the south side of the river and in the north east could have potential to accommodate small solar energy development however careful consideration of the impacts must be given in order not to undermine the valued characteristics of this area.

LCT 6: Limestone Escarpment

- 3.37 There are three landscape character areas within the LCT: 6a Penshaw Hill; 6b Hastings Hill and Copt Hill; and 6c High Moorsley.

Figure 3.4 Location of Limestone Escarpment



- 3.38 Key characteristics of the Limestone Escarpment LCT, as described in the CSLCA:
- Steep, west-facing slopes, often prominently visible from the lowland to the west;
 - The escarpment follows an irregular, indented line comprising distinct individual hills and spurs, divided by valleys and narrow denes;
 - Underlying Magnesian Limestone expressed as a series of hilltop outcrops, and within quarried areas;
 - Generally open landcover of large arable fields, with low hedges and occasional field boundary trees;
 - Frequent deciduous woodlands including some ancient woodland, on steeper slopes and in the occasional narrow denes which dissect the scarp;
 - Magnesian Limestone grassland habitat occurs on limestone outcrops, supporting nationally rare flora and fauna;
 - Settlement is generally found at the foot of the escarpment, though some of the mining villages have expanded onto more gentle slopes;
 - A large number of limestone quarries, both active and historic, have been excavated into the scarp, and there are traces of the former deep-coal mines within the area; and
 - Long open views from the top of the scarp, across County Durham towards the Pennines to the west and north west.
- 3.39 The key sensitive features, issues and trends within this LCT as described in the CSLCA:
- Prominence of the Penshaw Monument within the Sunderland landscape and further afield, and its status as a widely recognised landmark.

- Open skylines when viewed from lower ground, including the Wear Valley and the Penshaw to Hetton-le-Hole area.
- Important Magnesian Limestone grassland habitats are characteristic of this landscape and support unique assemblages of species.
- Negative impact of major roads and power lines cutting across the escarpment.
- Limited foot and cycle access, especially north-south through this area.
- Ongoing quarrying and landfill activities.

Sensitivity assessment: wind energy

The following table sets out commentary on the sensitivity of this LCT to the wind energy assessment assessment criteria. Where relevant, the key characteristics have been used to inform the character character descriptions. Refer to

3.40 Table 2.1.1 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform and scale			
	Open steep west-facing slopes rising to high points of between 100m and 163m have a relatively large scale. The series of hilltop outcrops provide localised topographical variety and distinctive features.		
Land cover and scale			
	Generally open landcover of large arable fields with low hedgerow boundaries, some paddocks, and important areas of calcareous grassland. Clumps of well-established deciduous woodland (some ancient) are also present in what is a dry landscape with few water bodies.		
Perceptual qualities			
	Relatively sparsely populated with settlement generally found at the foot of the escarpment, though some of the mining villages have expanded onto more gentle slopes. Generally a quiet landscape though with localised effects of major roads and lines of pylons cut across the escarpment in parts forming overt man-made vertical structures.		
Skylines			
	Open skylines when viewed from lower ground, including the Wear Valley and the Penshaw to Hetton-le-Hole area. Occasional interrupted by development, though there are key landmarks such as the Penshaw Monument and man-made features such as the MOD weather radar at High Moorsley.		
Intervisibility			
	Elevated escarpment with long open views across County Durham towards the Pennines to the west and north west. The scarp is a prominent feature that is widely visible in Sunderland and to the west, providing a backdrop to neighbouring areas.		

Sensitivity assessment: solar energy

The following table sets out commentary on the sensitivity of this LCT to the solar energy assessment assessment criteria. Where relevant, the key characteristics have been used to inform the character character descriptions. Refer to

3.41 Table 2.1.2 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform			Visible steep west-facing slopes and prominent hilltop outcrops, though there are areas flatter plateau near the top of the escarpment.
Land cover			The area has a strongly rural land cover with areas of semi-natural Magnesian Limestone grassland. Occasional areas of brownfield associated with current and former limestone quarries, and transport routes through the area.
Perceptual qualities			Relatively sparsely populated with settlement generally found at the foot of the escarpment, though some of the mining villages have expanded onto more gentle slopes. Generally a quiet landscape though with localised effects of major roads and lines of pylons cut across the escarpment in parts forming overt man-made vertical structures.
Sense of enclosure			Generally open landcover of large arable fields with low hedgerow boundaries and some paddocks. Though clumps of well-established deciduous woodland reduce the sense of openness in parts.
Intervisibility			Long open views from the top of the scarp across County Durham towards the Pennines to the west and north west. The scarp is a prominent feature with important visual relationships with neighbouring areas.

Landscape sensitivity summary

3.42 This LCT is of higher landscape sensitivity to wind energy and moderate to high sensitivity to solar energy development. It is a sparsely populated rural landscape that is widely visible from surrounding areas. Occasionally limestone quarrying, overhead power lines and large roads detract from the rural setting and reduce sensitivity. Assuming careful siting and design, small turbines or small to medium solar energy development could potentially be accommodated without significantly changing the character of the landscape.

3.43 The following table summarises the underlying sensitivity of this LCT to the development types outlined in Table 1.4.

Typology	Sensitivity				
	Low	ML	Mod.	HM	High
1 – Small Solar Parks					
2 – Medium Solar Parks					
3 – Large Solar Parks					
4 - Small wind turbines (< 50m)					
5 - Medium wind turbines (50 to 100m)					
6 - Large wind turbines (> 100m)					

Siting and design guidelines: Limestone Escarpment

- 3.44 The landscape strategy for the 6a *Penshaw Hill* area is based around **landscape protection**. Of relevance to wind and solar energy, features identified for landscape protection include the setting of the landmark Penshaw Monument; the outward views across the surrounding landscape; and the retainment of the open nature of the ridge with opportunities sought to remove existing infrastructure from the skyline.
- 3.45 The landscape strategy for the 6b *Hastings Hill and Copt Hill* area is based around **landscape protection**. Of relevance to wind and solar energy, features identified for landscape protection include the open nature of the west-facing escarpment, and the setting it provides to the coalfield villages; maintenance of woodlands and enhancement of hedgerows; development at settlement edges providing opportunities to enhance settlement boundaries without impacting on the open skyline of the escarpment.
- 3.46 The landscape strategy for the 6c *High Moorsley* area is based around **landscape protection**. Of relevance to wind and solar energy, features identified for landscape protection include the open skyline of the ridge will be maintained to protect this important visual feature, and to maintain the open views which are available to the west; and hedges will be maintained as an important feature in habitat networks, linking the existing biodiversity reservoirs that include woodland and calcareous grasslands.

Wind energy

- 3.47 Areas of steep escarpment and distinct hilltop outcrops are highly sensitive to wind energy development due to their intervisibility with the adjacent landscapes, including residential areas. Medium or large scale turbines within these areas may appear out of scale and detract from a number of visually important and complex landforms. Away from the western edge of the escarpment the gently undulating elevated arable plateau could potentially accommodate medium or small turbines. However with regard to cumulative effects careful consideration will be required when siting further turbines within the area close to the Great Eppleton Wind Farm.
- 3.48 It would be preferable that a clear visual relationship be maintained between small scale turbines associated with buildings (e.g. single turbines on/ near farm buildings) to maintain a simple image and reinforce links between landscape character and design response. Visibility and visual impact of wind energy development in this area from residential areas to the west will be a key consideration.

Solar power

- 3.49 Areas of steep escarpment and distinct hilltop outcrops are sensitive to solar energy development due to their intervisibility with the adjacent landscapes, including residential areas. Away from the western edge of the escarpment the gently undulating elevated plateau could potentially accommodate small to medium solar parks. In the longer term small to medium solar parks could potentially be accommodated on restored quarry sites.

LCT 7: Clay Plateau

3.50 The Clay Plateau LCT comprises character area 7a Warden Law and Eppleton Moor.

Figure 3.5 Location of Clay Plateau



3.51 Key characteristics of the Coalfield Ridge LCT, as described in the CSLCA:

- Elevated plateau between 100m and 170m;
- Underlying Magnesian Limestone weakly expressed, thickly overlaid by deposits of glacial till;
- Open and gently undulating, a relatively exposed landscape;
- A dry landscape with few water bodies due to the permeability of the Magnesian Limestone;
- High ground often prominently visible from the lowland to the west;
- A farmed landscape of large arable fields with some pasture;
- Occasional woodland plantations and shelter belts; and
- Evidence of prehistoric activity as well as long-established farming and mineral extraction.






3.52 The key sensitive features, issues and trends within this LCT as described in the CSLCA:

- Urban fringe elements such as sporadic development.
- Pressure for urban expansion, including the proposed South Sunderland Growth Area.
- Potential for further wind energy proposals.
- Lack of field boundary trees and sustainability of hedgerows.

Sensitivity assessment: wind energy

The following table sets out commentary on the sensitivity of this LCT to the wind energy assessment assessment criteria. Where relevant, the key characteristics have been used to inform the character character descriptions. Refer to

3.53 Table 2.1.1 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform and scale			Elevated, gently undulating plateau. A relatively exposed and open landscape of a larger scale. In places this landscape is close to the narrow Limestone Escarpment (LCT 6), where its sensitivity is locally increased.
Land cover patterns			A generally open and simple pattern of land cover with large geometric arable fields, bounded by weak intermittent hedgerows and occasional field boundary ash, oak and small copses of mature sycamore. Proximity of north-facing slopes to settlement edge gives a localised urban fringe character.
Perceptual qualities			There is limited settlement, though the northern edge abuts the existing settlement boundary. Quarrying, wind turbines and overhead power lines have an influence on character, and the A19 dual carriageway adds a sense of movement. There are also quieter rural and recreational landscapes.
Skylines			Open, simple skylines with few distinctive features. Pylons traversing the length of the LCT and the tall turbines of Great Eppleton Wind Farm are often highly visible features on the skyline.
Intervisibility			The LCT includes the highest ground in Sunderland offering broad views outwards. The high ground around Warden Law is clearly visible from the lowland to the west, where it is seen above the slope of the Limestone Escarpment. The north-facing slopes are visible from the city to the north, while central areas are more visually contained.

Sensitivity assessment: solar energy

The following table sets out commentary on the sensitivity of this LCT to the solar energy assessment assessment criteria. Where relevant, the key characteristics have been used to inform the character character descriptions. Refer to

3.54 Table 2.1.2 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform	Elevated, open and gently undulating plateau with a lack of prominent landforms.		
Land cover	A predominantly rural land cover with open and simple pattern of large geometric arable fields, bounded by weak intermittent hedgerows. Proximity of north-facing slopes to settlement edge gives an urban fringe character to parts of the north.		
Perceptual qualities	There is limited settlement, though the northern edge abuts the existing settlement boundary. Quarrying, wind turbines and overhead power lines have an influence on character, and the A19 dual carriageway adds a sense of movement. There are also quieter rural and recreational landscapes.		
Sense of enclosure	This is a relatively open landscape with weak hedgerows and little tree cover. The area comprises large arable fields with limited enclosure for the most part. Though scattered coniferous plantations provide a degree of enclosure in parts.		
Intervisibility	The LCT includes the highest ground in Sunderland offering broad views outwards. The high ground around Warden Law is clearly visible from the lowland to the west, where it is seen above the slope of the Limestone Escarpment. The north-facing slopes are visible from the city to the north, while central areas are more visually contained.		

Landscape sensitivity summary

3.55 This LCT is of moderate landscape sensitivity to wind energy and solar energy development. The gently undulating elevated plateau could accommodate wind turbines or small to medium solar energy development without significantly altering the character of this landscape. Sensitivity is increased closer to the edge of the Limestone Escarpment (LCT 6), particularly for wind turbines, as these would be seen above the escarpment from lower ground to the west.

3.56 The following table summarises the underlying sensitivity of this LCT to the development types outlined in Table 1.4.

Typology	Sensitivity				
	Low	ML	Mod.	HM	High
1 – Small Solar Parks					
2 – Medium Solar Parks					
3 – Large Solar Parks					
4 - Small wind turbines (< 50m)					
5 - Medium wind turbines (50 to 100m)					
6 - Large wind turbines (> 100m)					

Siting and design guidelines: Coalfield Ridge

3.57 The landscape strategy for area *7a Warden Law and Eppleton Moor* is based around **landscape enhancement**. Of relevance to wind and solar energy, features identified for landscape enhancement include the existing landscape structure will be retained and enhanced where appropriate; and development that would alter the character of the traditional farming settlements should be resisted.

Wind energy

3.58 Visibility and visual impact of wind turbines will be a key consideration in this area. Although central parts of the plateau are less visible, northern and western locations are seen from surrounding residential areas. Areas of elevated, open and gently undulating plateau farmland could potentially accommodate wind turbines of all scales. Due to the visual prominence to neighbouring areas the LCT is likely to be somewhat more sensitive to turbines higher than 100m and is unlikely to be able to accommodate groups of turbines, without introducing a significant change to landscape character. All turbines, and particularly larger turbines, should be sited to reduce visibility from lower ground to the west, where they would appear above the Limestone Escarpment, and from the city to the north. Any turbines should be sited so as to be clearly located on the plateau, and not on the slopes which run down to adjacent character areas.

3.59 There is judged to be limited scope for further development within this area, due to cumulative effects likely to arise from the presence of the operational Great Eppleton Wind Farm and other nearby developments. The existing wind farm is widely visible from neighbouring areas, including from the settlements to the west, and is seen in views with other turbines at Sharpley to the east and Haswell to the south. There are also more distant views of wind farms further west in County Durham. It may be possible to site further turbines in association with the operational turbines, though compatibility of turbine height, form and spacing would be essential. Introduction of smaller turbines could conflict visually with the existing turbines and should be avoided.

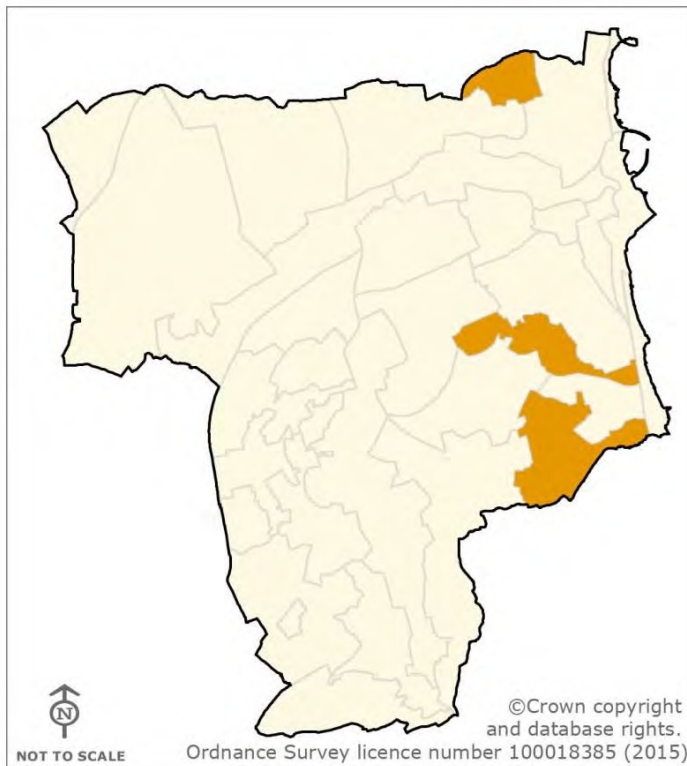
Solar power

3.60 Areas within the north are likely to be of higher sensitivity to large solar energy development due to their visual prominence to neighbouring settlements. The central area of elevated plateau farmland could potentially accommodate small to medium solar parks without introducing a significant change to the landscape character. Careful consideration should be given to views from the wider landscape including the lower ground to the west. It may be beneficial to integrate solar development with existing wind energy development.

LCT 8: Coastal Limestone Plateau

3.61 There are three LCAs within this LCT: 8a Carley Hill; 8b Tunstall Hills; and 8c Burdon to Ryhope

Figure 3.6 Location of Coastal Limestone Plateau



3.62 Key characteristics of the Coastal Limestone Plateau LCT, as described in the CSLCA:

- Low plateau of rolling terrain, incised by narrow steep-sided denes;
- Though coastal-facing, the influence of the sea is moderated by that of the neighbouring urban areas;
- Gently rounded topography of Magnesian Limestone, with distinct outcrops in places, and elsewhere covered by glacial till;
- Predominantly arable farmland with regular patterns of medium and large-scale fields;
- Significant areas of public open space often associated with settlement fringe development;
- A visually open landscape with relatively few trees, other than ancient ash woods in sheltered denes; and
- Coal and quarrying has had a substantial influence on the landscape, its main legacy being in the settlement pattern.

3.63 The key sensitive features, issues and trends within this LCT as described in the CSLCA:

- Magnesian Limestone grassland habitat supports nationally rare flora and fauna.
- Importance of geological exposures at Fulwell Quarries.
- Northward views to Cleadon Hills and across to the coast.
- Significant recreational open space readily accessible from adjacent neighbourhoods.
- Magnesian Limestone outcrops and grassland habitat supporting nationally rare flora and fauna.
- Importance of geological exposures in the area.
- Tunstall Hills and Tunstall Bank are key viewpoints, as well as landmarks in wider views.

- Silksworth Sports Complex provides regionally important recreational facility.
- Important green space within the densely populated urban area.
- Coastal aspect and sea views, particularly the broad view from Burdon Lane.
- Special character of Burdon/Cherry Knowle/Ryhope Dene, the finest example of a coastal dene within Sunderland.
- Rural character of the southern area, with farms and hedges which are in better condition.

Sensitivity assessment: wind energy

The following table sets out commentary on the sensitivity of this LCT to the wind energy assessment assessment criteria. Where relevant, the key characteristics have been used to inform the character character descriptions. Refer to

3.64 Table 2.1.1 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform and scale			
	<p>Relatively small scale low plateau of rolling landform with topographical variety provided by distinct outcrops of Magnesian Limestone and narrow steep-sided incised denes. More elevated gently rounded open hill summits have a larger scale. Distinctive landforms of Tunstall Hills and Carley Hill.</p>		
Land cover and scale			
	<p>Predominantly arable farmland with regular patterns of medium and large-scale fields, but with smaller fields of semi-improved grassland and small pasture fields along the denes. Nationally important Magnesian Limestone grassland habitat occurs on the Tunstall Hills.</p>		
Perceptual qualities			
	<p>Undeveloped areas though with a strong influence from adjacent urban areas, and urban fringe character in places. However these are important tranquil areas in strong contrast to the adjacent city suburbs, despite localised influence of movement on busy roads.</p>		
Skylines			
	<p>The prominent outcrops of Carley Hill and the Tunstall Hills form open and distinctive skylines seen from neighbouring urban areas and from the wider landscape.</p>		
Intervisibility			
	<p>A visually open LCT with relatively few trees offering long broad views and having strong visual connection to the coast. The elevated land of Carley Hill, the Tunstall Hills and Tunstall Bank are key viewpoints allowing wide views out and are widely visible from surrounding areas. The incised denes have an enclosed character with limited views in or outwards.</p>		

Sensitivity assessment: solar energy

The following table sets out commentary on the sensitivity of this LCT to the solar energy assessment assessment criteria. Where relevant, the key characteristics have been used to inform the character character descriptions. Refer to

3.65 Table 2.1.2 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform			
	Areas of rolling landform, distinct outcrops of Magnesian Limestone and narrow steep-sided incised denes. Flatter areas of low plateau farmland are also present.		
Land cover			
	Predominantly arable farmland with regular patterns of medium and large-scale fields, but with smaller fields of semi-improved grassland and small pasture fields along the denes. Nationally important Magnesian Limestone grassland habitat occurs on the Tunstall Hills.		
Perceptual qualities			
	Undeveloped areas though with a strong influence from adjacent urban areas, and urban fringe character in places. However these are important tranquil areas in strong contrast to the adjacent city suburbs, despite localised influence of movement on busy roads.		
Sense of enclosure			
	Generally this is a relatively open landscape comprising large fields with weak hedgerow and little tree cover fields with limited enclosure for the most part. The Burdon to Ryhope LCA is deeply incised by a series of burns forming wooded coastal denes with a strong sense of enclosure, and there are enclosing woodlands at Carley Hill.		
Intervisibility			
	A visually open LCT with relatively few trees offering long broad views and having strong visual connection to the coast. The elevated land of Carley Hill, the Tunstall Hills and Tunstall Bank are key viewpoints allowing wide views out and are widely visible from surrounding areas. The incised denes have an enclosed character with limited views in or outwards.		

Landscape sensitivity summary

3.66 This LCT is of higher landscape sensitivity to wind energy development and solar energy development. The prominent Magnesian Limestone outcrops of Carley Hill and the Tunstall Hills provide key visual foci for large urban areas of Sunderland as well as providing significant areas of public open space and important grassland habitats. There are pockets of reduced sensitivity in the farmed plateau to the south.

3.67 The following table summarises the underlying sensitivity of this LCT to the development types outlined in Table 1.4.

Typology	Sensitivity				
	Low	ML	Mod.	HM	High
1 – Small Solar Parks					
2 – Medium Solar Parks					
3 – Large Solar Parks					
4 - Small wind turbines (< 50m)					
5 - Medium wind turbines (50 to 100m)					
6 - Large wind turbines (> 100m)					

Siting and design guidelines: Coastal Limestone Plateau

- 3.68 The landscape strategy for area 8a *Carley Hill* is based around **landscape enhancement** and **landscape protection**. Of relevance to wind and solar energy includes enhancement of the landscape towards a high-quality accessible open space and farmland. Relevant features identified for landscape protection include key habitats and open spaces in this area, to retain its undeveloped character; and the open, undeveloped character of the hill will be protected as part of the essential setting of northern Sunderland, along with the panoramic views which are available from the high ground.
- 3.69 The landscape strategy for area 8b *Tunstall Hills* is based around **landscape protection** and **landscape enhancement**. Of relevance to wind and solar energy, features identified for landscape protection include this key area of open space within the city; the essential areas of Sunderland's green infrastructure provided by the hills; and protection against further encroachment of residential or commercial development into this corridor of open land. Relevant features identified for landscape enhancement include reinstatement and management of hedgerows; enhancement towards a high quality linear area of accessible open space and well managed farmland linking suburbs and coast.
- 3.70 The landscape strategy for area 8c *Burdon to Ryhope* is based around **landscape enhancement**. Of relevance to wind and solar energy, features identified for landscape enhancement include existing woodlands, including the important coastal denes, will be protected and managed, with new connections formed by enhanced hedges and tree planting; retainment of the largely undeveloped character of the majority of the landscape; and recreational links to provide circular routes from the new residential and employment areas into the surrounding landscape.

Wind energy

- 3.71 The prominent Magnesian Limestone outcrops of Carley Hill (area 8a) and the Tunstall Hills (area 8b) provided key visual foci for large urban areas of Sunderland as well as providing significant areas of public open space and important grassland habitats. Wind energy developments sited on these hills will be visible by large numbers visual receptors. The introduction of tall man-made structures is likely to detract from these visually important landforms and will have a significant effect on local landscape character. Away from the prominent outcrops the gently rolling low plateau farmland within area 8c will be less sensitive to small scale turbines, with the exception of the incised denes. The area remains of higher sensitivity to medium and larger turbines.

Solar power

- 3.72 The Tunstall Hills (area 8b) is valued for its recreational landscape and, along with Carley Hill (area 8a), provides significant areas of public open space. Both areas are formed of prominent outcrops of Magnesian Limestone and are key visual foci for large urban areas of Sunderland. Solar energy developments sited on these hills are likely to be visible to large numbers of receptors and limited scope is apparent for any but the smallest schemes in lower locations. Away from the hills the gently sloping large arable fields within the north of 8a and gently rolling low plateau farmland within area 8c are generally less sensitive to small or medium scale solar parks. However, these areas are likely to remain of higher sensitivity to large schemes. The intimate and secluded qualities of the coastal denes found within area 8c are unlikely to accommodate solar development.

LCT 10: Urban Limestone Gorge

3.73 The Urban Limestone Gorge LCT comprises character area 10a River Wear Gorge.

Figure 3.7 Location of Urban Limestone Gorge



3.74 Key characteristics of the Urban Limestone Gorge LCT, as described in the CSLCA:

- Steep sided incised river gorge;
- Exposed Magnesian Limestone geology;
- Natural river bank gives way to canalised margins towards the river mouth;
- Mix of old heavy industry and docks, with new land uses introduced by regeneration;
- Busy communication routes alongside the river;
- Series of landmark bridges carrying road and rail links;
- Tidal river with mud banks exposed at low tide.

3.75 The key sensitive features, issues and trends within this LCT as described in the CSLCA:

- Inaccessible riverside.
- Vacant land and underused/neglected industrial townscape.
- Important heritage of Old Sunderland and Monkwearmouth areas.

Sensitivity assessment: wind energy

The following table sets out commentary on the sensitivity of this LCT to the wind energy assessment assessment criteria. Where relevant, the key characteristics have been used to inform the character character descriptions. Refer to

3.76 Table 2.1.1 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform and scale	Areas of steep sided river gorge have a small scale. Lower-lying sections of river bank further downstream, with areas of alluvial deposits and river terraces, have an increased sense of scale. There is a mix of steep slopes and flatter ground.		
Land cover and scale	Largely industrialised river bank and terraces composed of heavy industry, shipbuilding yards, and docks with new land uses introduced by regeneration. Large buildings, infrastructure and areas of derelict land create a complex land cover pattern, though the scale is often large due to the size of industrial buildings. Upstream the river bank becomes more naturalistic.		
Perceptual qualities	Strong human influence pervades the river valley, with no part of this area being more than a few hundred metres from development. Largely industrial and commercial as the river passes through the built-up area of Sunderland. A high level of apparent movement due to busy riverside roads and major road and rail bridges. A small number of secluded quieter pockets can be found along the river bank where vehicular access is limited.		
Skylines	Skylines are generally contained by the steep sided river gorge obscured by surrounding built development. Bridges are landmark features in the valley, and there are other landmark buildings along the riverside. Claxheugh Rock is a key feature.		
Intervisibility	Incised river gorge in the west has an enclosed character with limited views inwards or outwards. Further downstream the river valley widens allowing views across the area from both river banks.		

Sensitivity assessment: solar energy

The following table sets out commentary on the sensitivity of this LCT to the solar energy assessment assessment criteria. Where relevant, the key characteristics have been used to inform the character character descriptions. Refer to

3.77 Table 2.1.2 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform			
	<p>Areas of steep sided river gorge have a small scale. Lower-lying sections of river bank further downstream, with areas of alluvial deposits and river terraces, have an increased sense of scale. There is a mix of steep slopes and flatter ground.</p>		
Land cover			
	<p>Largely industrialised river bank and terraces composed of a complex land cover pattern of heavy industry, docks, large buildings, infrastructure and areas of derelict or vacant land. Regeneration has introduced new land uses, such as business parks. Upstream there are remaining areas of more natural land cover.</p>		
Perceptual qualities			
	<p>Strong human influence with overt modern development . A high level of apparent movement due to busy roads alongside the river and major road and rail bridges. Secluded quieter pockets of land can be found in wooded parts of the river bank where vehicular access is limited.</p>		
Sense of enclosure			
	<p>Largely developed riverside, with some areas of trees but enclosure for the most part provided by large buildings which break up views. Downstream the riversides are more open.</p>		
Intervisibility			
	<p>Incised river gorge in the west has an enclosed character with limited views inwards or outwards. Further downstream the river valley widens allowing views across the area from both river banks.</p>		

Landscape sensitivity summary

- 3.78 This LCT is of higher landscape sensitivity to larger developments, either wind or solar, which would be out of scale in this enclosed steep sided valley. The developed nature of the majority of the valley indicates lower sensitivity to medium or smaller wind turbines, as well as medium or smaller solar parks.
- 3.79 The following table summarises the underlying sensitivity of this LCT to the development types outlined in Table 1.4.

Typology	Sensitivity				
	Low	ML	Mod.	HM	High
1 – Small Solar Parks					
2 – Medium Solar Parks					
3 – Large Solar Parks					
4 - Small wind turbines (< 50m)					
5 - Medium wind turbines (50 to 100m)					
6 - Large wind turbines (> 100m)					

Siting and design guidelines: Urban Limestone Gorge

- 3.80 The landscape strategy for area *7a Urban Limestone Gorge* is based around **landscape protection** and **landscape enhancement**. Of relevance to wind and solar energy, features identified for landscape protection include the significant features of the Wear gorge, including Claxheugh Rock and the adjacent open space and woodland that is important for local recreation; and the area immediately north of the city centre and East End which has been the focus of regeneration. Of relevance to wind and solar energy, features identified for landscape enhancement include areas of riverside, to improve access and to promote the river as a recreation and biodiversity corridor; underused and vacant land will be identified and targeted for reuse.

Wind energy

- 3.81 The industrial setting of this area has a lower sensitivity to small wind energy development with areas of brownfield land with potential to accommodate small to medium wind turbines. Siting of turbines should avoid key views to and from landmark features such as Claxheugh Rock or the Wear bridges. Small turbines will be more readily accommodated among the substantial industrial and commercial buildings along the river corridor. Turbines at the upper end of the medium category are likely to appear significantly taller than surrounding structures, and may begin to diminish the sense of scale of the river gorge. Large turbines (over 100m) are unlikely to be accommodated within this landscape, and would be more visible from locations outside the river gorge.

Solar power

- 3.82 The industrial setting of this area has a lower sensitivity to solar energy development with areas of brownfield land with potential to accommodate small to medium solar parks. There is unlikely to be scope for accommodating large solar parks due to the narrow form of the river valley and the steep slopes. Medium or smaller schemes could be sited in relatively enclosed locations, or in places where they will be seen in the context of industry or commercial buildings.

LCT 11: Limestone Coast

- 3.83 There are three LCAs within this LCT: 11a North Sunderland Coast; 11b Sunderland Harbour and Docks; 11c South Sunderland Coast.

Figure 3.8 Location of Limestone Coast



- 3.84 Key characteristics of the Limestone Coast LCT, as described in the CSLCA:
- Narrow coastal landscape facing the North Sea;
 - Sand and shingle beaches with extensive areas of rocky foreshore;
 - Low, eroded clay cliffs;
 - Coastal development including the extensive harbour works at the mouth of the Wear, and leisure development further north; and
 - Coastal grassland hinterland in undeveloped areas.
- 3.85 The key sensitive features, issues and trends within this LCT as described in the CSLCA:
- Popular beaches of Roker with historic sea front.
 - Inaccessible docks, with potential lack of maintenance of historic features.
 - Pressure for further large scale industrial and commercial developments.
 - Emerging habitats along railway sidings area.
 - Erosion of cliffs to south of Hendon.
 - High habitat value of south coast recognised in international designations.

Sensitivity assessment: wind energy

The following table sets out commentary on the sensitivity of this LCT to the wind energy assessment assessment criteria. Where relevant, the key characteristics have been used to inform the character character descriptions. Refer to






3.86 Table 2.1.1 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform and scale			
	Narrow and relatively flat coastal landscape which is set above low coastal cliffs in parts. Smaller scale, with scale indicators present. Larger scale further south where it is less developed, but retaining intricate coastal landform.		
Land cover and scale			
	Complex pattern of land cover comprising flat sandy beaches with rocky wave-cut platforms; seafront development; an industrial man-made seascape of piers, docks and harbours; and an undeveloped hinterland of coastal grasslands and arable fields set above low eroded clay cliffs.		
Perceptual qualities			
	Sunderland Docks and the areas to the north have a very strong human influence with large parts of the seascape being man-modified. Strong sense of apparent movement due to busy coastal roads and activity within the Docks. Human influence is less apparent in the relatively undeveloped coast further south. This area is quieter though the A1018 flyover is locally prominent.		
Skylines			
	Skylines generally contained by the city to the west. The skylines seen from the coast are developed in the north and around the docks, though less so further south. Landmarks tend to be man-made and located in the northern areas.		
Intervisibility			
	Long open views up and down the coast and out to sea are available in parts. The coast is low lying and not widely visible from other parts of the landscape, except in long views from elevated locations e.g. Tunstall Hills. Views into the Sunderland Docks are particularly restricted by rail and road embankments.		

Sensitivity assessment: solar energy

The following table sets out commentary on the sensitivity of this LCT to the solar energy assessment assessment criteria. Where relevant, the key characteristics have been used to inform the character character descriptions. Refer to

3.87 Table 2.1.2 for full details of the evaluation criteria.

Characteristic	Lower sensitivity	↔	Higher sensitivity
Landform			Narrow and relatively flat coastal landscape which is set above low coastal cliffs or sandy beaches with more intricate coastal landform. Lack of prominent landforms and visible slopes.
Land cover			Land cover varies from flat sandy beaches, leisure and retail development and seafront promenade to the north; an industrial man-made seascape of piers, docks, and harbours around Wearmouth, with a number of brownfield sites; and to the south an undeveloped hinterland of coastal grasslands and arable fields set above low eroded clay cliffs.
Perceptual qualities			Sunderland Docks and the areas to the north have a very strong human influence with large parts of the seascape being man-modified. Human influence is less apparent in the relatively undeveloped coast further south.
Sense of enclosure			Largely urbanised areas in the north and docks have a lack of trees except for the railway sidings area, and the docks has enclosure provided by buildings. More natural seascape and agricultural areas to the south open and exposed with limited tree cover and weak hedgerows.
Intervisibility			Long open views up and down the coast and out to sea are available in parts. The coast is low lying and not widely visible from other parts of the landscape, except in long views from elevated locations e.g. Tunstall Hills. Views into the Sunderland Docks are particularly restricted by rail and road embankments.

Landscape sensitivity summary

- 3.88 This LCT is of moderate or higher landscape sensitivity to wind energy and solar energy development. There is local variation in that the docks area is considered to be of lower sensitivity than either the recreational coast to the north or the undeveloped coast to the south.
- 3.89 The following table summarises the underlying sensitivity of this LCT to the development types outlined in Table 1.4.

Typology	Sensitivity				
	Low	ML	Mod.	HM	High
1 – Small Solar Parks					
2 – Medium Solar Parks					
3 – Large Solar Parks					
4 - Small wind turbines (< 50m)					
5 - Medium wind turbines (50 to 100m)					
6 - Large wind turbines (> 100m)					

Siting and design guidelines: Limestone Coast

- 3.90 The landscape strategy for area 11a *North Sunderland Coast* is based around **landscape protection**. Of relevance to wind and solar energy, features identified for landscape protection include the high-quality seafront; recently upgraded promenade areas; and the undeveloped nature of the coastline further north;
- 3.91 The landscape strategy for area 11b *Sunderland Harbour* is based around **landscape enhancement**. Of relevance to wind and solar energy, features identified for landscape enhancement include positive re-use and repair of vacant and underused land, both within the port and in the adjacent industrial estates.
- 3.92 The landscape strategy for area 11c *South Sunderland Coast* is based around **landscape protection**. Of relevance to wind and solar energy, features identified for landscape protection include the undeveloped coastline, which is of international importance for biodiversity, particularly bird life; positive management of the coastal grasslands will be sought to bolster this value; and retention of the open nature of the coast will also protect the attractive scenery and high geodiversity value of the cliffs.

Wind energy

- 3.93 The highly valued recreational and leisure destinations within the North Sunderland Coast, combined with its smaller scale and landmarks, suggests this area has a higher sensitivity wind power of all sizes. The coastal hinterland within the south of the LCT has higher sensitivity to wind energy development due to its undeveloped nature and more elevated location which would increase the visibility of turbines. The introduction of tall man-made structures is likely to have a significant effect on the character of this area. It is unlikely that any wind turbines could be adequately accommodated within character areas 11a or 11c.
- 3.94 The industrial setting of the Sunderland Docks (area 11b) has a lower sensitivity to wind energy development due to its heavily man-modified nature and human activity, and lower intervisibility. There are areas of brownfield or underused land that have potential to accommodate small to medium wind turbines. Siting should consider visibility of turbines from key locations around

Wearmouth and from the beach and promenade to the north. Turbines could be seen as a sculptural addition to the docks, as has been achieved at Blyth further north.

Solar power

- 3.95 The North Sunderland Coast (area 11a) is highly valued for its recreational landscape including beaches and the promenade. Solar energy developments in this small-scale, open area are likely to be visible to large numbers of receptors and limited scope is apparent for any but the smallest schemes. The more undeveloped seascape of the South Sunderland Coast comprises an open, undeveloped and treeless hinterland with a relatively peaceful quality that has a high sensitivity to solar development.
- 3.96 As with wind power, the industrial setting of the Sunderland Docks (area 11b) has a lower sensitivity to solar energy schemes, due to its lower visibility and greater human influence. Areas of disused brownfield land within the Sunderland Docks could potentially accommodate small to medium solar development without significantly changing the character of the landscape.

4 Summary

Sensitivity to wind energy development

- 4.1 The majority of the City is of moderate or higher sensitivity to wind energy development, particularly at larger scales. This reflects the generally smaller scale of the landscapes in and around Sunderland, and their high visibility and visual prominence from residential areas. When considering large turbines (over 100m to tip), only the Clay Plateau LCT was considered to have less than high sensitivity. However as noted in the siting and design guidelines there is limited scope for further development in this area due to operational turbines and the potential for cumulative effects.
- 4.2 When considering medium turbines (50-100m to tip) it was assessed that the Coalfield Lowland Terraces and Urban Limestone Gorge LCTs are of moderate sensitivity in part due to the strong human influence in these landscapes. Locally, this human influence also lowers the sensitivity of the Sunderland Docks, although other parts of the Limestone Coast LCT are more sensitive.
- 4.3 Several areas are of moderate or lower sensitivity to small wind turbines (30-50m), due to the reduced potential for conflict between smaller machines and the medium-scale landscapes. LCTs including the Incised Lowland Valley, Limestone Escarpment and Limestone Coast are of high-medium sensitivity to small turbines, due to their more intricate character and greater visual prominence.

Table 4.1 Summary table: sensitivity to wind energy development

LCT	Sensitivity to small wind turbines (30-50m)	Sensitivity to medium wind turbines (50-100m)	Sensitivity to large wind turbines (over 100m)
1. Coalfield Ridge	M	H	H
2. Coalfield Lowland Terraces	ML	M	H
3. Incised Lowland Valley	HM	H	H
6. Limestone Escarpment	HM	H	H
7. Clay Plateau	M	M	HM
8. Coastal Limestone Plateau	M	H	H
10. Urban Limestone Gorge	ML	M	H
11. Limestone Coast	HM	H	H

L: Low
M: Moderate
H: High
ML: Moderate-low
HM: High-moderate

Sensitivity to solar energy development

- 4.4 Sensitivity to large solar parks (between 10 and 20 ha) is assessed as high or high-medium across the City. This is primarily due to the landform and relative openness of the landscapes of Sunderland. There are few locations where large solar parks would not become visible features within the landscape. There is considered to be a moderate or lower sensitivity to medium solar parks (5-10 ha) across a number of LCTs. These include the Coalfield Lowland Terraces and Urban Limestone Gorge where existing infrastructure and brownfield land indicate reduced sensitivity. Most areas were assessed as having moderate or lower sensitivity to small solar parks (1-5 ha), as there are many opportunities for siting small features within the landscape of the City, particularly in relation to brownfield or urban fringe locations. These opportunities exist even in more prominent landscapes such as the Limestone Escarpment LCT, though siting and design guidelines identify locations where such development would be less appropriate.

Table 4.2 Summary table: sensitivity to solar energy development

LCT	Sensitivity to small solar parks (1-5 ha)	Sensitivity to medium solar parks (5-10 ha)	Sensitivity to large solar parks (10-20 ha)
1. Coalfield Ridge	L	M	H
2. Coalfield Lowland Terraces	L	ML	HM
3. Incised Lowland Valley	M	HM	H
6. Limestone Escarpment	M	HM	H
7. Clay Plateau	ML	M	HM
8. Coastal Limestone Plateau	M	HM	H
10. Urban Limestone Gorge	L	M	H
11. Limestone Coast	M	HM	H

L: Low
M: Moderate
H: High
ML: Moderate-low
HM: High-moderate