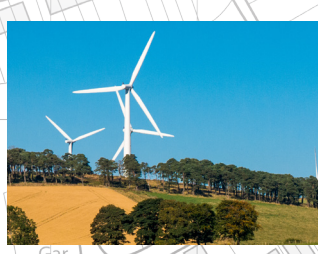
County Durham Plan

Wind Turbine Development Evidence Paper

2019




Altogether better

Durham County Council

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1 Introduction

1.1 The purpose of this Evidence Paper is to support the approach taken in the Wind Turbine Development policy (Policy 36) in the County Durham Plan Preferred Options. It does not seek to provide a discourse on the policy as a whole, but to address the locally-specific issues in County Durham and explain the approach taken in the policy. Our policy approach is positive, identifying suitable areas, and criteria based, to ensure that sustainable and appropriate development is looked upon favourably in line with the "presumption in favour of sustainable development" in the National Planning Policy Framework (NPPF). The policy covers all scales of wind turbine development.

1.2 The UK is required to meet legally binding targets for the generation of 15% of all energy (including electricity, fuel and heating) from renewable sources by 2020. In 2011 the Government produced 'Planning our electric future: a White Paper for secure, affordable and low-carbon electricity' which set out the goal of 'decarbonising' electricity generation. Also in 2011, the Government produced a 'UK Renewable Energy Roadmap' which sets out how the 2020 target will be achieved. This was updated in late 2012[1] with discussion of progress toward the 2020 target. The 2012 Update restates that the aim is 'a diverse low-carbon and secure energy mix.' Whilst other technologies remain important and are being given increasing emphasis by Government, onshore wind remains the most effective renewable source.

1.3 Durham County Council and its partners have committed to an already agreed 40% reduction in CO_2 emissions (based upon 1990 levels) by 2020, enshrined in the adopted County-wide Climate Change Strategy. The national target is for an 80% reduction by 2050, therefore by 2031 we are targeting a reduction of 55%. The Sustainable Energy Action Plan (an integral part of our obligations under the EU Covenant of Mayors) also proposes how we aim to meet our obligations under the agreement.

1.4 The National Policy Statements EN-1 and EN-3 set out the background for renewable energy development in general and wind turbine development specifically. Although written as guidance for the assessment of Nationally Significant Infrastructure Projects by the Planning Inspectorate (in the case of onshore wind, at the time of writing this is wind farms over 50MW[2]), they provide useful information on the approach to be taken and have been used both by the industry and by development management officers as a guidance tool.

1.5 The National Planning Policy Framework sets out the Government's approach to planning for renewable energy. It states that:

> *To help increase the use and supply of renewable and low carbon energy and heat, plans should:*

[1] UK Renewable Energy Roadmap Update 2012.

[2] There are currently proposals in the Energy Bill to remove onshore wind projects in England and Wales from the NSIP regime, so all including those over 50MW will now be directed to local authorities. Whilst consultation has been carried out with developers of large windfarms, it is still the Government's intention to fulfil the manifesto promise of returning the final say on wind turbines to local communities.

> *a) provide a positive strategy for energy from these sources that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);*
>
> *b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development.* (Paragraph 151)

1.6 When determining planning applications for renewable development it requires that local planning authorities should approve the application if its impacts are (or can be made) acceptable, and in respect of wind energy it states as follows.

> *Except for applications for the repowering of existing wind turbines, a proposed wind energy development involving one or more turbines should not be considered acceptable unless it is in an area identified as suitable for wind energy development in the development plan; and, following consultation, it can be demonstrated that the planning impacts identified by the affected local community have been fully addressed and the proposal has their backing.* (Footnote 49)

1.7 It further requires that local planning authorities should support community-led initiatives for renewable and low carbon energy, including developments outside areas identified in local plans or other strategic policies that are being taken forward through neighbourhood planning.

1.8 The NPPF is complemented by the online National Planning Practice Guidance (PPG) section on renewable and low carbon energy which sets out the approach to be taken in the assessment of renewable energy schemes in relation to a variety of issues in a question-and-answer format. In relation to the identification of suitable areas it advises as follows.

> *There are no hard and fast rules about how suitable areas for renewable energy should be identified, but in considering locations, local planning authorities will need to ensure they take into account the requirements of the technology and, critically, the potential impacts on the local environment, including from cumulative impacts. The views of local communities likely to be affected should be listened to.*
>
> *When identifying suitable areas it is also important to set out the factors that will be taken into account when considering individual proposals in these areas. These factors may be dependent on the investigatory work underpinning the identified area.*
>
> *There is a methodology available from the Department of Energy and Climate Change's website on assessing the capacity for renewable energy development which can be used and there may be existing local assessments. However, the impact of some types of technologies may have changed since assessments were drawn up (eg the size of wind turbines has been increasing). In considering impacts, assessments can use tools to identify where impacts are likely to be acceptable. For example, landscape character areas could form the basis for considering which technologies at which scale may be appropriate in different types of location. Landscape Character Assessment is a process used to explain the type and characteristics of landscape in an area. Natural England has used Landscape Character Assessment to identify 159 National Character Areas in England which*

provide a national level database. Landscape Character Assessment carried out at a county or district level may provide a more appropriate scale for assessing the likely landscape and visual impacts of individual proposals. Some renewable energy schemes may have visual impacts on the marine and coastal environment and it may be appropriate to also to assess potential impacts on seascape character.

Identifying areas suitable for renewable energy in plans gives greater certainty as to where such development will be permitted. For example, where councils have identified suitable areas for large scale solar farms, they should not have to give permission outside those areas for speculative applications involving the same type of development when they judge the impact to be unacceptable.

In the case of wind turbines, a planning application should not be approved unless the proposed development site is an area identified as suitable for wind energy development in a Local or Neighbourhood Plan.

It also advises that:

Suitable areas for wind energy development will need to have been allocated clearly in a Local or Neighbourhood Plan. Maps showing the wind resource as favourable to wind turbines or similar will not be sufficient.

1.9 Onshore wind is supported financially through three schemes: contracts for difference (CfDs), the renewables obligation and Feed-in Tariffs. New subsidies for onshore wind, specifically in relation to the renewables obligation (RO) ceased from 1st April 2016.

2 Background

Current wind development in County Durham

2.1 There are currently 157 operational wind turbines in County Durham and 18 with planning consent but not yet built. Figure 1 shows existing and consented development at October 2016.

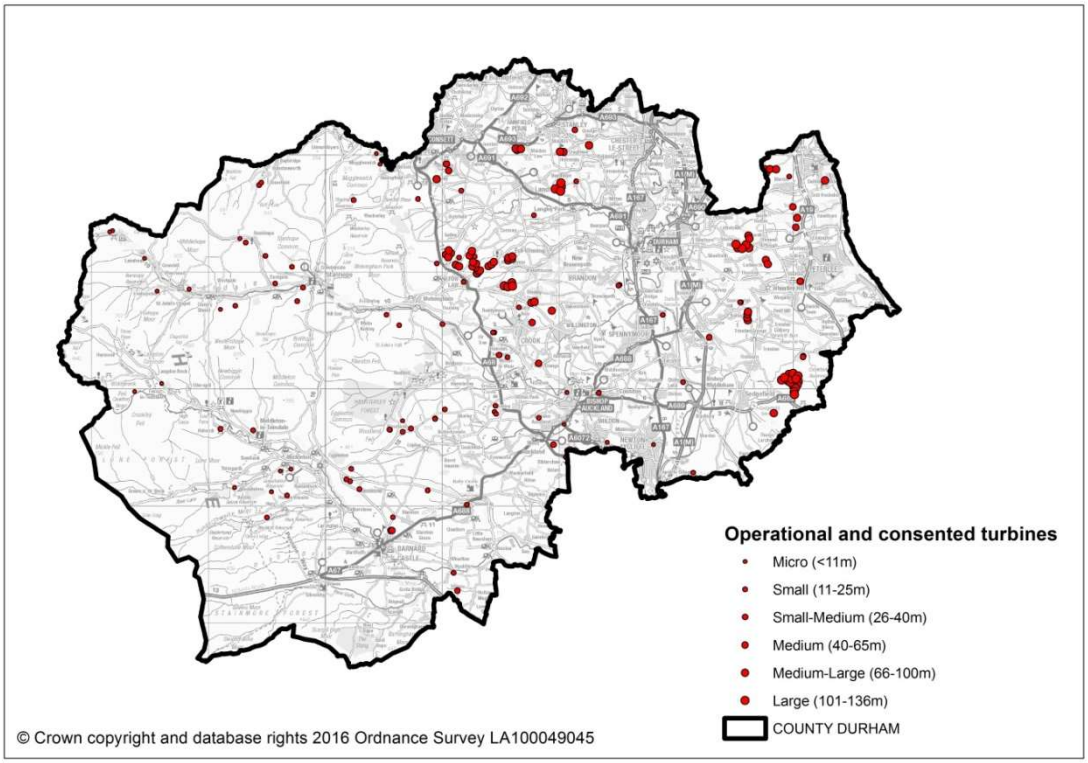

Figure 1 Operational and consented wind turbines in county durham

2.2 These range in size from small micro turbines providing electricity for isolated properties to large turbines supplying electricity to the national grid.

The potential for further development

2.3 NPPF states that local planning authorities should "consider identifying areas suitable for renewable and low carbon sources and supporting infrastructure, where this would help secure the development of such sources" (paragraph 97). The online National Planning Practice Guidance (PPG) section on renewable and low carbon energy advises that "...in considering locations, local planning authorities will need to ensure they take into account the requirements of the technology and, critically, the potential impacts on the local environment, including from cumulative impacts" and "In the case of wind turbines, a planning application should not be approved unless the proposed development site is an area identified as suitable for wind energy development in a Local or Neighbourhood Plan."(Paragraph 005 Reference ID: 5-005-20150618, Revision Date 18 06 2015). It goes on to state that "Suitable areas for wind energy development will need to have been allocated clearly in a Local or Neighbourhood Plan. Maps showing the wind resource as favourable to wind turbines or similar will not be sufficient" (Paragraph 032 Reference ID: 5-032-150618, Revision Date 18 06 2015).

2.4 In line with the Written Ministerial Statement of the 18th June 2015, PPG states under the title *Do local people have the final say on wind farm applications?* that the "Written Ministerial Statement...is quite clear that when considering applications for wind energy development, local planning authorities should (subject to the transitional arrangement) only grant planning permission if: the development site is in an area identified as suitable for wind energy development in a Local or Neighbourhood Plan; and following consultation, it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed and therefore the proposal has their backing.

2.5 Whether the proposal has the backing of the affected local community is a planning judgement for the local planning authority" (Paragraph 033 Reference ID: 5-033-150618, Revision Date 18 06 2015).

Previous approaches to identifying capacity

2.6 In County Durham areas suitable for onshore wind development were first identified in the County Durham Renewable Energy Strategy (DCC/ETSU 1994); the first of its kind to be produced by a local authority in England. This identified less constrained areas for wind energy development based on an assessment of potential wind resource and landscape sensitivity. These areas formed the basis of Strategic Wind Resource Areas identified in the County Structure Plan 1999.

2.7 A more detailed assessment of the potential for commercial scale wind energy was carried out as part of the North East Renewable Energy Strategy (NERES) which informed the development of spatial policies for onshore wind in the now revoked North East Regional Spatial Strategy 2008 (NERSS)[3]. This assessment included a landscape sensitivity study, the Landscape Appraisal for Onshore Wind (GONE, 2003) undertaken by the Landscape Research Group at the University of Newcastle (LRG), a GIS based constraints mapping exercise undertaken by the Centre for Environmental and Spatial Analysis at the University of Northumbria (CESA), and a grid capacity study undertaken by PB Power.

2.8 The Landscape Appraisal assessed the sensitivity of the landscape to onshore wind development in respect of a range of physical and perceptual criteria. The appraisal was based on landscape types identified in the National Landscape Typology (draft) produced by the Countryside Agency (now Natural England), modified in places to reflect local landscape character assessments. Figure 2 shows the combined sensitivity scores for landscapes in County Durham.

2.9 The GIS constraints mapping exercise mapped a range of factors at a relatively coarse grain including national and international environmental designations, areas of low wind speed, and the main urban areas in the region. Figure 3 shows the 'absolute constraints' it identified in County Durham.

[3] The North East of England Plan Regional Spatial Strategy to 2021 (Government Office for the North East, July 2008)

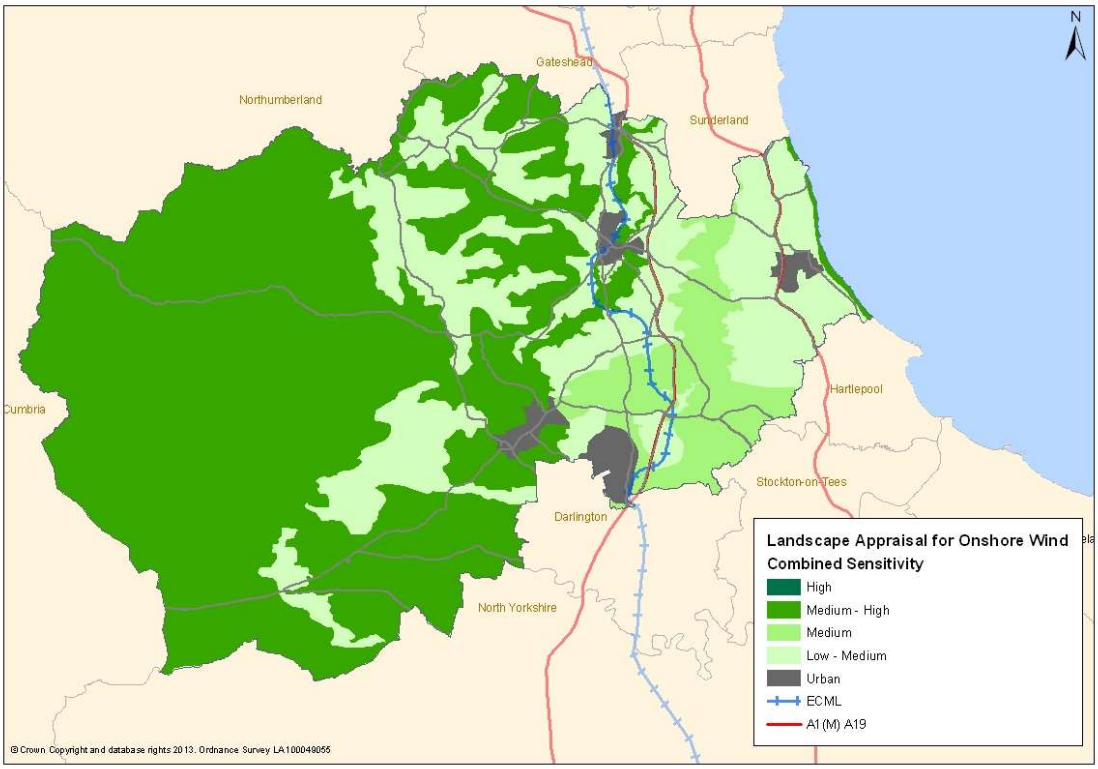

Figure 2 2003 Landscape Appraisal for Onshore Wind *Combined Sensitivity* scores for Landscapes in County Durham

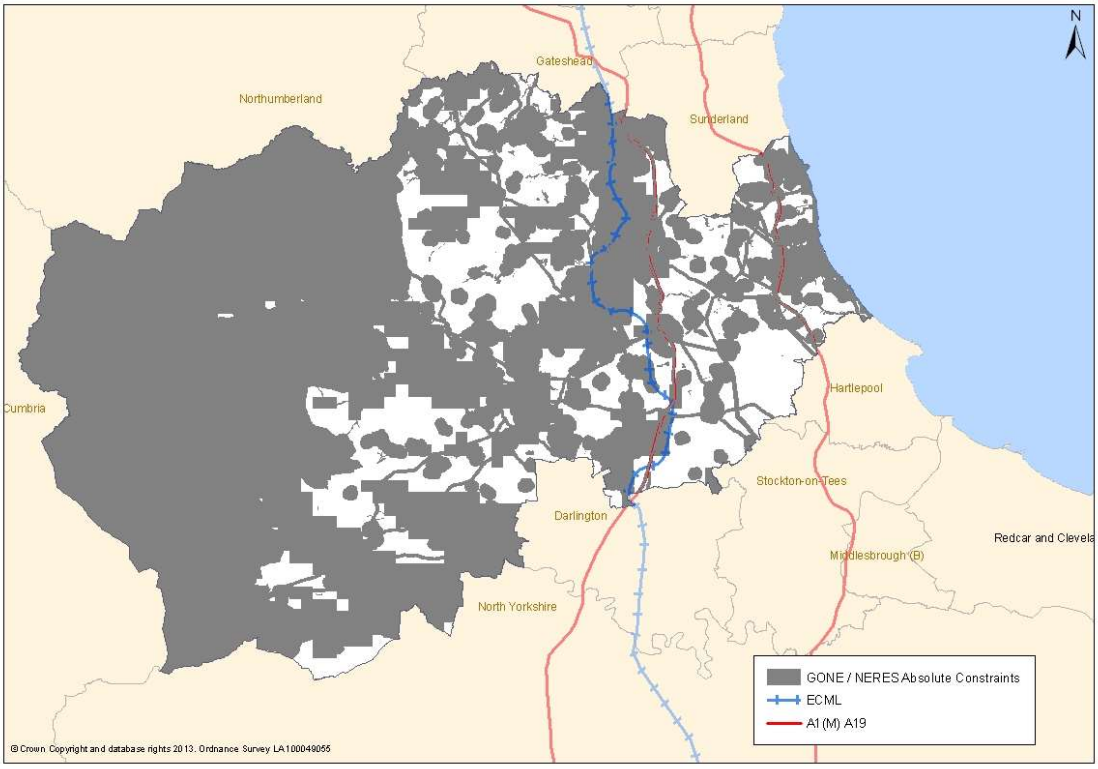

Figure 3 2003 LRG *Absolute Constraints* in County Durham

2.10 Informed by these studies, the North East Regional Spatial Strategy (NERSS) identified a number of 'Broad Areas of Least Constraint' across the region which were identified in Policy 41 and shown as W symbols on the accompanying maps. Four of these were in County Durham: the North Durham Coalfield Upland, the South Durham Coalfield Upland, the East Durham Limestone Area and the Tees Plain. These represented landscapes of medium or low-medium sensitivity to wind development where the constraints mapping exercise suggested there were significant opportunities for development (Figure 4).

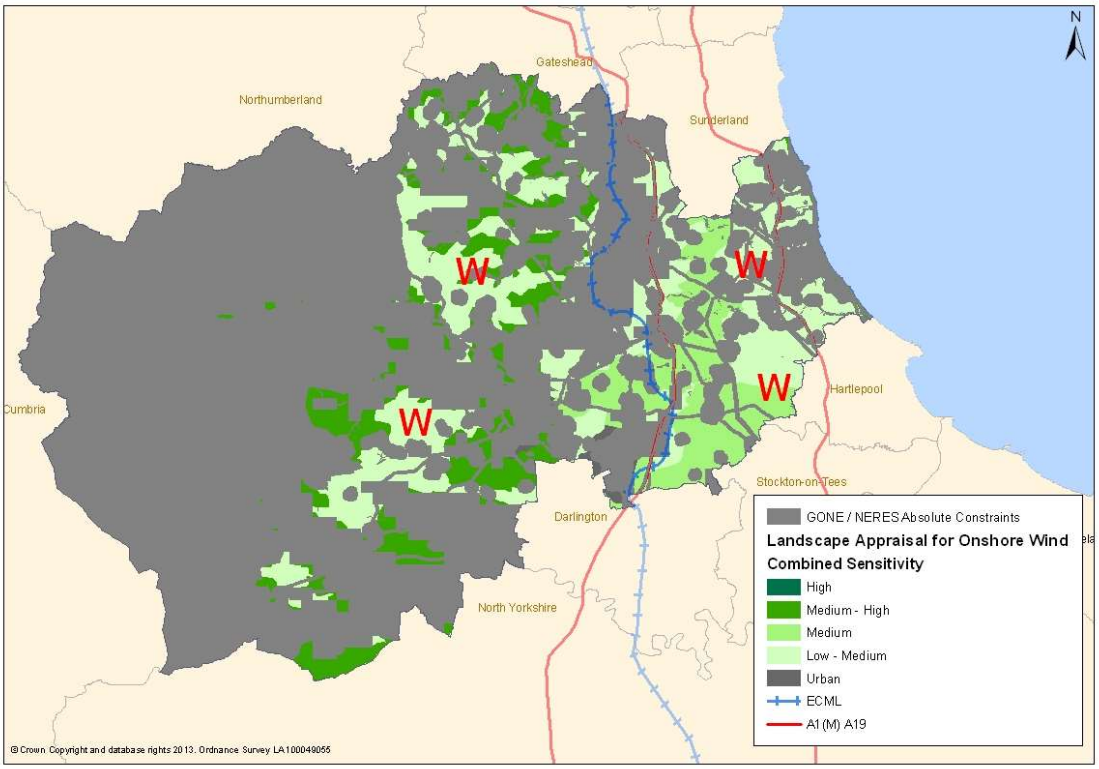

Figure 4 NERSS 'Broad Areas of Least Constraint'

2.11 NERSS identified the capacity of each of these areas as being "up to 20 to 25 turbines". This was not based on any technical assessment of capacity. The capacity of each of these 'Broad Areas of Least Constraint' was analysed in more detail in a series of studies carried out in the region by consultants ARUP, on behalf of the North East Assembly. The particular studies relevant to County Durham were:

- Wind Farm Development and Landscape Capacity Studies: East Durham Limestone and Tees Plain (2008); and
- Wind Farm Development and Landscape Capacity Studies: North & South Durham Upland Coalfield (2009)

2.12 A supplementary study, the East Durham Limestone and Tees Plain Addendum (2009) was produced to model scenarios based on the pattern of development emerging in the area at that time. The areas covered by these studies are shown on Figure 5. The studies in full can be found on the council's website[4].

[4] http://content.durham.gov.uk/PDFRepository/WinNorth_and_South_Durham_Coalfield_.pdf

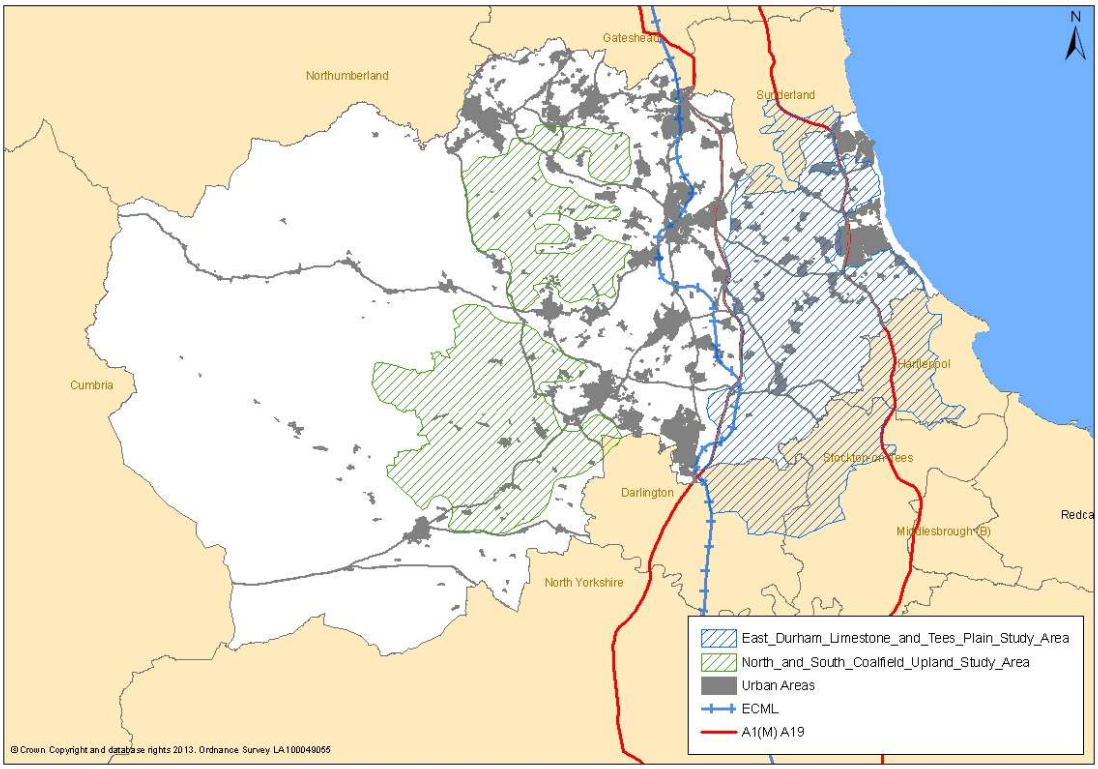

Figure 5 Wind Farm Development and Landscape Capacity Studies
East Durham Limestone and Tees Plain (2008) and
North & South Durham Upland Coalfield (2009).

2.13 These detailed assessments built upon the outputs of previous reports and considered the landscape capacity and visual characteristics of the four areas. The studies included a review of technical and environmental constraints and a landscape, visual and cumulative impact analysis. In particular, they highlighted the potential for any modification to the assessed capacity for onshore wind for the areas identified in NERSS. Although non-statutory, the reports were informative to decision making, and were particularly useful for those areas which relate to more than one local authority area, such as the Tees Plain. The findings of the reports were formally endorsed by Durham County Council.

2.14 Unlike in Northumberland where the studies were carried out in advance of development taking place, in County Durham substantial amounts of development had already occurred or had planning permission within the study areas.

2.15 The findings of the studies in respect of future capacity were as follows.

North Durham Coalfield Upland

2.16 The level of existing wind energy development (32 existing commercial scale turbines) within the North Durham Coalfield Upland exceeds the scale of development envisaged for the area within the NERSS (i.e. up to 20-25 turbines). The study nevertheless identified some limited capacity for further development within the area without further change to

the landscape character of the area. Any proposals for new development will need to have regard to potential cumulative impacts with existing development, and considerable care will need to be taken in siting, design and layout to ensure that such impacts are kept within acceptable levels (paragraph 8.1).

2.17 The limited capacity the study identified was in the form of minor extensions to existing wind farms where this could be done while maintaining the separation of the main clusters (paragraph 7.2.6). Additional capacity for small scale development was identified in other parts of the study area (paragraph 7.2). Since it was published additional development has been permitted in or close to areas identified (7 medium-large turbines in five individual schemes and 3 medium scale turbines). A number (8) of small turbines have also been developed across the general area.

South Durham Coalfield Upland

2.18 "There is currently no wind energy development within the South Durham Upland Coalfield. The study indicates that this area is not capable of accommodating the level of wind turbine development envisaged within the RSS (i.e. up to 20-25 turbines), without a significant change in the landscape character of the area. It is considered that the area may be able to accommodate around half of the level of development envisaged within the RSS..." (paragraph 8.1).

2.19 The potential for strategic scale development is very limited due to the many constraints in the area, mainly the dispersed settlement pattern, and the assessed sensitivity of the individual zones (paragraph 7.3.1).

2.20 The limited capacity identified in the area was in the form of a few small, well separated clusters avoiding significant adverse effect on the AONB, the Tees Valley and the combination of scattered and clustered settlement throughout the area. Since the study was published no further development has taken place or been permitted other than a number of small (16) and small-medium (3) turbines.

2.21 The South Durham Coalfield Upland study area extended beyond the coalfield area identified in NERSS to take in the Dales Fringe north of Barnard Castle where the previous studies had identified areas of low-medium sensitivity which were not heavily constrained. The lack of constraints was not borne out by the more detailed analysis carried out in the study.

East Durham Limestone

2.22 "The study suggests that given the landscape capacity (and the degree of constraint), the East Durham Limestone wind resource area is largely full at present with wind turbines and therefore the logic of continuing to include the area as a medium wind resource area in the RSS might be questioned. It would appear a criteria based approach could be considered but the opportunities for development appear very limited..." (paragraph 8.1, a).

2.23 Since the study was published additional development has been consented in the north of the area (5 medium-large turbines in three schemes). A number of small (3), small medium (3), and medium (3) turbines have been consented across the study area.

Tees Plain

2.24 "The Tees Plain wind resource area could potentially exceed the identified draft RSS recommended levels of development within the capacity of the landscape. This study has derived a 'least impact' area where this should occur. The potential has been identified for around 9-15 turbines within the 'least impact' area in addition to the existing and consented development. Scenarios developed for the study show 3 possible broad locations for any future wind farms. However the study suggests that generally any additional two wind farm clusters separated by around 5km (from existing consented or each other) may be acceptable in the Tees Plain 'least impact' area..." (paragraph 8.1, b).

2.25 Since the study was published a further 15 large turbines have been permitted in 3 wind farms within the 'least impact' area together with a single medium-large turbine. A number (5) of small turbines have been consented across the study area.

2.26 The identification of these areas as Broad Areas of Least Constraint has proved to have been generally robust both in terms of the technical deliverability of development and as a planning delivery tool. With the exception of two 43m turbines at GSK in Barnard Castle, which pre-date NERSS, all of the larger scale development (wind farms and single turbines >40m in height) that has taken place within the County has been within these Broad Areas of Least Constraint. Over 90% of operational and approved development in these areas has been approved by planning committees or by officers under delegated authority and less that 10% through the appeals process.

Summary

2.27 The Written Ministerial Statement requires that planning permission for wind energy development involving one or more turbines should only be granted if the development site is in an area identified as suitable for wind energy development in a Local or Neighbourhood plan. This applies to development of any scale requiring planning consent. It is therefore necessary for the Plan to identify suitable areas if any new wind energy development is to take place, or if existing sites are to be extended or re-powered.

2.28 Areas identified in the past as having capacity have either seen a substantial amount of development since they were identified, or have been found on further investigation to have a more limited capacity than envisaged. Previous studies were restricted to consideration of larger scales of wind energy development and don't provide any information on capacity for smaller scales of development.

2.28 It is therefore necessary to identify areas of the county that might be suitable for new wind energy development of all sizes. This needs to be based on an understanding of a range of factors that are reviewed in the following sections:

- environmental and technical constraints to development of different scales;
- the cumulative effects of existing development; and
- the sensitivity of the county's varied landscapes to development of different scales.

2.30 As with previous landscape sensitivity and capacity studies carried out in the region or the county, this study is considered to be informative rather than definitive. The Landscape Sensitivity Assessment contained within this study is intended to supersede those previously undertaken.

3 Contraints

3.1 The location and design of wind energy development can be constrained by a wide range of factors. Some of these can be readily mapped using data and modelling in Geographic Information Systems (GIS). Other factors are more difficult to model or can only be assessed on the basis of detailed site-specific investigations. Mapping data in GIS has its technical limitations but can give a useful understanding of the spatial distribution of development constraints. Constraints mapped in this study are shown in Table 1.

Table 1: Mapped constraints

Constraint	*Mapped feature*
PHYSICAL	
Steeply sloping land	Feature (DCC Landscape database)
Water	Feature (OS Mastermap)
SAFETY	
Railways	1.5 x turbine height from feature
Motorways and trunk roads	1.5 x turbine height from feature
Higher voltage power lines	Turbine height plus 10% from feature
High pressure gas pipelines	1.5 x turbine hub height from feature
A, B and C class roads	Turbine height plus 10% from feature
Equestrian routes	3 x turbine height from bridleways and MUR
Footpaths	Turbine rotor radius from PROW footpath
RESIDENTIAL AMENITY	
Residential address	6 X turbine height from address point
BIODIVERSITY	
Special Protection Area	Designated area
Special Area for Conservation	Designated area
Site of Special Scientific Interest	Designated area
Local Wildlife Site	Designated area
Ancient woodland	DCC Inventory feature
CULTURAL HERITAGE	
World Heritage Site	Designated area
Conservation Area	Designated area
Scheduled Ancient Monument	Designated area
Parks and gardens of national interest	Designated area
Registered battlefields	Designated area
PLANNING	
Green Belt	Designated area
TECHNICAL	
Wind speed	<6m/s

3.2 Constraints not mapped in the study include those where data isn't available in an appropriate form or quality, or where potential effects are a matter for detailed assessment, or can be readily mitigated through design. Constraints not mapped include

- Grid Capacity
- MOD and Airport Radar
- Landscape designations
- Protected species

- Listed buildings
- Non-designated heritage assets
- Settings of heritage assets
- Set-backs from watercourses and vegetation

Wind resource

3.3 The Landscape Appraisal for Onshore Wind constraints study modelled mean annual wind speeds of < 6.5m/s from NOABL (data measured at 45m above ground level) as an absolute constraint. Some proposals have come forward for larger turbines in areas with modelled wind speeds as low as 6.2m/s. For smaller turbines linked to individual properties or businesses wind speed may be a less critical factor. In this study wind speeds of under 6m/s are modelled as a constraint for larger turbine sizes (>40m) only. While this is not a technical limit to development, in practice wind speeds of this order are not currently commercially attractive.

Physical constraints

3.4 In this study larger water bodies and steeply sloping land such as cliffs, bluffs and incised valleys[5] are modelled as a constraint. Although not a technical limit to development land in this category would be generally unsuitable and likely to have abnormal development costs.

Biodiversity

3.5 In this study, European protected sites including Special Protection Areas (SPAs) and Special Areas of Conservation (SACs), nationally designated sites including Sites of Special Scientific Interest (SSSIs), Local Wildlife Sites (LWS) and Ancient Woodland are modelled as constraints. In most cases potential effects would preclude development within these areas.

3.6 In some circumstances development outside of European protected sites could have adverse effects on the integrity of the designation: for example through effects on qualifying species using 'functionally linked land' beyond the designation boundary. Only the designated areas are mapped here. Protected species are not mapped, as comprehensive data is unavailable, and the consequences for any development would be a matter for detailed assessment.

Cultural Heritage

3.7 In this study World Heritage Sites (WHS), Scheduled Monuments, Registered Parks & Gardens of National Interest, Historic Battlefields and Conservation Areas are mapped as a constraint. In most cases potential effects would preclude development within these areas.

3.8 Development outside of these areas could have adverse effects on the significance of the heritage asset, and particularly visual effects on setting. Only the designated areas are mapped here as effects on setting are usually a matter for detailed assessment. The setting and character of some of these assets is reflected in the Landscape Sensitivity Assessment (Section 6). For the Durham Castle and Cathedral WHS this has been informed by work on the setting of the WHS contained in the WHS Management Plan (2016 Draft).

[5] Sourced from the County Durham Landscape Character Assessment database.

3.9 Listed buildings are not mapped as a constraint as an effect on their setting is a matter for detailed assessment. Parks and Gardens of Local Interest are not mapped as a constraint as the designation includes a wide range of features and effects on their fabric or setting is a matter for detailed assessment.

Residential amenity

3.10 The protection of residential amenity in respect of noise, shadow flicker or visual dominance is an important design consideration, and can be a significant constraint to development potential in settled landscapes. In this study an area 6 x turbine height from OS address points is modelled as a constraint. This is taken as a reasonable proxy for the kind of distances within which these effects might preclude development (see Appendix A). While any individual address point modelled could be an involved property where lower set-backs might be accepted, or a less sensitive non-residential address, the overall pattern is considered to be closely representative of this factor as a constraint.

Safety

3.11 Stand-off distance, primarily for safety, of features like roads, railway lines, power lines, pipelines and public rights of way can be a significant constraint in settled areas. The values modelled in this study are given in Table 1.

3.12 The value of 1.5 x turbine height for Motorways and trunk roads reflects DOT guidance and is applied here also to railways. This reflects the potential consequences of toppling and debris scatter to nationally important infrastructure, even though the risks are generally considered to be low. The value of turbine height + 10% for A, B and C class roads reflects previous government advice (Planning for Renewable Energy: A companion Guide to PPS22, paragraph 53) of 'at least fall over distance'. The values of turbine height plus 10% and 1.5 x turbine height for higher voltage power lines and high pressure gas mains reflect the utilities provider recommendations.

3.13 The value of rotor radius for public footpaths is a commonly adopted set-back to avoid rotors over-sweeping a path. This is primarily adopted to avoid intimidating footpath users rather than as a safety buffer. The value of 3 x turbine height from equestrian routes is based on the advice of the British Horse Society of a distance of 3x height or 200m whichever is the greater. This is modelled for public bridleways and multi-user paths such as railway walks.

Planning

3.14 Development of wind turbines can affect the openness of the Green Belt. This depends partly on scale. The Green Belt is mapped as a constraint in this study for turbines >25m.

Landscape designations

3.15 The North Pennines Area of Outstanding Natural Beauty (AONB) covers a substantial area in the west of the county. Wind energy development of some scales and in some locations, including locations outside of the AONB, could have significant effects on its special qualities and conflict with the purposes of its designation. This issue is dealt with in the Landscape Sensitivity Assessment and the AONB is therefore not mapped as a constraint in this study. Parts of the county are identified as Areas of High Landscape Value

(AHLV) and much of the coast is defined as Heritage Coast. The sensitivities and qualities underpinning those designations are dealt with as factors in the Landscape Sensitivity Assessment and they are therefore not mapped as constraints.

Combined constraints

3.16 Figures 6 to 10 show the combined effects of the mapped constraints described above for turbines of different sizes. These do not include landscape constraints relating to landscape sensitivity or landscape designations, or the potential cumulative effects of development. The size of turbines modelled is based on the categories adopted in the Landscape Sensitivity Assessment (Section 5 Table 13).

Combined constraints for 25m turbines

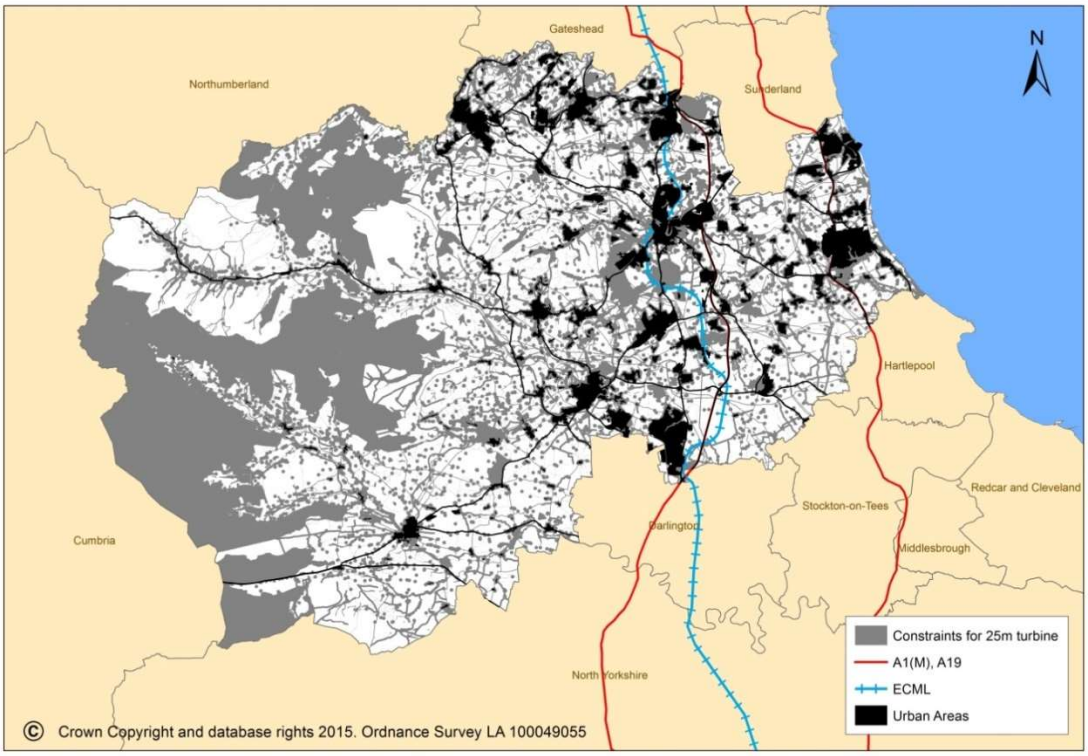

Figure 6 Combined constraints for 25m turbines.

Table 2 Mapped constraints for 25m turbines.

Constraint	*Mapped feature*
PHYSICAL	
Steeply sloping land	Feature
Water	Feature
SAFETY	
Railway (1.5 x height)	Feature + 38m
Motorway / trunk (1.5 x height)	Feature + 38m
Overhead lines (Height + 10%)	Feature + 28m
High pressure gas (1.5 x typical hub height)	Feature + 30m
A, B and C Roads (Height + 10%)	Feature + 28m
Equestrian route (3 X height)	Feature + 75m

Footpath (typical rotor radius)	Feature + 5m
RESIDENTIAL AMENITY	
Residential address (6 x height)	Feature + 150
BIODIVERSITY	
Special Protection Area	Designated area
Special Area for Conservation	Designated area
Site of Special Scientific Interest	Designated area
Local Wildlife Site	Designated area
Ancient woodland	Feature from DCC inventory
CULTURAL HERITAGE	
World Heritage Site	Designated area
Conservation Area	Designated area
Scheduled Ancient Monument	Designated area
Parks and gardens of national interest	Designated area
Registered battlefields	Designated area
PLANNING	
Green Belt	-
TECHNICAL	
Wind speed	-

Combined constraints for 40m turbines

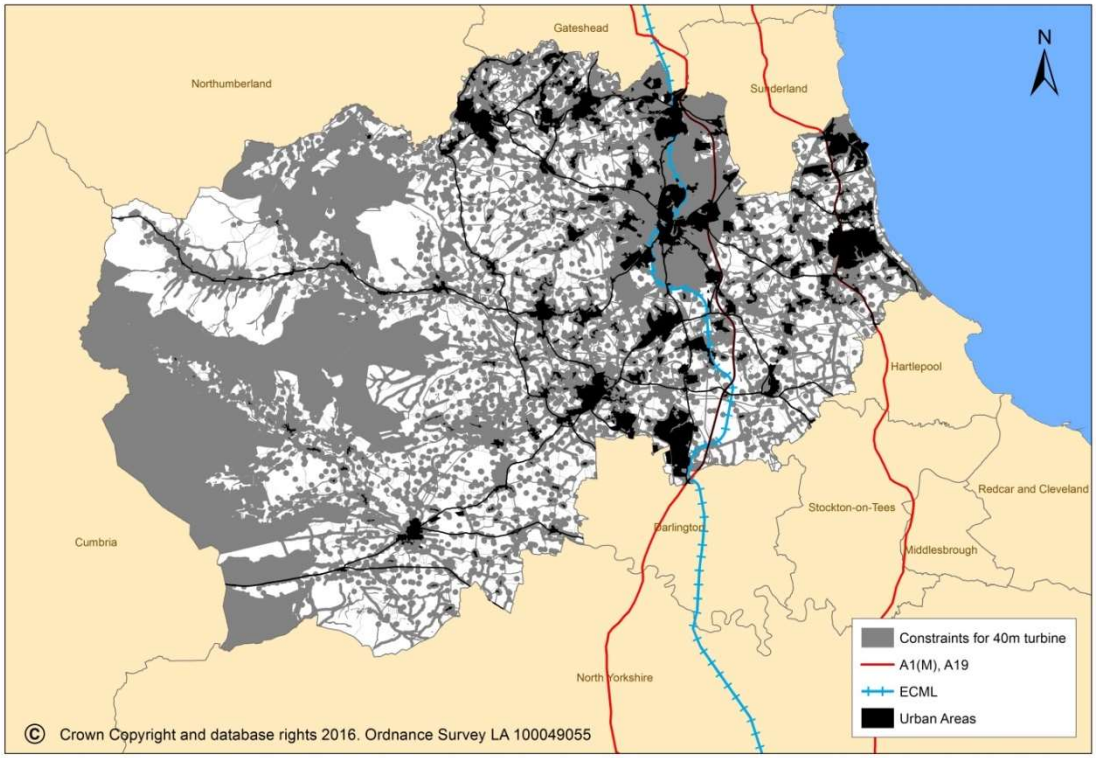

Figure 7 Combined constraints for 40m turbines

Table 3: Mapped constraints for 40m turbines.

Constraint	*Mapped feature*
PHYSICAL	
Steeply sloping land	Feature
Water	Feature
SAFETY	
Railway (1.5 x height)	Feature + 60m
Motorway / trunk (1.5 x height)	Feature + 60m
Overhead lines (Height + 10%)	Feature + 44m
High pressure gas (1.5 x typical hub height)	Feature + 45m
A, B and C Roads (Height + 10%)	Feature + 44m
Equestrian route (3 X height)	Feature + 120m
Footpath (typical rotor radius)	Feature + 200m
RESIDENTIAL AMENITY	
Residential address (6 x height)	Feature +240m
BIODIVERSITY	
Special Protection Area	Designated area
Special Area for Conservation	Designated area
Site of Special Scientific Interest	Designated area
Local Wildlife Site	Designated area
Ancient woodland	Feature from DCC inventory
CULTURAL HERITAGE	
World Heritage Site	Designated area
Conservation Area	Designated area
Scheduled Ancient Monument	Designated area
Parks and gardens of national interest	Designated area
Registered battlefields	Designated area
PLANNING	
Green Belt	Designated area
TECHNICAL	
Wind speed	-

Combined constraints for 65m turbines

Table 4: Mapped constraints for 65m turbines.

Constraint	*Mapped feature*
PHYSICAL	
Steeply sloping land	Feature
Water	Feature
SAFETY	
Railway (1.5 x height)	Feature + 98m
Motorway / trunk (1.5 x height)	Feature + 98m
Overhead lines (Height + 10%)	Feature +72m
High pressure gas (1.5 x typical hub height)	Feature + 75m
A, B and C Roads (Height + 10%)	Feature +73m
Equestrian route (3 X height)	Feature + 195m
Footpath (typical rotor radius)	Feature + 200m
RESIDENTIAL AMENITY	

Residential address (6 x height)	Feature + 390m
BIODIVERSITY	
Special Protection Area	Designated area
Special Area for Conservation	Designated area
Site of Special Scientific Interest	Designated area
Local Wildlife Site	Designated area
Ancient woodland	Feature from DCC inventory
CULTURAL HERITAGE	
World Heritage Site	Designated area
Conservation Area	Designated area
Scheduled Ancient Monument	Designated area
Parks and gardens of national interest	Designated area
Registered battlefields	Designated area
PLANNING	
Green Belt	Designated area
TECHNICAL	
Wind speed	<6m/s

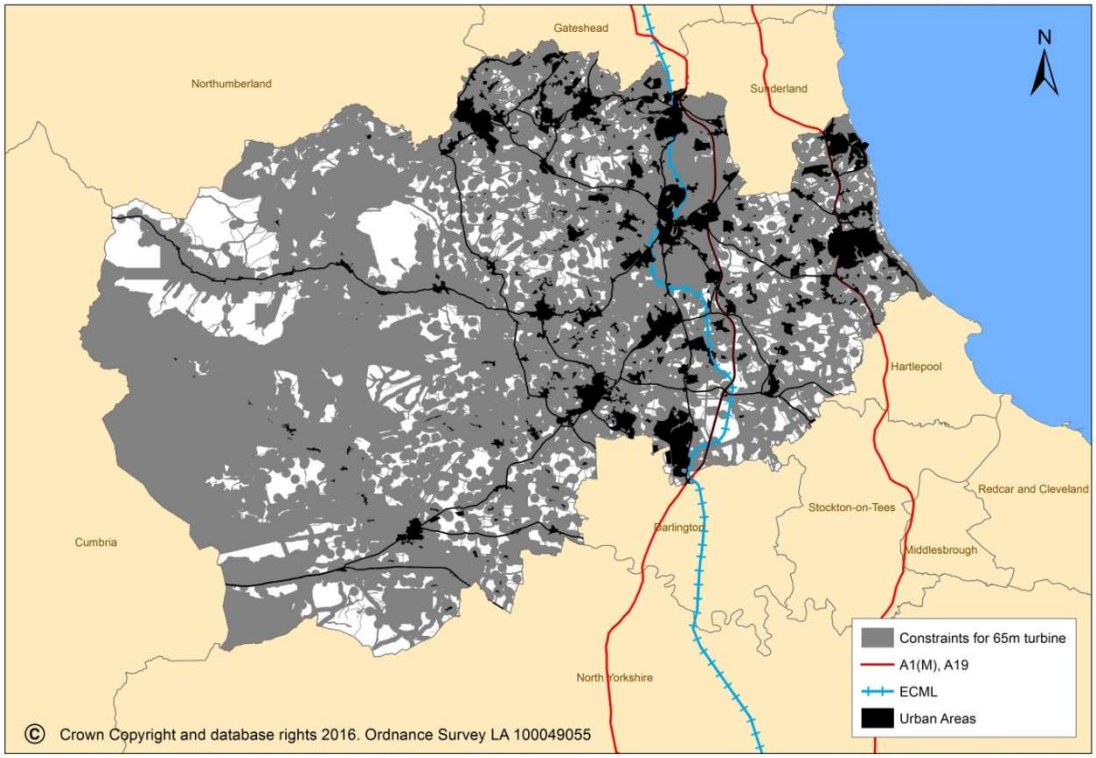

Figure 8 Combined constraints for 65m turbines

Combined constraints for 100m turbines

Table 5: Mapped constraints for 100m turbines.

Constraint	*Mapped feature*
PHYSICAL	
Steeply sloping land	Feature
Water	Feature
SAFETY	
Railway (1.5 x height)	Feature +150m
Motorway / trunk (1.5 x height)	Feature +150m
Overhead lines (Height + 10%)	Feature +110m
High pressure gas (1.5 x typical hub height)	Feature +90m
A, B and C Roads (Height + 10%)	Feature +110m
Equestrian route (3 X height)	Feature + 300m
Footpath (typical rotor radius)	Feature + 300m
RESIDENTIAL AMENITY	
Residential address (6 x height)	Feature + 600m
BIODIVERSITY	
Special Protection Area	Designated area
Special Area for Conservation	Designated area
Site of Special Scientific Interest	Designated area
Local Wildlife Site	Designated area
Ancient woodland	Feature from DCC inventory
CULTURAL HERITAGE	
World Heritage Site	Designated area
Conservation Area	Designated area
Scheduled Ancient Monument	Designated area
Parks and gardens of national interest	Designated area
Registered battlefields	Designated area
PLANNING	
Green Belt	Designated area
TECHNICAL	
Wind speed	<6m/s

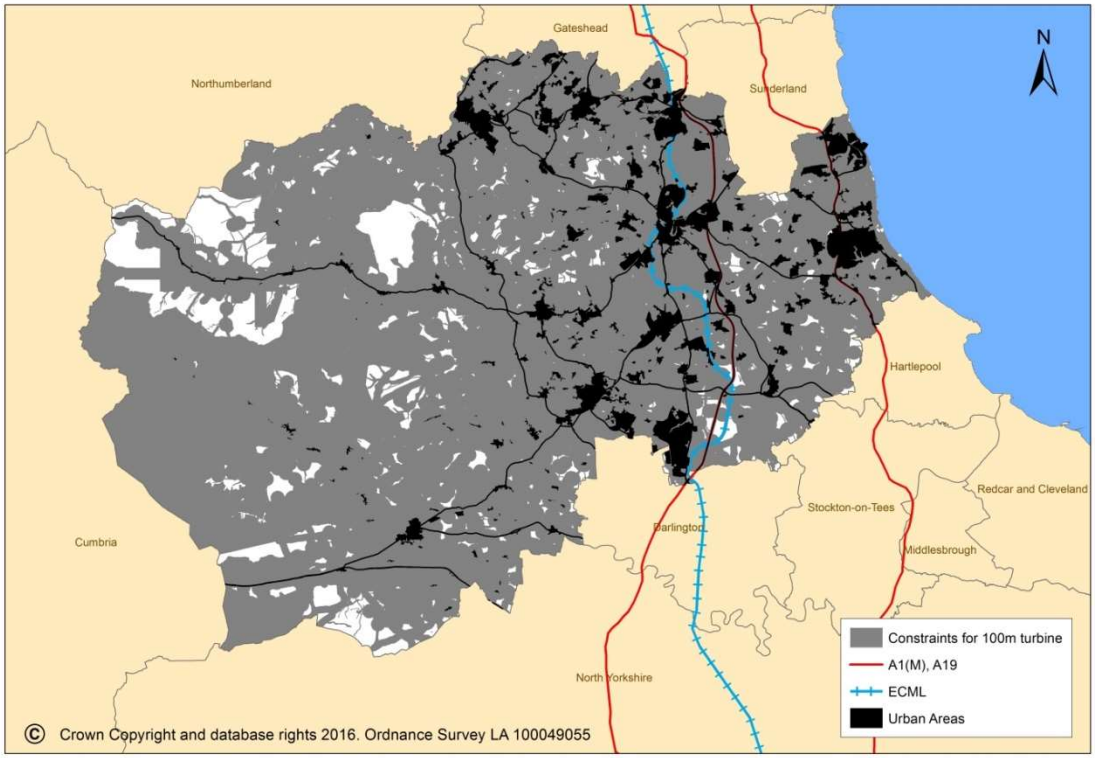

Figure 9 Combined constraints for 100m turbines

Combined constraints for 135m turbines

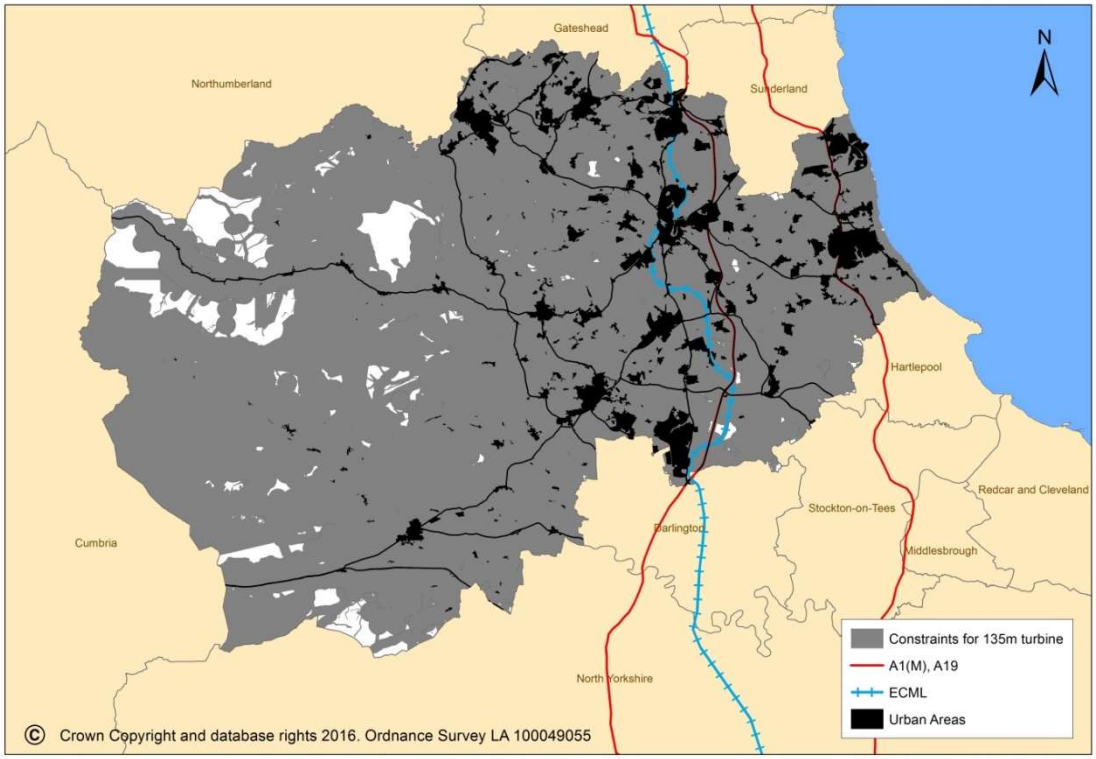

Figure 10 Combined constraints for 135m turbines

Table 6: Mapped constraints for 135m turbines.

Constraint	*Mapped feature*
PHYSICAL	
Steeply sloping land	Feature
Water	Feature
SAFETY	
Railway (1.5 x height)	Feature + 202m
Motorway / trunk (1.5 x height)	Feature + 202m
Overhead lines (Height + 10%)	Feature +148m
High pressure gas (1.5 x typical hub height)	Feature +135m
A, B and C Roads (Height + 10%)	Feature +148m
Equestrian route (3 X height)	Feature + 405m
Footpath (typical rotor radius)	Feature + 405m
RESIDENTIAL AMENITY	
Residential address (6 x height)	Feature + 810m
BIODIVERSITY	
Special Protection Area	Designated area
Special Area for Conservation	Designated area
Site of Special Scientific Interest	Designated area
Local Wildlife Site	Designated area
Ancient woodland	Feature from DCC inventory
CULTURAL HERITAGE	
World Heritage Site	Designated area
Conservation Area	Designated area
Scheduled Ancient Monument	Designated area
Parks and gardens of national interest	Designated area
Registered battlefields	Designated area
PLANNING	
Green Belt	Feature
TECHNICAL	
Wind speed	<6m/s

4 Cumulative effects

4.1 Wind energy developments in combination with each other can have cumulative effects on a range of environmental resources. Cumulative impacts can be defined as the combined effect of a set of developments, taken together. This study only considers cumulative effects on the character of the landscape.

Assessment of cumulative effects on landscape character: published guidance

4.2 There is no single established methodology for assessing the cumulative effects of wind energy on the landscape. Research into the assessment of the visual effects of wind farms was carried out for Scottish Natural Heritage by the University of Newcastle and published in the report University of Newcastle (2002) Visual Assessment of Windfarms Best Practice. (*SNH Commissioned Report* F01AA303A). Guidance on cumulative effects is produced by Scottish Natural Heritage in Assessing the Cumulative Impacts of Onshore Wind Energy Developments (SNH 2012). This focusses its detailed guidance on the assessment of the cumulative effects of individual development proposals. Landscape Capacity Studies in Scotland: a review and guidance to good practice (*SNH Commissioned Report* F01AA303A 2010) provides some general guidance on development capacity studies. Guidance on landscape and visual impact assessment, which provides some guidance on assessing sensitivity, is produced by the Landscape Institute and Institute of Environmental Management in Guidelines for Landscape and Visual Impact Assessment: 3rd Edition (GLVIA3, 2013). This again focusses on assessing the cumulative effects of development proposals as part of the EIA process.

4.3 The cumulative effects of existing development on the character of different landscape types within the county are described in the Landscape Sensitivity Assessment (section 5) together with commentary on the potential cumulative effects of further development. This section provides an overview of the current baseline of cumulative effects in the county as a whole, and describes the types of cumulative effects that could arise from new development.

Current situation

4.2 At the time of the study there were a total of 175 operational or consented turbines in County Durham. Table 7 shows the number of turbines in the size ranges used in the Landscape Sensitivity Assessment. Figure 1 (Section 2) shows existing and consented development at October 2016.

Table 7: Operational and approved wind turbines in County Durham

Scale	Height (metres)	Number
Micro	<11m	21
Small	11.1 – 25	59
Small-medium	26 - 40	8
Medium	41 - 65	9
Medium-large	66 - 100	48
Large	101 – 135	30

Visibility

4.3 The general visibility of operational and consented wind turbines in County Durham and within 4km is shown on Figure 11. This models the visibility of turbines on a bare terrain model and so does not take into account the effects of buildings and vegetation. The tip height of turbines is used to model visibility up to 30km from the turbine. The colour intensity reflects the number of turbines theoretically visible at any one point (from 1 to 158). While this gives a broad indication of where turbines are generally visible from, it doesn't distinguish between the effects of large turbines nearby and small turbines in the far distance. It isn't therefore particularly informative as to the visual influence of turbines in the landscape.

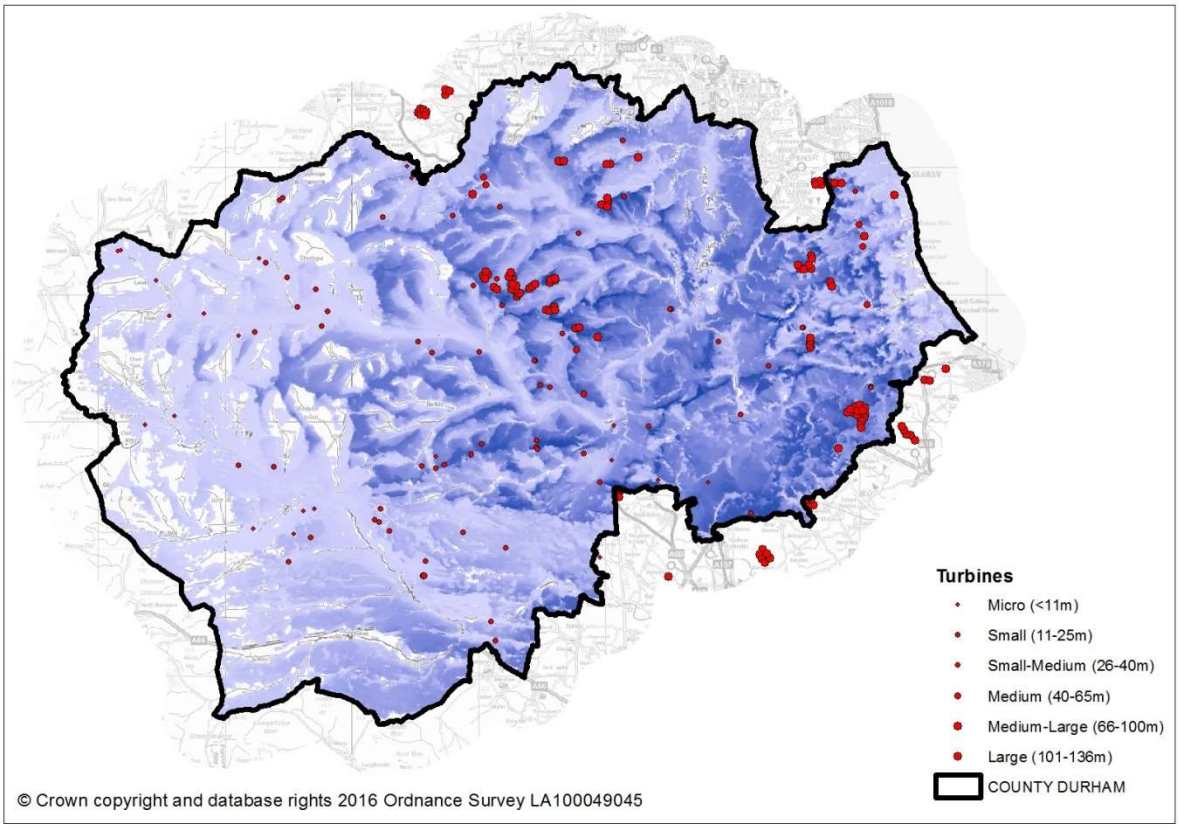

Figure 11 General visibility of turbines in County Durham

Effects of distance

4.4 In modelling landscape and visual effects the ARUP studies undertaken in Durham make reference to *zones of visual dominance* and *zones of visual prominence.* These zones reflect the use in the study of a systematic approach to describing the magnitude of effects based on recommendations made in the Visual Assessment of Windfarms Best Practice. This advised linking the magnitude of effects with the effective size of features in the view and suggested a vocabulary of descriptive terms which is given in Table 8.

Table 8: Size Classes, Names and Descriptors for Visual Effect (Magnitude) from Visual Assessment of Windfarms Best Practice: Table 18 p.64

Size class	Name	Descriptors – appearance in central vision field	Modifying factors
Very large	Dominant	Commanding, controlling the view	Few
Large	Prominent	Standing out, striking, sharp, unmistakeable, easily seen	Few
Medium	Conspicuous	Noticeable, distinct, catching the eye or attention, clearly visible, well defined	Many
Small	Apparent	Visible, evident, obvious	Many Limits of potential visual significance⇩
Very small	Inconspicuous	Lacking sharpness of definition, not obvious, indistinct, not clear, obscure, blurred, indefinite	Many Limit of ZVI⇩
Negligible	Faint	Weak, not legible, near limit of acuity of human eye	Few

4.5 In the ARUP studies these size classes, names and descriptors were calibrated in respect of the likely magnitude of effects and distance ranges for a typical 125m turbine, and the likely significance of effects on receptors of different sensitivities. The magnitude of effects and distance ranges are shown in Table 9.

Table 9: Values for Magnitude of effects and distance ranges used in ARUP development capacity studies

Size class	Name	Magnitude of effects	Distance range
Very large	Dominant	Substantial adverse	Up to 2km
Large	Prominent	Substantial/moderate	2 to 5km
Medium	Conspicuous	Moderate	4 to 10km
Small	*Apparent*	*Category not used by ARUP*	*NA*
Very small	Inconspicuous	Minor	9 to 20km
Negligible	Faint	Negligible	15km to 30km

4.6 The correlation between distance and the magnitude of effects can only be broadly indicative as they represent points on a continuum and do not take into account other contextual factors. As noted in Visual Assessment of Windfarms there are few contextual factors likely to modify visual effects within the closer distance ranges / size classes. With increasing distance more factors are likely to modify visual effects, other than at greater distances towards the limits of visibility where contextual factors again have less effect on the very small effect remaining.

4.7 Using distance as a factor in modelling effects can be a useful tool in structuring analysis of visual effects and identifying which parts of the landscape are likely to be more strongly influenced by the presence of wind turbines. This can be done with more confidence in respect of areas closer to turbines, where they might be dominant or prominent, and less confidence as distance increases.

4.8 In the ARUP studies *zones of visual dominance* and *visual prominence* were mapped as part of the assessment of potential cumulative effects. They were mapped as simple spatial buffers around existing wind farms of 2km and 5km irrespective of the size of the turbines in those developments. This approach can be refined by modelling distance as a factor of turbine height rather than a single figure. This allows the effects of turbines of varied sizes to be modelled more accurately and preserves the relationship between apparent size and visual effect noted in Visual Assessment of Windfarms. Maintaining the values used in the ARUP studies for a turbine of 125m height would give the factors shown in Table 10.

Table 10: Distance ranges used in ARUP studies expressed as a factor of turbine height

Size class	Name	Magnitude of effects	Distance range	Distance as a factor of height
Very large	Dominant	Substantial adverse	Up to 2km	Up to 16 x h
Large	Prominent	Substantial/moderate	2 to 5km	16 to 40 x h
Medium	Conspicuous	Moderate	4 to 10km	32 to 80 x h
Very small	Inconspicuous	Minor	9 to 20km	72 – 160 x h
Negligible	Faint	Negligible	15km to 30km	120 – 240 x h

4.9 Three visual influence zones are modelled in this study based on that approach. These are shown in Table 11. Cumulative effects in areas beyond those distance factors are not modelled as it is considered likely that the majority of significant cumulative effects will occur within that area.

Table 11: Visual influence zones

Zone	Name	Descriptors – appearance in central vision field	Distance as a factor of turbine height
Zone A	Dominant	Commanding, controlling the view	<16 x height
Zone B	Prominent	Standing out, striking, sharp, unmistakeable, easily seen	16 – 40 x height
Zone C	Conspicuous	Noticeable, distinct, catching the eye or attention, clearly visible, well defined	40 – 80 x height

4.10 This approach can be refined further by using visibility modelling based on turbine height to identify these zones rather than simple spatial buffers. Figure 12 shows three zones modelled using the Zones of Theoretical Visibility (ZTV) of operational and consented turbines of all sizes. These were produced using a bare terrain model and therefore only take account of the screening effects of topography, and not of other features such as woodlands or buildings.

4.11 In Zone A wind turbines would be expected to be dominant features in general views of the landscape. This is the zone typically considered to be a 'wind farm' landscape type or sub-type.

4.12 In Zone B wind turbines would be expected to be prominent features in many views. Wind turbines would be likely to be considered to be a key characteristic of the landscape.

4.13 In Zone C wind turbines would be expected to be conspicuous or noticeable features in some views. The visibility of wind turbines would be likely to be considered a characteristic of the landscape.

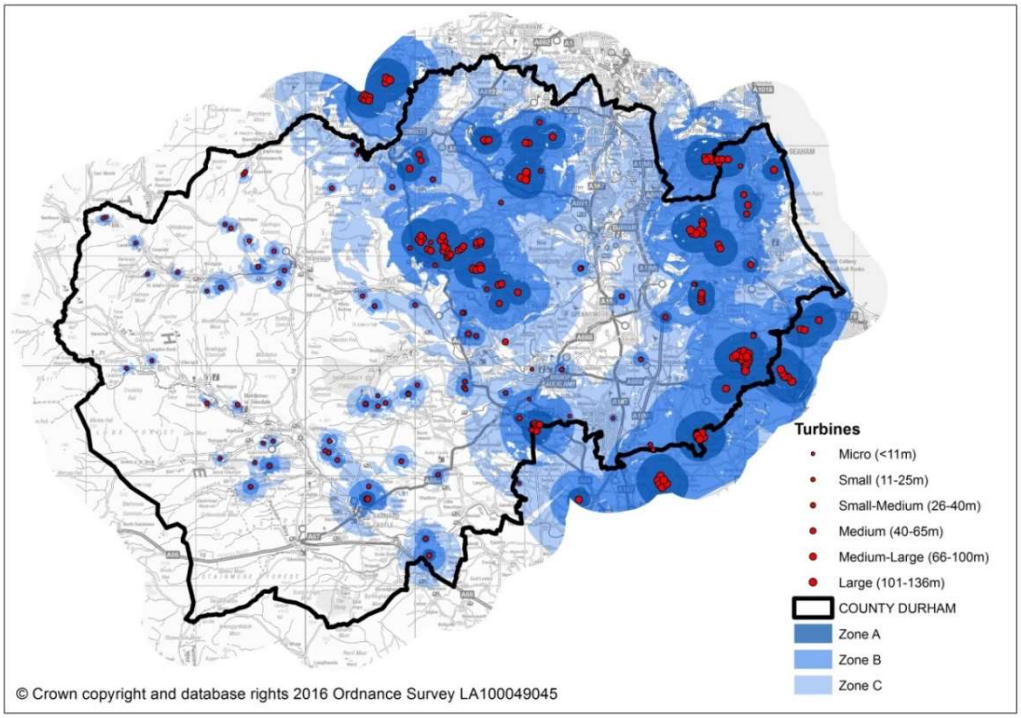

Figure 12 Visual influence zones of operational and consented turbines

Effects of turbine number

4.14 Within the zones modelled, the magnitude of the effect of wind turbines in the view will depend in part on the number of turbines visible.

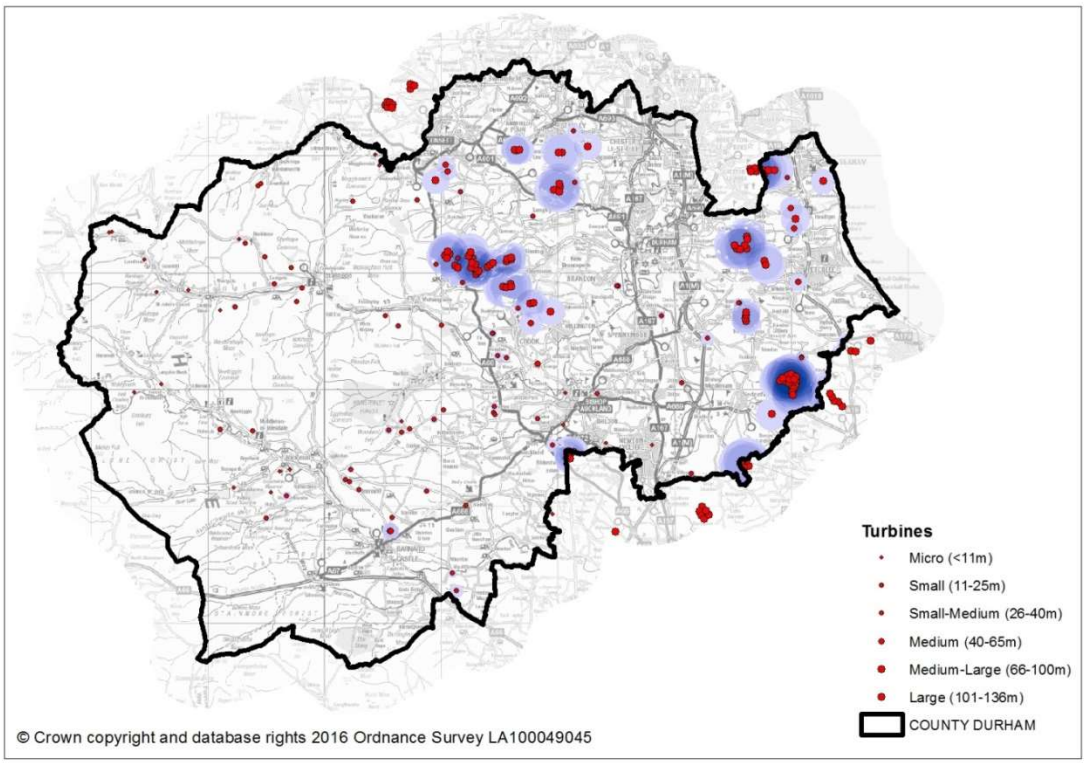

Figure 13 Visibility of turbines in near views within Zone A.

4.15 Figure 13 models the number of turbines visible at distance factors of <16 x the height of the turbine within Zone A. The colour intensity reflects the number of turbines visible at any one point (between 1 and 17). The highest values for numbers of turbines viewed at close range occur in and around the larger complexes:

- east of Tow Law (Tow Law, High Hedley, High Hedley II and West Durham wind farms);
- east of Sedgefield (Butterwick and Walkway wind farms); and
- west of Haswell (Haswell Moor and High Haswell wind farms)
- north of Murton (Eppleton, South Sharpley and High Sharpley wind farms).

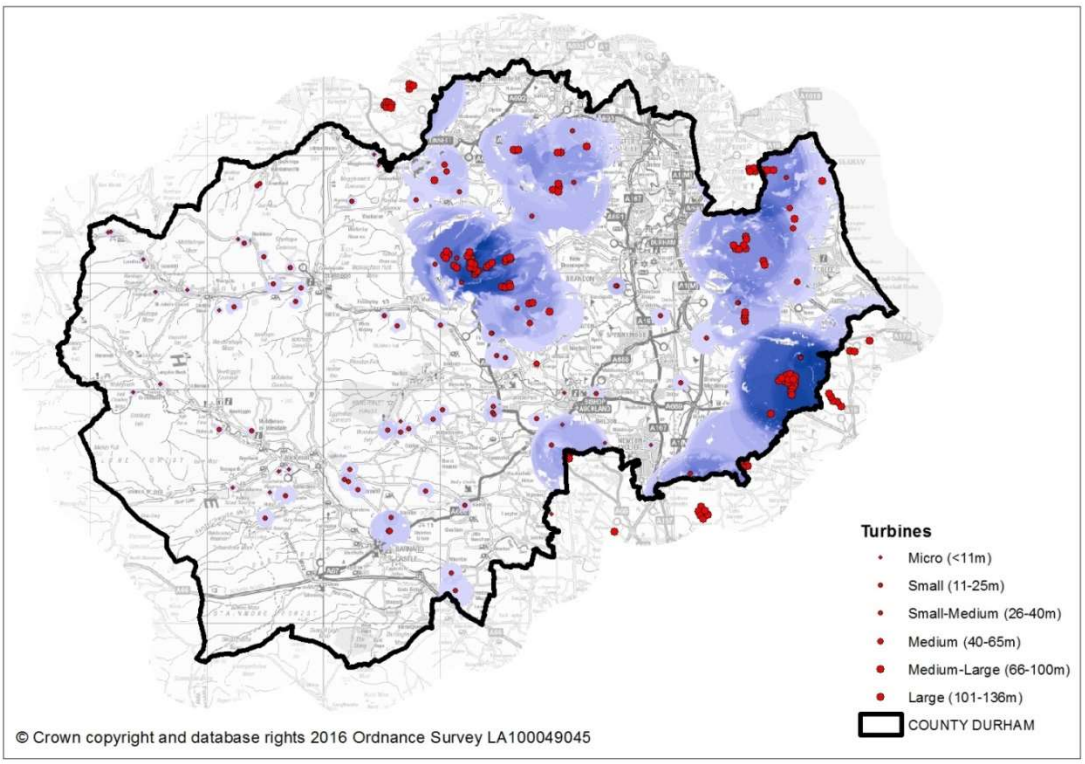

Figure 14 Visibility of turbines in near and middle distance views within Zone A and B

4.16 Figure 14 models the number of turbines visible at distance factors of <40 x the height of the turbine within Zone A and Zone B. The colour intensity reflects the number of turbines visible at any one point between 1 and 27. The highest values for numbers of turbines viewed in near and middle-distance views occur:

- north and east of Tow Law in the Stanley Burn, upper Hedleyhope and Pan Burn valleys and westwards onto Wolsingham North Moor;
- east of Sedgefield on the Tees plain and southern parts of the East Durham Plateau;
- in the northern parts of the East Durham Plateau west of the A19;
- in the Cong Burn valley east of Burnhope;
- the Tees Plain east of Aycliffe.

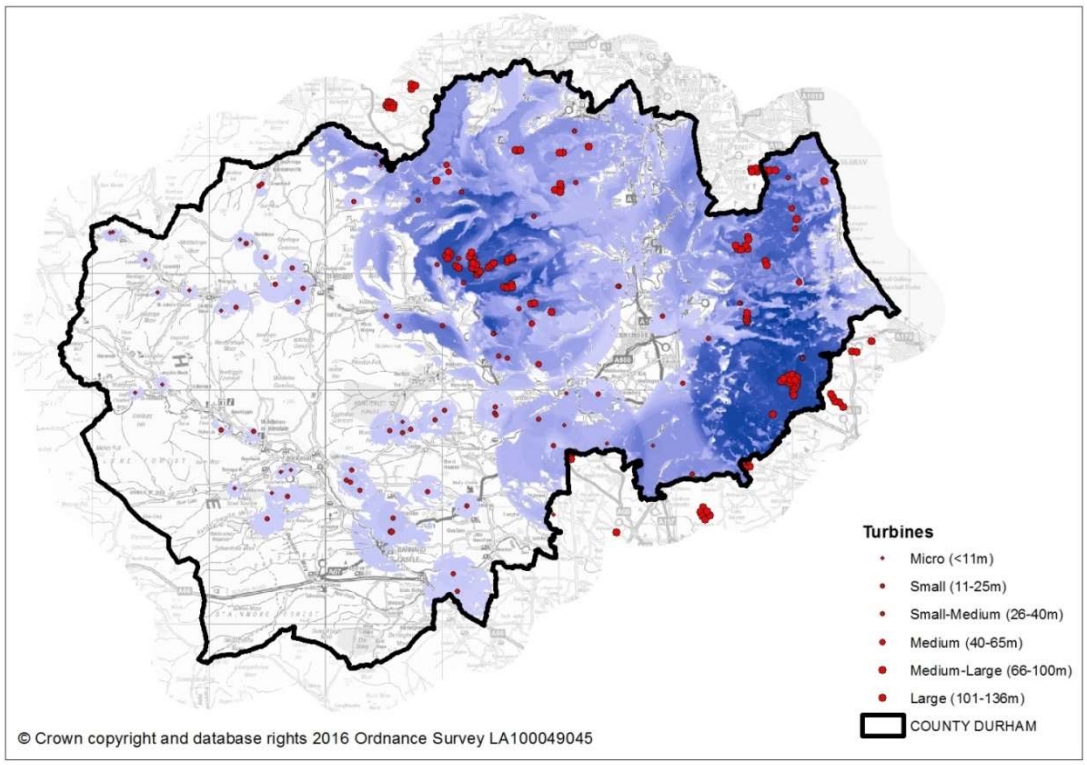

Figure 15 Visibility of turbines in near, middle distance and more distant views within Zone A, B & C

4.17 Figure 15 models the number of turbines visible at distance factors of <80 x the height of the turbine within Zones A, B and C. The colour intensity reflects the number of turbines visible at any one point between 1 and 39. The highest values for numbers of turbines viewed in near, middle-distance, and more distant views occurs:

- in a relatively extensive area north and east of Tow Law in the wider upper Deerness, Hedleyhope, Browney and Pan Burn valleys and westwards onto Wolsingham North Moor;
- in an extensive tract of land around Sedgefield on the Tees Plain and southern parts of the East Durham Plateau; and
- much of the central and northern East Durham Plateau.

4.18 Relatively high values are also found in:

- the higher ground of the central and northern parts of the coalfield generally;
- the eastern flanks of the moors and moorland fringes of the North Pennines north of Pikestone Fell;
- the northern part of the Wear Lowlands.

Patterns of visual influence in different landscapes

4.19 The County Durham Landscape Character Assessment (2008) (CDLCA) identifies a range of landscape types and character areas at different scales from the national/regional to the local. The broadest category, County Character Areas, represent those parts of National Character Areas lying within County Durham (Table 12). The current pattern of

development and visual influence within each of these County Character Areas is described below.

Table 12: National Character Areas and County Character Areas

National Character Area	County Character Areas
North Pennines	North Pennines
Durham Coalfield Pennine Fringe	West Durham Coalfield
Pennine Dales Fringe	Dales Fringe
Tyne and Wear Lowlands	Wear Lowlands
East Durham Magnesian Limestone Plateau	East Durham Limestone Plateau
Tees Lowlands	Tees Lowlands

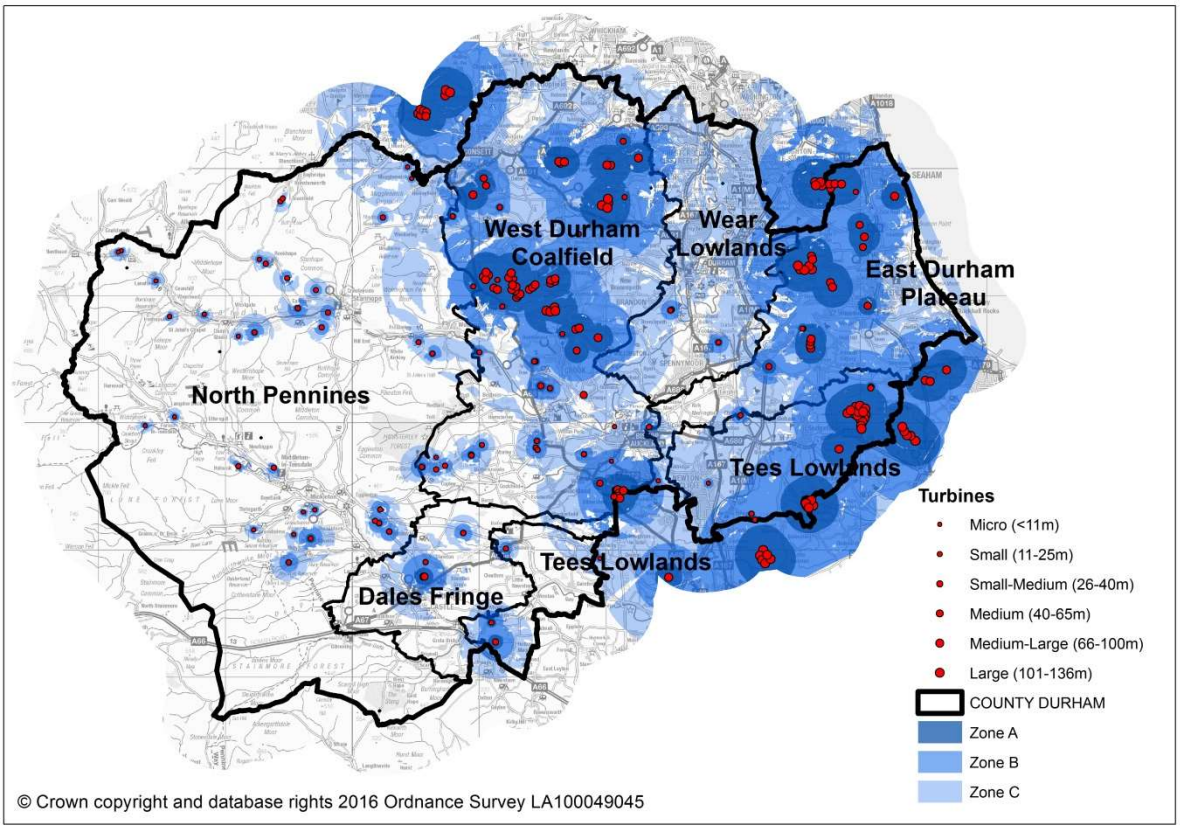

Figure 16 Visual influence zones of operational and consented turbines and County Character Areas

North Pennines

4.20 There is currently little development in the North Pennines other than scattered micro and small turbines associated with isolated properties in the dales. These don't currently give rise to any significant cumulative effects. A small part of the area around Wolsingham North Moor lies in Zone B, from where turbines in the complex to the east around Tow Law are prominent in general views. The wider eastern flanks of the northern moors fall within Zone C where turbines in the western part of the coalfield from Crook in the south to Kiln Pit Hill in the north are visible, at times conspicuous, in some views. Some of the eastern parts of the central moors and moorland fringes north and east of Pikestone Fell fall within Zone C where turbines across the Wear valley are visible on the skyline.

West Durham Coalfield

4.21 Much of the central and northern parts of the West Durham Coalfield lie within Zone C and a substantial proportion of that within Zone B, where wind turbines are prominent features in many views. There are some relatively extensive areas of land falling within Zone A with tracts of 'wind farm landscape' associated with complexes of development:

- in the upper Deerness and Browney catchments between Willington and Tow Law (Tow Law, High Hedley, High Hedley II, West Durham and Broom Hill wind farms; Tanner's Hall Farm, Oakenshaw and Crook Golf Course turbines);
- on the northern flanks of the Browney and across the Cong and Stanley Burn Valleys between Langley Park, Lanchester, Stanley and Annfield Plain (Langley, Holmside and Greencroft wind farms; Greenhouse and Humbleburn turbines);
- on the Browney / Derwent watershed south of Castleside (single turbines at Hown's Farm, High Knitsley and Middle Heads); and
- north of the county on the northern flanks of the Derwent Valley between Allensford and Wittonstall (Kiln Pit Hill and Boundary Lane wind farms);

4.22 There is currently a degree of separation between these tracts, although the complexes remain relatively prominent from areas in between them. In the ridge and valley topography of the area inter-visibility between complexes tends to be high on the ridges but lower in the valleys.

4.23 The southern part of the coalfield has seen little development other than scattered small and small-medium turbines. The consented Royal Oak wind farm lies immediately south of the county boundary in the south west and parts of that area would fall within its visual influence with turbines locally visible, prominent or dominant on the skyline should it be developed.

Wear Lowlands

4.24 There is currently little development in the Wear lowlands other than a single small turbine and micro-turbines within urban/industrial areas. Much of the area falls within Zone C, with turbines on the adjacent high ground of the limestone escarpment and coalfield ridges visible on the eastern and western skylines in some views. Some areas in the east approaching the escarpment fall within Zone A, from where turbines west of Haswell can be prominent in some views.

East Durham Plateau

4.25 Almost all of the central and northern parts of the East Durham Limestone Plateau lie within Zone C and a substantial proportion of that within Zone B, where wind turbines are prominent features in many views. There are a number of areas of land falling within Zone A with tracts of 'wind farm landscape' associated with complexes of development:

- north of Murton (Great Eppleton, High Sharpley, South Sharpley wind farms);
- west of the A19 south of Murton (single turbines);
- between Sherburn Hill and Shotton Colliery (Haswell Moor, High Haswell, Hare Hill wind farms); and
- a single wind farm North of Trimdon Grange (Trimdon Grange wind farm).

4.26 There is currently a reasonable degree of separation between these tracts, although wind turbines or clusters can be locally prominent from areas in between them. In the shallow views typical of the rolling topography of the plateau, inter-visibility between complexes is often reduced locally by the screening effects of topography and vegetation. In the more open terrain of the escarpment, and in views of the escarpment from the West, development clusters are often notable features on the skyline.

4.27 Land in the south-east of the area bordering onto the Tees Plain falls within Zone B. Turbines in the Butterwick, Walkway and High Volts wind farms are prominent in some views.

Tees Lowlands

4.28 Almost all of the northern part of the Tees Plain in Durham lies within Zone C and a substantial area in the south and east lies within Zone B, where turbines are prominent features in many views. There are some large areas of land falling within Zone A with tracts of 'wind farm landscape' associated with operational development in and close to the county Boundary:

- south of Hart (High Volts wind farm);
- north of Wynyard (Red Gap Moor wind farm);
- east of Sedgefield (Butterwick and Walkway wind farms);
- west of Stillington (Lamb's Hill wind farm); and
- south of Great Stainton (Moorhouse wind farm);

4.29 There are also some isolated medium-large turbines (East Close Farm, Acorn Dairies) adding to that pattern.

4.30 The large Butterwick/Walkway complex reads as a single development. Within the tract of windfarm landscape around it, it is particularly dominant because of its scale and visual density. Construction of the Red Gap Moor wind farm to the east has led to a more extensive tract of wind farm landscape developing though this area. There is currently a degree of separation between these and other tracts. In the shallow views typical of the rolling topography of the Tees Plain inter-visibility between tracts is reduced to some degree by the screening effects of topography and vegetation, although where landscape is more open, as it more typically is, a relatively high degree of inter-visibility between existing wind farms and those under construction might be anticipated.

4.31 The Tees Vale in the west has seen little development. There are a small number of scattered small and medium-small turbines which don't currently give rise to any significant cumulative effects.

The Dales Fringe

4.32 The Dales Fringe has seen little development. There are two small turbines in isolated locations and two medium turbines set within an industrial context within Barnard Castle. These are locally visible and only occasionally prominent in views from the surrounding area.

Potential cumulative effects of new development

4.33 New development has the potential to add to the cumulative effects of existing development in a number of ways.

4.44 Extensions to existing wind farms can:

- increase the physical extent of tracts of 'wind farm landscape';
- increase the number of turbines visible at close range within those areas;
- reduce separation distances between wind farms leading to coalescence of tracts of 'wind farm landscape';
- fill in gaps between clusters of turbines leading to a more dense development form;
- introduce turbines of a different scale or character leading to a lack of visual coherence;
- increase the number of turbines visible generally within a wider landscape type or character area.

4.45 The development of extensions to existing wind farms can be challenging. The introduction of new turbines that are not closely related to existing ones in respect of their scale and character or their spatial relationship with each other can be damaging to the overall coherence of the group. In some circumstances the overall form can be improved and particularly where the existing form is visually awkward, for example where existing turbines are in pairs or straight lines. Extensions which are consistent with the form and character of an existing wind farm may have less significant cumulative effects than developments in new locations.

4.46 New wind farms can:

- introduce new areas of 'wind farm landscape' into a wider landscape type or character area, reducing the proportion of landscape remaining unaffected;
- reduce separation distances between wind farms leading to coalescence of tracts of 'wind farm landscape';
- increase the number of turbines visible generally within a wider landscape type or character area.

4.47 The ARUP Landscape Capacity Studies reports recommended in general that new wind farms or clusters should be separated by around 5km from each other. This was to avoid the situation where the 'wind farm landscapes' (Zone A) associated with individual wind farms would coalesce to form more extensive tracts. This has already occurred in parts of the county where an area of resource has been developed by more than one wind farm leading to wind farm complexes with associated wider tracts of 'wind farm landscape'. The pattern of existing wind farms is such that further development of any significant scale within these areas would often lead to coalescence or extension of existing areas of wind farm landscape into more extensive tracts.

4.48 New single turbines can:

- lead to the development of new areas of 'wind farm landscape' and particularly where they are developed near to other singletons;
- increase the extent of existing tracts of 'wind farm landscape' where they are developed close to existing wind farms ;

- lead to the coalescence of tracts of 'wind farm landscape' where they are developed between existing wind farms;
- fill in gaps between clusters of turbines within wind farms leading to a more dense development form;
- where turbines are already present, introduce new turbines of a varied scale or character leading to a lack of visual coherence;
- increase the number of turbines visible generally within a wider landscape type or character area.

4.49 Single turbines vary from small (<25m) to medium-large (>66m) or large (>100m) turbines comparable in scale to those found in wind farms. These all have the potential to have cumulative effects on the character of the landscape. In areas where existing development is already present, the development of new turbines that are not closely related in respect of their scale, character, rotation speed or colour can to lead to an increase in visual clutter and a straggling or congested pattern of development that lacks coherence.

Re-commissioning

4.50 Wind development is a temporary use of land and its impacts are assessed on that basis. The de-commissioning of wind turbines and the restoration of the site are generally secured by planning conditions. It is nevertheless likely to be the case that some of the resource areas where development has taken place in the past will be the best places to locate development in future should the need arise. Due to advances in technology the re-development of a wind farm will often involve deploying turbines in different sizes, numbers or locations. Re-powering a wind farm with different turbines may give rise to potentially adverse effects – for example through increases in turbine size - or beneficial effects – for example through a reduction in numbers or an improvement of form.

Thresholds of acceptable change

4.51 Although published guidance provides advice on how cumulative landscape and visual effects can occur, and how their magnitude and significance can be assessed, there is little advice on what might constitute an acceptable or unacceptable level of overall cumulative effect. In respect of assessing individual development GLVIA advises (7.27) that the significance of cumulative effects will depend partly on:

- the susceptibility of the landscape;
- the value attached to the landscape;
- the size or scale of the cumulative landscape effects identified;
- the extent of the geographical area covered by the cumulative effects identified; and
- the duration of the cumulative landscape effects.

One indicator referred to in GLVIA is *whether or not the character of the landscape is changed to such an extent that it becomes a new landscape type or sub-type* (GLVIA 7.26)

These factors are taken into account in the commentaries on existing and potential cumulative effects on individual landscape types in the Landscape Sensitivity Assessment.

5 Landscape Sensitivity

Methodology

Introduction

5.1 The assessment of landscape sensitivity involves the following key stages.

- Identifying the characteristics of wind energy development and its potential landscape and visual effects;
- assessing the sensitivity of individual landscape types and character areas to the effects of development at a range of different scales;
- describing the pattern of existing wind energy development within each landscape type and providing commentary on the potential cumulative effects of further development; and
- mapping the variations in landscape sensitivity to different scales of development across the county.

Characteristics of wind energy development

5.2 Wind energy development is very diverse and ranges from small individual turbines providing electricity for isolated properties to substantial arrays of large turbines supplying electricity to the grid. The main physical components of a wind turbine are:

- a tower which may be of lattice construction but is generally a tubular mono-pole structure;
- a nacelle which houses the generator;
- rotor blades which are generally mounted on the front of the nacelle;
- a transformer which may be built into the tower or a free-standing structure.

5.3 Associated features may include access tracks and hard standings, and, particularly in the case of larger turbines or arrays:

- temporary construction compounds;
- temporary lay-down areas for larger components;
- anemometer masts, usually on guyed lattice towers;
- control buildings, sometimes including a sub-station.

5.4 Wind energy developments have a limited life and are typically given time-limited planning consents (usually around 25 years). At the end of the life of the development it can either be restored or, subject to planning permission being secured, ‘re-powered’ with a new turbine or turbines. In typical farmland situations, restoration back to something close to the land’s original condition is usually possible.

Types of wind energy development

5.5 Turbines range in size from very small micro turbines to very large commercial turbines. Small turbines tend to occur as single features, often closely associated with individual properties or businesses. Larger turbines occur both as singletons and clusters or larger wind farm arrays. Turbines can be broadly divided into the size ranges given in Table 13 based on the types of turbines that have been developed in the county to date.

Table 13: wind turbine size

Scale	Tip height (m)	Rotor Dia. (m)	Capacity (kw)	Typical applications
Micro	<11	<3	<2.5	Single turbines mounted on buildings, caravans etc.
Small	11.1 – 25	<10	2.5 – 15	Single turbines serving individual farms and residential properties.
Small-medium	26 - 40	10 - 20	20 - 50	Single turbines serving larger farm or other businesses
Medium	41 - 65	20 - 30	225 - 330	Single turbines providing electricity primarily to the grid.
Medium-large	66 - 100	30 - 60	500 - 1300	Single turbines or arrays providing electricity primarily to the grid.
Large	101 – 135	70 – 100	2000- 3000	Single turbines or arrays providing electricity to the grid.

5.6 The tip height of a turbine can only give an indication of scale. A small diameter rotor on a tall slender tower can have the same tip height as a larger diameter rotor with a large nacelle on a short thick tower. Generally the rotor diameter, tower height and the overall scale of components are closely related, although analysis of existing turbines in the county would suggest that a notable step in scale does occur at a height of around 40m. Turbines below that height tend to be smaller in overall scale – 20-50kw machines – and those immediately above that height tend to be considerably larger in overall scale – 225-300kw machines.

Figure 17 Small turbine (18m) at Bolton Hill

Figure 18 Small-medium turbine (34m) at Hutton Hall

Figure 19 Medium turbine (46m) at High Knitsley

Figure 20 Medium-large turbine (74m) at Middle Heads

Figure 21 Large turbine (110m) at Langley

5.7 At the time of the study there were a total of 154 operational and permitted turbines over 11m in height in the county. Table 14 shows the number of turbines in these size ranges.

Table 14: Operational and approved wind turbines in County Durham

Scale	Height	Number
Small	11.1 – 25	59
Small-medium	26 - 40	8
Medium	41 - 65	9
Medium-large	66 - 100	48
Large	101 – 135	30

5.8 In County Durham the majority of wind farms occur as clusters or small groups (2-5 turbines) with a small number of larger arrays of up to 12 turbines. In some situations these combine with adjacent development to form larger complexes. This reflects the heavily constrained nature of the county's settled lowland and upland fringe landscapes where the development has taken place and the scarcity there of large tracts of unconstrained land. At the time of writing there were 18 wind farms (including small clusters) in County Durham. These are shown in Table 15.

Table 15: Wind farm size

Wind farm	Turbine number	Turbine height (m)
Glaxo	2	43
Tanner's Hall Farm	2	74
High Sharpley	2	90
Hare Hill	2	100
Holmside	2	100
Haswell Moor Farm	2	100
High Hedley I	3	71
Tow Law	3	71
Greencroft/Greenhouse	3	76
South Sharpley	3	100
Trimdon Grange	4	76
High Hedley II	4	80
Langley	4	110
Broom Hill	4	110
Haswell Moor	5	110
Walkway	7	110
Butterwick	10	110
West Durham	12	100

Potential landscape and visual effects of wind energy development

5.9 Wind energy development can bring changes to the landscape in a number of ways.

- The construction of turbines and associated infrastructure can involve the loss of landscape features such as hedges and trees within the site.

- The delivery of large components can involve physical impacts off-site such as the loss of landscape features or road widening within the swept path of abnormal loads.
- The introduction of tall features may affect the perception of the scale in the landscape and particularly in respect of landforms and features such as trees, woodlands, hedges and buildings.
- As large features turbines can be visually dominant elements and detract from the way other landscape features are experienced.
- The introduction of moving rotors can erode the tranquillity of the landscape as well as drawing attention to the turbines and increasing their visual effects.
- As overtly man-made features turbines can erode the qualities of remoteness, naturalness or wildness that are found in some landscapes.
- As large modern features turbines can detract from the setting of some heritage assets.
- Associated features such as access tracks can be visually intrusive and particularly in moorland landscapes of moderate or strong relief.
- Turbines prominent on or near skylines can create strong focal points that change the way open sweeping horizons are experienced, or compete for attention with other landmarks.
- As large moving structures turbines can be visually overbearing when seen at close quarters and can be visually distracting when only partially visible.
- Turbines can detract from the scenic quality of some landscapes if they erode valued characteristics such as visual unity and coherence, or detract from the aesthetic qualities of designed landscapes like historic parks.
- Larger turbines in particular can be visible over extensive areas and can affect the way a landscape as a whole, and the wider landscape beyond, are experienced.

5.10 Development can also bring positive changes to the landscape.

- The development of a site can generate resources to carry out restoration or enhancement works to landscape features that bring long term benefits to its character.
- As large moving objects with strong aesthetic properties of their own turbines can bring drama to the landscape and amplify some characteristics, particularly in large scale or elemental landscapes.

Assessment of Landscape Sensitivity: published guidance

5.11 Although there is a general understanding that landscapes vary in their sensitivity to the effects of development of different types there is no single established methodology for assessing sensitivity. General guidance on landscape character and sensitivity is produced by Natural England (formerly the Countryside Agency) and Scottish Natural Heritage in Landscape Character Assessment: Guidance for England and Scotland and the accompanying Topic Paper 6. Techniques and criteria for Judging Capacity and Sensitivity (Countryside Agency / Scottish Natural Heritage 2002) and the more recent An Approach to Landscape Character Assessment (Natural England 2014). Guidance on landscape and visual impact assessment, which provides some guidance on assessing sensitivity, is produced by

the Landscape Institute and Institute of Environmental Management in Guidelines for Landscape and Visual Impact Assessment: 3rd Edition (GLVIA3, 2013).

Terminology

5.12 Topic Paper 6 states that:

'*Judging landscape character sensitivity requires professional judgement about the degree to which the landscape in question is robust, in that it is able to accommodate change without adverse impacts on character. This involves making decisions about whether or not significant characteristic elements of the landscape will be liable to loss... and whether important aesthetic aspects of character will be liable to change*' (Paragraph 4.2).

5.13 In this study the following definition of the term *sensitivity* is used.

> *The extent to which the character and quality of the landscape is susceptible to change as a result of wind energy development.*

In this context the term susceptibility is understood to mean the following.

> *The ability of a landscape to accommodate wind energy development without undue negative consequences.*

This is consistent with advice given in the published guidance cited above and with other landscape sensitivity studies of this type.

Study area

5.14 The study area covers County Durham. In order to assess inter-visibility with other landscapes consideration is given to areas within 5km of the county boundary.

Assessment Criteria

5.15 Wind energy development affects the character of the landscape in different ways, depending in part on the characteristics of the landscape and in part on those of the development. Within a single landscape of a given character, development may affect different characteristics to different degrees. So, for example, a landscape may be of low sensitivity in respect of its scale but of higher sensitivity in respect of perceptual factors such as 'remoteness' or 'naturalness'.

5.16 Landscape sensitivity studies therefore typically identify different components of landscape character that may be affected by this form of development in order to analyse the sensitivity of individual landscape types or character areas in a structured manner. There is a relatively high degree of consensus among published sensitivity and capacity studies as to the ways in which wind development can affect landscape character, although there are differences in the ways in which landscape components are identified or articulated.

5.17 The criteria used in this study are based on a review of published studies and the professional judgement of the assessment team as to the most appropriate to use in the context of the landscapes of County Durham. These are set out in Table 16.

Table 16: Assessment criteria

Component	Characteristics indicating lower sensitivity to wind energy development	↔	Characteristics indicating higher sensitivity to wind energy development
Physical criteria			
Landform	• Large scale simple landforms with little variety.	↔	• Complex irregular topography. • Small scale topography. • Discrete or distinctive landforms.
Simple landforms such as flat, gently rolling or undulating plains and plateaux are likely to be of low sensitivity to the effects of wind turbines as conflicts of scale tend not to occur. In complex topography, or where there are distinct landforms such as discrete hills, escarpments, bluffs or knolls, turbines may be out scale, detract from the legibility of important features or be visually confusing due to varying turbine heights.			
Landcover	• Simple and consistent landcover with little variety. • Large scale regular pattern. • Complex but incoherent pattern. • Lacking in domestic or human scale features.	↔	• Smaller scale, complex and irregular but coherent pattern. • Varied but unified landcover. • Abundant domestic or human scale features.
Simple and consistent landcover is likely to lead to low sensitivity to the effects of wind turbines as conflicts with the patterns of other features tend not to occur. Large scale regular patterns in landcover can assimilate regular patterns of development. Complex heterogeneous patterns that lack coherence, such as in urban fringe landscapes, can also assimilate new development without a fundamental change in character. Complex and irregular patterns of landcover such as old field systems with varied but unified landcover are likely to be of higher sensitivity to the introduction of new elements. Landscapes where features that give a human scale to the landscape are abundant – hedges, walls, trees, domestic scale buildings – are generally more vulnerable to the scale effects of large structures.			
Perceptual and visual criteria			
Visibility and views	• Visually enclosed and experienced in short and /or shallow views. • Few notable views or landmarks. • Self-contained: not widely visible from other landscapes. • Not an important component of the	↔	• Visually open and experienced in deep and/or panoramic views. • Notable views or landmarks • Widely inter-visible with other landscapes and forming part of important or sensitive views.

	visual environment of sensitive receptors or heritage assets.		• Important component of the visual environment of sensitive receptors or heritage assets.
Visually open landscapes experienced in deep or panoramic views are likely to be of higher sensitivity to the effects of wind turbines as they tend to be omnipresent in views and widespread in their effect. In landscapes which are typically experienced in short or shallow views the effects of wind turbines tend to be more localised and attenuate rapidly with distance. Landscapes characterised by notable views and landmark features are more vulnerable to the effects of new and conspicuous structures than those which lack them. In landscapes where there are high levels of inter-visibility with neighbouring landscapes sensitivity may be higher, depending on the intrinsic sensitivity of those landscapes. Some landscapes form a particularly important part of the visual environment of sensitive receptors or heritage assets. Notable examples in Durham include those which form part of the inner and outer setting of the Durham Cathedral and Castle World Heritage Site and contribute to its outstanding universal value (OUV). Other examples include the settings of historic parks and gardens and historic towns and villages.			
Skylines	• Skylines not prominent or distinctive. • Skylines dominated by development, tall structures or otherwise visually cluttered with multiple foci.	↔	• Skylines prominent and/or distinctive. • Skylines visually clean and lacking in development, tall structures or other foci.
Landscapes where skylines are prominent and distinctive with established focal features, or clean and sweeping, lacking in tall structures and other focal points, are likely to be sensitive to the effects of turbines which may detract from their character or draw attention away from existing features. Landscapes where skylines aren't prominent or distinctive, or are visually cluttered, or where tall structures such as industrial towers, masts and overhead transmission lines are commonplace are likely to be of low sensitivity.			
Perceptual qualities	• Heavily developed landscapes of an urban or industrial character. • Busy landscapes with continuous or frequent movement and man-made noise.	↔	• Undeveloped landscapes with a strong sense of remoteness and/or naturalness. • Still and quiet landscapes where movement and noise arise largely from natural forces.
High levels of urban and industrial development in the landscape are likely to lead to a reduced sensitivity to the effects of wind turbines as built and engineered features are already highly characteristic elements. Landscapes with a strong sense of naturalness or wildness – even where this is in part a result of human management – are likely to be of high sensitivity to the introduction of conspicuous man-made features. Tranquil			

landscapes, where movement and noise arising largely from natural forces is a component of that tranquillity, are likely to be of high sensitivity to the introduction of artificial movement and noise.			
Qualitative criteria			
Scenic qualities	• Low scenic quality • Many detractive elements	↔	• High scenic quality • Few detractive elements
Landscapes of high scenic quality or of a purposefully aesthetic design, such as ornamental parks and gardens, are likely to be of high sensitivity to the effects of wind turbines and particularly where there are few existing elements that detract from those qualities. Landscapes with little scenic value or with many existing detractive elements will generally be of low sensitivity although where they have some special qualities they can be vulnerable to the cumulative effects of additional visual clutter.			

Landscape typology

5.18 The landscape typology used in any assessment, the way the landscape is divided into landscape types and character areas, will have an important influence on its outcomes. Broader brush national or regional typologies such as National Character Areas will give very imprecise and approximate values for sensitivity. Finer grained local assessments may be too small in scale to analyse the wider-ranging visual effects of tall structures. The County Durham Landscape Character Assessment (2008) (CDLCA) identifies a range of landscape types and character areas at different scales from the national/regional to the local.

- County Character Areas (equivalent to National Character Areas)
- Broad Landscape Types
- Broad Character Areas
- Local Landscape Types
- Local Landscape Sub-types

This assessment uses Broad Landscape Types and Broad Character Areas to assess sensitivity.

5.19 Within Broad Landscape Types the individual components which are assessed for sensitivity may vary considerably. For example the *Coalfield Upland Fringe* broad type contains areas that are heavily developed and areas that are very rural. The assessment for each Broad Landscape Type is therefore expressed as a range rather than a single value. Broad Landscape Types are subdivided into Broad Character Areas in the CDLCA. This generally allows the assessment to be narrowed down to a single representative value. In some cases attributes will vary within a Broad Character Area. Where this is notable, and can be refined by further subdivision, the assessment sub-divides the character area into sub-areas. The landscape units used in the assessment are shown in Table 17.

Table 17: Landscape Assessment Units

Broad Landscape Type	*Broad Character Area / Sub-area*
North Pennines National Character Area	

North Pennines County Character Area	
1. Moorland Ridges and Summits	1a Barningham, Hope & Scargill Moors
	1b Bollihope Common, Ireshope & Westernhope Moors
	1c Holwick & Cronkley
	1d Langdon, Newbiggin & Middleton Common
	1e Lune Forest & Mickle Fell
	1f Middlehope Fell, Redburn, Wolfcleugh & Lintzgarth
	1g Muggleswick & Waskerley
	1h Nookton Fell
	1i Pikestone & Woodland Fells
	1j Stanhope Common & Wolsingham Moors
	1k West Common & Cow Green
2. Moorland Plateau	2a Cotherstone Moor
	2b Mickleton and Hunderthwaite Moors
	2c Stainmore
3. Moorland Fringe	3a Deepdale Moorland fringe
	3b Derwentdale Moorland fringe
	3c Hamsterley
	3d Lunedale moorland fringe
	3e Romaldkirk Moor
	3f Scargill and Barningham fringe
	3g Sleightholme & Greta Moorland Fringes
	3h Teesdale moorland fringes
	3i Waskerley & Tunstall Moorland fringe
	3j Weardale Moorland fringes
	3k Woodland, Langleydale and Marwood fringes
4. Upper Dale	4a Burnhope Head
	4b Upper Baldersdale
	4c Upper Derwentdale
	4d Upper Greta Valley
	4e Upper Lunedale
	4f Upper Rookhope
	4g Upper Teesdale
	4h Upper Weardale
5. Middle Dale	5a Baldersdale
	5b Burnhope
	5c Langleydale & Marwood
	5d Lunedale
	5e Mid Greta Valley
	5f Mid Derwentdale
	5g Mid Teesdale
	5h Mid Weardale
	5i Rookhope
	5j Tunstall
6. Lower Dale	6a Lower Derwent

	6b Lower Greta
	6c Lower Teesdale
	6d Lower Weardale
Durham Coalfield Upland Fringe National Character Area **West Durham Coalfield** County Character Area	
7. Coalfield Upland Fringe	7a: Northern Coalfield Uplands
	7a (i): Charlaw Fell East
	7a (ii) Medomsley
	7b: Browney Uplands
	7b (i) Salters Gate
	7b (ii) Rowley and Butsfield
	7c: Central Coalfield Uplands
	7c (i): Cornsay & Esh
	7c (ii): Pithouse
	7c(iii): Houselop
	7c (iv) Gibbet Hills
	7d: Upper Bedburn & Harthope Valleys
	7e: Southern Coalfield Uplands
	7f: Brussleton
8. Coalfield Valley	8a Beamish & Causey Burn Valley
	8a (i) Marley Hill
	8b Beechburn Valley
	8c Browney Valley
	8c (i) Smallhope Valley
	8d Central Wear Valley
	8d (i) Auckland
	8d (ii) Wear corridor
	8e Cong Burn Valley
	8f Deerness & Hedleyhope Valley
	8g Derwent Valley
	8h Findon Hill & South Burn Valley
	8i Gaunless Valley
	8j Hummerbeck Valley
	8j(i) Crook Beck Valley
	8k Kyo Burn Valley.
	8l Linburn Valley
	8m Stanley Burn Valley.
	8n Stockley Beck Valley.
	8n (i) Scripton Gill
	8o Upper Wear & Lower Bedburn Valleys.
9. Coalfield Valley Floodplain	9a Derwent floodplain
	9b Gaunless floodplain.
	9b (i) Upper Gaunless floodplain
	9c Wear floodplain
Pennine Dales Fringe National Character Area	

Dales Fringe County Character Area	
10. Gritstone Upland Fringe	10a Bowes
	10b Moorhouse and Gillbeck
	10c Raby Hill, Marwood & Kinninvie
	10c (i) Raby Hill
11. Gritstone Vale	11a Barnigham, Brignall and Rokeby
	11a (i) Rokeby parklands
	11b Bolam, Hilton & Wackerfield
	11c Boldron and Lartington
	11c (i) Lartington parklands
	11d Newsham and Cleatlam
	11e Raby and Streatlam
	11e (i) Raby and Streatlam parklands
Tyne and Wear Lowlands National Character Area **Wear Lowlands** County Character Area	
12. Incised Lowland Valleys	12a Congburn, Southburn and Blackdene
	12b Lower Browney Valley
	12c Northern Wear Valley
	12c (i) Lambton & Lumley
	12d Southern Wear Valley
	12d (i) Brancepeth Park
	12d (ii) Burn Hall and Croxdale
	12e Team Valley
13. Lowland Valley Terraces	13a Eastern Valley Terraces
	13 a (i) Lambton and Lumley parklands
	13 a (ii) Eastern Vales
	13b Western Valley Terraces
	13b (i) Western Valley Terraces North
	13b (ii) Western Valley Terraces South
	13b (iii) Brancepeth parklands
	13b (iv) Brasside and Finchale
East Durham Magnesian Limestone Plateau National Character Area **East Durham Limestone Plateau** County Character Area	
14. Limestone Escarpment	14a The Limestone Escarpment Ridge
	14a (i) Eastern Limestone Escarpment Ridge
	14b The Northern Limestone Escarpment
	14b (i) Areas transitional with the Clay Plateau to the east
	14c The Southern Limestone Escarpment
15. Clay plateau	15a The Central East Durham Plateau
16. Coastal Limestone Plateau	16a Coastal East Durham Plateau
	16a (i) Murton
	16a (ii) Castle Eden
	16a (iii) Castle Eden Park
	16b Sheraton
	16b (i) Hulam

17. Limestone Coast	17a The Durham Coast
Tees Lowlands National Character Area **Tees Lowlands** County Character Area	
18. Lowland Plain	18a Butterwick & Shotton
	18b Embleton
	18c Sedgefield, Windlestone & Aycliffe
	18c (i) Hardwick park
	18c (ii) Windlestone Park
	18c (iii) West of Sedgefield
	18c (iv) Rushyford, Woodham and Middridge
19. Lowland Carrs	19a Bradbury Preston and Morden Carrs
	19b Nunstainton, Mainsforth and Middleham Carrs
20. Lowland River terraces	20a The River Tees
21. Lowland Vale	21a Northern Tees Vale: Staindrop & Ingleton
	21a (i) Raby park
	21b Southern Tees Vale: Hutton Magna
	21b (i) Tees corridor

Designated landscapes

5.20 The study area includes a number of landscapes designated for their landscape value including the North Pennines Area of Outstanding Natural Beauty (AONB), Registered Historic Parks and Gardens, Areas of High Landscape Value identified in District Local Plans, and locally listed Parks and Gardens of Local Interest. Designated landscapes are not assessed individually for their sensitivity, but the sensitivities they represent are captured in the assessment of landscape types, character areas and sub-areas in respect of the assessment criteria set out in Table 16. In some cases larger parklands may be identified in themselves as sub-areas.

Development typology

5.21 The sensitivity of the landscape to the effects of wind development depends on the scale of development both in respect of the size and the number of turbines. Turbine height is most likely to be the determining factor for the assessment of landscape sensitivity and is the most readily assessed. Where landscapes are assessed as having low or moderate sensitivity to turbines of that size, further consideration is given to turbine number in the commentary. The size ranges used in this assessment are set out in Table 18. The assessment does not consider domestic-scale turbines (of 11m to blade tip or less).

Table 18: Turbine categories

Category	Scale	Tip height (m)
A	Small	11 – 25
B	Small-medium	26 - 40
C	Medium	41 - 65
D	Medium-large	66 - 100
E	Large	101 – 136

Assessment process

5.22 The characteristics of each broad landscape type were assessed against each of the criteria. For each Broad Landscape Type (BLT) the assessment provides:

- a 'sensitivity profile' including commentary for that BLT;
- commentary on the sensitivity of the BLT to different turbine sizes and how that might vary spatially across the BLT;
- assessment of each Broad Character Area (BCA) or sub-area within the BLT;
- commentary on the pattern of existing development within the BLT, and on the potential for cumulative effects arising from further development.

5.23 The sensitivity profile developed for each BLT relates to its sensitivity to wind energy generally, rather than to individual size categories. In assessing the sensitivity of BLTs a range of values is given which may be broad (multiple values) or narrow (single value) depending on the character of the BLT.

5.24 The assessment of the sensitivity of BCAs and sub-areas relates to turbine size categories given in Table 18. This gives a single value for the overall sensitivity of the landscape unit to development of that size based on the categories given in Table 19. This is consistent with the majority of studies of this kind. The assessment of overall sensitivity is based on professional judgement rather than numerical scoring (reflecting current guidance) as this enables appropriate weight to be given to attributes of particular importance to some landscapes.

Table 19: Sensitivity categories

Sensitivity	Definition
Low Sensitivity (L)	The characteristics and qualities of the landscape are not generally sensitive to the effects of development of this scale. The landscape would be able to accommodate development without a significant effect on its character.
Low-moderate Sensitivity (LM)	Few of the characteristics and qualities of the landscape are sensitive to the effects of development of this scale. The landscape would be likely to be able to accommodate development without a significant effect on its character.
Moderate Sensitivity (M)	Some of the characteristics and qualities of the landscape are sensitive to the effects of development of this scale. The landscape would be likely to be able to accommodate development without a significant effect on its character.
Moderate-high Sensitivity (MH)	Many of the characteristics and qualities of the landscape are sensitive to the effects of development of this scale. The landscape would be unlikely to be able to accommodate development without a significant effect on its character.
High Sensitivity (H)	Many of the characteristics and qualities of the landscape are sensitive or highly sensitive to the effects of development of this scale. The landscape would not be able to accommodate such development without a significant effect on its character.

5.25 The assessment was carried out initially as a desk-top and GIS map-based exercise using information from the CDLCA, the County Durham Landscape Database and other relevant datasets and documentary evidence including the following.

- OS Digital Mapping
- OS Terrain 5m contours
- OS Aerial photography (2001, 2010, 2015)
- ESRI World Imagery aerial photography
- Durham Cathedral and Castle World Heritage Site Management Plan (Draft 2016)
- County Durham and Darlington Historic Landscape Characterisation
- GIS Viewshed Analysis to Identify Zones of Potential Visual Influence on Protected Landscapes (Natural England 2013) - report and ESRI Geodatabase
- GIS data
    - Conservation areas
    - Listed buildings
    - Scheduled Monuments
    - Wind turbines
    - Parks and Gardens of Special Interest
    - Parks and Gardens of Local Interest
    - Areas of High Landscape Value
    - Durham Heritage Coast
    - North Pennines AONB

5.26 The assessments were qualified in the field in a series of site visits carried out in 2015 to verify preliminary judgements relating to visual matters and particularly inter-visibility with other landscapes and heritage assets.

Cumulative effects

5.27 The commentary on cumulative effects for each BLT was informed by the analysis contained in section 4 of this evidence paper.

Sensitivity maps

5.28 The results of the assessment are mapped by size category in Figures 64 to 68.

Landscape Sensitivity Assessment

North Pennines County Character Area

BLT1 Moorland ridges & Summits

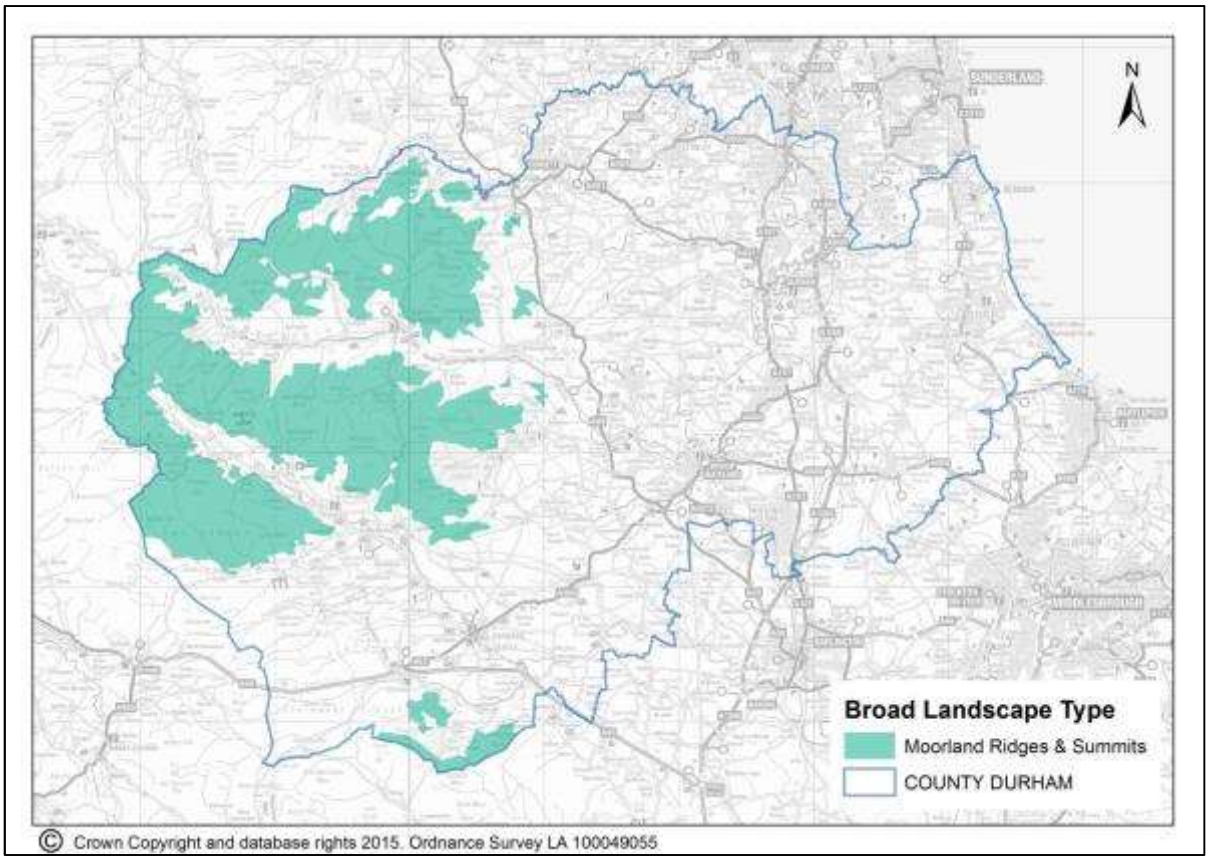

Figure 22: Map of BLT1 Moorland ridges & Summits

5.29 Key Characteristics

- Broad divided ridges and high flat-topped summits.
- A strong horizontal grain to the topography.
- Grits and limestones outcrop locally in low grey crags and stone bands.
- Hard igneous dolerites outcrop in larger crags and scree slopes.
- Rocky, quick flowing becks or burns in steep sided gullies.
- Extensive tracts of blanket bog of heather, cotton grass and sphagnum mosses.
- Deep peat exposed in eroded hags and peat edges.
- Drier slopes clothed in upland heath of heather and bilberry or acid grasslands.
- Extensive grazing by hardy hill sheep.
- Burning patterns on grouse moors create a patchwork of older and younger heather.

- Few man made features other than occasional fences, grouse butts, cairns and sheepfolds.
- Unfenced roads marked by snow poles with gates or cattle-grids at the moor wall.
- Relics of lead mining - bell pits, hushes, waste heaps, railways, reservoirs and water leats, smelter flues and chimneys.
- Panoramic long distance views out across unbroken moorlands or adjoining dales.
- A remote and elemental landscape with a near wilderness quality in places.

Table 19: Sensitivity profile BLT1 Moorland ridges & Summits

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform		**Low-moderate**	**Moderate**		
	Large scale landform of broad divided ridges and flat topped summits.				
Landcover		**Low-moderate**	**Moderate**		
	A large scale landscape with relatively consistent landcover in muted mosaics of grass and heather moorland. Small scale features are generally absent.				
Visibility and views				**Moderate-high**	**High**
	A visually very open landscape with deep panoramic views across adjoining dales and shallower panoramic views across sequential ridges. High levels of inter-visibility throughout and between character areas. Together with the Moorland Fringe and Moorland Plateau LCTs forms the backdrop of views within enclosed dales and upland fringe LCTs to the east.				
Skylines				**Moderate-high**	**High**
	Prominent open skylines for the most part wholly undeveloped. Vertical elements almost entirely absent: very occasional masts, service poles and roadside snow poles. Sweeping skylines with very few arresting focal points or landmark features.				
Perceptual Qualities				**Moderate-high**	**High**
	A remote and elemental landscape with a near wilderness quality in places. Very tranquil. Very little movement other than natural forces.				
Scenic Qualities				**Moderate-high**	**High**
	High scenic quality. Most of the LCT is designated as AONB. Areas outside of the AONB of similar character are of similar high scenic value.				

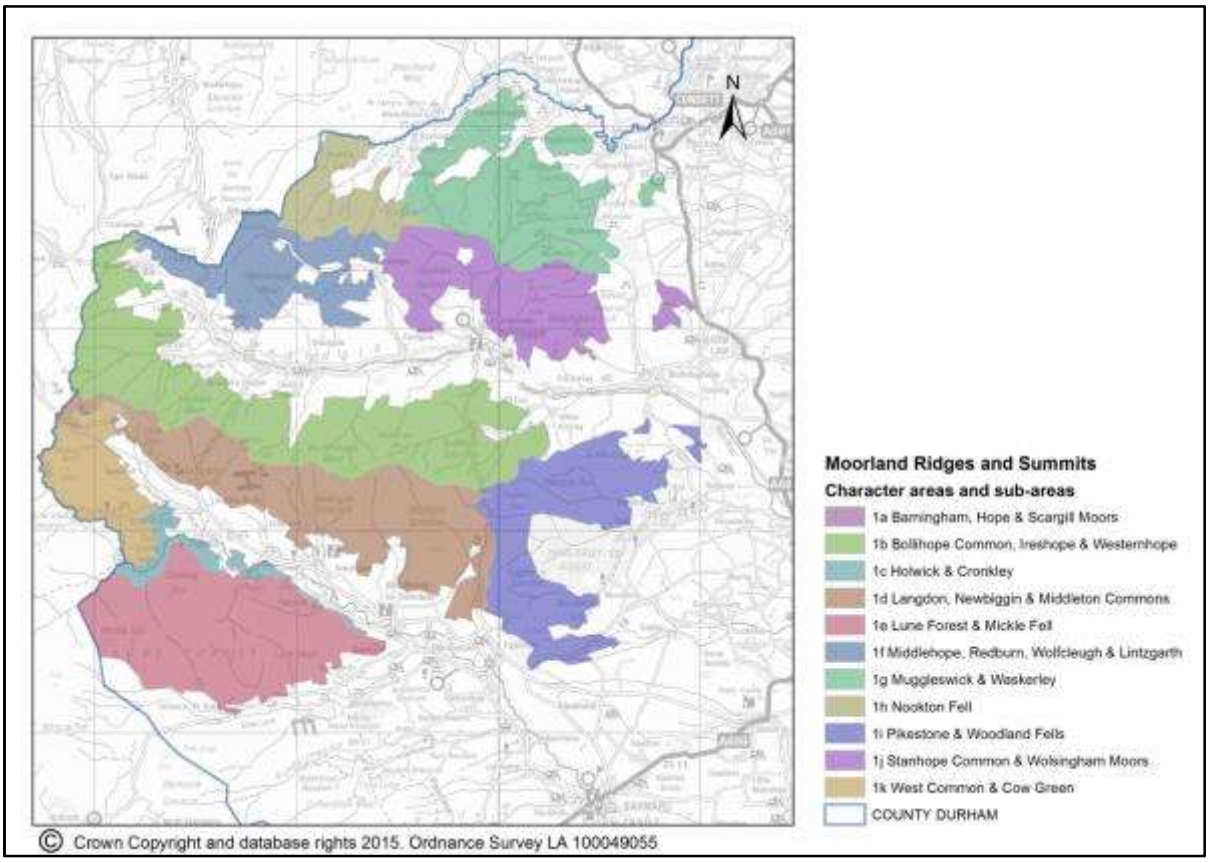

Figure 23: Map of BLT1 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.30 The remoteness and wildness of this landscape type, clean sweeping skylines lacking in focal points and tall structures, and its high scenic quality would indicate a generally high sensitivity to turbines of most scales. This would be the case for single turbines and turbines in clusters or larger arrays.

Table 20: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
1a Barningham, Hope & Scargill Moors.	H	H	H	H	H
1b Bollihope Common, Ireshope & Westernhope Moors.	H	H	H	H	H
1c Holwick & Cronkley.	H	H	H	H	H
1d Langdon, Newbiggin & Middleton Common.	H	H	H	H	H
1e Lune Forest & Mickle Fell.	H	H	H	H	H
1f Middlehope Fell, Redburn, Wolfcleugh & Lintzgarth.	H	H	H	H	H
1g Muggleswick & Waskerley.	H	H	H	H	H
1h Nookton Fell.	H	H	H	H	H
1i Pikestone & Woodland Fells.	H	H	H	H	H
1j Stanhope Common & Wolsingham Moors.	H	H	H	H	H

1k West Common & Cow Green.	H	H	H	H	H

Existing development and cumulative effects

Table 21: Operational and permitted turbines in BLT1

BLT1 Moorland ridges & Summits	Category				
	A	B	C	D	E
Operational and permitted turbines	0	0	0	0	0

5.30 There are currently no wind turbines of the scales being assessed within this LCT. There are a small number of micro-turbines (<11.1m) associated with isolated building. This is a-typical of this LCT where buildings are generally absent.

5.31 Wind turbines within neighbouring LCTs are visible in places. Large wind turbines in the northern uplands of the West Durham Coalfield are notable features in eastward views from the northern moors and particularly the Stanhope Common & Wolsingham Moors and Muggleswick & Waskerley character areas. In some cases turbines appear in views out from the moors which take in visually complex settled landscapes. In other cases they appear in views of a more rural character and detract in varying degrees from the sense of wildness and remoteness of the moorland LCT.

5.32 Additional development of wind turbines in this area, and in particular those areas close to the moorland LCT, would further erode those characteristics. This could be avoided by maintaining strategic gaps between existing development complexes and particularly in the Browney Uplands (7b (i) Salter's Gate and 7b (ii) Rowley and Butsfield) and Central Coalfield Uplands (7c (iii) Houselop). Development of turbines of a medium scale and above would need to be avoided in those areas.

5.33 Development in areas bordering the moors to the south (1i Pikestone and Woodland fells), which are currently of a largely rural character, would extend this erosion of the sense of remoteness in the eastern moors further. This could be avoided by not developing turbines of a medium scale and larger in areas close to the moorland LCT and particularly the Moorland Fringe LCT (3c Hamsterley) and the Coalfield Upland Fringe LCT (7d Upper Bedburn and Harthope and 7e Southern Coalfield Uplands).

BLT2 Moorland Plateau

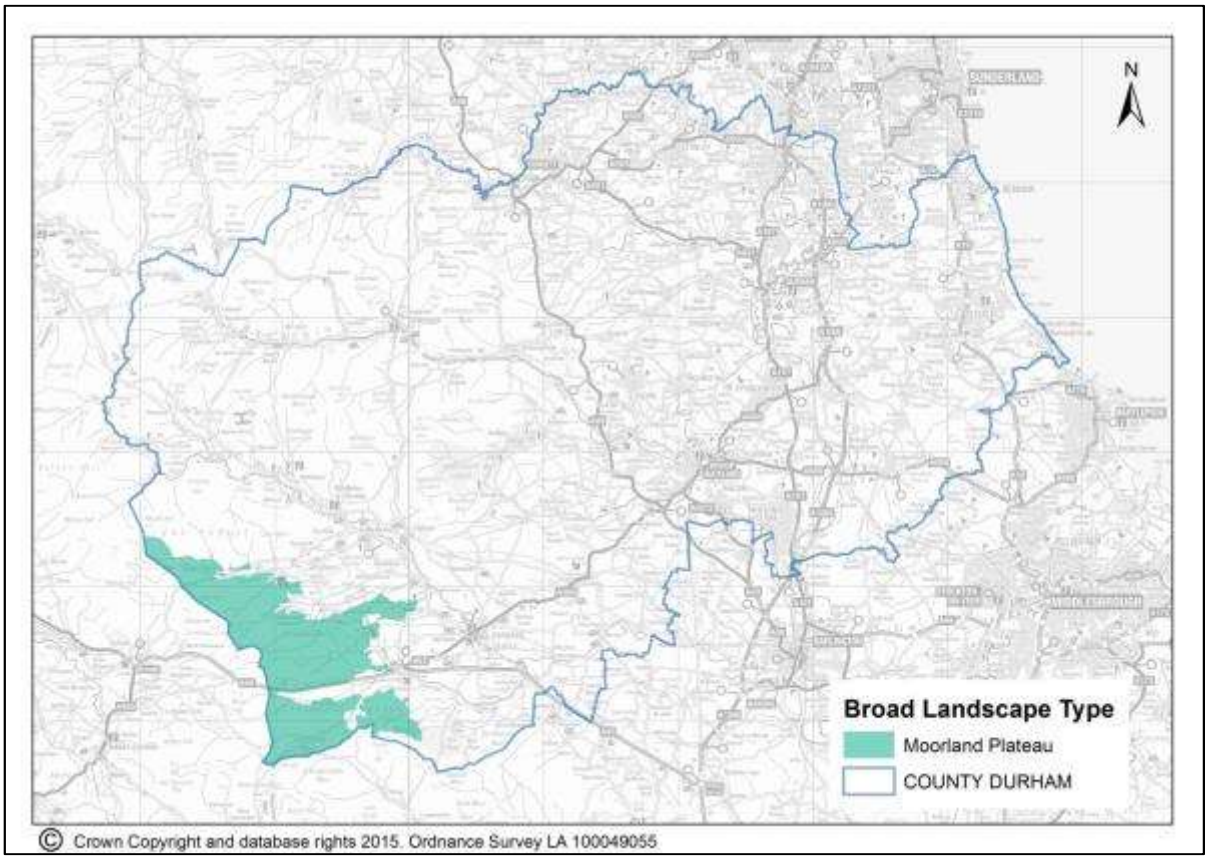

Figure 24: Map of BLT2 Moorland Plateau

5.33 Key Characteristics

- High moorland plateau.
- Gently rolling, almost flat, terrain cut into by steep sided gullies.
- Occasional small, low, flat-topped, summits.
- Carboniferous rocks masked by deep peat which is exposed in eroded hags and peat edges.
- Millstone grits outcrop locally in summits, gullies and stone bands.
- Continuous blanket bog of heather, cotton grass and sphagnum mosses.
- Upland heath and acid grassland in drier moorland fringes.
- Extensive grazing by hardy hill sheep.
- Burning patterns on grouse moors create a patchwork of older and younger heather.
- Few man made features other than occasional fences, grouse butts, cairns and sheepfolds.
- A remote and inaccessible landscape with few roads or tracks.

- A broad scale landscape with long distance views across open moorland to distant summits.
- An exposed, elemental and simple, often bleak, landscape with a near wilderness quality.

Table 22 Sensitivity profile of BLT2 Moorland Plateau

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform		**Low-moderate**	**Moderate**	**Moderate high**	
	Large scale landform of open flat plateau with occasional discrete flat-topped landmark summits.				
Landcover		**Low-moderate**	**Moderate**		
	A large scale landscape with relatively consistent landcover in muted mosaics of grass and heather moorland. Small scale features are generally absent.				
Visibility and views				**Moderate-high**	**High**
	A visually very open landscape with shallower panoramic views across the plateau to higher ground of Moorland Ridges and Summits LCT to the north and south and the distant ridges of upland fringes to the east. High levels of inter-visibility throughout and between character areas. Forms a low moorland backdrop in views from the north and upland fringe LCTs to the east.				
Skylines				**Moderate-high**	**High**
	Prominent open skylines for the most part wholly undeveloped. Vertical elements almost entirely absent: very occasional masts service poles and roadside snow poles. Sweeping skylines with very few arresting focal points or landmark features.				
Perceptual Qualities				**Moderate-high**	**High**
	A remote and elemental landscape with a near wilderness quality in places. Very tranquil. Very little movement other than natural forces. Locally affected by busy A66.				
Scenic Qualities				**Moderate-high**	**High**
	High scenic quality. All of the LCT is designated as AONB. Areas outside of the AONB of similar character are of similar high scenic value.				

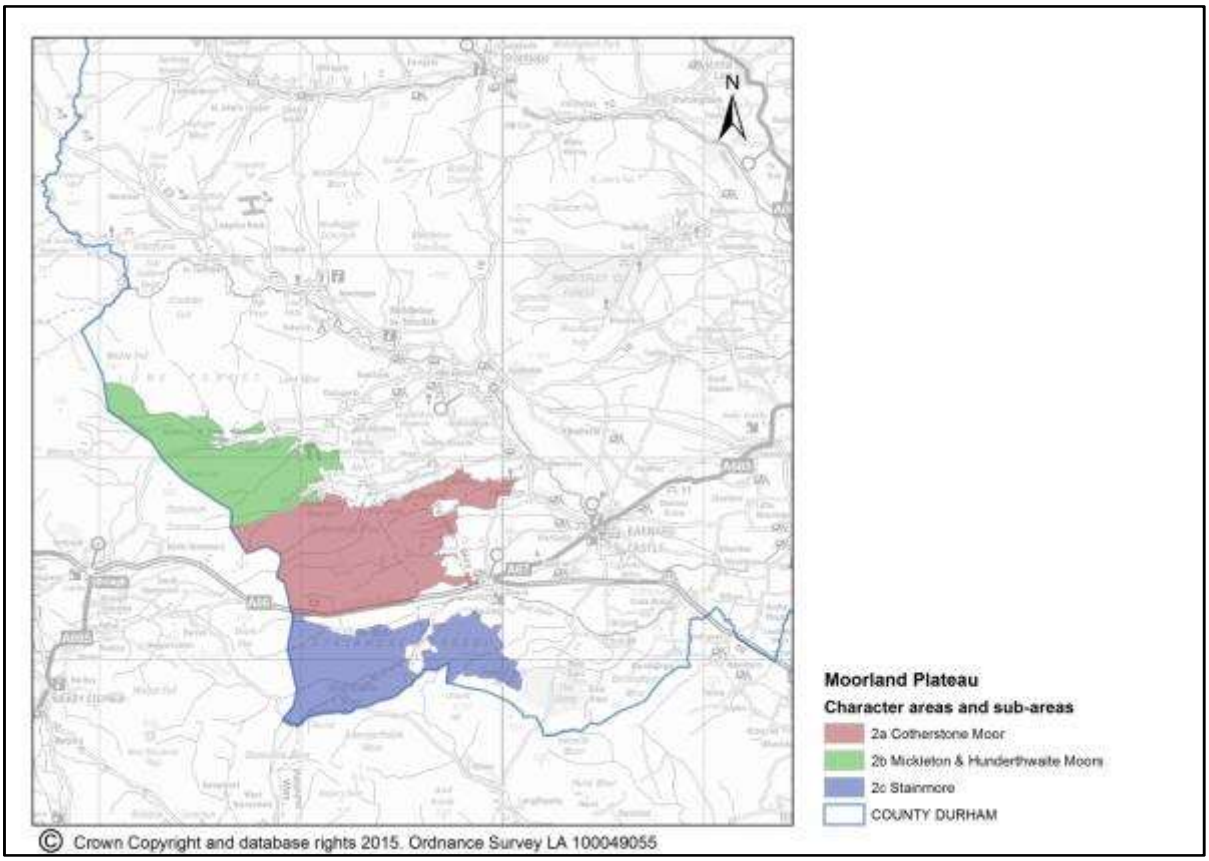

Figure 25: Map of BLT2 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.34 The remoteness and wildness of this landscape type, clean sweeping skylines lacking in focal points and tall structures, and high scenic quality would indicate a generally high sensitivity to turbines of most scales. This would be the case for single turbines and turbines in clusters or larger arrays.

Table 23: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
2a Cotherstone Moor.	H	H	H	H	H
2b Mickleton and Hunderthwaite Moors.	H	H	H	H	H
2c Stainmore.	H	H	H	H	H

Existing development and cumulative effects

Table 24: Operational and permitted turbines in BLT2

BL2 Moorland Plateau	Category				
	A	B	C	D	E
Operational and permitted turbines	0	0	0	0	0

5.35 There are currently no wind turbines within this LCT and little visibility of turbines in adjacent LCTs. The Moorland Plateau LCT is particularly vulnerable to the effects of

development of turbines of larger scales in neighbouring LCTS due to the relatively flat topography and visual openness which leads to high levels of inter-visibility. Development of turbines in even modest numbers in neighbouring LCTs could lead to significant cumulative effects.

BLT3 Moorland Fringe

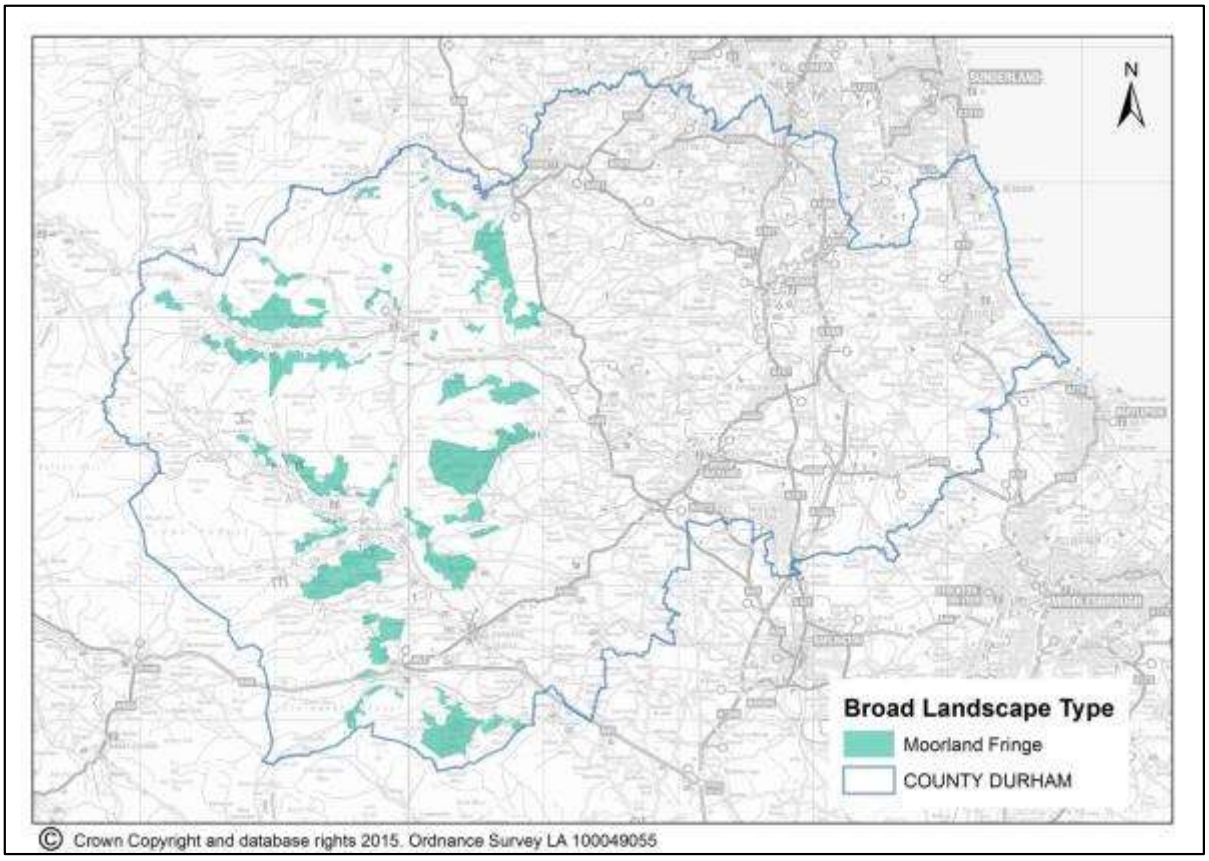

Figure 26: Map of BLT3 Moorland Fringe

5.36 Key Characteristics

- Upland landscape of improved moorland fringes, intakes and allotments.
- Varied topography including valleys and upper dale sides.
- Carboniferous rocks bare of drift or covered by boulder clays.
- Hard igneous dolerites outcrop locally in low crags.
- Shallow, infertile or waterlogged peaty soils.
- Wet, rushy pastures, rough grazing and enclosed moorland.
- Large regular fields bounded by low stone walls and wire fences.
- Isolated farms connected by straight roads.
- Scattered conifer plantations and shelterbelts - occasional large tracts of commercial forestry.
- Relics of the lead mining industry – mine buildings, waste heaps, smelter flues, reservoirs and hushes.
- Visually open and often broad in scale with extensive views across adjacent dales and moors.

- A remote and tranquil landscape on the margins of settlement and agriculture.

Table 25 Sensitivity profile of BLT3 Moorland Fringe

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform		**Low-moderate**	**Moderate**	**Moderate high**	
	Varied but typically large scale landform of moderate or steeply sloping valley sides and plateaux with some incised gills, steeper bluffs and discrete hills.				
Landcover		**Low-moderate**	**Moderate**		
	A large scale landscape with relatively consistent landcover in broad muted patchworks of improved and rough pasture. Locally afforested or with blocky plantations. Small scale features are generally sparse.				
Visibility and views			**Moderate**	**Moderate-high**	**High**
	Other than in afforested areas a visually very open landscape with deep panoramic views across adjoining dales and shallower panoramic views across moorland ridges. High levels of inter-visibility with dales and moorland LCTs. Together with the Moorland LCTs forms the backdrop of views within enclosed dales.				
Skylines		**Low-moderate**	**Moderate**	**Moderate-high**	
	Skylines occasionally prominent but generally formed by adjacent moorland LCTS. Some vertical elements including masts and service poles but these are generally sparse. A variable landscape which may contain few or multiple focal points.				
Perceptual Qualities			**Moderate**	**Moderate-high**	
	A generally remote and tranquil landscape. Little movement other than natural forces, agricultural activities and traffic on minor roads.				
Scenic Qualities				**Moderate-high**	**High**
	Moderate or high scenic quality but generally forming part of wider views of high scenic quality. Much of the LCT is designated as AONB. Areas outside of the AONB lie within areas identified in past development plans as AHLV.				

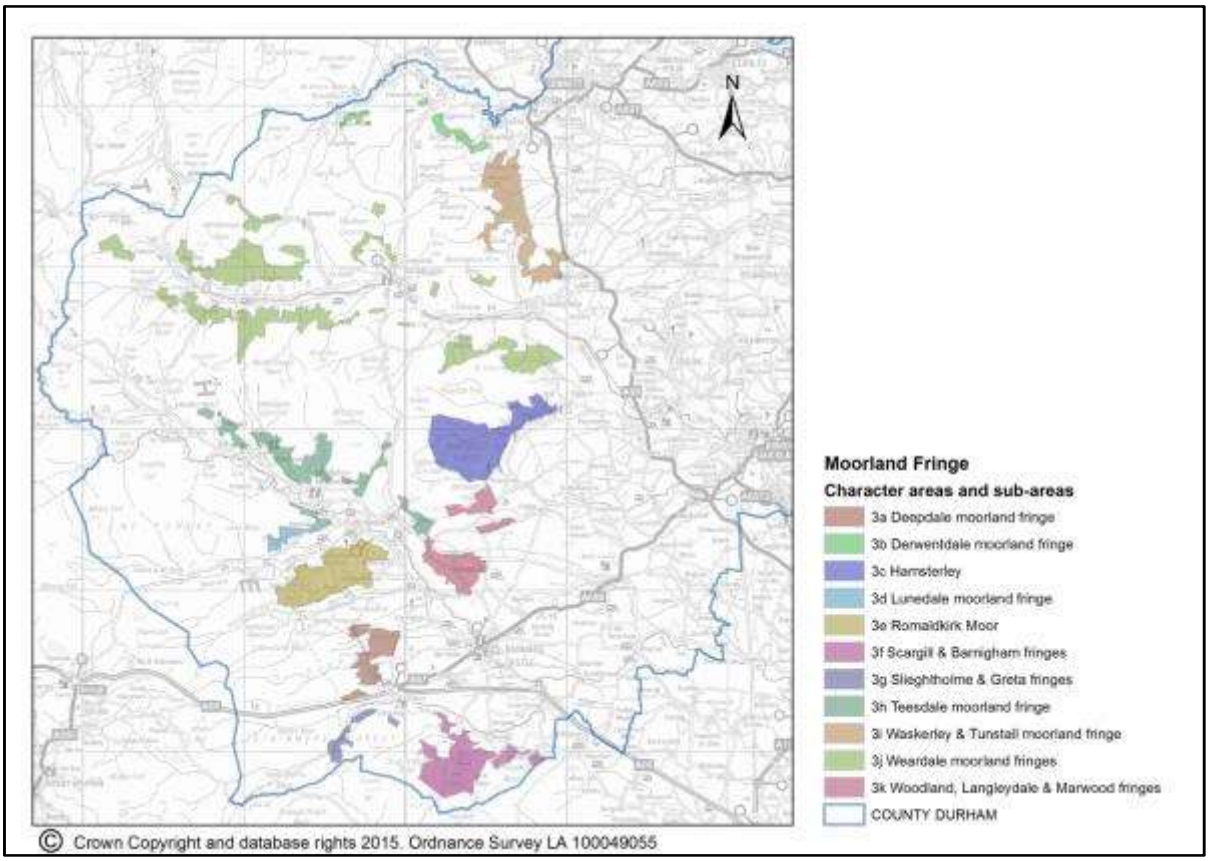

Figure 27: Map of BLT3 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.37 Some of the characteristics of the LCT would indicate a moderate sensitivity to turbines of most scales but its relationship with, and high levels of inter-visibility with, adjacent moorland landscapes gives it a higher sensitivity. It is generally experienced as part of views of high scenic quality within the AONB. This would be the case for both single turbines and turbines in clusters or larger arrays.

5.38 Parts of the LCT, and particularly areas where farmsteads and plantations are present, are of moderate sensitivity to small turbines if they are developed in close visual association with those elements. Localised parts of some LCAs – particularly small incursions into higher sensitivity moorland landscapes – will be of higher sensitivity. Small turbines typically occur as single features: sensitivity to groups or arrays of smaller turbines would be higher.

Table 26: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
3a Deepdale Moorland fringe.	M	MH	H	H	H
3b Derwentdale Moorland fringe.	M	MH	H	H	H
3c Hamsterley.	M	MH	H	H	H
3d Lunedale moorland fringe.	M	MH	H	H	H
3e Romaldkirk Moor.	M	MH	H	H	H

3f Scargill and Barningham fringe.	M	MH	H	H	H
3g Sleightholme & Greta Moorland Fringes.	M	MH	H	H	H
3h Teesdale moorland fringes.	M	MH	H	H	H
3i Waskerley & Tunstall Moorland fringe.	M	MH	H	H	H
3j Weardale Moorland fringes.	M	MH	H	H	H
3k Woodland, Langleydale and Marwood fringes.	M	MH	H	H	H

Existing development and cumulative effects

Table 27: Operational and permitted turbines in BLT3

BLT3 Moorland Fringe	Category				
	A	B	C	D	E
Operational and permitted turbines	6	0	0	0	0

5.39 There are a number of small turbines scattered across this LCT associated with individual farmsteads. These currently do not have significant cumulative effects. It is unlikely that significant cumulative effects would arise unless there was a substantial increase in the deployment of turbines of this scale.

5.40 Wind turbines within neighbouring LCTs are visible in places. Large wind turbines in the northern uplands of the West Durham Coalfield are visible in some eastward views from the Derwentdale Moorland Fringe (3b) and Waskerley and Tunstall Moorland Fringe (3i) but often concealed by topography and the cumulative effect is currently low.

BLT4 Upper Dale

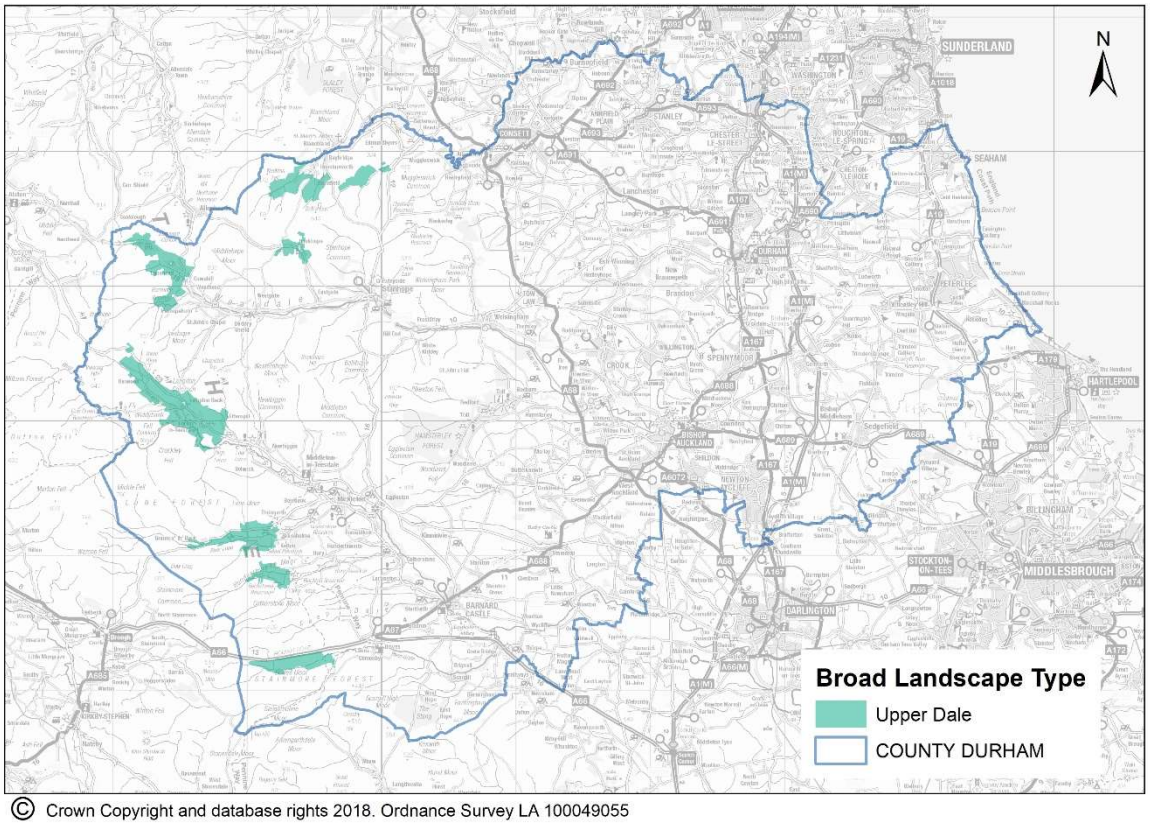

Figure 28: Map of BLT4 Upper Dale

5.41 Key Characteristics

- Upper reaches of the Pennine dales.
- Varied valley topography.
- Carboniferous rocks bare of drift or covered by glacial boulder clays.
- Fast flowing rocky streams.
- Shallow, infertile or waterlogged soils.
- Wet rush pastures, upland hay meadows and rough grazing in the moorland fringes.
- Regular field patterns of dry stone walls. Scattered field barns.
- Few trees or woodlands – occasional concentrations of conifer plantations.
- Scattered small farms with occasional farm clusters and hamlets.
- Relics of the lead mining industry – mine buildings, waste heaps, smelter flues, reservoirs and hushes.
- Major reservoirs in some dales.
- Visually open but enclosed by encircling moorland ridgelines.

- Remote and tranquil landscapes on the margins of settlement and agriculture

Table 28 Sensitivity profile of BLT4 Upper Dale

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform		**Low-moderate**	**Moderate**	**Moderate high**	
	Varied but typically moderately sloping medium scale valley heads. Locally modified by reservoirs. Occasional discrete landforms such as Drumlins.				
Landcover		**Low-moderate**	**Moderate**	**Moderate-high**	
	A large scale landscape with relatively consistent landcover in broad muted patchworks of improved and rough pasture. Locally afforested or with blocky plantations. Small scale features – trees and traditional farm buildings – are generally sparse but locally notable.				
Visibility and views			**Moderate**	**Moderate-high**	**High**
	Other than in localised wooded areas a visually open landscape with deep views along the dale and of rising dale-sides. Generally high levels of inter-visibility with middle dale and moorland LCTs. Widely overlooked from encircling higher ground in open near and middle distance views.				
Skylines		**Low-moderate**	**Moderate**	**Moderate-high**	**High**
	Skylines generally formed by adjacent moorland LCTs. Some vertical elements including masts and service poles but these are generally sparse. A variable landscape which may contain few or multiple focal points.				
Perceptual Qualities			**Moderate**	**Moderate-high**	**High**
	A generally remote and tranquil landscape. Little movement other than natural forces, agricultural activities and traffic on minor roads. One LCA locally affected by busy A66.				
Scenic Qualities				**Moderate-high**	**High**
	Typically high scenic quality and forming part of wider views of high scenic quality. All of the LCT is designated as AONB.				

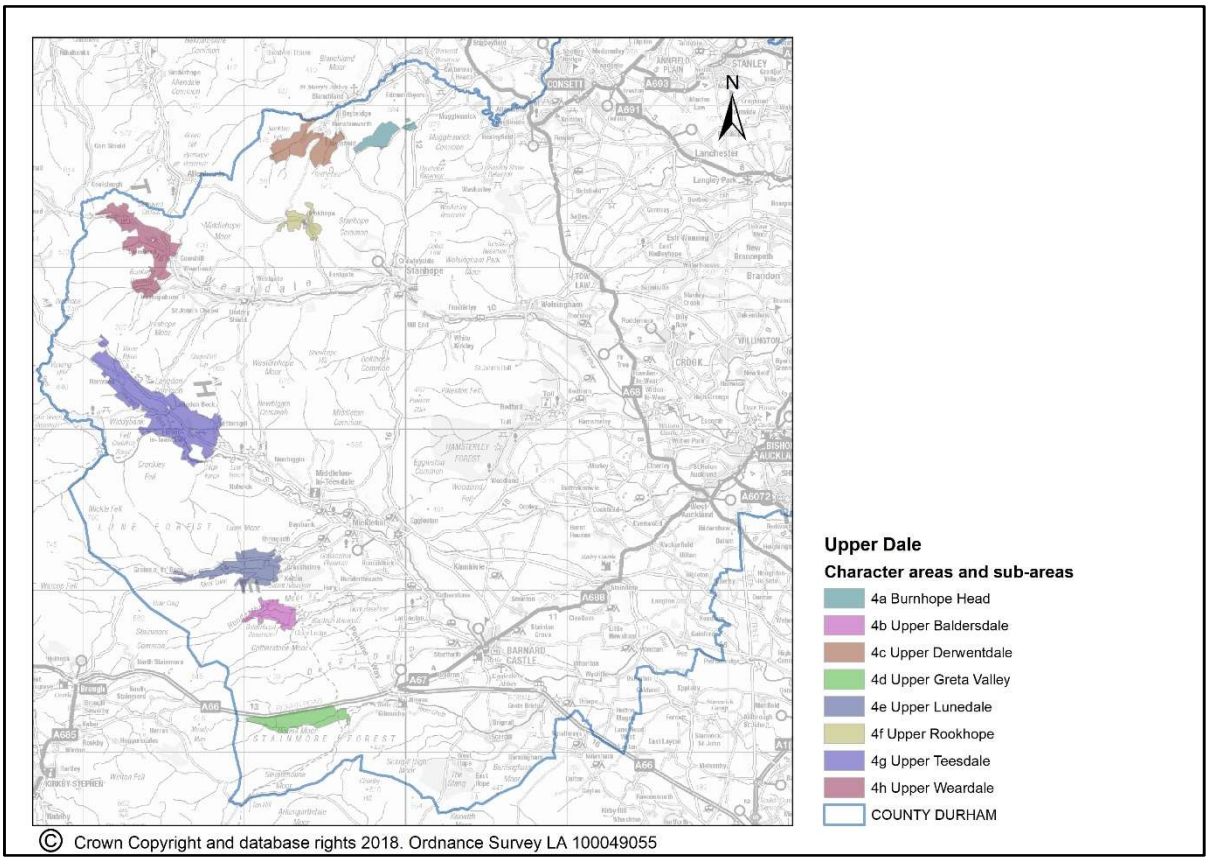

Figure 29: Map of BLT4 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.42 Most of the attributes of this landscape would indicate a moderate-high or high sensitivity to wind turbines of most scales. Inter-visibility is also generally high with higher sensitivity moorland landscapes. This would be the case for both single turbines and turbines in clusters or larger arrays.

5.43 Sensitivity to small turbines would be moderate- high, and particularly for turbines towards the upper part of that range. Sensitivity to turbines towards the lower end of the range and micro turbines would be moderate and particularly areas where farmsteads and plantations were present and turbines of that scale could be developed in close visual association with those elements. Small turbines typically occur as single features: sensitivity to groups or arrays of smaller turbines would be higher.

Table 29: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
4a Burnhope Head.	MH	H	H	H	H
4b Upper Baldersdale.	MH	MH	H	H	H
4c Upper Derwentdale.	MH	MH	H	H	H
4d Upper Greta Valley.	MH	H	H	H	H
4e Upper Lunedale.	MH	MH	H	H	H

4f Upper Rookhope	MH	MH	H	H	H
4g Upper Teesdale.	MH	H	H	H	H
4h Upper Weardale.	M	MH	H	H	H

Existing development and cumulative effects

Table 30: Operational and permitted turbines in BLT4

BLT4 Upper Dale	Category				
	A	**B**	**C**	**D**	**E**
Operational and permitted turbines	2	0	0	0	0

5.44 There are two small turbines (both just into this size range at <12m high) and five micro-turbines (<11m) scattered across this LCT associated with individual farmsteads. These currently do not have significant cumulative effects. It is unlikely that significant cumulative effects would arise unless there was a substantial increase in the deployment of turbines of this scale.

BLT5 Middle Dale

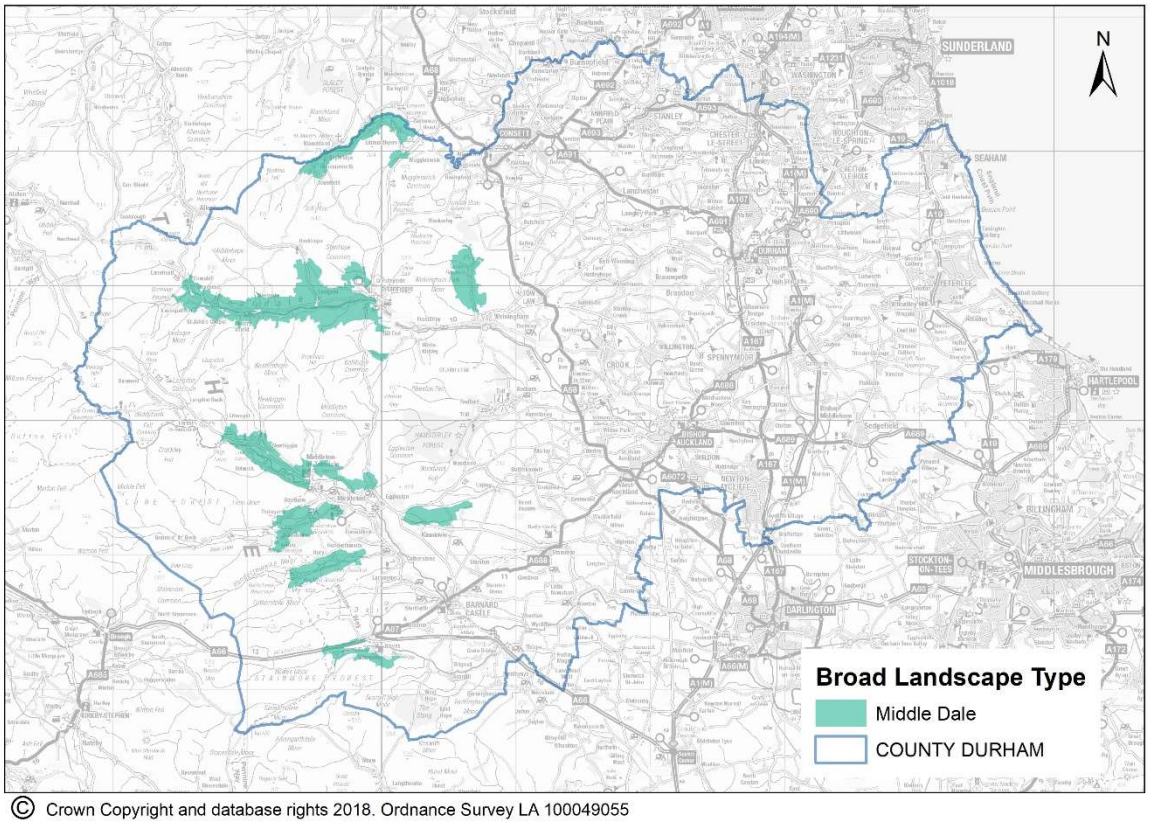

Figure 30: Map of BLT5 Middle Dale

5.45 Key Characteristics

- Broad upland valleys with moderately sloping, often gently stepped valley sides, incised by narrow steep-sided gills.
- Carboniferous rocks overlain on lower slopes by boulder clays. Hard igneous dolerites outcrop locally in prominent scars.
- Narrow floodplains of alluvium or glacial sands and gravels.
- Rocky fast flowing rivers and streams.
- Heavy, often waterlogged, clay soils with more fertile brown earths on valley floors.
- Improved and semi-improved pastures and flower-rich upland hay meadows.
- Strong regular or sub-regular patterns of dry stone walls with occasional ash, oak and sycamore field trees.
- Sparsely wooded. Narrow ash and oak-birch woodlands along rivers and streams and dale side gills. Scattered plantations of pine, larch or spruce.
- Small villages, hamlets and farm clusters follow valley floor roads – scattered farms and field barns on the dale side. Buildings of local stone with roofs of stone flag or slate.

- Active and abandoned limestone and whinstone quarries prominent on the dale side.
- Relics of the lead mining industry – mine buildings, waste heaps, smelter flues, reservoirs and hushes.
- Major reservoirs in some dales.
- Visually open but enclosed by encircling moorland ridgelines.
- Settled tranquil upland landscapes with a strong sense of cultural continuity.

Table 31 Sensitivity profile BLT5 Middle Dale

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform			**Moderate**	**Moderate high**	
	Varied but typically moderately sloping medium to broad scale valleys with occasional steep bluffs and incised gills. Locally modified by reservoirs and by quarrying.				
Landcover			**Moderate**	**Moderate-high**	**High**
	A landscape of small and medium sized fields in regular patterns although often appearing more irregular under the influence of topography. Relatively consistent landcover of improved and semi-improved pasture interrupted by blocky plantations of linear gill and riverside woods. Small scale features – field trees and traditional farm buildings - are generally abundant.				
Visibility and views			**Moderate**	**Moderate-high**	**High**
	Other than in localised wooded areas a visually open landscape with deep views along the dale and of rising dale-sides. Generally high levels of inter-visibility with upper and lower dale, moorland fringe and moorland LCTs. Widely overlooked from higher ground in open near and middle distance views.				
Skylines		**Low-moderate**	**Moderate**	**Moderate-high**	
	Skylines generally formed by adjacent moorland LCTs. Some vertical elements including masts and service poles but these are relatively sparse. A variable landscape which may contain relatively few or multiple focal points.				
Perceptual Qualities			**Moderate**	**Moderate-high**	
	A relatively remote and tranquil landscape with a strong sense of cultural continuity coming from an historic settlement pattern of small villages and farmsteads. In minor dales there is little movement other than natural forces, agricultural activities and traffic on minor roads. Locally affected by traffic on busier roads in the main dales.				
Scenic Qualities				**Moderate-high**	**High**
	Typically high scenic quality and forming part of wider views of high scenic quality. Much of the LCT is designated as AONB. Areas outside of the AONB lie within areas identified in past development plans as AHLV.				

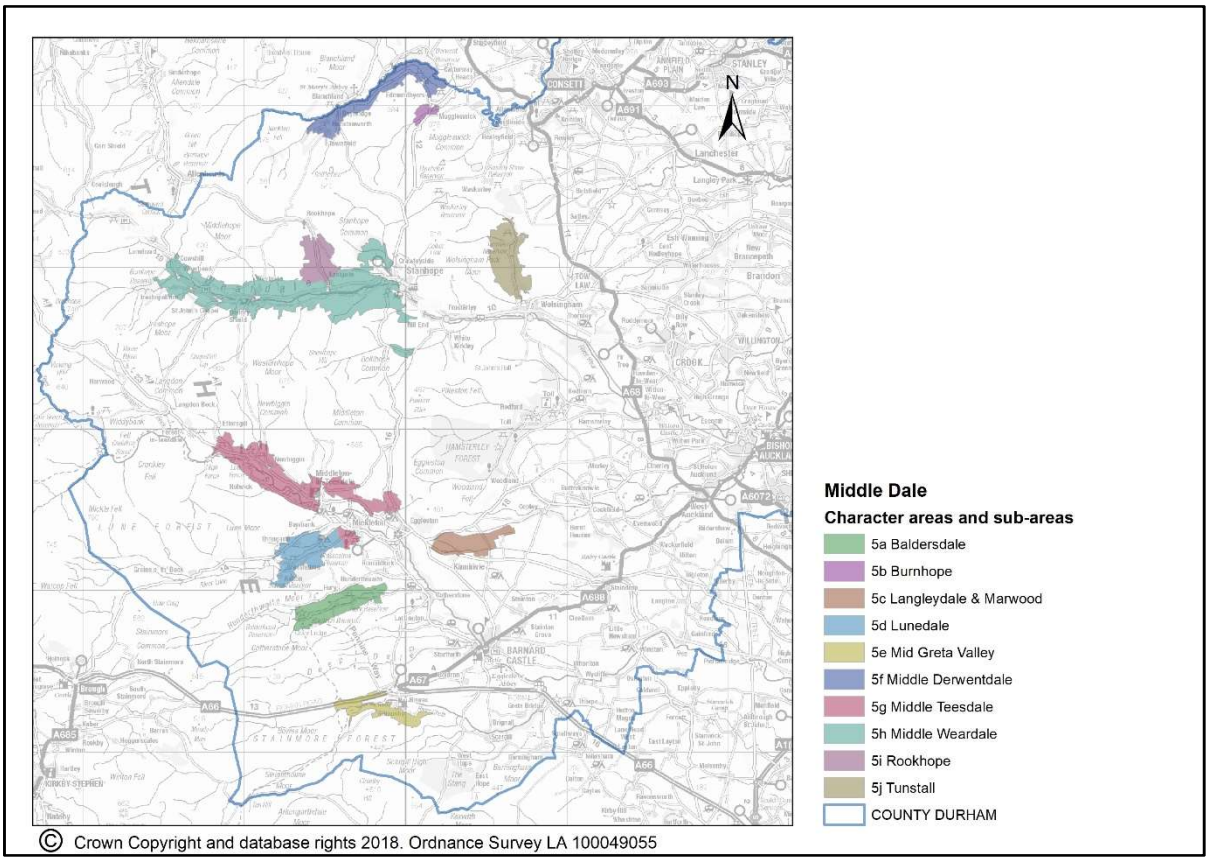

Figure 31: Map of BLT5 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.46 Most of the attributes of this landscape would indicate a moderate-high or high sensitivity to wind turbines of most scales. Inter-visibility is also generally high with higher sensitivity moorland landscapes. This would be the case for both single turbines and turbines in clusters or larger arrays.

5.47 Sensitivity to small turbines would be moderate and particularly for turbines towards the lower end of the size range in areas where farmsteads and plantations were present and turbines of an appropriate scale could be developed in close visual association with those elements. Sensitivity to turbines towards the higher end of the size range would in many cases be higher. Small turbines typically occur as single features: sensitivity to groups or arrays of smaller turbines would be higher.

Table 32: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
5a Baldersdale.	M	MH	H	H	H
5b Burnhope.	M	MH	H	H	H
5c Langleydale & Marwood.	M	MH	H	H	H
5d Lunedale.	M	MH	H	H	H
5e Mid Greta Valley.	M	MH	H	H	H

5f Mid Derwentdale.	M	MH	H	H	H
5g Mid Teesdale.	M	MH	H	H	H
5h Mid Weardale.	M	MH	H	H	H
5i Rookhope.	M	MH	H	H	H
5j Tunstall.	M	MH	H	H	H

Existing development and cumulative effects

Table 33: Operational and permitted turbines in BLT5

BLT5 Middle Dale	Category				
	A	B	C	D	E
Operational and permitted turbines	10	0	0	0	0

5.48 There are a few small turbines and micro-turbines scattered across this LCT associated with individual farmsteads. The majority of the small turbines (6) are towards the lower end of the size range (11-15m) with 4 in the 18-20m size range. These currently do not have significant cumulative effects. It is unlikely that significant cumulative effects would arise unless there was a substantial increase in the deployment of turbines of this scale.

BLT6 Lower Dale

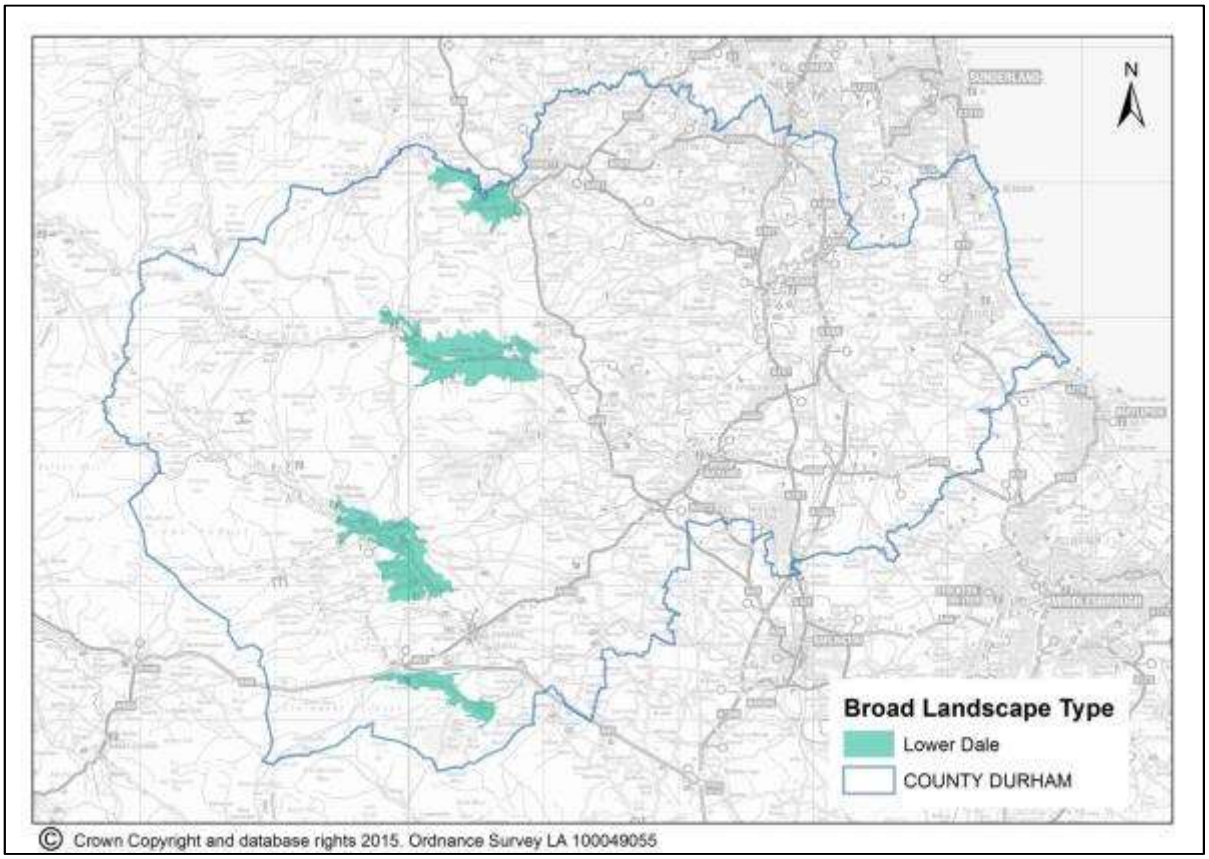

Figure 32: Map of BLT6 Lower Dale

5.49 Key Characteristics

- Broad valleys with narrow floodplains or gorges on the valley floor.
- Winding, rocky fast flowing rivers.
- Carboniferous rocks covered by glacial drift, river gravels or alluvium.
- Limestones, sandstones and shales outcrop occasionally on the sides of gorges and dale side quarries.
- Heavy clay soils with more fertile brown earths and alluvial soils on the dale floor.
- Pastoral farmland of improved and semi-improved pastures.
- Old field systems with sub regular or linear patterns of hedges and walls.
- Relics of rig and furrow, and cultivation terraces.
- Frequent hedgerow oak, ash, sycamore and wych elm, tree lined watercourses and overgrown hedgerows.

- Ancient ash and oak woods in gorges and denes.
- Old villages of vernacular sandstone buildings on the dale floor.
- Scattered stone farmsteads and field barns.
- Limestone quarries are locally prominent on the dale side.
- Visually enclosed by woodlands, trees and hedgerows and defined by high moorland ridgelines.

Table 34 Sensitivity profile of BLT6 Lower Dale

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform		**Low-moderate**	**Moderate**	**Moderate high**	**High**
	Varied but typically moderately sloping medium to broad scale valleys with occasional steep bluffs and incised gills and gorges. Locally modified by quarrying.				
Landcover			**Moderate**	**Moderate-high**	**High**
	A landscape of small and medium sized fields in sub-regular patterns. Relatively consistent landcover of improved and semi-improved pasture interrupted by linear gill and riverside woods. Small scale features – hedgerow and field trees and traditional farm buildings - are abundant.				
Visibility and views			**Moderate**	**Moderate-high**	**High**
	A varied visual environment with shallow views along the dale floor often filtered or enclosed by vegetation but with deeper and more open views from and of the rising dale-sides. Generally high levels of inter-visibility with middle dale, moorland fringe and moorland LCTs. Widely overlooked from higher ground in near and middle distance views. Rising dale sides form the backdrop in views of villages.				
Skylines		**Low-moderate**	**Moderate**	**Moderate-high**	**High**
	Skylines generally formed by adjacent moorland LCTs. Some vertical elements including masts and service poles but these are relatively sparse. A variable landscape which may contain multiple focal points though generally of similar character and scale.				
Perceptual Qualities			**Moderate**	**Moderate-high**	**High**
	A deeply rural and relatively tranquil landscape with a strong sense of cultural continuity coming from an historic settlement pattern of small villages and farmsteads. In minor dales little movement other than natural forces, agricultural activities and traffic on minor roads. Locally affected by traffic on busier roads in the main dales.				
Scenic Qualities				**Moderate-high**	**High**
	Typically high scenic quality and forming part of wider views of high scenic quality. Small parts of the LCT are designated as AONB. Areas outside of the AONB lie within areas identified in past development plans as AHLV. The lower dales form part of important and highly attractive 'gateway' views of the dales and AONB.				

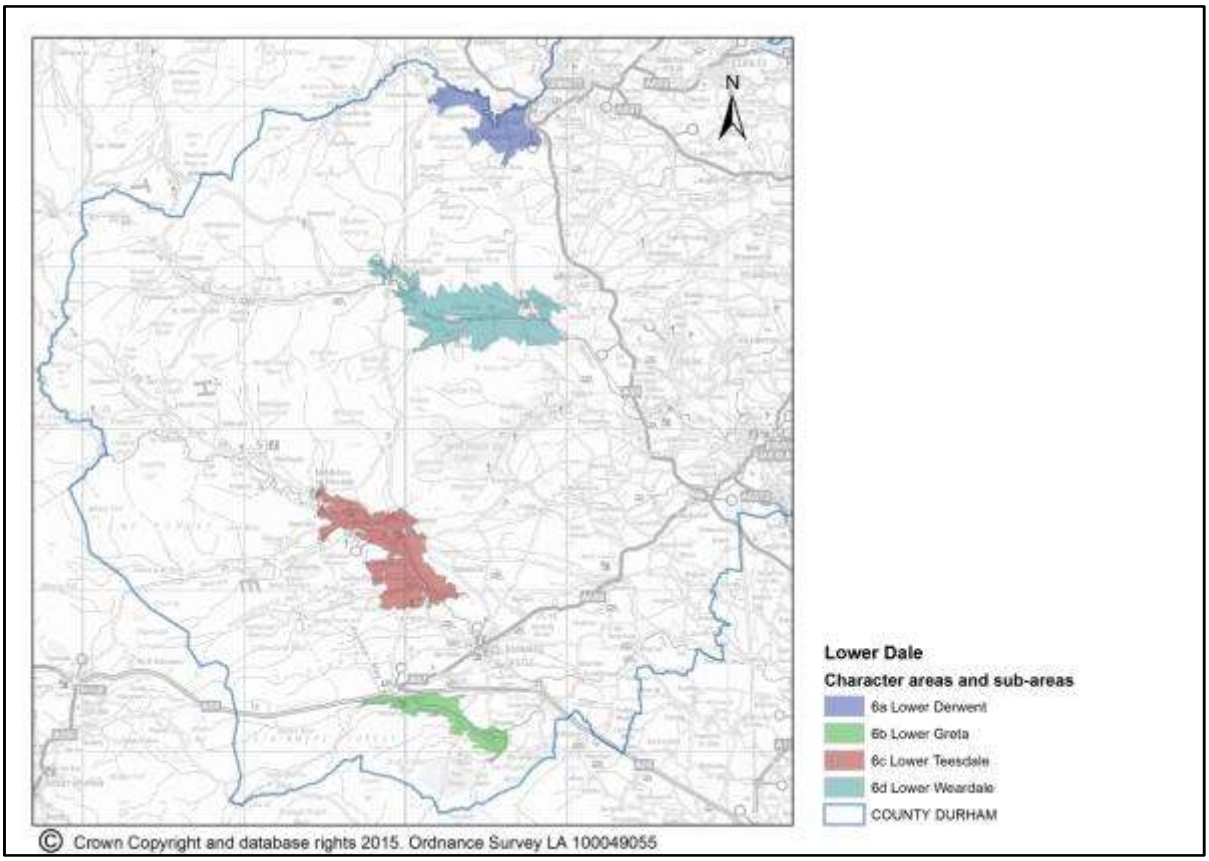

Figure 33: Map of BLT6 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.50 Most of the attributes of this landscape would indicate a moderate-high or high sensitivity to wind turbines of most scales. Inter-visibility is also generally high with higher sensitivity moorland landscapes. This would be the case for both single turbines and turbines in clusters or larger arrays.

5.51 Sensitivity to small turbines would be moderate and particularly areas where farmsteads and plantations were present and turbines of an appropriate scale could be developed in close visual association with those elements. Small turbines typically occur as single features: sensitivity to groups or arrays of smaller turbines would be higher.

Table 35: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
6a Lower Derwent.	M	MH	H	H	H
6b Lower Greta	M	MH	H	H	H
6c Lower Teesdale.	M	MH	H	H	H
6d Lower Weardale	M	MH	H	H	H

Existing development and cumulative effects

Table 36: Operational and permitted turbines in BLT6

BLT6 Lower Dale	Category				
	A	B	C	D	E
Operational and permitted turbines	1	0	0	0	0

5.52 There are currently very few small turbines and micro-turbines (<11m) scattered across this LCT associated with individual farmsteads. These do not have significant cumulative effects. It is unlikely that significant cumulative effects would arise unless there was a substantial increase in the deployment of turbines of this scale.

West Durham Coalfield County Character Area

BLT7 Coalfield Upland Fringe

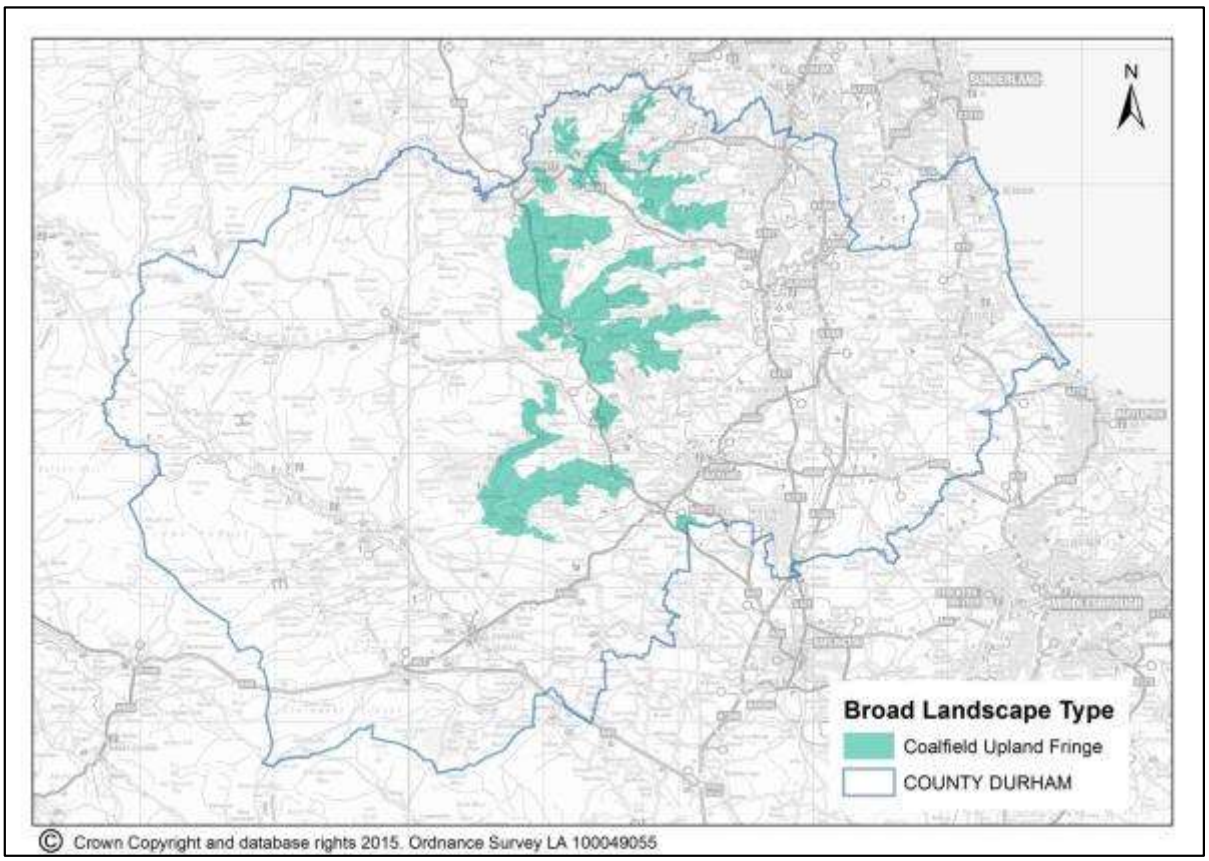

Figure 34: Map of BLT7 Coalfield Upland Fringe

5.53 Key Characteristics

- Broad ridges and shallow valley heads.
- Gently rounded topography of drift free, thinly bedded sandstones, mudstones, shales and coals.
- Occasional steep bluffs and incised denes.
- Heavy, seasonally waterlogged clay soils with pockets of peaty soils supporting heathland vegetation.
- Pastoral land use of improved or semi-improved pasture with some arable cropping on drier ridges.
- Regular grids of parliamentary enclosures bounded by dry stone walls or overgrown hawthorn hedges. Occasional older field systems.
- Few trees - scattered hedgerow oak, ash, rowan or birch.
- Sparsely wooded - scattered conifer plantations and shelterbelts.
- Isolated farms connected by straight enclosure roads – occasional old ‘green’ villages of local stone on ridge top sites.

- Scattered mining villages of stone and brick and occasional larger towns.
- Occasional relics of the mining industry including small spoil heaps, coke ovens and waggonways.
- Telecommunications masts and wind turbines prominent on some ridges.
- Extensive areas of restored opencast land – often open and relatively featureless.
- A visually open landscape with commanding views across adjacent valleys to distant ridges.

Table 37: Sensitivity profile of BLT7 Coalfield Upland Fringe

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform	**Low**	**Low-moderate**	**Moderate**		
	Broad ridges and valley heads. Simple rolling topography. Some localized steeper bluffs with defined edges.				
Landcover		**Low-moderate**	**Moderate**		
	A largely pastoral landscape of improved or semi-improved pasture with some arable cropping in regular patterns. In rural areas the landcover is relatively consistent with broad tracts of similar character. There are locally frequent small scale features such as hedgerow trees and traditional farm and domestic buildings both dispersed and in small villages. In more heavily settled areas the pattern of landcover is more coarse, complex and varied with multiple focal points.				
Visibility and views			**Moderate**	**Moderate-high**	
	A visually open landscape with panoramic views across adjoining valleys and sequential ridges. In more settled areas it forms part of the backdrop to views of and from settlements. Around its edges there are commanding views across neighbouring landscapes. It forms parts of the backdrop to views across the Wear Lowlands and from the Limestone Plateau, some eastern spurs being notable elements in the backdrop to views of Durham Castle and Cathedral World Heritage Site. Western areas in particular are visible in views within and from the moorlands of the AONB.				
Skylines			**Moderate**	**Moderate-high**	
	A ridge and valley landscape of prominent and varied skylines, locally clean and undeveloped but often (particularly in the north) containing urban and industrial development, tall masts and pylons. The high ground of this LCT forms the skylines of views within neighbouring LCTs and most notably the Coalfield Valleys. Existing wind turbines are locally prominent or dominant features (see cumulative effects below).				
Perceptual Qualities		**Low-moderate**	**Moderate**	**Moderate-high**	
	A varied landscape, densely settled in some areas but with a relatively remote and tranquil quality in its most rural parts.				
Scenic Qualities		**Low-moderate**	**Moderate**	**Moderate-high**	**High**
	The LCT is of very variable scenic quality being heavily influenced in places by urban and industrial development or by opencast coal mining. It also includes areas of attractive countryside of moderate or high scenic quality containing few detractors, and areas which take in views of a high scenic quality across neighbouring valley and moorland landscapes. Some areas west of the A68 lie within the AONB and have scenic views across the moors to the west. Other areas on the edge of the AONB were identified in the Teesdale Local Plan as Area of High Landscape Value (Bedburn, Upper Linburn and Upper Gaunless valleys). There are few historic parks in this LCT: a single park of local interest is found at Woodlands Hall in the Smallhope burn valley which has some scenic interest.				

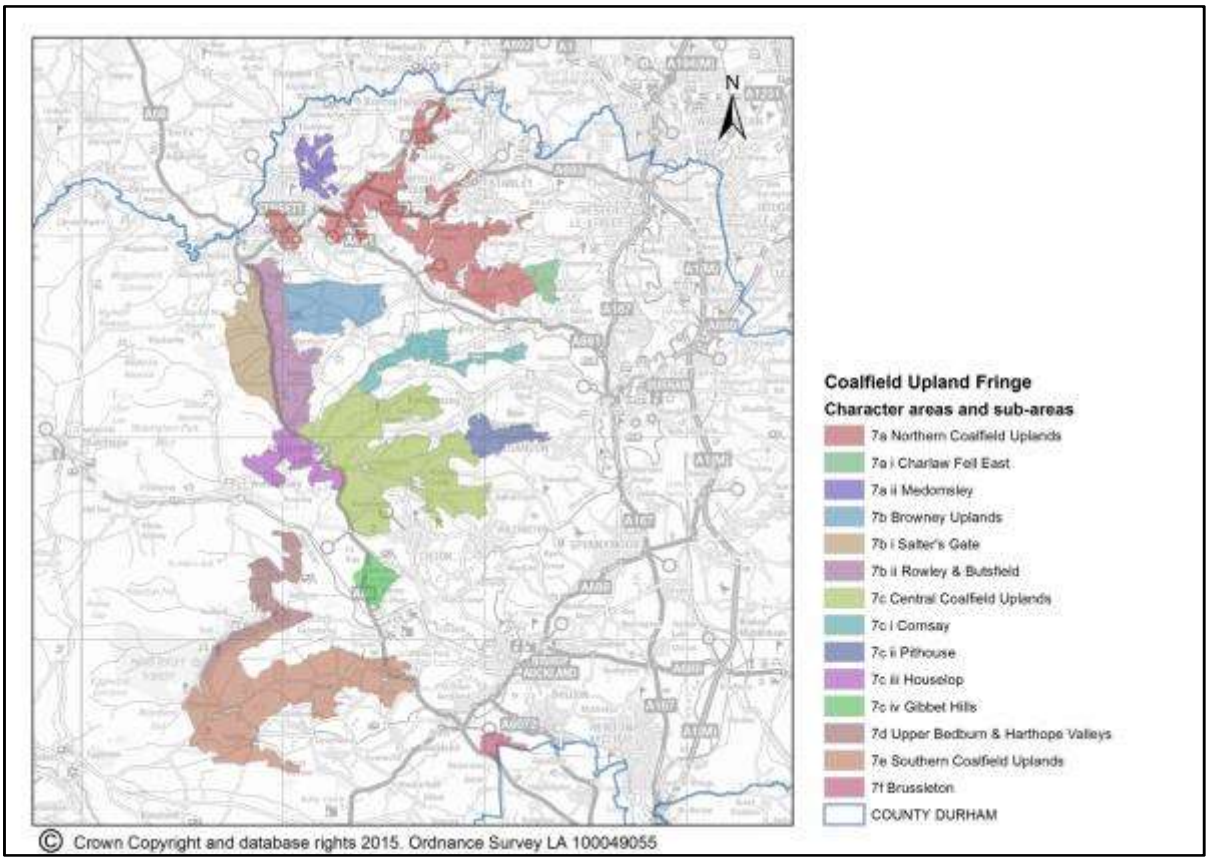

Figure 35: Map of BLT7 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.54 The scale and character of landform and landcover in this landscape type and its settled, semi-rural character would indicate a generally moderate sensitivity to medium and larger turbines. This would be the case for single turbines or turbines in smaller clusters (typically 3 – 5 turbines) of irregular form which reflect the scale of the ridge and valley topography. Sensitivity to larger arrays or more uniform geometrical layouts would be higher. In the past larger developments have been accommodated by breaking arrays up into discrete clusters. Sensitivity is locally elevated in more rural areas and areas forming part of visually important views of and from the AONB in the west and of the World Heritage Site in the east.

5.55 Sensitivity to small and small-medium turbines is generally between low and moderate. Turbines in these size ranges typically occur as single features: sensitivity to groups or arrays of smaller turbines would be higher in some situations.

Table 38: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
7a: Northern Coalfield Uplands	L	LM	M	M	M
7a (i): Charlaw Fell East	L	M	MH	MH	MH
7a (ii): Medomsley	L	M	MH	MH	MH
7b: Browney Uplands	L	LM	M	M	M

7b (i) Salters Gate	L	M	MH	H	H
7b (ii) Rowley and Butsfield	L	LM	M	M	MH
7c: Central Coalfield Uplands	L	LM	LM	M	M
7c (i): Cornsay & Esh	L	M	MH	MH	MH
7c (ii): Pithouse	L	M	MH	MH	MH
7c(iii): Houselop	L	M	MH	H	H
7c (iv): Gibbet Hills	L	M	MH	MH	MH
7d: Upper Bedburn & Harthope Valleys	L	MH	MH	H	H
7e: Southern Coalfield Uplands	L	M	MH	MH	MH
7f: Brussleton	LM	M	MH	MH	MH

Existing development and cumulative effects

Table 39: Operational and permitted turbines in BLT7

BLT7 Coalfield Upland Fringe	Category				
	A	B	C	D	E
Operational and permitted turbines	15	1	0	29	8

5.56 There are a number of small turbines scattered across this LCT associated with individual farmsteads. These currently do not have significant cumulative effects. There are notable tracts of 'wind farm' landscape in the LCT. A large complex of wind farms covers much of the central coalfield uplands between Stanley Crook and Tow Law. A second tract covers much of watersheds between the Browney, Cong Burn and Stanley Burn valleys around Burnhope, Annfield Plain and Craghead. A similar area exists to the north of the county between Kiln Pit Hill and Wittonstall. Lower density areas of single turbines are a notable feature of the Hownsgill and Rowley area and the area west of Crook.

5.57 Further coalescence of wind farm landscape across the central northern part of the coalfield uplands would result in a very high proportion of the northern part of this LCT having wind turbines as a defining characteristic. This could be avoided by maintaining strategic gaps between existing development complexes and particularly in the Browney Uplands (7b, 7b (i) 7b (ii)), the Browney / Hedleyhope / Deerness watershed (7c (i)), and the Derwent / Browney watershed in the Northern Coalfield Uplands (7a). New turbines of small-medium size and above would need to be avoided in those areas to avoid that coalescence and to prevent a straggling pattern of development emerging. Further development close to the existing large windfarm complex in the Central Coalfield Uplands would lead to enlargement of this already large tract of wind farm landscape. This could be avoided by restricting development in remaining parts of this LCT to small turbines.

5.58 Extensions to, or re-powering of, existing wind farms might be accommodated without significant further cumulative effects. The development of additional turbines in those areas should otherwise be avoided and particularly where they do not match existing turbines in scale and character.

BLT8 Coalfield Valley

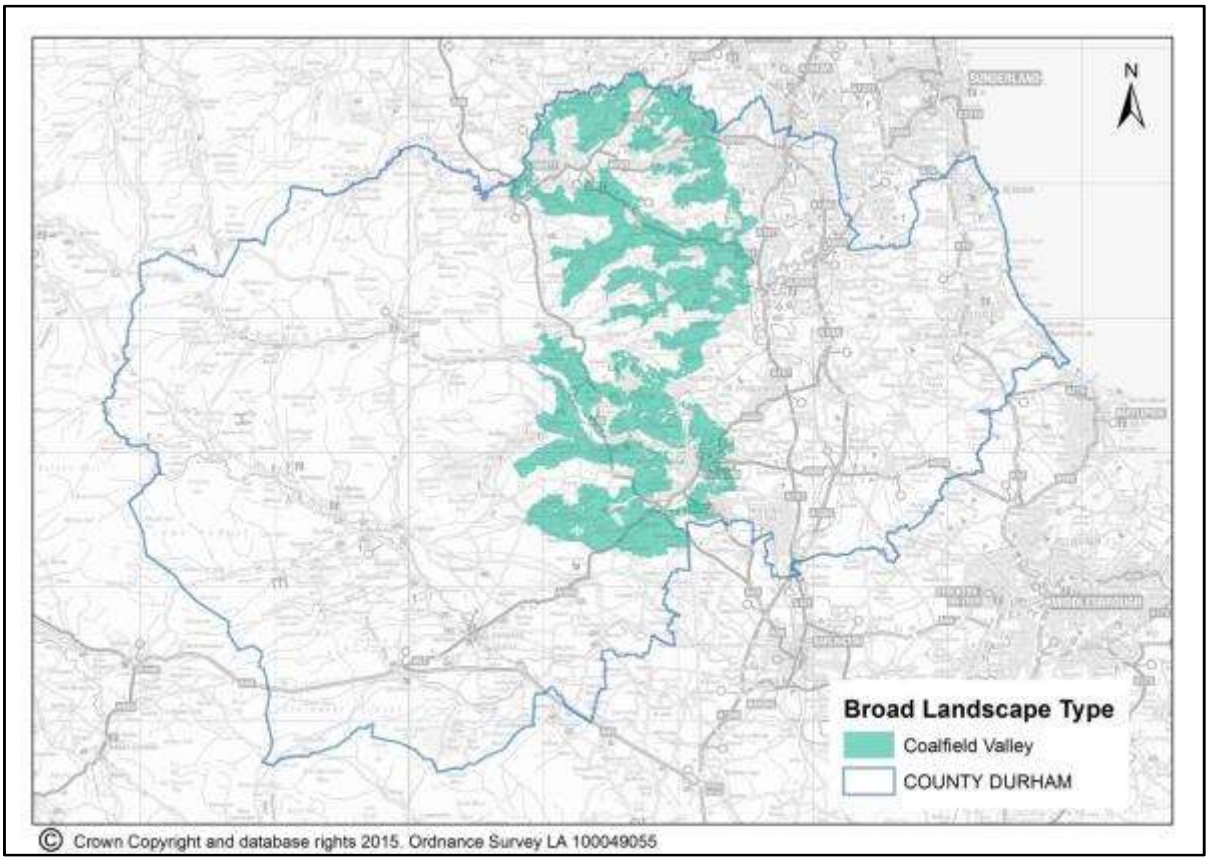

Figure 36: Map of BLT8 Coalfield Valley

5.59 Key Characteristics

- Broad, well defined valleys with occasional narrow floodplains and incised denes.
- Rounded topography of thinly bedded sandstones, mudstones, shales and coals overlain by glacial boulder clays.
- Heavy, seasonally waterlogged, clay soils.
- Mixed farmland of improved pasture and arable cropping.
- Sub-regular field patterns of old enclosures bounded by thorn hedges. Occasional regular Parliamentary enclosures.
- Scattered hedgerow oak, ash, sycamore and beech.
- Variable woodland cover – open in places but wooded elsewhere with ancient oak-birch woods in narrow denes and along watercourses, and blocky conifer plantations on valley sides.
- Scattered mining towns and villages connected by busy modern roads.
- Occasional older 'green' villages linked by narrow winding roads.
- Extensive areas of restored opencast land and reclaimed colliery land – often open and relatively featureless.

- Scattered relics of the mining industry – small spoil heaps, coke ovens and railway lines.
- Occasional ornamental parklands.
- An open landscape, relatively broad in scale but defined by enclosing ridgelines.
- A strongly rural landscape in places but with a 'semi-rural' or urban fringe quality in its more settled areas.

Table 40: Sensitivity profile BLT 8 Coalfield Valley

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform			**Moderate**	**Moderate-high**	
	Broad, well defined valleys with occasional narrow floodplains and incised denes. Relatively simple rolling topography. Some localized steeper bluffs with defined edges and incised denes.				
Landcover			**Moderate**	**Moderate-high**	
	In rural areas the landcover is a varied mosaic of arable, pasture and woodland. Field patterns are typically sub-regular. There are locally frequent small scale features such as hedgerow trees and traditional farm and domestic buildings both dispersed and in small villages. In more heavily settled areas the pattern of landcover is more coarse, complex and varied with multiple focal points. Finer grained and smaller scale landscapes found in and around historic parks.				
Visibility and views			**Moderate**	**Moderate-high**	
	Typically a visually open landscape defined by enclosing ridgelines but with a high degree of enclosure in more wooded areas. There are deep views along and across valleys and panoramic views from higher ground. In more settled areas rising valley sides form part of the visual environment in views within, of and from settlements.				
Skylines			**Moderate**	**Moderate-high**	
	Prominent and varied skylines often formed by neighbouring Coalfield Upland Fringe LCT, locally clean and undeveloped but containing tall masts and pylons in places. Existing wind turbines are locally prominent or dominant features (see cumulative effects below).				
Perceptual Qualities		**Low-moderate**	**Moderate**	**Moderate-high**	
	A varied landscape, settled in some areas but with a relatively remote and tranquil quality in its more rural parts.				
Scenic Qualities		**Low-moderate**	**Moderate**	**Moderate-high**	**High**
	The LCT is of variable scenic quality being heavily influenced in places by urban and industrial development or by past opencast coal mining but also including extensive areas of attractive countryside of moderate or high scenic quality containing few detractors. A number of areas have been identified in past development plans as Area of High Landscape Value including parts of the Wear, Linburn, Bedburn, Hummerbeck, Deerness, Hedleyhope, Derwent, Pont, Knitsley Burn and Beamish Burn valleys. The LCT is notable for the number of historic parklands it contains including the registered Auckland Castle Park (II*) and a number of parks of local interest which are of a high scenic value.				

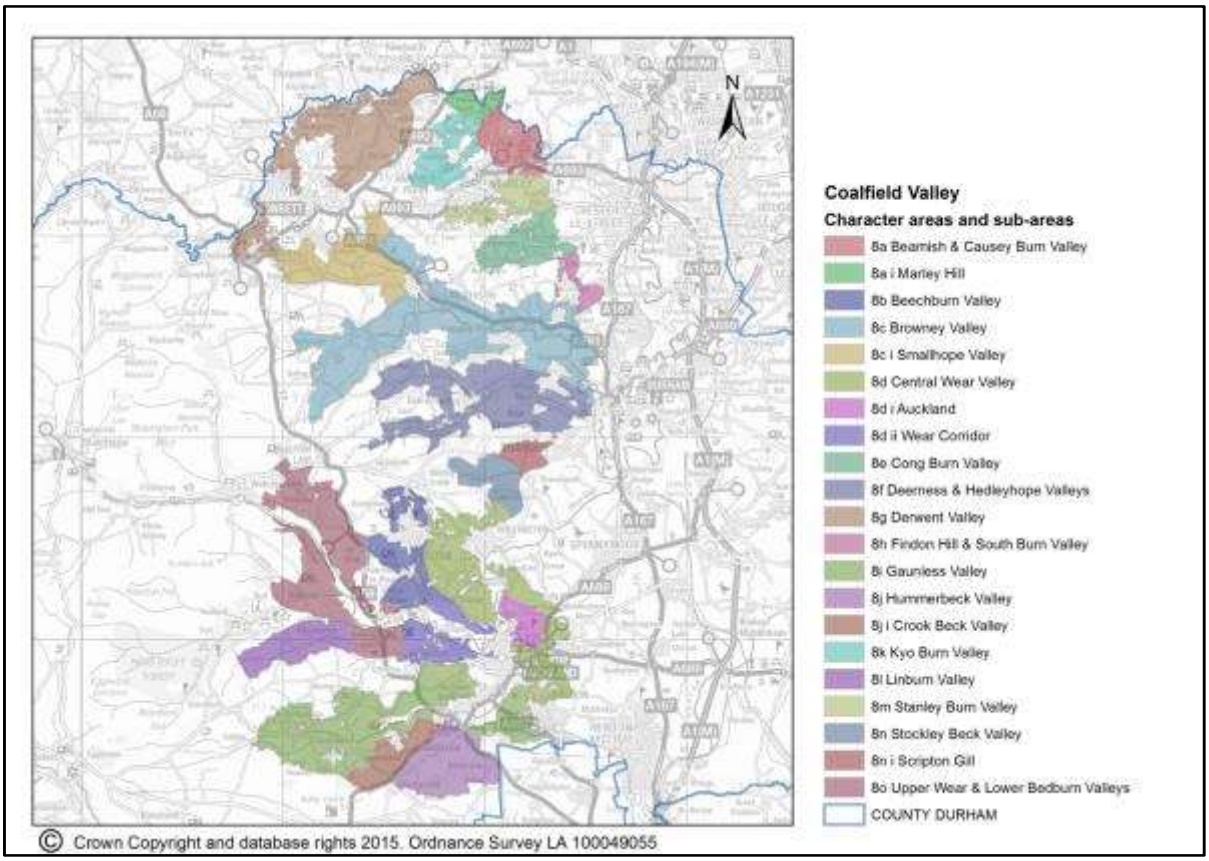

Figure 37: Map of BLT8 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.60 The scale and character of landform and landcover in this landscape type would indicate a generally moderate – high sensitivity to medium and larger turbines. This would be locally elevated in areas of higher scenic quality and historic parkland and areas forming part of the outer setting of the World Heritage Site. This would be the case for both single turbines and turbines in clusters or larger arrays.

5.61 Sensitivity to small-medium and medium scale turbines is generally moderate although again locally elevated in areas of higher scenic quality and historic parkland. Sensitivity to small turbines is generally low due to the degree of enclosure in the landscape at a local level, and the abundance of vertical elements (trees, woodlands) of comparable scale, although locally higher in and around areas of historic parkland. Turbines in these size ranges typically occur as single features: sensitivity to groups or arrays would be higher.

Table 41: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
8a Beamish & Causey Burn Valley.	LM	MH	MH	MH	H
8a (i) Marley Hill	L	M	M	MH	MH
8b Beechburn Valley.	L	M	M	MH	MH
8c Browney Valley	LM	MH	MH	MH	H
8c (i) Smallhope Valley	L	M	M	MH	MH

8d Central Wear Valley	L	M	M	MH	MH
8d (i) Auckland	M	H	H	H	H
8d (ii) Wear corridor	LM	MH	MH	MH	H
8e Cong Burn Valley.	L	M	M	MH	MH
8f Deerness & Hedleyhope Valley	LM	MH	MH	MH	H
8g Derwent Valley	LM	MH	MH	MH	H
8h Findon Hill & South Burn Valley.	LM	MH	MH	MH	H
8i Gaunless Valley.	L	M	M	MH	MH
8j Hummerbeck Valley.	L	M	MH	MH	MH
8j(i) Crook Beck valley	L	M	M	M	MH
8k Kyo Burn Valley.	L	M	M	M	MH
8l Linburn Valley	LM	MH	MH	MH	H
8m Stanley Burn Valley.	L	M	M	MH	MH
8n Stockley Beck Valley.	L	M	M	MH	MH
8n (i) Scripton Gill	L	M	MH	MH	H
8o Upper Wear & Lower Bedburn Valleys.	LM	MH	MH	MH	H

Existing development and cumulative effects

Table 42: Operational and permitted turbines in BLT8

BLT8 Coalfield Valley	Category				
	A	B	C	D	E
Operational and permitted turbines	5	3	3	2	0

5.62 There are a number of small turbines scattered across this LCT associated with individual farmsteads. These currently do not have significant cumulative effects. There are a number of small-medium, medium and medium-large turbines scattered across the LCT, generally at the transition with the Coalfield Upland Fringe LCT where they have some cumulative effects with wind farms and other single turbines in those areas. The tracts of wind farm landscape in that LCT spread into the adjacent valley landscapes and particularly parts of the Browney, Stanley Burn, Congburn and Hedleyhope Burn valleys. Wind turbines are often prominent skyline features across the valleys north of the Wear.

5.63 Further coalescence of wind farm landscape across the central northern part of the coalfield uplands and the valleys in that area would result in a high proportion of the northern part of this LCT having wind turbines as a defining characteristic. This could be avoided by maintaining strategic gaps between existing development complexes and particularly in the valleys in the northern part of the coalfield. New turbines of small-medium size and above would need to be avoided in those areas to avoid that coalescence and to prevent a straggling pattern of development emerging.

5.64 Further development close to the existing large windfarm complex in the Central Coalfield Uplands would lead to enlargement of this already large tract of wind farm

landscape. This could be avoided by restricting development in adjacent valleys to small turbines.

BLT9 Coalfield Valley Floodplain

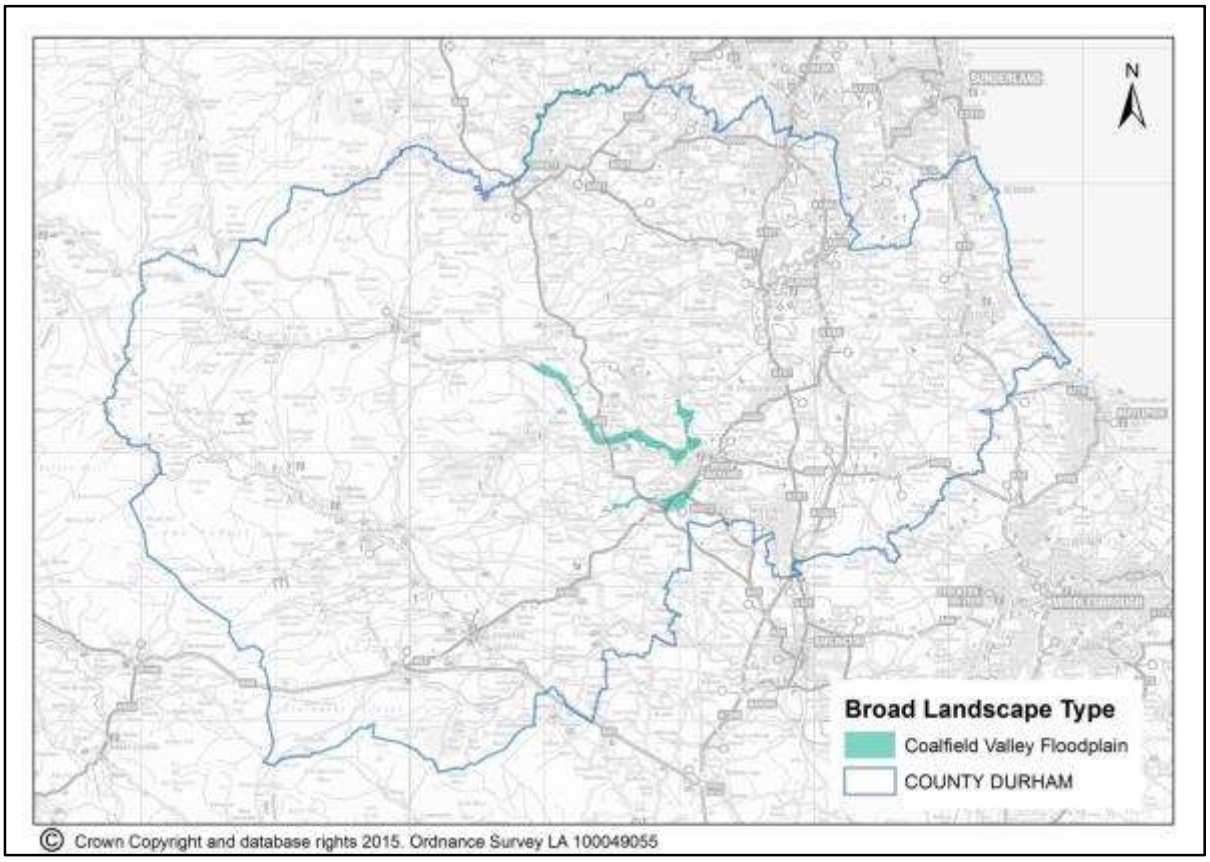

Figure 38: Map of BLT9 Coalfield Valley Floodplain

5.65 Key Characteristics

- Flat, narrow floodplains fringed in places by low, steep-sided bluffs.
- Meandering rivers with alternating riffles and pools.
- Alluvial soils.
- Large arable fields protected from flooding in places by low levees.
- Smaller pastures of improved or semi-improved wet pastures bounded by low thorn hedges with scattered hedgerow oak, ash and alder.
- Ancient woodlands of oak and birch on steep bluffs.
- Narrow riparian woods or tree lines of alder, oak, ash and willow on river banks.
- Semi-improved pastures on steeper bluffs with scattered scrub of gorse or hawthorn.
- Occasional small ponds and ox-bow lakes and larger wetlands in abandoned or restored gravel workings.
- Few farms or farm buildings.
- Occasional relics of corn or fulling mills or later iron-working mills – including mill races and buildings.

- Occasional industrial land or sewerage works bordering larger settlements.
- A diverse landscape. Enclosed and intimate in scale in wooded areas but more open, and reading as part of the wider valley landscape, in others.

Table 43: Sensitivity profile BLT9: Coalfield Valley Floodplain

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform			**Moderate**	**Moderate-high**	**High**
	Relatively narrow floodplains flanked by steep bluffs. Locally broader in scale.				
Landcover		**Low-moderate**	**Moderate**		
	A varied mosaic of arable, pasture and, locally, woodland and wetland. Fields vary in scale from small to large. Field patterns are typically sub-regular. There are locally abundant small scale features such as hedgerow trees. A strong linear pattern to landcover in narrower floodplains. More consistent open character in broader floodplains.				
Visibility and views			**Moderate**	**Moderate-high**	
	Typically a visually open landscape defined by enclosing valley slopes but with a high degree of enclosure in more wooded areas. There are often deep views along valleys. Floodplains are widely overlooked from higher ground in panoramic views. In more settled areas rising valley sides form part of the visual environment in views within, of and from settlements.				
Skylines			**Moderate**	**Moderate-high**	
	Prominent and varied skylines often formed by neighbouring Coalfield Valley and Coalfield Upland Fringe LCT, locally clean and undeveloped but containing buildings and other structures in places.				
Perceptual Qualities		**Low-moderate**	**Moderate**	**Moderate-high**	
	A varied landscape, settled in some areas but with a relatively remote and tranquil quality in its more rural parts.				
Scenic Qualities		**Low-moderate**	**Moderate**	**Moderate-high**	**High**
	The LCT is of variable scenic quality being influenced in places by urban and industrial development or gravel workings but also including areas forming part of attractive wider river valley landscapes of high scenic quality containing few detractors. The Wear and Derwent floodplains lie in areas identified in past development plans as Area of High Landscape Value.				

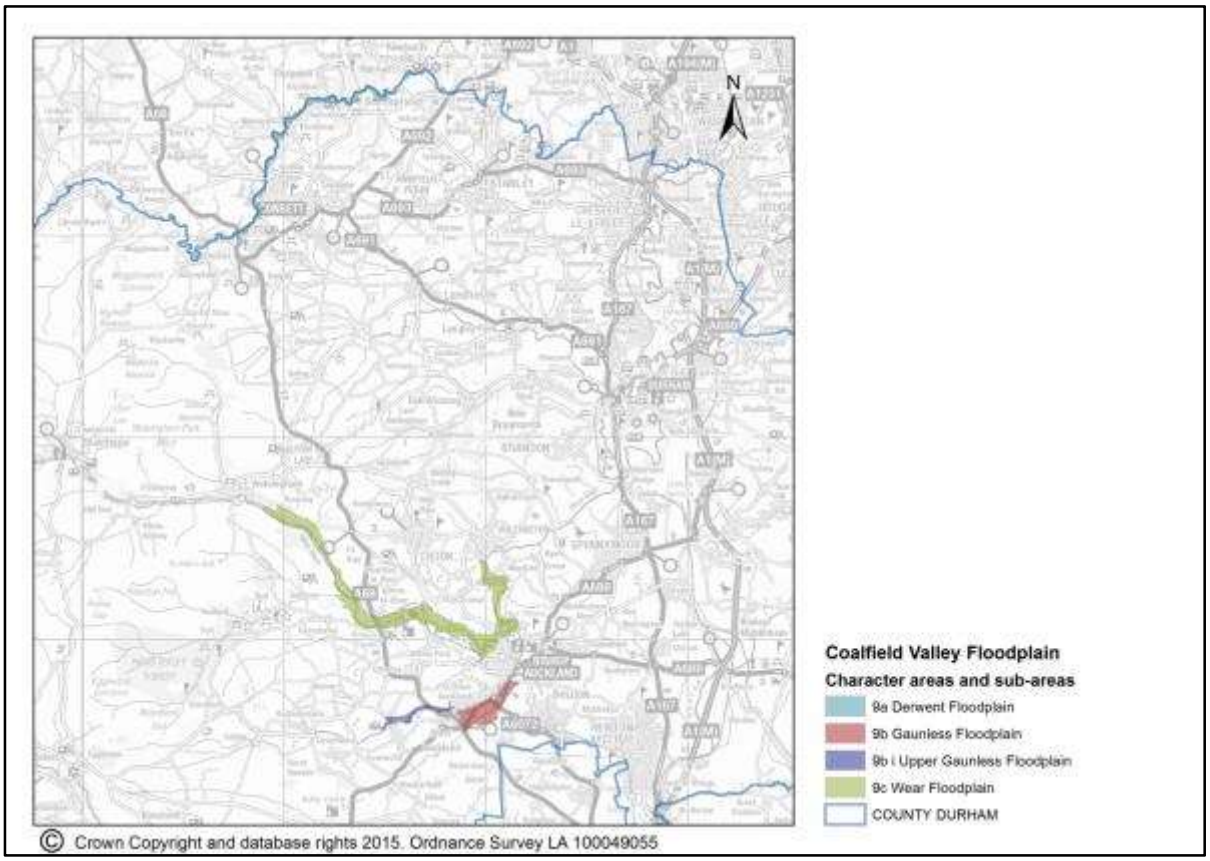

Figure 39: Map of BLT9 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.66 The scale and character of landform and landcover in this landscape type and its generally high scenic value would indicate a high sensitivity to medium and larger turbines and a moderate sensitivity to smaller turbines. This sensitivity would be locally lower in broader floodplains not forming part of wider landscapes of higher scenic quality (9b Gaunless floodplain).

Table 44: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
9a Derwent floodplain	M	MH	H	H	H
9b Gaunless floodplain.	L	M	MH	MH	H
9b (i) Upper Gaunless floodplain	M	MH	H	H	H
9c Wear floodplain	M	MH	H	H	H

Existing development and cumulative effects

Table 45: Operational and permitted turbines in BLT9

BLT9 Coalfield Valley Floodplain	Category				
	A	B	C	D	E
Operational and permitted turbines	0	0	0	0	0

5.67 There are currently no operational or permitted turbines within this LCT.

Dales Fringe County Character Area

BLT10 Gritstone Upland Fringe

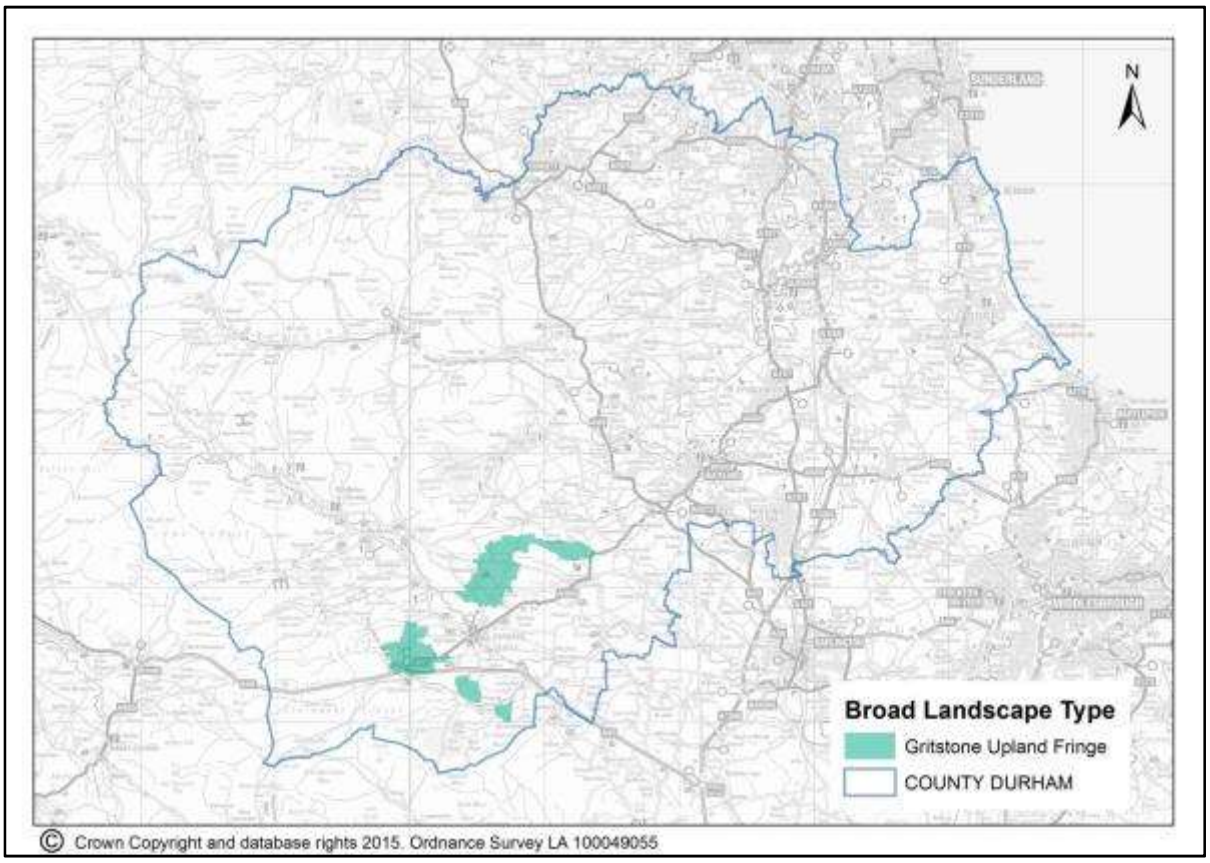

Figure 40: Map of BLT10 Gritstone Upland Fringe

5.68 Key Characteristics

- Broad ridges and plateaux.
- Gently rounded topography of thinly bedded sandstones, limestones and mudstones overlain by glacial boulder clay.
- Small becks, occasionally in narrow incised valleys.
- Heavy, seasonally waterlogged clay soils.
- Pastoral land use of improved, semi-improved or wet rush pasture.
- Regular grids of parliamentary enclosures bounded by dry stone walls or hawthorn hedges, often gappy and overgrown. Occasional older field systems.
- Few trees – scattered hedgerow oak and ash.
- Variable woodland cover – generally sparsely wooded but with scattered conifer plantations in places.
- Isolated farms connected by straight enclosure roads. Farms of the Raby estate north of the Tees are painted white.

- A visually open landscape, broad in scale though locally defined by minor ridgelines and with occasional panoramic views across the Tees vale.
- A remote and tranquil rural landscape.

Table 46: Sensitivity profile BLT10 Gritstone Upland Fringe

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform		**Low-moderate**	**Moderate**		
	Generally large scale landform of broad ridges, shallow valleys and plateau. Gently rolling topography. Occasional incised denes and steeper bluffs.				
Landcover		**Low-moderate**	**Moderate**	**Moderate-high**	
	A large scale landscape with relatively consistent landcover in broad muted patchworks of improved and semi-improved grassland. Field patterns are regular grids of hedges and stone walls crossed by straight enclosure roads. Locally there are tree lines, thin linear shelterbelts or blocky plantations. The landscape has a strong underlying order but modulated by variety in field boundaries and tree cover. Small scale features – field trees, overgrown hedges and traditional farm buildings – are common.				
Visibility and views			**Moderate**	**Moderate-high**	**High**
	A visually very open landscape with shallow interior views and occasional deeper panoramic views from higher ground. High levels of inter-visibility in places with dales and moorland LCTs and with the Gritstone Vale.				
Skylines			**Moderate**	**Moderate-high**	
	Skylines occasionally prominent but not generally distinctive other than those formed by adjacent moorland LCTs. Few tall vertical elements. A variable landscape with multiple focal points of a similar scale and character.				
Perceptual Qualities				**Moderate-high**	
	A strongly rural, remote and tranquil landscape. Little movement other than natural forces, agricultural activities and traffic on minor roads. Locally affected by the A67 and busy A66.				
Scenic Qualities				**Moderate-high**	**High**
	The area is of consistently good scenic quality as attractive countryside with few detractors and often forms part of wider views of high scenic quality. All of the LCT falls within areas formerly identified in the Teesdale Local Plan as Area of High Landscape Value. Some views within the LCT, and particularly from its western edges, take in the AONB. Parts of the Raby Hill character area lie within the parkland and designed estate farmland of Raby Park and are of notably high scenic value forming part of the Grade II* parkland and its immediate setting.				

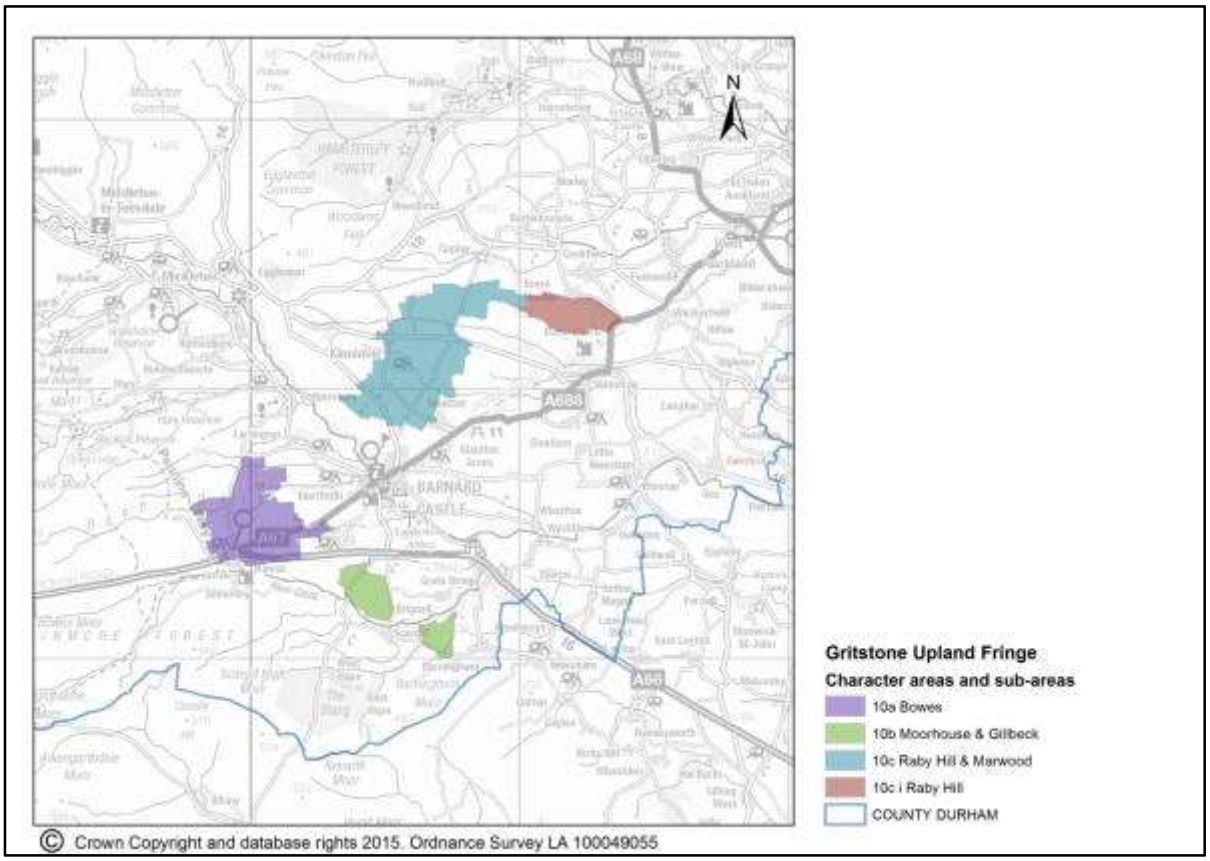

Figure 41: Map of BLT10 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.69 Some of the attributes of the LCT – and particularly the scale and character of its landform and landcover – would indicate a moderate sensitivity to turbines of most scales. Other attributes indicate a higher sensitivity to medium and larger turbines and particularly its visual openness, scenic quality, and its remote and tranquil character. The degree of inter-visibility with higher sensitivity landscapes is a notable factor in this LCT, and particularly those of the AONB. This would be the case for both single turbines and turbines in clusters or larger arrays.

5.70 Its sensitivity to small-medium turbines is generally moderate although locally higher in and around areas of historic parkland, and in the south and west where the topography allows high levels of inter-visibility with adjacent higher sensitivity landscapes. Sensitivity to small turbines is generally low-moderate due to the presence of features of comparable scale to associate with at a local level despite the visual openness of the landscape. Sensitivities are generally elevated in the Raby Hill area which forms part of Raby Park and its immediate setting. Turbines in these size ranges typically occur as single features: sensitivity to groups or arrays would be higher.

Table 47: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
10a Bowes	LM	MH	MH	MH	MH

10b Moorhouse and Gillbeck	LM	MH	MH	MH	MH
10c Raby Hill, Marwood & Kinninvie	LM	M	MH	MH	MH
10c (i) Raby Hill	M	H	H	H	H

Existing development and cumulative effects

Table 48: Operational and permitted turbines in BLT 10

BLT10 Gritstone Upland Fringe	**Category**				
	A	**B**	**C**	**D**	**E**
Operational and permitted turbines	1	0	0	0	0

5.71 There is currently only one small turbine in this LCT and few visible in neighbouring LCTs. There are currently no significant cumulative effects.

BLT11 Gritstone Vale

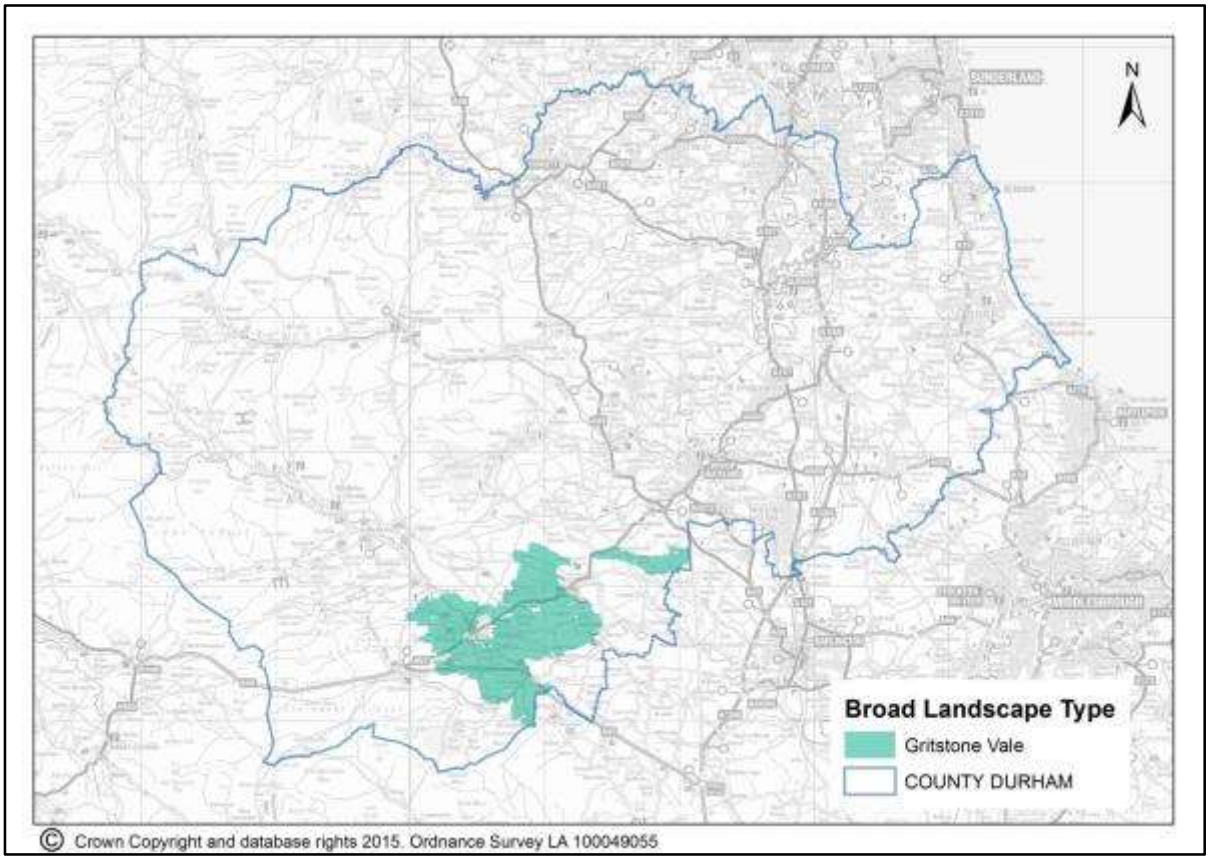

Figure 42: Map of BLT11 Gritstone Vale

5.72 Key Characteristics

- Broad rolling vale, incised by the narrow denes of rivers and streams.
- Gently rounded topography of thinly bedded sandstones, limestones and mudstones overlain by glacial drift.
- Mosaic of heavy, seasonally waterlogged clay soils and more fertile brown earths.
- Mixed farmland of improved pasture and arable cropping.
- Semi-regular, sometimes linear, patterns of old enclosures bounded by thorn hedges, with occasional dry stone walls.
- Abundant hedgerow ash, oak and sycamore.
- Ancient ash and oak woodlands in narrow denes. Scattered coniferous or mixed plantations.
- Areas of old parklands and heavily wooded estate farmland.
- Nucleated settlement pattern of small green villages centered on the historic market town of Barnard Castle. Scattered farms.
- Buildings of local stone with roofs of stone, slate or clay pan tile. Farms of the Raby Estate painted white.

- Narrow winding lanes and some busy modern highways.
- Occasional disused army camps.
- A well-timbered landscape creating a high degree of enclosure in places, but with broad scale panoramic views across the vale from higher vantage points.
- A tranquil settled rural landscape.

Table 49: Sensitivity profile BLT11 Gritstone Vale

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform		**Low-moderate**	**Moderate**	**Moderate-high**	
	Broad vale, locally incised by the narrow denes of rivers and streams. Simple, gently rolling or undulating topography. Some localized discrete low hills in the Newsham and Cleatlam character area.				
Landcover				**Moderate-high**	**High**
	A mosaic of arable and pasture in sub-regular patterns of typically medium-sized fields. Strong linear grain to parts of the landscape incised by wooded denes and particularly Boldron and Lartington character area. Locally fine grained landscapes and particularly in historic parklands. Abundant smaller scale features including hedgerow and parkland trees and traditional farm and domestic buildings both dispersed and in small villages.				
Visibility and views			**Moderate**	**Moderate-high**	**High**
	Within the vale the landscape is typically seen in relatively shallow views but there are deeper views from local high ground and panoramic views across the vale from around its edges, from adjoining upland fringes, and more locally from moorland fringe and moorland landscapes. Parts of the landscape figure in the backdrop to views of and within settlements including the historic market town of Barnard Castle and smaller villages. There are important views and vistas within, of, and from historic parklands.				
Skylines			**Moderate**	**Moderate-high**	
	Skylines occasionally prominent locally but often formed by distant high ground. Few tall vertical elements: some telecommunications masts and very locally some small (<30m / 132KV) service pylons. A variable landscape with multiple focal points of similar scale and character.				
Perceptual Qualities			**Moderate**	**Moderate-high**	
	A settled but strongly rural and generally tranquil landscape. In most areas little movement other than natural forces, agricultural activities and traffic on minor roads. Locally affected by traffic on busy roads (A688, A66, A67).				
Scenic Qualities				**Moderate-high**	**High**
	The area is of consistently good scenic quality as attractive countryside with few detractors, and of locally high or very high scenic quality and particularly in and around its incised rivers and denes and historic parklands. Much of the area was formerly identified in the Teesdale Local Plan as an Area of High Landscape Value. The area contains a number of notable parklands of high scenic value including Lartington Park (Grade II), Rokeby Park (II*) and Bowes Museum Park (II) together with parts of the wider parklands of Raby (II*) and non-designated parks at Streatlam, Eastwood and Barningham.				

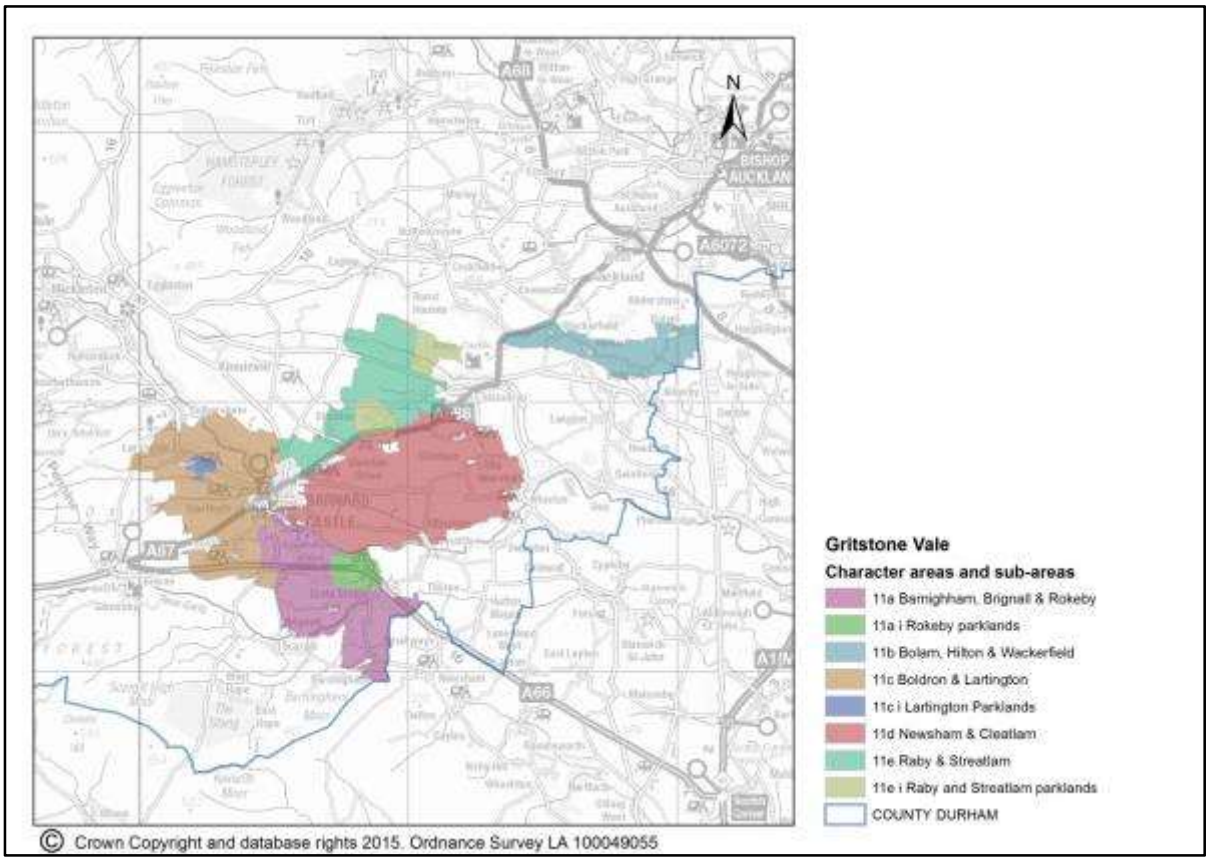

Figure 43: Map of BLT11 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.73 The small scale landcover of the vale, its scenic qualities and its role in panoramic views from higher ground mean that this LCT is likely to be of high sensitivity to medium-large and large scale turbines. This would be the case for both single turbines and turbines in clusters or larger arrays.

5.74 Its sensitivity to small-medium and medium-scale turbines will generally be moderate to high although locally high in and around areas of historic parkland (11a (i) Rokeby Parklands, 11c (i) Lartington Parklands and 11e (i) Raby and Streatlam Parklands). Its sensitivity to small turbines will be generally low due to the degree of enclosure in the landscape at a local level and the abundance of vertical elements (trees, woodlands) of comparable scale, although locally higher in and around areas of historic parkland. Turbines in these size ranges typically occur as single features: sensitivity to groups or arrays would be higher.

Table 50: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
11a Barnigham, Brignall and Rokeby	L	MH	MH	H	H
11a (i) Rokeby parklands	M	H	H	H	H
11b Bolam, Hilton & Wackerfield	L	MH	MH	H	H
11c Boldron and Lartington	L	MH	MH	H	H

11c (i) Lartington parklands	M	H	H	H	H
11d Newsham and Cleatlam	L	MH	MH	H	H
11e Raby and Streatlam	L	MH	MH	H	H
11e (i) Raby and Streatlam parklands	M	H	H	H	H

Existing development and cumulative effects

Table 51: Operational and permitted turbines in BLT 11

BLT11: Gritstone Vale	Category				
	A	B	C	D	E
Operational and permitted turbines	1	0	2	0	0

5.75 There are currently few turbines in this LCT and few visible in neighbouring LCTs. There are two medium sized turbines on industrial land in the edge of Barnard Castle and a single small turbine associated with a farmstead. There are currently no significant cumulative effects.

Wear Lowlands County Character Area

BLT12 Incised Lowland Valleys

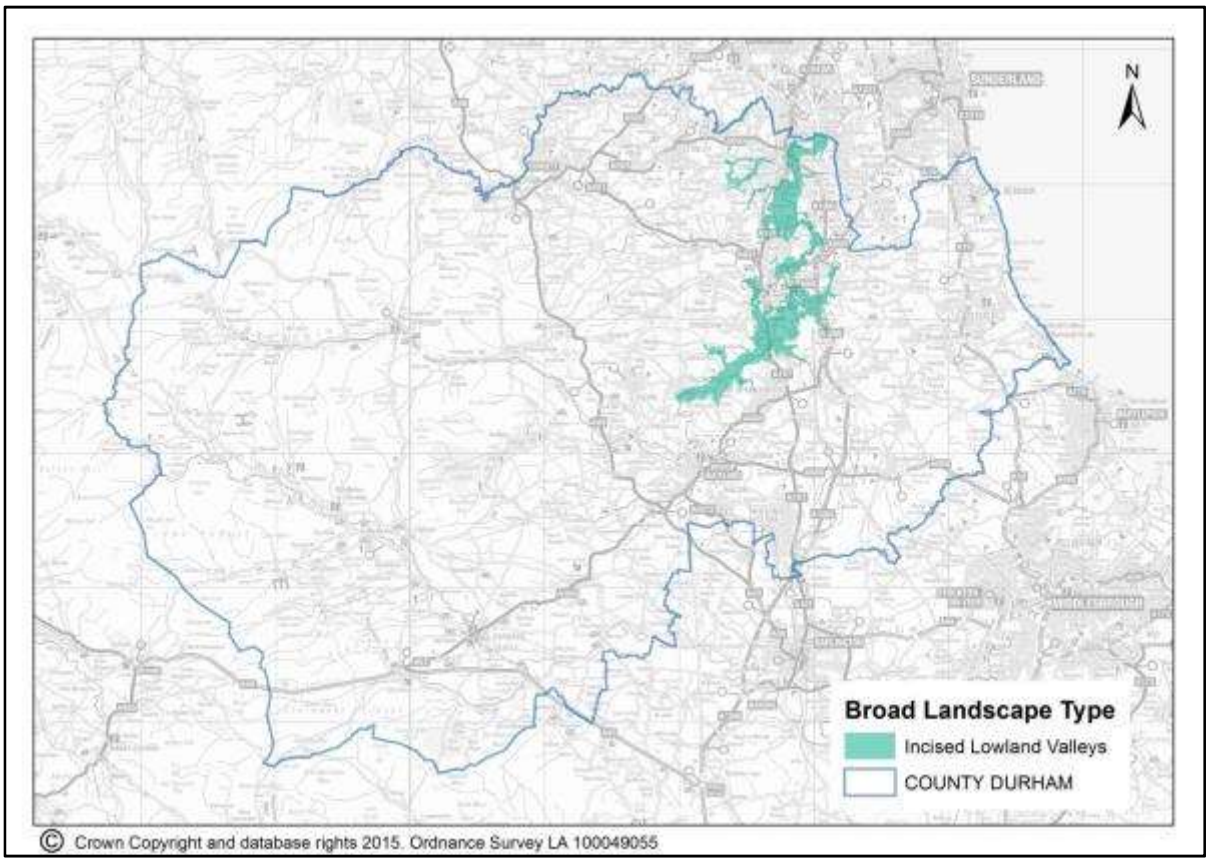

Figure 44: Map of BLT12 Incised Lowland Valleys

5.76 Key Characteristics

- Incised valley landscape of gorges, denes, river floodplains and steep bluffs.
- Carboniferous rocks are masked by thick deposits of glacial drift.
- Sandstones, shales and thin coal seams outcrop very occasionally in gorges.
- Meandering rivers with alternating riffles and pools.
- Varied soils - alluvial soils, brown sands, and heavy clays.
- Mixed farmland - pasture on steeper ground and arable cropping on floodplains.
- Semi-regular patterns of old enclosures bounded by hawthorn hedges.
- Abundant hedgerow oak, ash, sycamore and beech.
- Heavily wooded – ancient oak woods in river gorges, denes and bluffs.
- Numerous ornamental parklands and areas of wooded estate farmland.
- Occasional older ‘green villages’ of stone and clay pantile.
- Landmark buildings including Durham Cathedral and Castle.
- Numerous bridges and viaducts from the ancient to the modern.

- An enclosed landscape, intimate in scale, with occasional dramatic vistas.
- A settled but tranquil rural landscape of great scenic quality and a rich cultural heritage.

Table 52: Sensitivity profile BLT12 Incised Lowland Valleys

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform				**Moderate-high**	**High**
	Complex irregular topography of river gorges, denes and steep bluffs with narrow flat floodplains. Relatively modest scale: generally around 40 -50m elevation expressed in incised features.				
Landcover				**Moderate-high**	**High**
	Considerable variety in land cover. Typically a medium scale mosaic of arable, pasture and woodland. Field systems are semi-regular in form. Woodlands generally follow topographic features and are sinuous and irregular. Locally augmented with planted woodlands of aesthetic design in historic parks and wooded estates. Small scale features – hedgerow and parkland trees, and domestic buildings – are abundant.				
Visibility and views			**Moderate**	**Moderate-high**	**High**
	A visually complex landscape heavily enclosed in places giving obstructed or heavily filtered shallow views, but with deep views across and along the valleys in places and panoramic views from higher ground. High levels of inter-visibility in places with adjacent LCTs, and with the Limestone Escarpment to the east and coalfield spurs to the west. Parts of the LCT form the immediate and wider setting of the World Heritage Site and are both unique in that respect and contribute to its Outstanding Universal Value (OUV). Parts of the landscape figure in the backdrop to views of and within settlements including the historic core of Durham City. There are important views of other landmark features including castles and country houses (Lumley, Burn Hall), notable bridges and railway viaducts, and Penshaw Monument.				
Skylines		**Low-moderate**	**Moderate**	**Moderate-high**	**High**
	Skylines are very varied, often prominent and locally very distinctive. Some skylines are undeveloped or with important landmark features. Urban form is prominent on other skylines, sometimes extensively so in the north with views of Chester-le-Street and the Team Valley beyond. Some tall vertical elements locally including high voltage transmission lines (to 50m) and lighting columns at the riverside stadium. A variable landscape with multiple focal points.				
Perceptual Qualities			**Moderate**	**Moderate-high**	**High**
	A settled rural landscape with a rich cultural heritage. Locally tranquil but affected in places by noise and movement on busy roads (A167, A1M).				
Scenic Qualities				**Moderate-high**	**High**
	The LCT is generally of good or high scenic quality as attractive countryside, in places highly picturesque, with only localised detractors. Much of the LCT falls within areas formerly identified in the City of Durham, Sedgefield and Chester-le-Street Local Plans as Area of High Landscape Value. The LCT is notable for the number of historic parklands it contains including registered parks of Lambton (II), Lumley(II), Burn Hall (II), Croxdale (II*) and Brancepeth (II) which are of a high scenic value.				

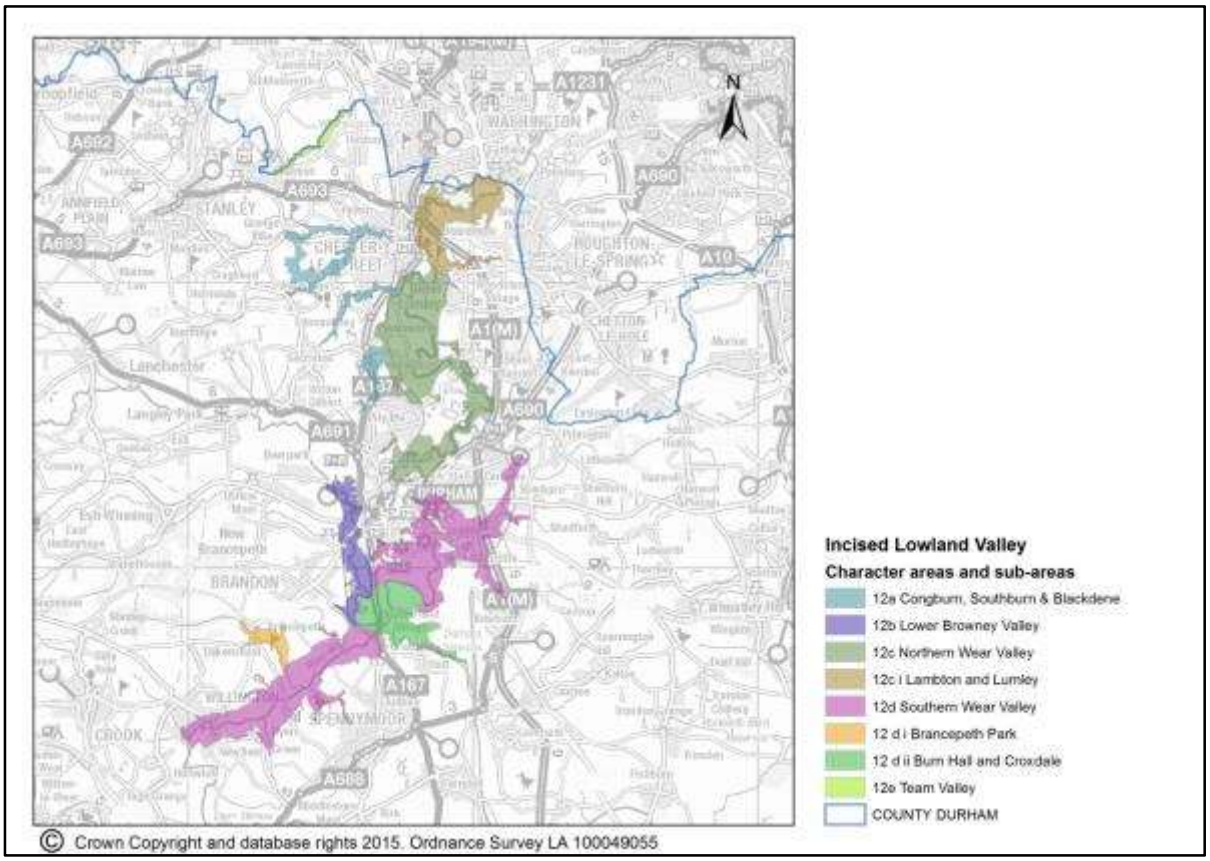

Figure 45: Map of BLT12 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.77 The complex natural topography, varied landcover, high scenic quality, numerous landmarks (including the culturally significant World Heritage Site) and the number of historic parks indicate that this LCT is generally of high sensitivity to medium, medium-large and large scale turbines. This would be the case for both single turbines and turbines in clusters or larger arrays.

5.78 Sensitivity to small-medium turbines is generally moderate- high, but high within areas of historic parkland. Sensitivity to small turbines is generally low-moderate due to the degree of enclosure in the landscape at a local level and the abundance of vertical elements (trees, woodlands) of comparable scale, but higher in areas of historic parkland and incised denes. Turbines in these size ranges typically occur as single features: sensitivity to groups or arrays would be higher.

Table 53: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
12a Congburn, Southburn and Blackdene	M	MH	H	H	H
12b Lower Browney Valley	LM	MH	H	H	H
12c Northern Wear Valley	LM	MH	H	H	H
12c (i) Lambton & Lumley	M	H	H	H	H
12d Southern Wear Valley	LM	MH	H	H	H

12d (i) Brancepeth Park	M	H	H	H	H
12d (ii) Burn Hall and Croxdale	M	H	H	H	H
12e Team Valley	LM	MH	H	H	H

Existing development and cumulative effects

Table 54: Operational and permitted turbines in BLT 12

BLT12 Incised Lowland Valleys	**Category**				
	A	**B**	**C**	**D**	**E**
Operational and permitted turbines	0	0	0	0	0

5.79 There are currently no turbines within this LCT. Turbines are occasionally visible on distant skylines to the east and west. There are currently no significant cumulative effects. There is a potential for cumulative effects arising from development to the east and west on the setting of the World Heritage Site which lies within this LCT.

BLT13 Lowland Valley Terraces

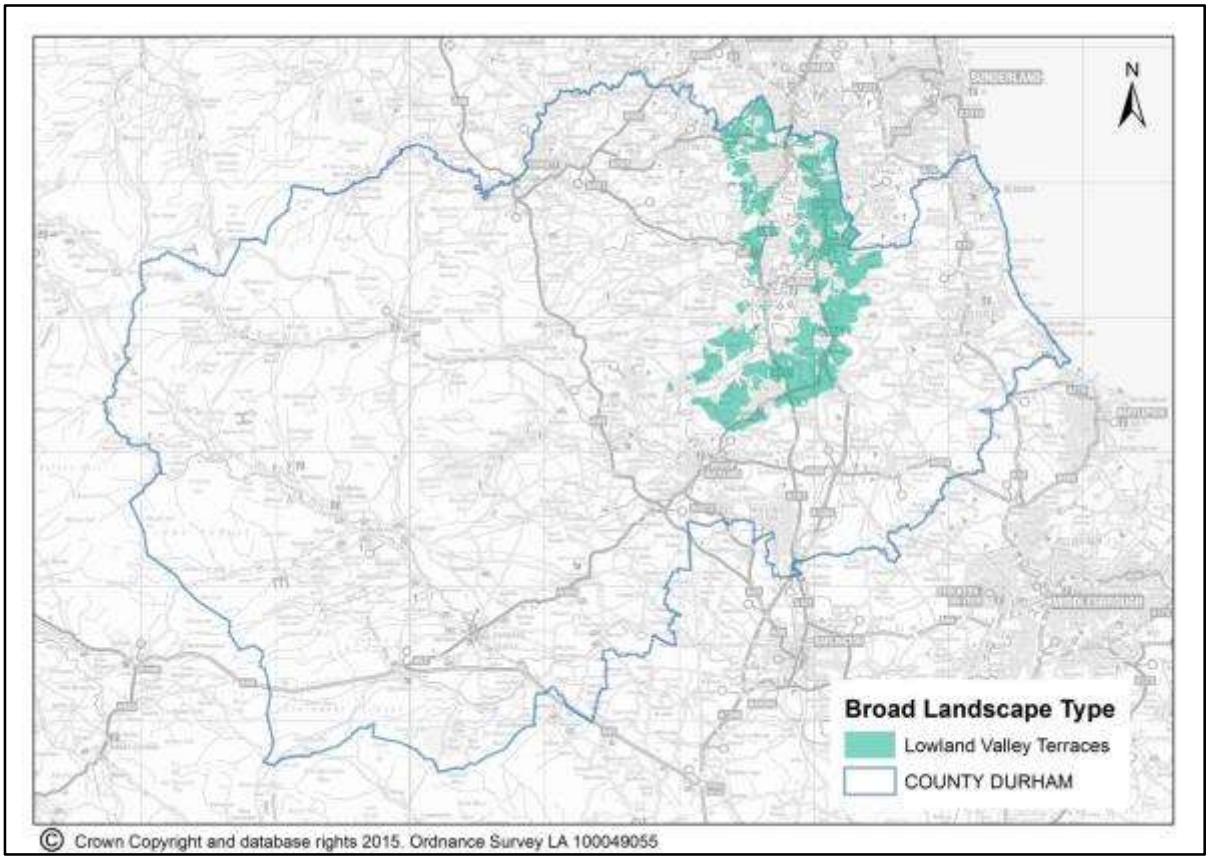

Figure 46: Map of BLT13 Lowland Valley Terraces

5.80 Key Characteristics

- Broad lowland valley floor.
- Carboniferous Coal Measures are masked by thick layers of glacial drift.
- Gently rolling topography of boulder clay with areas of more undulating terrain of glacial sands and gravels.
- Heavy, seasonally waterlogged clay soils and lighter brown earths and brown sands.
- Mixed farmland of improved pastures and arable cropping.
- Semi-regular patterns of medium and large-scale fields bounded by low hawthorn hedges.
- Few trees – thinly scattered hedgerow ash, oak and sycamore.
- Isolated fragments of lowland heath and mire.
- Sparsely wooded but with some heavily wooded areas of old parkland and estate farmland. Scattered mining towns and villages connected by busy modern roads. Occasional older ‘green’ villages.
- Opencast coal sites, clay workings and waste disposal sites locally prominent.

- Tracts of immature and relatively featureless reclaimed land. An important communications corridor with motorways, trunk roads, railway lines and overhead transmission lines.
- An open landscape, broad in scale, defined by the Limestone Escarpment to the east and the spurs of the West Durham Coalfield to the west.
- A settled landscape with a semi-rural or urban fringe quality in places.

Table 55: Sensitivity profile BLT13 Lowland Valley Terraces

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform	**Low**	**Low-moderate**			
	Broad scale simple gently rolling or undulating topography. Bounded by a low limestone escarpment (around 60m relative elevation) and spurs to the west (70-150m).				
Landcover		**Low-moderate**	**Moderate**	**Moderate-high**	**High**
	Typically a medium to large scale mosaic of arable fields with some pasture. Field systems are semi-regular in form, locally modified by field amalgamations. More varied and smaller scale landscapes in and around historic parks. A settled landscape with extensive continuous or fragmented tracts of urban and industrial land. Small scale features – hedgerow and parkland trees, and domestic buildings – are common.				
Visibility and views		**Low-moderate**	**Moderate**	**Moderate-high**	
	A visually open landscape experienced in relatively shallow views but with some long vistas along the valley. High levels of inter-visibility in places with adjacent Incised Valley LCT and with the Limestone Escarpment to the east and coalfield spurs to the west. Some parts of the LCT form the wider setting of the World Heritage Site and contribute to its Outstanding Universal Value (OUV). There are important views of other landmark features including Lumley Castle and Penshaw Monument.				
Skylines		**Low-moderate**	**Moderate**	**Moderate-high**	
	Skylines are varied, sometimes prominent and locally distinctive other times less so. Often formed by rising ground of the escarpment to the east and coalfield spurs to the west. Some skylines are undeveloped or with important landmark features. Urban form is prominent on other skylines, sometimes extensively so in the north with views of Chester-le-Street and the Team Valley. Wind turbines feature on the eastern skyline and on more distant skylines to the west. Tall vertical elements are relatively widespread including telecoms masts and high voltage transmission lines (to 50m). A variable landscape with multiple focal points.				
Perceptual Qualities	**Low**	**Low-moderate**	**Moderate**	**Moderate-high**	
	A settled, in places semi-rural landscape. Locally tranquil but often affected by the noise and movement of busy roads and railway lines.				
Scenic Qualities	**Low**	**Low-moderate**	**Moderate**	**Moderate-high**	**High**
	The area is of variable scenic quality being partly attractive countryside but having an urban fringe character with detractor elements in places. It is locally of high scenic quality in and around historic parklands, and where it lies close to the incised valley landscapes and forms part of wider views of a high scenic quality. Those parts of the LCT fall within areas formerly identified in the City of Durham, Sedgefield and Chester-le-Street Local Plans as Area of High Landscape Value. The LCT is notable for the number of historic parklands it contains including parts of registered parks of Lambton (II), Lumley(II), Croxdale (II*) and Brancepeth (II) which are of a high scenic value.				

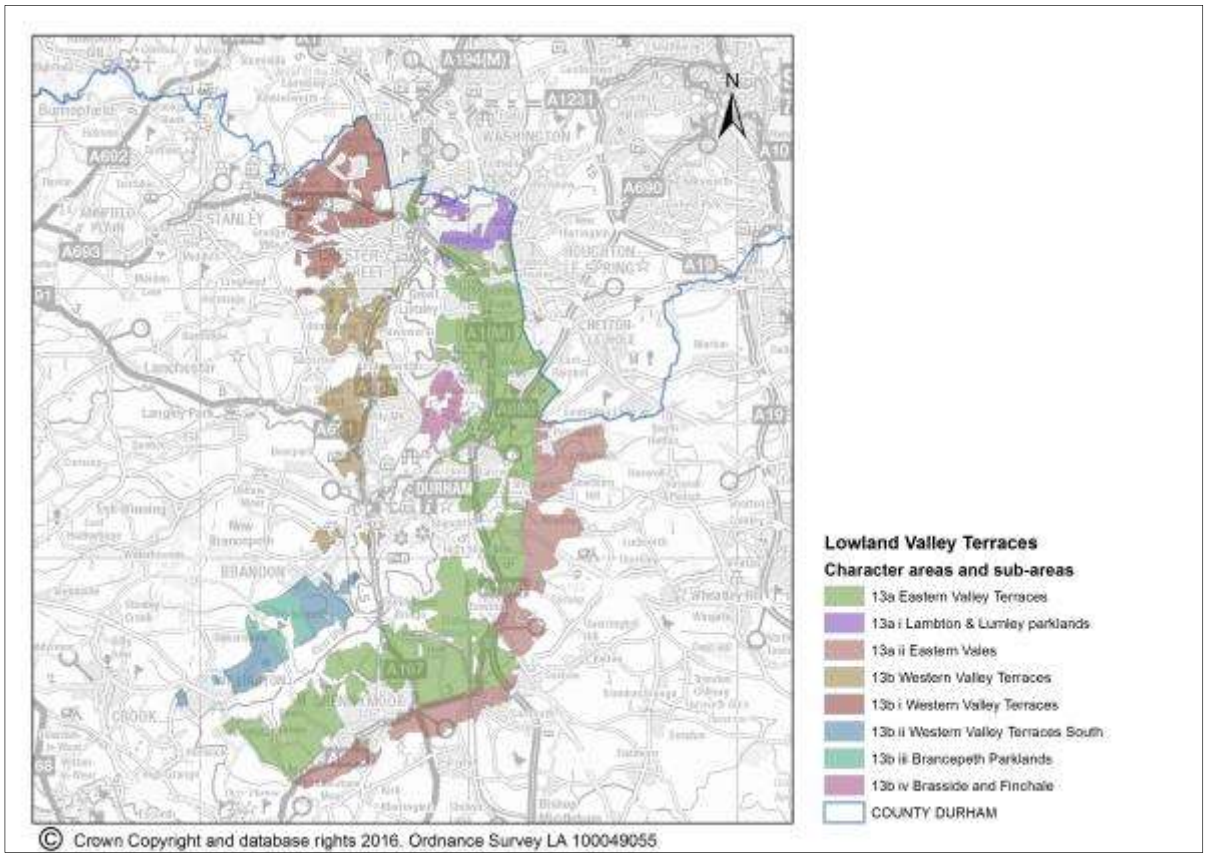

Figure 47: Map of BLT13 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.81 The simple topography, broad scale of landcover, semi-rural character and the presence of vertical structures would indicate a moderate sensitivity to turbines of most scales. This would be the case for both single turbines and turbines in smaller clusters (typically 3 – 5 turbines) which reflect the scale and pattern of landcover. Sensitivity to larger arrays or more uniform geometrical layouts would be higher.

5.82 For medium, medium-large and large turbines sensitivity is elevated in many areas by its role as part of the setting of the WHS and other important landmarks, inter-visibility with neighbouring LCTs, and scale- effects in views of the escarpment to the east. It is also locally elevated in and around areas of historic parkland (13a (i) Lambton and Lumley, 13b (iii) Brancepeth) and in enclosed vales (13a (ii) Eastern Vales) close to the Limestone Escarpment.

5.83 Sensitivity to small-medium turbines is generally moderate although locally higher in and around areas of historic parkland, in areas forming part of the setting of the WHS (13b (iv) Brasside and Finchale) and towards the limestone escarpment (13a (ii) Eastern Vales). Sensitivity to small turbines is generally low to moderate due to the degree of enclosure in the landscape at a local level and the abundance of vertical elements (trees, woodlands) of comparable scale. This would be locally higher in areas of historic parkland. Small turbines typically occur as single features: sensitivity to groups or arrays of smaller turbines would be higher.

Table 56: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
13a Eastern Valley Terraces	L	M	MH	MH	MH
13 a (i) Lambton and Lumley parklands	M	H	H	H	H
13 a (ii) Eastern Vales	M	MH	H	H	H
13b Western Valley Terraces	L	M	MH	MH	H
13b (i) Western Valley Terraces North	L	LM	M	M	MH
13b (ii) Western Valley Terraces South	L	M	MH	MH	H
13b (iii) Brancepeth parklands	M	H	H	H	H
13b (iv) Brasside and Finchale	M	MH	MH	H	H

Existing development and cumulative effects

Table 57: Operational and permitted turbines in BLT 13

BLT13: Lowland Valley terraces	Category				
	A	B	C	D	E
Operational and permitted turbines	1	0	0	0	0

5.84 There is currently only one turbine approved within this LCT. Turbines are often visible on distant skylines to the east and west. There are currently no significant cumulative effects. There is a potential for development in this LCT to have cumulative effects with that in neighbouring LCTs on the setting of the World Heritage Site which lies within the neighbouring Incised Lowland Valleys LCT.

East Durham Limestone Plateau County Character Area

BLT14 Limestone Escarpment

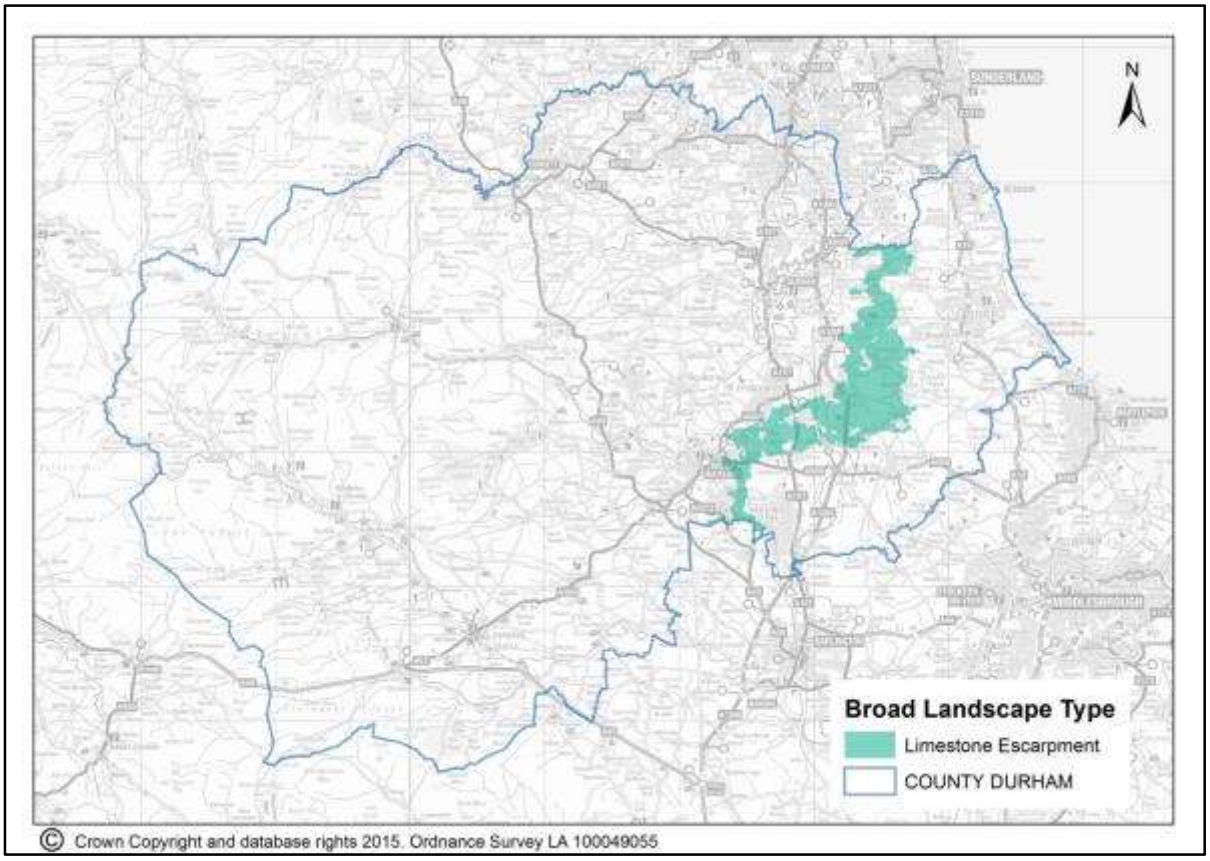

Figure 48: Map of BLT14 Limestone Escarpment

5.85 Key Characteristics

- A low escarpment, deeply dissected in places to form a series of short valleys between well-defined spurs.
- Occasional steep-sided incised valleys and glacial melt-water channels.
- Gently rounded topography of soft magnesian limestones covered in places by glacial drift.
- Thin calcareous soils over limestones with heavier clays on boulder clay and brown earths on glacial sands and gravels.
- Open, predominantly arable farmland, with pasture on steeper slopes.
- Remnants of limestone grassland on the thin soils of scarp slopes, spurs, ridge tops and incised valleys.
- Varied limestone plant communities in abandoned limestone quarries.
- Semi-regular patterns of medium and large-scale fields bounded by low, clipped hawthorn hedges.
- Few trees – thinly scattered hedgerow ash.

- Sparsely wooded – ancient ash woodlands and areas of hawthorn scrub on steep spurs and vale-sides.
- Occasional small 'green' villages on ridge tops and valley floors. Scattered mining towns and villages.
- Large limestone quarries often in prominent locations on ridges and spurs.
- A visually open landscape with panoramic views across the surrounding lowlands.
- Rural in character in places but with a semi-rural or urban fringe quality in settled areas.

Table 58: Sensitivity profile BLT14 Limestone Escarpment

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform			**Moderate**	**Moderate-high**	**High**
	Complex irregular topography of escarpment spurs and valleys. Relatively modest scale: generally around 50-60m elevation expressed in steeper scarps and vale-sides. Locally simpler and larger in scale at the eastern transition with the plateau. Locally disturbed by quarry workings.				
Landcover		**Low-moderate**	**Moderate**	**Moderate-high**	
	Some variety in land cover. Typically a medium to large scale mosaic of arable farmland and pasture. Field systems are semi-regular in form. Woodlands are sparse, generally following steeper topographic features, and are sinuous and irregular. These are locally augmented with planned blocky plantations of historic parks and land reclamation schemes. Tree cover is otherwise low. Small scale features – hedgerow and parkland trees, and domestic buildings – vary in frequency being often sparse but locally abundant.				
Visibility and views			**Moderate**	**Moderate-high**	**High**
	A visually open landscape with commanding panoramic views across adjoining lowlands and across sequential spurs along the escarpment. Generally experienced in deep views from sloping ground and lower ground. Locally in more shallow views at the eastern transition with the plateau. High levels of inter-visibility with adjacent LCTs and particularly Wear Lowlands. Forms the backdrop to important views of Durham Castle and Cathedral, which are also landmark features in views out. Forms part of the wider setting of the WHS and contributes to its OUV. In more settled areas it forms part of the backdrop to views of and from local settlements.				
Skylines		**Low-moderate**	**Moderate**	**Moderate-high**	
	Skylines are varied, often prominent and locally distinctive. Some skylines are undeveloped or with important landmark features. Urban form is prominent on others. Some tall vertical elements locally including high voltage transmission lines (to 50m). A variable landscape with multiple focal points in places.				
Perceptual Qualities	**Low**	**Low-moderate**	**Moderate**		
	A settled semi-rural landscape. Locally tranquil but affected in places by noise and movement on busy roads.				
Scenic Qualities		**Low-moderate**	**Moderate**	**Moderate-high**	
	Variable scenic quality with some attractive and picturesque rural landscapes but with relatively widespread detractors including limestone quarries, roads and overhead transmission lines. A small area in the north was identified in the City of Durham Local Plan as an Area of High Landscape Value. The LCT contains no registered parks but some small parklands of local interest.				

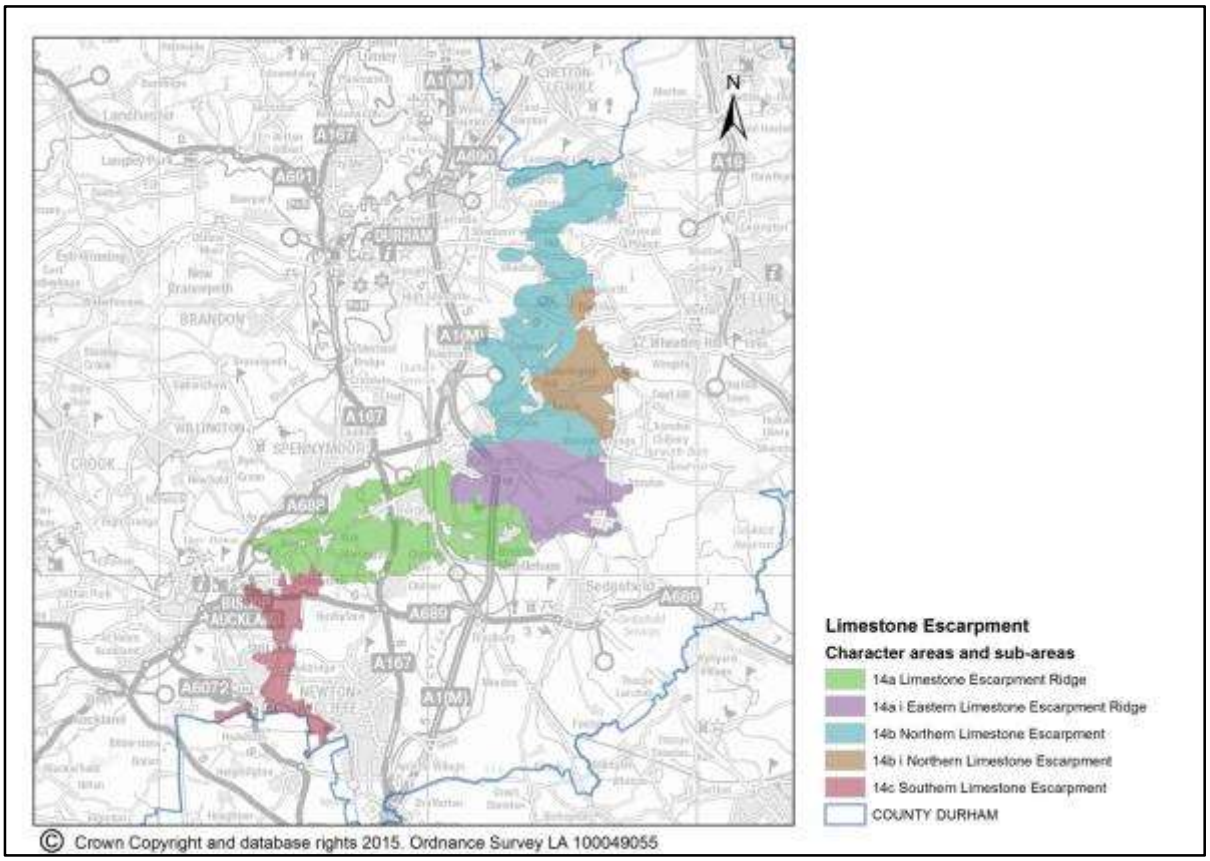

Figure 49: Map of BLT14 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.86 While the settled semi-rural character of this LCT and the scale and character of landcover would indicate a moderate sensitivity to development of tall structures, the character and scale of the escarpment topography and its importance as a skyline in views from the west, and of the WHS in particular, make it of generally higher sensitivity to turbines of medium and larger scales. This would be the case for both single turbines and turbines in clusters or larger arrays.

5.87 This sensitivity decreases where the scarp broadens (14a (i) Eastern Limestone Escarpment Ridge) and merges with the Clay Plateau LCT to the east (14b (i)). This would be the case for both single turbines and turbines in smaller clusters (typically 3 – 5 turbines) which reflect the scale and pattern of landcover. Sensitivity to larger arrays or more uniform geometrical layouts would be higher.

5.88 Sensitivity to turbines of small-medium scale would be moderate to high within the well-defined spur and vale topography of the northern escarpment and the escarpment ridge west of Ferryhill. This sensitivity decreases in areas of less defined form away from the edge of the scarp and in areas transitional with the Lowland Plain LCT in the south- east. Sensitivity to small turbines would be generally low to moderate although locally higher on the more prominent edges of the escarpment spurs. Turbines in these size ranges typically occur as single features: sensitivity to groups or arrays would be higher.

Table 59: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category

	A	B	C	D	E
14a The Limestone Escarpment Ridge	M	MH	MH	MH	H
14a (i) Eastern Limestone Escarpment Ridge	L	M	M	MH	H
14b The Northern Limestone Escarpment	M	MH	MH	MH	H
14b (i) Areas transitional with the Clay Plateau to the east	L	LM	M	M	MH
14c The Southern Limestone Escarpment	LM	M	MH	MH	MH

Existing development and cumulative effects

Table 60: Operational and permitted turbines in BLT14

BLT14: Limestone Escarpment	Category				
	A	B	C	D	E
Operational and permitted turbines	3	1	0	6	0

5.89 There are currently a small number of small and small-medium turbines scattered across this LCT. There are two clusters of medium-large turbines in the central part of the area (1 operational, 1 approved) which will form a relatively continuous tract of wind farm landscape west of Fishburn and the Trimdons. A larger tract of wind farm landscape associated with wind farms on the adjacent Clay Plateau (Haswell Moor, High Haswell, and Hare Hill) covers the northern part of the escarpment. Beyond the county boundary to the north a similar tract of wind farm landscape associated with wind farms on the Clay Plateau (Great Eppleton, South Sharpley, High Sharpley) covers the escarpment in that area.

5.90 Further coalescence of wind farm landscape across the central and northern part of the Escarpment would result in a very high proportion of the northern part of this LCT having wind turbines as a defining characteristic. This could be avoided by maintaining strategic gaps between existing development complexes. Development of turbines of small-medium scale and above would need to be avoided in those areas for this to be achieved.

5.91 Extensions to, or re-powering of, existing wind farms might be accommodated without significant further cumulative effects. The development of additional turbines in those areas should otherwise be avoided and particularly where they do not match existing turbines in scale and character.

BLT15 Clay Plateau

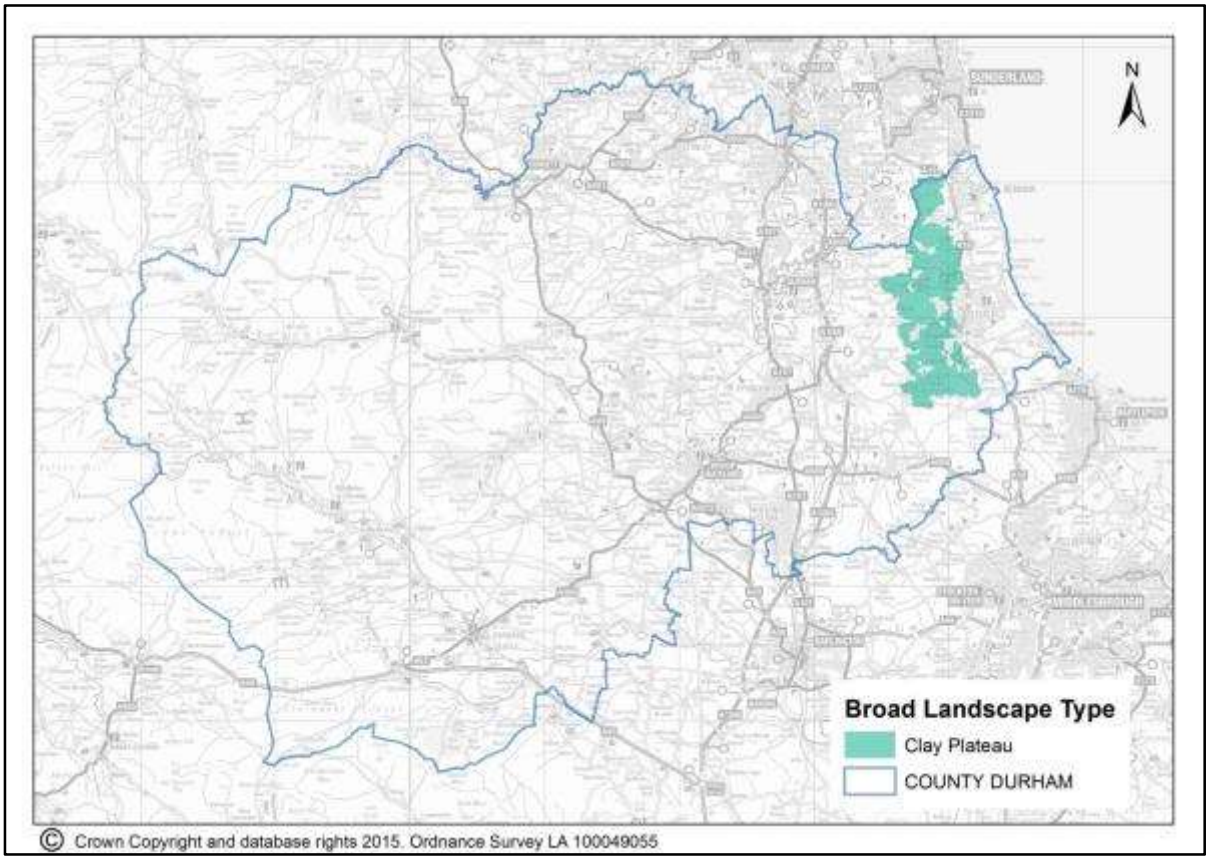

Figure 50: Map of BLT15 Clay Plateau

5.92 Key Characteristics

- Low plateau of flat, gently rolling or undulating terrain.
- Soft magnesian limestones are covered by a thick mantle of boulder clay.
- Heavy, seasonally waterlogged clay soils.
- Mosaic of improved pasture and arable cropping - mostly cereals and oilseed rape.
- Regular or semi-regular patterns of medium and large-scale fields bounded by low hawthorn hedges.
- Few trees – thinly scattered hedgerow ash, oak and sycamore.
- Sparsely wooded – occasional small broadleaved woods and larger conifer plantations.
- Scattered mining villages connected by a well-developed network of busy roads.
- Telecommunications masts and pylons frequently feature on the skyline.
- Areas of derelict colliery land, reclaimed land and old clay pits.
- Abandoned railway lines, many in use as cycle-ways.
- A visually open landscape, broad in scale, with a semi-rural or urban fringe quality in places.

Table 61 Sensitivity profile BLT15 Clay Plateau

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform	**Low**	**Low-moderate**			
	Broad scale simple gently rolling or undulating topography.				
Landcover		**Low-moderate**	**Moderate**		
	Generally a large scale mosaic of arable and pasture. Field systems are regular or semi-regular in form, often modified by field amalgamations. Few trees or woodlands but locally some areas heavily wooded and ordered with large blocky plantations. A settled landscape with extensive continuous or fragmented tracts of urban and industrial land. In rural areas the landcover is relatively consistent with broad tracts of similar character. In more heavily settled areas the pattern of landcover is more coarse, complex and varied with multiple focal points. Small scale features – hedgerow trees and domestic buildings – vary in frequency being generally sparse but locally common.				
Visibility and views	**Low**	**Low-moderate**	**Moderate**		
	A visually open landscape experienced in shallow views. Views are often shortened by undulating terrain. Some longer views from localised areas of higher ground. Relatively low levels of inter-visibility with adjacent LCTs.				
Skylines	**Low**	**Low-moderate**	**Moderate**		
	Skylines are not generally prominent and there are few notable landmark features. Urban form is locally evident on the skyline typically as low linear settlement edges. Tall vertical elements are relatively widespread including telecoms masts and high voltage transmission lines (to 50m) and wind turbines of varying scales to 115m. A variable landscape with multiple focal points.				
Perceptual Qualities	**Low**	**Low-moderate**	**Moderate**		
	A settled, in places semi-rural, landscape. Locally tranquil but often affected by the noise and movement of busy roads.				
Scenic Qualities	**Low**	**Low-moderate**	**Moderate**	**Moderate-high**	
	The area is of variable scenic quality being in places attractive countryside but having a semi-rural or urban fringe character elsewhere with detractive elements. Heavily wooded areas west of Wingate were identified in the Easington District Local Plan as Area of High Landscape Value.				

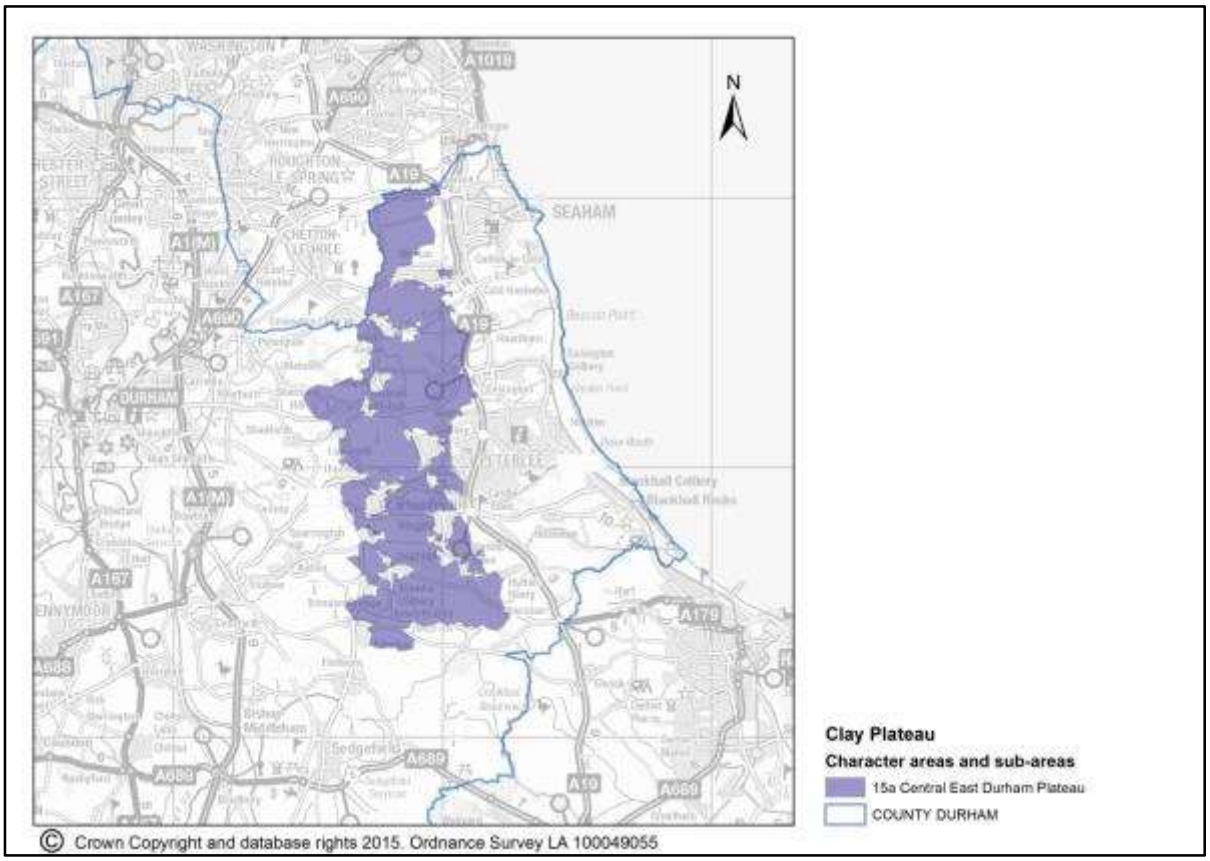

Figure 51: Map of BLT15 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.93 The simple topography, broad scale of landcover, semi-rural character and the presence of vertical structures would indicate a low or moderate sensitivity to turbines of most scales. This would be the case for single turbines or turbines in clusters (typically 3 – 7 turbines) which reflect the scale and pattern of landcover. Sensitivity to larger arrays or more uniform geometrical layouts would be higher.

Table 62: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
15a The Central East Durham Plateau	L	LM	M	M	M

Existing development and cumulative effects

Table 63: Operational and permitted turbines in BLT15

BLT 15: Clay plateau	Category				
	A	B	C	D	E
Operational and permitted turbines	1	0	3	11	5

5.94 There are currently few small turbines in this LCT. There are tracts of wind farm landscape associated with wind farms in the centre and north of the LCT; west and south of Haswell Plough (Haswell Moor, High Haswell, Hare Hill) and north of Murton (Great

Eppleton, South Sharpley, High Sharpley). A smaller tract is emerging south of Murton associated with single medium and medium-large turbines in that area. The tract of wind farm landscape emerging west of the Trimdons in the neighbouring Escarpment spreads into the edge of the LCT in the south-west. A large tract of wind farm landscape associated with the Butterwick / Walkway wind farms lies close to the southern edge of the LCT.

5.95 Further coalescence of wind farm landscape across the Clay Plateau would result in a very high proportion of this LCT having wind turbines as a defining characteristic. This could be avoided by maintaining strategic gaps between existing development complexes within the LCT, and in neighbouring LCTs. Development of turbines of small-medium and above would need to be avoided in those areas.

5.96 Extensions to, or re-powering of, existing wind farms might be accommodated without significant further cumulative effects. The development of additional turbines in those areas should otherwise be avoided and particularly where they do not match existing turbines in scale and character.

BLT16 Coastal Limestone Plateau

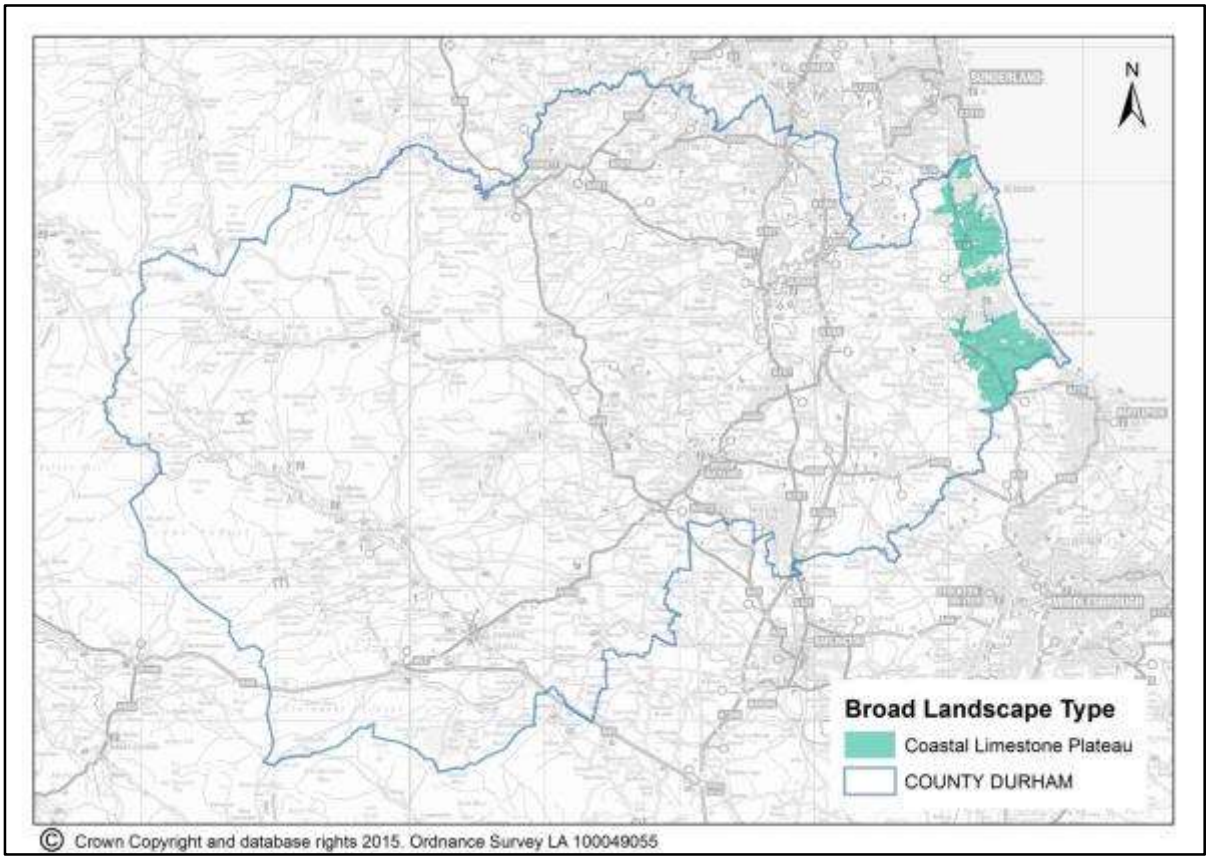

Figure 52: Map of BLT16 Coastal Limestone Plateau

5.97 Key Characteristics

- Low coastal plateau of rolling terrain, incised by narrow steep-sided denes.
- Gently rounded topography of soft magnesian and shell limestones covered in places by glacial drift of boulder clay, sands and gravels.
- Heavy, seasonally waterlogged clay soils and lighter brown earths.
- Predominantly arable farmland of cereals and oilseed rape.
- Semi-regular patterns of medium and large-scale fields bounded by low hawthorn hedges.
- An open landscape exposed to the sea with few trees or woodlands.
- Ancient ash woods in sheltered denes.
- Large mining towns and villages connected by a well-developed network of busy roads.
- Scattered older agricultural ‘green’ villages connected by narrow winding lanes.
- Occasional areas of parkland and estate farmland rich in hedgerow trees.
- A visually open landscape, broad in scale but with spaces defined by the rolling terrain.
- The sea is often visible forming the eastern horizon.

- A semi-rural or urban fringe quality in places.

Table 64 Sensitivity profile BLT16 Coastal Limestone Plateau

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform	**Low**	**Low-moderate**	**Moderate**	**Moderate-high**	
	Broad scale simple gently rolling or undulating topography locally incised by narrow denes. Some localised areas of discrete well defined knolls and low hills (20 -30m height).				
Landcover		**Low-moderate**	**Moderate**	**Moderate-high**	
	Generally a large scale mosaic of arable and pasture. Field systems are regular or semi-regular in form, often modified by field amalgamations. Woodlands are sparse, generally following incised denes, and are sinuous and irregular. These are locally augmented with planned blocky plantations of historic parklands. In rural areas the landcover is relatively consistent with broad tracts of similar character. In more heavily settled areas the pattern of landcover is more coarse, complex and varied with multiple focal points. Small scale features – hedgerow trees and domestic buildings – vary in frequency being generally sparse but locally abundant.				
Visibility and views		**Low-moderate**	**Moderate**	**Moderate-high**	
	A visually open landscape often experienced in shallow views. Views are restricted in places by undulating terrain but there are longer views from localised areas of higher ground and open views towards the coast and the sea across falling ground. Locally the landscape is visually enclosed in areas of parkland and wooded estate farmland. Relatively low levels of inter-visibility with the Clay Plateau LCT but high levels of inter-visibility in places with the Limestone Coast LCT.				
Skylines		**Low-moderate**	**Moderate**	**Moderate-high**	
	Skylines are not generally prominent and there are few notable landmark features. Locally there are areas with more varied and distinctive skylines with landmark hills. Urban form is locally evident on the skyline typically as low linear settlement edges. There are few tall vertical elements other than in westward views across the Clay plateau LCT. A variable landscape often with multiple focal points but with some simple and uncluttered sea-ward views.				
Perceptual Qualities		**Low-moderate**	**Moderate**	**Moderate-high**	
	A settled landscape with a rural character in places but more often semi-rural. Locally tranquil but affected in places by the noise and movement of busy roads.				
Scenic Qualities		**Low-moderate**	**Moderate**	**Moderate-high**	**High**
	The area is of variable scenic quality being in places attractive countryside but having a semi-rural or urban fringe character elsewhere with detractive elements. Views of the sea are a notable feature of areas of higher ground, though often taking in urban areas. Landscapes associated with incised wooded denes across the area are identified in the Easington District Local Plan as Areas of High Landscape Value. The LCT contains historic parklands at Castle Eden (Grade II) which are of a high scenic value and smaller non-designated parks at Seaham Hall and Hardwick Hall.				

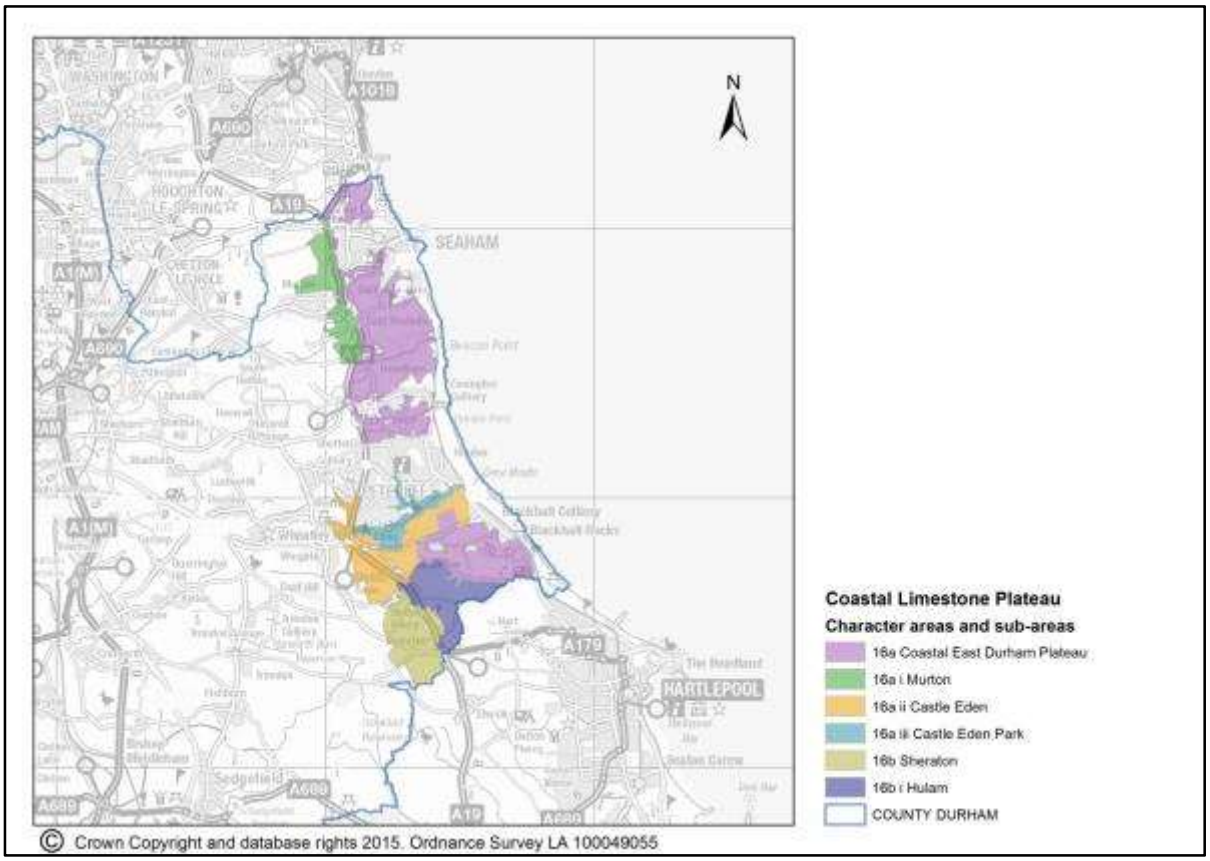

Figure 53: Map of BLT16 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.98 While the settled semi-rural character of this LCT and the scale and character of landform and landcover would indicate a moderate sensitivity to development of tall structures, its visual openness and inter-visibility with the coast make it of moderate-high sensitivity to medium and larger scale turbines. Sensitivity is locally elevated in areas of higher scenic quality (16a (ii) Castle Eden and 16a (iii) Castle Eden Park) and complex topography (16b Sheraton). This would be the case for both single turbines and turbines in clusters or larger arrays.

5.99 Sensitivity is lower in areas with a weaker relationship with the coast and simple topography (16a (i) Murton and 16b (i) Hulam). This would be the case for single turbines or turbines in clusters or smaller groups (typically 3 – 7 turbines) which reflect the scale and pattern of landcover. Sensitivity to larger arrays or more uniform geometrical layouts would be higher.

5.100 Sensitivity to turbines of small and small medium scale is low to moderate in most areas, locally higher in areas of higher scenic quality (16 (ii) Castle Eden and 16 (iii) Castle Eden Park) and complex topography (16b Sheraton). Turbines in these size ranges typically occur as single features: sensitivity to groups or arrays would in some cases be higher.

Table 65: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
16a Coastal East Durham Plateau	LM	M	MH	MH	MH
16a (i) Murton	L	LM	M	M	M
16a (ii) Castle Eden	M	MH	MH	H	H
16a (iii) Castle Eden Park	M	H	H	H	H
16b Sheraton	M	MH	MH	H	H
16b (i) Hulam	L	LM	M	M	M

Existing development and cumulative effects

Table 66: Operational and permitted turbines in BLT16

BLT16 Coastal Limestone Plateau	Category				
	A	B	C	D	E
Operational and permitted turbines	0	0	1	0	0

5.101 There are currently no turbines within this LCT. A single medium-sized turbine has been approved on industrial land south of Seaham. An area of wind farm landscape associated with the High Volts wind farm lies on landscape of similar character to the immediate south of the county boundary. Tracts of wind farm landscape within the Clay Plateau LCT lie close in the north of the LCT.

5.102 Due to the degree of proximity to and inter-visibility with the Clay Plateau development in this LCT could contribute to the coalescence of wind farm landscapes across both LCTs. This could be avoided by maintaining separation distances between existing and new development of around 4 to 5 km. New turbines of small-medium size and above would need to be avoided in those areas to avoid a cluttered or straggling pattern of development emerging.

BLT17 Limestone Coast

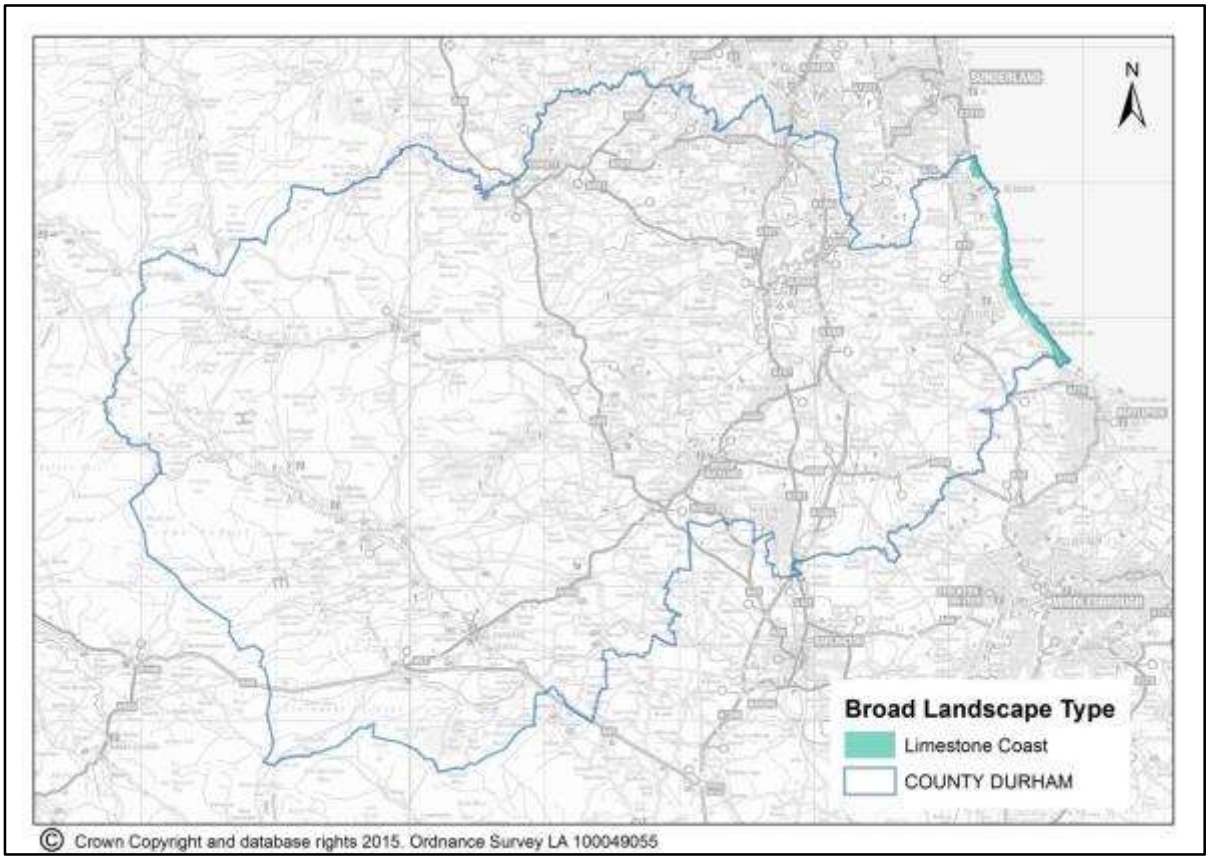

Figure 54: Map of BLT17 Limestone Coast

5.103 Key Characteristics

- Varied coast of shallow bays and headlands.
- Cliffs of pale magnesian limestone with crests of boulder clay, occasional caves and stacks.
- Sand or shingle beaches and rock platforms – despoiled in places by colliery wastes.
- Shallow denes cut down into the cliff-top boulder clay. Larger denes breach the limestone cliffs.
- Gently rolling cliff-top farmland of open arable fields or rough coastal grassland.
- Varied grassland flora – red fescue, sea plantain, and bloody cranesbill.
- Patches of wind-shaped blackthorn scrub with occasional hazel and juniper on clay slopes and cliff top denes.
- Ancient woodlands of ash, oak, wych elm and yew in deeper sheltered dene-mouths.
- Localised sand dunes with marram grass, sea couch and red fescue.
- Generally undeveloped other than the port and sea front of Seaham and localised caravan parks and recreation facilities.

- Bordered inland by the coastal railway line or the edges and allotment gardens of mining settlements.
- Areas of recently reclaimed colliery land.
- A visually open landscape with extensive views out across the North Sea.
- A natural coastline damaged in places by colliery workings and with an urban fringe quality in places.

Table 67: Sensitivity profile BLT17 Limestone Coast

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform			**Moderate**	**Moderate-high**	**High**
	Complex natural coastal topography of sandy bays and rocky headlands, low cliffs, clay slopes and dunes. Cliffs and clay slopes typically in the region of 25 to 40m in height.				
Landcover		**Low-moderate**	**Moderate**	**Moderate-high**	**High**
	Landcover is varied with simple patterns of large arable fields and pasture above the cliffs and diverse mosaics of rough grassland, woodland and scrub on the cliff-top slopes and incised denes. Landcover within the immediate littoral zone is natural and varied. Small scale features are often sparse but locally abundant.				
Visibility and views			**Moderate**	**Moderate-high**	**High**
	A visually open landscape with shallow inland views across the Coastal Limestone Plateau LCT and a mixture of deep and shallow views along the coast and out to sea. Views along the coast to headlands and other landmark features are of particular importance.				
Skylines		**Low-moderate**	**Moderate**	**Moderate-high**	**High**
	Skylines are varied, being generally prominent and locally distinctive in the littoral zone. Viewed from the shore cliffs forming the skyline are generally natural and undeveloped. Development is often evident in less distinctive skylines in inland views from cliff top farmland. Tall features are generally absent from the coastal strip. Some pylons and turbines are visible as middle distance features in inland views but are not generally visible from the foreshore.				
Perceptual Qualities			**Moderate**	**Moderate-high**	**High**
	A maritime landscape in which many features are wholly natural, although affected in places by past mining activity and with an urban fringe quality to parts of its inland edge. Generally tranquil, particularly on the foreshore, but locally affected on its inland side by the noise and movement of settlements, busy roads and railway lines.				
Scenic Qualities		**Low-moderate**	**Moderate**	**Moderate-high**	**High**
	The area is of generally good or high scenic quality although inland views out of the LCT are often of poorer quality. Much of the coast is nationally defined as Heritage Coast and most was identified in the Easington District Local Plan as an Area of High Landscape Value.				

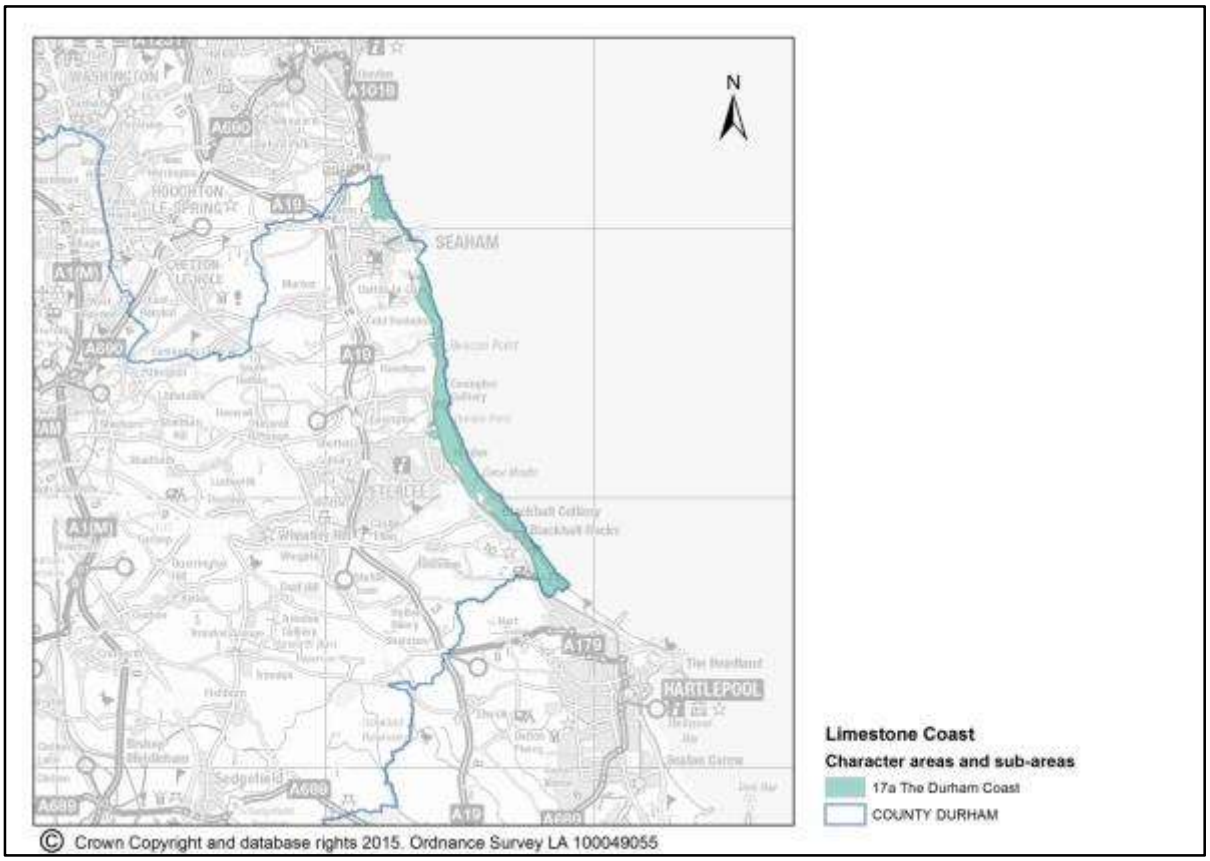

Figure 55: Map of BLT17 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.104 The varied small scale natural topography, diverse land cover, scenic quality and the strong sense of naturalness of the coast would indicate a generally high or moderate-high sensitivity to turbines of most scales. This would be the case for both single turbines and turbines in clusters or larger arrays.

Table 68: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
17a The Durham Coast	M	MH	MH	H	H

Existing development and cumulative effects

Table 69: Operational and permitted turbines in BLT17

BLT17 Limestone Coast	Category				
	A	B	C	D	E
Operational and permitted turbines	0	0	0	0	0

5.105 There are currently no turbines within this LCT.

Tees Lowlands County Character Area

BLT 18 Lowland Plain

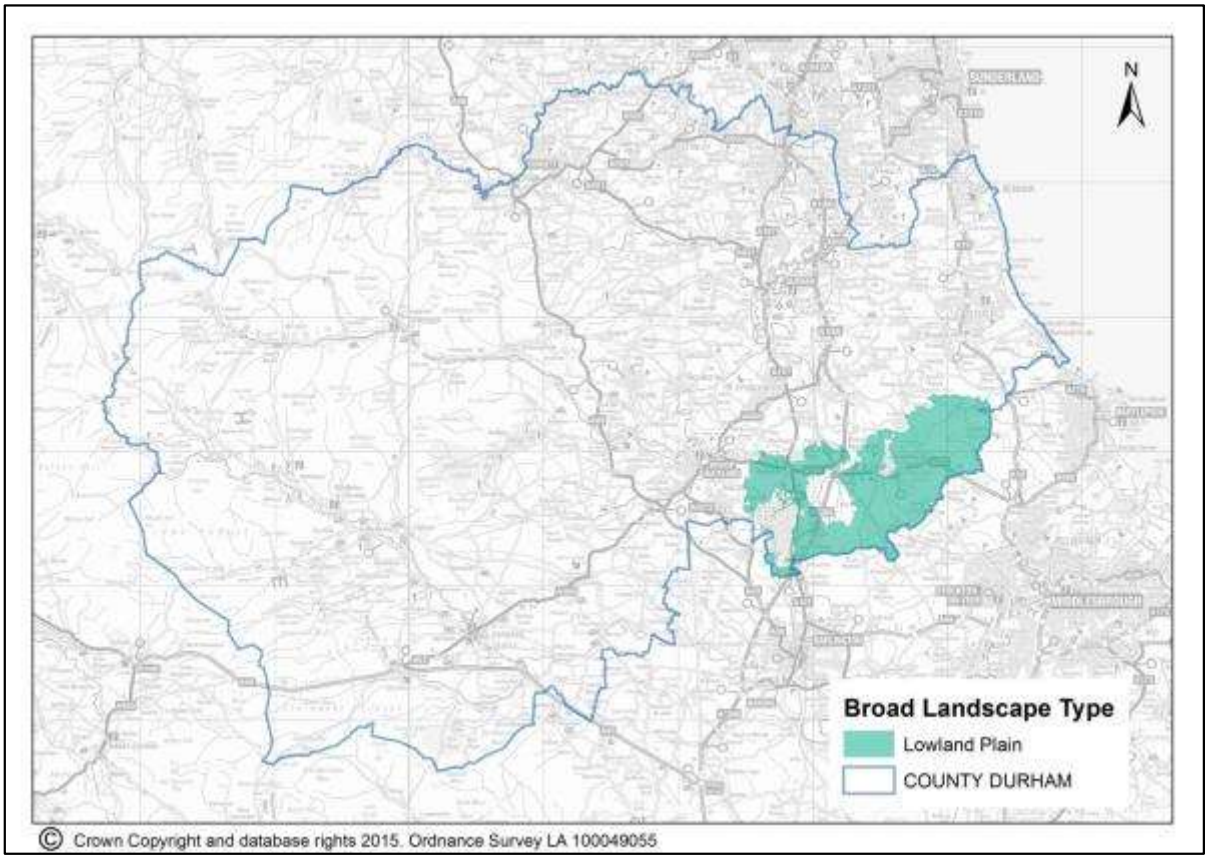

Figure 56: Map of BLT18 Lowland Plain

5.106 Key Characteristics

- Open lowland plain.
- Permian rocks are masked by a thick mantle of glacial clays, sands and gravels.
- Gently rolling or undulating topography with areas of flat or hummocky terrain.
- Seasonally waterlogged brown and reddish-brown clay soils with pockets of brown earths and brown sands.
- Mixed but largely arable farmland of cereals and oil-seed rape.
- Semi-regular patterns of old enclosures, often fragmented by amalgamation into large arable fields.
- Low clipped hawthorn hedges.
- Relics of rigg and furrow in older pastures.
- Few trees – thinly scattered hedgerow ash, oak and sycamore.
- Sparsely wooded but with some heavily wooded areas of old parkland and estate farmland.

- Nucleated pattern of small green villages connected by winding lands. Many shrunken or deserted medieval villages. Scattered farms.
- Busy trunk roads and overhead transmission lines in places.
- A visually open and broad scale landscape with long distance views to the Cleveland Hills to the south. Heavily wooded areas create a greater degree of enclosure and a more intimate scale.
- A sparsely settled rural landscape.

Table 70: Sensitivity profile BLT18 Lowland Plain

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform	**Low**	**Low-moderate**			
	Broad scale simple gently rolling or undulating topography.				
Landcover	**Low**	**Low-moderate**	**Moderate**	**Moderate-high**	
	Typically a medium to large scale mosaic of arable fields with some pasture. Field systems are semi-regular in form, locally modified by field amalgamations: landcover and boundary patterns are often not strongly legible in shallow views. Locally blocky woodland pattern reading as linear massing in shallow views. More varied and smaller scale landscapes in and around historic parks. Small scale features – hedgerow and parkland trees, and domestic buildings – are locally common.				
Visibility and views		**Low-moderate**	**Moderate**	**Moderate-high**	
	A visually open landscape generally experienced in shallow views but with some deeper views from higher ground in adjoining LCTs. Visually enclosed in varying degrees in more wooded areas. Some important views and vistas within historic parklands. Views to the Cleveland Hills to the south a common feature.				
Skylines		**Low-moderate**	**Moderate**	**Moderate-high**	
	Skylines are typically low and are not generally prominent or distinctive. Few landmark features. Cleveland hills with distinctive profile form a distant skyline in southward views. Tall vertical elements are locally evident including telecoms masts, high voltage transmission lines (to 50m) and wind turbines (to 110m). A varied landscape with multiple focal points.				
Perceptual Qualities		**Low-moderate**	**Moderate**		
	A settled rural landscape. Locally tranquil but often affected by the noise and movement of busy roads (A1(M), A689, A177, and A167) and railway lines.				
Scenic Qualities		**Low-moderate**	**Moderate**	**Moderate-high**	**High**
	The area is of variable scenic quality being generally attractive but unremarkable countryside with some detractor elements in places. It is locally of higher scenic quality in more wooded areas and particularly in and around historic parklands including those of Hardwick Hall (II*) and Windlestone Hall (II).				

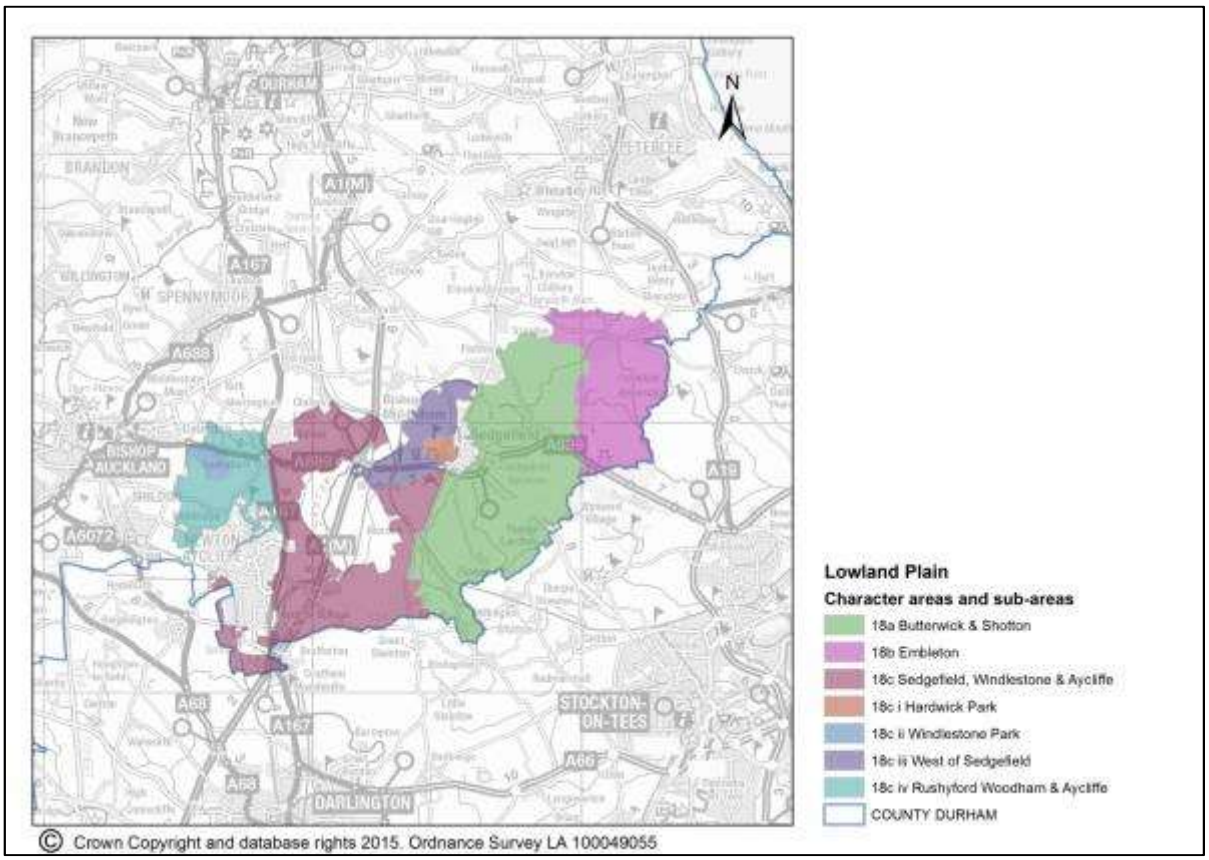

Figure 57 Map of BLT18 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.107 The simple topography, broad scale of landcover, shallow views and the presence of tall structures in places would indicate a generally moderate sensitivity to turbines of most scales. This would be the case for single turbines or turbines in clusters, groups and larger arrays (up to 17 turbines) reflecting the scale and pattern of landcover. Sensitivity to very large arrays or more uniform geometrical layouts would be higher. For medium to large turbines sensitivity is locally elevated in and around areas of parkland and wooded estate farmland and areas of higher scenic value (18c (i) Hardwick 18c (ii) Windlestone Park, 18c (iii) West of Sedgefield, 18c (iv) Rushyford Woodham & Middridge).

5.108 Sensitivity to small-medium turbines is generally low-moderate although locally higher in and around areas of historic parkland. Sensitivity to small turbines is generally low due to the degree of enclosure in the landscape at a local level and the abundance of vertical elements (trees, woodlands) of comparable scale. Turbines in these size ranges typically occur as single features: sensitivity to groups or arrays would in some cases be higher.

Table 71: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
18a Butterwick & Shotton	L	LM	M	M	M
18b Embleton	L	LM	M	M	M

18c Sedgefield, Windlestone & Aycliffe	L	LM	M	M	M
18c (i) Hardwick park	M	H	H	H	H
18c (ii) Windlestone Park	M	H	H	H	H
18c (iii) West of Sedgefield	L	M	MH	MH	MH
18c (iv) Rushyford, Woodham and Middridge	L	M	MH	MH	MH

Existing development and cumulative effects

Table 72: Operational and permitted turbines in BLT18

BLT18 Lowland Plain	Category				
	A	B	C	D	E
Operational and permitted turbines	4	0	0	1	17

5.109 There are currently few small turbines in this LCT. There is a large tract of wind farm landscape developing in the east of the LCT associated with the Butterwick / Walkway wind farms and the approved Red Gap Moor wind farm which lies beyond the county boundary. Similar tracts would develop in the south-east associated with approved wind farms at Lamb's Hill and Moorhouse which lie beyond the county boundary.

5.110 Further coalescence of wind farm landscape across the Lowland Plain would result in a high proportion of this LCT and the wider Tees Plain Character Area having wind turbines as a defining characteristic. This could be avoided by maintaining strategic gaps between and around existing development complexes within the LCT, and in neighbouring LCTs. Existing and permitted development is in the form of discrete clusters and larger groups. New turbines of small-medium size and above would need to be avoided in those areas to avoid a cluttered or straggling pattern of development emerging.

5.111 Extensions to, or re-powering of, existing wind farms might be accommodated without significant cumulative effects. The development of additional turbines in those areas should otherwise be avoided and particularly where they do not match existing turbines in scale and character.

BLT19 Lowland Carrs

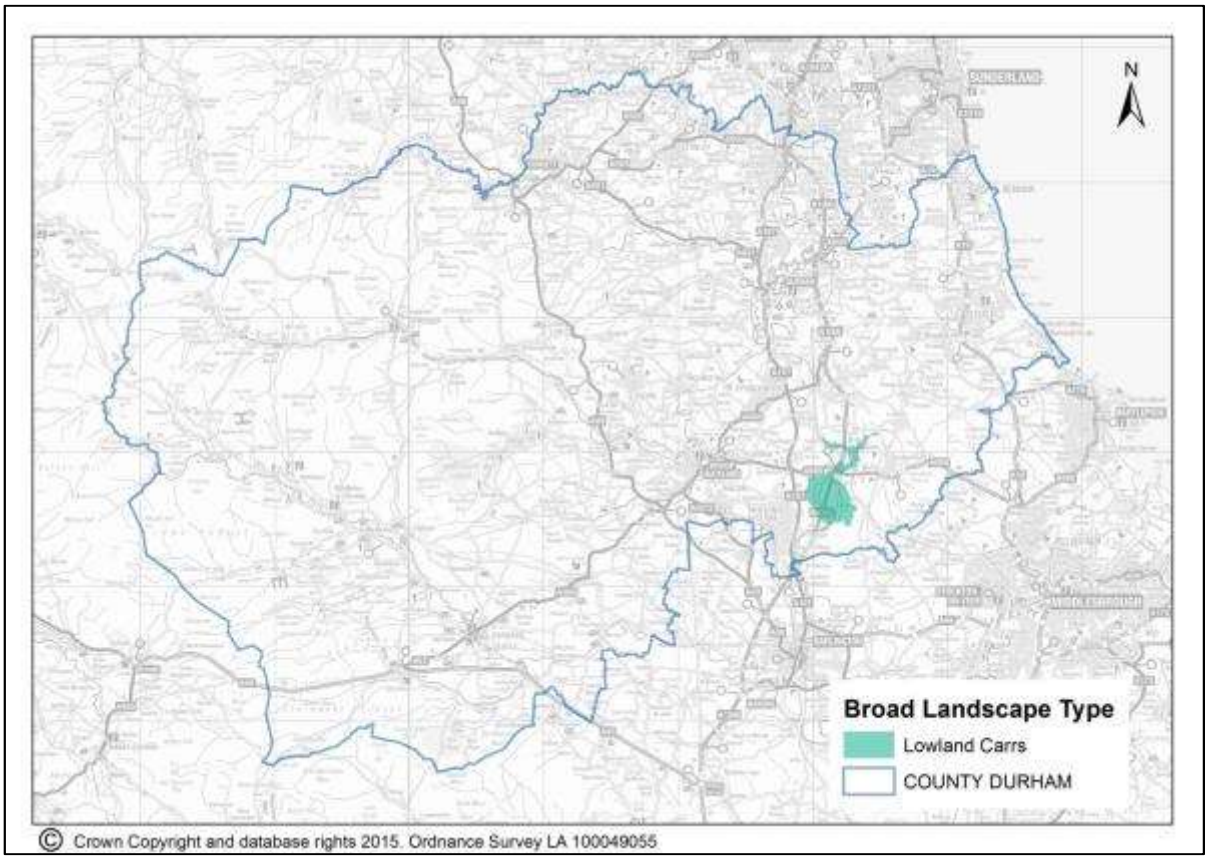

Figure 58: Map of BLT19 Lowland Carrs

5.112 Key Characteristics

- Flat, low lying and poorly drained carrs.
- Deep glacial clays overlain in places by alluvium and shallow peat.
- Seasonally waterlogged alluvial and brown clay soils with tracts of earthy peats.
- Arable and mixed farmland on higher lying ground. Improved and wet rushy pasture on poorly drained flats.
- Straight watercourses flanked by levees.
- Occasional pumping stations.
- Regular grids of water-filled ditches and wire fences on lower ground.
- Semi-regular field patterns of gappy thorn hedges on drier ground.
- Few trees – occasional willow along watercourses.
- Few woodlands – thinly scattered small broadleaved plantations.
- Occasional farms in the fringes of the carrs and on pockets of higher ground.
- Few roads or footpaths.

- The carrs are crossed by the A1 (M) and the East Coast Main Line railway line on raised embankments.
- A visually open landscape defined by the slightly higher ground of the surrounding lowland plain.
- A sparsely settled rural landscape with a strong sense of place.

Table 73: Sensitivity profile BLT19 Lowland Carrs

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform	**Low**				
	Simple gently undulating or flat topography				
Landcover	**Low**	**Low-moderate**			
	Typically a medium to large scale mosaic of arable and pasture. Field systems are semi-regular in form, locally modified by field amalgamations: landcover and boundary patterns are often not strongly legible in shallow views. Small scale features – hedgerow and parkland trees, and domestic buildings - are locally evident but absent in places.				
Visibility and views		**Low-moderate**	**Moderate**	**Moderate-high**	
	A visually very open landscape generally experienced in shallow views but with slightly deeper views from higher ground in the Isles and the fringes of adjoining LCTs. The openness of the landscape gives extensive inward views across the LCT. Some inter-visibility with the fringes of adjoining LCTs although inter-visibility of tall structures would be high due to low relative relief.				
Skylines		**Low-moderate**	**Moderate**	**Moderate-high**	
	Skylines are typically low and are not generally prominent or distinctive. Few landmark features. Cleveland hills with distinctive profile form a distant skyline in southward views. Slightly higher ground of surrounding Lowland Plain LCT often forms low intermediate skyline. Tall vertical elements are locally evident including high voltage transmission lines (to 50m). A varied landscape with multiple focal points.				
Perceptual Qualities			**Moderate**	**Moderate-high**	
	A sparsely settled rural landscape with strong sense of place. Identified in the Sedgefield Local Plan as having a special historic character. Remote and tranquil in places although affected locally by noise and movement on the busy A1(M) and East Coast Main Line railway line.				
Scenic Qualities		**Low-moderate**	**Moderate**		
	The area is of generally moderate scenic quality being attractive open countryside with some detractor elements locally evident.				

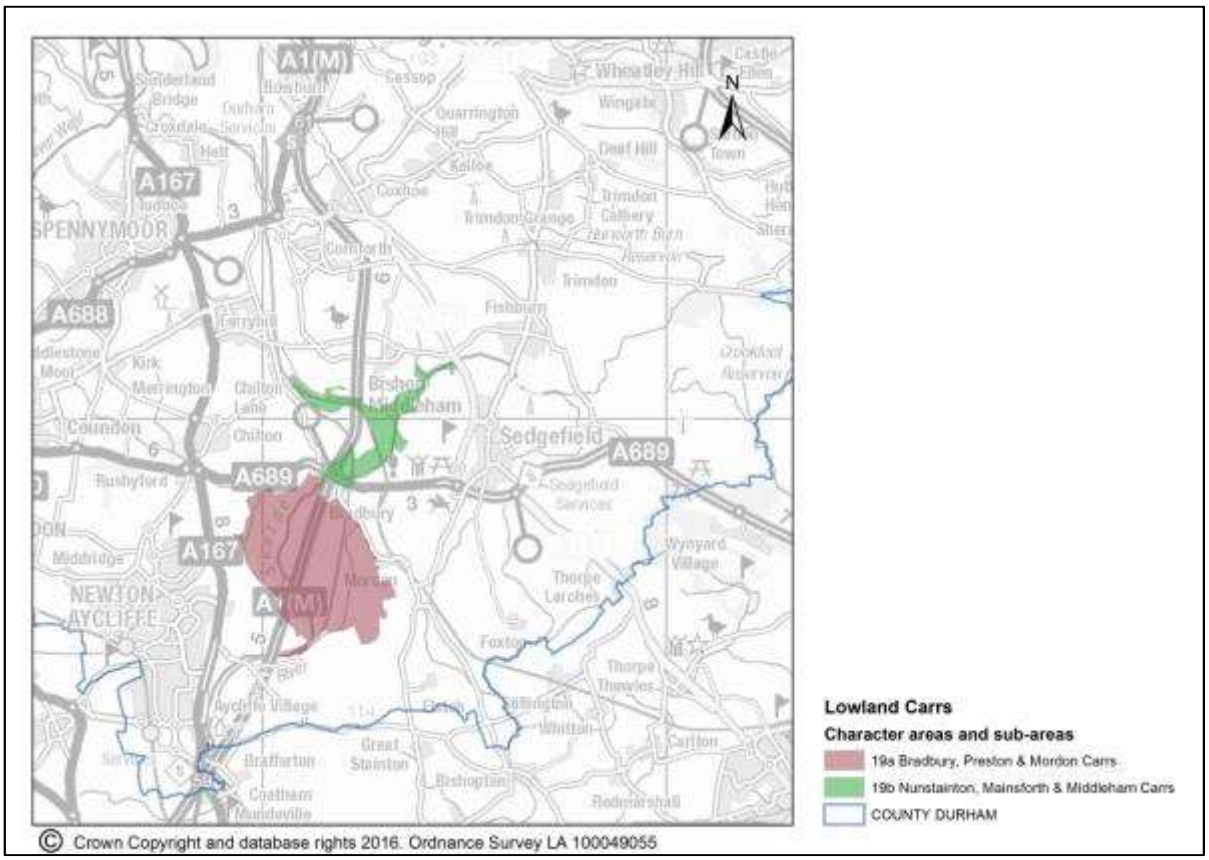

Figure 59 Map of BLT19 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.113 The simple topography, broad scale of landcover, shallow views and the presence of tall structures in places would indicate a generally low or moderate sensitivity to turbines of most scales. For larger turbine sizes this is elevated by the openness of the landscape which gives extensive inward views of this small and localised LCT as a whole in which tall structures would be omnipresent. Sensitivity would also be locally elevated in the narrow Nunstainton, Mainsforth and Middleham Carrs where inter-visibility with neighbouring LCTs would largely determine sensitivity. This would be the case for both single turbines and turbines in clusters or larger arrays.

5.114 Sensitivity to small to medium turbines is generally low to moderate, although locally higher for medium scale turbines in the narrow Nunstainton, Mainsforth and Middleham Carrs (19b). Turbines in these size ranges typically occur as single features: sensitivity to groups or arrays would be generally higher.

Table 74: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
19a Bradbury Preston and Morden Carrs	L	LM	M	MH	MH
19b Nunstainton, Mainsforth and Middleham Carrs	L	M	MH	MH	MH

Existing development and cumulative effects

Table 75: Operational and permitted turbines in BLT19

BLT19 Lowland Carrs	Category				
	A	B	C	D	E
Operational and permitted turbines	0	0	0	0	0

5.115 There are currently no turbines within this LCT. It lies close to emerging wind farm landscapes that may develop around the approved Moorhouse and Lamb's Hill wind farms beyond the county boundary to the south and south-east.

5.116 Development of larger scale turbines in this LCT could lead to further extension and coalescence of these wind farm landscapes resulting in a high proportion of the northern part of the wider Tees Plain character area having wind turbines as a defining characteristic. Existing and permitted development is in the form of discrete clusters and larger groups. New small medium and larger single turbines on the edges of a heavily developed resource area could lead to a less coherent and more straggling pattern of development emerging. This could be avoided by not developing medium, medium-large or large turbines in this LCT.

BLT20: Lowland River terraces

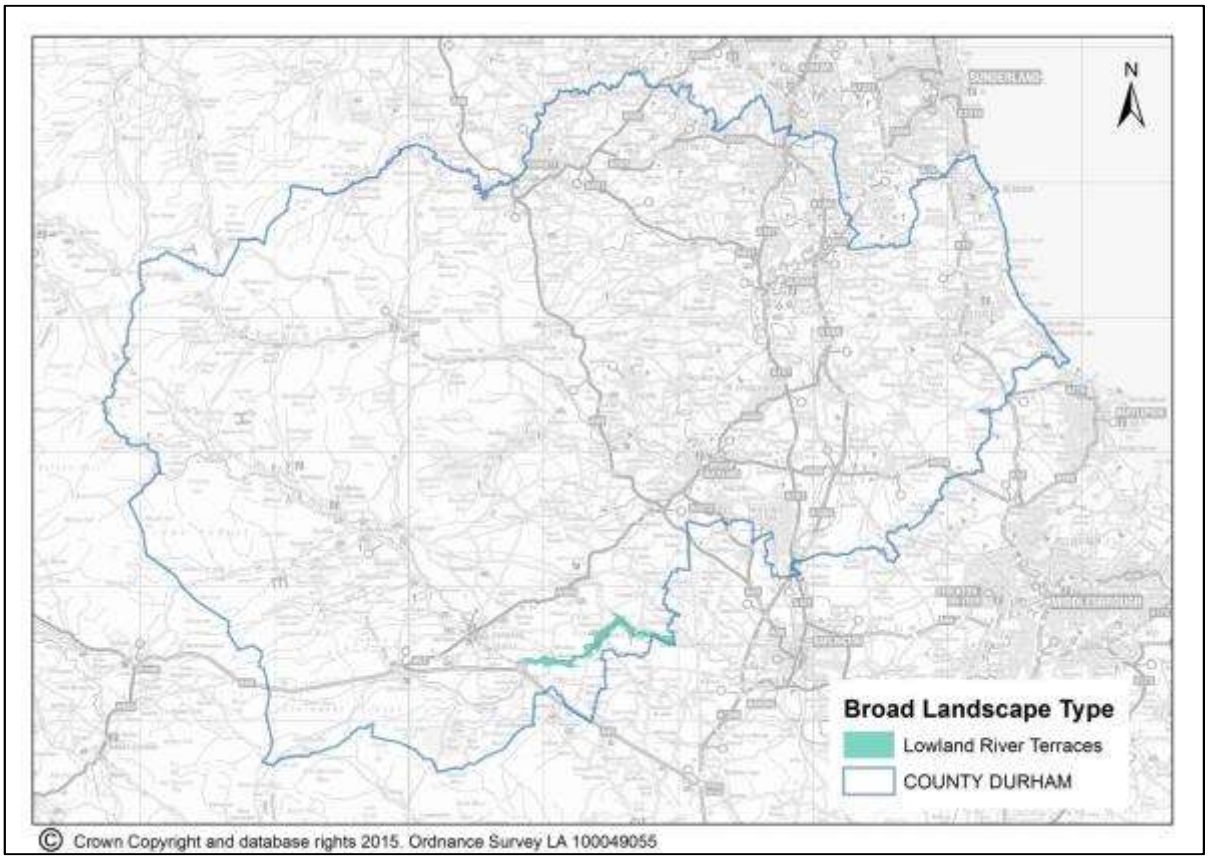

Figure 60: Map of BLT20 Lowland River Terraces

5.117 Key Characteristics

- Flat, narrow floodplain fringed in places by low, steep-sided bluffs.
- Coarse loamy and sandy soils on alluvial river terrace drift.
- Meandering rivers with alternating riffles and pools.
- Arable cropping on the floodplain.
- Semi-improved pastures on bluffs.
- Low hawthorn hedges with scattered hedgerow oak and ash.
- Fragments of rigg and furrow survive in older pastures.
- Ancient oak woodlands on steeper bluffs.
- Narrow riparian woods or tree lines of alder, oak, ash and willow on river banks.
- Old villages closely associated with the river, often on bridging or fording points.
- Buildings of local stone with roofs of slate or clay pan tile.
- Occasional recreational sites – lidos and caravan parks.
- A visually enclosed landscape of an intimate scale.
- A settled but tranquil rural landscape of high scenic quality and historical depth.

Table 76: Sensitivity profile BLT20 Lowland River Terraces

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform				**Moderate-high**	**High**
	Complex irregular topography of river terraces, steep bluffs and narrow flat floodplains. Small or modest scale: generally around 20-35m relative elevation expressed in steeper slopes.				
Landcover				**Moderate-high**	**High**
	Irregular mosaic of arable, pasture and woodland. Field systems are semi-regular in form. Woodlands generally follow topographic features and are narrow, sinuous and irregular. Locally augmented with planted woodlands of aesthetic design in historic parks and wooded estates. Small scale features – hedgerow trees, domestic and small farm buildings – are common.				
Visibility and views			**Moderate**	**Moderate-high**	**High**
	A visually complex landscape. Generally enclosed with shallow and short views, but with longer vistas in places along the river valley and some deeper views across and along the valley from higher ground. Some inter-visibility from its edges with adjacent Lowland Vale and Gritstone Vale LCTs but being incised below the level of the vale is generally visually isolated. For tall structures a high level of inter-visibility would be expected. There are infrequent but important views of and from landmark bridges and viaducts.				
Skylines				**Moderate-high**	**High**
	Skylines are very varied, often prominent and locally very distinctive. Most skylines are undeveloped although small villages may be locally evident. The landscape has a strong horizontal grain. Vertical elements and tall structures are generally absent. A variable landscape with multiple focal points.				
Perceptual Qualities			**Moderate**	**Moderate-high**	**High**
	A settled rural landscape with a rich cultural heritage. Generally very tranquil although affected locally by noise and movement on the busy A67.				
Scenic Qualities				**Moderate-high**	**High**
	The LCT is generally of high scenic quality as attractive countryside, in places very picturesque, with very few detractors. All of the LCT falls within an area formerly identified in the Teesdale Local Plan as Area of High Landscape Value. A number of historic parklands lie within or border onto this LCT including the registered park at Rokeby (II*), and parks of local interest at Thorpe Hall, Wycliffe Hall, Selaby Hall and Snow Hall which are of a high scenic value.				

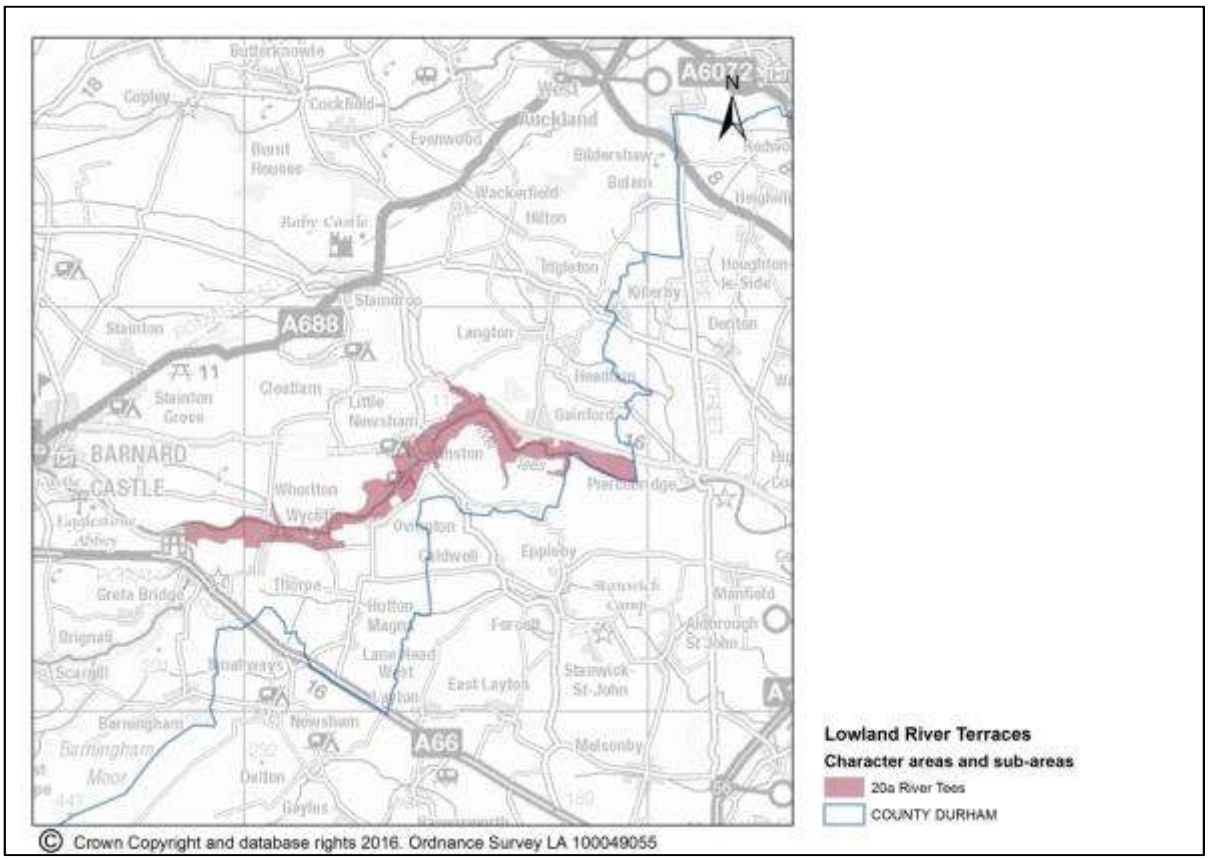

Figure 61 Map of BLT20 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.118 The complex natural topography with its well defined but small scale relief, varied landcover, high scenic quality and the importance of views and vistas indicate that this LCT is likely to be generally of high sensitivity to turbines of small-medium to large scale. This would be the case for both single turbines and turbines in clusters or larger arrays.

5.119 Sensitivity to small turbines is generally moderate due to the degree of enclosure in the landscape at a local level and the abundance of vertical elements (trees, woodlands) of comparable scale. Small turbines typically occur as single features: sensitivity to groups or arrays of smaller turbines would be higher.

Table 77: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
20a The River Tees	M	H	H	H	H

Existing development and cumulative effects

Table 78: Operational and permitted turbines in BLT20

BL20: Lowland River Terraces	Category				
	A	B	C	D	E
Operational and permitted turbines	1	0	0	0	0

5.120 There is currently a single small turbine in this LCT and little visibility of turbines in neighbouring LCTs. There are no significant cumulative effects.

BLT21: Lowland Vale

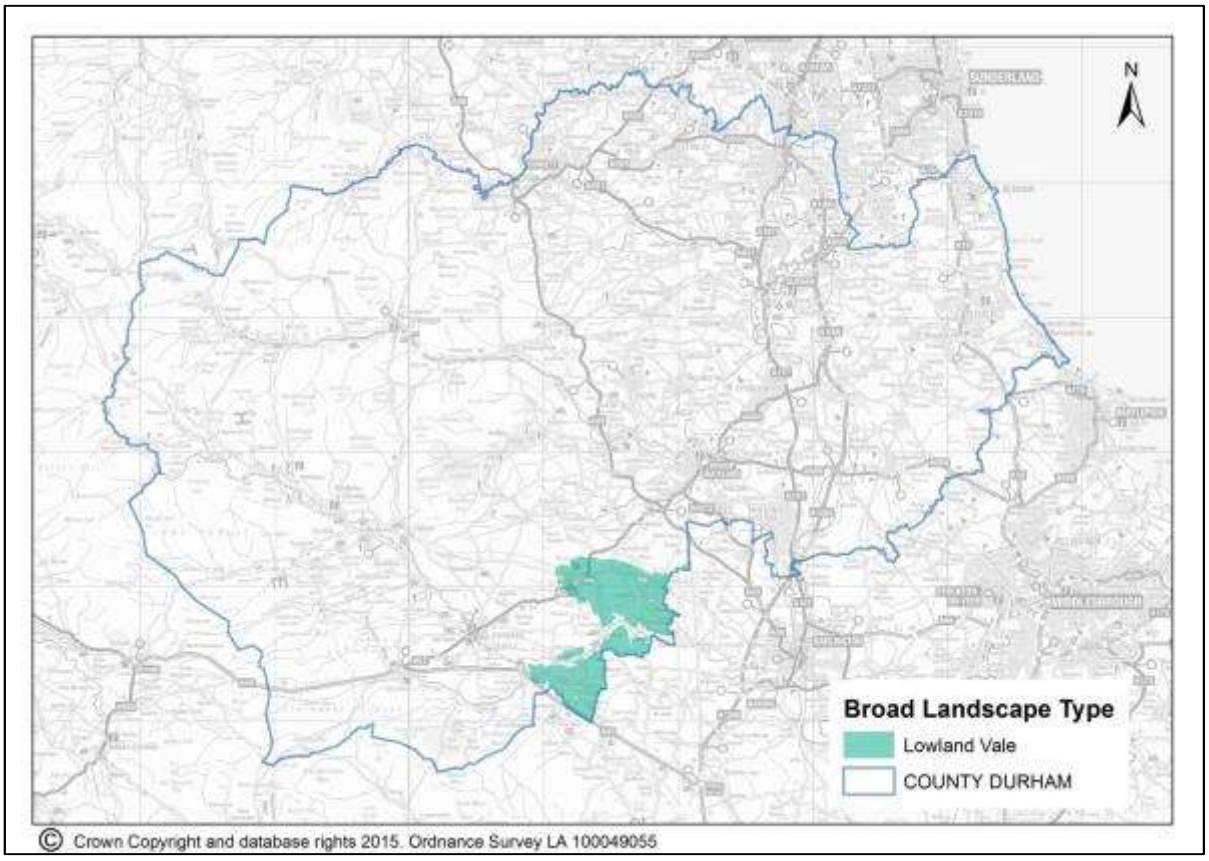

Figure 62: Map of BLT21 Lowland Vale

5.121 Key Characteristics

- Broad lowland vale.
- Varied Carboniferous and Permian rocks are covered by a thick mantle of drift.
- Gently rolling or undulating topography of glacial moraines, boulder clays and sands and gravels. Occasional flats.
- Seasonally waterlogged loamy clay soils and more free-draining brown earths.
- Mixed, but predominantly arable farmland – a mosaic of improved pasture and arable cropping.
- Semi-regular patterns of old enclosures bounded by thorn hedges.
- Relics of rigg and furrow in older pastures.
- Scattered hedgerow ash, oak and sycamore – abundant in places.
- Sparsely wooded but with some heavily wooded areas of old parkland and estate farmland.
- Nucleated pattern of small green villages connected by narrow, winding, hedged lanes.
- Buildings of local stone with roofs of clay pan tile. Farms of the Raby Estate are painted white.

- The high incidence of hedgerow trees creates a degree of enclosure in places, but the landscape remains fairly broad in scale with views to distant high ground.
- A tranquil settled rural landscape.

Table 79: Sensitivity profile BLT21 Lowland Vale

Attribute	Low	Low-moderate	Moderate	Moderate-high	High
Landform	**Low**	**Low-moderate**			
	Broad scale simple gently rolling or undulating topography.				
Landcover		**Low-moderate**	**Moderate**	**Moderate-high**	
	Typically a medium scale mosaic of arable and pasture. Field systems are semi-regular in form, locally modified by field amalgamations: landcover and boundary patterns are often not strongly legible in shallow views. Locally blocky woodland pattern reading as linear massing in shallow views. More varied and smaller scale landscapes in and around historic parks. Small scale features – hedgerow and parkland trees, and domestic buildings – are common.				
Visibility and views		**Low-moderate**	**Moderate**	**Moderate-high**	
	A visually relatively open landscape generally experienced in shallow views but with some deeper views across the vale from higher ground within the LCT and panoramic views from adjoining higher LCTs. Visually enclosed in varying degrees in more wooded areas. Some important views and vistas within historic parklands.				
Skylines			**Moderate**	**Moderate-high**	
	Skylines are typically low and are not generally prominent or distinctive. Occasionally formed by distant high ground. Few landmark features. Few tall vertical elements: some telecommunications masts. A varied landscape with multiple focal points of similar scale and character.				
Perceptual Qualities		**Low-moderate**	**Moderate**	**Moderate-high**	
	A settled but strongly rural and generally tranquil landscape. In most areas little movement other than natural forces, agricultural activities and traffic on minor roads. Locally affected by traffic on busy roads (A688, A66)				
Scenic Qualities		**Low moderate**	**Moderate**	**Moderate-high**	**High**
	The area is of generally high scenic quality being attractive countryside with few detractor elements. Much of the LCT falls within an area formerly identified in the Teesdale Local Plan as Area of High Landscape Value. A number of historic parklands lie within or border onto this LCT including registered parks at Raby (II*) and Rokeby (II*) and parks of local interest at Selaby, Langton, Wycliffe and Thorpe Hall.				

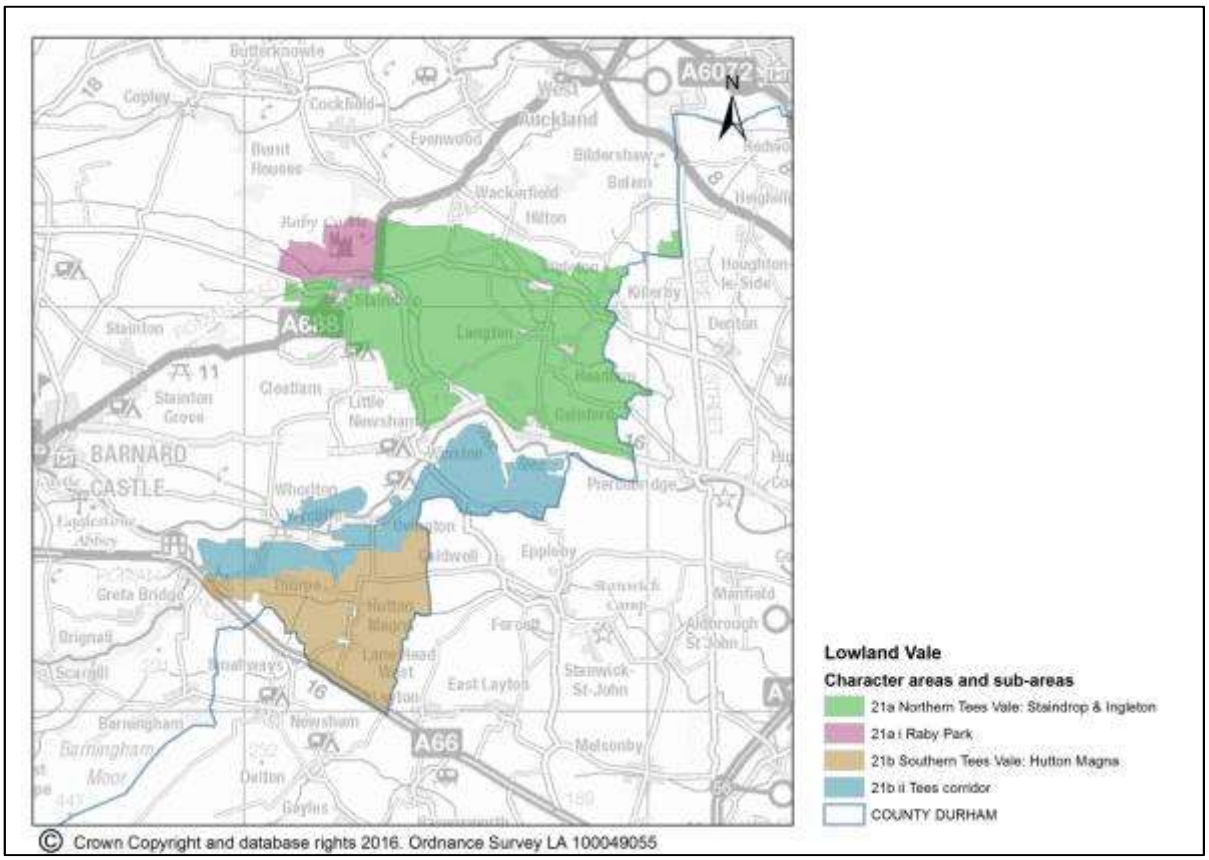

Figure 63 Map of BLT21 Character Areas and sub-areas

Sensitivity by character area / sub area to different turbine scales

5.122 The modest scale landcover of the vale, its tranquillity and absence of tall structures, scenic qualities, and its role in panoramic views from higher ground mean that this LCT is likely to be of moderate-high or high sensitivity to medium and larger scale turbines. This would be the case for both single turbines and turbines in clusters or larger arrays.

5.123 Sensitivity to small-medium turbines would be moderate although locally elevated in and around areas of historic parkland (21a (i) Raby Park and areas close to the incised valley landscapes of the Tees (21 b (i) Tees Corridor). Sensitivity to small turbines will be generally low or moderate due to the presence of vertical elements (trees, woodlands) of comparable scale. Turbines in these size ranges typically occur as single features: sensitivity to groups or arrays of smaller turbines would in many situations be higher.

Table 80: Sensitivity by character area / sub area

Character area / Sub-area	Sensitivity by category				
	A	B	C	D	E
21a Northern Tees Vale: Staindrop & Ingleton	L	M	MH	MH	MH
21a (i) Raby park	M	MH	H	H	H
21b Southern Tees Vale: Hutton Magna	L	M	MH	MH	MH
21b (i) Tees corridor	M	MH	H	H	H

Existing development and cumulative effects

Table 81: Operational and permitted turbines in BLT21

BLT 21 Lowland Vale	Category				
	A	B	C	D	E
Operational and permitted turbines	**2**	**1**	0	0	0

5.124 This LCT currently contains 2 small and 1 small-medium turbines. There are currently no significant cumulative effects.

Sensitivity Maps

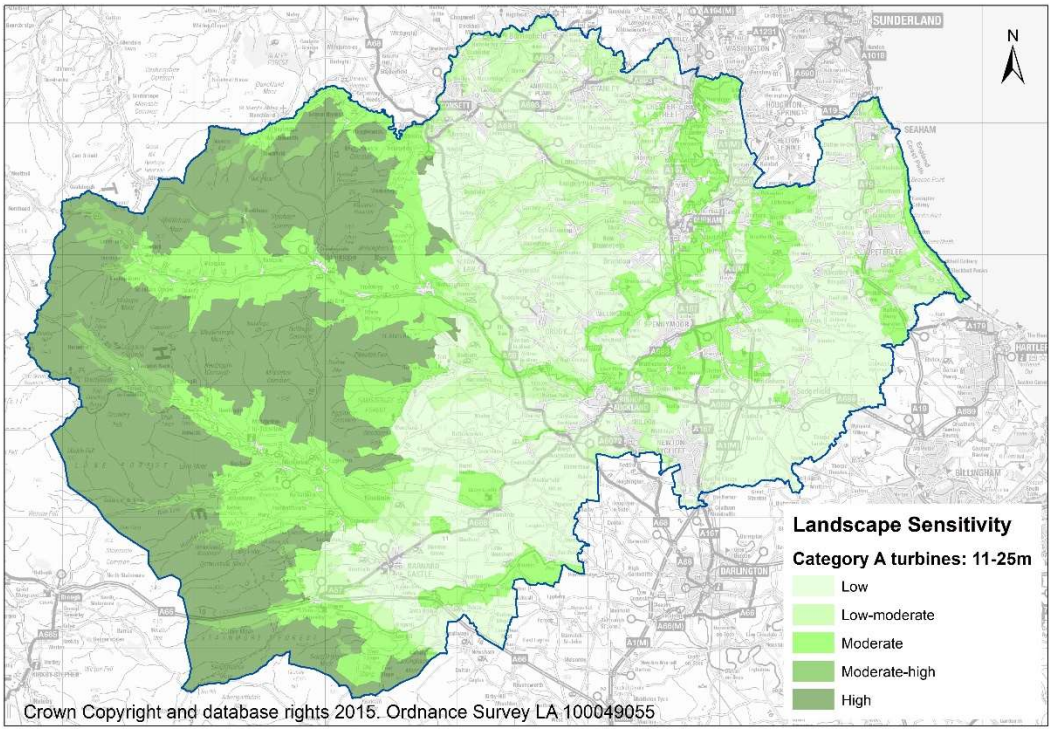

Figure 64 Landscape sensitivity to small (11-25m) turbines.

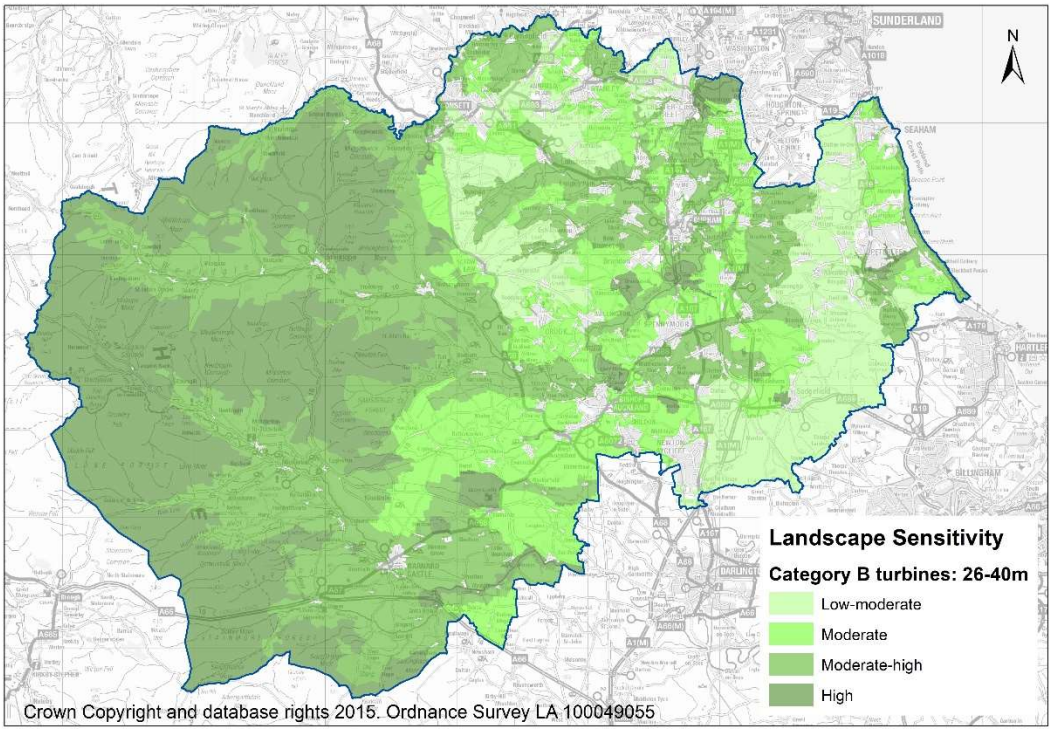

Figure 65: Landscape sensitivity to small-medium (26-40m) turbines.

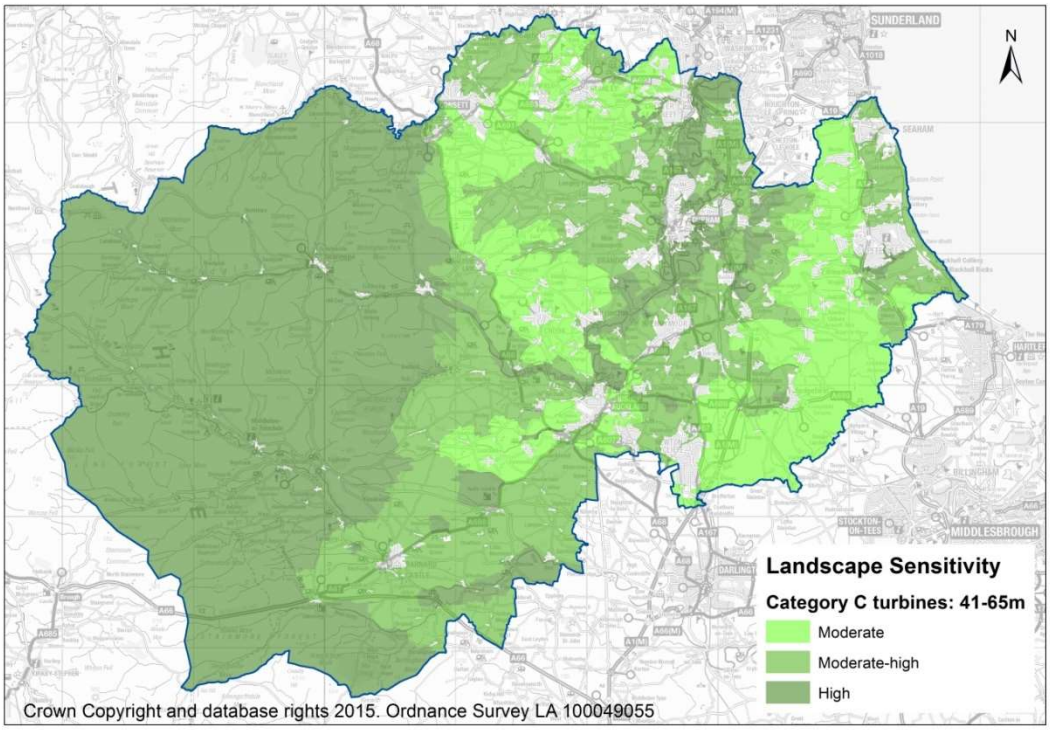

Figure 66: Landscape sensitivity to medium (41-65m) turbines.

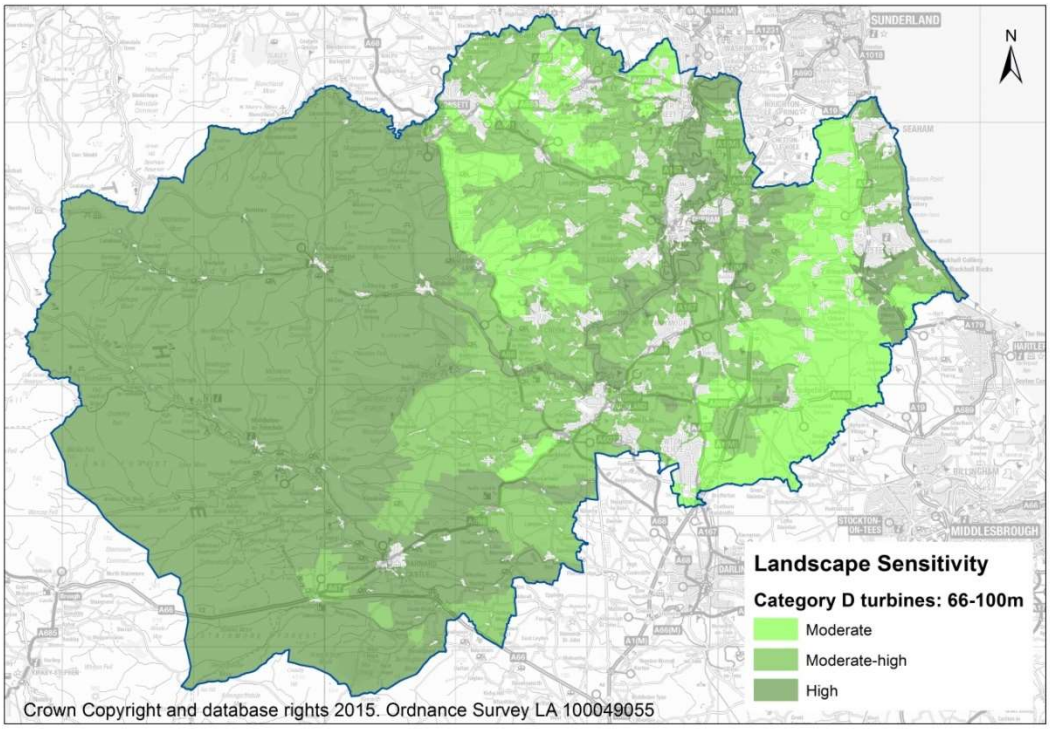

Figure 67: Landscape sensitivity to medium-large (66-100m) turbines.

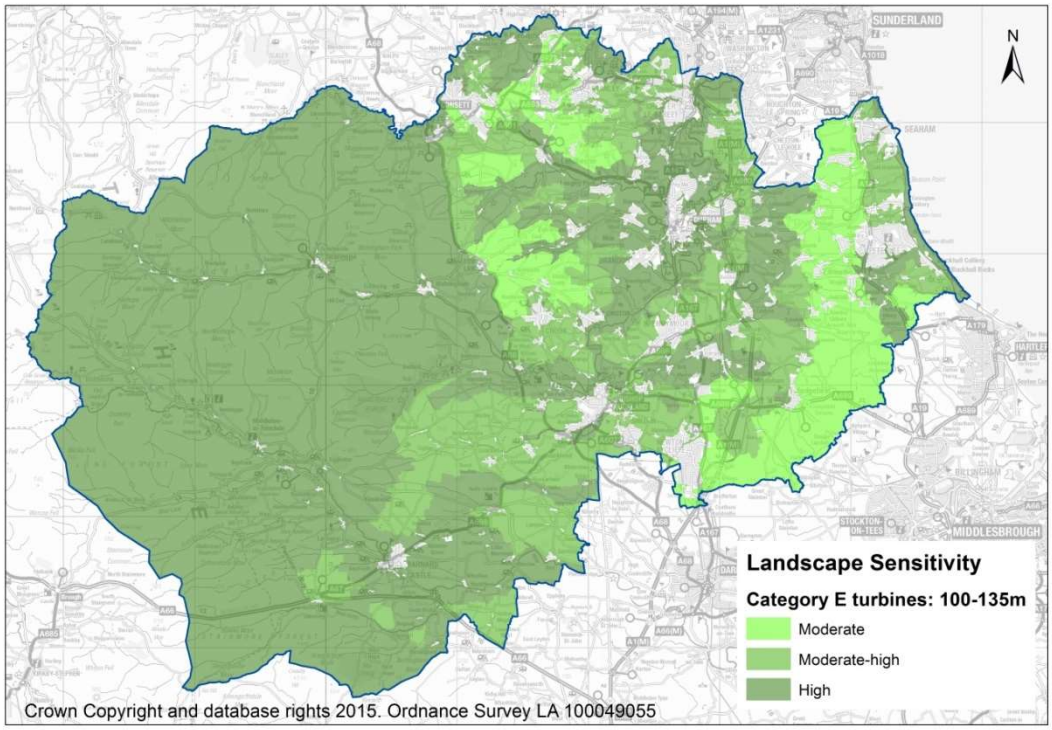

Figure 68: Landscape sensitivity to large (101-135m) turbines.

6 Potential suitable areas

Potential suitable areas for micro turbines (<11m)

6.1 Sensitivity and constraints for micro turbines have not been assessed in this study. Building-mounted and stand-alone wind turbines of this size (<11.1m) benefit from permitted development rights other than in particular circumstances including within the curtilage of a Listed Building, within a site designated as a Scheduled Monument or on designated land (including Areas of Outstanding Natural Beauty, and World Heritage Sites) other than Conservation Areas.

6.2 All areas considered potentially suitable for turbines in the 11-25m size range (Category A) will also be potentially suitable for turbines of this size. The sensitivity study notes that some micro turbines are already present in Upper Dales landscapes and that sensitivity for turbines of this scale are likely to be moderate in those areas.

6.3 Potentially suitable areas for micro turbines could be identified on the basis of landscapes of low to moderate sensitivity to 11-25m turbines, together with the upper dales. Excluding environmental designations might be inappropriate for turbines of this scale as it would preclude features such as the turbine at Moorhouse National Nature Reserve which may be acceptable even in very sensitive locations. While this would need to be balanced against the undesirability of encouraging the development of small turbines in locations with higher sensitivities in respect of cultural heritage or biodiversity, the most important of these areas have statutory protection and any proposals requiring planning consent would be subject to other policies in the development plan. Figure 69 shows potentially suitable areas.

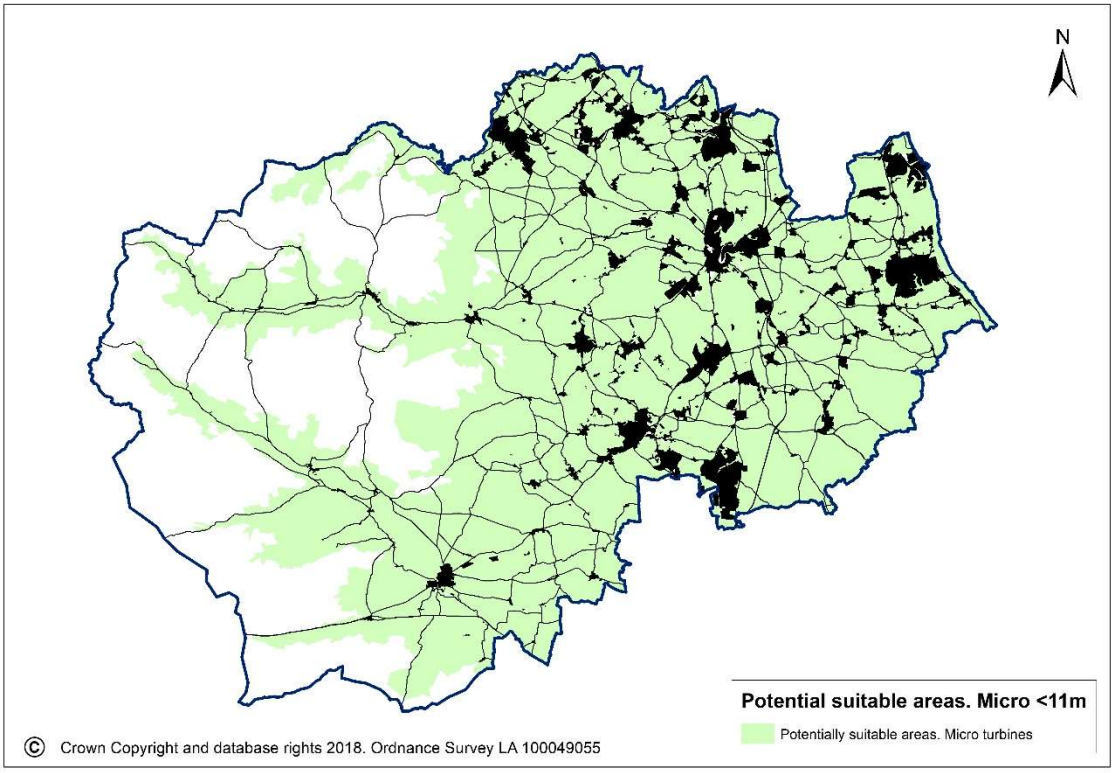

Figure 69: Map of potentially suitable areas for micro turbines (<11m)

Potential suitable areas for small turbines (Category A: 11-25m)

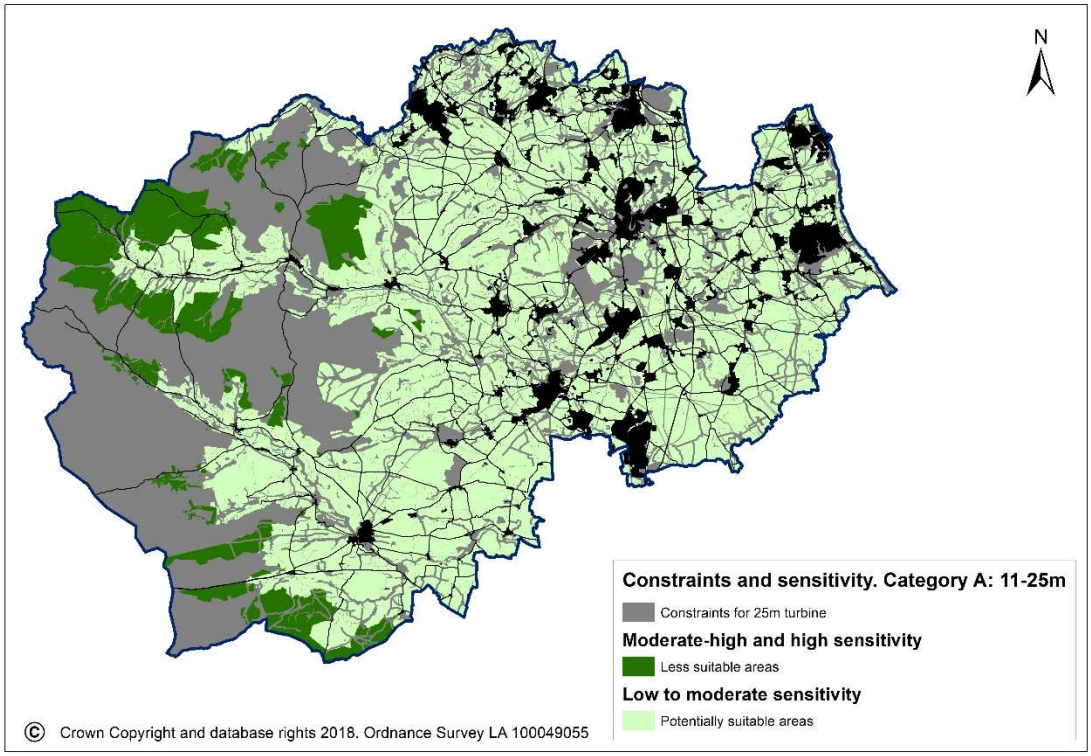

Figure 70: Map of constraints and sensitivity to small turbines (Category A: 11-25m)

6.1 With the exception of the moorlands of the North Pennines the landscapes of the county are of generally low to moderate sensitivity to turbines of this scale.

6.2 Some areas are heavily constrained by other factors with the Special Protection Areas of the North Pennine Moors particularly notable in the west. Other environmental and technical constraints would be influential at a site level but large areas of the countryside are relatively unconstrained.

6.3 Although small turbines may have cumulative effects with other single turbines and with larger turbines in wind farms, their effects tend to be of a different order. It is likely that further development of some small turbines could be accommodated in areas already heavily influenced by wind development without significant cumulative effects.

6.4 Potentially suitable areas for turbines in this size range could be identified on the basis of landscapes of low to moderate sensitivity, but excluding areas covered by environmental designations. Figure 70 shows potentially suitable areas based on excluding the following designations.

- Special Protection Areas
- Special Areas for Conservation
- Sites of Special Scientific Interest
- Local Wildlife Sites
- Conservation Areas
- Scheduled Monuments
- Registered Historic Parks and Gardens

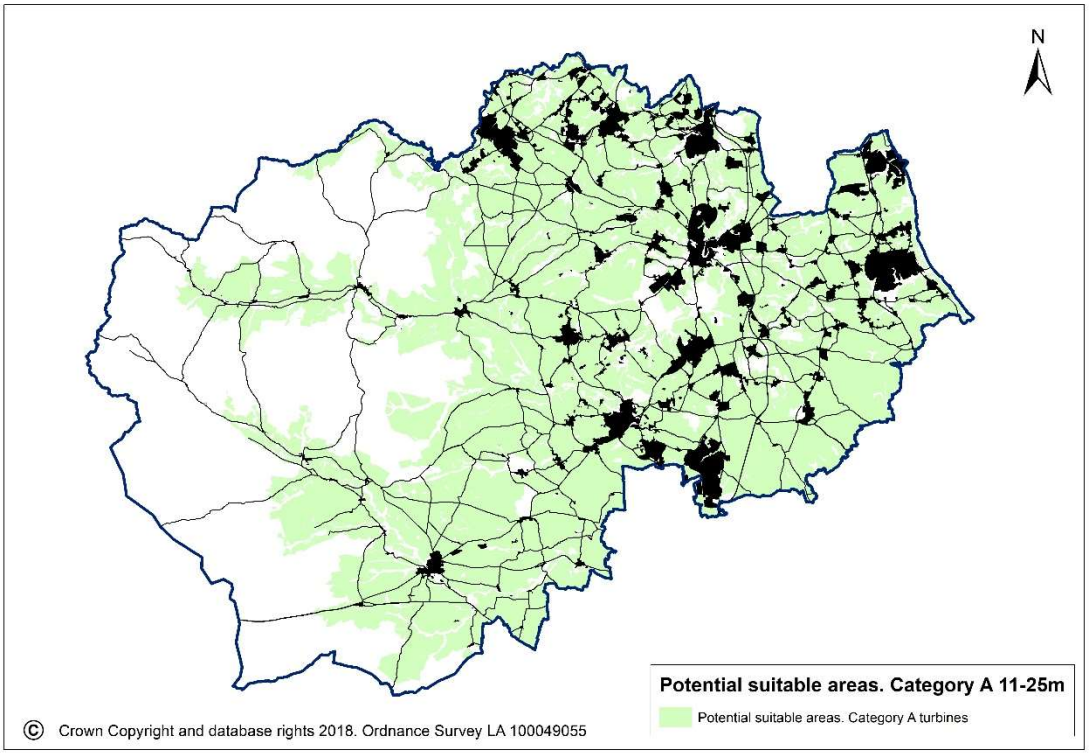

Figure 71: Map of potentially suitable areas for small turbines (Category A: 11-25m)

Potential suitable areas for small-medium turbines (Category B: 26-40m)

6.5 Some of the county's landscapes have a low or moderate sensitivity to turbines of this scale. Higher sensitivities are found in the moorland and dales landscapes of the North Pennines, the vale and valley landscapes of the Dales Fringe and West Durham Coalfield and coastal and escarpment landscapes of the East Durham Plateau.

6.6 Some areas are heavily constrained by other factors, with the Special Protection Areas of the North Pennine moors notable in the west and the Green Belt notable in the centre and north. Other environmental and technical constraints would be influential at a site level but large areas of the countryside remain relatively unconstrained.

6.7 Some of the less constrained land of low or moderate sensitivity lies in areas where the Landscape Sensitivity Assessment has identified that new development of turbines in this size range could give rise to significant cumulative effects. This includes the northern and central parts of the Coalfield Upland Fringe and Coalfield Valleys, the central and northern parts of Limestone Escarpment, Clay Plateau and Coastal Limestone Plateau and parts of the Lowland Plain and Lowland Carrs BLTs.

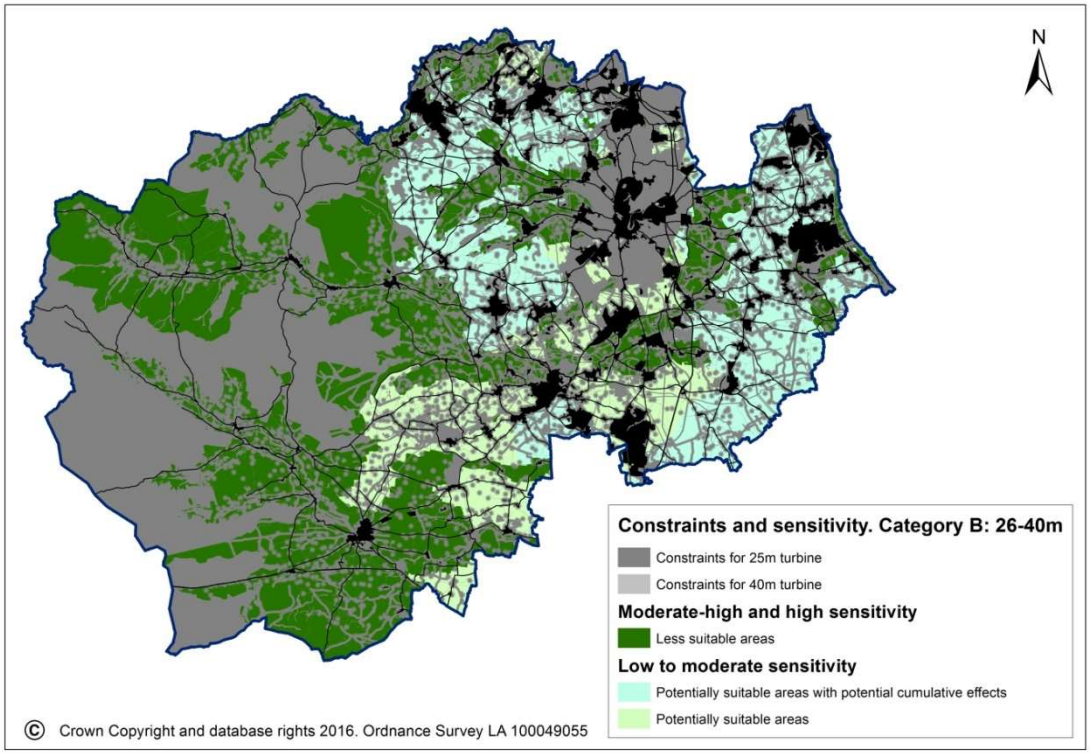

Figure 72: Map of constraints and sensitivity to small-medium turbines (Category B: 26-40m)

6.8 Identifying the extent of the area in which new turbines of this size could give rise to significant cumulative effects with existing development is something which can't be done with precision; the effects of any individual development could only be assessed in detail on a case by case basis.

6.9 The zone of visual prominence, Zone B, of the larger developments modelled in Figure 12 would be particularly vulnerable to the introduction of additional turbines, and particularly those of different size and character to existing features. Those parts of Zone C enclosed or partially enclosed by Zone B would also be likely to be vulnerable, and particularly in areas where Figure 15 shows relatively high levels of visual influence from existing turbines. This is reflected in the Landscape Sensitivity Assessment commentaries on cumulative effects. Landscapes of moderate and lower sensitivity within such areas are mapped in Figure 71 as *potentially suitable areas with potential cumulative effects*.

6.10 One approach to identifying suitable areas would be to identify all of the landscapes of low to medium sensitivity as suitable, other than in areas covered by designations, and relying on criteria in a wind policy to deal with cumulative effects. This would have the advantage of identifying the maximum area with potential for development. It would have the disadvantages of:

- identifying as suitable many areas where cumulative effects are likely to be a constraint;
- creating a lack of certainty on that issue for developers and communities; and

- encouraging small-scale development that might prejudice the potential within these areas for larger scale re-powering and extensions to existing wind farms of a more strategic nature.

6.11 Given the heavily constrained nature of the wind resource in the county, a precautionary approach to smaller scale development in these strategic resource areas might be preferred. That would entail identifying as suitable areas only landscapes of low to moderate sensitivity outside of the zone where potential significant cumulative effects might be anticipated, other than in areas covered by designations.

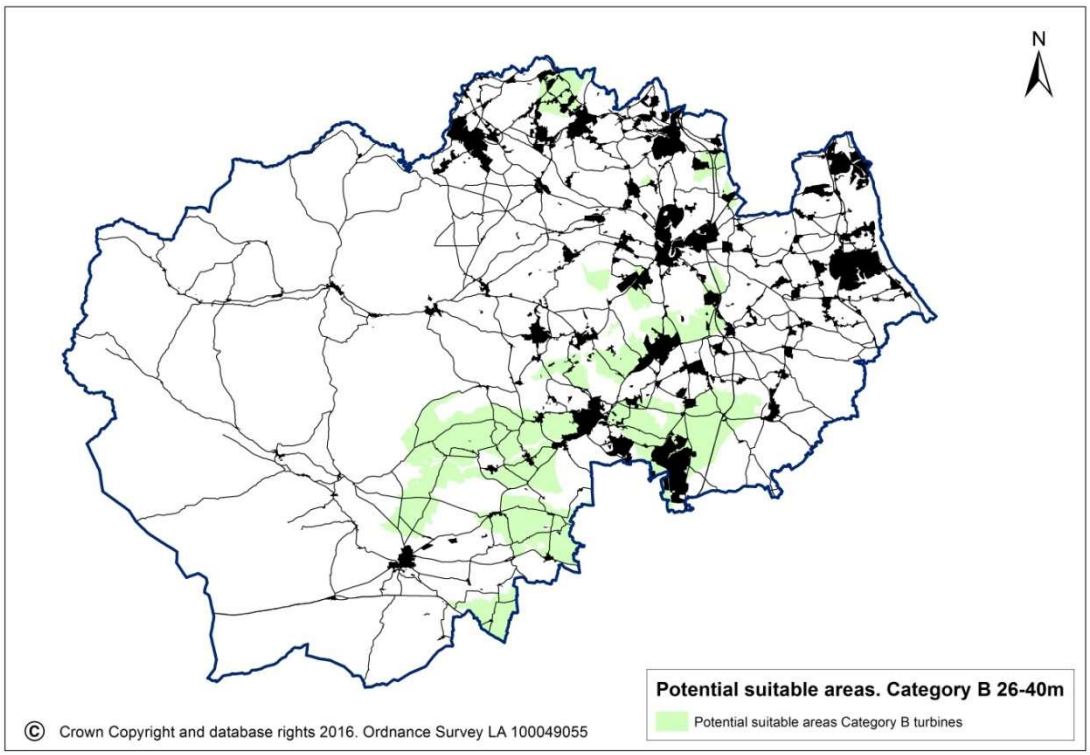

Figure 73: Map of potentially suitable areas for small-medium turbines (Category B: 26-40m)

6.12 Figure 72 shows those potentially suitable areas based on excluding the following designations.

- Special Protection Areas
- Special Areas for Conservation
- Sites of Special Scientific Interest
- Local Wildlife Sites
- Conservation Areas
- Scheduled Monuments
- Registered Historic Parks and Gardens
- Historic Battlefields
- Green Belt

Potential suitable areas for medium turbines (Category C: 41-65m)

6.13 Many of the county's landscapes are of moderate-high or high sensitivity to turbines of this scale. Landscapes of moderate sensitivity include parts of the Coalfield Upland Fringe, Coalfield Valleys, Limestone Escarpment, Clay Plateau, Coastal Limestone Plateau, Lowland Carrs and Lowland Plain broad landscape types.

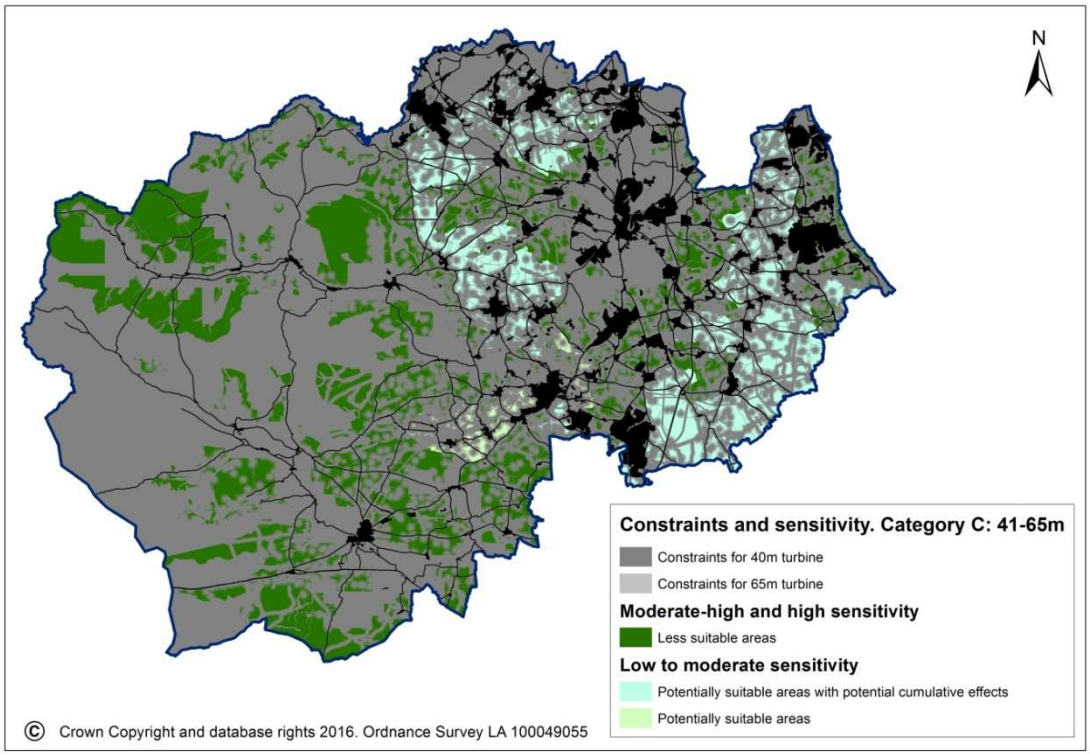

Figure 74: Map of constraints and sensitivity for medium turbines (Category C: 41-65m)

6.14 Other environmental and technical constraints are a significant factor for turbines of this size but some large tracts of the countryside remain relatively unconstrained.

6.15 Much of the less constrained land of low or moderate sensitivity lies in areas already developed or where the Landscape Sensitivity Assessment has identified that new development could give rise to significant cumulative effects. This includes the northern and central parts of the Coalfield Upland Fringe and Coalfield Valleys, the central and northern parts of the Limestone Escarpment, the Clay Plateau, Coastal Limestone Plateau, Lowland Plain and Lowland Carrs LCTs.

6.16 As noted above in respect of Category B turbines, identifying the extent of the area in which new turbines of this size could give rise to significant cumulative effects is something which cannot be done with precision; the effects of any individual development could only be assessed in detail on a case by case basis.

6.17 The zone of visual prominence, Zone B, of the larger developments modelled in Figure 12 would be particularly vulnerable to the introduction of additional turbines, and particularly those of different size and character to existing features. Those

parts of Zone C enclosed or partially enclosed by Zone B would also be likely to be vulnerable, and particularly in areas where Figure 15 shows relatively high levels of visual influence from existing turbines. This is reflected in the Landscape Sensitivity Assessment commentaries on cumulative effects. Landscapes of moderate and lower sensitivity within such areas are mapped in Figure 73 as *potentially suitable areas with potential cumulative effects*.

6.18 The constraints map shows some pockets of land outside of these areas where there could be further opportunities for development. These are small and heavily fragmented by other constraints.

6.19 As with Category B turbines, one approach to identifying suitable areas would be to identify all of the landscapes of low to medium sensitivity as suitable, other than in areas covered by designations. This would have the advantage of identifying the maximum area with potential for development of this scale. It would have the disadvantages of:

- identifying as suitable many areas where cumulative effects are likely to be a constraint;
- identifying as suitable areas likely to be heavily constrained by other factors;
- creating a lack of certainty on that issue for developers and communities; and
- encouraging small-scale development that might prejudice the potential within these areas for larger scale re-powering and extensions to existing wind farms of a more strategic nature.

6.20 As with Category B turbines, given the heavily constrained nature of the wind resource in the county, a precautionary approach to further medium scale development in these strategic resource areas might be preferred.

6.21 The approach considered for Category B turbines of identifying suitable areas outside of the zone of potential cumulative effects would be likely to be impractical for turbines of this size. Figure 73 indicates that the areas remaining are small and heavily fragmented by other constraints. Not to identify any areas as suitable would prevent the replacement /re-powering of existing turbines in locations that have already been determined to be suitable.

6.22 One approach would be to group turbines of this scale with those of larger scales to identify areas suitable for re-powering of, or extensions to, existing wind development including wind farms, clusters and single turbines. Figure 74 shows an area of 500m around operational turbines of medium and larger scales in areas of low to moderate sensitivity to turbines of medium scale which is broadly indicative of the kind of area in which such development might take place. A larger area would give greater flexibility but would inevitably begin to include more land known to be constrained by other factors. A point symbol could equally be used, based on existing turbine locations, indicative of a suitable area but without a precisely defined spatial expression of it.

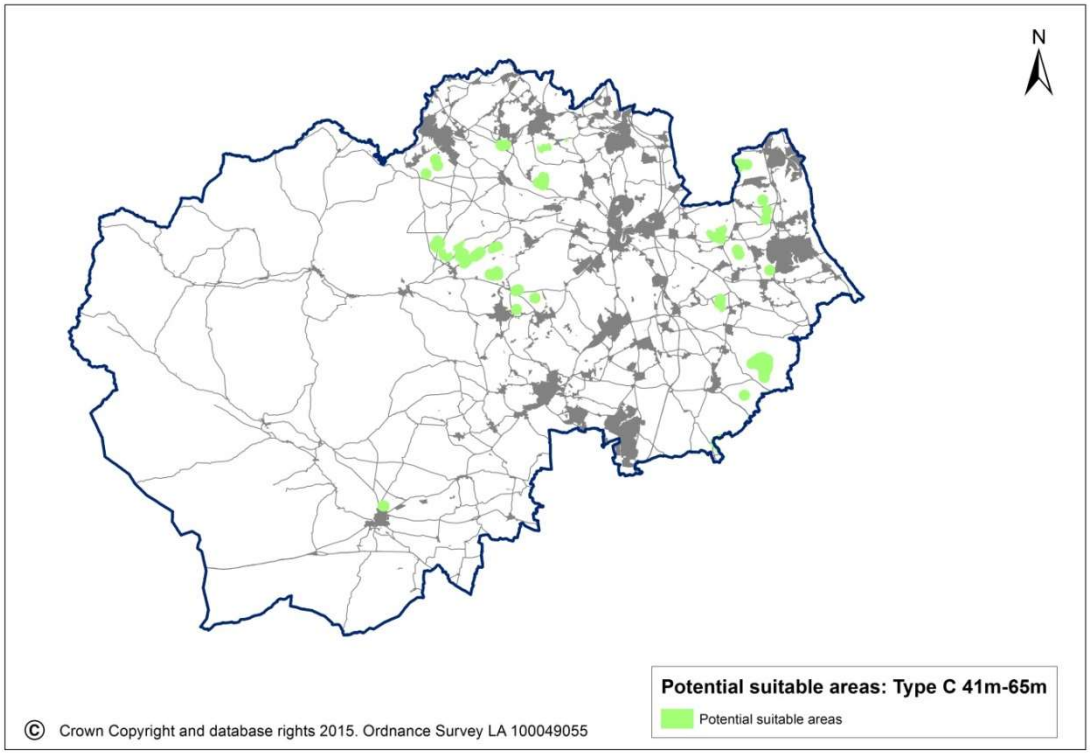

Figure 75 Potentially suitable areas for medium turbines (Category C: 41-65m)

Potential suitable areas for medium-large turbines (Category D: 66-100m)

6.23 Many of the county's landscapes are of moderate-high or high sensitivity to turbines of this scale. Landscapes of moderate sensitivity include parts of the Coalfield Upland Fringe, Limestone Escarpment, Clay Plateau, Coastal Limestone Plateau and Lowland Plain broad landscape types.

6.24 Much of the countryside is heavily constrained for turbines of this size with set-back distances for residential amenity particularly influential in the settled landscapes of central and eastern Durham and environmental designations in the rural west.

6.25 Most of the potential opportunities for development lie in areas already developed or where the cumulative effects of new development would be likely to be significant. As noted for other categories of turbines above, identifying the extent of the area in which new turbines of this size could give rise to significant cumulative effects is something which cannot be done with precision; the effects of any individual development could only be assessed in detail on a case by case basis.

6.26 The zone of visual prominence, Zone B, of the larger developments modelled in Figure 12 would be particularly vulnerable to the introduction of additional turbines in new locations. Those parts of Zone C enclosed or partially enclosed by Zone B would also be likely to be vulnerable, and particularly in areas where Figure 15 shows relatively high levels of visual influence from existing turbines. This is reflected in the Landscape Sensitivity Assessment commentaries on cumulative

effects. Landscapes of moderate and lower sensitivity within such areas are mapped in Figure 75 as *potentially suitable areas with potential cumulative effects*.

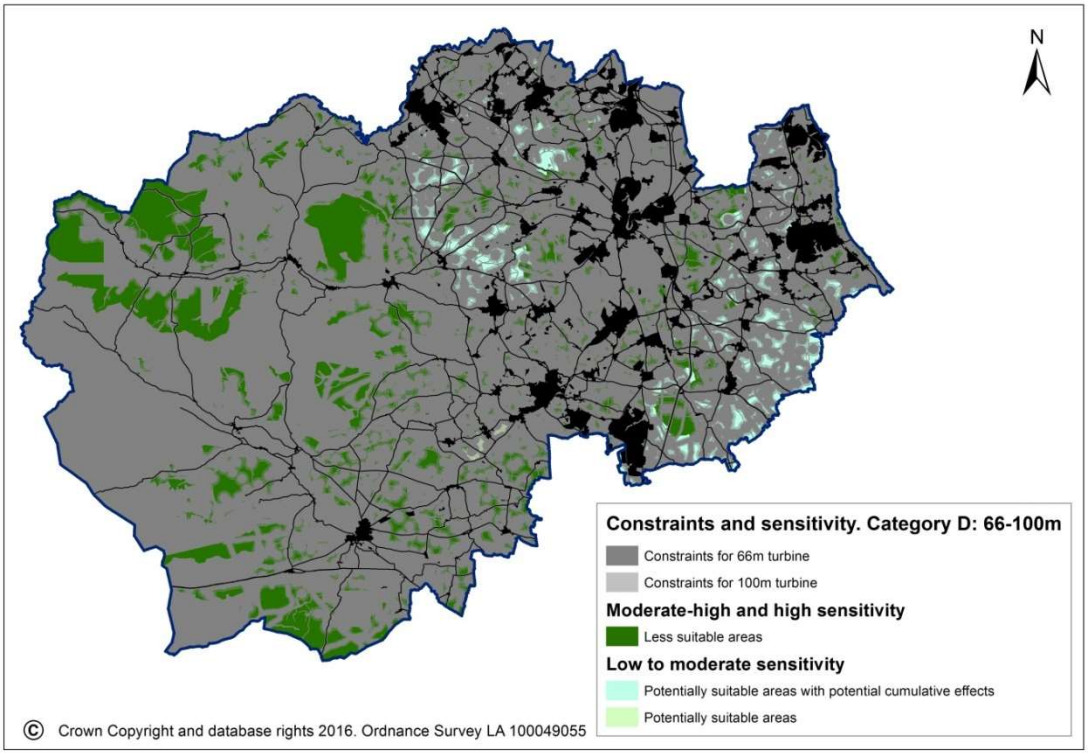

Figure 76: Map of constraints and sensitivity to medium-large turbines (Category D: 66-100m)

6.27 As with small-medium and medium turbines, one approach to identifying suitable areas would be to identify all of the landscapes of low to medium sensitivity as suitable, other than in areas covered by designations. This would have the advantage of identifying the maximum area with potential for development of this scale. It would have the disadvantages of:

- identifying as suitable, areas likely to be heavily constrained by other factors;
- identifying as suitable, areas where cumulative effects are likely to be a constraint;
- creating a lack of certainty on those issues for developers and communities.

6.28 For turbines of this scale, constraints other than landscape sensitivity become very influential and less sensitive landscapes no longer offer a useful geography in themselves for mapping suitable areas. As with Category C turbines, identifying suitable areas outside of the zone of potential cumulative effects would be impractical for turbines of this size. Figure 75 indicates that the areas remaining are small and fragmented by other constraints.

6.29 Not to identify any areas as suitable would prevent the replacement /re-powering of existing turbines in locations that have already been determined to be suitable and which already play a strategic role in delivering a significant proportion of the County's energy requirements.

6.30 One approach would be to group turbines of this scale with medium and larger scales to identify areas suitable for re-powering of, or extensions to, existing wind development, including wind farms, clusters and single turbines. Figure 76 shows an area of 500m around operational turbines of medium-large and larger scales in areas of low to moderate sensitivity to turbines of medium-large scale which is broadly indicative of the kind of area in which such development might take place. A larger area would give greater flexibility but would inevitably begin to include more land known to be constrained by other factors. A point symbol could equally be used, based on existing turbine locations, indicative of a suitable area but without a precisely defined spatial expression of it.

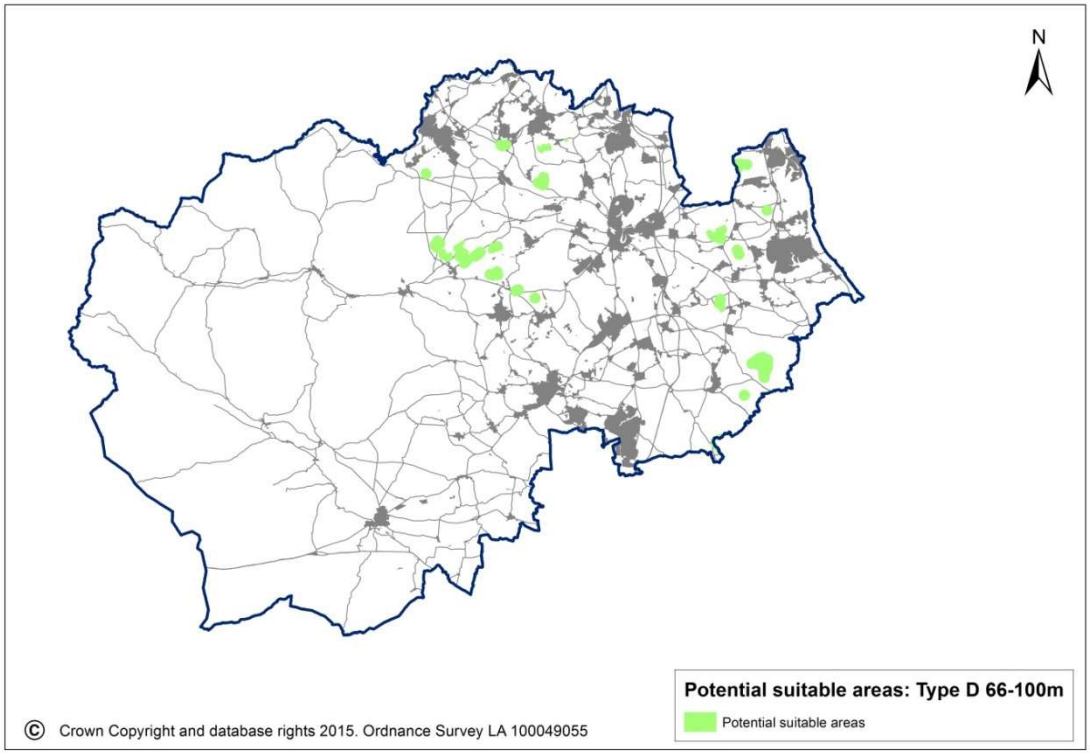

Figure 77: Potentially suitable areas for medium-large turbines (Category D 66-100m)

Potential suitable areas for large turbines (Category E: 100- 135m)

6.31 Many of the county's landscapes are of moderate-high or high sensitivity to turbines of this scale. Landscapes of moderate sensitivity include parts of the Coalfield Upland Fringe, Clay Plateau, Coastal Limestone Plateau and Lowland Plain broad landscape types.

6.32 Much of the countryside is heavily constrained, with set-back distances for residential amenity particularly influential in the settled landscapes of central and eastern Durham and environmental designations in the rural west.

6.33 All of the potential opportunities for development lie in areas already developed or where the cumulative effects of new development would be likely to be significant. As noted for other categories of turbines above, identifying the extent

of the area in which new turbines of this size could give rise to significant cumulative effects is something which can't be done with precision; the effects of any individual development could only be assessed in detail on a case by case basis.

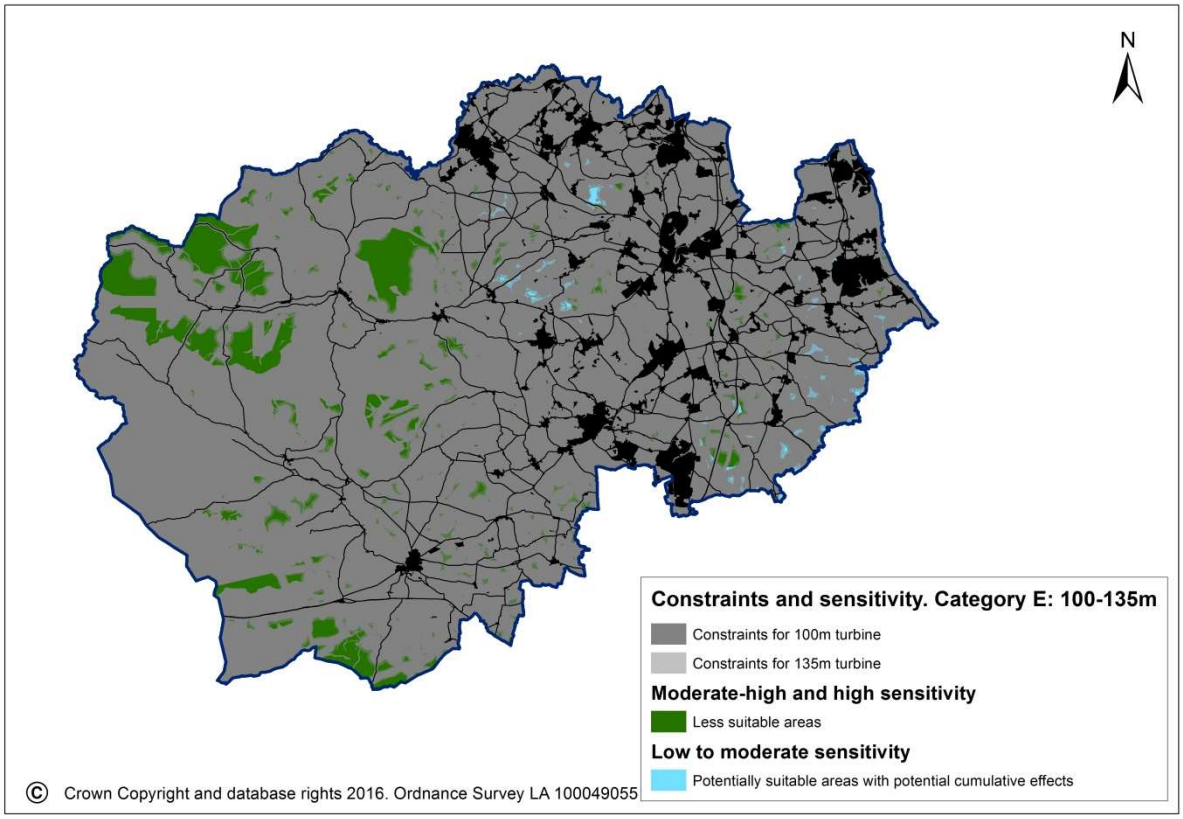

Figure 78: Map of constraints and sensitivity to large turbines (Category E: 100- 135m)

6.34 The zone of visual prominence, Zone B, of the larger developments modelled in Figure 12 would be particularly vulnerable to the introduction of additional turbines in new locations. Areas of Zone C enclosed or partially enclosed by Zone B would also be likely to be vulnerable, and particularly in areas where Figure 15 shows relatively high levels of visual influence from existing turbines. This is reflected in the Landscape Sensitivity Assessment commentaries on cumulative effects. Landscapes of moderate and lower sensitivity within such areas are mapped in Figure 77 as *potentially suitable areas with potential cumulative effects*.

6.35 As with small-medium and medium turbines, one approach to identifying suitable areas would be to identify all of the landscapes of low to medium sensitivity as suitable, other than in areas covered by designations. This would have the advantage of identifying the maximum area with potential for development of this scale. It would have the disadvantages of:

- identifying as suitable, areas likely to be heavily constrained by other factors;
- identifying as suitable, areas where cumulative effects are likely to be a constraint;
- creating a lack of certainty on those issues for developers and communities.

6.36 For turbines of this scale, constraints other than landscape sensitivity become very influential and less sensitive landscapes no longer offer a useful geography in themselves for mapping suitable areas. The small pockets of unconstrained land shown on Figure 77 would be too small and site-specific to be identified as suitable areas without considerable further work to establish suitability.

6.37 As with the other larger size categories, not to identify any areas as suitable would prevent the replacement /re-powering of existing turbines in locations that have already been determined to be suitable and which already play a strategic role in delivering a significant proportion of the County's energy requirements. Re-powering with turbines in this size range is one of the mechanisms by which capacity could be increased in some of these areas.

6.38 The approach previously considered for medium and medium large turbines would be to identify areas suitable for re-powering of, or extensions to, existing wind development. Figure 78 shows an area of 500m around operational turbines in areas of low to moderate sensitivity to turbines of this scale which is broadly indicative of the kind of area in which such development might take place. A larger area would give greater flexibility but would inevitably begin to include more land known to be constrained by other factors. A point symbol could equally be used, based on existing turbine locations, indicative of a suitable area but without a precisely defined spatial expression of it.

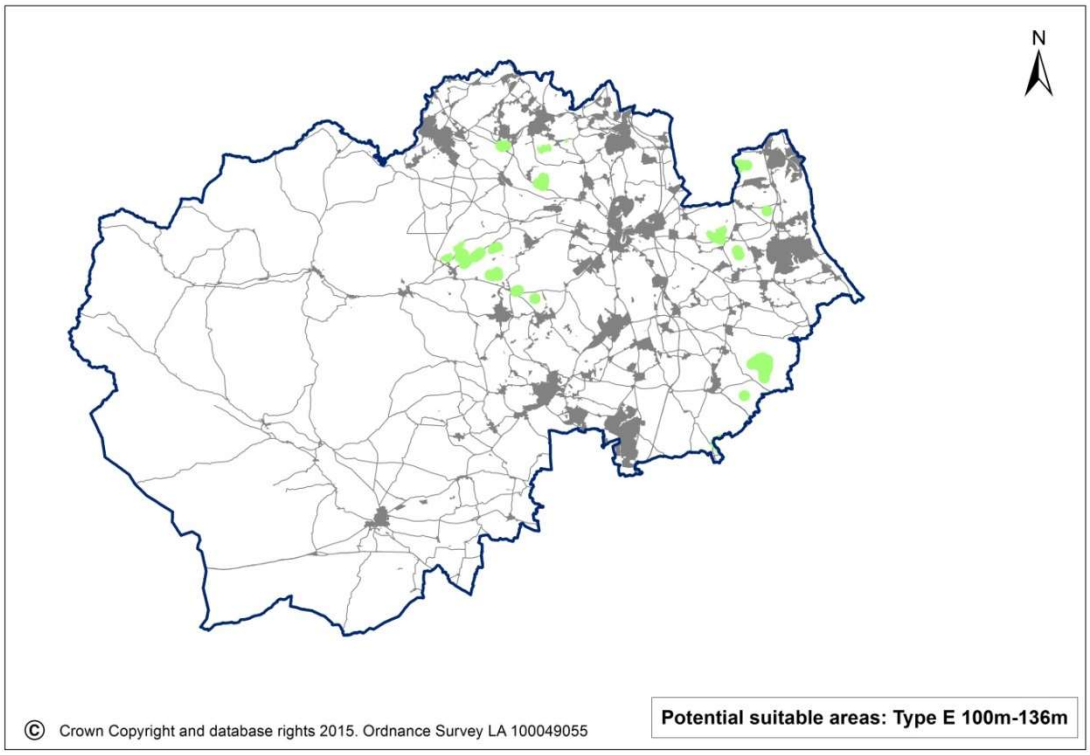

Figure 79: Potentially suitable areas for large turbines
(Category E: 100- 135m)

Conclusions

6.39 The analysis indicates that two different approaches may be appropriate for turbines of different sizes, with a wider area-based approach suitable for small and small-medium turbines, and a more site-specific approach aimed at facilitating re-powering and extensions of existing development for medium and larger turbines.

6.40 Given the similarity of approach for medium, medium-large and large turbines consideration could be given to identifying a single area, based on the pattern of existing development, for turbines of medium and large scale (Categories C, D and E). This could be identified as suitable for turbines >40m, with the qualification that the scale of any proposals in those areas would need to be determined by site-specific constraints and sensitivities, and be informed by the Landscape Sensitivity Assessment. The suitable area for turbines of this size range could be identified either as a polygon (Figure 79) or as a symbol (Figure 80). In both cases the locations would need to be considered as broadly indicative rather than definitive. A symbol might be preferred in that respect as being more clearly symbolic or indicative of a general area.

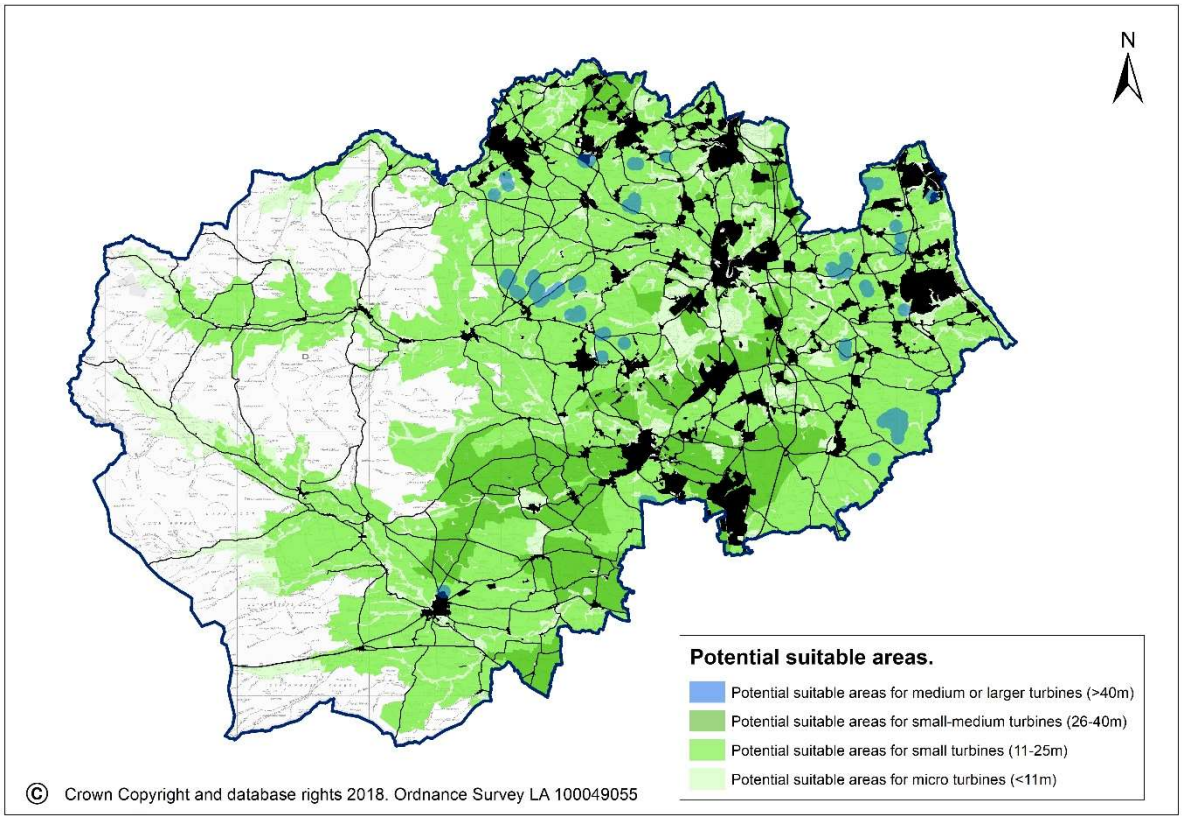

Figure 80: Potentially suitable areas (polygon for larger sizes)

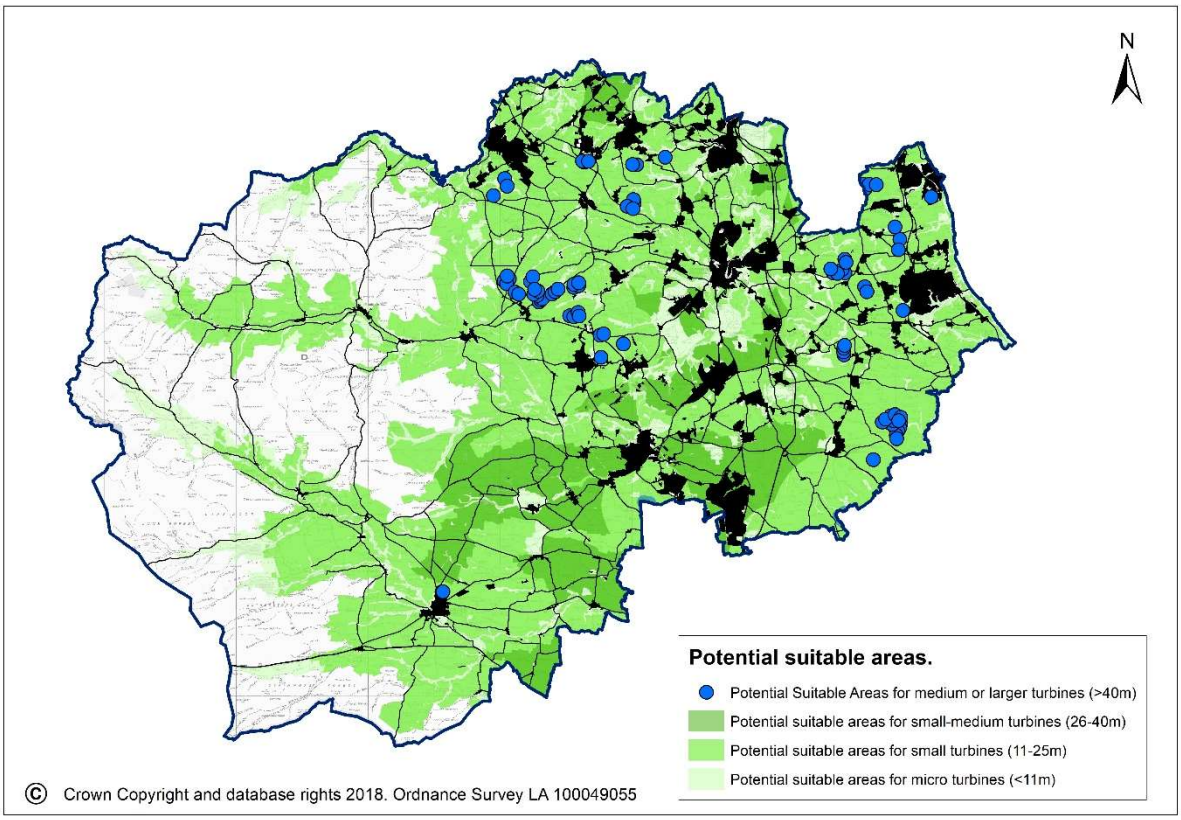

Figure 81: Potentially suitable areas (symbol for larger sizes)

A Residential Visual Amenity

A.1 It is an established principle in planning that there is no right to a view. However, where large moving structures are developed in close proximity to a residential property the effects can be overbearing or oppressive, and may render a property an unattractive place to live and this will be a material planning consideration.

A.2 There is no published guidance on how impacts on residential visual amenity should be assessed, and no obvious thresholds for determining what might be an acceptable level of impact. The size of turbines and the distance to them are clearly important factors as these affect their perceived scale. The number of turbines, the angle of view they occupy, their elevation relative to the viewer, the visual density of the development and the occurrence of 'stacking' or overlapping of rotors are also important factors as are the orientation of habitable rooms and gardens and screening by topography, buildings or vegetation. Whether or not a turbine or wind farm is perceived as overbearing or oppressive to an unacceptable degree will also depend in part on the subjective response of the individual viewer, whether they are a resident affected by the proposals, an assessor or a decision maker.

A.3 The degree to which a wind turbine will be overbearing can also be difficult to assess. Visualisations are not always prepared for individual properties and where they are prepared they do not always give a convincing sense of scale. Judgements in many cases will be finely balanced and subjective. This creates uncertainty for those potentially affected by development, for developers and for decision makers.

A.4 While contextual factors can only be assessed on a case by case basis, the use of distance and scale as measurable factors can have its uses in either:

- identifying the kind of distances within which it will be necessary to demonstrate that a development will not be overbearing to an unacceptable degree - and conversely distances beyond which it will not generally be necessary to do so;
- identifying the kind of distances at which a 'reasonable person' might consider a tall moving structure to be overbearing in open views - and conversely distances beyond which they would be unlikely to do so.

A.5 PPG Paragraph 008 (Reference ID: 5-008-20140306, Revision date: 06 03 2014) states:

"*Local planning authorities should not rule out otherwise acceptable renewable energy developments through inflexible rules on buffer zones or separation distances. Other than when dealing with set back distances for safety, distance of itself does not necessarily determine whether the impact of a proposal is unacceptable. Distance plays a part, but so does the local context including factors such as topography, the local environment and near-by land uses. This is why it is important to think about in what circumstances proposals are likely to be acceptable and plan on this basis*".

A.6 Set-back distances have been a feature of some policies in development plans. In County Durham the Derwentside District Local Plan policy on renewable energy Policy CF8 required that "turbines rated between 350-500 kilowatts are located at least 350 metres from neighbouring dwellings". Turbines of that capacity are typically in the 50-70m height range which represents a set-back of between 5 and 7 times the turbine height. The use of distance in this policy was, however, intended to cover a range of environmental impacts

including visual amenity and noise. Most set-back distances proposed in development plans or supplementary guidance in England have been of this type, seeking to deal with a range of environmental effects through the use of a single spatial buffer.

A.7 In considering the use of distance and scale as a factor in formulating policy on visual residential amenity, reviewing previous planning decisions can be informative as to what decision makers have found to be acceptable or unacceptable in the past.

Past planning decisions in County Durham

A.8 Figure 81 shows distance factors to the nearest non-involved property of all operational or permitted turbines over 25m in height in County Durham expressed as a multiple of turbine height. Only three turbines have been permitted at distances less than 5 times the turbine height. The majority of turbines have been permitted at distances in excess of 6 times the turbine height. This is not unambiguously informative of decisions on visual amenity as noise is often the most important driver of separation distances and will have, in some cases, dictated distances in excess of what might have given rise to unacceptable visual effects. In most cases contextual factors affecting the level of impact on residential visual amenity will have had an important influence on the decision.

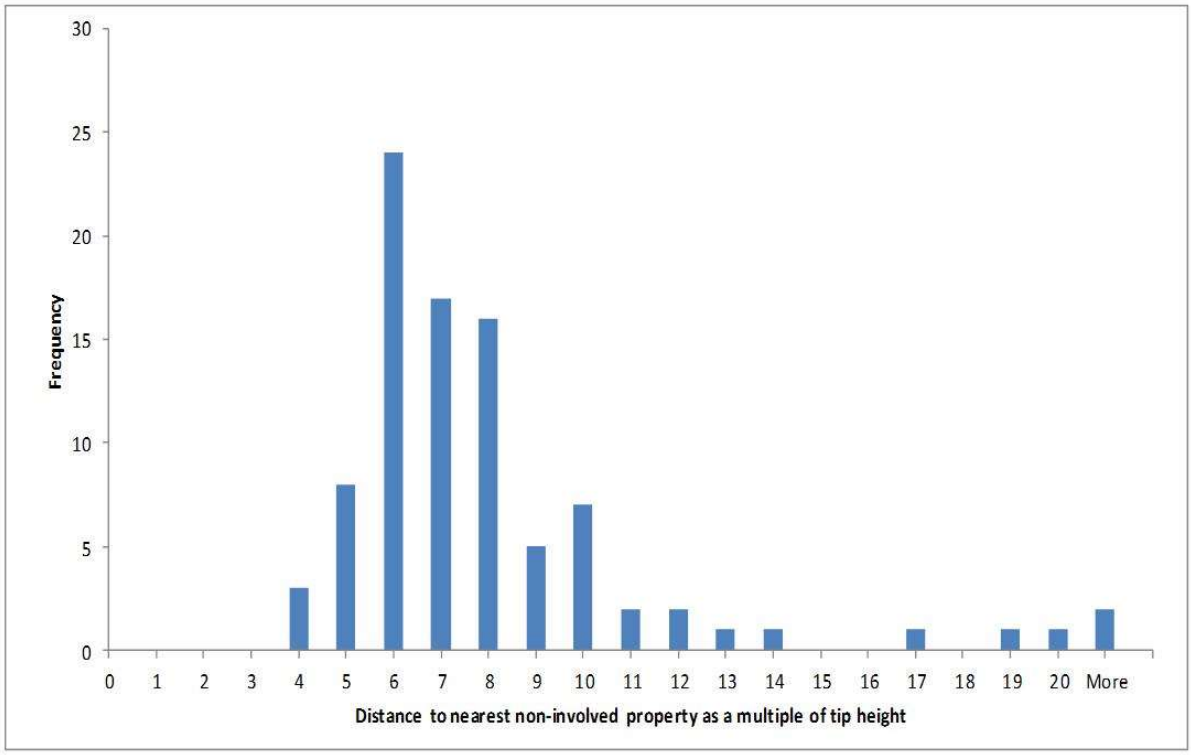

Figure 82 Past Planning Decisions Shown as Multiple of Tip Height from Nearest Property

Past decisions by Inspectors

A.9 Analysis of past decisions by inspectors can be informative, as residential visual amenity is more likely to have been at issue in sites that have been initially refused than those that have been approved. A review of the findings of Inspector's decisions carried out by consultants LDA design ('Study of Inspectors' decisions in relation to residential amenity') in 2011 found that:

"..unacceptable impacts are markedly more likely to be deemed unacceptable at 600m or less from the turbines but can be deemed acceptable for uninvolved properties (with views of turbines of 100m or taller) as close as 500-550m (Goveton and Burnthouse). Furthermore, when effects are deemed to be unacceptable it tends to involve direct views from main living rooms, often with a wide arc of view occupied by turbines, or an unusually close proximity (500m or less); and/or a situation where several properties are thus affected. None of the decisions has identified unacceptable effects at 800m or more, and there is an evident decline in concern regarding properties at this distance as they are less frequently mentioned in decisions". (LDA, 2011, 1.1.28)

A.10 Figure 82 shows a graph of those findings.

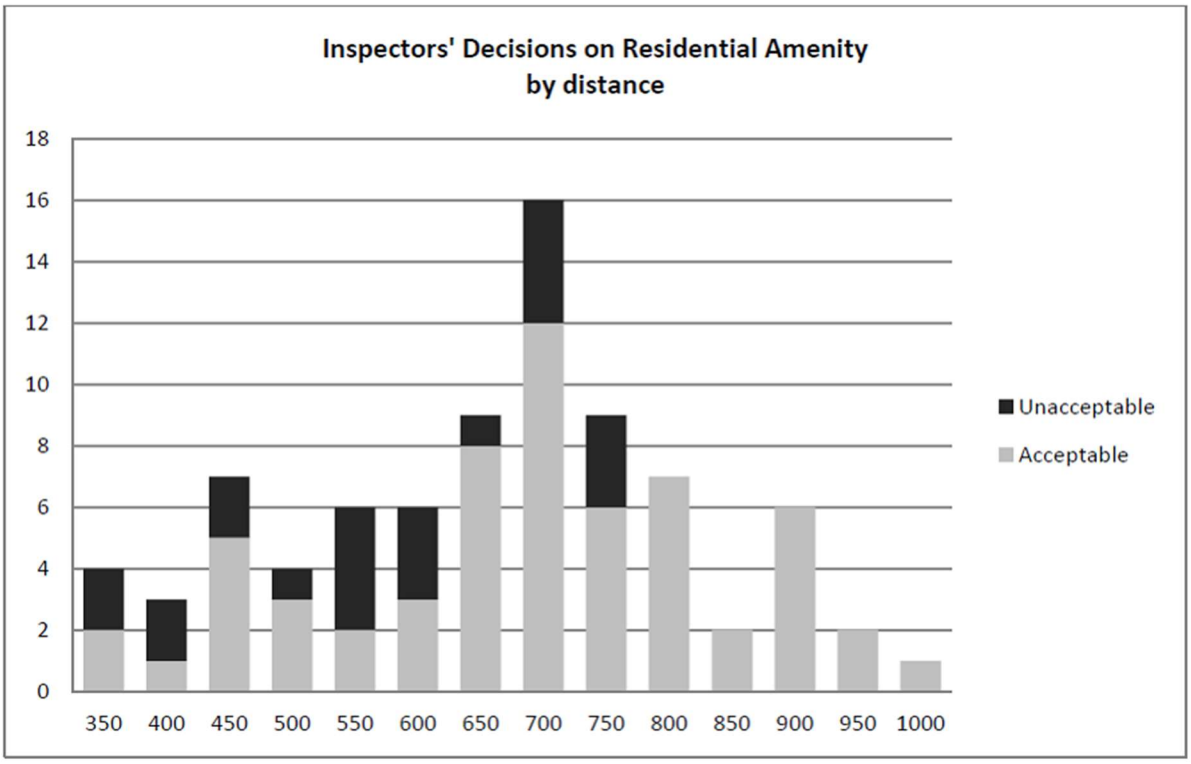

Figure 83 Inspector's Decisions on Residential Amenity by Distance

A.11 The LDA analysis is based on distance rather than a distance factor expressed as a multiple of turbine height.

A.12 It is clear that in assessing impacts on residential amenity Inspectors will have had regard to a wide range of contextual factors on a case by case basis and the apparent scale of the nearest turbine will have only been one factor. The evidence of past decision does, however, indicate that the issue of whether or not wind development is 'overbearing' is focused on distances of between around 350m and 800m. Within that distance range turbines have in many cases been found to be overbearing and beyond that distance range they have generally not. At distance ranges in between, the acceptability or otherwise of their impacts is influenced by site-specific factors, by the professional judgements of

individual decision-makers and by their understanding of terms such as ‘overbearing’ or ‘oppressive’.

A.13 This suggests that in using distance as a factor in identifying the kind of distances within which it should be necessary to demonstrate that a development will not be overbearing to an unacceptable degree, distances of around 800m or distance factors of between 6 or 6.5 times turbine height might be appropriate.

A.14 The evidence is less informative as to the kind of distances at which a ‘reasonable person’ might consider a tall moving structure to be overbearing in open views. While the proximity and apparent scale of the nearest turbine will have been a significant factor in many of these decisions, contextual factors will always have been important. Identifying a distance factor of this kind will always be difficult as it will be a point on a continuum rather than an obvious threshold on which there will be a high degree of consensus. The Council believes that doing so can nevertheless give certainty to both developers and those who may be affected by development on an issue which will always be heavily subjective.

A.15 In July 2014 Allerdale Borough Council successfully introduced a policy including a separation distance of 800m between wind turbines and housing in its Local Plan for the area. The policy is worded in such a way that this separation distance does not have to apply rigidly and gives flexibility to decision makers not to have to use it in all cases.

A.16 The policy proposed in the County Durham Plan Preferred Options would be to support new development unless "in respect of the visual amenity of individual residential properties, any proposed turbine would be located within 6 times its overall height of the property, unless it can be demonstrated that it would not be overbearing".

A.17 The Council believes that this offers sufficient flexibility to be consistent with the Renewable and low carbon energy section of PPG.

B Shadow Flicker

Shadow flicker

B.1 Shadow flicker is the effect caused when an operating turbine is located between the sun and a receptor, such as a dwelling or place of work. The effect occurs when the shadow of the rotating blades causes the light intensity within affected rooms to fluctuate. Only properties within 130 degrees either side of North relative to the turbines are susceptible to shadow flicker at UK latitudes. Shadow flicker can be controlled either passively, by maintaining an appropriate distance from a susceptible property, typically around 10 times the diameter of the rotor, or actively by installing management systems which shut down a turbine during periods when shadow flicker at a particular property could occur at specific times of day and on specific days of the year.

B.2 Although there have been problems in the past with shadow flicker from developments within County Durham, the issue is now routinely dealt with well in larger scale developments. Proposals continue to come forward for smaller developments where the potential for shadow flicker has not been assessed or where reference is made to acceptable levels of shadow flicker based on standards from other countries. There is no UK standard for acceptable levels of shadow flicker. Monitoring or enforcing conditions based on thresholds defined in terms of the duration of an episode or the number of episodes over a period of time is difficult due to the episodic nature of the phenomenon. The Council believes that shadow flicker can and should be avoided, either by passive or active means, and that developments which fail to do so should not be permitted.

B.3 The policy proposed in the County Durham Plan Preferred Options would be to support new development unless "In respect of shadow flicker, any proposed turbine would be located within 10 times its rotor diameter of a susceptible dwelling house, community facility or workplace, unless it can be demonstrated that shadow flicker would not occur, or would be prevented from occurring".

B.4 The Council believes that this offers sufficient flexibility to be consistent with paragraph 020 (Reference ID: 5-020-20140306, Revision date: 06 03 2014) of the Renewable and low carbon energy section of PPG.

B.5 Further information can be found in the DECC publication 'Update of UK Shadow Flicker Evidence Base' which can be found on the GOV.UK website.

C Wind development affecting the North Pennines Area of Outstanding Natural Beauty (AONB)

Large scale development

C.1 The NPPF states that "great weight should be given to conserving landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to landscape and scenic beauty" (paragraph 115) and that "planning permission should be refused for major developments in these designated areas except in exceptional circumstances and where it can be demonstrated they are in the public interest" (paragraph 116).

C.2 The National Association of Areas of Outstanding Natural Beauty (NAAONB) position statement on renewable energy distinguishes between larger or commercial scale developments, which in respect of wind energy and hydro-electric development it considers would constitute 'major development' which would be incompatible with the purposes of designation, and smaller scale developments which may be acceptable where they would not be to the detriment of the natural beauty, character, amenity and/or the nature conservation interest of the AONB.

C.3 England's AONBs vary in their character and therefore vary in their sensitivity to different forms of development. Conserving the relative wildness and remoteness of the North Pennines landscape is fundamental to the purposes of its designation. This wildness, coupled with the openness of the landscape and high degree of inter-visibility across the high ground of the AONB where much of the wind resource lies, makes it highly vulnerable to the impacts of commercial scale wind energy development.

C.4 The findings of the Landscape Sensitivity Assessment are that all of the landscapes within the AONB that are of high or moderate-high sensitivity to wind turbines of a medium scale and larger (>40m). It is not therefore proposed to identify any suitable areas for turbines of this size within the AONB.

Small scale development

C.5 The AONB can make a contribution to the deployment of renewable energy technologies of a smaller scale. Indeed small scale renewable technologies have been rolled out to a greater extent in the AONB than rural landscapes elsewhere in the County, partly because of the costs and difficulties of supplying conventional energy sources, and partly because of the support of bodies like the North Pennines AONB Partnership.

C.6 Small scale developments required to meet the needs of properties and businesses within the AONB can in many cases can be accommodated without significant impacts on its special qualities where it is sensitively sited. The AONB Partnership publishes guidance on small scale and micro renewable energy installations in the North Pennines AONB Planning Guidelines (2010) and North Pennines AONB Building Design Guide (2010) both of which have been endorsed by the County Council. The area currently has 27 operational or permitted micro or small turbines (<25m), some providing electricity to off-grid properties.

C.7 Under previous planning guidance (PPS22) local planning authorities were required to set out the circumstances in which particular types and sizes of renewable energy

developments would be acceptable in nationally designated areas. NERSS identified wind energy schemes requiring more than one turbine or a turbine with a ground-to-hub height of 25 metres or more, as being unlikely to be acceptable in the AONB.

C.8 The findings of the Landscape Sensitivity Assessment are that there are some landscapes within the AONB that are of high or moderate-high sensitivity to wind turbines of up to 25m in height and some landscapes of lower sensitivity. Amongst those landscapes with elevated sensitivity to turbines towards the upper end of that size range, some were considered to have potentially lower sensitivity to micro-turbines (<11m). Although not all of these areas would be suitable for turbines, as permitted development rights for turbines of this size do not apply in the AONB, if areas were not identified as suitable in the Local Plan some otherwise acceptable locations would be ruled out. One example of a micro-turbine found to be acceptable in a highly sensitive location is the 9m turbine at Moorhouse National Nature Reserve. Identifying such areas as suitable allows proposals to come forward if found to be acceptable against other policies in the plan. It is therefore proposed to identify some suitable areas for micro turbines in the AONB (Figure 84).

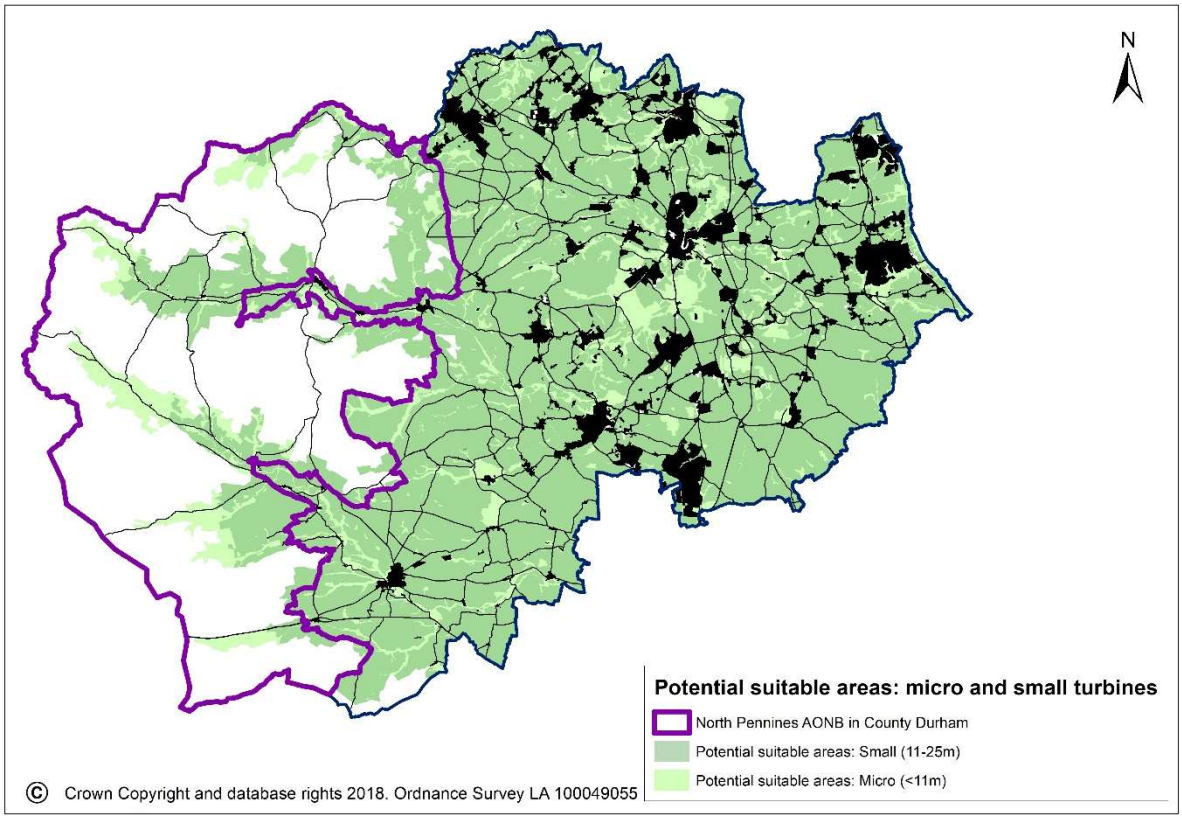

Figure 84 Potential suitable areas for micro (<11m) and small turbines (Category A: 11-25m) in the North Pennines AONB

C.9 In areas considered to be of moderate sensitivity to small turbines (Category A: 11-25m) the assessment noted that sensitivity in some landscapes would often be elevated for turbines towards the upper end of that size range. The majority of turbines currently permitted in those areas lie towards the lower end of the range (13-15m), with a small number towards the upper end (18-20m). It is therefore proposed to identify those areas as

suitable for small turbines in the Local Plan (Figure 84) whilst qualifying in the supporting text that turbines towards the upper end of the range will not always be appropriate.

C.10 The findings of the Landscape Sensitivity Assessment are that the majority of landscapes within the AONB are of high or moderate-high sensitivity to wind turbines of 25-40m in height. There are locally some landscapes of moderate sensitivity to wind turbines of this scale in the coalfield upland fringe west of the A68. These lie in an area where there would be potentially significant cumulative effects with existing development (Figure 85) and it is not therefore proposed to identify them as suitable areas.

C.11 The policy proposed in the County Durham Plan Preferred Options is that small scale wind development within the AONB will be permitted in suitable areas "...for its benefits to the economy, rural communities and wider environment provided that its impacts on the environment are acceptable, and it meets criteria (a) to (i) of this policy."

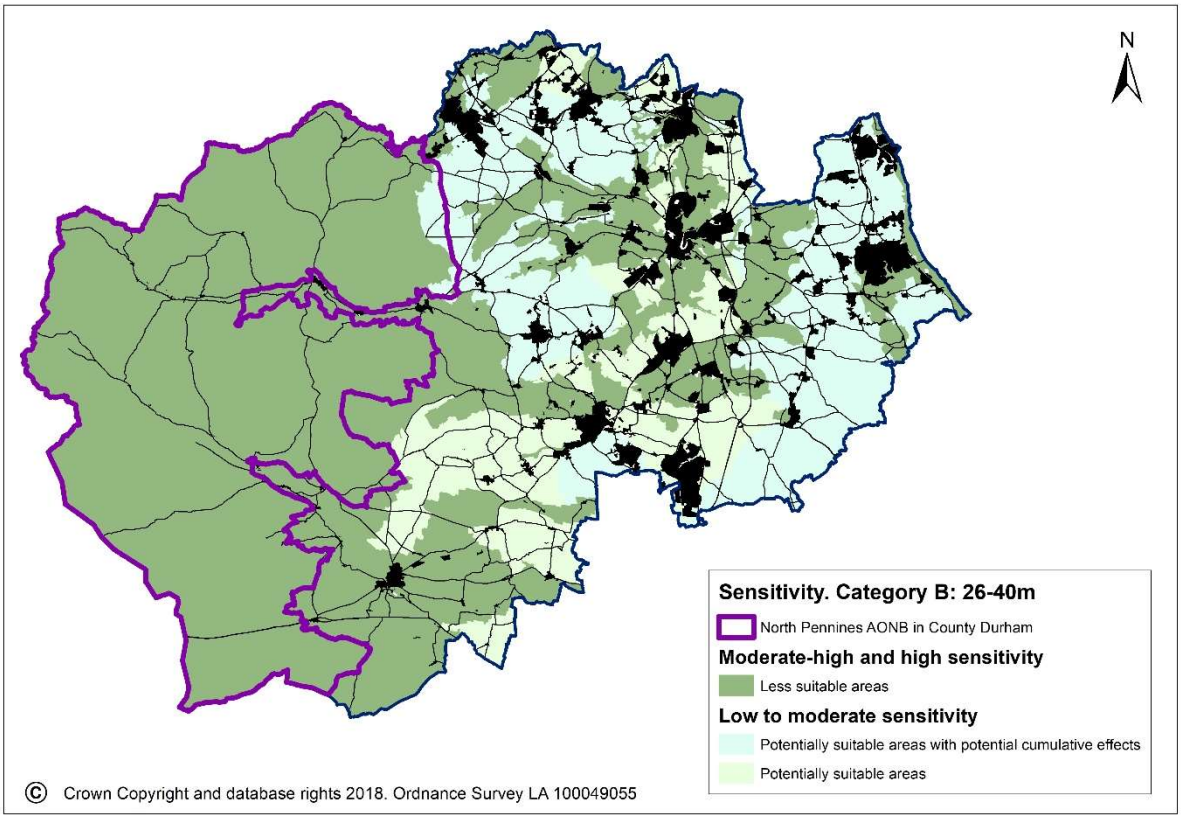

Figure 85 Potential suitable areas for small-medium turbines (Category B: 26-40m) in relation to the North Pennines AONB

Development outside of the AONB

C.12 In some circumstances development outside of a nationally designated area can have impacts on the special qualities that form the basis of its designation and underlie its purpose. PPG paragraph 007 (Reference ID: 5-007-20140306, Revision date: 06 03 2014) is clear that "proposals in National Parks and Areas of Outstanding Natural Beauty, and in areas close to them where there could be an adverse impact on the protected area, will need careful consideration." PPG paragraph 023 (Reference ID: 5-023-20140306, Revision date: 06 03 2014) advises "...at the most detailed level, description and assessment of

cumulative impacts may include the following landscape issues: scale of development in relation to landscape character or designations, sense of distance, existing focal points in the landscape, skylining (where additional development along a skyline appears disproportionately dominant) and sense of remoteness or wildness."

C.13 The North Pennines AONB Planning Guidelines (2010) note that *wind turbines outside of the AONB can have significant landscape and visual effects within it as they are discernible at considerable distances in favourable weather conditions, typically project above the skyline, and can stand out in their colour in the otherwise muted earth tones of the landscape. In the very simple, open horizontal landscapes of most of the Pennine moors, where man made features and vertical elements are rare, wind turbines can have greater impacts at further distance than in more visually complex lowland landscapes. This can have consequences for the perceptions of the landscape as wild and remote which are fundamental to the purposes of the AONB designation* (P.63).

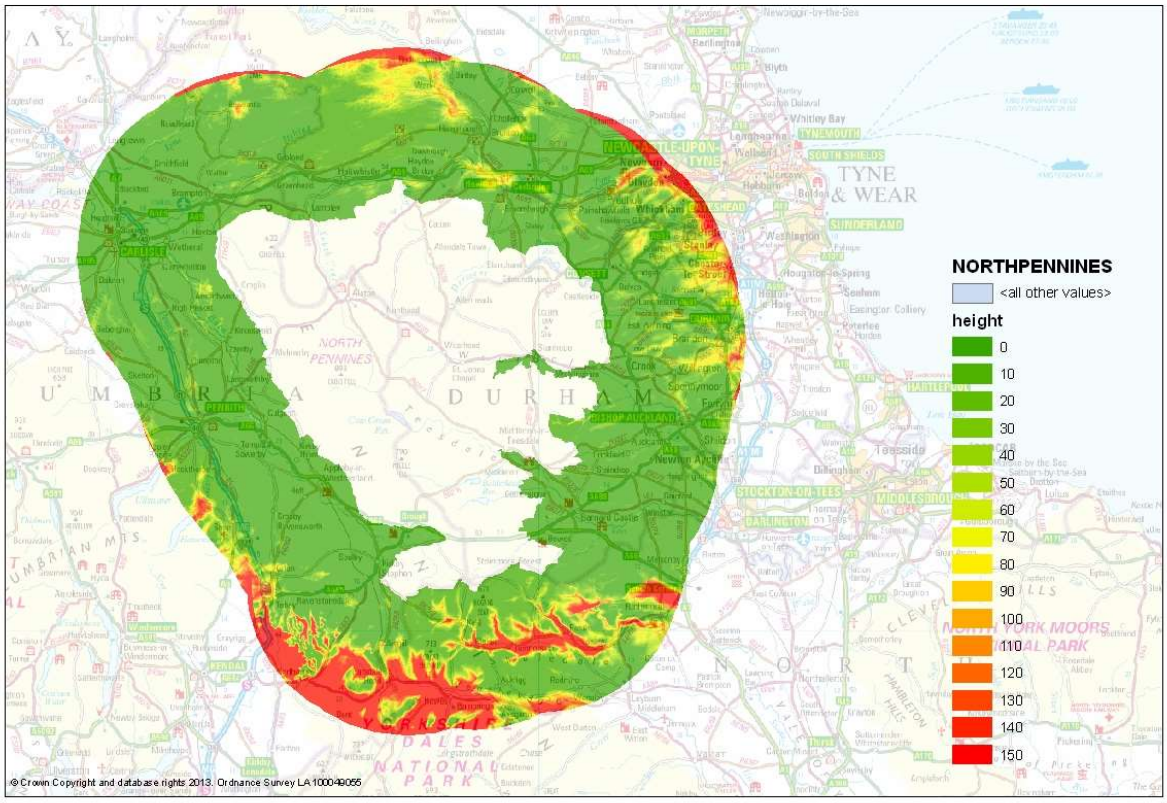

Figure 86 Height at which Objects become Visible (HOBV) from the North Pennines AONB.

C.14 Natural England commissioned work in 2013 from the Geodata Institute, University of Southampton to inform their understanding of potential visual effects on protected landscapes: GIS Viewshed Analysis to Identify Zones of Potential Visual Impact on Protected Landscapes – Natural England - Methodology Report v.1 (2013). This provided data on the *Height at which Objects become Visible* (HOBV) from protected landscapes. The results for the North Pennines AONB are shown on Figure 86 which shows HOBV within 20km. It should be noted that this provides quantitative evidence of visibility rather than qualitative

evidence of impact. This shows widespread visibility of land or features of modest height (<20m) east of the AONB in the south of the county, and on higher ground in the north, but a more complex pattern of visibility in the north east of the zone reflecting the grain of the ridge and valley topography of that area.

C.15 The AONB Planning Guidelines distinguish between views which are effectively 'views out from' the AONB, 'views within' the AONB, and 'views of' the AONB.

C.16 Views out from the AONB are those *which are across, or of, a different landscape. There are many vantage points either on elevated ground or on the edges of the AONB where there are commanding panoramic views across adjacent landscapes which are of a clearly different character, and where development would rarely be considered by a typical viewer to affect the landscape of the AONB itself. Exceptions might be views of acknowledged importance to other significant landmarks such as, for example, views from the western summits of the AONB towards the peaks of the Lake District National Park*. (P.62)

C.17 Views within the AONB are those *which primarily take in the landscape of the AONB itself. In some cases other landscapes may be visible as part of that view, although a typical viewer might not be able to discern any differences in character of the distant landscape and it remains functionally 'part of' that interior view of the AONB. In some cases development in an adjoining area can detract from such interior views, for example wind turbines on a distant ridge may be visible from well within the AONB, affecting the character of interior views of the AONB landscape.* (P.62)

C.18 Views of the AONB are views *from other landscapes in which the AONB features in the view. This type of view varies from those where the AONB is visible as a muted backdrop but has no special significance to a typical viewer, to those where the visible parts of the AONB are an important, even iconic, part of the view. An example of the former is views from parts of the Wear Lowlands where the eastern fringes of the AONB are empirically visible but generally indistinguishable in character from the high ridges of the intervening West Durham Coalfield. An example of the latter is views from the Vale of Eden of the great western escarpment of the North Pennines where it could be argued that it is in views such as these that this part of the AONB landscape is best appreciated. Development can detract from exterior views at this end of the spectrum, and particularly if it affects individually important viewpoints*. (P.62-63)

C.19 The AONB Planning Guidelines also advise that *in practice it can be difficult to draw a precise line between these different types of view. The AONB boundary is rarely reflected in a sharp change in landscape character or quality on the ground, or one which is readily apparent to the typical viewer. Some views across the AONB towards other parts of the AONB take in non-AONB landscapes in between, for example views across the lower parts of Weardale and Teesdale, and views across Hamsterley Forest. The distinction does remain, however, a useful way of structuring any assessment of landscape and visual impacts on the AONB*. (P63)

C.20 The Landscape Sensitivity Assessment takes account of the sensitivity of landscapes within the AONB and of inter-visibility with the AONB, including views within, of, and out from the AONB, when assessing the sensitivity of neighbouring landscape character areas and sub-areas.

C.21 The AONB Planning Guidelines also advise that c*oming to conclusions on the overall significance of a development's impacts on the special qualities of the AONB can be difficult. Ultimately this will be informed by the degree to which the development would have significant impacts on views within the AONB, and individually important views of, or from, the AONB. The extent of this impact in terms of the scale of the area or number of viewpoints affected will be a consideration, but care should be taken not to express this as a 'proportion' of the AONB - all of its landscapes are important* (P. 63-64). This will be a matter for the detailed assessment of individual proposals.

C.22 In respect of cumulative effects the AONB Planning Guidelines advise that t*he cumulative effect of otherwise individually acceptable development is a key issue for the AONB. Particular care must be taken to avoid a piecemeal erosion of its special qualities. Development around the AONB can lead to the establishment of demarcations in the landscape between the AONB and its surroundings that otherwise would not exist. Piecemeal erosion of the sense of remoteness and wildness in the margins of the AONB can reduce the extent of the area over which such qualities can be appreciated (*P.64*).*

C.23 The cumulative effects of existing development on parts of the AONB are described in sections 4.16, 4.18 and 4.20 and sections 5.31-5.33, 5.35 and 5.40. Commentary on the potential cumulative effects of new development can be found in 5.32 and 5.33.

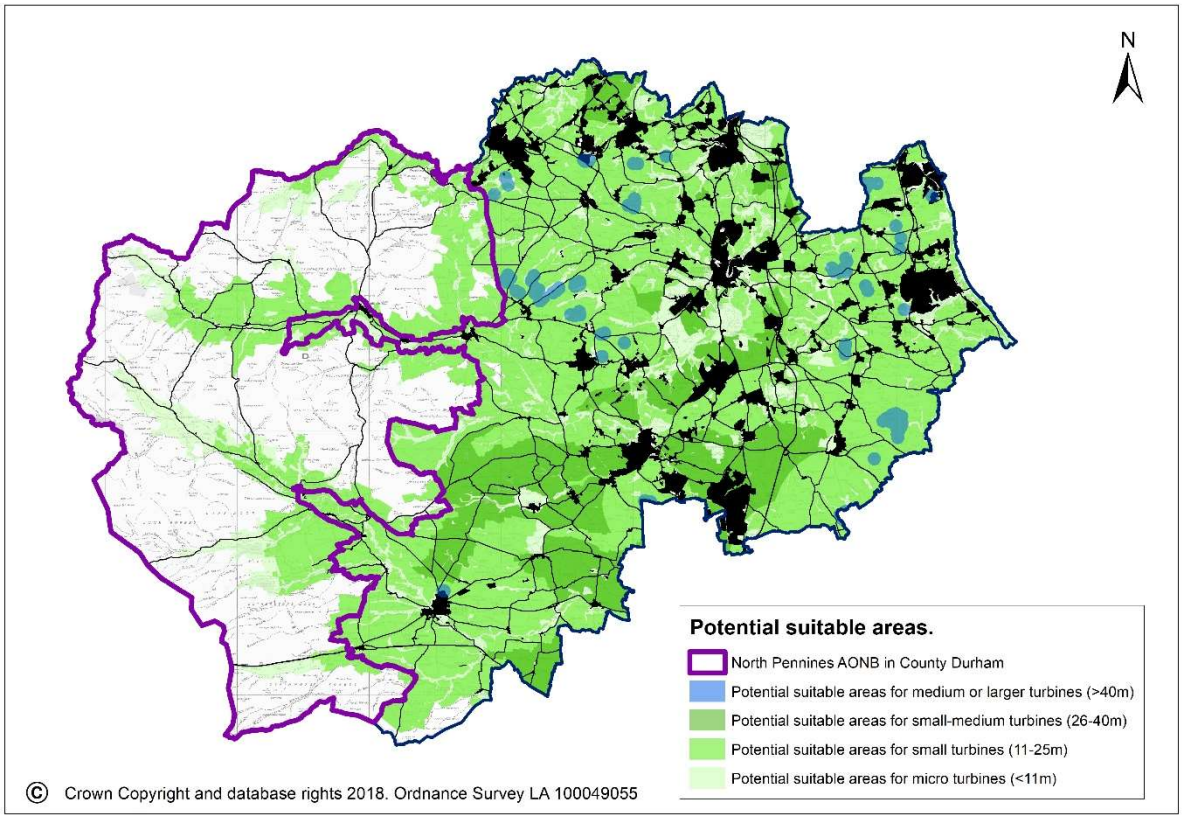

Figure 87 Potential suitable areas for wind turbines in relation to the North Pennines AONB

C.24 Some suitable areas for larger scales of development are identified in areas close to the AONB. These are shown on Figure 87. These represent areas of existing development

which have some effects on the special qualities of the AONB. As noted in 5.31, *in some cases turbines appear in views out from the moors which take in visually complex settled landscapes. In other cases they appear in views of a more rural character and detract in varying degrees from the sense of wildness and remoteness of the moorland LCT*. While the effects of development in these areas have been found to be acceptable in the past, in some cases the decision pre-dated more recent studies and guidance. The effects of any development proposals in those areas on the special qualities of the AONB would need to be carefully assessed.

C.25. The policy proposed in the County Durham Plan Preferred Options is that

"…development outside of the AONB which has an unacceptable impact on views within the AONB, or important views of the AONB, will not be permitted" (Policy 36).

C.26 The Yorkshire Dales National Park lies to the south-west of County Durham and within distance ranges where wind development in the county could have landscape and visual effects. The policy proposed in the County Durham Plan Preferred Options is that

"…development affecting the Yorkshire Dales National Park will be subject to the same considerations" as the AONB (Policy 36).

D Wind development affecting Durham Cathedral and Castle World Heritage Site

Background

D1 Durham Castle and Cathedral was first inscribed on the World Heritage List in 1986. It sits on a visually prominent site on an incised meander of the River Wear on the floor of the broader valley of the Wear Lowlands. In many views of the World Heritage Site (WHS) it is seen in the context of a wider landscape setting.

Setting

D2 The inner setting of the WHS (Figure 87) is formed by enclosing ridges of higher ground that form part of the incised valley landscapes of the River Wear. In places the backdrop contains built form, in other places it is open or wooded, or with built form largely concealed by tree canopies. The buildings of the WHS are either seen entirely against rising ground or, more typically, seen partially against rising ground with the cathedral towers and pinnacles breaking the skyline.

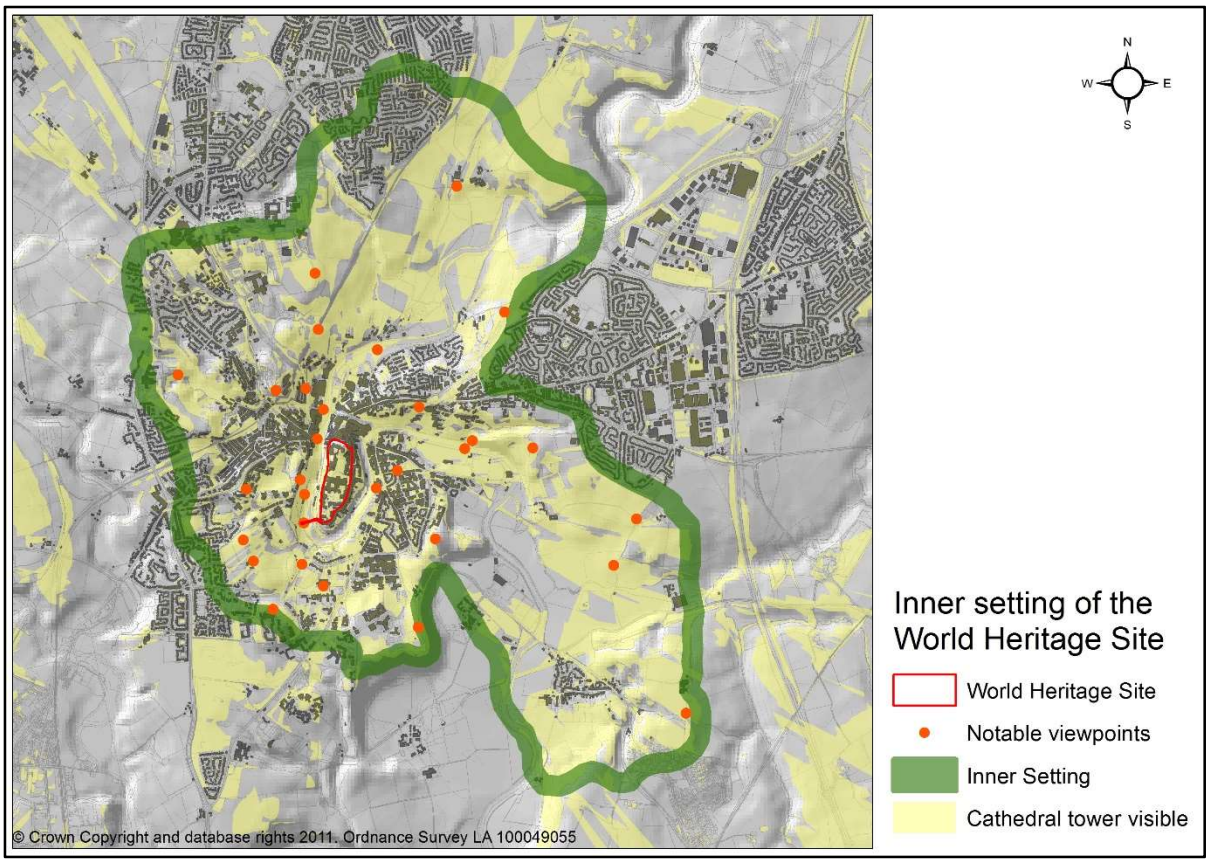

Figure 88 Map of the inner setting of the World Heritage Site (Durham Castle and Cathedral WHS Management Plan 2017-2023)

D3 The outer setting of the WHS (Figure 88) is formed by higher ground around the edges of the Wear Lowlands, and particularly the Limestone Escarpment to the east and south, and the higher ridges and spurs of the West Durham Coalfield to the west. The backdrop is largely made up of settled countryside. The buildings of the WHS are either seen entirely

against rising ground, and particularly when seen in distant views or partially against rising ground with the cathedral towers and pinnacles breaking the skyline; particularly in closer views.

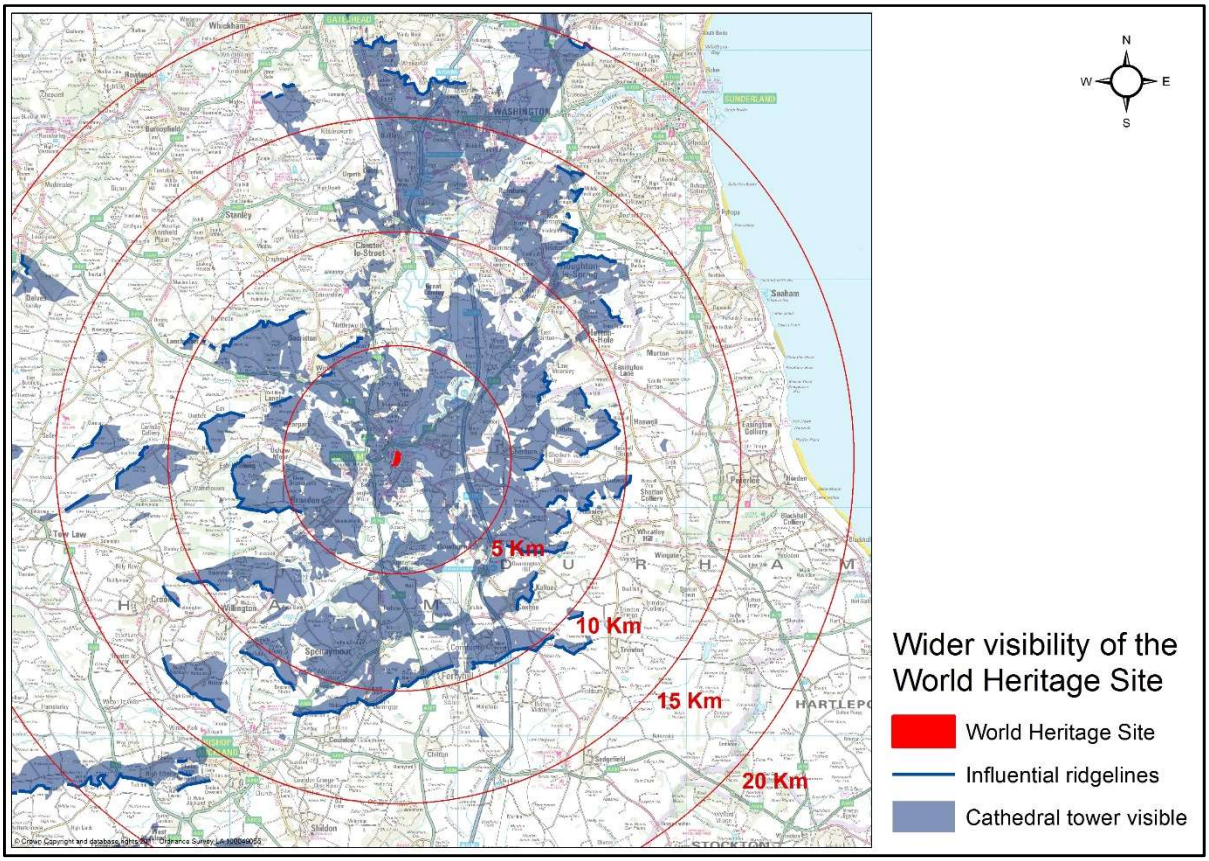

Figure 89 Map of the wider visibility of the World Heritage Site (Durham Castle and Cathedral WHS Management Plan 2017-2023)

Figure 90 Photograph of WHS from Wharton Park

D4 Figure 89 shows the WHS viewed from the north-west. The wooded ridge of Great High Wood in its inner setting forms the immediate backdrop and the more distant ridgeline of the limestone escarpment in its outer setting forms the far horizon.

Figure 91 Photograph of WHS from St Aiden's College

D5 Figure 90 shows the WHS viewed from the south. The low ridges running through Newton Hall, Frankland Farm and Gilesgate in its inner setting form the immediate backdrop, and the more distant ridgeline of the limestone escarpment in its outer setting forms the far horizon with Penshaw Hill notable beyond the central tower.

Figure 92 Photograph of WHS from Mountjoy Reservoir

D6 Figure 91 shows the WHS viewed from the south-west. The rising ground of Aykley Heads and North End in its inner setting forms the immediate backdrop and the more distant ridgeline of Findon Hill and Charlaw fell in its outer setting forms the far horizon.

Outstanding Universal Value (OUV)

D7 The setting of the WHS contributes in a number of different ways to its Outstanding Universal Value (OUV). An updated Statement of Outstanding Universal Value (SOUV) was

approved by the World Heritage Committee in June 2013. Attributes of the site related to the SOUV set out in the World Heritage Site Management Plan which engage with setting include the following.

SIGNIFICANCE 2: The visual drama of the Cathedral and Castle on the peninsula and the associations with notions of romantic beauty.

- *The dramatic, dynamic skyline of Durham Cathedral and Castle*
- *The Cathedral and Castle and their immediate setting*
- *Setting of the World Heritage Site*
- *The visual appeal of the site in its context*

SIGNIFICANCE 3: The Physical Expression of the Spiritual and Secular Powers of the Medieval Bishops Palatine that the Defended Complex Provides.

- *The scale of the spaces and buildings*
- *Buildings intended to dominate the landscape*

SIGNIFICANCE 6: The Site's Role as a Political Statement of Norman Power Imposed upon a Subjugate Nation, as one of the Country's Most Powerful Symbols of the Norman Conquest of Britain

- *The Cathedral and Castle as a monumental ensemble whose original functions are immediately recognisable, even from a distance (P 11-15)*

D8 Wind energy development has the potential to affect the significance of the WHS primarily by introducing elements that:

- interfere visually with the relationship of the WHS and the skyline;
- compete for attention with the WHS and detract from its visual dominance;
- detract from the visual appeal of the WHS in its context and particularly its visual drama and notions of romantic beauty.

D9 The degree to which individual developments affect significance needs to be assessed in detail on a case by case basis but is likely to be influenced by such factors as:

- the apparent scale of features in the view;
- proximity to the WHS in the backdrop or on the skyline;
- the importance of affected views – whether they are private or public, whether they are notable modern or historic views, whether they are from modern or historic pilgrimage routes;
- the character of affected views – whether they are of scenic quality or are of a visually complex or heterogeneous character;
- cumulative effects with other development.

D10 The potential effects of development aren't limited to areas shown on Figure 88 and being areas from which the cathedral tower is visible. Tall structures standing beyond otherwise visually influential ridgelines can be visually prominent on the skyline.

D11 The Landscape Sensitivity Assessment takes views of the WHS into account as part of its assessment criteria (Table 16, page 41). This influences the assessed sensitivity of a number of Broad Character Areas and sub-areas for some turbine sizes, and particularly:

- 7a(i) Charlaw Fell East
- 7c(i) Cornsay & Esh
- 7c (ii) Pithouse
- 8f Deerness & Hedleyhope
- 8h Findon hill and Southburn Valley
- 12c Northern Wear Valley
- 12d Southern Wear Valley
- 13b Western Valley Terraces
- 13a (ii) Eastern Vales
- 13b (iv) Brasside and Finchale
- 14a Limestone Escarpment Ridge
- 14a (i) Eastern Limestone Escarpment Ridge
- 14b Northern Limestone Escarpment

D12 The approach taken to development affecting the WHS proposed in Policy 47 (a) is as follows.

> *The Durham Cathedral and Castle World Heritage Site is a designated asset of the highest significance. Development within or affecting the setting of the World Heritage Site will be required to:*
>
> *a. Sustain or enhance the significance of the designated asset;*
> *b. Be based on an understanding of the Outstanding Universal Value of the site, having regard to the adopted World Heritage Site Management Plan and Statement of Outstanding*
> *Universal Value; and*
> *c. Protect and enhance the Outstanding Universal Value, the immediate and wider setting and important views across, out of, and into the site.*
>
> *Development that would result in harm to the Outstanding Universal Value of the World Heritage Site or its setting will not be permitted other than in wholly exceptional circumstances.*

D13 The approach taken to development affecting the WHS proposed in Policy 36(h) is as follows.

> *Wind energy development will only be permitted in the areas identified as suitable for development on Map G in the policies map document and where the applicant is able to demonstrate that, following consultation, those planning-related impacts identified by any affected local communities have been fully addressed. In those circumstances, planning permission will be granted unless:*
>
> *h. There would be unacceptable harm either individually or cumulatively to the significance of a heritage asset or its setting;.*

Existing turbines, recommissioning and wind farm extensions

D14 There are a number of existing turbines within the wider visual environment of the WHS (Figure 92). There are none within its inner setting but some within its outer setting. In most cases these were found to be acceptable because they weren't considered to have substantial effects in important views. In some cases permission was granted before the issue of the effects of tall structures on the setting of the WHS was well understood. In some cases the height of turbines was limited to avoid adverse effects in key views

(Trimdon Grange Wind Farm). None of the existing turbines fall within areas found to be of elevated sensitivity to turbines of their size class in the Landscape Sensitivity Assessment.

D 15 This study identifies some potential suitable areas for turbines of different size ranges within the setting of the WHS (Figure 93).

D16 For small turbines (<25m) some suitable areas lie within both the inner and outer setting. This reflects the potential for small structures to be screened or assimilated by other landscape features. Careful assessment would nevertheless be required for features of this size class within the inner setting.

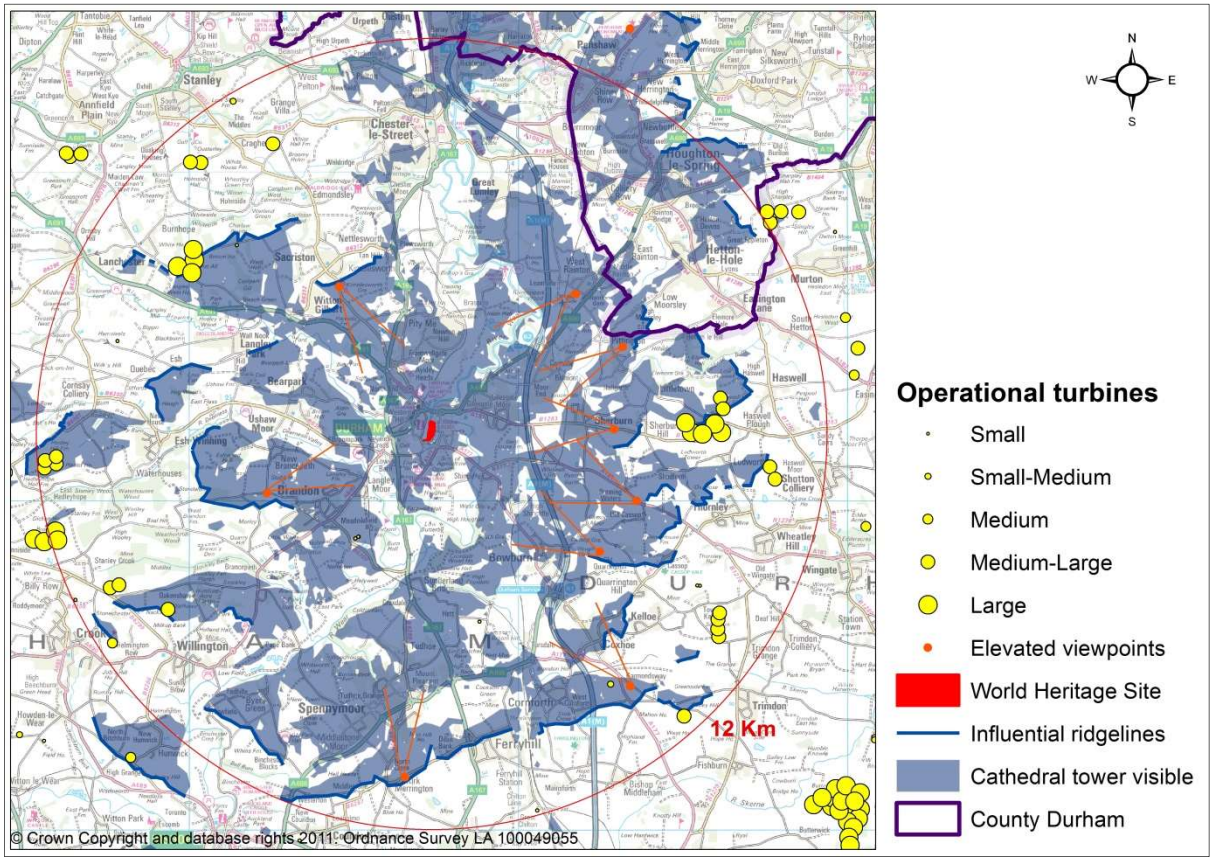

Figure 93 Existing turbines and the outer setting of the WHS

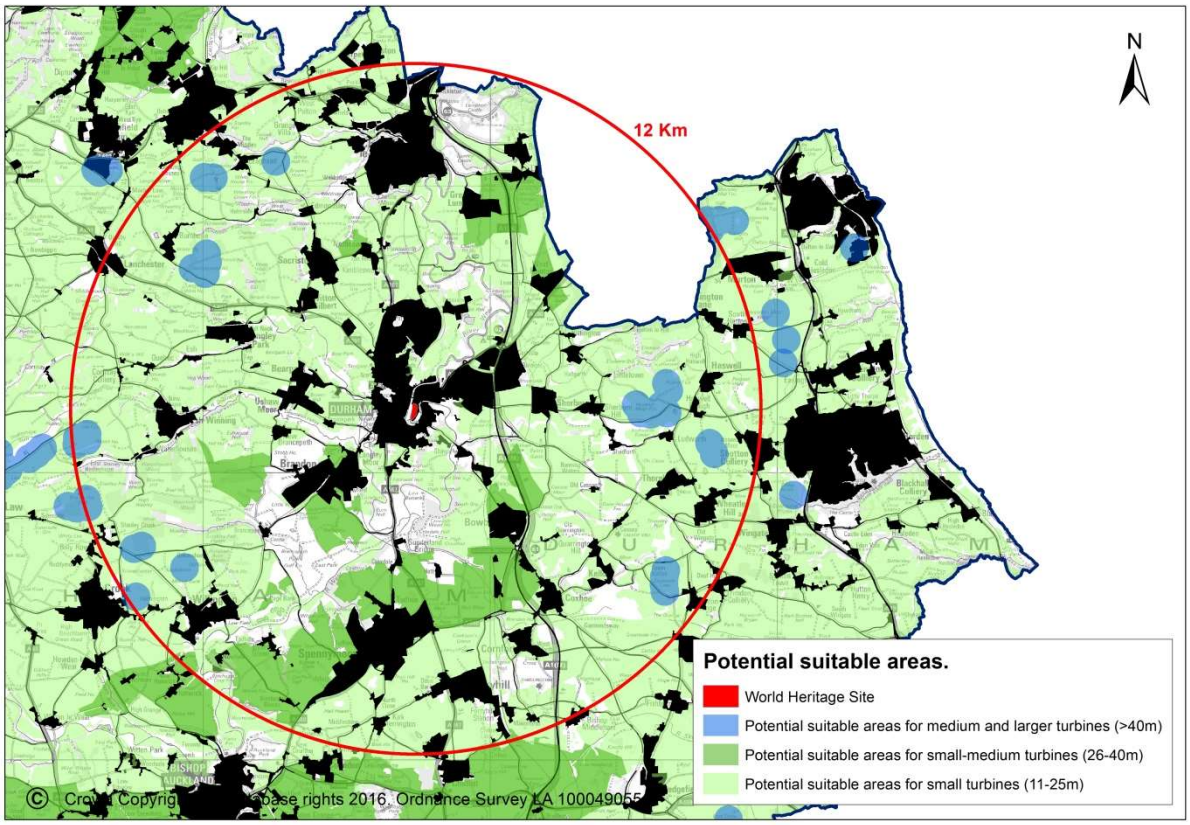

Figure 94 Potential suitable areas

D17 For small-medium turbines (26-40m) some suitable areas lie within the outer setting. This reflects the potential for structures of this size to be screened or assimilated by topography and other features in key views. Careful assessment would nevertheless be required for features of this size class affecting the setting of the WHS.

D18 For medium and larger turbines (>40m) the locations of existing development are identified as being suitable areas for re-commissioning or extensions to existing development. This reflects the fact that these locations have been found to be acceptable in the past. Careful assessment would nevertheless be required for features of this size class in these locations, and particularly in respect of re-powering with larger turbines or increases in the number of turbines.

D19 The approach taken to extensions and re-commissioning or re-powering in Policy 36 is as follows.

> *Extensions to existing wind farms will be supported provided that the proposals are in keeping with the character of the existing development and meet the other provisions of this policy.*
>
> *Proposals to re-commission or re-power wind energy development will be supported provided that the development meets the other provisions of this policy, taking full account of the effects of the extended timescale.*