

North East Regional
Assembly

**Wind Farm
Development and
Landscape Capacity
Studies: East Durham
Limestone and Tees
Plain**

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This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party

Job number 123906

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1 Introduction

1.1 Overview/report structure

Arup was appointed in July 2007 by the North East Assembly, Durham County, Durham City, Sedgefield Borough, Darlington Borough, Stockton-on-Tees Borough, Hartlepool Borough, District of Easington and Sunderland City Councils, and Tees Valley Joint Strategy Unit to undertake a 'wind farm development and landscape capacity study' to assess the potential of the East Durham Limestone and Tees Plain wind resource areas to accommodate this type of development.

This report covers variously:

- *A summary of the client brief;*
- *A review of the appropriate energy and planning policy;*
- *The proposed methodology for the project;*
- *Landscape appraisal;*
- *Visual appraisal;*
- *Cumulative impact assessment scenarios;*
- *Conclusions and recommendations*

Arup has been assisted on this study by the following sub-consultants:

- White Consultants – Landscape and visual assessment support
- The Centre for Environmental and Spatial Analysis at the University of Northumbria (CESA) – GIS, Visual assessment and graphics support

The study has lasted approximately 8 months. Outputs from the study are anticipated to assist in:

- better understanding the potential for wind energy generation in terms of landscape character and cumulative impact;
- determining/commenting on current planning applications for wind farms in the East Durham Limestone and Tees Plain Wind Resource areas;
- informing the energy planning policies contained within the current Submission Draft Regional Spatial Strategy (RSS) for the North East June 2006; and
- informing forthcoming updates to the energy policies for the councils involved within their new Local Development Framework.

The study is an objective technical assessment of capacity of an area to accommodate wind farm development in the context of the current policy framework. It has not been influenced by any current developer scoping proposals, although consented applications have been considered.

1.2 Client Brief

The client brief is set out below.

The key concern of the North East Assembly and the relevant local authorities in commissioning Landscape capacity Studies are to ensure that:

- *Wind farm development in the broad areas identified in Draft RSS Policy 42 is consistent with the criteria in Policy 41 (c) and (j) concerning acceptable visual impact.*
- *A consistent approach is taken to the assessment of multiple planning applications for wind farm developments within a given broad area*

This project is to comprise a further level of work which fits between the RRES strategic level Landscape Study¹ and developer's project specific studies. This work is intended to provide the relevant councils with a tool they can use to assess planning applications, gain greater "control" of the process and to help inform the development of their Local Development Framework (LDF).

In summary, the "levels" of work relevant to assessing the impact of wind development on landscape can be described as follows:

- *Overall regional assessment of sensitivity to wind development leading to the identification of broad areas. This work is complete (the GO-NE study²).*
- *Consideration of the capacity of the broad areas to accommodate wind development. This work has not been undertaken, and represents a gap which will make it difficult for local planning authorities to assess multiple applications in some of the resource areas.*
- *Project specific assessments. These are being prepared by developers at the present time and cumulative impact assessments will be required once multiple planning applications have been made.*

There is currently a mismatch between the scale of developer interest and that proposed in the RSS in some areas, the most urgent areas requiring examination were the Knowesgate and Harwood Forest wind resource areas³ in Northumberland (as identified in the RSS and supporting documentation). Work on these areas is now complete and published⁴ and has acted as a pilot exercise prior to commencing activity in other resource areas.

This study should build on the outputs of the Strategic Landscape Sensitivity Study already completed as part of the preparation of the Regional Renewable Energy Strategy (RRES), and go on to consider the capacity of the landscape in the area or areas specified to accommodate specific types and scales of development.

This analysis should include:

- *defining typologies for development;*
- *selecting sample/test wind farm locations;*
- *running ZVIs and combined ZVIs;*
- *analysing impact on landscapes of different sensitivities;*
- *analysing impact on population;*

¹ Government office for the North East (GO-NE)- Landscape Appraisal for onshore wind development – Report NEREG/2002/004 Final Report July 2003

² Government office for the North East - Landscape Appraisal for onshore wind development – Report NEREG/2002/004 Final Report July 2003

³ The wind resource areas in the Submission Draft RSS were identified as a result of the North East Regional Renewable Energy Strategy March 2005. This represented the on shore medium wind resource areas on a map with a 'W' symbol

⁴ See <http://www.northeastassembly.gov.uk/voice/view.cfm?vc=289>. Wind farm Development and Landscape Capacity studies: Knowesgate and Harwood Forest.

-
- *analysing different scenarios for cumulative effects; and*
 - *taking account of biodiversity issues.*

The findings and recommendations of the proposed Capacity Studies should:

- *define and set landscape objectives in respect of wind energy developments;*
- *set thresholds for acceptable change;*
- *set guidelines for scale and size of potential developments;*
- *identify preferred areas for development*

The proposed Landscape Capacity Studies should progress through a series of stages including:

- *identifying the extent of the study area;*
- *explanation of the methodology;*
- *establishment of baselines;*
- *analysis, on the lines above;*
- *modelling; and*
- *development and analysis of scenarios.*

2 Understanding of Policy

2.1 Planning Context

2.1.1 National Planning and Energy Policy

English Planning Policy for the planning for renewable energy is established in Planning Policy Statement 1 (PPS1) – Delivering Sustainable Development and Planning Policy Statement 22 (PPS22) – Renewable Energy. These documents set out a very positive approach to planning for renewable energy development. PPS1 sets out the Government's vision for planning and the key policies and principles for delivering sustainable development. Planning Policy Statement: Planning and Climate Change Supplement to Planning Policy Statement 1, published December 2007, supplements PPS1 by setting out how planning should contribute to reducing emissions and stabilising climate change and take into account the unavoidable consequences of climate change.

PPS 22 requires Regional Spatial Strategies (RSS) to include targets, criteria policies and identify broad areas where the development of renewables may be considered appropriate. PPS 22 has recently been strengthened by a 'Renewables Statement of Need', published in July 2006 as Annex D of the Energy Review 2006⁵. It indicates that:

... there will be certain areas with more readily available access to renewable resources that will be more attractive for developers, for example where windspeeds are greatest. As such, as we increase the level of renewables, in line with our energy policy goals, there will be occasions when proposals are received for renewables projects that are located closely enough together potentially to have cumulative impacts. Decision makers will have to work closely together with statutory advisers, such as English Nature, to consider the handling of assessments of the cumulative impact of such proposed developments. Cumulative effects, like the impacts of individual projects, will not however necessarily be unacceptable or incapable of reduction through mitigation measures.

This study forms part of the process of considering the cumulative impact of proposed developments.

2.1.2 Regional Planning and Energy Policy

Until recently the majority of the study area was covered by two separate structure plans. The County Durham Structure Plan, adopted in March 1999, covered Durham City, Easington and Sedgfield (also Teesdale, Wear Valley, Derwentside and Chester-le-Street not covered by this study) and the Tees Valley Structure Plan, adopted in 2004, covered Hartlepool, Stockton On Tees, Middlesbrough and Darlington (also Redcar & Cleveland not covered by this study).

Under the provisions of the Planning and Compulsory Purchase Act 2004 Regional Spatial Strategies and Local Development Frameworks collectively replace Structure Plans and Local Plans. The adopted County Durham and Tees Valley Structure Plans ceased to have effect as of 27th September 2007. However provision was made under the Planning and Compulsory Purchase Act for saving certain Structure Plan policies to prevent a policy void until the Regional Spatial Strategy is adopted. The Secretary of State issued Directions together with schedules specifying those policies in the County Durham⁶ and Tees Valley⁷ Structure Plans that have been saved.

⁵ <http://www.dti.gov.uk/energy/review/>

⁶ Direction under paragraph 1(3) of Schedule 8 to the Planning and Compulsory Purchase Act 2004 policies contained in County Durham Structure Plan (1999)

⁷ Direction under paragraph 1(3) of Schedule 8 to the Planning and Compulsory Purchase Act 2004 policies contained in Tees Valley Structure Plan (2004)

No policies relating to renewable energy were saved from the Tees Valley Structure Plan. The following policies relating to renewable energy were saved from the County Durham Structure Plan:

Policy 80 Development associated with energy generation

When considering proposals for development associated with energy generation, account should be taken of:

(a) the wider impacts of the development such as those of new transmission facilities or pollution as well as the direct impacts of the development on the local environment and local communities;

(b) the contribution to meeting energy requirements;

(c) whether adequate arrangements have been made to ensure the removal of redundant equipment; and

(d) in the case of combined heat and power schemes, the advantages in terms of the efficient use of energy resources compared with conventional power stations.

Where there are conflicts with policies to protect areas designated nationally for their environmental importance it must be demonstrated that there is an overriding national need that cannot be met on alternative sites in less sensitive areas.

Policy 81 Renewable energy

Subject to the considerations set out in should contribute to reducing emissions and stabilising climate change and take into account the unavoidable consequences Policy 80, the generation of energy from renewable sources will be encouraged. When considering such proposals, particular account should be taken of the wider environmental benefits of using renewable energy sources.

To inform the Regional Spatial Strategy (RSS) for the North East of England a Regional Renewable Energy Strategy (RRES) was prepared. The Draft RRES was issued in July 2003, the Final version was issued in March 2005 and a review of the Final document was undertaken in November 2005.

The Draft RSS was submitted to the First Secretary of State in June 2005 and was the subject of an Examination in Public (EiP) in March 2006. As indicated in the Client's brief, the Draft RSS identified a number of 'broad areas of least constraint for wind farm development'; these were listed in Policy 42 and identified with a "W" symbol on maps contained within the Draft RSS.

The Panel report on the EiP was received on the 4th August 2006⁸. The EiP Panel considered whether there was a need for greater clarity in Policy 42 and supporting text concerning the use of the term 'medium scale wind energy development'. Policy 42 b) confirms that the areas identified in the Policy have 'potential for medium scale development'. It emerged from the debate at the EiP that the interpretation that should be put upon the potential of these areas is that they are suitable for small to medium scale wind energy development, and that this description was intended to distinguish these areas from the potential for large scale wind energy development in the Kielder Forest. It was pointed out that some renewable energy companies believed that this policy implied that the designated areas could accommodate a number of 'medium scale' developments. It was established from the North East Assembly in reply that the definition of medium scale set out in paragraph 3.141 (20 - 25 turbines) and carried forward into Policy 42 related to the total capacity of an area and should not be regarded as an appropriate scale for individual

⁸ http://www.go-ne.gov.uk/gone/ourregion/regional_strategies/rss_panel_report/

proposals. It was also confirmed that work is on-going using landscape capacity techniques to better inform the carrying capacity of the designated areas. The Panel noted that this work will be of particular assistance in making judgements on cumulative impact.

In light of the above information the EiP panel were of the opinion that paragraph 3.141 should be extended to confirm that the scale indications relate to the overall area and not to individual proposals. Likewise it concluded that this extension of the text should be complemented by a modification of Policy 42 b) to clarify that the potential of the identified areas is for small to medium scale development. It also concluded that it would be useful to include a reference to the future contribution of the landscape capacity analysis in terms of cumulative impact. The EiP Panel Report recommended that the Draft RSS text be modified as follows:

- *Amend Paragraph 3.141 to provide an adequate explanation of the scale/capacity issue, and to include reference to the future contribution the landscape capacity analysis study will make to assessing cumulative impact.*
- *Modify Policy 42 b) as follows -*
 - b) the following areas have potential for small to medium scale development:*

Following the publication of the EiP Panel report the Government then prepared a Proposed Changes to the draft RSS document, taking into account the recommendations made by the Panel. The Proposed Changes document was published in May 2007 and a first stage of public consultation on these proposed changes was held between May and August 2007. The comments received during that consultation were taken into account in the preparation of the Further Proposed Changes document, published February 2008 which was subject to a second stage of public consultation between February and April 2008. Following consideration of the views received, the Secretary of State will issue the final version of the RSS – anticipated to be early summer 2008.

The Further Proposed Changes document has:

- retained reference to the definition of medium scale wind energy development as *“broadly up to 20-25 turbines”* (paragraph 3.166)
- highlighted in paragraph 3.167 that the *“broad areas of least constraint could sustainably accommodate more than 1 wind energy development subject to the requirements of Policy 41”*
- included reference within Policy 42b) to the East Durham Limestone Area which was missing from the Draft RSS and omitted reference to the Tees Estuary

Throughout the evolving RSS, Policy 42 has outlined a number of ‘broad areas of least constraint for wind farm development’; which are identified with a “W” symbol on maps contained within the various versions of the RSS. The current maps outlining the location of the “W’s” contained within Further Proposed Changes document are provided below, **Environment Maps 1, 2 and 3.**

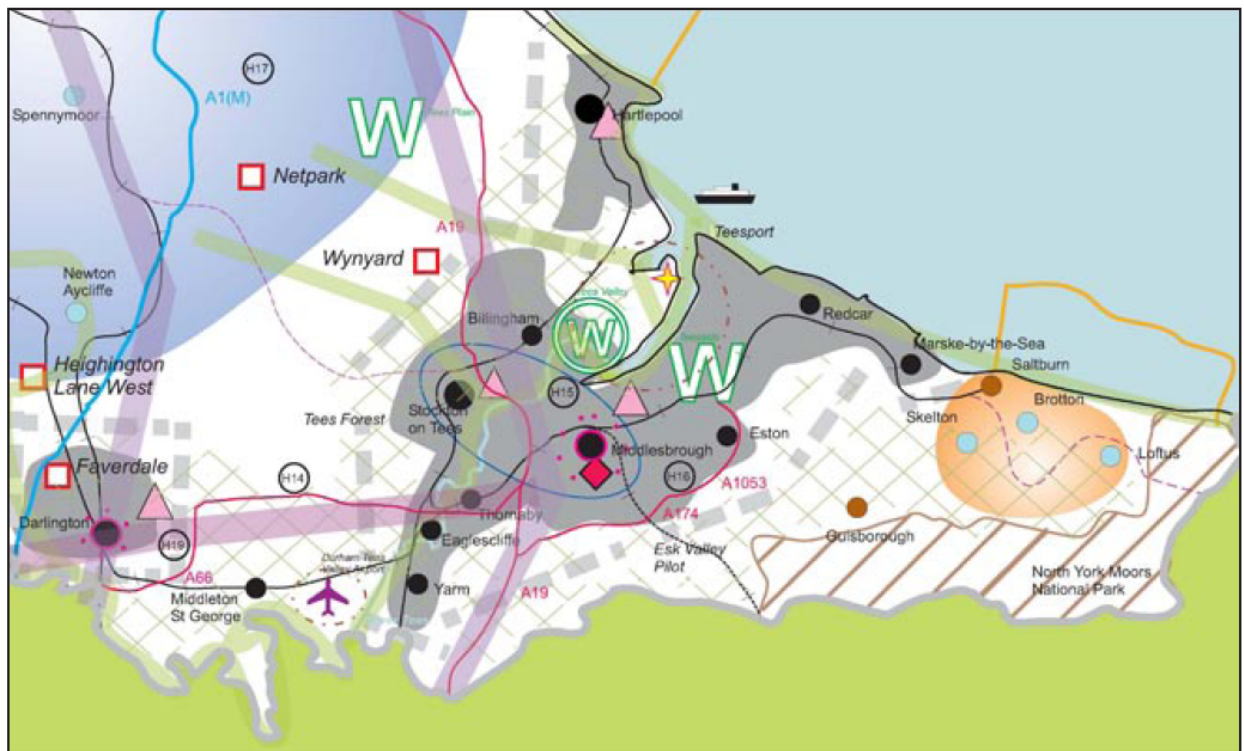
Environment Map 1 – Key Diagram from The Secretary of State’s Further Proposed Changes to the Draft Revision Submitted by the North East Assembly (February 2008)



Environment Map 2 – Inset (N) Diagram from The Secretary of State’s Further Proposed Changes to the Draft Revision Submitted by the North East Assembly (February 2008)



Environment Map 3 – Inset (S) Diagram from The Secretary of State’s Further Proposed Changes to the Draft Revision Submitted by the North East Assembly (February 2008)



The larger “Ws” within the above maps represent areas with potential for the development of “medium scale” wind farms, which as explained in the Draft RSS paragraph 3.141 and the subsequent Proposed Changes and Proposed Further Changes documents paragraph 3.166, are indicatively considered to represent up to 20 – 25 turbines.

At present, the majority of wind developer activity is focused on the above broad areas, indicating that the strategic planning framework is providing a level of effective spatial guidance. However the scale of development emerging in some of the areas exceeds the guideline of 20 – 25 turbines.

The November 2005 review of the Regional Renewable Energy Strategy indicates (para. 3.1.1) that, as of September 2005, over 117MW of onshore development was either operation or had gained planning permission with another 150MW at the pre-planning/scoping/planning stage in the County Durham and Tees Valley area.

In summary therefore, current national and regional planning policy provides a positive environment for wind energy development in County Durham and Tees Valley. (Adopted District level policies are generally out of date with the current spatial regional planning policies for renewable energy, given the rapid advances in this technology over the last few years). The policy environment provides policy guidelines and criteria to assess appropriate levels of developments; however frequent references are made to:

- ‘medium scale’ development
- cumulative impact; and
- the need to respond to the local landscape.

These are issues this study sets out to examine in greater detail.

3 Proposed Study Methodology

3.1 Overview

The study methodology is essentially unique to the current series of ongoing projects in the North East of England⁹; as far as the study team are aware this sort of exercise has not been attempted to quite this extent to date in the UK, particularly the use of visual data and the preparation of development scenarios.

Moves have been made to direct wind farm development through the planning system (e.g. in Cumbria and Yorkshire) using landscape data but these have had only limited success and have not been tested against the level of developer activity and interest present in County Durham and Tees Valley. The study team has been involved in broadly similar regional wind work in Wales, implementing Technical Advice Note 8: Planning for renewable energy. The approach advocated in TAN 8 differs from that in PPS 22 since the Welsh regional *onshore wind* targets are established through a national policy document and are thus less flexible than the renewable energy aspirations in the North East RSS.

3.2 Study Approach

Broadly this study methodology comprised two stages:

- a. Technical and environmental constraints review. This aims to reduce the scope of the area to be subject to landscape/visual analysis, largely to maximise available resources. It comprises a standard constraint sieving exercise using a Geographic Information System (GIS), similar to that undertaken by all wind farm developers when selecting sites. This identifies the “least constrained”¹⁰ land with respect to range of parameters which can then be tested for its suitability in landscape and visual terms.
- b. Landscape, visual and cumulative analysis. This is the bulk of the effort of the study and aims to determine the relative landscape and visual performance of parts of the study area. It also attempts to examine the potential for cumulative landscape and visual impact and thus will consider thresholds for acceptable change.

This chapter now considers both stages in turn.

3.3 Technical and Environmental Constraints/Study area

The technical and environmental constraints review builds directly on work undertaken to underpin the North East RRES; a regional Geographic Information System was used for this work.¹¹ For this study, using broadly the same constraint datasets an indication of the “unconstrained” or “least-constrained” land in the study area was defined. There are subtle differences between the method used for GIS analysis in this Wind Farm Development and Landscape Capacity Study and previous work for the RRES and these are:

- Use of an OS Address Point dataset. This contains a point feature for each UK property with a valid postal address.

⁹ The first study using this method was of the Knowesgate and Harwood Forest Area, completed in 2006, followed by Kiln Pit Hill (February 2007), North and South Charlton (April 2007) and South and West Berwick upon Tweed (June 2007).

¹⁰ “Least constrained” in this context refers to the absence or comparatively lower frequency (when compared to the surrounding area) of a set of pre-defined technical and environmental constraints that prohibit development in absolute terms. It does not relate to the landscape and visual characteristics of an area or suggest that there are not other constraints that either singularly or in combination may affect the ability to develop wind turbines.

¹¹ Dunsford HM, MacFarlane, R and Turner KL (2003) The Development of a Regional Geographic Information system for the North East Renewable Energy Strategy. Project Reference NEREG/2002/004

- The wind speed threshold in the NOABL¹² dataset has been raised from 6.4m to 6.8m in order to provide greater focus on the areas most likely to be considered by developers in the first instance¹³.

The results of the constraint analysis are shown on **Figure 1** and **Table A** gives details of the constraint datasets used in the analysis.

Table A – Constraints to large-scale wind energy development

Criteria / constraint	Source	Details/justification/decision
Visual / aural amenity of sensitive receptors (Settlements, isolated properties, farms etc) (600 m radius buffer of all postal addresses)	OS Address point data	This reflects the practice within the onshore wind industry of siting development an appropriate distance from residential properties (for noise/amenity and safety reasons). 600m has been chosen for this study. It is acknowledged that acoustic separation distances closer to 700m are now the norm for the very largest rated turbines (2-3MW turbines) and the study recommendations (when developed) generally respond to this sort of separation distance from residential areas. This is not to suggest that 600m represents a new planning criterion for use at the development control level; it is used to broadly represent the most densely populated rural areas and thus to help define a sensible study area for analysis.
Wind speed < 6.8 m On 1km square basis	DTI/NOABL Model	Developers of large (i.e. ≥ 25 MW) wind farms would typically seek sites with a minimum mean annual wind speed of 6.8+ m/s (defined at 45m above ground level). Generally other areas are unlikely to be considered economically viable; however, with the tallest turbines some flexibility is now available on the margins of the areas of higher wind speeds. This is not to suggest that areas with wind speeds less than 6.8m/s represent a new planning criterion for use at the development control level; the data is used to broadly represent the most promising wind resource areas and thus to help define a sensible study area for analysis.
Sites of Special Scientific Interest	Natural England	Wind farms generally have a very small physical footprint compared to the total area occupied by the development, since only the turbine footings and access / maintenance tracks require the disturbance of the ground surface. Nonetheless, because of the ecological importance of sites under designation such areas are now considered

¹² The Department of Trade and Industry wind speed database (ETSU NOABL) contains estimates of the annual mean wind speed throughout the UK. The data is the result of an air flow model that estimates the effect of topography on wind speed. There is no allowance for the effect of local thermally driven winds such as sea breezes or mountain/valley breezes. The model was applied with 1km square resolution and makes no allowance for topography on a small scale or local surface roughness (such as tall crops, stone walls, or trees), both of which may have a considerable effect on the wind speed. The data can only be used as a guide and should be followed by on-site measurements for a proper assessment.

¹³ Sensitivity testing has been undertaken on the effects of changing this parameter from 6.5m/s to 6.8m/s and in reality the spatial changes in unconstrained area are small.

		as constraints to large-scale wind farm developments.
National Parks, Areas of Outstanding Natural Beauty (AONB), Special Protection Areas, RAMSAR, pSAC, SAC, National Nature Reserves,	Natural England	Because of the landscape, cultural and ecological importance of sites under designation such areas are considered as absolute constraints to large-scale wind farm developments.
Scheduled Ancient Monuments World Heritage Site Listed building data is also used where available but is not buffered on the constraint plans.	English Heritage	Scheduled Ancient Monuments (SAMs) are designated by English Heritage and are statutorily protected, thus are considered as absolute constraints to large-scale wind farm developments. The extent of World Heritage Site(s) have been considered as absolute constraints and their setting considered further in the report.
Radar		UK military and Airports are concerned about turbines interfering within air traffic control. Calculating the visibility of Wind turbines to a radar installation allows the identification of sites that are not in the line or site of a radar installation. Distances beyond which this is no longer an issue varies with Airports at 30km and Military Radar 76km.

Note that data has also been used for land outside of the study area where appropriate and where it would be significant within the analysis e.g. settlement data.

1.2.1 Derivation of Study Area

The Regional Renewable Energy Strategy makes no specific reference to the true spatial extent of the “W” symbols; the only descriptive text is as follows: “*The [W] symbols on the Indicative Diagram are intended to give a positive steer towards areas of least constraint. They do not imply that other suitable areas for development in relation to criteria policies will not emerge from more detailed developer activity*”.

For the ongoing Wind farm Development and Landscape Capacity Studies in the North East of England, a broad study area some **10km radius from the centre of the W symbol** has been used as the starting point for the analysis. The W symbol as defined in the RRES represents an area some 4km in diameter, although this represents just a graphical aid and does not imply physical limits or a definitive boundary. An initial 10km radius therefore should encompass all possible permutations of the W location and extent; this is shown on **Figure 1b** below. Within this 10km radius area, the study area is defined by the main area of “least constraint” closest to the ‘W’ symbol and ideally forming a contiguous area with the ‘W’ symbol. This is also shown on **Figure 1b**.

For ease of geographic reference this main area of “least constraint” closest to the ‘W’ symbol is also reproduced on an OS base as **Figure 2**, and against a map of topography as **Figure 3**.

The study area is then subjected to further landscape and visual analysis, and this is set out in the next chapter.

Figure 1b – Derivation of Study Area

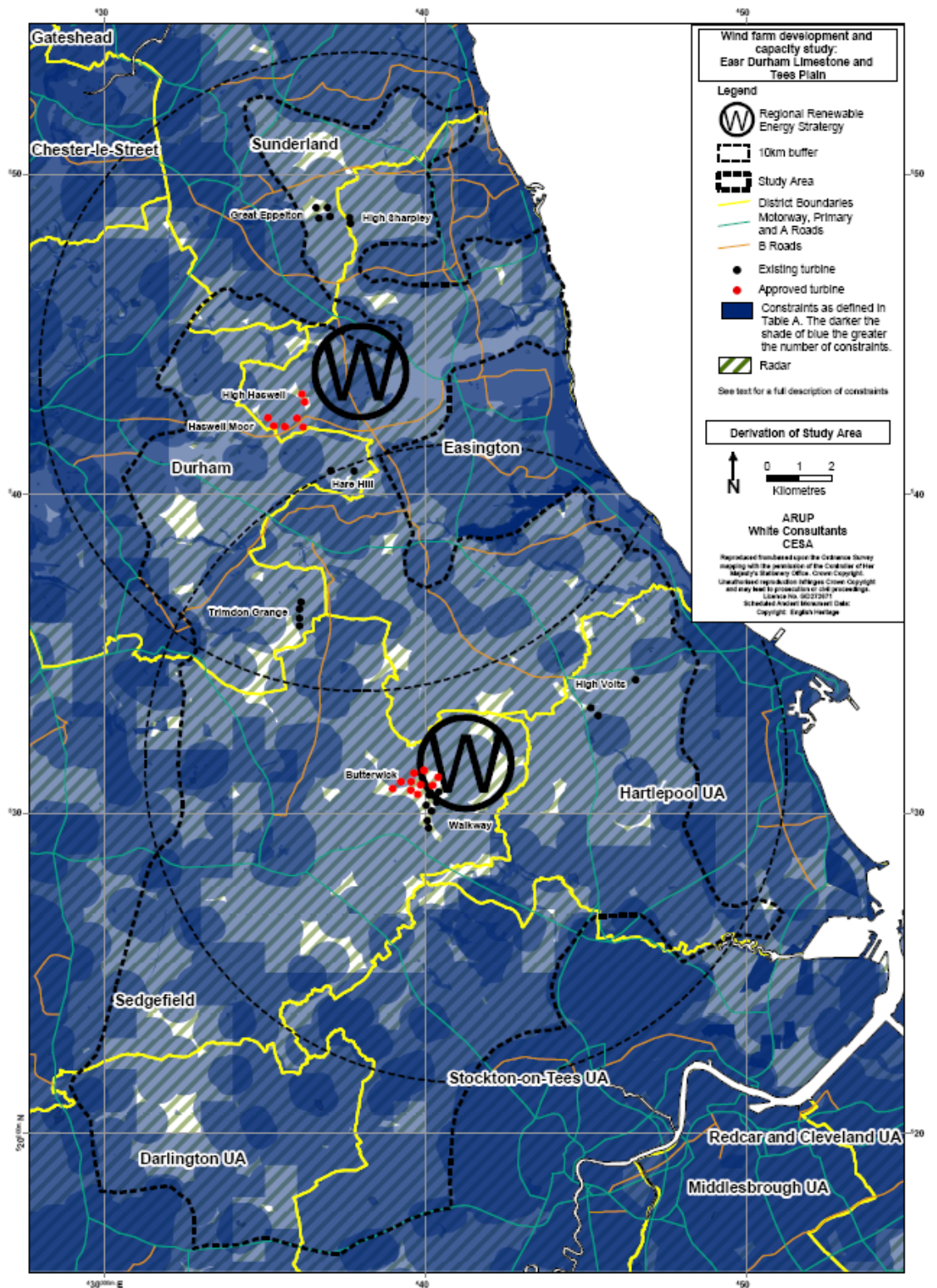


Figure 2 – Study Area on OS base

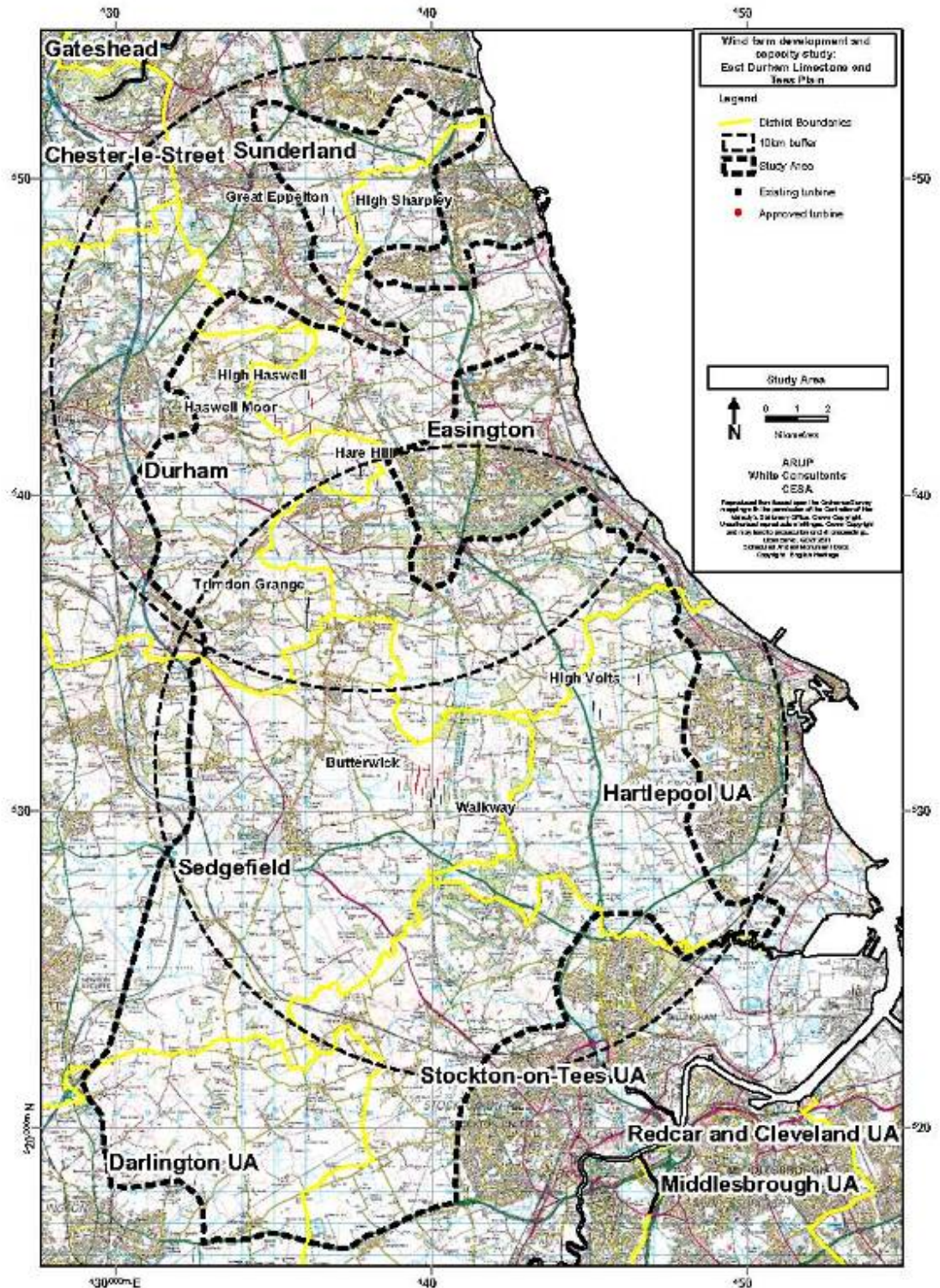
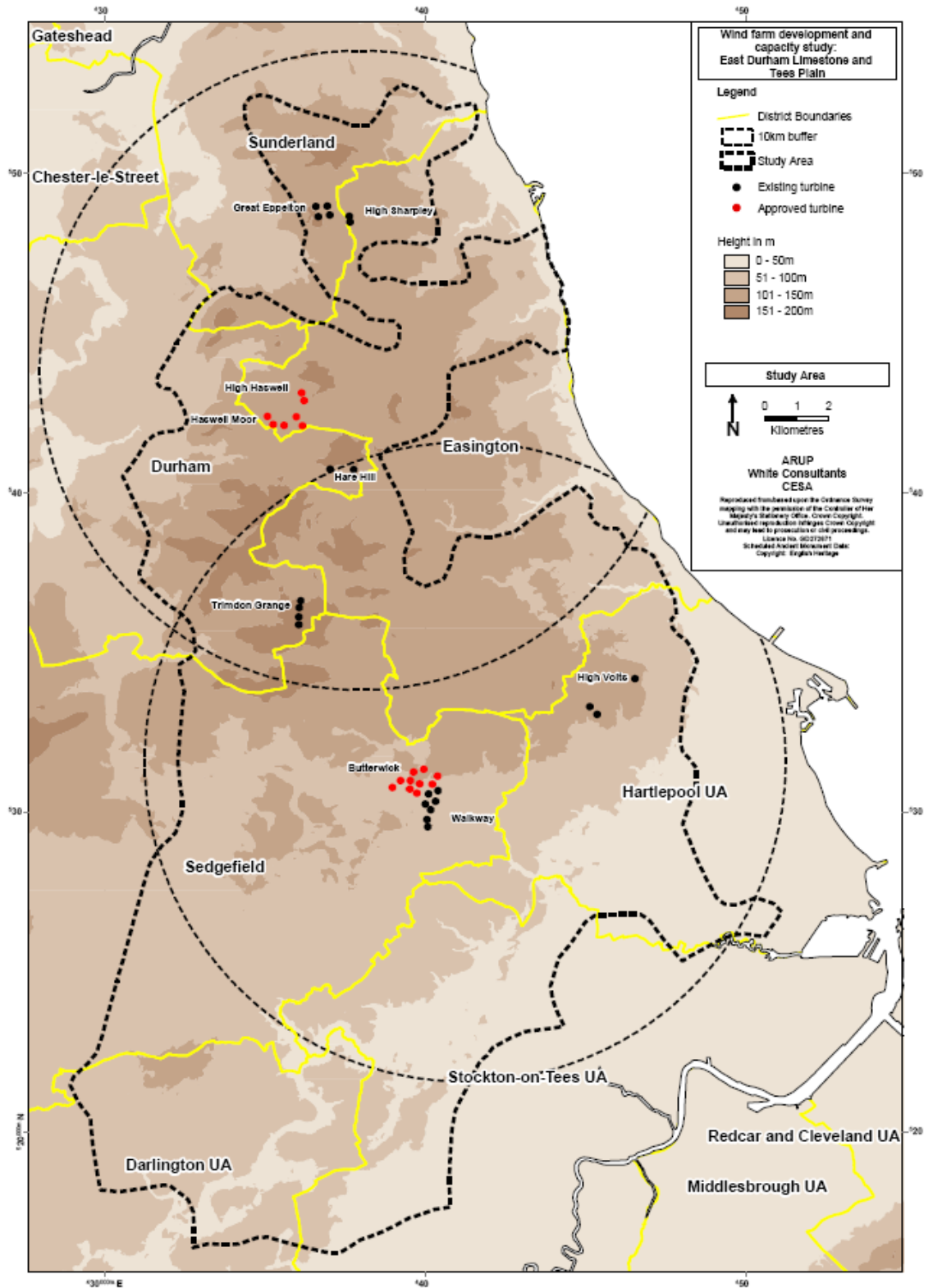


Figure 3 – Initial topographical analysis of the study area



4 Landscape Analysis

4.1 Introduction

This chapter considers the influence of the landscape on the siting of wind turbines within the study area with reference to desk study and a field-based landscape sensitivity/capacity assessment. This study is considering the capacity for both the East Durham Limestone and Tees Plain “Ws” as indicated in the NE draft RSS.

4.2 Overview

The Study Brief requires the following:

- Landscape objectives in respect of wind energy developments;
- Thresholds for acceptable change; and
- Setting guidelines for the scale and size of potential developments.

In order to arrive at the information required by the study brief it is considered the following three components of information are required:

- Landscape sensitivity and thus a measure of the *capacity of a particular landscape* to accommodate wind farm developments of particular scales/forms;
- *Visual sensitivity*, a measure of the likely visual effects associated with development of a part of the study area; and
- A view on the likelihood of *cumulative landscape and visual impact* between proposals.

The approach to these issues is guided by the following documents:

- Guidelines for Landscape and Visual Impact Assessment¹⁴
- Landscape Character Assessment: Guidance for England and Scotland¹⁵
- Visual Assessment of Windfarms: Best Practice¹⁶
- Landscape Appraisal for Onshore Wind Development¹⁷
- Topic Paper 6 – Techniques and criteria for judging capacity and sensitivity¹⁸
- Topic Paper 9 – Climate Change and Natural Forces – The consequences for Landscape Character¹⁹

It is accepted that climate change is occurring as stated in Topic paper 9 and unless action is taken will result in changes to the landscape. One mitigating measure is the provision of wind farms to reduce CO₂ emissions from energy generation and the development of strategic planning policies are key to ensuring that these can be achieved appropriately. This report works within this positive frame work. It is not possible to state with confidence that changes are likely to occur in the County Durham and Tees Plain landscape due to climate change. We therefore use the existing landscape baseline as a means to define sensitivity and capacity for wind farms over the next few years.

¹⁴ Landscape Institute and IEMA (2002) – 2nd Edition

¹⁵ Countryside Agency and SNH (2002)

¹⁶ SNH – Revised 2005

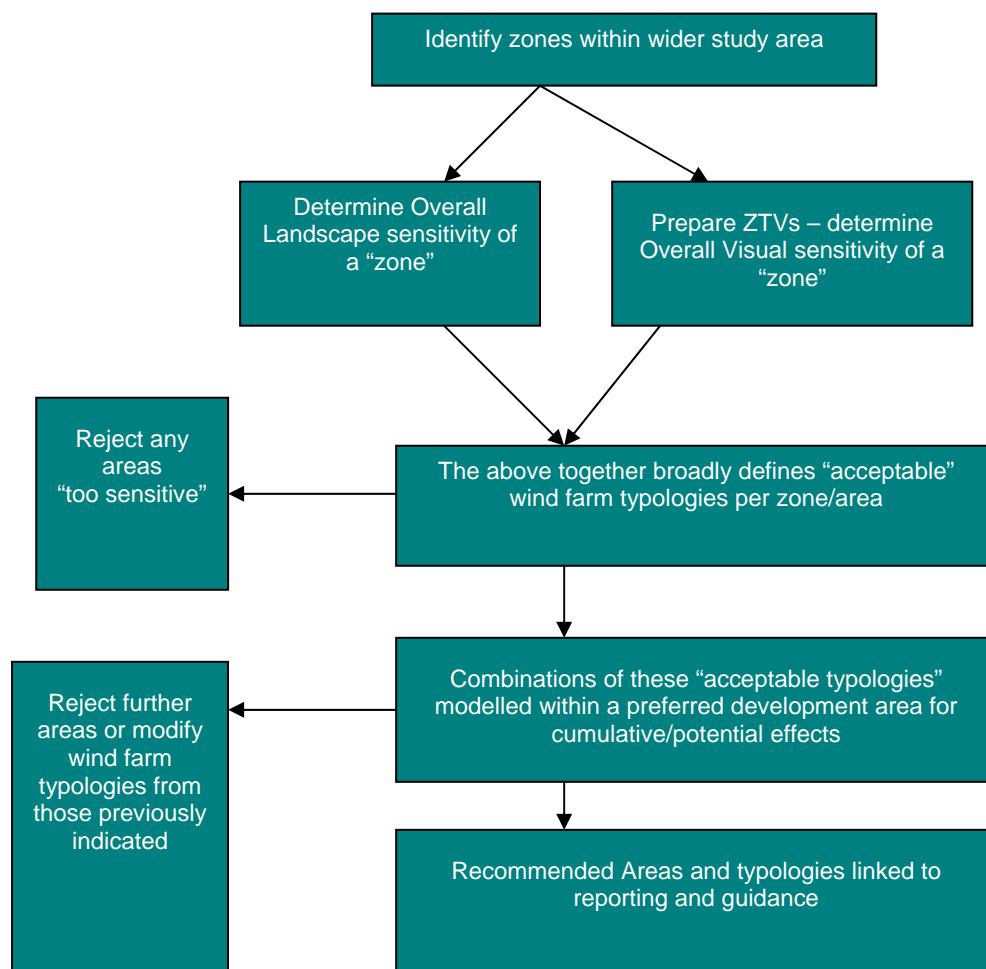
¹⁷ Benson, J. *et al* (2003)

¹⁸ SNH and Countryside Agency (2005)

¹⁹ SNH and Countryside Agency (2002)

The three elements of landscape sensitivity, visual sensitivity and cumulative impact are brought together as shown on **Diagram A** and **Table 1**. The building blocks for the analysis are landscape ‘zones’ or sub-units which are sub-divisions of the general study area. These are principally derived from desk study but have been verified in the field.

Diagram A – Indicative Methodology for landscape and visual assessment work



The tasks are set out below in **Table 1**.

Table 1 – Outline workflow for landscape and visual work

Task title	Task
Definition of “least constrained” ²⁰ areas	Review of standard GIS constraints for wind farm developments
Definition of study area	Identify major areas of “least constraint”, group together and cross check against developer interest (only to ensure main areas of interest addressed)
Definition of typologies for wind farms	Research typologies based on recent applications. Define likely size and number of turbines for feasible wind farms updating GO-NE study

²⁰ “Least constrained” in this context refers to the absence or comparatively lower frequency (when compared to the surrounding area) of a set of pre-defined technical and environmental constraints that prohibit development in absolute terms. It does not relate to the landscape and visual characteristics of an area or suggest that there are not other constraints that either singularly or in combination may affect the ability to develop wind turbines.

Task title	Task
	typologies
Refinement of landscape sensitivity/capacity, derivation of landscape units/zones	-Identify landscape types/units in technically feasible areas [referring to GO-NE study, Landscape character assessment of England, County Durham County Character Area Study and other available studies] -Refine capacity for different landscape types/areas for refined wind farm typologies working within UoN framework
Refinement of zones/units	Identify areas within landscape units which may perform differently in terms of overall visibility and visual effects on sensitive receptors, subdivide accordingly
Identification of viewpoints for assessment and site assessment	Identify and visit viewpoints for: <ul style="list-style-type: none"> - assessing landscape sensitivity/ capacity - assessing potential visual effects of each zone's potential wind farms
Zone of Theoretical Visibility (ZTV)	Identify categories of receptors for ZTV analysis e.g. overall effects, settlement, A-roads, National Park, Areas of Outstanding Natural Beauty, National Trails, visitor attractions, National Trust properties/registered parkland/listed buildings, conservation areas etc. -Define radii of analysis -Define heights of turbines to be used for analysis -Carry out ZTV for each zone for each receptor type -Score/summarise visual performance with commentary [based on site visit] -link to wind farm typologies
Cumulative development	-Research further evidence of wind farm cumulative impact studies -Identify draft criteria and thresholds for defining what constitutes unacceptable cumulative effects -Define scenarios for analysis of cumulative effects -Carry out ZTV analysis for all zones overlaid [quantitative] -Analyse potential cumulative effects overall and on sensitive receptors of combinations [qualitative]
Guidance for local authorities, DTI etc.	Define process, factors and information that local authorities/DTI etc. will take into consideration or require in determining wind farm applications

4.3 Landscape Desk study

4.3.1 GO-NE Landscape Appraisal for Onshore Wind Development

The work undertaken as part of the preparation of the North East Regional Renewable Energy Strategy (RRES) in 2003, which underpins Submission Draft RSS renewable energy policies, included a "Landscape Appraisal for Onshore Wind Development"²¹. This study fed into an onshore wind GIS created as part of RRES which helped to identify the "Ws." The GO-NE Landscape Study identified and described the region's landscape character areas based predominantly on desk study analysis with limited field work. A level of sensitivity to wind turbine development was then ascribed to each character area based on an assessment of physical and perceptual characteristics. This has provided the basis for strategic planning at RSS level.

While the GO-NE Landscape Study provides a starting point, in that it identifies levels of sensitivity to wind development, it does not give any guidance as to the capacity of a particular landscape to accommodate multiple developments; neither does it consider the cumulative impact of successive developments or visual impact issues. It is also at too coarse a scale to inform this type of project, other than to provide context. To this end the relevant landscape character areas from the GO-NE Landscape study have been added to **Figure 4**, along with their relative landscape sensitivity.

Most of the study area corresponds with 5 landscape character areas (Reference **Figure 4**). These are the:

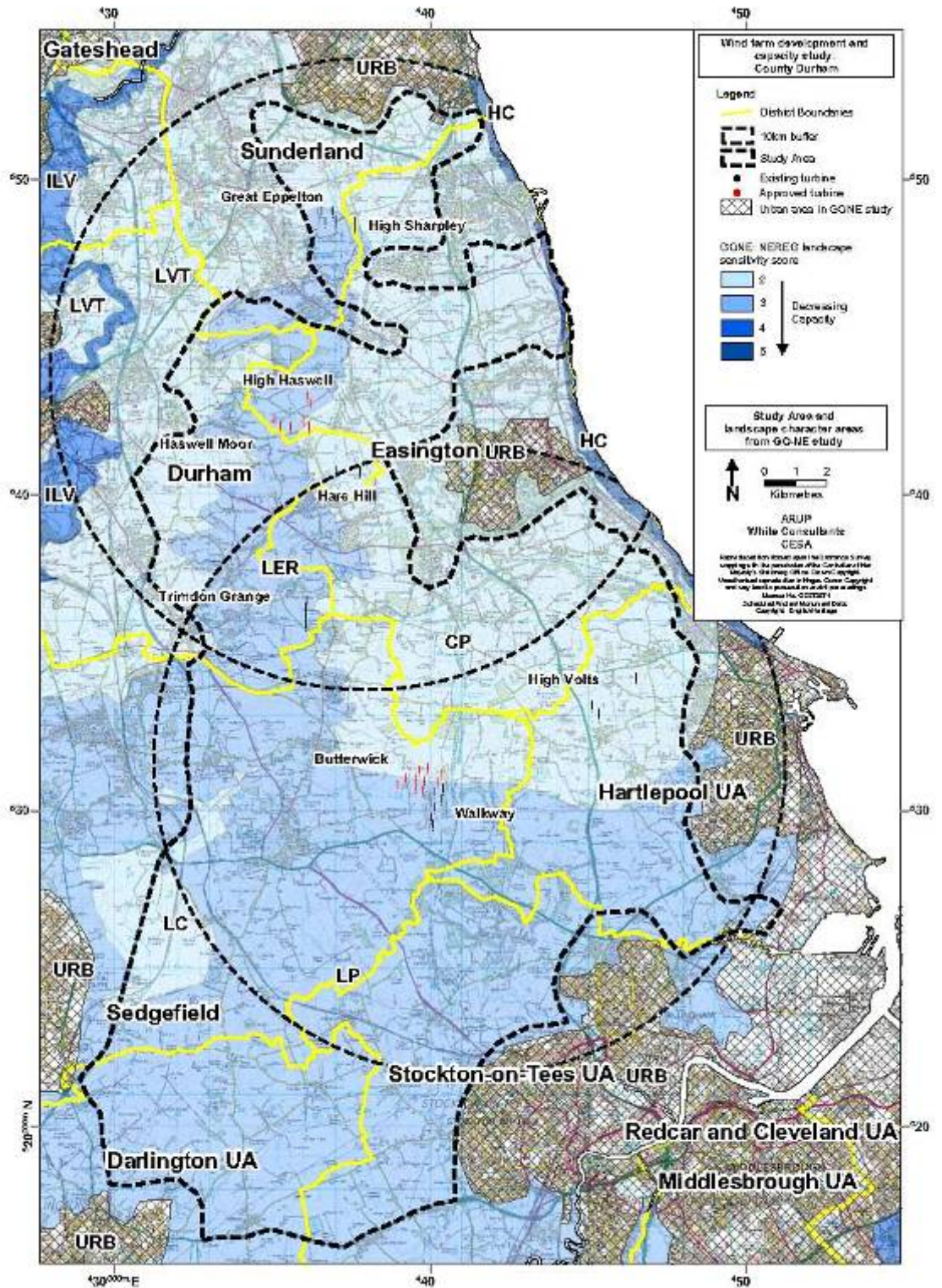
- CP- Coastal Plateau – an area of low-medium landscape sensitivity (Score 2²²) to wind farms comprising the lower eastern parts of the study area between Hartlepool and Sunderland.
- LER- Limestone Escarpment and Ridge – an area of medium landscape sensitivity (Score 3) to wind farms comprising the central northern section of the study area.
- LVT– Lowland Valley Terraces – an area of low-medium landscape sensitivity (Score 2) to wind farms comprising the north western part of the study area. This character area continues to the west of the study area.
- LP- Lowland Plain – an area of medium landscape sensitivity (Score 3) to wind farms comprising the majority of the south of the area. This character area continues to the south and east.
- LC – Lowland Carrs – an area of low-medium landscape sensitivity (Score 2) to wind farms comprising a discrete broad low-lying plain bisected by the A1(M) in the south west of the study area.

To the east lie the sea cliffs of the Hard Coast which are of High sensitivity (Score 5).

²¹ Government office for the North East - Landscape Appraisal for onshore wind development – Report NEREG/2002/004 Final Report July 2003

²² Where Score 1 is least sensitive and Score 5 is most sensitive to wind development

Figure 4 – Study Area and landscape character areas from GO-NE study



4.3.2 County Durham Landscape Character Assessment

A nested series of landscape character assessments covering County Character Areas, Broad Character Types, Broad Character Areas and Local Landscape Types in County Durham has been carried out by County Durham²³.

There are 3 County Character Areas which are further subdivided into 6 Broad Character Types (Reference **Figure 4a**) in the north portion of the study area which lies within the County Durham administrative boundary. These are the:

East Durham Limestone Plateau

- **Limestone Escarpment** – A low escarpment comprising sparsely wooded predominantly arable farmland with a series of short steep sided
- **Clay Plateau** – A low flat to gently rolling plateau of sparsely wooded improved pasture and arable farmland.
- **Coastal Limestone Plateau** – A low rolling coastal plateau of predominantly arable farmland, incised by narrow steep-sided denes.

Tees Lowlands

- **Lowland Plain** – Open gently rolling lowland plain with areas of flat or hummocky terrain. Mixed but largely arable farmland, generally sparsely wooded with areas of heavily wooded old parkland and estate farmland.
- **Lowland Carrs** – Flat low lying arable and mixed farmland divided by regular grids of water filled ditches. The area is crossed by the A1(M) and the East Coast railway line on raised embankments.

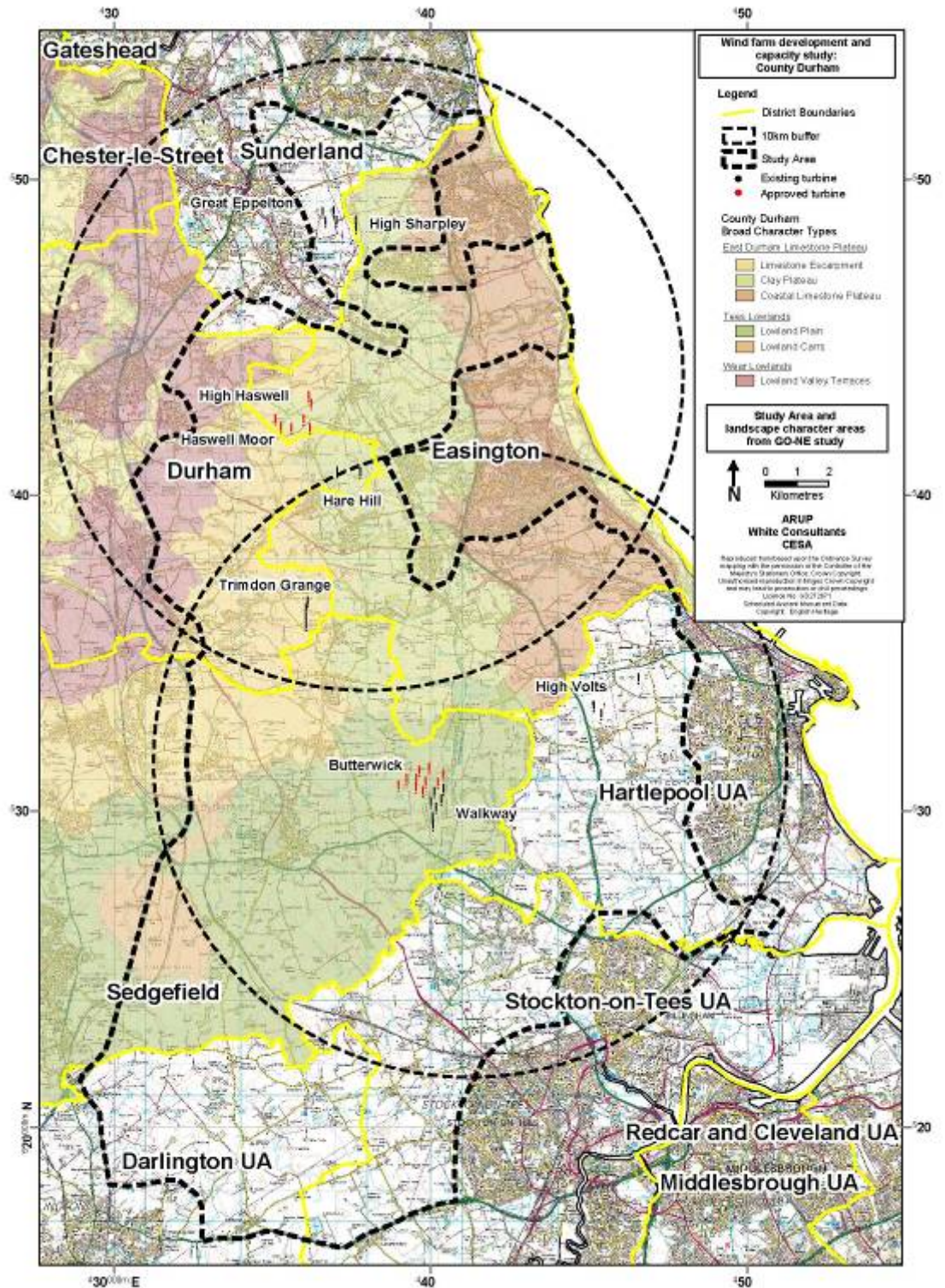
Wear Lowlands

- **Lowland Valley Terraces** – A broad gently rolling lowland valley floor comprising sparsely wooded mixed farmland with areas of heavily wooded old parkland and estate farmland.

To the east of the study area lies the Limestone Coast a varied coastline of shallow bays, cliffs and headlands which forms the eastern most part of the East Durham Limestone character area.

²³ Durham County Council, 2003.

Figure 4a – Study Area and County Durham Broad Character Types



4.3.3 Derivation of Landscape Zones

Using the Broad Character Types identified in the Durham Landscape Character Assessment and acknowledging the GO-NE study, Ordnance Survey mapping and fieldwork, the study area has been further sub-divided into zones of anticipated similar landscape character. It should be noted that these zones are not intended to represent a detailed landscape character assessment of the study area.

Twenty seven zones have been developed and these are shown on **Figure 5**. Each zone is then subjected to a landscape sensitivity analysis and visual assessment and this process is described in the next section.

4.3.4 Relevant landscape characteristics

Topography

The land in the north of the study area is characterised by a low limestone escarpment which rises to 193m AOD above Old Cassop at its highest point. A series of steep sided valleys dissect the scarp slope between prominent west facing spurs. The dip slope forms a low plateau that gently undulates as it falls towards the east. A low coastal plateau with a gently rounded topography which is incised by narrow steep sided denes extends to the sea cliffs in the north east of the study area.

To the south of the limestone escarpment the land opens out to a gently undulating lowland plain with a few localised areas of topographical interest such as a small area of locally distinctive sparsely settled lowland carrs which lies at around 75m AOD in the south west of the study area. The lowland plain extends southwards across the Tees Valley until the land begins to rise again at the edge of the North York Moors National Park outside of the study area.

Landcover

The dominant landcover is mixed farming with a high proportion of arable fields especially in the north west of the study area. There is a semi regular pattern of medium and large fields frequently bounded by low hawthorn hedges except on the carrs where water filled ditches form the field boundaries on the lower poorly drained ground. Tree cover is sparse in the north of the study area becoming more frequent towards the south of the area with some heavily wooded areas of old parkland and estate farmland, for example the woodland surrounding the settlement of Wynyard.

The study area is surrounded by large conurbations including Sunderland to the north, Durham to the west, Darlington, Stockton on Tees and Middlesbrough to the south, Hartlepool and Peterlee to the east. The study area is well settled with frequent scattered mining towns and villages throughout the north, with scattered farms and a nucleated pattern of villages in the south. The area is served by a network of busy roads and winding lanes. Pylons are frequent throughout the area and dominate the skyline in places. Several existing wind farms are located throughout the study area, generally with a turbine height to blade tip of around 100m although reaching 110m at Walkway to the west of Sedgfield. There are also several recently consented wind farms within the study area with proposed height to blade tip ranging from 76m at Trimdon Grange to 115m at Great Eppelton where existing turbine development (69.5m to blade tip) is being repowered.

Figure 5 – Proposed landscape zones for sensitivity analysis and visual assessment

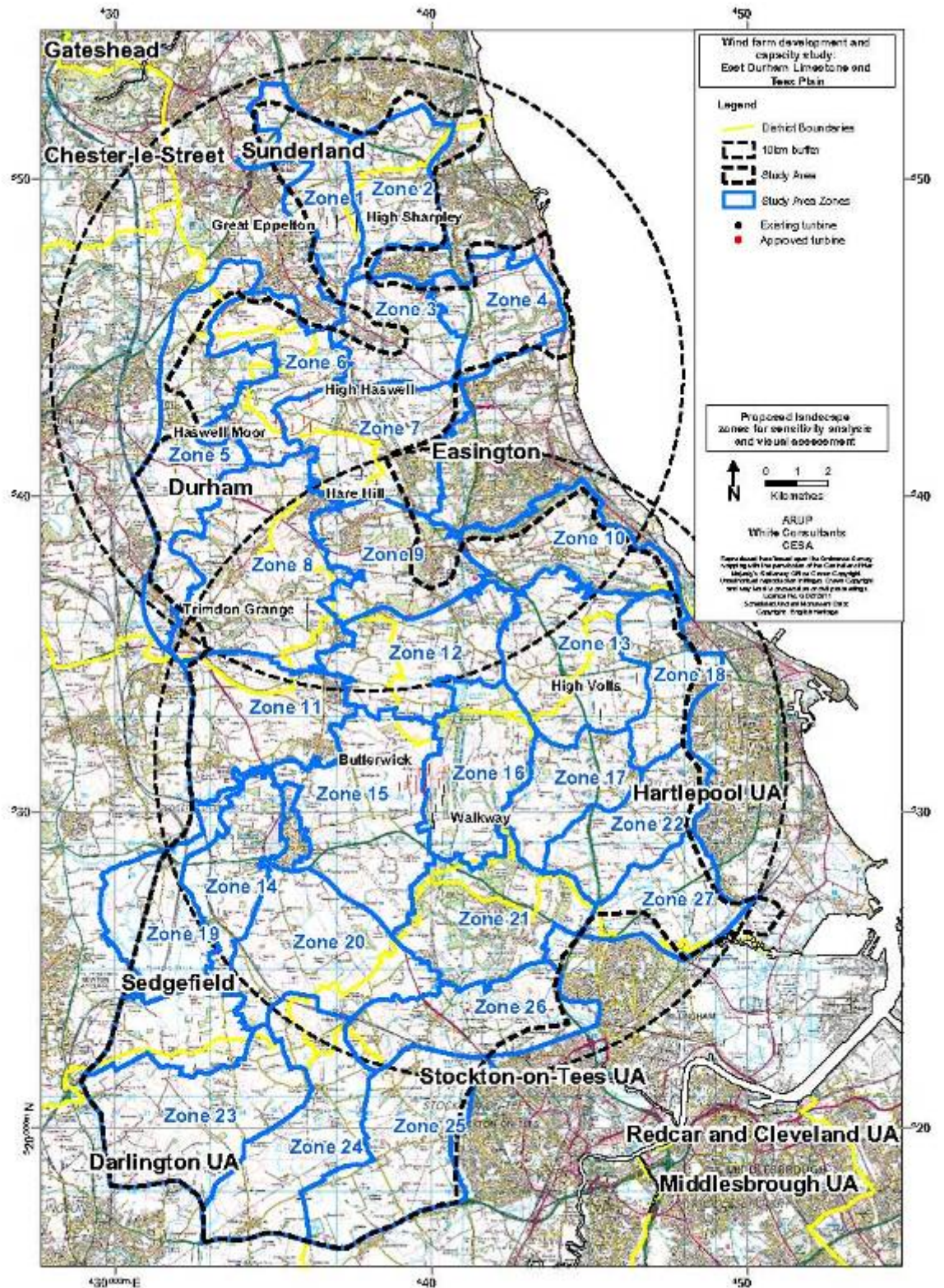
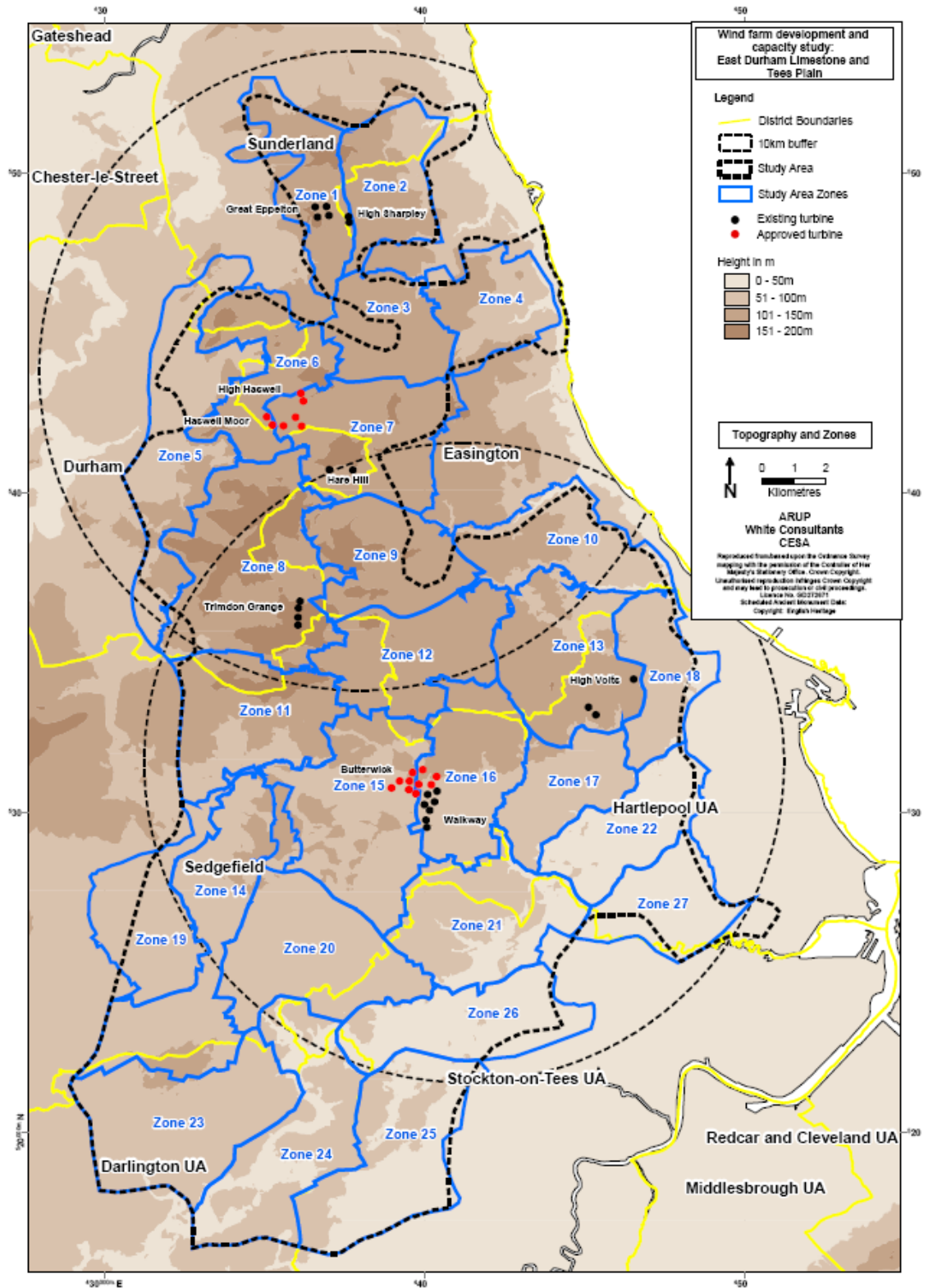


Figure 6 – Topography and Zones



Perceptual Qualities

Overall this is a well settled generally large scale farmed landscape. It is a visually open landscape with panoramic views from the higher ground across the surrounding lowlands and toward the sea in the east. The area has a rural character in places but with a semi-rural or urban fringe quality in settled areas.

The comprehensive transport network and the volume of traffic generally reduce the tranquillity of the area. Detractors including telecommunications masts and pylons are frequent throughout the area. Existing and disused quarries and evidence of mining reclamations are present within the north of the area. Several existing wind farms are located throughout the study area, generally with a turbine height to blade tip of around 100m although reaching 110m at Walkway to the west of Sedgfield. There are also several recently consented wind farms within the study area with proposed height to blade tip ranging from 76m at Trimdon Grange to 115m at Great Eppelton where existing turbine development (69.5m to blade tip) is being repowered.

The limestone escarpment which is highly visible from the A1 forms an important backdrop to the City of Durham and Durham Cathedral and Castle World Heritage Site.

4.4 Landscape Sensitivity and Capacity

The GO-NE Landscape Appraisal for Onshore Wind Development uses a landscape methodology to determine a broad view on the sensitivity of the region's landscape character areas and how vulnerable they are to change. The project considered specifically sensitivity to wind energy development. There is agreement amongst landscape professionals that landscapes have different sensitivities depending on the form of change or development e.g. an assessment for housing would be different to one for minerals extraction.

The GO-NE appraisal indicates:

"Landscapes which are highly sensitive are at risk of having their key characteristics fundamentally altered by development, leading to a change to a different character. Sensitivity is to be assessed by considering the physical characteristics and perceptual characteristics of landscapes in the light of particular forms of development" (in this case wind farms).

Sensitivity is considered independent of landscape value (i.e. whether an area has a landscape designation or not).

Landscape capacity refers to the degree to which a particular landscape area is able to accommodate a particular type of change without significant effects on its character, or overall change of character. Capacity implies a quantity that can be assessed and measured; it relates to how much a landscape can absorb or accommodate development without a fundamental change in character, i.e. becoming a dominant characteristic, rather than a prominent element.

Based upon a review of previous landscape capacity studies for wind farms, including the GO-NE study, plus the experience of the study team in Wales between 2002 and 2006 in developing and implementing TAN8, a simplified sensitivity and capacity matrix has been developed. This links a series of objective criteria relating to the physical and perceptual characteristics of a landscape zone to the capacity of those zones for a particular type of wind farm development. It is inevitably simplistic in its approach, but arguably its strength lies in its relative ease of application and its transparency.

The matrix is applied to the landscape zones (which range from approximately 10 – 30km² in size) and which together form landscape character areas. Thus the approach is fine-grained and capable of detecting local changes in landcover/landform. Such a small grain of analysis also serves to even out any individual uncertainties over capacity limits, since the units are to be brought together to form an overall series of broad capacity areas covering the East Durham Limestone and Tees Plain wind resource areas.

Of the criteria presented within the sensitivity and capacity matrix all are to be considered of equal weight in principle, however experience suggests that scale of landform, scale of landcover and topographic form are the most instructive.

To inform the landscape sensitivity/capacity work, a series of wind farm typologies have been developed. These are set out below:

- **Very large** - Greater than 76MW or 25-35+ turbines approx. i.e. larger wind farms submitted to DTI -Kielder Forest - or several of the below grouped together.
- **Large** - Between 50-75MW or 17-24 turbines approx. i.e. such as submitted to DTI for example Ray in the Knowesgate and Harwood Forest Resource Area.
- **Medium** - Between 26-49 MW or 9-16 turbines approx. i.e. Butterwick
- **Medium small** - Between 7.5-25 MW or 4-9 turbines approx.
- **Small-Medium small** - Between 7.5-18 MW or 4-6 turbines approx.
- **Small** - Less than 7.5MW or less than 4 turbines approx.
- **None** – Area unsuitable for any wind turbines by virtue of its landscape characteristics and/or relationship to sensitive landscape features.

Due to the settled nature of this low lying landscape turbines in the range of 100-125m to blade tip have been considered within the typologies. However, it should be noted that in some instances larger numbers of smaller (say 80m to blade tip) turbines may be appropriate.

It should be noted that the proposed “Medium” category suggested above comprises a smaller number of turbines than the RSS “medium” category (up to 20-25 turbines) yet given modern turbine outputs the installed capacity in MW is likely to be broadly the same. It is considered that >50MW would be viewed by most parties as a key size threshold given the change in consenting regime and represents most developers view of what constitutes a “large” project.

The study brief makes reference to “*guidelines for scale and size of potential developments*”. This is a contentious issue as smaller turbines (sub-100m to blade tip), whilst often more desirable in landscape terms, are generally less efficient, increasingly difficult to purchase and are unlikely to come forward in future applications. Turbine heights are also likely to continue to increase over time as taller turbines give greater energy yields per turbine and are also required in areas of forestry to avoid turbulence effects. The Landscape Sensitivity/Capacity assessment will consider therefore the suitability or otherwise of parts of the study area for current design turbines in the 100-125m+ to blade tip range and give emphasis as to what an appropriate number of turbines might be for the landscapes concerned. Any areas not deemed suitable for current turbine technology will be highlighted and a commentary made on whether those areas would be unsuitable for all wind turbines or whether smaller turbines might be acceptable if available (e.g. second hand).

Generally the greater the sensitivity of a landscape the smaller the typology of wind farm which is appropriate for that landscape to avoid the wind farm becoming a dominant element within the landscape. A Landscape Capacity worksheet was completed for each zone and based on the physical and perceptual characteristics identified in the worksheets professional judgement was used to determine the wind farm typology appropriate for each zone.

The typology relates to the size of a single cluster that may be appropriate in a zone irrespective of the number of turbines that may already be located within the zone or which may have been given planning permission. This means that in some zones it may be considered that they have reached their landscape capacity already due to the number of turbines or the size of the zone. This is commented on in the worksheets. Some zones, due to their size may be able to accommodate more than one cluster of a given typology. The desirability of this is explored in the cumulative assessment section. The capacity assessment relates only to landscape issues, not overall development capacity as this is determined by numerous factors, some of which are outwith the scope of this report.

The summary of results for the landscape sensitivity and appropriate typologies for the zones is set out within **Table 2** below and illustrated on **Figure 7**. The completed Landscape Capacity worksheets for each zone are included in **Appendix A**.

Table 2 – Landscape Sensitivity of Zones and resulting largest wind farm typology potentially acceptable

Zones	Landscape sensitivity	Largest wind farm typology potentially acceptable	Comments
Zone 1	Medium – Medium high	Small - Medium Small	<p>The area forms a backdrop to a heavily settled landscape, rising above settlements including Houghton-le-Spring and Hetton-le-Hole, reaching around 170m AOD to the north west of Warden Law. The area has medium scale fields and limited woodland cover generally associated with the steeper slopes, leisure facilities and small areas of plantation. Pylons run through the eastern part of the zone.</p> <p>The sensitivity of the zone allows only a small-medium small typology due to the scale of landform, its edge characteristics and grain of landcover.</p> <p>There are 2 existing 90m to blade tip turbines at High Sharpley and 4 72m turbines at Great Eppleton which are currently being re-powered with 4 115m to blade tip turbines.</p> <p>The capacity for turbine development within this zone is limited due to the existing development and is discussed in Table 8.</p>

Zones	Landscape sensitivity	Largest wind farm typology potentially acceptable	Comments
Zone 2	Medium	Small – Medium Small	<p>This area gently rises above the settlement of Seaham, affording open views out to the North Sea. The A19 passes through the north before forming the eastern boundary of the area. Apart from the wooded Burdon Dene, tree cover in the area is generally limited to widely scattered small plantations and shelterbelts. Several small water bodies are spread throughout the area.</p> <p>The sensitivity of the zone allows only a small-medium small typology due to the scale of landform and grain and lowland character of landcover.</p> <p>There are no existing turbines within the zone although 2 90m turbines at High Sharpley lie on its western boundary, and 4 72m turbines at Great Eppleton which are currently being re-powered with 4 115m turbines lie to their immediate west.</p> <p>The capacity for turbine development within this zone is limited due to the existing development to the west which is discussed in Table 8.</p>
Zone 3	Medium	Small	<p>A gently undulating landscape rising to over 135m at Croup Hill with several large villages located along the A182. The area is crossed by many overhead power lines and the disused South Hetton Colliery is a local detractor within the zone. The A19 forms part of the eastern boundary.</p> <p>The sensitivity of the zone allows only a small typology due to the grain and character of landscape and settlement pattern.</p> <p>The capacity for turbine development within this zone is limited due to the existing development to the west which is discussed in Table 8.</p>

Zones	Landscape sensitivity	Largest wind farm typology potentially acceptable	Comments
Zone 4	Medium – Medium high	Small - None	<p>A gently undulating area containing the incised wooded Hawthorn Dene. The land rises to 143m AOD at Batterlaw Hill. Settlement within this area comprises a few scattered farms and the village of Hawthorn with the larger settlements of Seaham and Easington Colliery located outside the area to the north and south respectively. The Durham Heritage Coast lies to the east of the area and includes the extreme south east corner of the area.</p> <p>The sensitivity of the zone allows only a small typology due to the grain and character of landscape and settlement pattern.</p> <p>The capacity for turbine development within this zone is limited due to the existing development to the west which is discussed in Table 8.</p>
Zone 5	Medium high	None	<p>Part of the broad terraced valley to the east of the City of Durham with broad, lightly wooded valleys. The raised embankments of the A1(M) and the East Coast railway line form much of the western boundary to the area. Settlement within the area includes the villages of Sherburn, Hallgarth, Pitlington and Old Quarrington. The Greenbelt around Durham extends into the north west of the area. The scarp slope within Zone 6 forms a strong backdrop to the zone.</p> <p>The area is considered unsuitable for turbine development due to its lower slope small scale, settled characteristics between the fingers of the adjacent limestone scarp slope [Zone 6] and its relationship with Durham Cathedral & Castle World Heritage Site to the east.</p>
Zone 6	Medium high	None	<p>Low west facing limestone escarpment dissected by valleys separated by broad well defined spurs affording open views toward Durham Cathedral. The land rises to 163m AOD above High Moorsley. Deciduous and mixed woodland is associated with the land surrounding the Grade 1 listed Elmore Hall. Several small disused quarries and the large active Crime Rig quarry are visible on the scarp face.</p> <p>The zone is not considered suitable for wind energy development due to the scarp slope which forms a prominent backdrop to the land to the west.</p>

Zones	Landscape sensitivity	Largest wind farm typology potentially acceptable	Comments
Zone 7	Medium	Small- Medium Small	<p>Undulating land rising to 169m AOD at Hare Hill with limited woodland cover. Shotton Airfield and the disused Tuthill Quarry are located in the eastern part of the zone. Pylons form a prominent feature as they pass through the middle of the area. The area forms a rural backdrop to the settlements of Shotton Colliery and Peterlee which lie to the east.</p> <p>The sensitivity of the zone allows only a small-medium small typology due to the scale of landform, its role as backcloth to lower land to the west and the grain of the settlement pattern.</p> <p>There are two existing 100m turbines at Hare Hill, three consented 100m turbines forming part of the larger (five turbine) Haswell Moor development, and two consented 110m turbines at High Haswell which would visually coalesce with Haswell Moor.</p> <p>The capacity for turbine development within this zone is limited due to the existing/permitted development which is discussed in Table 8.</p>
Zone 8	Medium - Medium high	Small	<p>Continuation of the low west facing limestone escarpment in Zone 6. Woodland cover is generally associated with the scarp slope and valley sides. Open views across the valley terrace to the City of Durham and Durham Cathedral are possible. The villages of Cassop, Quarrington Hill, Coxhoe and Trimdon Grange are located within the zone. Several active and disused quarries, some of which now used as landfill sites, are evident within the area.</p> <p>The sensitivity of the zone allows only a small typology due to the scarp slope to the west, its role as backcloth to lower land and the grain and type of settlement pattern.</p> <p>4 No. 76m to blade tip turbines have been permitted at Trimdon Grange within this zone,</p> <p>The capacity for turbine development within this zone is limited due to the existing/permitted development which is discussed in Table 8.</p>

Zones	Landscape sensitivity	Largest wind farm typology potentially acceptable	Comments
Zone 9	Medium	Medium small	<p>An undulating landscape rising to 163m AOD at Deaf Hill with small scale coniferous and mixed plantations in the east of the zone. The area is well settled with the large villages/small towns of Deaf Hill, Wheatley Hill and Wingate located toward the edges of the zone. The A181 passes through the middle of the zone. Pylons pass through the north west of the zone.</p> <p>The sensitivity of the zone allows only a medium small typology due to the grain and character of the landscape and settlement pattern</p> <p>The capacity for turbine development within this zone is limited due to the existing development to the north and west which is discussed in Table 8.</p>
Zone 10	Medium high	None	<p>An undulating plateau reaching 134m AOD bounded by the incised wooded valleys of Castle Eden Burn (a SSSI, NNR and SAC) to the north, and Crimdon Beck and Hesleden Dene to the south. The area is relatively well settled with a medium scale rectilinear field pattern. Castel Eden Park is included on the Register of Historic Parks and Gardens and several listed buildings are located in the north of the zone near Castle Eden Burn. Open views of the north sea are possible from the zone. The Durham Heritage Coast lies to the east of the zone.</p> <p>The area is considered unsuitable for turbine development due to its settled characteristics, incised valleys and its relationship with the coast.</p>
Zone 11	Medium	Small - Medium small	<p>A gently undulating landscape rising to 183 m AOD in the north east near Trimdon. Small pockets of woodland are generally associated with disused workings and quarries. A relatively well settled area with pylons forming dominant features in the north and east of the zone. Fishburn Airfield is located to the north west of Fishburn within this zone. The area is crossed by several busy roads including the A177.</p> <p>The sensitivity of the zone allows only a small-medium small typology due to the grain and character of the landscape and settlement pattern.</p> <p>The capacity for turbine development within this zone is limited due to the existing development to the north and west which is discussed in Table 8.</p>

Zones	Landscape sensitivity	Largest wind farm typology potentially acceptable	Comments
Zone 12	Medium	Medium small	<p>An undulating open landscape with a medium scale rectilinear field pattern, rising to 157m AOD at Trimdon Colliery. The settlements of Trimdon Colliery, Station Town and Hutton Henry are located towards the periphery of the zone and the remainder of the zone is relatively sparsely settled.</p> <p>The sensitivity of the zone allows only a medium small typology due to the grain and character of the landscape and settlement pattern</p> <p>The capacity for turbine development within this zone is limited due to the existing development to the north and west which is discussed in Table 8.</p>
Zone 13	Medium	Small- Medium small	<p>A landscape of gently rolling hills sloping east towards the coast with an area of plateau above Heselden Dene. A small incised wooded valley extends from Heselden Dene into the zone in the north. The A19 passes through this farmed landscape reducing tranquillity. Overhead power lines are prominent features in places.</p> <p>The sensitivity of the zone allows only a small-medium small typology due to the prominence of skyline from the east and south east, and the pattern of landcover.</p> <p>Three 100m to blade tip turbines are already operational at High Volts.</p> <p>The capacity for turbine development within this zone is limited due to the existing development which is discussed in Table 8.</p>

Zones	Landscape sensitivity	Largest wind farm typology potentially acceptable	Comments
Zone 14	Medium - Medium high	Small to the south – None to the north	<p>A medium scale undulating plateau with blocks of woodland in the north and a more open character in the south. Generally sparsely settled with scattered farms with the exception of the village of Mordon. Sedgefield is located on the eastern boundary of the zone. Hardwick Country Park in the north of the zone is included on the Register of Historic Parks and Gardens with several listed buildings located within the setting of the park.</p> <p>The sensitivity of the zone allows only a small typology in the south of the zone due to the scale and grain of the landscape. The north of the zone is considered unsuitable for turbine development due to its relationship with Sedgefield and Hardwick Country Park.</p> <p>The capacity for turbine development within the zone is limited due to the existing/permitted development to the east which is discussed in Table 8.</p>

Zones	Landscape sensitivity	Largest wind farm typology potentially acceptable	Comments
Zone 15	Medium	Medium small	<p>A gently undulating predominantly arable landscape with medium sized fields which reduce in size towards Sedgfield. Field boundaries are a mixture of hedges with hedgerow trees and post and wire fences. The area is relatively sparsely settled with scattered farms but the large settlements of Sedgfield, Fishburn and Trimdon all lie either on or close to the western boundary of the zone. The busy A689 passes through the area, east to west, connecting the A1 with the A19, and reducing tranquillity. There are overhead power lines running north to south.</p> <p>The sensitivity of the zone allows only a medium small typology due to the presence of clustered settlements nearby and the pattern of landcover.</p> <p>Turbine development has been consented in the east of the zone with 6 of ten total permitted 110m turbines at Butterwick. The rest of the 10 lie adjacent to the seven 110m to blade tip turbines recently been constructed at the Walkway site in Zone 16. Together the two developments will read as a single development of 17 turbines and will form a strong group larger than the typology considered appropriate for either zone.</p> <p>The capacity for turbine development within this zone is limited due to the existing development which is discussed in Table 8.</p>

Zones	Landscape sensitivity	Largest wind farm typology potentially acceptable	Comments
Zone 16	Medium	Medium small	<p>A gently undulating landscape reaching around 125m AOD in the north of the zone with open fields, deciduous, mixed and coniferous plantations and woodland. Views are generally enclosed within the zone by the woodland. Two reservoirs and several smaller water bodies are located within the area. The Castle Eden Walkway, along which National Cycle Route 1 run through the area. The zone is relatively sparsely settled with settlement generally comprising scattered farms. The site of the medieval village of Embleton lies in the eastern parts. The busy A689 passes through the southern fringes, connecting the A1 with the A19.</p> <p>The sensitivity of the zone allows only a medium small typology due to the grain and the pattern of landcover and proximity of settlement.</p> <p>Seven 110m to blade tip turbines have recently been constructed at the Walkway site. Further turbine development has been consented at Butterwick to the west with four of ten total permitted 110m turbines. The rest of the 10 lie adjacent to the west in Zone 15. Together the two developments will read as a single development of 17 turbines and will form a strong group larger than the typology considered appropriate for either zone.</p> <p>The capacity for turbine development within this zone is limited due to the existing development which is discussed in Table 8.</p>
Zone 17	Medium	Medium small	<p>An undulating landscape bisected by the A19 falling gently to the south east towards the Tees Estuary. Medium sized fields with some limited tree cover. Sparsely settled with the exception of the villages of Elwick in the north and Dalton Percy in the east of the zone. A disused windmill forms a local focal point to the west of the busy A19. Pylons are located in the east of the zone.</p> <p>The sensitivity of the zone allows only a medium small typology due to the grain of the pattern of landcover and proximity of settlement.</p> <p>The capacity for turbine development within the zone is limited due to the existing/permitted development to the west and the existing development to the north which is discussed in Table 8.</p>

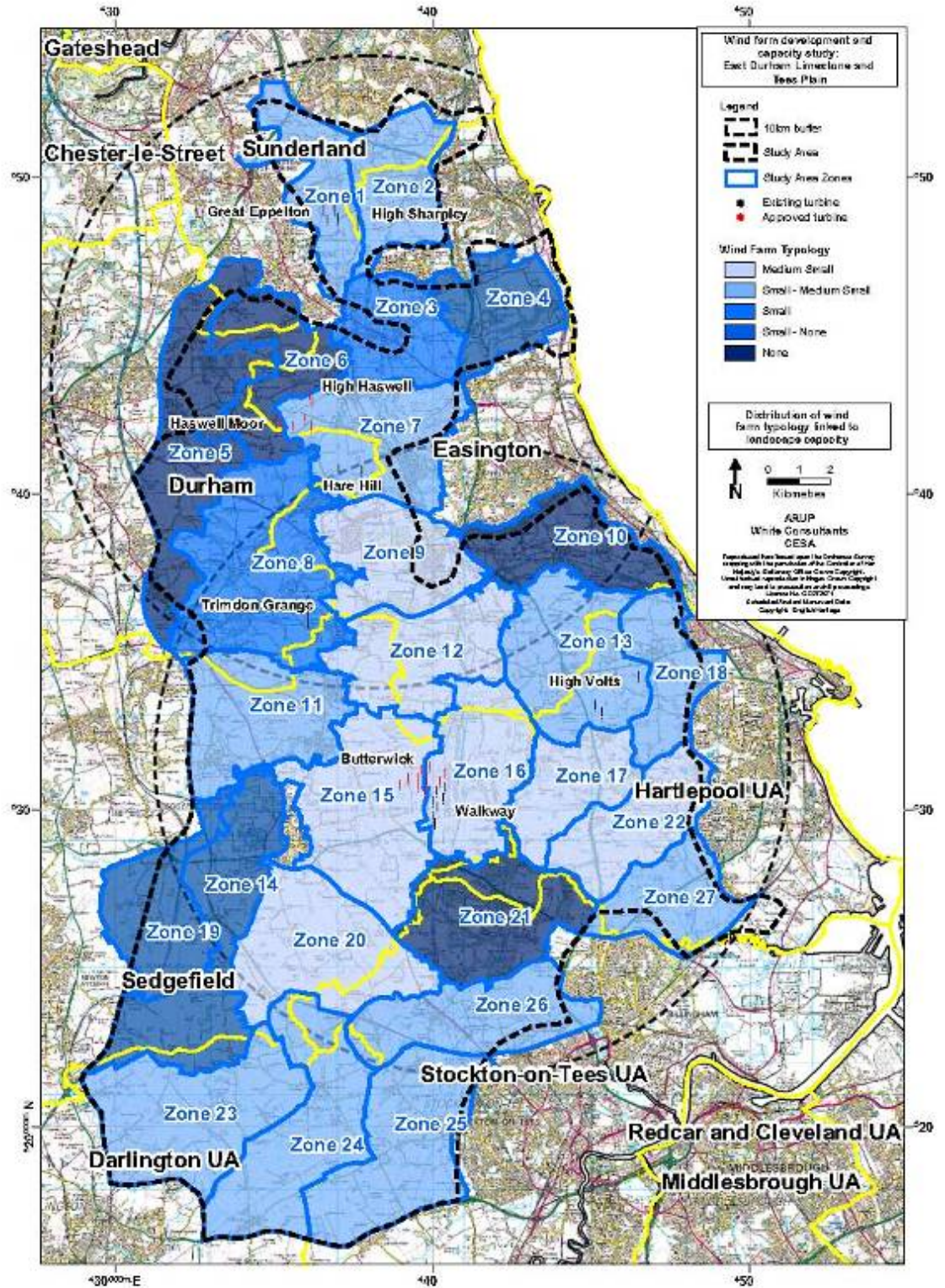
Zones	Landscape sensitivity	Largest wind farm typology potentially acceptable	Comments
Zone 18	Medium	Small - Medium small	<p>Medium scale fields gently sloping east towards Hartlepool and the coast beyond. Sparsely settled with the exception of the village of Hart and a small section of the outskirts of Hartlepool in the east of the zone. Predominantly arable fields with field boundaries generally comprising hedgerows. A small sand and gravel quarry is located to the south of the village of Hart. Tree cover is limited and open views to the north sea are possible from parts of this zone..</p> <p>The sensitivity of the zone allows only a small-medium small typology due to the scale and grain of landform, and its relationship with the coast.</p> <p>The capacity for turbine development within the zone is limited due to the existing development to the west which is discussed in Table 8.</p>
Zone 19	Medium-Medium high	Small-None	<p>A broad, poorly drained low lying open plain, generally around 80m AOD, with boundary ditches to medium scale rectilinear fields. The area is sparsely settled with very limited woodland cover. The A1 and the east coast main railway line traverse the carrs on raised embankments.</p> <p>The sensitivity of the zone allows only at most a small typology due to the rarity value of this landscape type in the wider area.</p> <p>The capacity for turbine development within the zone is also limited due to the rarity value of this landscape type in the wider area which is discussed in Table 8.</p>

Zones	Landscape sensitivity	Largest wind farm typology potentially acceptable	Comments
Zone 20	Medium	Medium small	<p>A gently undulating landscape falling away from Sedgfield which lies to the north of the zone. Predominantly arable fields of varying size with field boundaries generally comprising hedgerows with some trees. Several small deciduous and mixed plantations are located throughout the zone. The area is relatively sparsely settled with access into the zone generally limited to footpaths, bridleways, private tracks and two minor roads one of which passes through the west of the zone and the other which serves properties within the zone. The sites of two medieval villages, Shotton and Layton, are located within the zone.</p> <p>The sensitivity of the zone allows only a medium small typology due to the scale and grain of the landscape and settlement pattern.</p> <p>The capacity for turbine development within the zone is limited due to the existing/permitted development to the north which is discussed in Table 8.</p>
Zone 21	Medium high	None	<p>This zone contains Wynyard village – a development of executive homes with associated leisure facilities within a wooded setting. The woodland in this zone is a mixture of deciduous woods and coniferous plantation. The Grade 2* listed Wynyard Park recorded on the Register of Historic Parks and Gardens, is located in the south east of the zone. The northern part of Wynyard Woodland Country Park through which National Cycle Route 1 passes is contained within this zone. Business park type development is being concentrated in the north east of the zone.</p> <p>The area is considered unsuitable for turbine development due to its settled characteristics, and its relationship with the Grade 2* listed Wynyard Park.</p>

Zones	Landscape sensitivity	Largest wind farm typology potentially acceptable	Comments
Zone 22	Medium	Medium small	<p>This predominantly arable zone extends north east from the area of business park development within Zone 21 towards Hartlepool. Field sizes increase towards the east of the zone with field boundaries generally formed by hedges with few hedgerow trees. Settlement is generally confined to a few scattered farms with Hartlepool lying just beyond the east boundary of the zone. Lines of pylons pass in a north-south direction through the zone.</p> <p>The sensitivity of the zone allows only a medium small typology due to the scale and grain of the landscape and settlement pattern.</p> <p>The capacity for turbine development within the zone is limited due to the existing/permitted development to the west and the existing development to the north which is discussed in Table 8.</p>
Zone 23	Medium	Small - Medium small	<p>A gently undulating farmed landscape. Field boundaries are generally formed by hedges with quite frequent hedgerow trees. Pockets of deciduous woodland are scattered throughout the zone, often associated with watercourses. Settlement is generally comprised of scattered farms with the villages of Great Stainton with its church tower, Little Stainton and Brafferton located towards the periphery of the zone. The zone is crossed by overhead power lines.</p> <p>The sensitivity of the zone allows only a small - medium small typology due to the scale and grain of the landcover and settlement pattern.</p>
Zone 24	Medium	Small - Medium small	<p>A sparsely wooded, open, gently undulating landscape of mixed farmland which rises gently in the south to around 73m AOD at the village of Sadberge. Several reservoirs and other water bodies are scattered throughout the zone. A windsurfing centre is located at one of these water bodies near Bishopton. The remains of a Motte and Bailey castle are also located near Bishopton. The villages of Stillington, Bishopton and Sadberge are located in the centre, north and south of the zone respectively, with scattered farms located throughout the zone.</p> <p>The sensitivity of the zone allows only a small - medium small typology due to the scale, grain and pattern of the landcover and settlement.</p>

Zones	Landscape sensitivity	Largest wind farm typology potentially acceptable	Comments
Zone 25	Medium	Small - Medium small	<p>A gently undulating zone with medium size field to the west of Stockton on Tees. The busy A66 forms the southern boundary of the zone. The south of the zone is well settled with farms generally associated with the minor roads that pass through the zone. The villages of Carlton and Redmarshall lie in the north of the zone. Several small blocks of deciduous woodland are scattered throughout the zone. Field boundaries are a mixture of hedges with hedgerow trees and fences. The zone is crossed by several overhead power lines. Direct views of Stockton on Tees are possible from parts of the area.</p> <p>The sensitivity of the zone allows only a small - medium small typology due to the scale, grain and pattern of the landcover and settlement.</p>
Zone 26	Medium	Small - Medium small	<p>The zone contains the broad valley of Thorpe Beck and part of Wynyard Woodland Country Park (the remainder of the park extends northward) through which National Cycle Route 1 passes. The villages of Thorpe Thewles, Stillington and Whitton are located within zone which is bisected by the busy A177. Pylons run in a north south direction through the centre of the zone. Views into Stockton on Tees are possible from parts of the area.</p> <p>The sensitivity of the zone allows only a small - medium small typology due to the scale and grain of the landscape and settlement pattern.</p>
Zone 27	Medium	Small - Medium small	<p>A generally open plateau bound by Billingham to the west and Hartlepool to the east with the village of Newton Bewley located in the west of the zone. The land begins to rise to the north beyond this zone allowing open views into this zone. Views of the large scale industrial development at Seal Sands and Middlesbrough are partially screened in places by the elevated railway line which forms the southern boundary of the zone. Wind development could relate to the industrial development to the south east and east of this zone.</p> <p>The sensitivity of the zone allows only a small - medium small typology due to the scale and grain of the landscape and settlement pattern.</p>

Figure 7 – Distribution of wind farm typology



4.5 Summary of Landscape Effects

As indicated by the data within **Table 2** 23 zones are considered to have some capacity for wind development from small to medium small typology wind farms. The areas with simpler large scale landform and landcover, away from the edge of significant or distinct changes in level, are favoured. Given the settled nature of the study area careful consideration should be given to potential juxtaposition between wind turbines and settlement in zones with potential for wind development.

The following areas should be excluded from wind farm development due to their landscape characteristics including complexity, skyline, edge characteristics or scale:

- Zone 5
- Zone 6
- Zone 10
- Zone 21

5 Visual Sensitivity Analysis

5.1 Introduction

This chapter considers the variable performance of the study area with respect to visual impact. It looks mainly at the *relative* performance of the different parts of the zones within the study area.

This chapter discusses the visual data generated for the study and then describes how it is used within the analysis of the study area zones.

The parameters used within this chapter are based upon evidence/experience gathered from previous similar studies in Northumberland, Wales and Scotland, either by the University of Newcastle or by this study team; references to relevant studies are included where appropriate.

5.2 Visual Sensitivity: Overview of data generated

Landscape capacity (as outlined in the previous chapter) tends broadly to address the direct effects of the development of wind turbines in particular areas. It is clear that an important issue relating to most, if not all, wind farm proposals is that of visual impact, and in particular the potential for visual impact upon sensitive receptors.

Sensitive visual receptors are diverse in nature, but can be grouped as follows:

- **“Landscape/Sensitive Outdoor Recreation Receptors”** – these are locations within ‘sensitive landscapes’ used by people who may be sensitive receptors such as walkers/cyclists and general visitors enjoying areas of scenic quality. ‘Sensitive landscapes’ in this context are generally considered to be those which are valued nationally such as the North York Moors National Park and the North Pennines AONB, neither of which lie within 10km of the zones analysed. National Trails are considered as ‘sensitive outdoor recreation receptors’ no route lies within 10km of the zones analysed.
- **“People day to day”** – these are people who may see turbines frequently while carrying out their day to day business or whilst residing in or around an area. Those most affected will be on the edges of settlements (others gaining glimpses between buildings and other structures). The category also includes those using highways in the area.

The study has considered the relative visual effects of hypothetical turbines of fixed height placed within each of the landscape zone/units identified for the landscape sensitivity exercise. Each zone has been evaluated in terms of its visibility overall and to sensitive receptors via the creation of a zone of theoretical visibility (ZTV) for each. The ZTVs do not take into account any screening from buildings and vegetation, and therefore represent a worst case scenario.

Key parameters used in the generation of the relative visual analysis are established within **Table 3** below.

Table 3 – Key parameters used in the generation of the relative visual analysis

Turbine height	125m to blade tip (a median value between a nominal 135m in any forested areas and a nominal 115m in open moorland). It should be stressed that using height to blade-tip in the ZTV presents a conservative approach to the analysis; many individual EIA ZTV studies for wind farms consider height to hub as well as to blade tip. These nominal turbine heights may not exactly fit with a given
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	manufacturers specification.
Turbine density in zones	4 No. placed within each 1 km within the zone on a grid basis. Note this turbine distribution does not directly relate to the likely developable capacity (MW) available per zone as no constraints are taken into account.
Grid size used in ZTV	250m square
Extent of ZTV	Minimum extent of 20km from edge turbines in the zone. Whilst it is acknowledged that 30-35km represents the ZTV in many cases, the study is concerned with <i>moderate adverse</i> visual impacts and greater only. For 100-140m turbines these impacts are considered to occur within 20km of the study area.

The ZTV generated is then broken down into component parts:

- The overall area that can see wind turbines in each zone
- The number/area of day-to-day receptors such as dwellings and A and B roads that can see wind turbines in each zone
- The number/area of sensitive landscape and features receptors such as World Heritage Site that can see wind turbines in each zone.

This is further described within **Table 4**.

Table 4 – Visibility data description – further details

Measurement category	Comments
Overall visual effect	
Overall total area that can view turbines	This measurement defines the theoretical area that can view the theoretically placed wind turbines in any study area zone. It covers all potential receptors including those not covered by categories below such as users of open access land, public footpaths and minor roads. It is also a factor which brings in the effects of the turbines on perception of landscapes surrounding any zones.
Landscape/ sensitive outdoor recreation receptors	
Areas of National Park/AONB that can view turbines	These are sensitive landscapes used by people who may be sensitive receptors such as visitors enjoying its scenic quality. The nature of the landscapes within National Parks/AONBs is such that they often allow broad views, and wind turbines may be viewed whilst undertaking leisure activities. (NOT APPLICABLE/SIGNIFICANT BUT USED IN OTHER STUDIES)
National Trail that can view turbines	These are sensitive routes used by people who will be sensitive receptors-walkers enjoying scenic quality. The National Trails often allow broad views, and wind turbines may be viewed whilst undertaking leisure activities. (NOT APPLICABLE/SIGNIFICANT BUT USED IN OTHER STUDIES)
People day to day	
Settlements that can view turbines in close proximity	The likelihood of severe effects upon visual amenity and setting, particularly cumulative effects upon communities. i.e. the visual effects that developing a zone might have upon adjacent villages and

Measurement category	Comments
	settlement in terms of dominance and sense of enclosure.
Settlements that can view turbines in medium distance	Settlements are the most sensitive receptors. People may see turbines frequently while carrying out their day to day business or whilst residing in or around the study area. Those most affected will be on the edge of settlements, others gaining glimpses between buildings and other structures.
A and B roads that can view turbines	Users of roads are less sensitive than residents generally but may include tourists and turbines will affect visitor's perceptions of an area.
<p>In arriving at an overall summary of the visual performance of a zone/sub-area, the data per receptor group is first ranked, and then the data combined. This is combined as follows:- Rank given to overall visual performance+ Rank given to settlement data (10km) + Rank given to settlement data (2km) + Rank given to roads + Rank given to National Park/AONB (where applicable) + Rank given to the National Trails (where applicable)</p>	

The effects on these different receptors are considered at varying distances to cover the most significant effects dependent on the type of receptor. It is acknowledged that there will be effects beyond these distances and this is discussed further below.

5.3 Calibration of likely visual effects

There have been many studies relating to the potential visual effect on wind farm development. This is brought together in the publication 'Visual assessment of Windfarms: Best practice' produced for Scottish Natural Heritage by the University of Newcastle 2002. As pointed out by the study, the expected magnitude of effect varied between studies but this depended on whether the writer was pro or anti wind farm development. 'PAN 45: Renewable Energy Technologies' produced by the Scottish Executive in 2002 suggest the following perception for a wind farm in an open landscape [without relating this to tower height, but having earlier referred to turbines of tower height >70m and rotor diameters of >80m i.e. height to blade tip of up to 110 m] is as follows (**Table 5**):

Table 5 – Perceptual distances for Wind farms

<i>Distance</i>	<i>Perception</i>
0-2km	Likely to be a prominent feature
2-5km	Relatively prominent
5-15km	Only prominent in clear visibility .. seen as part of a wider landscape
15-30km	Only seen in very clear visibility .. a minor element in the landscape

The University of Newcastle suggest, based on this and other research that the size classes, names and descriptions of visual effect should be modified. This study does not come to a view on significance which is related to the sensitivity of the receptor. In **Table 6** below the University of Newcastle data is taken and a view is developed on distance and significance of effect for 125m to blade tip turbines depending on sensitivity of receptor as the basis of the calibration of effects for visual impact assessment.

Table 6 – Calibration of significance of visual effects with distance for wind farms

<i>University of Newcastle criteria</i>				<i>This study calibration</i>				
Size class [Magnitude]	Name	Descriptors - appearance in central vision field	Modifying factors	Magnitude of Effects	Distance range	Sensitivity of Receptor		
						High Sensitivity	Moderate sensitivity	Low sensitivity
						Likely significance of effect		
Very large	Dominant	Commanding, controlling the view	Few	Substantial adverse	Up to 2 km	<i>Severe</i>	<i>Major</i>	<i>Moderate</i>
Large	Prominent	Standing out, striking, sharp, unmistakable, easily seen	Few	Substantial/ Moderate	2 to 5 km	<i>Severe. Major in some situations</i>	<i>Major. Moderate in some situations</i>	<i>Moderate</i>
Medium	Conspicuous	Noticeable, distinct, catching the eye or attention, clearly visible, well-defined	Many: Limit of potential visual significance	Moderate	4- 10 km	<i>Major</i>	<i>Moderate</i>	<i>Minor</i>
Very small	Inconspicuous	Lacking sharpness of definition, not obvious, indistinct, not clear, obscure, blurred, indefinite	Many Limit of ZVI	Minor	9-20km	<i>Moderate</i>	<i>Minor</i>	<i>Minor</i>
Negligible	Faint	Weak, not legible, near limit of acuity of human eye	Few	Negligible	15km-30km	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>

The sensitivity of receptors is based on commonly accepted standards derived from the Guidelines for Landscape and Visual Assessment [GLVIA 2002].

The total angle of view where turbines are visible due to intervening landform or vegetation will also have an important influence on magnitude of effect. It is therefore also considered in the cumulative impact assessment (next chapter refers).

The most significant i.e. "severe to moderate effects" on visual receptors are shown highlighted in **Table 6** and in the context of this study are considered to be effects on:

- settlements – effects within 2km and 10km (acknowledged double counting – distance band tends to highlight most significant effects where potential for inter-visibility screening would be less)
- roads – effects within 5km (lower sensitivity users)

The data for the effects within these distance bands for each of the zones with the study area are shown in **Table 7** below, and illustrated spatially on **Figure 8** which follows.

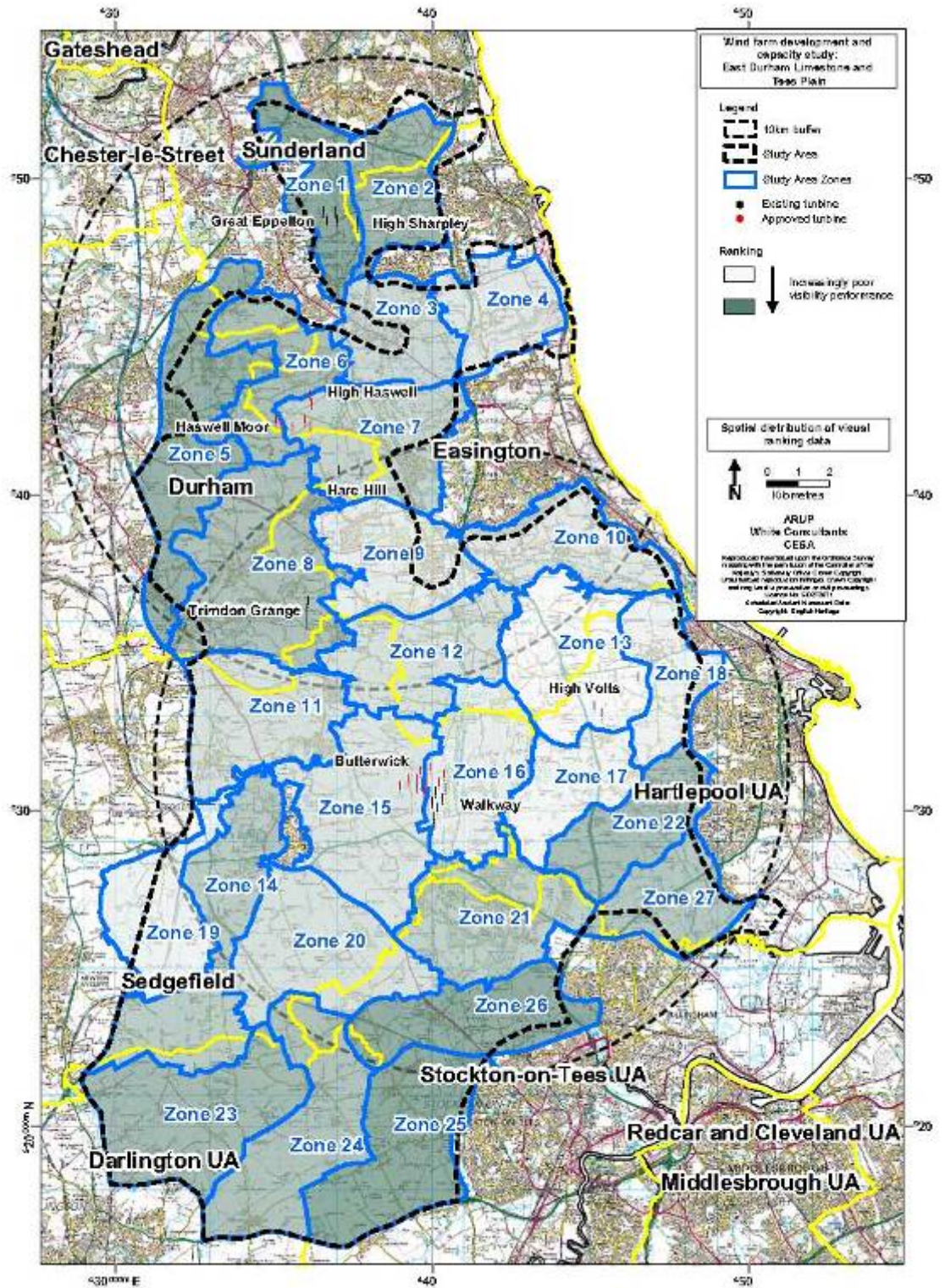
The data in Table 7 generally shows the number of 250mx250m grid squares (in the computer generated ZTV distance band referenced) containing the appropriate sensitive receptors that would be theoretically able to see turbines located within each zone or sub-area. The only exception to this relates to the settlement data. This shows the numbers of residential properties (in the computer generated ZTV distance band referenced) that would be theoretically able to see turbines located within each zone or sub-area. Each set of data is then ranked.

The maximum theoretical overall visibility within the 15km radius (representing most significant effects) is the area occupied by a circle of this radius centred on the zone. This equates to 700km² approx. or 11300 grid squares of 250x250m.

Table 7 – Areas potentially exposed to views of turbines for each zone, by receptor group, with data ranked

	Turbine No	Overall 15km	Rank	Settlement Count up to 10km	Rank	Settlement Count up to 2km	Rank	Roads up to 5km	Rank	Totals of ranking	Overall ranking
Zone 1	40	8316	9	205344	27	28440	27	613	27	90	26
Zone 2	44	6900	4	173944	23	25769	25	540	24	76	23
Zone 3	35	6573	3	108846	11	11005	14	453	21	49	13
Zone 4	40	4869	1	92503	6	16572	18	350	14	39	7
Zone 5	64	10134	16	124085	16	18739	22	606	26	80	24
Zone 6	53	8692	11	122586	15	13283	16	553	25	67	20
Zone 7	53	7838	6	90775	5	13366	17	480	22	50	14
Zone 8	91	10663	20	102356	10	13266	15	508	23	62	18
Zone 9	36	8767	12	66353	1	10321	13	347	12	38	5
Zone 10	42	6180	2	87989	4	17809	21	347	12	39	7
Zone 11	59	10266	17	74744	2	7638	9	389	19	47	10
Zone 12	59	9243	14	93497	8	7225	7	383	18	47	10
Zone 13	76	7941	7	98151	9	7404	8	298	4	28	1
Zone 14	84	12500	24	114773	12	5323	5	367	17	58	16
Zone 15	92	10779	21	120142	13	5529	6	263	1	41	9
Zone 16	58	9422	15	120624	14	1298	1	326	8	38	5
Zone 17	44	8812	13	125457	17	1468	2	285	2	34	2
Zone 18	32	6963	5	93461	7	17103	20	303	5	37	3
Zone 19	56	10505	18	83817	3	8009	10	309	6	37	3
Zone 20	79	11322	22	136081	19	3050	3	288	3	47	10
Zone 21	65	10526	19	148247	21	8816	11	309	6	57	15
Zone 22	46	8549	10	140595	20	25895	26	340	11	67	20
Zone 23	90	13203	25	129004	18	9200	12	408	20	75	22
Zone 24	76	13504	27	156004	22	4481	4	329	9	62	18
Zone 25	78	13434	26	175735	25	19137	23	358	16	90	26
Zone 26	51	11442	23	176687	26	24441	24	353	15	88	25
Zone 27	31	8096	8	175470	24	16604	19	336	10	61	17

Figure 8 – Spatial Distribution of visual ranking data



It should be noted that the ZTV does not make allowances for the screening effect of buildings and vegetation as it is not possible to model effectively such features within a County level 3-D model as generated for this study; the computing and resource implications render it impractical. It is therefore likely that the visual effects on settlement and other receptors will be less than indicated and that the information derived from the ZTV should be taken as a worst case scenario.

The study area has been visited and views taken from key receptors within and around the search area. The findings of the ZTVs are combined with the expected effects in key views to arrive at the conclusions discussed in the section below.

5.4 Description of Visual Effects

5.4.1 Overall Visual Effects

The most visible area is Zone 24 which is visible over nearly three times the area of Zone 4, the least visible zone. Zone 24, a gently rolling area around 50m AOD, which rises in the south to 73m AOD at Sadberge, is visible over long distances on the relatively flat open Tees Plain. Zones 14, 23, 25 and 26 are also located on the open Tees Plain and therefore also have high overall visibility.

The least visible zone is Zone 4 which slopes gently eastwards towards the coast, with the eastern most boundary of the zone almost being formed by sea cliffs. Zones 2, 3, 10, 13 and 18 also all lie in relatively close proximity to the coast and slope gently east.

These zones show different performance when considered against the various criteria.

5.4.2 Effects on Settlement

The area is heavily settled with settlement ranging from individual farming properties to small towns/large villages within the study area and several large settlements including Durham, Hartlepool, Stockton on Tees and Darlington which surround the study area.

The worst performing zone within a distance of both 2km and 10km is Zone 1 which is surrounded by settlement around the majority of its boundary. Zone 2 also in the north performs relatively poorly at both 2km and 10km. Zones in the south of the study area, e.g. zones 22, 25, 26 and 27 perform relatively poorly due to their close proximity to very large settlements such as Hartlepool and Stockton on Tees.

The number of address data points affected by the worst performing zones in this study for effects upon settlement are over 100 times that counted for the equivalent zones in Knowesgate and Harwood, highlighting the well settled nature of the study area.

The best performing zones for settlement up to 2km are a cluster of zones 12, 14, 15, 16, 17, 20 and 24, these zones perform less well at 10km. These are generally zones which do not contain the larger settlements found within the study area boundary. Within 10km, Zones 4, 7, 8, 10 and 18 which have close proximity to the sea, as well as Zones 11 and 19 in the west perform best.

It should be noted that the number of address data points affected by the best performing zones at 2km and 10km is over 13 and 25 times respectively that counted for the equivalent zones in Knowesgate and Harwood.

5.4.3 Effects on Roads

The A1 and the A19, both major road transport corridors in the north east either pass through or form the boundary of the study area. A network of A and B-roads and smaller roads crosses through the study area connecting the large settlements which surround the study area.

The worst performing zones are generally located in the north and north west of the study area. Zone 1, the worst performing zone, is highly visible from several A-roads including the A1, A19, and A690 and adjacent B-roads. Adjacent Zones 2, 3, 5, 6, 7 and 8 are also highly visible.

The best performing areas are Zones 13, 17 and 18 located to the east, Zone 19 to the west and Zone 15 in the middle of the study area.

5.5 Summary of Visual effects

Zones in the extreme north of the study area and those towards the south tend to have a greater impact on people due to their location close to large centres of populations. Zones with the greatest impact on roads are located in the north and north west, where there is a dense network of interconnecting A-roads serving the large population centres.

No zone performs consistently well across the board. Zone 18 performs most consistently across all categories apart from its effects on settlement up to 10km.

Zones 25 and 26 generally perform poorly in all categories. The same is true for Zone 1, which is joint worst performing when ranked overall, apart from its relatively good performance for overall visibility.

The area is a heavily settled landscape with further large centres of population surrounding the study area, especially when compared with the wind resource areas in Northumberland. The south of the study area is located on the Tees Plain where the open gently undulating landform increases intervisibility between the large centres of populations which surround the study area and potential wind development.

While the settlement data indicates that significantly more properties are affected within 2km and 10km it is likely that the properties which would experience any significant or major visual effects from turbine development would be those located at the outer edges of the settlement. Those properties located within the core of settlements, are likely to only have limited or no views of turbine development with buildings and vegetation providing intermediate screening.

Taking the above into consideration it is necessary to carefully consider the appropriate scale of development in terms of the scenarios.

6 Capacity of Zones for further wind farm development

6.1 Introduction

In contrast to previous studies of the wind resource areas in the North East, this defined study area has within it some sizeable existing and consented wind farms and includes significant areas potentially constrained by scattered settlement and other factors. In the previous chapters, each zone has been allocated a landscape sensitivity and capacity for a given size of typology and its visibility to sensitive receptors explored. However, the existing or consented wind farm development needs to be factored in to explore whether the recommended typology has been exceeded or not. This chapter explores this issue.

The existing and consented wind farms have the potential to cause cumulative effects with any other wind farm development proposed in close proximity. **Figure 9** highlights approximate zones of potential visual dominance/prominence (based on the perceptual distances shown in **Table 5** previously) for the existing and consented wind farms within the study area. These zones of visual dominance/prominence do not represent a development control constraint.

6.2 Suitability Assessment

The cumulative effects of possible further development in relation to existing and consented wind farms also need to be considered. As a rough rule of thumb, turbine developments should be separated by at least around 5km minimum to avoid overbearing/dominating effects on both sides of intervening sensitive receptors. It is appreciated that there may be instances where this is not an issue, and indeed some developments within the study area are closer than this, often reading as one wind farm from some angles. This section addresses this issue in broad terms.

The nature of the study area landscape is such that there is a significant density of residential properties which, alongside other constraints, limits the technical feasibility of wind farms. This has to be treated with caution but, when combined with the location of existing or permitted development and landscape capacity, is an indicator of whether more development is appropriate within an area.

The table below discusses each zone in turn and comes to conclusions as to whether each zone is suitable for further wind farm development. This will help define whether a zone should be taken forward to the scenario modelling stage in the next chapter.

Figure 9 – Zones of visual dominance/prominence for existing and consented wind farms

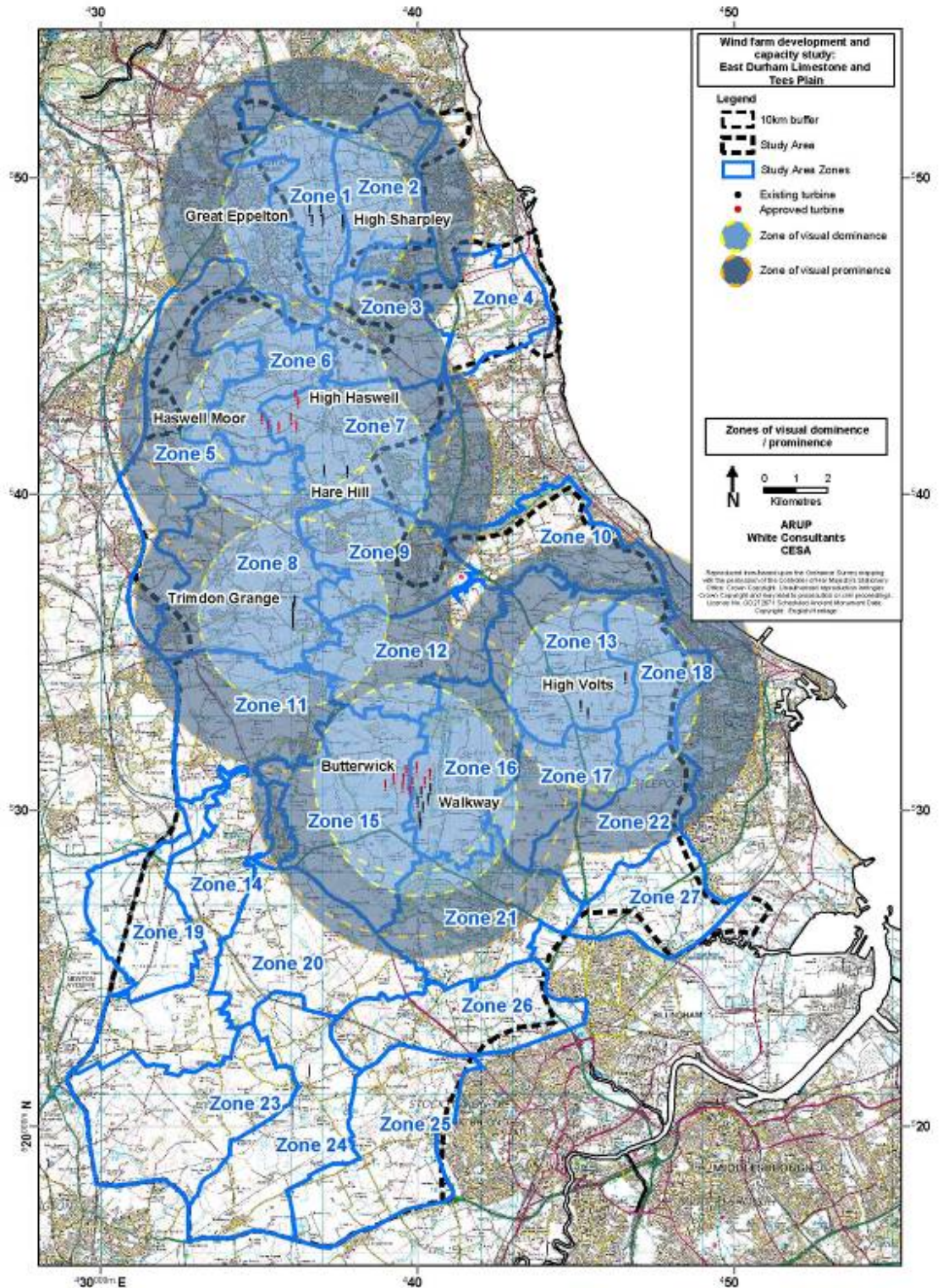


Table 8 – Assessed suitability of Zones for further wind farm development

Zones	Assessed suitability for further wind farm development	Comments
Zone 1	None / very limited	The existing/consented wind farms at Great Eppleton and High Sharpley meet the maximum typology for the area. There is little capacity for any further development in the zone away from these wind farms as much of the remaining area is of high sensitivity due to its proximity to the escarpment edge. Separation distances from existing development would also be low and potential cumulative impacts could therefore be unacceptably high.
Zone 2	None / very limited	The capacity for wind energy development in the south-west of the zone is likely to be limited by the presence of existing and proposed turbines in the adjacent part of Zone 1. These will form a single group of 6 in some views which is the same as the maximum typology desirable in either area. Proposals which would appear as part of the same group as the turbines to the west would result in a development which was out of scale with the landscape. There is little capacity for development elsewhere in the zone as separation distances from existing development would be relatively low (typically <4km) and cumulative impacts could therefore be unacceptably high.
Zone 3	None / limited	There are no existing turbines within the zone. In principle the landscape could have the capacity to accommodate a small scale typology of development but separation distances from existing turbines in Zone 1 would be low (typically <3km) and relatively low (<4km) from permitted turbines in Zone 7. Cumulative impacts could therefore be unacceptably high.
Zone 4	None / limited	There are no existing turbines within the zone. In principle the landscape could have the capacity to accommodate a small scale development (i.e. <4 turbines). However, the constraints map indicates that there is potentially little unconstrained land
Zone 5	None	There are no existing turbines within the zone. The area is not suitable for development due to the sensitivity of the limestone scarp slope and its importance in the backdrop of key views of Durham Cathedral & Castle World Heritage Site..
Zone 6	None	There are two consented (100m) turbines which form part of the larger (five turbine) Haswell Moor development on the very eastern edge of the zone. The area is considered unsuitable for development due to the sensitivity of the escarpment and its importance in the backdrop of key views of Durham Cathedral & Castle World Heritage Site.

Zones	Assessed suitability for further wind farm development	Comments
Zone 7	None / very limited	<p>The capacity for further wind energy development in the eastern part of the zone is limited by the presence of existing and proposed turbines in or immediately adjacent to the area. The Haswell Moor & High Haswell turbines would collectively form a group of 7 which is slightly larger than the typology assessed as appropriate to the zone. Limited development associated with Hare Hill could be possible without exceeding the appropriate typology in that area but given the scale and proximity (<2km) of the permitted Haswell schemes, and the potential for the schemes to visually coalesce, the level of cumulative impact might be unacceptably high.</p> <p>There is little capacity for development elsewhere in the zone as separation distances from existing development would be low (typically <3km) and cumulative impacts could therefore be unacceptably high.</p>
Zone 8	None	<p>The four existing 76m turbines at Trimdon Grange are around the maximum typology size for the zone as they are at the maximum height to avoid visibility from Durham Cathedral and Castle and their number exceeds the typology number of turbines.</p> <p>There is little capacity for development elsewhere in the zone as much of the remaining area is of high sensitivity due to its proximity to the escarpment edge and the importance of the area as a backdrop to the Durham Cathedral and Castle World Heritage site. .</p>
Zone 9	None / limited	<p>There are no existing turbines within the zone. In principle the zone could have the capacity to accommodate a medium small scale development (i.e. 4-9 turbines). However, the constraints map indicates that there indicates that there is potentially little unconstrained land. The separation distances from two existing developments in nearby zones at Trimdon Grange and Hare Hill would be low (typically <3km) and cumulative impacts could therefore be unacceptably high.</p>
Zone 10	None	<p>There are no existing turbines within the zone. The area is not suitable for development due to the sensitivity of the landscape.</p>
Zone 11	None / limited	<p>There are no existing turbines within the zone. In principle the landscape could have the capacity to accommodate small medium-small - scale development(i.e. 4-6 turbines). However, the constraints map indicates that there is potentially little unconstrained land. The separation distances from the nearby Trimdon Grange in Zone 8 are low (1.5 -3km), and relatively low (4 – 5.5km) from the large Butterwick/ Walkway complex and cumulative impacts – particularly in the Trimdon area - could therefore be unacceptably high</p>

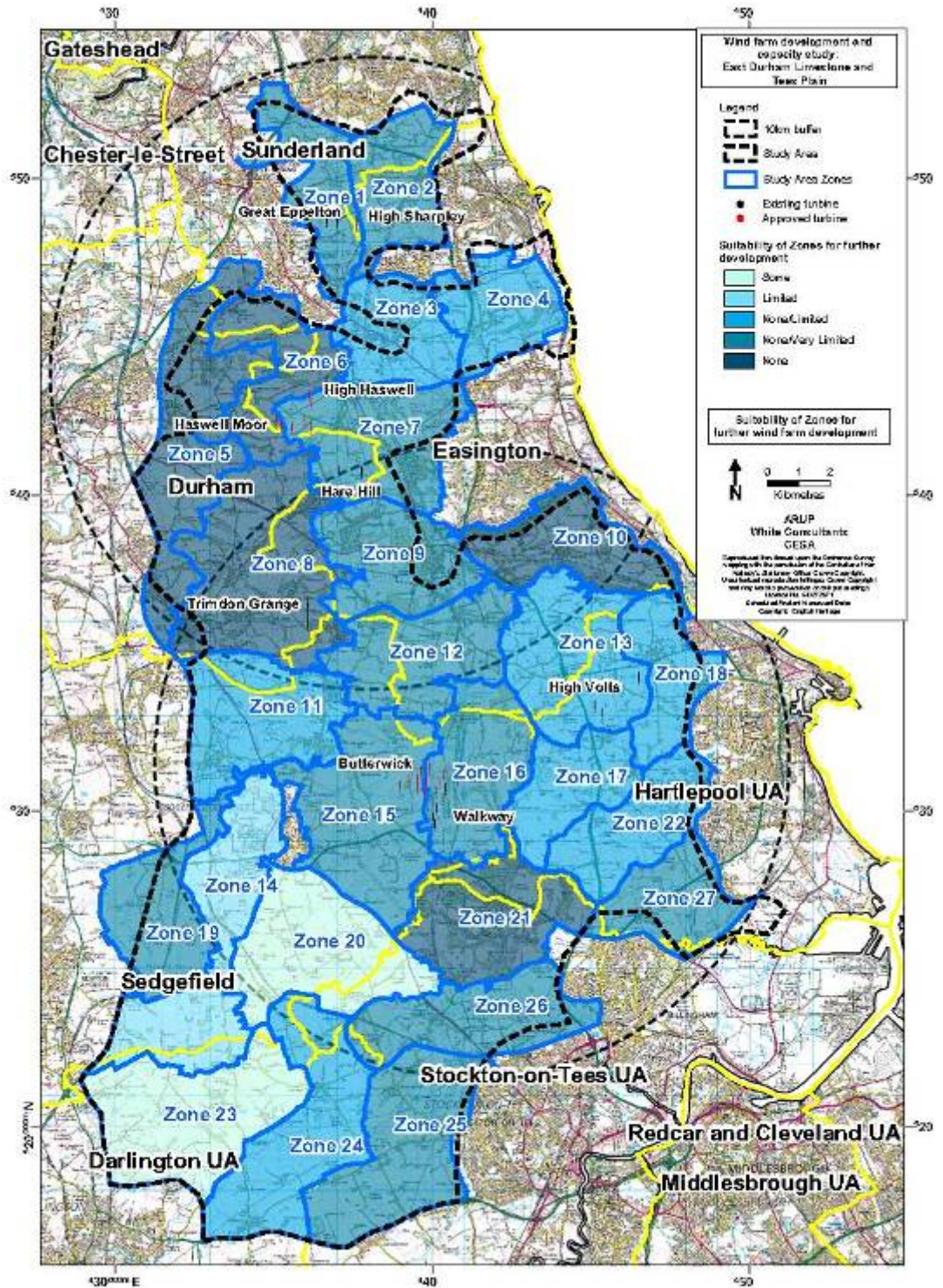
Zones	Assessed suitability for further wind farm development	Comments
Zone 12	None / very limited	There are no existing turbines within the zone. In principle the landscape could have the capacity to accommodate a medium-small scale development (i.e. 4-9 turbines). However, the constraints map indicates that there is potentially little unconstrained land. The separation distances from the nearby Trimdon Grange in Zone 8 (2.5 - 3km) and the large Butterwick/ Walkway complex in Zones 15 and 16 (2.5-4km) are relatively low and cumulative impacts – particularly in the Trimdon area - could therefore be unacceptably high.
Zone 13	None / limited	There could be some potential for further development associated with High Volts provided that the cluster did not exceed the typology assessed as appropriate (<6 turbines). The zone theoretically has the capacity to accommodate additional small scale development elsewhere in the zone. However, the constraints map indicates that there is potentially little unconstrained land and separation distances from High Volts would be low or relatively low (2.5 – 4km), cumulative impacts might therefore be unacceptably high.
Zone 14	Limited	There are no existing turbines within the zone. In principle the landscape in the south of the zone could have the capacity to accommodate small scale development (<4 turbines). However, the constraints map indicates that there is potentially little unconstrained land. Development in the north would be constrained by potential impacts on Hardwick Park and Sedgfield village.
Zone 15	None / very limited	Together the Butterwick and Walkway developments will read as a single development of 17 turbines which is larger than the medium-small typology assessed as appropriate for these zones individually. Therefore, no further turbines are considered appropriate associated with these clusters. There is little landscape capacity for development elsewhere in the zone as separation distances from the permitted and existing wind farms would be low (typically <2.5km) and it is likely that cumulative impacts would be unacceptably high.
Zone 16	None / very limited	Together the Butterwick and Walkway developments will read as a single development of 17 turbines which is larger than the medium-small typology assessed as appropriate for these zones individually. Therefore, no further turbines are considered appropriate associated with these clusters. There is little landscape capacity for development elsewhere in the zone as separation distances from the permitted and existing wind farms would be low (typically <2.5km from Butterwick/Walkway and 2.5-5km from High Volts) and it is likely that cumulative impacts would be unacceptably high.

Zones	Assessed suitability for further wind farm development	Comments
Zone 17	Limited	There are no existing turbines within the zone. In principle the landscape could have the capacity to accommodate medium-small scale development (i.e. 4-9 turbines). However, the constraints map indicates that there is potentially little unconstrained land. The separation distances from existing and permitted schemes in neighbouring zones at Walkway / Butterwick (typically 3-4km) and High Volts (2.5-4km) are low. Cumulative impacts could therefore be unacceptably high.
Zone 18	None / limited	There are no existing turbines within the zone. In principle there could be some potential for further development associated with High Volts provided that individual clusters did not exceed the typology assessed as appropriate (<4 turbines). However, the constraints map indicates that there is potentially little unconstrained land Elsewhere in the zone separation distances from High Volts are low (<2.5km) and it is likely that cumulative impacts with High Volts would be unacceptably high.
Zone 19	None / very limited	There are no existing turbines within the zone. In principle the landscape could have the capacity to accommodate small scale development (i.e. less than 4 turbines) towards the edge of the carrs. However, the constraints map indicates that the land within this zone is potentially extremely constrained.
Zone 20	Some	There are no existing turbines within the zone. In principle the landscape could have the capacity to accommodate a medium-small scale development (i.e. 4-9 turbines). Separation distances from development in adjacent Zone 15 are > 5km although cumulative impacts on receptors in between and on Sedgfield could be an issue.
Zone 21	None	There are no existing turbines within the zone. The area is not suitable for development due to the sensitivity of the landscape.
Zone 22	Limited	There are no existing turbines within the zone. In principle the landscape could have the capacity to accommodate medium small scale development (i.e. 4-9 turbines). However, the constraints map indicates that there is potentially little unconstrained land. Separation distances from Walkway are generally > 5km. Separation distances from High Volts are lower (typically 3-3.5km) and cumulative impacts with High Volts could be a constraint.
Zone 23	Some	There are no existing turbines within the zone. In principle the landscape could have the capacity to accommodate more than one medium small – small scale development (i.e. 4-6 turbines per development). However, development constraints within the zone may make this unlikely.
Zone 24	None/limited	There are no existing turbines within the zone. In principle the landscape could have the capacity to accommodate more than one medium small – small scale development (i.e. 4-6 turbines per development). However, the constraints map indicates that is very little unconstrained land within this zone.

Zones	Assessed suitability for further wind farm development	Comments
Zone 25	None/very limited	There are no existing turbines within the zone. In principle the landscape could have the capacity to accommodate more than one medium small – small scale development (i.e. 4-6 turbines per development). However, the constraints map indicates that development capacity in this area is extremely restricted.
Zone 26	None/very limited	There are no existing turbines within the zone. In principle the landscape could have the capacity to accommodate more than one medium small – small scale development (i.e. 4-6 turbines per development). However, the constraints map indicates that is very little or no unconstrained land within this zone.
Zone 27	None/very limited	There are no existing turbines within the zone. In principle the landscape could have the capacity to accommodate more than one medium small – small scale development (i.e. 4-6 turbines per development). However, development constraints within the zone may make this unlikely.

The pattern of potential further wind farm development within the study area is set out in **Figure 10**. How this is used to define a “least impact” area is explained in Chapter 7.

Figure 10 – Suitability of Zones for further wind farm development



7 Cumulative Effects: scenario modelling

7.1 Introduction

This chapter considers the absolute landscape and visual performance of the zones within the study area via the development of a “least impact”/preferred area and different development scenarios. These scenarios are tested for their environmental performance against landscape and visual objectives. They are intended to provide an indication of the level of potentially acceptable development achievable within the study area. It should be noted that the format of the scenarios contained within this report has changed from the format used in previous studies of the wind resource areas in the North East. This is in part due to previous misunderstandings regarding the use and purpose of the scenarios and in part due to the complex settlement pattern of the area.

7.2 Developing a “Least impact” area for development

7.2.1 “Least impact” area

The “least impact”/preferred area is defined as the area of least constraint to wind farm development where there is potential for development subject to environmental impact assessment.

Developing the whole of the “least impact” area is not an acceptable scenario due to the high densities of settlement present within and surrounding the area. The size of wind farms in the least impact area should ideally respond to the overall scale and grain of the landscape and not cause unacceptable visual impact on sensitive receptors (as per the landscape capacity wind farm typologies discussed previously). These considerations will guide the scenarios considered.

7.2.2 Justification and explanation for the “least impact” area

The landscape sensitivity assessment in Chapter 4 shows that zones concentrated towards the centre and south of the study area have the lowest relative sensitivity (in terms of this study) to wind turbine development. The landscape capacity assessment for the individual zones suggests that there is a group of zones with the greatest capacity located toward the middle of the study area. Other zones with more limited capacity are located adjacent to this central group. There are a few zones where no development is recommended due to the presence of, and proximity to, settlement, settings and sensitive landscape character.

The setting of the Durham Cathedral and Castle World Heritage Site (WHS) is considered to be an important planning issue & is the subject of policies in both the County Structure Plan (Policy 60 B) and the City of Durham Local Plan (Policy E3). In views from vantage points to the west of the WHS, for example Wharton Park and Flass Vale, the escarpment forms an important essentially rural backdrop to the Cathedral and Castle, with the limestone escarpment forming the skyline. Development on this skyline has the potential to visually interfere with, compete for attention with or otherwise detract from the setting of the WHS. The setting of the WHS has been taken into account in the derivation of the “least impact” area.

Land in the north of the study area is constrained by presence of sensitive landscape features and foci and the proximity of settlement within and surrounding the area and there are already a number of existing and consented wind farms. The exploration of suitability for further development in Chapter 6 indicates that it is not considered appropriate to include zones to the north of the study area in the “least impact” area as opportunities for further wind development are extremely limited. There may be possibilities for small scale extensions to existing turbine developments but these would have to be considered on a case by case basis.

As the land begins to flatten and open out toward the Tees Plain the sensitivity of the landscape generally begins to decrease. There are few topographical foci and the gently undulating landscape is considered to be less sensitive to wind energy development. This decreased sensitivity has led these more central and southern zones to be considered, on their individual merits, for inclusion within the “least impact” area.

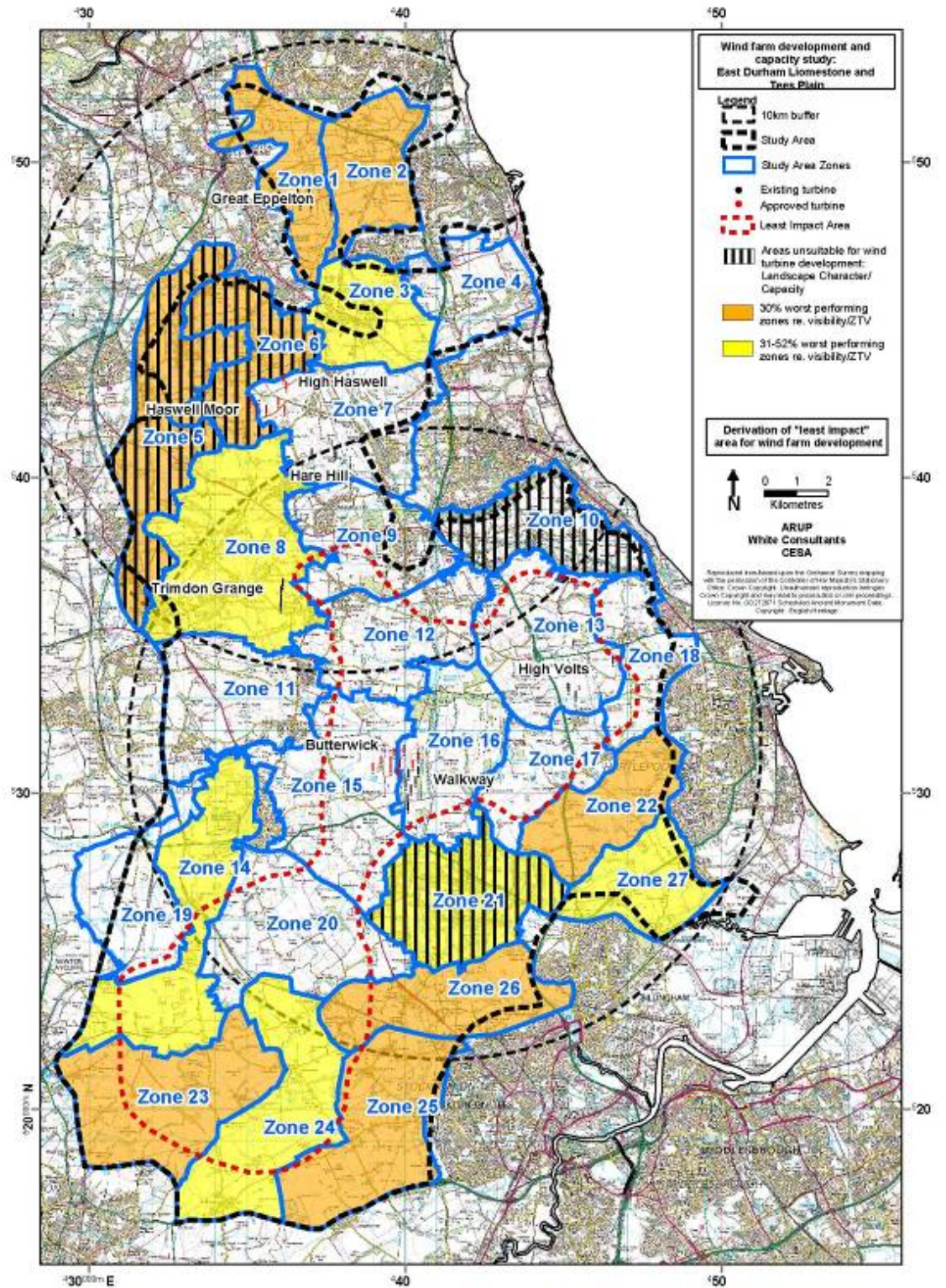
The visibility analysis in Chapter 5 highlights the settled nature of the study area and that the central group of zones perform best. As highlighted in Section 5.4, when localised screening from vegetation and buildings is not considered, intervisibility between residential receptors and turbine development on the Tees Plain is potentially very high. Zones in the south of the study area (in this area of high potential intervisibility) have been shown to perform relatively poorly in terms of the ranked visibility exercise. However, these zones have been considered for inclusion in part within the “least impact” area based on their landscape capacity for turbine development.

The land within the study area boundary, when compared with the study areas for the medium wind resources areas in Northumberland, is heavily settled with small towns, villages and isolated properties scattered throughout the area. Because of the settled nature of the area it has not been possible to locate the “least impact”/preferred area away from all settlement but it has been located so as to avoid significant/major effects on the cluster of towns/villages which run northward from Sedgfield. Where villages and individual properties are located within the “least impact”/preferred area this is not an indication of a reduction in their sensitivity to wind energy development.

Taking the landscape effects, and to a lesser extent for reasons previously discussed, visual effects into consideration it is possible to define a preferred “least impact” area for development (see **Figure 11**). This “least impact” area for development takes no account of landownership.

It should be noted that the south west boundary of the “least impact” area lies within 4.5km of Durham Tees Valley Airport and radar constraints may render turbine development impossible in the south of the “least impact” area. It is not possible to comment at the strategic level on the possibility of this occurring as specific mitigation measures for a wind farm proposal may be considered acceptable by the airport and Civil Aviation Authority.

Figure 11 – Derivation of proposed "least impact"/preferred area for wind farm development



7.3 Cumulative Impact: Wind farm development scenarios

In order to assess the overall capacity of the “least impact” area, a high level cumulative impact assessment of various potential development locations (scenarios) is proposed. A detailed landscape and visual environmental assessment is not possible within the remit and hence resources of the study. The purpose of the cumulative impact assessment is to understand an upper threshold for acceptable landscape change in the area as a whole. More detailed work is the remit of developers in preparing Environmental Impact Assessments in support of planning applications.

In a study for the Welsh Assembly Government in 2004²⁴ this consultant team suggested that cumulative impact assessment may be an issue for wind farms located *within a minimum* of 10 to 20 km of each other, dependent on size of the wind turbines²⁵.

Unlike the study area for the wind resource areas in Northumberland there are several existing and consented turbine developments within the study area. In certain locations such as the recently consented High Haswell and Haswell Moor, and Walkway and Butterwick, wind farms are located in very close proximity to each other, so when viewed from a distance they may be interpreted as one development. Generally the turbine clusters (viewing those in close proximity as a single cluster) in the study area are at 6km centres and it is possible to view more than one cluster at a time from a number of locations both outside and within the study.

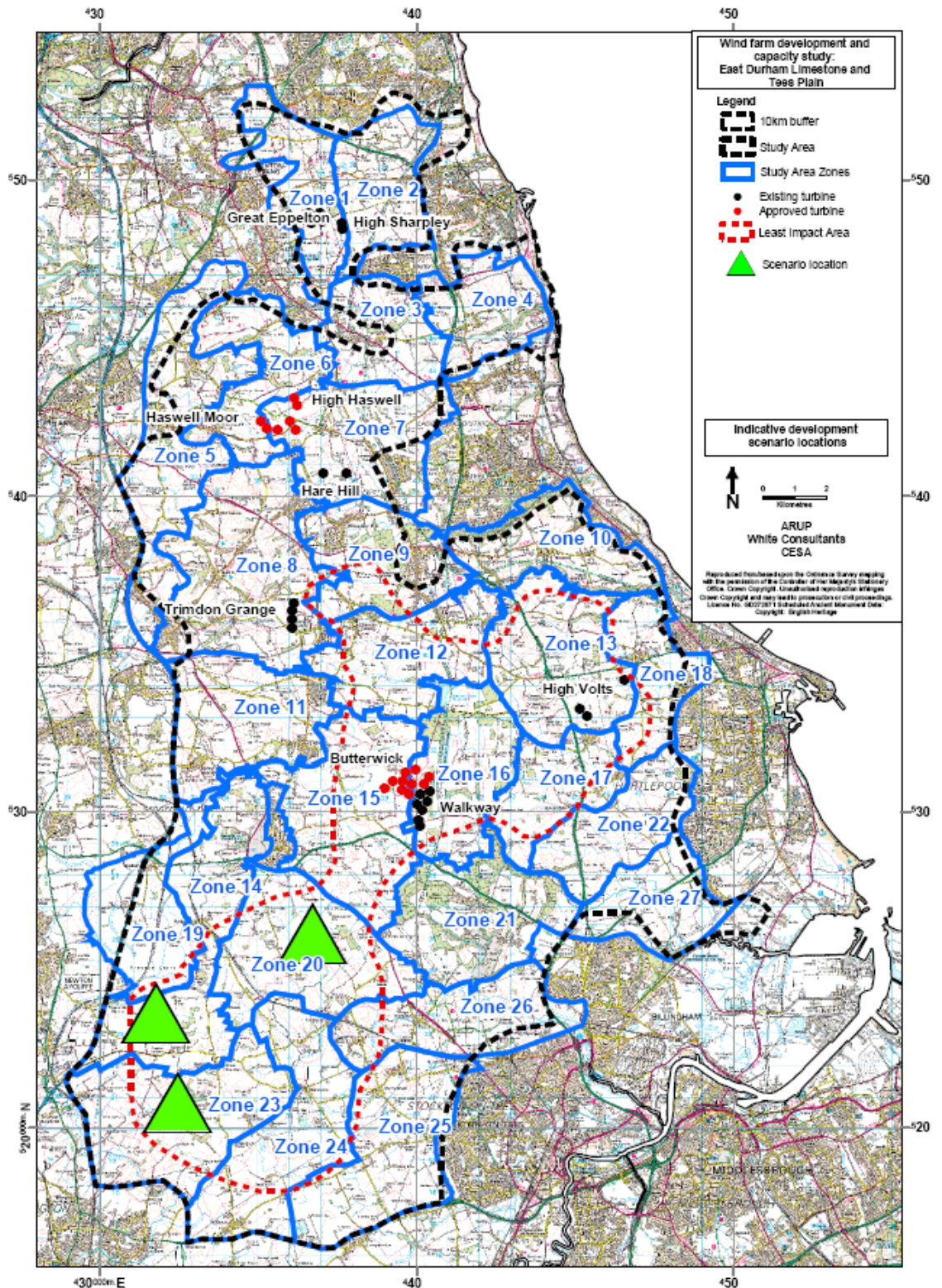
Five further development scenarios which take the existing and consented wind farms into account with regard their spacing and location have been developed to explore cumulative impact issues. These scenarios take into account the level of restriction for development imposed on the least impact area by constraints such as settlement. The scenarios presuppose that any developments located within the ‘least impact areas’ shown spatially would generally accord with the suggested maximum wind farm typologies discussed in Chapter 4 of this report. The five scenarios are outlined below illustrated in **Figure 12**. Estimated MW capacities²⁶ based on the suggested wind farm typologies derived earlier in the report have been calculated for each scenario. The turbines considered within the scenarios are commercial scale turbines between 100-125m to blade tip.

²⁴ Facilitating the Planning for Renewable Energy in Wales: Meeting the Target: Final Report on Research Contracts 105/2002 and 269/2003, July 2004

²⁵ Current best practice guidance on the assessment of cumulative effects associated with wind farms has been prepared for use in Scotland. This document deals extensively with improving best practice on the techniques of assessment e.g. giving guidance on assessment study areas and how material should be presented by developers to the decision-making bodies. Understandably however, no guidance is provided to local or regional bodies on how to make decisions on what is acceptable or not. This (it is argued) requires individual proposals to be considered within a wider context of natural heritage objectives for an area; this almost always missing in the UK. As far as the authors are aware, only in Wales through the TAN 8 process, have clear regional landscape objectives been established relating to wind farms and given a formal statutory basis in National and Local Planning Policy.

²⁶ Please note the use of 2.5MW turbines has been assumed.

Figure 12 – Indicative scenario locations



Scenario A

Three clusters comprising a small (<4 turbines) cluster located in Zone 14, a medium small (4-9 turbines) cluster in Zone 20 and a medium small - small (approx 6 turbines) cluster in Zone 23 with a total estimated maximum capacity of approximately 45MW. The maximum number of turbines in this scenario is 18.

Scenario B	Two clusters comprising a medium-small (4-9 turbines) cluster in Zone 20 and a medium small - small (approx 6 turbines) cluster in Zone 23 with a total estimated maximum capacity of approximately 37.5MW. The maximum number of turbines in this scenario is 15.
Scenario C	Two clusters comprising a medium-small (4-9 turbines) cluster in Zone 20 and a small (<4 turbines) cluster in Zone14 with a total estimated capacity of approximately 30MW. The maximum number of turbines in this scenario is 12.
Scenario D	Two clusters comprising a small (<4 turbines) cluster in Zone 14 and a medium small - small (approx 6 turbines) cluster in Zone 23 and with a total estimated capacity of approximately 22.5MW. The maximum number of turbines in this scenario is 9.
Scenario E	A single medium-small (4-9 turbines) cluster located in Zone 20 with a total estimated maximum capacity of approximately 22.5MW. The maximum number of turbines in this scenario is 9.
Scenario F	A single small (<4 turbines) cluster located in Zone14 with a total estimated maximum capacity of approximately 7.5MW. The maximum number of turbines in this scenario is 3.
Scenario G	A single medium small - small (approx 6 turbines) cluster located in Zone23 with a total estimated maximum capacity of approximately 15MW. The maximum number of turbines in this scenario is 6.

It should be noted that MW capacities associated with each scenario are based on the use of 2.5MW turbines and do not take into account MW already constructed/ consented in the wind resource area.

The following principles have been assumed to have been taken into consideration with the potential development scenarios:

- Nearby adjacent wind farms will have similar turbine design, colour, turbine spacing, informal layout and pattern.
- Turbine heights will be similar for large clusters but may reduce for small clusters in smaller scale landscapes at a distance from other clusters *but distances between turbines would be similar.*
- The wind farms will be carried out broadly in accordance with micro-siting principles set out in **Appendix B.**

7.4 Cumulative Impact assessment: Scenario environmental performance

There are a significant number of receptors of varying sensitivity in and around the search area. A selection of higher sensitivity receptors has been used to explore the likely cumulative effects of the different scenarios. These are:

- Sedgefield²⁷
- Sadberge (south)
- Great Stainton
- Stillington
- Windsurfing centre near Bishopton
- Parking by Forestry Commission land approx. 2km NE of Durham Tees Valley Airport
- Bridge over A1 on the unnamed road to Newton Aycliffe below Preston le Skerne
- Bradbury

It should be noted that due to the number of settlements within and around the search area the selection of a particular settlement as one of the receptors used for assessment of the scenarios does not necessarily indicate increased level of sensitivity as a receptor. The selection of receptors is intended as an attempt at providing a balanced outline assessment of the scenarios. Where development proposals come forward it is expected that the location of key visual receptors and key viewpoints would be agreed with local authorities and other consultees.

The “least impact” area was sited so as to avoid the worst effects on views of the World Heritage Site (WHS). All of the scenarios locations are at least approx. 18km from the WHS so effects are considered to be Minor/Negligible but further detailed analysis is recommended for any development proposals which may be visible within key views of the WHS and from the WHS itself.

The assessment outlining the level of significance of effects on receptors as defined in Table 6 earlier in the report is summarised in **Tables 9, 10, 11, 12, 13 and 14**. It should be noted that with the assessments of the potential visual effects of the scenarios on viewpoints :

- No wireframe or photomontages have been carried out to inform the assessments. It is therefore generally the maximum potential effect rather than the actual effect.
- Screening landform and vegetation have not been taken into account unless it is absolutely clear that visibility is not possible.

²⁷ Effects are likely to be limited only to properties in extreme southern fringes of Sedgefield.

Table 9 – Potential visual effect of scenario A on viewpoints

Viewpoint number	Viewpoint location	Scenario A		
		Approximate distance nearest cluster	Maximum potential angle of view of wind turbines	Potential significance of effect
1	Sedgefield	1.9km	71°	Severe
2	Sadberge	3.5km	31° (some turbine clusters will be viewed through others)	Severe/Major
3	Great Stainton	1.1km	69° (some turbine clusters will be viewed through others)	Severe
4	Stillington	1.9km	73° (some turbine clusters will be viewed through others)	Severe
5	Windsurfing centre near Bishopton	3.7km	55°	Major/Moderate
6	Parking by Forestry Commission land approx. 2km NE of Durham Tees Valley Airport	7.9km	29°	Moderate
7	Bridge over A1 on the unnamed road to Newton Aycliffe	1.2km	57° (some turbine clusters will be viewed through others)	Severe/Major
8	Bradbury	4.0km	42° (some turbine clusters will be viewed through others)	Severe/Major

Table 10 – Potential visual effect of scenario B on viewpoints

Viewpoint number	Viewpoint location	Scenario B		
		Approximate distance nearest cluster	Maximum potential angle of view of wind turbines	Potential significance of effect
1	Sedgefield	1.9km	63°	Severe
2	Sadberge	3.5km	31° (some turbine clusters will be viewed through others)	Severe/Major
3	Great Stainton	1.1km	58°	Severe
4	Stillington	1.9km	67° (some turbine clusters will be viewed through others)	Severe
5	Windsurfing centre near Bishopton	3.7km	50°	Major/Moderate
6	Parking by Forestry Commission land approx. 2km NE of Durham Tees Valley Airport	7.9km	26°	Moderate
7	Bridge over A1 on the unnamed road to Newton Aycliffe	3.0km	45°	Major/Moderate
8	Bradbury	4.5km	35°	Severe/Major

Table 11 – Potential visual effect of scenario C on viewpoints

Viewpoint number	Viewpoint location	Scenario C		
		Approximate distance nearest cluster	Maximum potential angle of view of wind turbines	Potential significance of effect
1	Sedgefield	1.9km	63°	Severe
2	Sadberge	6.6km	20° (some turbine clusters will be viewed through others)	Major
3	Great Stainton	2.2km	37°	Severe/Major
4	Stillington	1.9km	62° (some turbine clusters will be viewed through others)	Severe
5	Windsurfing centre near Bishopton	4.4km	39°	Moderate
6	Parking by Forestry Commission land approx. 2km NE of Durham Tees Valley Airport	9.2km	20°	Minor
7	Bridge over A1 on the unnamed road to Newton Aycliffe	1.2km	37°	Severe/Major
8	Bradbury	4.0km	36°	Severe/Major

Table 12 – Potential visual effect of scenario D on viewpoints

Viewpoint number	Viewpoint location	Scenario D		
		Approximate distance nearest cluster	Maximum potential angle of view of wind turbines	Potential significance of effect
1	Sedgefield	4.1km (Butterwick/Walkway)	38°	Severe/major
2	Sadberge	3.5km	23° (some turbine clusters will be viewed through others)	Severe/Major
3	Great Stainton	1.1km	53°	Severe
4	Stillington	4.8km	30°	Major
5	Windsurfing centre near Bishopton	3.7km	30°	Major/Moderate
6	Parking by Forestry Commission land approx. 2km NE of Durham Tees Valley Airport	7.9km	18°	Moderate
7	Bridge over A1 on the unnamed road to Newton Aycliffe	1.2km	51°	Severe/Major
8	Bradbury	4.0km	30° (some turbine clusters will be viewed through others)	Severe/Major

Table 11 – Potential visual effect of scenario E on viewpoints

Viewpoint number	Viewpoint location	Scenario E		
		Approximate distance nearest cluster	Maximum potential angle of view of wind turbines	Potential significance of effect
1	Sedgefield	1.9km	55°	Severe
2	Sadberge	8.4km	15° (some turbine clusters will be viewed through others)	Major
3	Great Stainton	4.2km	26° (some turbine clusters will be viewed through others)	Severe/Major
4	Stillington	1.9km	56° (some turbine clusters will be viewed through others)	Severe
5	Windsurfing centre near Bishopton	4.4km	34°	Moderate
6	Parking by Forestry Commission land approx. 2km NE of Durham Tees Valley Airport	9.2km	17°	Minor
7	Bridge over A1 on the unnamed road to Newton Aycliffe	6.2km	25°	Major/Moderate
8	Bradbury	4.5km	26°	Severe/Major

Table 13 – Potential visual effect of scenario F on viewpoints

Viewpoint number	Viewpoint location	Scenario F		
		Approximate distance nearest cluster	Maximum potential angle of view of wind turbines	Potential significance of effect
1	Sedgefield	4.1km (Butterwick/Walkway)	30°	Major
2	Sadberge	6.6km	12°	Major/Moderate
3	Great Stainton	2.2km	21°	Severe/Major
4	Stillington	5.2km	19°	Major/Moderate
5	Windsurfing centre near Bishopton	5.4km	14°	Moderate/Minor
6	Parking by Forestry Commission land approx. 2km NE of Durham Tees Valley Airport	10.5km	9°	Moderate/Minor
7	Bridge over A1 on the unnamed road to Newton Aycliffe	1.2km	31°	Severe/Moderate
8	Bradbury	4.0km	24°	Severe/Moderate

Table 14 – Potential visual effect of scenario G on viewpoints

Viewpoint number	Viewpoint location	Scenario G		
		Approximate distance nearest cluster	Maximum potential angle of view of wind turbines	Potential significance of effect
1	Sedgefield	4.1km (Butterwick/Walkway)	30°	Severe/Major
2	Sadberge	3.5km	23°	Severe/Major
3	Great Stainton	1.1km	42°	Severe
4	Stillington	4.8km	24°	Major
5	Windsurfing centre near Bishopton	3.7km	25°	Major/Moderate
6	Parking by Forestry Commission land approx. 2km NE of Durham Tees Valley Airport	7.9km	15°	Moderate
7	Bridge over A1 on the unnamed road to Newton Aycliffe	3.0km	29°	Major/Moderate
8	Bradbury	6.6km	23°	Major

Landscape and visual objectives were developed for the wind resource studies in Northumberland. These landscape and visual objectives/thresholds have been reviewed for relevance to this study. Each of the seven scenarios has been compared for potential cumulative landscape and visual impact against the reviewed landscape and visual objectives/thresholds which are included in **Table 15**. The completed appraisal data for the seven scenarios under consideration are included within **Appendix C**.

Table 15 – Wind Farm scenario cumulative landscape and visual assessment appraisal impact appraisal summary table

Landscape / Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Minimum Field of view in degrees in which stated impacts are to be avoided
VISUAL				
To prevent experience in a settlement of being in a wind farm landscape	High	Avoid most substantial adverse effects (unless directly linked to the development.)	Views from settlements of more than 10 dwellings should not have more than 90° of their field of view (360°) occupied by wind turbines. Wind farms on both sides to be avoided where they would cause significant or major visual impacts.	180-270
To prevent experience in a residential dwelling of being in a wind farm landscape	High	Avoid most substantial adverse effects (unless directly linked to the development or significantly compensated by agreement	Views from individual dwellings should not have more than 180° of their field of view occupied by wind turbines. Turbines in close proximity on both sides of dwellings to be avoided.	180
To have no significant detrimental effect upon the experience of visiting key visitor facilities within or in close proximity to the study area.	Moderate-high	Moderate adverse or greater	Turbines to be more than 7 – 10km from the most sensitive receptors e.g. World Heritage Site, and 5km minimum from other receptors	360
To prevent the impression to users of the main 'A' roads through the study area that they are in a wind farm landscape i.e. to allow only limited landscape change	Moderate	Substantial adverse	No more than a medium-sized wind farm equivalent of turbines to be seen with substantial adverse effect from A-roads in a single view. At least 5 minutes travel must occur between sequential views of separate wind farms	360

Landscape / Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Minimum Field of view in degrees in which stated impacts are to be avoided
To avoid more than a major effect upon key view points accessible by walkers outside the National Park/AONB	High	Avoid most substantial adverse effects	Turbines to be sited at least 2km away from such defined and agreed viewpoints	90-180
LANDSCAPE				
To entirely maintain the setting of Historic Parks and Gardens	High	Moderate adverse or greater	No turbines to be visibly prominent from the publicly accessible parts of the properties (i.e. no turbines visible within 7km)	360
To broadly protect the setting of nationally designated cultural heritage features	Moderate/high	Avoid most substantial adverse effects	No turbines to directly affect the setting of such structures where setting is a key consideration in their designation, (i.e. no turbines within 2km)	270-360
To avoid a severe effect upon sensitive local landscape character over a wide area.	Moderate	Avoid most substantial adverse effects	Turbines avoid direct effects on high sensitivity landscapes. No groups of turbines to overwhelm the grain of the landscape in terms of landform and cover.	
To avoid over-dominant effects on the skyline			Turbines to cover less than a third of the field of view of the skyline [say 45 degrees] from sensitive landscape viewpoint.	45
To avoid distortion of the sense of scale over a wide area			Avoid locations where there is a juxtaposition between wind farms and well defined landform/changes in level e.g. hill and valley sides	

The main differences between the above landscape and visual objectives/thresholds and those used for the studies in Northumberland are as follows:

- Objectives/Thresholds involving the setting of National Parks and AONBs have been omitted as both the North York Moors National Park and the North Pennines AONB lie at a distance of over 10km from the study area
- Reference to “key hilltop viewpoints” has been replaced with “key viewpoints” to reflect the lower lying gently undulating nature of the Tees Plain.

7.4.1 Scenario Performance

On the basis of the criteria developed for this study (Table 15), Scenario A has the highest number of “likely to be unacceptable” cumulative impact effects, Scenario B, C and D only have one “likely to be unacceptable effect” each, with Scenarios E, F and G having no “likely to be unacceptable” cumulative impact effects. Because of the relative number and complexity of receptors in this area it has not been possible to be definitive in assessing unacceptable and acceptable in some cases so intermediate categories have been used where there is potential doubt/more information is needed.

Scenario A’s “likely to be unacceptable” effects are:

- On several isolated dwellings - the extent of visibility from each has not been fully assessed.
- On the scale and grain of the landscape

Scenario A’s “possibly unacceptable” effects are:

- On settlements of more than 10 houses - including Great Stainton, Sedgefield and Stillington
- Effects on A roads
- Distortion of the sense of scale over a wide area

Scenario B’s “likely to be unacceptable” effects are:

- On sensitive landscape character and the grain of the landscape

Scenario B’s “possibly unacceptable” effects are on:

- On settlements of more than 10 houses -including Great Stainton, Sedgefield and Stillington
- Effects on A roads

Scenario C’s “likely to be unacceptable” effects are:

- On sensitive landscape character and the grain of the landscape

Scenario D’s “likely to be unacceptable” effects are:

- On several isolated dwellings - the extent of visibility from each has not been fully assessed.

Scenario D's "possibly unacceptable" effects are on:

- On several isolated dwellings - the extent of visibility from each has not been fully assessed.
- Cumulative effects on listed structures

Scenario D's "marginally acceptable" effects which are above the set threshold but may still be issues associated with are:

- On sensitive landscape character and the grain of the landscape

All scenarios find at least some properties lying directly between (existing/consented and proposed) clusters and there is potential for cumulative impact. At the level of assessment it has not been possible to determine the full cumulative effects on each. Of key concern is the effect on settlements above 10 properties. This does not just apply to precisely what can be seen from any given building but also from its curtilage and from the approaches to the settlement.

The presence of the Walkway/Butterwick turbine cluster and the heavily settled nature of the study area mean all of the scenarios have some potential to impact upon individual dwellings. The closer turbine clusters are to each other the greater the potential for substantially adverse effects on individual properties caused by the presence of turbines on both sides of a property.

There are a number of listed buildings and structures scattered across the area which are more or less potentially affected by the various scenarios. Again at the level of assessment it has not been possible to determine the full cumulative effects on each.

7.5 Conclusions: Scenarios

Scenario A has the most "likely to have unacceptable" and "possibly unacceptable" effects which mean that this is not recommended. Scenario C and Scenario D have one "likely to be unacceptable" effect each and no "possibly unacceptable" effects and therefore appear to perform marginally better than Scenario B. Scenarios E, F and G, with their single clusters, unsurprisingly, perform best of all. However, if it can be demonstrated that effects on sensitive landscape character and the grain of the landscape are not cumulatively an issue then Scenarios B and C may be acceptable and if it can be demonstrated that the effects on individual properties are not cumulatively an issue then Scenario D may be acceptable.

Already there are 10 existing wind turbines (at Walkway and High Volts) and another 10 consented turbines (Butterwick) located within the Tees Plain wind resource area. When considered with the existing and consented development all scenarios with the exception of Scenario F have the potential to exceed the identified draft RSS recommended levels of development of 20-25 turbines.

All the above discussed effects/impacts would have to be assessed in further detail and may be mitigated through careful siting/omission of turbines within each area (in accordance with the guidelines within **Appendix B**). As with all other studies in this series, planning applications within or close to the scenario areas would still have to be examined in detail for their environmental performance, but the scenarios give guidance on likely level/magnitude and spatial location of acceptable development (in largely landscape and visual terms), acknowledging the potential for cumulative impacts.

Comments on these scenarios should also be seen within the context of the need for a regional and county level appreciation of relative landscape capacity within each of the medium wind resource areas within County Durham and Tees Plain and perhaps the others within the North East England planning region. This would help benchmark the 'bottom-up' landscape-led thresholds of acceptable development in each W against the in part 'top-down' renewable energy targets to ensure that a balanced and pragmatic planning approach is taken.

The broad findings from this study could then be subjected to further political endorsement via subsequent meetings/workshops and adopted for use in policy. It should also be recognised that landscape and visual issues are only one environmental element in the decision-making process (albeit perhaps the most important) and that other environmental issues such as cumulative ecological impact or cultural heritage effects will also influence the policy response to the above scenario.

8 Conclusions and Recommendations

8.1 Study Findings

This study has built upon the outputs of previous studies (The GO-NE Landscape study²⁸ and (for method) the Wind Farm Development and Landscape Capacity Study in Knowesgate and Harwood Forest) and as required, has considered the landscape capacity and visual issues of the East Durham Limestone and Tees Plain wind resource areas.

This more detailed study has highlighted the potential for modification to the assessed landscape capacity for onshore wind for the area developed in the regional study and currently incorporated into planning documentation. It has come to two principal findings:

- a) 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.
- b) 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.

8.2 Use of the study

This consultants study provides the following:

- a) a further level of data between existing regional studies, and the material documenting significant environmental impacts contained within Environmental Impact Assessments prepared by developers in support of individual wind applications.
- b) An expert independent opinion to inform decision makers (particularly local authorities in assessing and commenting on single or multiple wind turbine proposals) in terms of landscape capacity, visual issues and cumulative impact within these North East Wind Resource areas. This can help guide the local planning authority(s) develop their own thresholds of acceptability for wind farm development, taking into account the area's landscape and the need to contribute to National and Regional Targets.

The study (and others in other Wind Resource Areas in the North East) could therefore be used as part of the overall statutory planning process. This is to help influence the planning response to the current high levels of developer interest within the North East of England and secure a more planned, consistent and coherent approach to the decisions taken with respect to onshore wind applications. This should provide greater protection to the more sensitive landscapes within the region, whilst allowing appropriate contributions to be met towards renewable energy targets, to help tackle global climate change.

It is recommended that developer proposals be considered within the context of the outcomes proposed, together with the criteria, thresholds and wind farm typologies

²⁸ Government office for the North East - Landscape Appraisal for onshore wind development – Report NREG/2002/004 Final Report July 2003

developed in this study. Further detailed assessment of any proposals in the East Durham Limestone and Tees Plain areas, considering other environmental factors such as biodiversity and archaeology, should, in the main, be reported on within Environmental Impact Statement submitted as part of a planning application. This assessment will need to be reviewed as part of the planning decision making process, alongside the comments of consultees on factors such as radar and aviation.

Appendix A

**Completed Landscape
Capacity Worksheets**

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 1

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
							Sensitivity	L	LM	M	MH	H
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
								L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>The area forms a backdrop to a heavily settled landscape, rising above settlements including Houghton-le-Spring and Hetton-le-Hole, reaching around 170m AOD to the north west of Warden Law. The area has medium scale fields and limited woodland cover generally associated with the steeper slopes, leisure facilities and small areas of plantation. Pylons run through the eastern part of the zone.</p> <p>The sensitivity of the zone allows only a small-medium small typology due to the scale of landform, its edge characteristics and grain of landcover.</p> <p>There are 2 existing 90m to blade tip turbines at High Sharpley and 4 72m turbines at Great Eppleton which are currently being re-powered with 4 115m to blade tip turbines.</p> <p>The capacity for turbine development within this zone is limited due to the existing development.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 2

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
Summary of physical criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
							Sensitivity	L	LM	M	MH	H
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry [note that scale of forest limited]	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
		Very large	Large	Medium	Medium-small	Small	None	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>This area gently rises above the settlement of Seaham, affording open views out to the North Sea. The A19 passes through the north before forming the eastern boundary of the area. Apart from the wooded Burdon Dene, tree cover in the area is generally limited to widely scattered small plantations and shelterbelts. Several small water bodies are spread throughout the area.</p> <p>The sensitivity of the zone allows only a small-medium small typology due to the scale of landform and grain and lowland character of landcover.</p> <p>There are no existing turbines within the zone although 2 90m turbines at High Sharpley lie on its western boundary, and 4 72m turbines at Great Eppleton which are currently being re-powered with 4 115m turbines lie to their immediate west.</p> <p>The capacity for turbine development within this zone is limited due to the existing development to the west.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 3

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
Summary of physical criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
							Sensitivity	L	LM	M	MH	H
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity						
		Very large	Large	Medium	Medium-small	Small	None	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments: A gently undulating landscape rising to over 135m at Croup Hill with several large villages located along the A182. The area is crossed by many overhead power lines and the disused South Hetton Colliery is a local detractor within the zone. The A19 forms part of the eastern boundary. The sensitivity of the zone allows only a small typology due to the grain and character of landscape and settlement pattern. The capacity for turbine development within this zone is limited due to the existing development to the west.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 4

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	Enclosed (Hawthorn Dene)	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity						
		Very large	Large	Medium	Medium-small	Small	None	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>A gently undulating area containing the incised wooded Hawthorn Dene. The land rises to 143m AOD at Batterlaw Hill. Settlement within this area comprises a few scattered farms and the village of Hawthorn with the larger settlements of Seaham and Easington Colliery located outside the area to the north and south respectively. The Durham Heritage Coast lies to the east of the area and includes the extreme south east corner of the area.</p> <p>The sensitivity of the zone allows only a small typology due to the grain and character of landscape and settlement pattern.</p> <p>The capacity for turbine development within this zone is limited due to the existing development to the west.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 5

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity					
		Very large	Large	Medium	Medium-small	Small	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None					
<p>Comments:</p> <p>Part of the broad terraced valley to the east of the City of Durham with broad, lightly wooded valleys. The raised embankments of the A1(M) and the East Coast railway line form much of the western boundary to the area. Settlement within the area includes the villages of Sherburn, Hallgarth, Pitlington and Old Quarrington. The Greenbelt around Durham extends into the north west of the area. The scarp slope within Zone 6 forms a strong backdrop to the zone.</p> <p>The area is considered unsuitable for turbine development due to its lower slope small scale, settled characteristics between the fingers of the adjacent limestone scarp slope [Zone 6] and its relationship with Durham Cathedral & Castle World Heritage Site to the east.</p>												

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 6

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
Summary of perceptual criteria							Sensitivity	L	LM	M	MH	H
							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity					
		Very large	Large	Medium	Medium-small	Small	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None					
<p>Comments: Low west facing limestone escarpment dissected by valleys separated by broad well defined spurs affording open views toward Durham Cathedral. The land rises to 163m AOD above High Moorsley. Deciduous and mixed woodland is associated with the land surrounding the Grade 1 listed Elmore Hall. Several small disused quarries and the large active Crime Rig quarry are visible on the scarp face. The zone is not considered suitable for wind energy development due to the scarp slope which forms a prominent backdrop to the land to the west.</p>												

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 7

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
							Sensitivity	L	LM	M	MH	H
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
								L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L	LM	M	MH	H
									1	2	3	4	5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>Undulating land rising to 169m AOD at Hare Hill with limited woodland cover. Shotton Airfield and the disused Tuthill Quarry are located in the eastern part of the zone. Pylons form a prominent feature as they pass through the middle of the area. The area forms a rural backdrop to the settlements of Shotton Colliery and Peterlee which lie to the east. The sensitivity of the zone allows only a small-medium small typology due to the scale of landform, its role as backcloth to lower land to the west and the grain of the settlement pattern.</p> <p>There are two existing 100m turbines at Hare Hill, three consented 100m turbines forming part of the larger (five turbine) Haswell Moor development, and two consented 110m turbines at High Haswell which would visually coalesce with Haswell Moor.</p> <p>The capacity for turbine development within this zone is limited due to the existing/permitted development.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 8

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
							Sensitivity	L	LM	M	MH	H
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity					
		Very large	Large	Medium	Medium-small	Small	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria							Summary Sensitivity Score	L	LM	M	MH	H
Type of wind farm potentially acceptable	Subject to EIA etc						None	1	2	3	4	5
<p>Comments:</p> <p>Continuation of the low west facing limestone escarpment in Zone 6. Woodland cover is generally associated with the scarp slope and valley sides. Open views across the valley terrace to the City of Durham and Durham Cathedral are possible. The villages of Cassop, Quarrington Hill, Coxhoe and Trimdon Grange are located within the zone. Several active and disused quarries, some of which now used as landfill sites, are evident within the area.</p> <p>The sensitivity of the zone allows only a small typology due to the scarp slope to the west, its role as backcloth to lower land and the grain and type of settlement pattern.</p> <p>4 No. 76m to blade tip turbines have been permitted at Trimdon Grange within this zone,</p> <p>The capacity for turbine development within this zone is limited due to the existing/permitted development.</p>												

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 9

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
		Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural					
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
		Very large	Large	Medium	Medium-small	Small	None	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>An undulating landscape rising to 163m AOD at Deaf Hill with small scale coniferous and mixed plantations in the east of the zone. The area is well settled with the large villages/small towns of Deaf Hill, Wheatley Hill and Wingate located toward the edges of the zone. The A181 passes through the middle of the zone. Pylons pass through the north west of the zone.</p> <p>The sensitivity of the zone allows only a medium small typology due to the grain and character of the landscape and settlement pattern.</p> <p>The capacity for turbine development within this zone is limited due to the existing development to the north and west.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 10

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
	skyline					skyline						
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/modification/naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Summary							Summary	L	LM	M	MH	H

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity					
		Very large	Large	Medium	Medium-small	Small	L	LM	M	MH	H	
sensitivity of physical and perceptual criteria							Sensitivity Score	1	2	3	4	5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None					
<p>Comments:</p> <p>An undulating plateau reaching 134m AOD bounded by the incised wooded valleys of Castle Eden Burn (a SSSI, NNR and SAC) to the north, and Crimdon Beck and Hesleden Dene to the south. The area is relatively well settled with a medium scale rectilinear field pattern. Castel Eden Park is included on the Register of Historic Parks and Gardens and several listed buildings are located in the north of the zone near Castle Eden Burn. Open views of the north sea are possible from the zone. The Durham Heritage Coast lies to the east of the zone.</p> <p>The area is considered unsuitable for turbine development due to its settled characteristics, incised valleys and its relationship with the coast.</p>												

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 11

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
								L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L	LM	M	MH	H
									1	2	3	4	5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>A gently undulating landscape rising to 183 m AOD in the north east near Timdon. Small pockets of woodland are generally associated with disused workings and quarries. A relatively well settled area with pylons forming dominant features in the north and east of the zone. Fishburn Airfield is located to the north west of Fishburn within this zone. The area is crossed by several busy roads including the A177.</p> <p>The sensitivity of the zone allows only a small-medium small typology due to the grain and character of the landscape and settlement pattern.</p> <p>The capacity for turbine development within this zone is limited due to the existing development to the north and west</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 12

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
		Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural					
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
Summary of perceptual criteria							Sensitivity	L	LM	M	MH	H
							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
								L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L	LM	M	MH	H
									1	2	3	4	5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments: An undulating open landscape with a medium scale rectilinear field pattern, rising to 157m AOD at Trimdon Colliery. The settlements of Trimdon Colliery, Station Town and Hutton Henry are located towards the periphery of the zone and the remainder of the zone is relatively sparsely settled. The sensitivity of the zone allows only a medium small typology due to the grain and character of the landscape and settlement pattern The capacity for turbine development within this zone is limited due to the existing development to the north and west.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 13

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
		Very large	Large	Medium	Medium-small	Small	None	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>A landscape of gently rolling hills sloping east towards the coast with an area of plateau above Heselden Dene. A small incised wooded valley extends from Heselden Dene into the zone in the north. The A19 passes through this farmed landscape reducing tranquillity. Overhead power lines are prominent features in places. The sensitivity of the zone allows only a small-medium small typology due to the prominence of skyline from the east and south east, and the pattern of landcover. Three 100m to blade tip turbines are already operational at High Volts. The capacity for turbine development within this zone is limited due to the existing development.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 14

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity					
		Very large	Large	Medium	Medium-small	Small (to the south)	None (to the north)	L	LM	M	MH	H
Summary sensitivity of physical and perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small (to the south)	None (to the north)					
<p>Comments:</p> <p>A medium scale undulating plateau with blocks of woodland in the north and a more open character in the south. Generally sparsely settled with scattered farms with the exception of the village of Mordon. Sedgefield is located on the eastern boundary of the zone. Hardwick Country Park in the north of the zone is included on the Register of Historic Parks and Gardens with several listed buildings located within the setting of the park.</p> <p>The sensitivity of the zone allows only a small typology in the south of the zone due to the scale and grain of the landscape. The north of the zone is considered unsuitable for turbine development due to its relationship with Sedgefield and Hardwick Country Park.</p> <p>The capacity for turbine development within the zone is limited due to the existing/permitted development to the east.</p>												

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 15

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	Large	medium	small	intimate						
	Scale of landcover	vast	Large	medium	small	intimate						
	Openness	confined	Enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	Simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	Occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
							Sensitivity	L	LM	M	MH	H
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry [note that scale of forest limited]	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity						
		Very large	Large	Medium	Medium-small	Small	None	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>A gently undulating predominantly arable landscape with medium sized fields which reduce in size towards Sedgfield. Field boundaries are a mixture of hedges with hedgerow trees and post and wire fences. The area is relatively sparsely settled with scattered farms but the large settlements of Sedgfield, Fishburn and Trimdon all lie either on or close to the western boundary of the zone. The busy A689 passes through the area, east to west, connecting the A1 with the A19, and reducing tranquillity. There are overhead power lines running north to south.</p> <p>The sensitivity of the zone allows only a medium small typology due to the presence of clustered settlements nearby and the pattern of landcover.</p> <p>Turbine development has been consented in the east of the zone with 6 of ten total permitted 110m turbines at Butterwick. The rest of the 10 lie adjacent to the seven 110m to blade tip turbines recently been constructed at the Walkway site in Zone 16. Together the two developments will read as a single development of 17 turbines and will form a strong group larger than the typology considered appropriate for either zone.</p> <p>The capacity for turbine development within this zone is limited due to the existing development.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 16

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	Large	medium	small	intimate						
	Scale of landcover	vast	Large	medium	small	intimate						
	Openness	confined	Enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	Simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	Occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
		Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural					
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
Summary of perceptual criteria							Sensitivity	L	LM	M	MH	H
							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
		Very large	Large	Medium	Medium-small	Small	None	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>A gently undulating landscape reaching around 125m AOD in the north of the zone with open fields, deciduous, mixed and coniferous plantations and woodland. Views are generally enclosed within the zone by the woodland. Two reservoirs and several smaller water bodies are located within the area. The Castle Eden Walkway, along which National Cycle Route 1 run through the area. The zone is relatively sparsely settled with settlement generally comprising scattered farms. The site of the medieval village of Embleton lies in the eastern parts. The busy A689 passes through the southern fringes, connecting the A1 with the A19.</p> <p>The sensitivity of the zone allows only a medium small typology due to the grain and the pattern of landcover and proximity of settlement.</p> <p>Seven 110m to blade tip turbines have recently been constructed at the Walkway site. Further turbine development has been consented at Butterwick to the west with four of ten total permitted 110m turbines. The rest of the 10 lie adjacent to the west in Zone 15. Together the two developments will read as a single development of 17 turbines and will form a strong group larger than the typology considered appropriate for either zone.</p> <p>The capacity for turbine development within this zone is limited due to the existing development.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 17

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	Large	medium	small	intimate						
	Scale of landcover	vast	Large	medium	small	intimate						
	Openness	confined	Enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	Simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
						Sensitivity	L	LM	M	MH	H	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	Occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
Summary of perceptual criteria							Sensitivity	L	LM	M	MH	H
							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
								L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L	LM	M	MH	H
									1	2	3	4	5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>An undulating landscape bisected by the A19 falling gently to the south east towards the Tees Estuary. Medium sized fields with some limited tree cover. Sparsely settled with the exception of the villages of Elwick in the north and Dalton Percy in the east of the zone. A disused windmill forms a local focal point to the west of the busy A19. Pylons are located in the east of the zone.</p> <p>The sensitivity of the zone allows only a medium small typology due to the grain of the pattern of landcover and proximity of settlement.</p> <p>The capacity for turbine development within the zone is limited due to the existing/permitted development to the west and the existing development to the north.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 18

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	Large	medium	small	intimate						
	Scale of landcover	vast	Large	medium	small	intimate						
	Openness	confined	Enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
							Sensitivity	L	LM	M	MH	H
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
								L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>Medium scale fields gently sloping east towards Hartlepool and the coast beyond. Sparsely settled with the exception of the village of Hart and a small section of the outskirts of Hartlepool in the east of the zone. Predominantly arable fields with field boundaries generally comprising hedgerows. A small sand and gravel quarry is located to the south of the village of Hart. Tree cover is limited and open views to the north sea are possible from parts of this zone.</p> <p>The sensitivity of the zone allows only a small-medium small typology due to the scale and grain of landform, and its relationship with the coast.</p> <p>The capacity for turbine development within the zone is limited due to the existing development to the west.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 19

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity						
		Very large	Large	Medium	Medium-small	Small	None	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L	LM	M	MH	H
Type of wind farm potentially acceptable	Subject to EIA etc								1	2	3	4	5
<p>Comments:</p> <p>A broad, poorly drained low lying open plain, generally around 80m AOD, with boundary ditches to medium scale rectilinear fields. The area is sparsely settled with very limited woodland cover. The A1 and the east coast main railway line traverse the carrs on raised embankments.</p> <p>The sensitivity of the zone allows only at most a small typology due to the rarity value of this landscape type in the wider area.</p> <p>The capacity for turbine development within the zone is also limited due to the rarity value of this landscape type in the wider area.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 20

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
								L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>A gently undulating landscape falling away from Sedgfield which lies to the north of the zone. Predominantly arable fields of varying size with field boundaries generally comprising hedgerows with some trees. Several small deciduous and mixed plantations are located throughout the zone. The area is relatively sparsely settled with access into the zone generally limited to footpaths, bridleways, private tracks and two minor roads one of which passes through the west of the zone and the other which serves properties within the zone. The sites of two medieval villages, Shotton and Layton, are located within the zone.</p> <p>The sensitivity of the zone allows only a medium small typology due to the scale and grain of the landscape and settlement pattern.</p> <p>The capacity for turbine development within the zone is limited due to the existing/permitted development to the north.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 21

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity					
		Very large	Large	Medium	Medium-small	Small	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None					
<p>Comments: This zone contains Wynyard village – a development of executive homes with associated leisure facilities within a wooded setting. The woodland in this zone is a mixture of deciduous woods and coniferous plantation. The Grade 2* listed Wynyard Park recorded on the Register of Historic Parks and Gardens, is located in the south east of the zone. The northern part of Wynyard Woodland Country Park through which National Cycle Route 1 passes is contained within this zone. Business park type development is being concentrated in the north east of the zone. The area is considered unsuitable for turbine development due to its settled characteristics, and its relationship with the Grade 2* listed Wynyard Park.</p>												

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 22

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
								L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L	LM	M	MH	H
									1	2	3	4	5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>This predominantly arable zone extends north east from the area of business park development within Zone 21 towards Hartlepool. Field sizes increase towards the east of the zone with field boundaries generally formed by hedges with few hedgerow trees. Settlement is generally confined to a few scattered farms with Hartlepool lying just beyond the east boundary of the zone. Lines of pylons pass in a north-south direction through the zone.</p> <p>The sensitivity of the zone allows only a medium small typology due to the scale and grain of the landscape and settlement pattern.</p> <p>The capacity for turbine development within the zone is limited due to the existing/permitted development to the west and the existing development to the north.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 23

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
							Sensitivity	L	LM	M	MH	H
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity						
		Very large	Large	Medium	Medium-small	Small	None	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L	LM	M	MH	H
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None	1	2	3	4	5	
<p>Comments: A gently undulating farmed landscape. Field boundaries are generally formed by hedges with quite frequent hedgerow trees. Pockets of deciduous woodland are scattered throughout the zone, often associated with watercourses. Settlement is generally comprised of scattered farms with the villages of Great Stainton with its church tower, Little Stainton and Brafferton located towards the periphery of the zone. The zone is crossed by overhead power lines. The sensitivity of the zone allows only a small - medium small typology due to the scale and grain of the landcover and settlement pattern.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 24

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
Summary of perceptual criteria							Sensitivity	L	LM	M	MH	H
							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
		Very large	Large	Medium	Medium-small	Small	None	L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments: A sparsely wooded, open, gently undulating landscape of mixed farmland which rises gently in the south to around 73m AOD at the village of Sadberge. Several reservoirs and other water bodies are scattered throughout the zone. A windsurfing centre is located at one of these water bodies near Bishopton. The remains of a Motte and Bailey castle are also located near Bishopton. The villages of Stillington, Bishopton and Sadberge are located in the centre, north and south of the zone respectively, with scattered farms located throughout the zone. The sensitivity of the zone allows only a small - medium small typology due to the scale, grain and pattern of the landcover and settlement.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 25

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria						Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5	
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
Summary of perceptual criteria							Sensitivity	L	LM	M	MH	H
							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
								L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L	LM	M	MH	H
								1	2	3	4	5	
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments:</p> <p>A gently undulating zone with medium size field to the west of Stockton on Tees. The busy A66 forms the southern boundary of the zone. The south of the zone is well settled with farms generally associated with the minor roads that pass through the zone. The villages of Carlton and Redmarshall lie in the north of the zone. Several small blocks of deciduous woodland are scattered throughout the zone. Field boundaries are a mixture of hedges with hedgerow trees and fences. The zone is crossed by several overhead power lines. Direct views of Stockton on Tees are possible from parts of the area.</p> <p>The sensitivity of the zone allows only a small - medium small typology due to the scale, grain and pattern of the landcover and settlement.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE ZONE: 26

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
								L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L	LM	M	MH	H
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None	1	2	3	4	5	
<p>Comments: The zone contains the broad valley of Thorpe Beck and part of Wynyard Woodland Country Park (the remainder of the park extends northward) through which National Cycle Route 1 passes. The villages of Thorpe Thewles, Stillington and Whitton are located within zone which is bisected by the busy A177. Pylons run in a north south direction through the centre of the zone. Views into Stockton on Tees are possible from parts of the zone. The sensitivity of the zone allows only a small - medium small typology due to the scale and grain of the landscape and settlement pattern.</p>													

NORTH EAST REGION WIND FARM DEVELOPMENT: Landscape capacity worksheet

LANDSCAPE TYPE: 27

Generally criteria from better to worse for wind farms, left to right.

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS					Sensitivity	L	LM	M	MH	H
PHYSICAL												
Landscape scale and openness	Scale of landform	vast	large	medium	small	intimate						
	Scale of landcover	vast	large	medium	small	intimate						
	Openness	confined	enclosed	open		exposed						
							Sensitivity	L	LM	M	MH	H
Landform and shape	Topographic form	plateau	rolling/undulating	hills/valleys	levels	mountains						
	Skyline	smooth		rounded		complex						
	Ridge pattern	Broad ridge		multiple ridge		Single narrow ridge						
							Sensitivity	L	LM	M	MH	H
Settlement	Settlement pattern	no settlement	large scale industrial	scattered/rural/farm	Small scale rural clustered	Small towns/large villages						
	Vertical elements	many masts and pylons		Some masts and pylons		No man made vertical elements						
							Sensitivity	L	LM	M	MH	H
Landscape pattern and foci	Landcover pattern	forestry	open land	large scale field pattern/ mosaic	small scale field pattern/ mosaic	development						
	Pattern	Weak/disrupted pattern		Moderately strong pattern		Strong pattern						
	Sensitive features/foci	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent						

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS										
							Sensitivity	L	LM	M	MH	H
	Sensitive features on skyline	no sensitive features	Few sensitive features apparent	some sensitive features apparent		sensitive features prominent on skyline						
Visual composition	Diversity	uniform	simple		diverse	complex	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Summary of physical criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5
PERCEPTUAL												
How the landscape is experienced	Level of human access ?	rare	occasional	infrequent	frequent	constant						
	Presence of attractive views	None		Some		Many						
	Presence of detractive views	Many		Some		None						
	Tranquillity	Noisy				Tranquil						
Context	Relationship with other LCTs	Weak- self contained area and views		moderate		Strong backdrop-this or adjacent LCT	Sensitivity	L	LM	M	MH	H
							Sensitivity	L	LM	M	MH	H
Remoteness/ modification/ naturalness	Remoteness	Remote				Settled						
	Modification	Extraction/infrastructure on a large scale	Large scale forestry	Some urban areas	Rural farmland	Semi natural						
		Poor condition		Moderate condition		Good condition						
	Wildness	Human intervention				Wild						
Summary of perceptual criteria							Summary Sensitivity Score	L 1	LM 2	M 3	MH 4	H 5

MAIN CRITERIA	SPECIFIC CRITERIA	CHARACTERISTICS						Sensitivity					
								L	LM	M	MH	H	
Summary sensitivity of physical and perceptual criteria								Summary Sensitivity Score	L	LM	M	MH	H
									1	2	3	4	5
Type of wind farm potentially acceptable	Subject to EIA etc	Very large	Large	Medium	Medium-small	Small	None						
<p>Comments: A generally open plateau bound by Billingham to the west and Hartlepool to the east with the village of Newton Bewley located in the west of the zone. The land begins to rise to the north beyond this zone allowing open views into this zone. Views of the large scale industrial development at Seal Sands and Middlesbrough are partially screened in places by the elevated railway line which forms the southern boundary of the zone. Wind development could relate to the industrial development to the south east and east of this zone. The sensitivity of the zone allows only a small - medium small typology due to the scale and grain of the landscape and settlement pattern.</p>													

Appendix B

**Wind Farm micro-siting
guidelines**

B1 Wind Farm Micro-Siting Guidelines

Initial Guidelines to minimise the landscape and visual impacts of wind farms

Aim	Guideline	Comment
Optimise location of wind farm	Site large wind farms on large-scale and simple landscapes with simple, smooth skylines	Avoid <i>complex</i> ridgelines and areas of <i>complex land cover</i> .
	Where views are possible towards wind farms site them back from the edge of plateaux, valley sides, hill fringes.	Site turbine a distance of around 5 times its height to blade tip from top of break of slope where possible
	Avoid breaking skylines when viewed from <i>sensitive landscapes</i> and viewpoints	
Optimise layout of wind farm	Lay out wind turbines in apparently random pattern. Avoid straight lines unless in highly rectilinear field pattern or industrial landscape.	
	Where possible break small wind farms into small groups in <i>finer grain</i> field landscapes.	Break up into small visually separate groups of around 5 turbines where possible.
	Avoid a cluttered appearance without spreading out	
Optimise wind turbine design and size	All turbines in one wind farm must be of the same appearance and size. It is commonly accepted that the three bladed wind turbines with a solid evenly tapering tower is the most elegant design.	Colour turbines off-white or light grey with a matt finish
	Respect scale of landscape where there is pronounced topography by using wind turbines sizes and numbers that do not dwarf hills / ridges. Larger wind turbines (>100m) could potentially have the effect of being out of scale with the appropriate topography, particularly where the receiving landform is pronounced and smaller in scale (say up to 200m change in level). In these circumstances a lower number of turbines e.g. 3-5, could potentially reduce the potential visual and landscape impact. Consider where possible not using wind turbines that are higher than a third of the height of the landform they are placed on, (or likely to be viewed against), where breaks of slope and heights are well defined. (Note: in gently undulating or flat landscapes this is irrelevant).	

Aim	Guideline	Comment
Optimise design and layout of ancillary equipment	Site ancillary equipment below the skyline including buildings, sub-stations and transmission lines.	Locate transmission lines underground in exposed parts of the site. Use timber poles to support higher voltage over-ground lines on lower slopes, where voltage allows.
	House all clutter within wind turbine structure.	
	Design access roads so they are not widely visible using local quarried crushed stone where possible.	

Appendix C

**Assessment of
cumulative Impacts**

C1 Assessment of Cumulative Impacts

Assessment of Cumulative Impacts and Thresholds for acceptable development

No account was taken in any of the scenarios of local landform, buildings, stands of trees and other intervening vegetation which may screen views of turbines, unless noted otherwise.

Table C1 Scenarios A - D

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view (degrees) in which stated impacts are to be avoided	Scenario Effects			
					Scenario A	Scenario B	Scenario C	Scenario D
VISUAL								
To prevent experience in a settlement of being in a wind farm landscape	High	Avoid most substantial adverse effects (unless directly linked to the development.)	Views from settlements of more than 10 dwellings should not have more than 90° of their field of view (360°) occupied by wind turbines. Wind farms on both sides to be avoided where they would cause	180-270	None of the settlements used in the analysis of the potential visual effects of scenarios on viewpoints would have a view of turbines that exceeded 90° of their field of view. Where views were possible turbines would be viewed at a distance of over 2km in most cases, providing a degree of visual separation. Views of the full extent of all clusters from the above settlements are unlikely due to landform and vegetation.			
					Scenario A Stillington has an estimated 73° arc of view of development with a field of view spread of 150°, some of the development will be in close proximity to the village. Receptors in the extreme south of Sedgfield have an estimated 71° arc of	Scenario B Stillington has an estimated 67° arc of view of development with a field of view spread of 150°, some of which is in close proximity. Receptors in the extreme south of Sedgfield have an estimated 63° arc of view of development with a field of view spread of	Scenario C Receptors in the extreme south of Sedgfield have an estimated 63° arc of view of development with a field of view spread of 168°. Stillington has an estimated 62° arc of view of development with a field of view	Scenario D Great Stainton has 53° arc of view occupied by turbine development with a field of view spread of 108°. Development lies in close proximity to the west of this village. Possibly acceptable - depending on visibility from settlement

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view (degrees) in which stated impacts are to be avoided	Scenario Effects			
			significant or major visual impacts.		view of development with a field of view spread of 168°. Great Stainton has development on three sides with an estimated 69° arc of view occupied by turbines with a field of view spread of 205°, development lies in close proximity to the west of the village. Possibly unacceptable – because of effects on Great Stainton	152°. Great Stainton has development on two sides with an estimated 58° arc of view with a field of view spread of 205°, development lies in close proximity to the west of the village. Possibly unacceptable – because of effects on Great Stainton	spread of 77°, some of the development is in close proximity. Development lies in reasonably close proximity to Great Stainton but only occupies a small part of the field of view. Possibly acceptable - depending on visibility from settlement	
To prevent experience in a residential dwelling of being in a wind farm landscape	High	Avoid most substantial adverse effects (unless directly linked to the development or significantly compensated by agreement	Views from individual dwellings should not have more than 180° of their field of view (360°) occupied by wind turbines. Turbines in	180	The heavily settled nature of the study area means that many individual dwelling may have a proportion of their field of view occupied by wind turbines. In some cases this proportion may be nearing or over the threshold but buildings, stands of trees and other intervening vegetation are likely to restrict screen views of turbines.			
					Scenario A The spread of development in this scenario mean that dwellings located within the proposed group of clusters will only be approx. max 3 km from turbine development.	Scenario B The spread of development in this scenario mean that dwellings located within the proposed group of clusters will only be approx. max 3 km from turbine development.	Scenario C The spread of development in this scenario mean that dwellings located within the proposed group of clusters will only be approx. max 3 km from turbine development.	Scenario D Several properties located in close proximity between the clusters in Zone 14 and 23, although the field of view of turbines in close proximity does not exceed 180°.

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view (degrees) in which stated impacts are to be avoided	Scenario Effects			
			close proximity on both sides of dwellings to be avoided.		Several properties located in close proximity between the clusters in Zone 14 and 23. Several properties located in close proximity to the cluster in Zone 20 have in excess of 100° of their field of view occupied by wind turbines. Likely to be unacceptable	Several properties located in close proximity to the cluster in Zone 20 have in excess of 100° of their field of view occupied by wind turbines Possibly acceptable - depending on actual degree of visibility from dwelling	Several properties located in close proximity to the cluster in Zone 20 have in excess of 100° of their field of view occupied by wind turbines Possibly acceptable - depending on actual degree of visibility from dwelling	Likely to be unacceptable - depending on visibility from settlement
To have no significant detrimental effect upon the experience of visiting key visitor facilities within or in close proximity to the study area.	Moderate-high	Moderate adverse or greater	Turbines to be more than 7 – 10km from the most sensitive receptors e.g. World Heritage Site, and 5km minimum from other sensitive receptors	360	Turbine clusters within all scenarios are over at least 18km from Durham Castle and Cathedral World Heritage Site.			
					Scenario A The visitor centre at Wynyard Woodland Park is approx. 3.5km from the nearest turbine cluster; visibility is likely to be reduced due to intervening vegetation. Likely to be acceptable	Scenario B The visitor centre at Wynyard Woodland Park is approx. 3.5km from the nearest turbine cluster; visibility is likely to be reduced due to intervening vegetation. Likely to be acceptable	Scenario C The visitor centre at Wynyard Woodland Park is approx. 3.5km from the nearest turbine cluster; visibility is likely to be reduced due to intervening vegetation. Likely to be acceptable	Scenario D The visitor centre at Wynyard Woodland Park is approx. 8km from the nearest turbine cluster. Acceptable

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view (degrees) in which stated impacts are to be avoided	Scenario Effects			
To prevent the impression to users of the main 'A' roads through the study area that they are in a wind farm landscape i.e. to allow only limited landscape change	Moderate	Substantial adverse	No more than a medium-sized wind farm equivalent of turbines to be seen with substantial adverse effect from A-roads in a single view. At least 5 minutes travel must occur between sequential views of separate wind farms	360	Frequent open views from the A1 to the east are readily available. Views of turbines from all roads may be broken by local landform and vegetation.			
					<p>Scenario A</p> <p>The A1 passes close to the two western clusters (1km and 2.5km). The proposed clusters and the Walkway/Butterwick cluster can potentially be viewed in quick succession and turbines may be seen for around 11 minutes at 60mph from the A1.</p> <p>The A698 and A177 pass in close proximity between the northern most turbine cluster and the Walkway/Butterwick cluster]. Turbines may be visible for around 5 minutes at 60mph along the A689, and for around 5 minutes at 50mph along the A177.</p> <p>Possibly</p>	<p>Scenario B</p> <p>The A1 passes within 2.5km of the western cluster. The proposed clusters and the Walkway/Butterwick cluster can potentially be viewed in quick succession and turbines may be seen for around 11 minutes at 60mph from the A1.</p> <p>The A698 and A177 pass in close proximity between the northern most turbine cluster and the Walkway/Butterwick cluster]. Turbines may be visible for around 5 minutes at 60mph along the A689, and for around 5 minutes at 50mph along the A177.</p> <p>Possibly unacceptable</p>	<p>Scenario C</p> <p>The A1 passes within 1km of the western cluster. The proposed clusters and the Walkway/Butterwick cluster can potentially be viewed in quick succession and some turbines may be seen for around 9 minutes at 60mph from the A1.</p> <p>The A698 and A177 pass in close proximity between the northern most turbine cluster and the Walkway/Butterwick cluster]. Turbines may be visible for around 5 minutes at 60mph along the A689, and for around 5 minutes at 50mph along the A177.</p> <p>Possibly acceptable</p>	<p>Scenario D</p> <p>The A1 passes close to both clusters (1km and 2.5km). The proposed clusters and the Walkway/Butterwick cluster can potentially be viewed in quick succession and some turbines may be seen for around 9 minutes at 60mph.</p> <p>The A698 and A177 pass in close proximity between the northern most turbine cluster and the Walkway/Butterwick cluster]. Turbines may be visible for around 5 minutes at 60mph along the A689, and for around 5 minutes at 50mph along the A177.</p> <p>Acceptable</p>

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view (degrees) in which stated impacts are to be avoided	Scenario Effects			
					unacceptable			
To avoid more than a major effect upon key long-distance viewpoints accessible by walkers outside the National Park/AONB .	High	Avoid most substantial adverse effects	Turbines to be sited at least 2km away from such defined and agreed viewpoints	90-180	No nearby key hilltop viewpoints. The Castle Eden Walkway (Sustrans Cycle Route 1) passes over 2km from nearest turbine cluster in all scenarios. Visibility is likely to be reduced due to screening by intervening vegetation.			
					Scenario A Acceptable	Scenario B Acceptable	Scenario C Acceptable	Scenario D Acceptable
LANDSCAPE								
To entirely maintain the setting of Historic Parks and Gardens	High	Moderate adverse or greater	No turbines to be visibly prominent from the publicly accessible parts of the properties (i.e. no turbines visible within 7km)	360	The exact layout of turbines within any development should take the setting of any Historic Parks and Gardens into consideration. All of the Registered Historic Parks within 7km of the scenarios are relatively heavily wooded and turbines are unlikely to be prominent due screening by trees and other vegetation. Degree of acceptability also depends on the extent of public access to land within Historic Parks and Gardens.			
					Scenario A Registered Parks and Gardens possibly affected within 7km are: Hardwick Park approx 3km from the cluster in Zone 20; Wynyard Park approx 3km from the cluster in Zone 20; and, Windlestone Hall	Scenario B Registered Parks and Gardens possibly affected within 7km are: Hardwick Park approx 3km from the cluster in Zone 20; and, Wynyard Park approx 3km from the cluster in Zone 20. Possibly acceptable	Scenario C Registered Parks and Gardens possibly affected within 7km are: Hardwick Park approx 3km from the cluster in Zone 20; Wynyard Park approx 3km from the cluster in Zone 20; and, Windlestone Hall approx. 6km from the	Scenario D Registered Parks and Gardens possibly affected within 7km are: Hardwick Park approx 5km from the cluster in Zone 14; and, Windlestone Hall approx. 6km from the cluster in Zone 14. Likely to be acceptable

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view (degrees) in which stated impacts are to be avoided	Scenario Effects			
					approx. 6km from the cluster in Zone14. Possibly acceptable		cluster in Zone14. Possibly acceptable	
To broadly protect the setting of nationally designated cultural heritage features	Moderate/ high	Avoid most substantial adverse effects	No turbines to directly affect the setting of such structures where setting is a key consideration in their designation, (i.e. no turbines within 2km)	270-360	The exact layout of turbines within any development should take the setting of sensitive listed buildings into consideration. Stands of trees and other intervening vegetation may screen views of turbines to and from listed structures.			
					Scenario A Both western clusters lie within 2km of several Grade II listed buildings. Possibly acceptable - depending on actual degree of visibility from structure and whether setting is a key consideration in the designation of the structure	Scenario B The southern most cluster lies within 2km of several Grade II listed buildings. Possibly acceptable - depending on actual degree of visibility from structure and whether setting is a key consideration in the designation of the structure	Scenario C The western cluster lies within 2km of several Grade II listed buildings. Possibly acceptable - depending on actual degree of visibility from structure and whether setting is a key consideration in the designation of the structure	Scenario D Both clusters lie within 2km of several Grade II listed buildings. Possibly acceptable - depending on actual degree of visibility from structure and whether setting is a key consideration in the designation of the structure
To avoid a severe effect upon sensitive local landscape character over a wide area.	Moderate	Avoid most substantial adverse effects	Turbines avoid direct effects on high sensitivity landscapes. No groups of turbines to		No turbines are located within a high sensitivity landscape.			
					Scenario A The extent of the clusters in this scenario when considered with the existing and consented turbine development within the	Scenario B The extent of the clusters in this scenario when considered with the existing and consented turbine development within the study area is	Scenario C The extent of the clusters in this scenario when considered with the existing and consented turbine development within the	Scenario D The extent of the clusters in this scenario when considered with the existing and consented turbine development within the study area is beginning

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view (degrees) in which stated impacts are to be avoided	Scenario Effects			
			overwhelm the grain of the landscape in terms of landform and cover.		study area is beginning to dominate and overwhelm the scale of the landscape. Likely to be unacceptable	beginning to dominate and overwhelm the scale of the landscape. Likely to be unacceptable	study area is beginning to dominate and overwhelm the scale of the landscape. Likely to be unacceptable	to overwhelm the scale of the landscape although to a lesser extent than with Scenarios A and B. Marginally acceptable
To avoid over-dominant effects on the skyline			Turbines to cover less than a third of the field of view of the skyline [say 45 degrees] from sensitive landscape viewpoint.		Buildings, stands of trees and other intervening vegetation are likely to restrict views of turbines from sensitive landscape viewpoints within the study area.			
					Scenario A Possibly acceptable	Scenario B Possibly acceptable	Scenario C Possibly acceptable	Scenario D Possibly acceptable
To avoid distortion of the sense of scale over a wide area			Avoid locations where there is a juxtaposition between wind farms and well defined landform/ch		Large-scale turbines distort the scale of the landscape making the landcover e.g. trees and dwellings seem relatively small in comparison . The clusters in all scenarios avoid well defined landform/changes in level. There is the potential for conflict between the scale of turbines in existing/ consented clusters and any future development.			
					Scenario A Although the change in level is not significant there is the potential,	Scenario B The distortion of scale caused by large scale turbines in the landscape	Scenario C The distortion of scale caused by large scale turbines in the	Scenario D Although the change in level is not significant there is the potential, depending

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view (degrees) in which stated impacts are to be avoided	Scenario Effects			
			anges in level e.g. hill and valley sides		depending on actual turbine location, for turbines to dominate the carrs to the north of the cluster in Zone 14. The distortion of scale caused by large scale turbines in the landscape occurs over a wide area in this scenario. Possibly un- acceptable	occurs over a wide area in this scenario. Possibly acceptable	landscape occurs over a wide area in this scenario. Possibly acceptable	on actual turbine location, for turbines to dominate the carrs to the north of the cluster in Zone 14. Possibly acceptable

Table C1 continued: Scenarios E – G

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view in degrees in which stated impacts are to be avoided	Scenario Effects		
					Scenario E	Scenario F	Scenario G
VISUAL							
To prevent experience in a settlement of being in a wind farm landscape	High	Avoid most substantial adverse effects (unless directly linked to the development.)	Views from settlements of more than 10 dwellings should not have more than 90° of their field of view (360°) occupied by wind turbines. Wind farms on both sides to be avoided where they would cause significant or major visual impacts.	180-270	<p>None of the settlements used in the analysis of the potential visual effects of scenarios on viewpoints would have a view of turbines that exceeded 90° of their field of view.</p> <p>Where views were possible turbines would be viewed at a distance of over 2km in most cases, providing a degree of visual separation. Views of the full extent of all clusters from the above settlements are unlikely due to landform and vegetation.</p>		
					<p>Scenario E</p> <p>Stillington has an estimated 56° arc of view of development with a field of view spread of 55°, some of which lies in close proximity. Receptors in the extreme south of Sedgefield have an estimated 55° arc of view of development with a field of view spread of 112°.</p> <p>Possibly acceptable - depending on actual visibility from settlement</p>	<p>Scenario F</p> <p>Receptors in the extreme south of Sedgefield have an estimated 30° arc of view of development with a field of view spread of 168°.</p> <p>Possibly acceptable - depending on actual visibility from settlement</p>	<p>Scenario G</p> <p>Great Stainton has development lying in close proximity to the west and at a distance of over 9.5km to the north east. There is an estimated 42° arc of view with a field of view spread of 205°.</p> <p>Receptors in the extreme south of Sedgefield have an estimated 30° arc of view of development with a field of view spread of 150°.</p> <p>Possibly acceptable - depending on actual visibility from settlement</p>

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view in degrees in which stated impacts are to be avoided	Scenario Effects		
To prevent experience in a residential dwelling of being in a wind farm landscape	High	Avoid most substantial adverse effects (unless directly linked to the development or significantly compensated by agreement	Views from individual dwellings should not have more than 180° of their field of view (360°) occupied by wind turbines. Turbines in close proximity on both sides of dwellings to be avoided.	180	The heavily settled nature of the study area means that many individual dwelling may have a proportion of their field of view occupied by wind turbines. In some cases this proportion may be nearing or over the threshold but buildings, stands of trees and other intervening vegetation are likely to restrict screen views of turbines.		
					<p>Scenario E</p> <p>Several proprieties located in close proximity to the cluster in Zone 20 have in excess of 100° of their field of view occupied by wind turbines</p> <p>Likely to be acceptable - depending on actual degree of visibility from dwellings</p>	<p>Scenario F</p> <p>No dwellings have turbine development in close proximity on two sides.</p> <p>Acceptable</p>	<p>Scenario G</p> <p>No dwellings have turbine development in close proximity on two sides.</p> <p>Acceptable</p>
To have no significant detrimental effect upon the experience of visiting key visitor facilities within or in close proximity to the study	Moderate-high	Moderate adverse or greater	Turbines to be more than 7 – 10km from the most sensitive receptors e.g. World Heritage Site, and	360	Turbine clusters within all scenarios are over at least 18km from Durham Castle and Cathedral World Heritage Site.		
					<p>Scenario E</p> <p>The visitor centre at Wynyard Woodland Park is approx. 3.5km from the nearest turbine cluster; visibility is likely to be reduced due to intervening vegetation.</p> <p>Likely to be acceptable</p>	<p>Scenario F</p> <p>The visitor centre at Wynyard Woodland Park is approx. 8km from the nearest turbine cluster.</p> <p>Acceptable</p>	<p>Scenario G</p> <p>The visitor centre at Wynyard Woodland Park is approx. 8.5km from the nearest turbine cluster.</p> <p>Acceptable</p>

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view in degrees in which stated impacts are to be avoided	Scenario Effects		
area.			5km minimum from other sensitive receptors				
To prevent the impression to users of the main 'A' roads through the study area that they are in a wind farm landscape i.e. to allow only limited landscape change	Moderate	Substantial adverse	No more than a medium-sized wind farm equivalent of turbines to be seen with substantial adverse effect from A-roads in a single view. At least 5 minutes travel must occur between sequential views of separate	360	Frequent open views from the A1 to the east are readily available. Views of turbines from all roads may be broken by local landform and vegetation.		
					<p>Scenario E</p> <p>The A698 and A177 pass in close proximity between the proposed turbine cluster and the Walkway/Butterwick cluster]. Turbines may be visible for around 5 minutes at 60mph along the A689, and for around 5 minutes at 50mph along the A177.</p> <p>Acceptable</p>	<p>Scenario F</p> <p>The A1 passes within 1km of the proposed cluster. The proposed cluster and the Walkway/Butterwick cluster can potentially be viewed in quick succession and some turbines may be seen for around 9 minutes at 60mph from the A1.</p> <p>Possibly acceptable</p>	<p>Scenario G</p> <p>The A1 passes within 2.5km of the western cluster. The proposed clusters and the Walkway/Butterwick cluster can potentially be viewed in quick succession and turbines may be seen for around 11 minutes at 60mph from the A1.</p> <p>Possibly acceptable</p>

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view in degrees in which stated impacts are to be avoided	Scenario Effects		
			wind farms				
To avoid more than a major effect upon key long-distance viewpoints accessible by walkers outside the National Park/AONB .	High	Avoid most substantial adverse effects	Turbines to be sited at least 2km away from such defined and agreed viewpoints	90-180	No nearby key hilltop viewpoints. The Castle Eden Walkway (Sustrans Cycle Route 1) passes over 2km from nearest turbine cluster in all scenarios. Visibility is likely to be reduced due to screening by intervening vegetation.		
					Scenario E Acceptable	Scenario F Acceptable	Scenario G Acceptable
LANDSCAPE							
To entirely maintain the setting of Historic Parks and Gardens	High	Moderate adverse or greater	No turbines to be visibly prominent from the publicly accessible parts of the properties (i.e. no turbines visible within 7km)	360	The exact layout of turbines within any development should take the setting of any Historic Parks and Gardens into consideration. All of the Registered Historic Parks within 7km of the scenarios are relatively heavily wooded and turbines are unlikely to be prominent due screening by trees and other vegetation. Degree of acceptability also depends on the extent of public access to land within Historic Parks and Gardens.		
					Scenario E Registered Parks and Gardens possibly affected within 7km are: Hardwick Park approx 3km from the cluster in Zone 20; and, Wynyard Park approx 3km from the cluster in Zone 20. Possibly acceptable	Scenario F Registered Parks and Gardens possibly affected within 7km are: Hardwick Park approx 5km from the cluster in Zone 14; and, Windlestone Hall approx. 6km from the cluster in Zone14. Likely to be acceptable	Scenario G The scenario is not within 7km of any Registered Parks and Gardens. Acceptable

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view in degrees in which stated impacts are to be avoided	Scenario Effects		
To broadly protect the setting of nationally designated cultural heritage features	Moderate/ high	Avoid most substantial adverse effects	No turbines to directly affect the setting of such structures where setting is a key consideration in their designation, (i.e. no turbines within 2km)	270-360	The exact layout of turbines within any development should take the setting of sensitive listed buildings into consideration. Stands of trees and other intervening vegetation may screen views of turbines to and from listed structures.		
					Scenario E The cluster does not appear to lie within 2km of any listed buildings. Acceptable	Scenario F The cluster lies within 2km of several Grade II listed buildings. Possibly acceptable - depending on actual degree of visibility from structure and whether setting is a key consideration in the designation of the structure	Scenario G The cluster lies within 2km of several Grade II listed buildings. Possibly acceptable - depending on actual degree of visibility from structure and whether setting is a key consideration in the designation of the structure
To avoid a severe effect upon sensitive local landscape character over a wide area.	Moderate	Avoid most substantial adverse effects	Turbines avoid direct effects on high sensitivity landscapes. No groups of turbines to overwhelm the grain of the		No turbines are located within a high sensitivity landscape.		
					Scenario E The extent of the clusters in this scenario is beginning to overwhelm the scale of the landscape at a localised level although to a lesser extent than with Scenarios A and B. Possibly acceptable	Scenario F The scenario when considered with the existing and consented turbine development within the study area is acceptable in terms of the grain of the landscape. Acceptable	Scenario G The scenario when considered with the existing and consented turbine development within the study area is acceptable in terms of the grain of the landscape. Acceptable

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view in degrees in which stated impacts are to be avoided	Scenario Effects					
			landscape in terms of landform and cover.							
To avoid over-dominant effects on the skyline			Turbines to cover less than a third of the field of view of the skyline [say 45 degrees] from sensitive landscape viewpoint.		Buildings, stands of trees and other intervening vegetation are likely to restrict views of turbines from sensitive landscape viewpoints within the study area. <table border="1" data-bbox="945 699 2042 1043"> <tr> <td data-bbox="945 699 1292 1043">Scenario E Possibly acceptable</td> <td data-bbox="1292 699 1662 1043">Scenario F Possibly acceptable</td> <td data-bbox="1662 699 2042 1043">Scenario G Possibly acceptable</td> </tr> </table>			Scenario E Possibly acceptable	Scenario F Possibly acceptable	Scenario G Possibly acceptable
Scenario E Possibly acceptable	Scenario F Possibly acceptable	Scenario G Possibly acceptable								
To avoid distortion of the sense of scale over a wide area			Avoid locations where there is a juxtaposition		Large-scale turbines distort the scale of the landscape making the landcover e.g. trees and dwellings seem relatively small in comparison . The clusters in all scenarios avoid well defined landform/changes in level. There is the potential for conflict between the scale of turbines in existing/ consented clusters and any future development.					

Landscape/ Visual Impact Objective	Sensitivity of receptor	Minimum magnitude of adverse visual effect to be avoided	Definition of Threshold	Min. field of view in degrees in which stated impacts are to be avoided	Scenario Effects		
			between wind farms and well defined landform/ch anges in level e.g. hill and valley sides		<p>Scenario E</p> <p>The distortion of scale caused by large scale turbines in the landscape occurs over a relatively limited area in this scenario</p> <p>Acceptable</p>	<p>Scenario F</p> <p>Although the change in level is not significant there is the potential, depending on actual turbine location, for turbines to dominate the carrs to the north of the cluster in Zone 14.</p> <p>Possibly acceptable</p>	<p>Scenario G</p> <p>The distortion of scale caused by large scale turbines in the landscape occurs over a relatively but very widely spaced area in this scenario</p> <p>Acceptable</p>