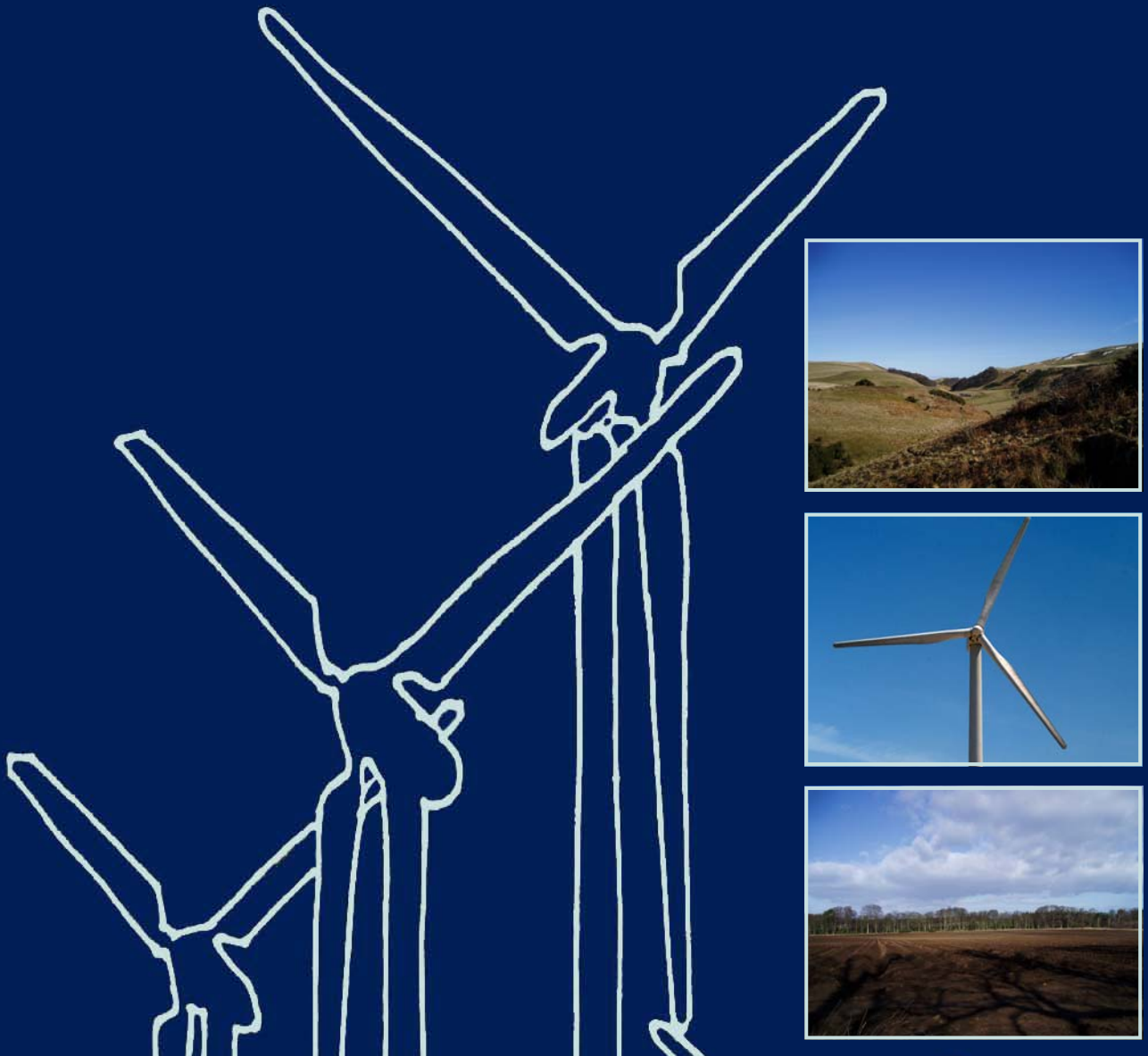
Landscape Capacity Study for Wind Turbine Development in East Lothian

A Report to East Lothian Council

FINAL REPORT



Carol Anderson
Alison Grant
Landscape Architects

May 2005

CONTENTS

1. BACKGROUND

1.1 Introduction

In response to the Kyoto Protocol, the UK made a commitment to reduce CO2 emissions by the year 2010. This commitment was further strengthened in the Energy White Paper published in February 2003, where a target of 20% reduction in emissions by 2020 and 60% by 2050 was set out. The Scottish statutory target for the proportion of electricity generated from renewable energy is 18.4%. A new aspirational target of 40% by 2020 has since been agreed by the Scottish Executive. Wind energy has been identified as the form of renewable energy most appropriate to meet these targets.

National planning policy is based on the principle that renewable energy developments should be accommodated throughout Scotland where the technology can operate efficiently and environmental impacts can be addressed satisfactorily. That policy requires that planning authorities should consider how they can provide positively for renewable energy through their development plan policies and development control decisions. Landscape capacity studies for wind energy development are one part of the strategic framework of guidance necessary to aid formulation of local planning policy and to assist in consideration of any planning applications.

1.2 The Study Brief

This study was jointly funded by East Lothian Council and Scottish Natural Heritage (SNH). The Council took the lead role in commissioning the study with advice and comment on the findings provided by SNH.

The key objective of the study is to provide strategic guidance on the capacity of the East Lothian landscape to accommodate wind turbine development together with associated infrastructure. The aims of the study are to:

- Identify areas where turbines could be located causing least visual intrusion and impact on landscape character and where such development would be unacceptable in terms of potential landscape and visual impact;
- Provide a context within which to inform local plan policy and evaluate future planning and Section 36 applications for wind energy development within a study area that includes East Lothian and an agreed 10km extension beyond its landward boundary.

In achieving these aims, the sensitivity of the landscape to windfarm development needed to be assessed and the capacity for a number of defined development scenarios determined. The brief required the whole of East Lothian to be considered in

the capacity study, but with a particular focus given to the Lammermuir Hills and the landscapes fringing them, due to the current interest in these areas from windfarm developers.

The cumulative landscape and visual effects of potential multiple wind energy developments, both in East Lothian and the adjoining local authority areas were also required to be considered in the study; this to take account of constructed and consented windfarms.

1.3 Current Guidance on Landscape Capacity Studies

Recent guidance exists for landscape character assessment (CA-SNH, 2002) and for assessing the impacts of development on the landscape and visual resource of a particular location (LI-IEMA, 2002). Scottish Natural Heritage have been involved in considering methods of assessing landscape sensitivities to wind energy development (SNH, 2000) and a number of landscape capacity studies have been undertaken in Scotland and elsewhere, further developing assessment methodologies in considering sensitivity to wind energy development. References are set out in Appendix A.

1.4 Scope of the Study

This is a strategic study that provides guidance on capacity related to landscape character areas, which includes consideration of visibility and cumulative landscape and visual sensitivities. The study does not consider other environmental constraints to windfarm development, for example nature conservation or archaeological aspects, and is intended to provide information on landscape and visual issues only, contributing to a wider examination of constraints and opportunities for wind energy development within East Lothian.

The study is not limited to assessing only areas where wind speeds are considered to be most commercially advantageous. Possible future changes in technology and the inclusion of a smaller domestic and community typology may not require the same wind speeds as the industry currently prefers for commercial scale development and therefore the whole of East Lothian has been considered.

Potential areas of search are identified in the study and these are based only on a broad assessment of landscape and visual sensitivities and do not take account of localised landscape and visual constraints, which would need to be considered on a site-by-site basis. Issues of noise, shadow flicker and other non landscape and visual issues have not been taken into account and are likely to severely constrain potential for development.

1.5 Report Layout

The methodology adopted for the capacity assessment is set out in section 2 of the report. Section 3 introduces the sensitivity assessment, describing the review of published landscape character assessments undertaken and outlining how the findings are structured in the report. Sections 4 and 5 outline the landscape and visual sensitivity and capacity assessment for ‘lowland’ and ‘upland’ landscape character areas respectively. A summary of the capacity for windfarm development within East Lothian and guidance on siting and design concludes the report in section 6.

Boundary of East Lothian

Study Area

0 2 4 6 8 10 km

1 : 250,000

Landscape Capacity Study for Wind Turbine Development in East Lothian

Study Area

Fig No: 1.1

2. METHODOLOGY

2.1 Background

Landscape capacity is described as '*the degree to which a particular landscape character type or area is able to accommodate change without significant effects on its character, or overall change of landscape character type. Capacity is likely to vary according to the type and nature of change being proposed*' (CA-SNH, 2002).

Most landscape capacity studies are based on landscape character units and identify key characteristics of each landscape area or type sensitive to any given development. The particular characteristics defined as key sensitivity criteria may change according to the nature of the development being considered, although the methodological approach adopted is generally similar between studies. Visibility and views may be considered as a separate issue or may form part of the assessment of landscape sensitivity as a criterion together with key landscape characteristics.

Recent guidance on the potential impacts and landscape sensitivities associated with wind energy development (SNH, 2000) and the practical application of methodologies used in recent landscape capacity studies undertaken for wind energy development, have informed our approach to, and methodology for, the study.

2.2 Definition of Terms

Landscape Character

Landscape relates not only to the physical attributes of the land but also to the experience of the receptor. Landscape character is made up of physical characteristics of land such as landform, woodland pattern etc (which exist whether anyone sees them or not) plus a range of perceptual and value based responses to that landscape.

Landscape Sensitivity

Sensitivity relates to landscape character and how vulnerable this is to change. In this study, change relates to wind energy development and any findings on landscape sensitivity are restricted to this. Landscapes may have different sensitivities to other forms of change or development. Landscapes which are highly sensitive are at risk of having their key characteristics fundamentally altered by development and change may result in a different landscape character. Sensitivity is assessed by considering the physical characteristics and the perceptual characteristics of landscapes.

Landscape Capacity

This relates to how far a landscape can absorb or accommodate development without a fundamental change in character. Landscape character and sensitivity are part of this, but capacity can also include visibility assessment and any values (in the form of designations) relating to that landscape and whether change was acceptable. Therefore a landscape which has high sensitivity in terms of potential effects on its character would not necessarily have a low capacity and vice versa as there are other factors which need to evaluated.

2.3 General Approach

Our approach considered sensitivity on the basis of 12 landscape character areas but also explored the wider relationship and inter-visibility between character areas and over the whole of the study area; this being particularly pertinent to the visibility analysis and assessment of cumulative effects. Upland and lowland character areas are addressed separately in the report principally due to the specific cumulative landscape and visual effects associated with these broad landscape divisions. Further background on the reasons for the separation of upland and lowland character areas is given in paragraphs 2.7 and 2.10.

The study was undertaken in the following broad stages:

- Consultation and review of guidance and recent capacity studies to develop an assessment method and define a study area
- Identification of wind energy development scenarios to be considered in the assessment
- Review of Landscape Character Assessments (LCA's) covering East Lothian and adjoining areas
- Field work to refine character areas outlined in the LCA's, assess landscape sensitivity, identify views and other key visual issues and potential cumulative landscape and visual effects
- Computer-aided visibility analysis focussing on potential views from settlements, transport routes and areas used for recreation and informing an appraisal of sensitivity in relation to views and visibility
- Assessment of the capacity considering landscape, visibility and cumulative factors and identifying potential search areas

2.4 The Study Area

The study area includes all of the East Lothian local authority area and extends 10km beyond its boundary into the adjacent Midlothian and Scottish Borders Regions, as shown in Figure 1.1. The 10km extension was defined on the basis of the potential significant visual effects that may arise from windfarm developments (120m high turbines to blade tip) at this distance, whether located in East Lothian or adjacent authorities.

Landscape character areas that lie (partially or wholly) within East Lothian have been fully assessed for sensitivity to windfarm development in the main body of the study. The landscape and visual sensitivities of character areas which lie within the study area but outwith East Lothian are addressed separately in Appendix B.

2.5 Development Typology

The brief defined five different development scenarios ranging from single turbine developments to larger scale developments of 21 turbines or more with a turbine height of 100 metres to blade tip. In discussion with the Council and Scottish Natural Heritage it was agreed that the height of turbine considered in these development scenarios should be increased to 120m in accordance with current trends for commercial developments. It was also agreed to consider a smaller windfarm development with a reduced height of turbine more appropriate to the scale of some of the landscapes present in East Lothian. Although we appreciate that smaller turbines may currently be considered by the industry to be unfeasible in terms of manufacture and economy, we felt it would be useful to assess these in the study as future technology and funding arrangements may encourage such developments to occur[1].

The development scenarios consequently considered in the assessment were as follows:

1. Single turbine development (120m high)
2. Small scale windfarm development (2-5 nr/42m to 65m high turbines)
3. Medium scale windfarm development (6-20 nr/120m high turbines)
4. Large scale windfarm development (21 +nr/120m high turbines)
5. Extensions to existing windfarms

[1] Garrad Hassan highlighted at the Scottish Renewables Federation conference (May 2005) that the United Kingdom and Germany lead in the promotion of larger 100m + height turbines while smaller turbines are still being pursued elsewhere in the world.

The sensitivity of some landscapes may mean 'domestic' scales of development would be more appropriate than commercial[2]. While these were not considered in this study, their suitability to the landscapes of East Lothian could be assessed as a separate exercise using the methodology and general sensitivities identified in this study.

We have assumed that turbines will be a matt off-white colour. All turbine heights outlined are to blade tip.

2.6 Existing Windfarm Development within the Study Area

The existing windfarms of Crystal Rig and Dun Law are located within the study area. Although both as currently built lie largely within the Scottish Borders Region, the proposed Phase II Crystal Rig development will extend within East Lothian. For the purposes of this study both Phase I and Phase II of the Crystal Rig development were considered as being operational and formed part of the baseline landscape character for the study. While an extension to the existing Dun Law windfarm is currently being progressed by a developer, it was excluded from the baseline used for the study.

2.7 Assessment of Landscape Sensitivity

The assessment uses landscape character areas as a basis for the landscape sensitivity assessment and makes judgements of the sensitivity of each character area to wind energy development by assessing potential effects on key characteristics sensitive to such development (in its various forms). The method separates out physical landscape qualities and perceptual qualities associated with the experience of that landscape and therefore allows judgements on each criterion to be made explicit. The assessment involved the following tasks:

Landscape Character Review

A review of background information including *The Lothians Landscape Character Assessment (ASH for SNH, 1998)* and *The Borders Landscape Character Assessment (ASH for SNH 1999)* was undertaken and key characteristics of character areas within the study area were identified from these documents. An initial field visit was undertaken to verify descriptions and boundaries and some revision of character areas was made for the purposes of this study. This is explained in more detail in section 3.1.

[2] The largest 'domestic' scale turbines currently range from 15m to 19m height to blade tip while the smallest height of commercial turbines currently manufactured are 51m height to blade tip (research undertaken October 2004). It is also possible to obtain smaller 'second hand' commercial scale turbines of around 40m height to blade tip.

Assessment of Sensitivity to Wind Energy Development

The field survey was undertaken by two professional landscape architects, experienced in the assessment of both windfarm development and landscape capacity, using a checklist from key viewpoints to record sensitivity to the development typologies against the following criteria:

Physical Criteria of Landscape

- Scale
- Landform and shape
- Settlement
- Industry and infrastructure elements
- Landscape pattern and foci
- Landscape context (effect on sensitivity from other Landscape Character Areas in view)
- Landscape composition
- Experiential/Perceptual
- Sense of remoteness/naturalness

Further background on sensitivity criteria can be found in Appendix C.

In terms of assessing the potential effects of turbines on key characteristics, we generally made judgements on height first. There are a number of large vertical elements in the East Lothian landscape which aided the assessment by providing a scale reference, notably the high buildings of Cockenzie (chimneys 149m high) and Torness (70m high) Power Stations and the 400Kv power lines (47-50m high towers) linking with these and crossing the Lammermuir plateau and foothills and the Mayfield/Tranent Ridge.

Previous to, and during the course of the study, we visited a number of smaller windfarm developments sited within relatively well-populated lowland areas. These included developments at the Findhorn Foundation in Morayshire (single turbine of 32 metres high), Blyth Harbour, Northumberland (9 nr, 42.5m high turbines), the Tow Law development in county Durham (42.5 m high turbines) and the two taller turbines (98m high) at Swaffam, West Norfolk. We have also viewed the recently constructed Gigha windfarm (3 x 43m high turbines) from the Argyll mainland.

Simple computer generated wireline visualisations of the smaller development scenarios were produced from sample viewpoint locations where few vertical references were present, for example within the low lying farmland of the Agricultural Plain, to aid our judgements.

We assessed the potential effect of numbers of turbines by gauging the geographical area that would be covered and considering how the 'extent' of development would relate to scale, landform, settlement and landscape pattern.

The assessment of landscape sensitivity considers the degree and nature of change on key characteristics, gauged through a combination of analytical survey, professional assessment and judgements. A five point rating scale was used to judge sensitivity on each assessment criterion and (using a scoring system of 1-5) conclude sensitivity for each character area overall as follows:

Table 1: Definitions of Landscape Sensitivity Ratings

Low sensitivity	Key characteristics of landscape are robust and able to accommodate development without significant character change; wind energy development relates to character.
Low – medium sensitivity	Key characteristics of landscape are resilient and are able to accommodate development in some situations without significant character change. Many aspects of wind energy development relate to landscape character.
Medium sensitivity	Key characteristics of landscape are vulnerable but with some ability to accommodate development in limited situations without significant character change; wind energy development relates to some aspects of landscape character.
Medium – high sensitivity	Key characteristics of landscape are sensitive and development can only be accommodated in very limited situations without significant character change. Wind energy development relates to only a few aspects of landscape character and some significant landscape impacts are likely to occur on key characteristics.
High sensitivity	Key characteristics of landscape are fragile and are unable to accommodate development without significant character change. Wind energy development conflicts the majority of the key aspects of landscape character and widespread significant landscape impacts would arise.

2.8 Views and Visibility Analysis

Views and visibility have been assessed through a combination of field survey and computer-aided theoretical visibility analysis. The assessment involved the following tasks:

- Identification of key views from major roads/designated tourist routes, promoted footpaths and popular outdoor recreation sites and description of the nature of these views
- Identification of settlements within East Lothian and adjoining authorities with potentially open views. Main centres of population were principally selected although some smaller settlements were also included by virtue of their status as Conservation Villages (eg Oldhamstocks), potential for more extensive open views (Innerwick and Humbie) or being representative in terms of geographic spread and nature of more restricted views (eg Spott).
- Computer aided generation of potential visibility from identified settlements, key viewpoints on transport routes and within areas used for recreation within East Lothian and within 10km of the county boundary in Midlothian and Borders to accord with the study area
- Computer generation of theoretical visibility of 120 metre and 65 metre height turbines to blade tip using the defined key 'viewpoints' and based on a 1:50,000 OS Digital Terrain Model. Screening by woodlands was taken into account using National Woodlands Inventory data. An observer height of 1.8m from viewpoints was used for the study.

Theoretical visibility maps for two heights of turbine over East Lothian and the adjoining buffer zone of Midlothian/Borders/City of Edinburgh have been produced at 1:250,000 scale in the report with separate maps produced for settlements, transport routes and recreation viewpoints in order to allow clear evaluation of different sensitivities (Figures D1-3, Appendix D)

We started out with the hypothesis that the landscapes of East Lothian were likely to be highly inter-visible. The computer aided visibility analysis was used to test this and confirmed our initial thinking that the topography, the settled character of much of the area and the height of turbines would result in development being highly visible throughout much of the county. On the basis of this, we therefore concluded that the landscape context, character and setting to views would be critical factors influencing sensitivity to windfarm development rather than whether or not the development was visible or not and because of this, we made the decision to consider views and visibility as one of a number of criteria considered within an overall assessment of landscape sensitivity.

The assessment of potential effects on views and visibility was based on computer-aided visibility analysis and assessment work undertaken in the field. This assessment considers views and visibility both within landscape character areas and from the wider study area to the character area. It involved an appraisal of the following:

- How the landscape is experienced
- Key views from within each character area, including a description of their nature and composition and the wider context ie) views of focal features outwith the character area
- Potential skyline effects and the context of views in terms of considering views of the character area from the wider study area.

Appendix D provides details of the computer aided visibility analysis.

2.9 Landscape Designations

There are no National Scenic Areas within the study area. A number of Areas of Great Landscape Value (AGLVs) are defined in the East Lothian Local Plan (adopted April 20001); these principally covering the Lammermuir Hills, extensive stretches of the coast, the Garleton Hills, Berwick and Traprain Laws and some areas of particularly well wooded landscape.

There are a number of properties listed in the Inventory of Gardens and Designed Landscapes within the study area. Although not strictly a landscape designation, the Edinburgh Green Belt applies to the western part of the study area.

The study brief requested that AGLVs should not be considered as 'no go' areas and in agreement with the Council, we have therefore not considered landscape designations as a sensitivity criterion in the assessment. An overview of the relevance of AGLVs as a policy designation to windfarm development is summarised in the concluding section of the report and detailed in Appendix E. Where designed landscapes are a key component of a character area, they are defined and landscape and visual sensitivities judged on the basis of this. Issues relating to the pattern and form of settlements are considered in the assessment of landscape sensitivity and have relevance to the aims of the Green Belt designation.

2.10 Cumulative Landscape and Visual Effects

Due to the strong inter-visibility of character areas within East Lothian, a decision was made to address cumulative effects over a broader area, with specific issues being considered separately for lowland and upland landscape character areas. The upland character areas comprise the Lammermuir Plateau and cumulative issues principally

relate to effects on openness and on the skyline, both visible from within the plateau and the ridge seen from the lowland areas of East Lothian, together with perceptual effects on remoteness and naturalness. Within the lowland areas, cumulative issues principally relate to the coast and the relationship with settled and developed areas.

The method for assessment is based on the draft *SNH Guidance Note on the Cumulative Effects of Windfarms (May 2004)*, supplemented by findings from our own experience and research on this subject.

The presence of existing windfarm development was useful in allowing us to consider potential cumulative effects within the landscape and visual sensitivity assessment and the effect of existing development is therefore taken into account in the assessment as part of the baseline landscape and visual character.

The assessment takes into account the following potential cumulative landscape and visual effects:

- Multiple windfarm development on existing landscape character including consideration of spatial arrangement and scale and the potential effects on the physical and perceptual qualities of each landscape character area.
- The sense of scale, distance and existing focal points in the landscape.
- The skyline, where the prominence and proportion of development can affect the nature of views and landscape character.
- Multiple windfarm developments seen from a single fixed viewpoint and sequentially when travelling through a landscape.

Field survey was undertaken to consider cumulative landscape and visual issues within landscape character areas and the wider study area and to identify potential effects from key viewpoints and transport routes. Cumulative effects were also considered as part of the landscape sensitivity and views and visibility assessment within some character areas, as the potential effects of additional windfarm development were assessed within a context where existing windfarm or large scale industrial development was already present.

Consideration was given to the possible definition of potential development scenarios as a means of assessing cumulative effects. Site selection and the scale of development is currently largely developer led and influenced by a range of factors including economic, technical and environmental. As it would be difficult to define accurate predictions of future development scenarios, we made the decision to discount this in favour of consideration of landscape and visual issues associated with more general development scenarios, and in particular, consideration of potential cumulative development within landscape character areas identified as having some

scope for windfarm development without wholesale significant change being incurred. 'High' landscape sensitivity areas were therefore excluded from this assessment, in accordance with the definitions set out in Table 1. Potential areas of search were defined in order to gauge the possible spatial arrangement of development that could occur in the lowland character areas and to thus inform the cumulative landscape and visual assessment.

2.11 Conclusions on Capacity

An assessment of capacity for each landscape character area and guidance on siting and design concludes each of the character area assessments. Potential cumulative impacts were then considered with an overall summary of sensitivity and capacity for windfarm development within East Lothian set out in the final section of the report.

3. INTRODUCTION TO THE SENSITIVITY ASSESSMENT

3.1 Landscape Character Review

3.1.1 *Lothian and Borders Landscape Character Assessments*

A review was undertaken of *The Lothians Landscape Character Assessment* and the *Borders Landscape Character Assessment* (ASH 1998). Descriptions for landscape character areas outlined in these studies were compared with the key characteristics identified as being sensitive to wind energy development (see para 2.7) and verified during field survey.

3.1.2 *Revisions to Landscape Character Areas*

In the context of this capacity study a number of changes have been made in the classification of landscape character defined in the *Lothians Landscape Character Assessment* as follows:

- Reclassification of the coastal part of the 'North Berwick Plain' and part of the 'Dunbar Plain' to form a separate landscape character area called 'Northern Coastal Margin' in recognition of the distinct character of estate policies, larger settlements and their association with the distinct topography of the coast, and the naturalistic qualities of the coastal edge and seascape.
- The Dunbar Plain identified in the Lothians LCA is consequently reduced in area in relation to the above reclassification and renamed the 'Eastern Coastal Margin'.
- Inclusion of a small part of the 'North Esk' landscape character area (Lothians LCA) in the 'Musselburgh/Prestonpans Fringe' by virtue of its similar coastal influence and settlement pattern.
- Amalgamation of the remainder of the 'North Berwick Plain' with the adjacent 'Haddington Plain' on the basis of the similarity of scale, landform and landscape pattern; key elements pertinent in gauging sensitivity to wind energy development. We have called this amalgamated area the 'Agricultural Plain'.
- Amalgamation of the individual landscape character areas of the 'Humbie/Gifford and Whittinghame Water valleys' in recognition of the similarity of scale and enclosure, landform and consistent woodland and small scale settlement pattern present in these areas.
- Some refinement has been made to the western boundary of the 'Eastern Lammermuir Fringe', defined in the Lothians LCA, to include parts of the 'Haddington Plain' and 'Dunbar Plain' which share a similar distinctly rolling landform with this area.
- The reclassification of the upper part of the 'Fala Moor' landscape character area as 'Plateau Grassland' (defined in the adjacent Borders area) due to the distinct

change of scale that occurs at the break in hill slopes ie) beyond the ridge visible from the East Lothian side, where shelterbelts are larger and the landscape shares the extensive gently undulating landform and characteristic openness of the 'Plateau Grassland'.

- The lower part of the 'Fala Moor' landscape character area, which comprises hill scarp with a distinct pattern of shelterbelts and woodlands, is included within the 'North Lammermuir Platform' in order to be consistent with the inclusion of similar foothill landscapes in this LCA further to the east.
- The 'Lammermuir Plateau' landscape character area has been sub-divided into two distinct areas; the 'East Lammermuir Plateau' and the 'Central Lammermuir Plateau', by virtue of distinct differences in the character of landform, landcover and settlement between the two areas. Further description of these distinguishing characteristics is set out in the sensitivity assessment which follows
- The adjacent 'Dissected Plateau Moorland', identified to the south of the Lammermuir Plateau within the Scottish Borders, is considered to run contiguously with the above reclassified character areas, sharing similar landscape characteristics.

Figure 3.1 shows the landscape types and areas set out in the published landscape character assessments while Figure 3.2 shows the reclassified areas outlined above and thereafter used as the basis of the sensitivity assessment in this study.

Landscape character areas that lie (partially or wholly) within East Lothian have been fully assessed for sensitivity to windfarm development in the main body of the study. The landscape and visual sensitivities of character areas which lie within the study area but outwith East Lothian are addressed separately within Appendix B.

3.2 Landscape and Visual Sensitivity Assessment

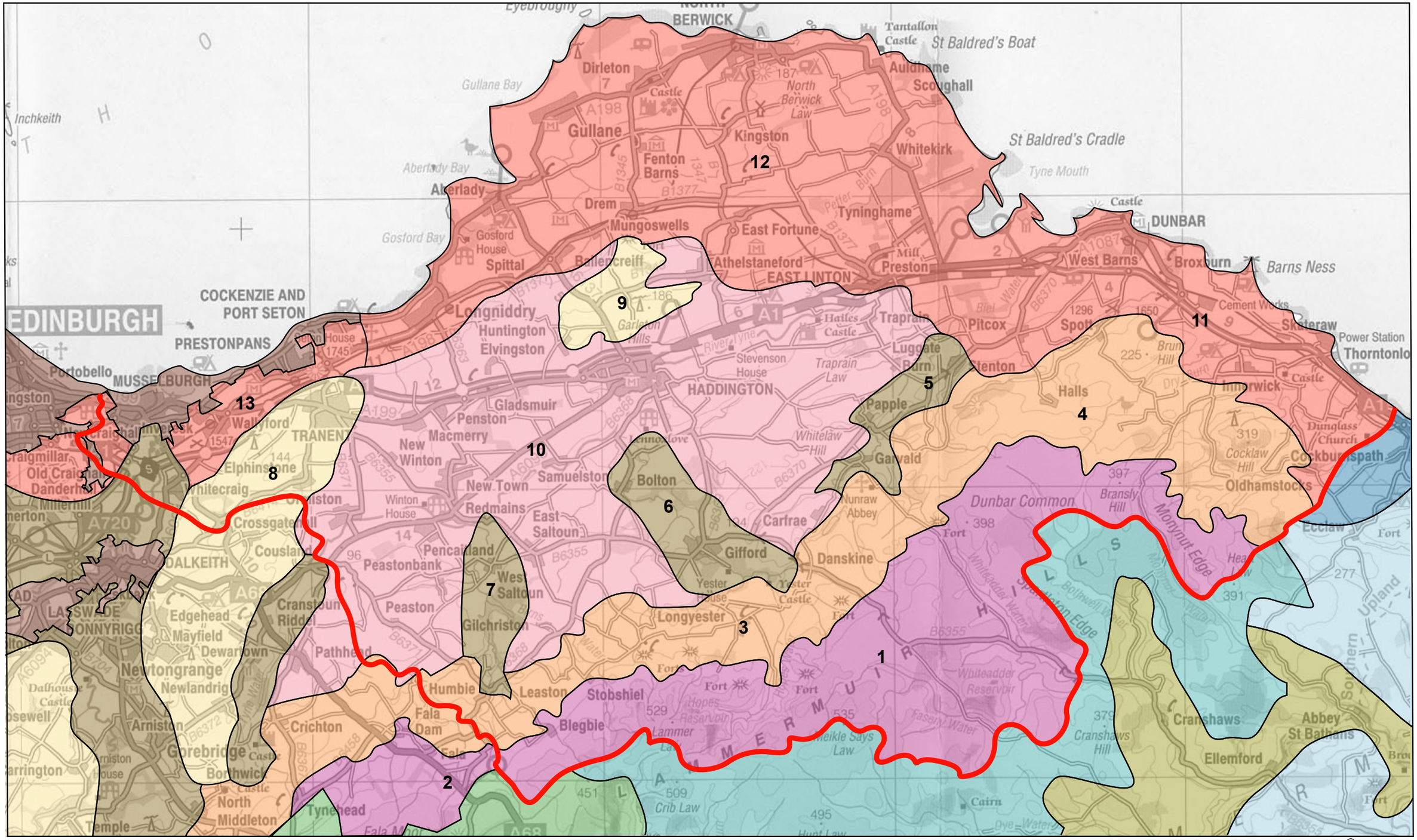
The following sections 4 and 5 assess the landscape and visual sensitivity of each landscape character area and are grouped into broader lowland and upland areas respectively. The assessment outlined in these sections should be read with reference to Figure 3.2 showing the location of landscape character areas within the study area.

Within each section, a brief introduction to each character area is given and illustrated by photographs showing key landscape characteristics. The assessment of landscape and visual issues relating to each character is organised to give a brief description of key characteristics against which sensitivity to windfarm development is assessed with an associated sensitivity rating applied. The development scenarios considered in the assessment are:

1. Single turbine development (120m high)
2. Small scale windfarm development (2-5 nr/42m to 65m high turbines)
3. Medium scale windfarm development (6-20 nr/120m high turbines)
4. Large scale windfarm development (21 +nr/120m high turbines)
5. Extensions to existing windfarms

For brevity, development scenarios are referenced by the number (1-5) set against each typology in the assessment. It should be stressed that while the development typologies above are described as being small/medium/large, these terms are used in relation to the height and number of respective turbines in the context of current commercial windfarm proposals in Scotland. Even developments termed as 'small' would comprise substantial features in the context of the landscapes of East Lothian.

Each character area is given an overall landscape and visual sensitivity rating, this calculated by scoring and adding individual ratings applied to sensitivity criteria. A statement on capacity for windfarm development within each character area is then outlined and guidance is given on location and design for windfarm development within character areas where there is considered to be some capacity. Cumulative landscape and visual issues are considered as a whole for the broad lowland and upland areas at the end of each section.



Reproduced from the Ordnance Survey mapping with the permission of The Controller of Her Majesty's Stationary Office ©Crown copyright.

Lothian Landscape Character Types and Areas

- Uplands
  - 1 Lammermuir Plateau
  - 2 Fala Moor
- Upland Fringes
  - 3 North Lammermuir Platform
  - 4 Eastern Lammermuirs
- Lowland River Valleys
  - 5 Whittinghame Water
  - 6 Gifford Water
  - 7 Humbie Water
- Lowland Hills and Ridges
  - 8 Mayfield / Tranent Ridge
  - 9 Garleton Hills
- Lowland Plains
  - 10 Haddington Plain
- Coastal Margins
  - 11 Dunbar Plain
  - 12 North Berwick Plain
  - 13 Musselburgh / Prestonpans Fringe
- Urban

Borders Landscape Character Types

- Coastal Farmland
- Dissected Plateau Moorland
- Plateau Grassland
- Platform Farmland
- Upland Valley with Farmland

Local Authority Boundary

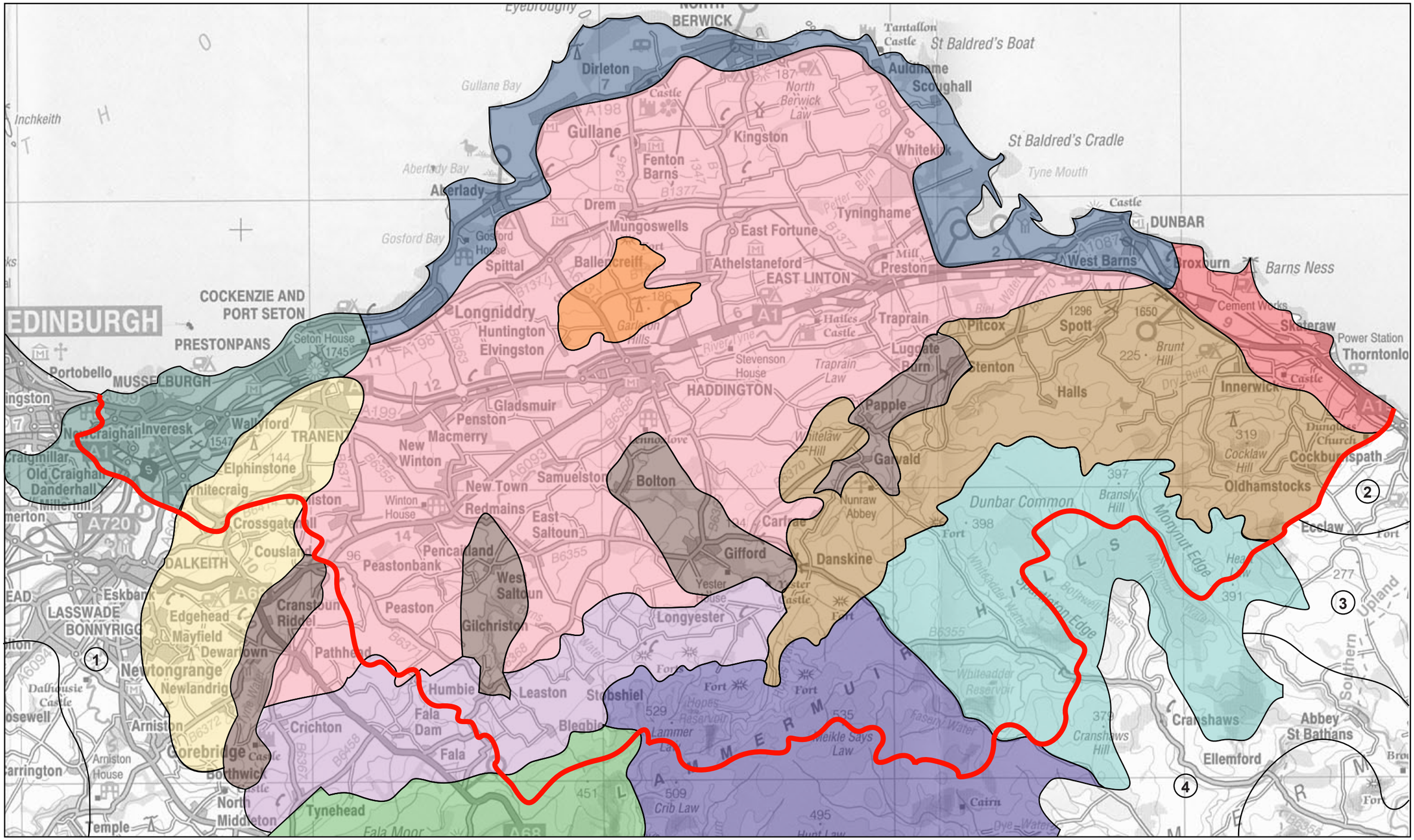
0 2 4 6 km

1 : 125,000

Landscape Capacity Study for Wind Turbine Development in East Lothian

Landscape Character Classification

Fig No: 3.1



Landscape Character Areas Assessed in Capacity Study

- Eastern Coastal Margin
- Northern Coastal Margin
- Musselburgh / Prestonpans Fringe
- Agricultural Plain
- Garleton Hills
- Mayfield / Tranent Ridge
- Humbie / Gifford / Whittinghame River Valleys
- Eastern Lammermuir Fringe
- North Lammermuir Platform
- Plateau Grassland
- Central Lammermuir Plateau
- East Lammermuir Plateau

Character Areas Addressed in Appendix B

1. North Esk
2. Coastal Farmland
3. Platform Farmland
4. Upland Valley with Farmland

0 2 4 6 km

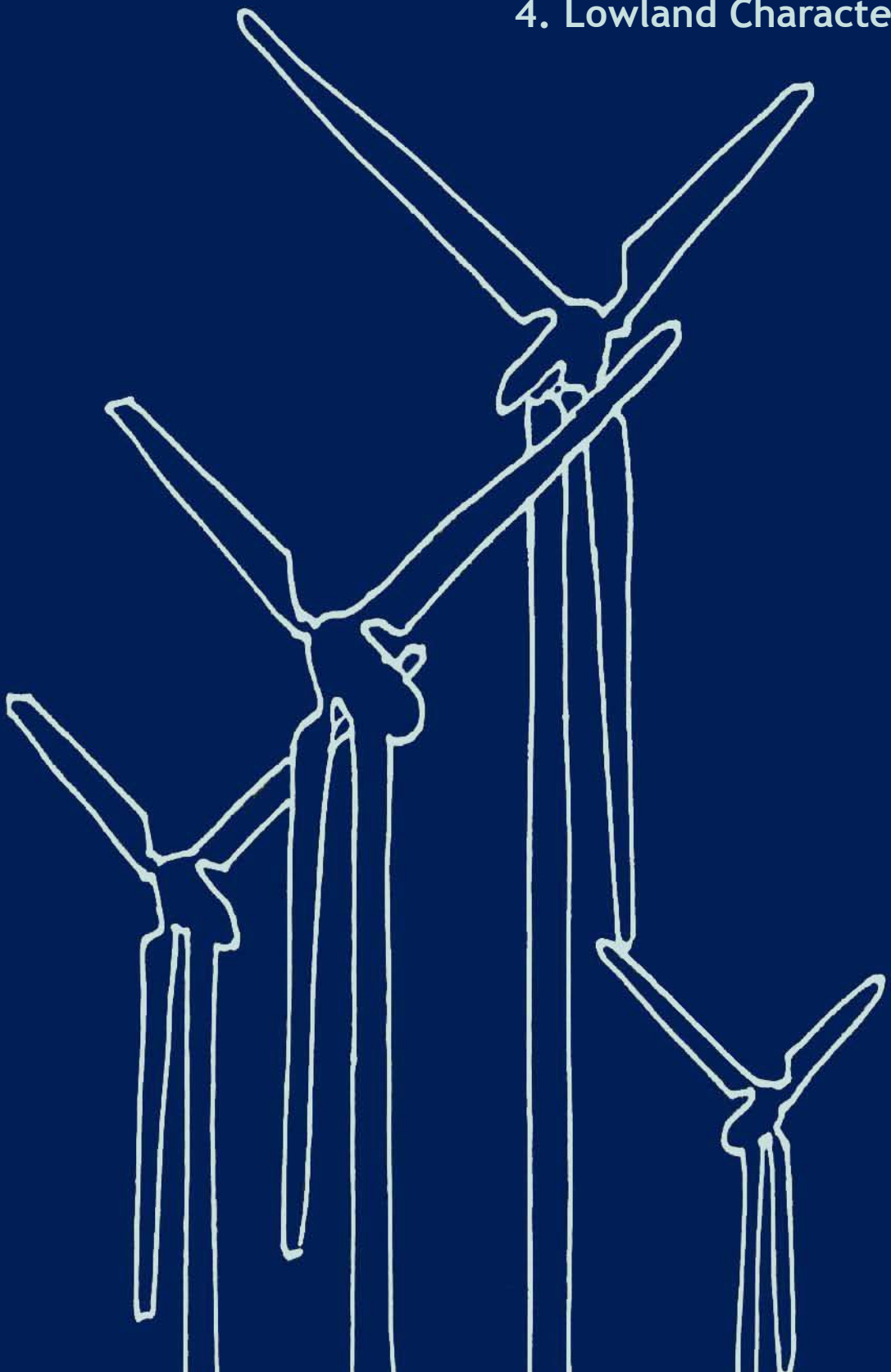
1 : 125,000

Landscape Capacity Study for Wind Turbine Development in East Lothian

Landscape Character Areas Used in Study

Fig No: 3.2

4. Lowland Character Areas



4.1 EASTERN COASTAL MARGIN

The Eastern Coastal Margin comprises a narrow fringe of land to the south-east of Dunbar, abutting the North Sea and contained by the foothills of the Lammermuir Hills to the south.

A gently undulating coastal plain, backed by Lammermuir foothills, but with open sea aspect

The coastal edge has naturalistic qualities and is often visually contained from the plain

Large-scale industrial development, quarrying and landfill are dominant features

EASTERN COASTAL MARGIN: LANDSCAPE SENSITIVITY ASSESSMENT

Scale

Although there is a strong horizontal emphasis to the landscape accentuated by the proximity to open sea, the rising ground of the Lammermuir foothills increasingly contain this narrow coastal margin and thereby limit scale to medium overall.

- Turbines could affect the degree of openness experienced against the coast. Larger height turbines, development scenarios (1, 3 + 4) would not fit with the medium scale and relative narrowness of this coastal band although the smaller height typology (2) could relate to its scale.
- The intimate scale of narrow wooded cleughs and small scale headlands and bays at the south-eastern extremity of this area towards the transition with the adjacent 'Coastal Farmlands' character type would be dominated by all development types. Medium

Landform and Shape

A rolling landform with smooth convex curves cut by steep sided valleys at the transition with the Eastern Lammermuir Fringe. Landform becomes increasingly complex south of Thorntonburn. Towards the coast the terrain opens out into a broad gently undulating plain. The coastal edge forms a series of prominent rounded headlands, extensive low rocky cliffs and horizontal rocky reefs. Embankments carrying the A1, mining and landfill sites result in a noticeably modified landform in places.

- Scope for development to relate to less indented coastal edges and gently undulating landform, although physical limitations to typology (4). Turbines could emphasise the modification of the landform if sited on or adjacent to, embankments, excavations and spoil heaps by drawing attention to them.
- All development types would detract from the distinct form of narrow cleughs and more indented coastline of small headlands and bays, particularly evident in the south-eastern extremity of this character area. Medium

Settlement

Settlement is relatively sparse comprising isolated farmsteads, some of these abandoned in the vicinity of the cement works and power station. There are a few small coastal settlements including permanent caravans at Thorntonburn.

- There is scope to locate development types (1-3) but not (4) to avoid direct comparisons of scale with domestic buildings, although scenario (2) would be more appropriate closer to centres of population. Low-med

Industrial and Infrastructure elements

Major transport routes and a number of prominent industrial developments disrupt the open farmland of the plain. The huge built structures of the cement works at Oxwell Mains and Torness Power station (70m high) dominate and landfill and quarrying sites are also present. All these features appear incongruously sited in the context of this predominantly agricultural landscape.

- While windfarm development would not be the only large scale structures within this landscape and could be associated with existing industry, thus concentrating development within defined areas, turbines may have a discordant visual relationship with the overly complex form of the cement works (but less so with the simpler form of Torness) and accentuate the clutter of large scale built features in this landscape. Development typology (4) could increase the 'spread' of industry if located between Torness/cement works although other typologies (2-3) could be better accommodated by either forming distinct developments or be associated with existing industry. A single turbine may appear trivial in the context of existing industry. Medium

Landscape Pattern and Foci

The regular pattern of medium to large-scale arable fields enclosed by low hedges is disrupted by a fragmented arrangement of disturbed land at quarrying/landfill sites. Woodland is generally restricted to shelterbelts associated with farmsteads and riparian woodlands within narrow incised valleys. Key foci within the area are the Torness Power Station and the cement works. The coastal edge, Barns Ness lighthouse, Bass Rock, and the distant Isle of May form secondary foci.

- While larger (120m) turbines would match, and in the case of Torness, exceed the height of industrial built elements, the movement of blades could increase complexity with visually competing elements occurring in the landscape.
- Siting turbines between built industrial 'point' features could lessen integrity further and increase fragmentation of landscape pattern. Development types (1-3) could however relate to the simple pattern of large arable fields providing much of this was retained to provide a degree of separation and setting to industrial features eg Torness power station
- All development typologies could interrupt the focus of sea, islands and lighthouse if sited against some parts of the coast. Med-high

Landscape Context

The small scale rolling and distinctly rural Eastern Lammermuir Fringe abuts this character area. Broxburn wooded policies on the eastern edge of Dunbar provide some visual containment between this area and the adjoining Northern Coastal Margin.

- Although large-scale industrial development is already present in this area and

visible from adjacent landscapes, there may be some minor indirect effects on the character of the Eastern Lammermuir Fringe, particularly associated with the larger development typology (4), depending on detailed siting. Cumulative landscape effects may occur with windfarm development on the East Lammermuir Plateau (see 5.4) Med-Low

Landscape Composition

This landscape area has both complex and simple parts. The presence of the sea introduces a dynamic yet consistent element to the scene.

- Turbines could interrupt the strong horizon of the sea and beaches in some views and further reduce openness against the coast. Larger typologies (4) would increase this effect. The off-white colour of turbines could be considered to relate well to pale coastal hues and the form of turbines could relate to areas of simpler landform and absence of strong pattern. Medium

Degree of Modification/Remoteness

The coast has natural qualities although industrial development and proximity of transport corridors diminishes this perception.

- Turbines would consolidate perception of present industrial character and if sited close to coastal edge could be perceived as spreading development and further diminishing natural qualities. Larger development typologies (3+4) would increase this effect. Med-Low

Key Views from the character area

Settlement within this area is limited to a few small coastal hamlets and farmsteads. Beaches such as Pease Bay are popular with windsurfers and campsites and caravan parks are located at Barns Ness and Thorntonloch. The A1 and main east coast railway offer glimpsed views of the coastal edge and open sea although existing industrial development is a dominant visual focus. The Firth, Bass Rock, Fife and Isle of May feature in views.

- Turbines could coalesce with existing large scale built features in elevated focal views above Cockburnspath, where initial views of East Lothian are experienced when travelling north, potentially exacerbating present intrusion on views of sea, islands and distant land/horizon from major transport routes. Some limited scope exists to locate smaller typologies (1-3) to limit intrusion on views.
- Views between coast and plain limited to some degree by edge of small cliffs and rise of hinterland, although visual intrusion of large-scale industrial buildings and quarrying activity experienced in places. Medium

General visibility of the character area

This area features in view from the elevated villages of Innerwick and Spott, the high narrow roads within the adjacent Eastern Lammermuir Fringe character area and from the north edge of the East Lammermuir Plateau. The Lammermuir Plateau and rolling eastern foothills limit wide visibility of this coastal margin. Views from Dunbar are largely screened by the wooded policies of Broxburn although distant views are possible from the Agricultural Plain and the eastern part of the Northern Coastal Margin around the Tyne bay and Whitekirk area.

- Smaller development typologies (1-3) sited where fewer elevated settlements are present in the adjacent Eastern Lammermuir Fringe eg between East Barns and Broxburn or Torness Point would limit impacts on views.
- All typologies could coalesce with existing large scale built features in elevated, but relatively distant, views from the Northern Coastal Margin and Agricultural Plain character areas. Medium

Overall Landscape and Visual Sensitivity

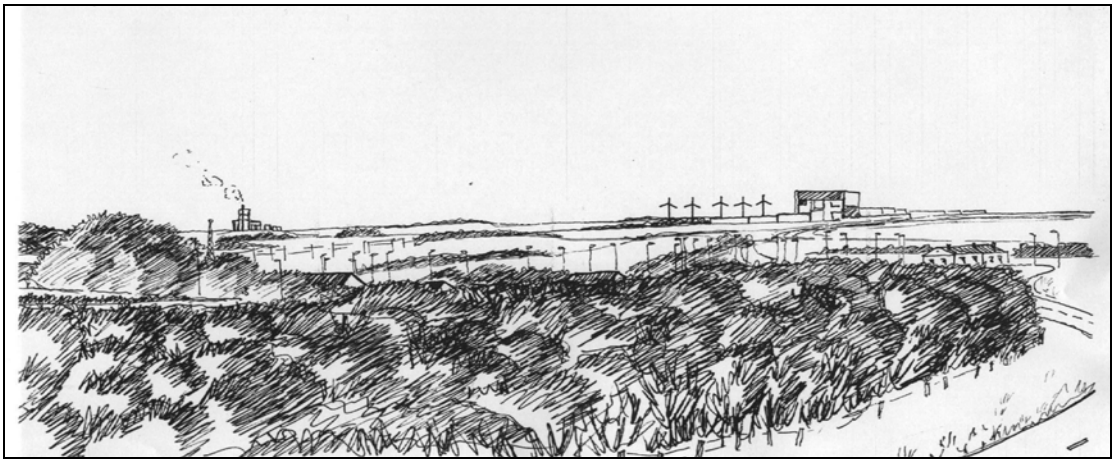
Medium Sensitivity: Development could fit with the simpler gently undulating landform of the plain and less indented coastal edge but turbines would need to be limited in number and height due to the narrowness of the character area, the pattern of existing industry and farmland and the perceptual qualities associated with the coast. Typology (2) would be most appropriate with turbines of up to 65m minimising impacts associated with visual competition with existing industrial features. A greater number of turbines (possibly up to 7) could be accommodated however, depending on precise location. Smaller development typologies (1-3) would also limit intrusion on key views to the coast, sea and islands from major transport routes and from settlements in adjoining character areas. Windfarm development would be inappropriate in the transition landscapes to the south and south-east where the irregularity and smaller scale of interlocking ridges, coastal features and cleughs and diverse pattern of vegetation and small scale settlement would be compromised by all development scenarios. Wind energy development sited close against the coast may further compromise its perceived natural qualities.

Capacity for Development and Guidance on Siting and Design

There is **Moderate** capacity for development in the Eastern Coastal Margin. There are some limited opportunities to locate smaller height turbines (development typology 2 up to 65m height turbines) on the more gently undulating coastal plain away from the coastal edge but turbines should be located to avoid 'spread' of built structures between existing industrial features. Turbines could draw attention to the artificiality of many man-made landforms if sited on, or close to them. It is therefore recommended that restoration of these areas to fit with natural landform character should be undertaken prior to consideration of any of these areas for wind energy development.

Opportunities for multiple developments are constrained in the Eastern Coastal Margin due to the relatively small size of the character area and the cumulative effects on views from the A1, where multiple development would be inter-visible with existing industrial development within this character area. A single wind turbine development site would fit better with the landscape pattern and geographic spread of existing development in terms of limiting cumulative impacts.

There would be potential problems with siting turbines close to the cement works as this may exacerbate visual clutter with too many discordant forms and a degree of geographic separation should occur if development were to be sited in the north-west of the character area. An easier visual relationship would result in association with the Torness Power Station, which although bulky has a simple visual form and relatively uncluttered landscape setting. Access tracks should be simple and grassed over post construction in order to limit interruption of the smoothly rolling landform and electricity connections buried underground to limit the clutter of elements in this character area.



Turbines should be sited to avoid coalescence of industrial features within the coastal plain

4.2 NORTHERN COASTAL MARGIN

The Northern Coastal Margin extends from the west of Seton Mains to east of Dunbar. It is characterised by its proximity to the Firth of Forth, its distinctive pattern of settlements located close to the coast and the presence of extensive estate policies.

A diverse coastline of shallow tidal bays, low rocky cliffs and long sandy beaches

Settlements are strongly related to the coastal edge and have a distinct architectural integrity

Policy woodlands are a feature against the coast and on the edge of settlements

NORTHERN COASTAL MARGIN: LANDSCAPE SENSITIVITY ASSESSMENT

Scale

Open character at inlets and bays eg at mouth of Tyne, Aberlady Bay, but strongly enclosed in many areas due to extensive policy woodlands, giving an overall medium scale. Scale experienced on coastal edge increases with open sea aspect although the hinterland is cut off by low cliffs, dunes and woodland along many stretches thus providing a sense of containment.

- All development typologies could relate to the broader open coastal bays and the Firth although would diminish the smaller scale headlands, dunes and bays.
- The lower height band of the small typology (2) could relate to the scale of the enclosure pattern where this is formed by long, medium scale shelterbelts while all other development typologies would dominate. Medium

Landform and Shape

Low cliffs and rocky outcrops form much of the coastal edge and enclose sandy bays. Low lying coastal plain and tidal bay at Tyne mouth and Aberlady and raised dune landscapes and soft ridges at Gullane contribute much to the diversity of this area. Islands such as Bass Rock are distinctive within the Firth.

- While small typology development (2) could relate to the relative simplicity of broader bays they would disrupt the continuity of the coastal edge and diminish the diversity of the coastal landform by 'filling' up open bays.
- Elsewhere all development types would conflict with the complex form of dune systems and the small scale of minor ridges and coastal hills but could relate to flatter and more gently undulating agricultural areas slightly inland. Med -High

Settlement

Distinct pattern of medium scale settlements aligning the coast, often with a strong architectural integrity and historic interest. Smaller, dispersed settlements and farms between North Berwick and Dunbar give a more rural character. Estate policies provide the immediate landscape setting to settlements such as Dirleton and Dunbar.

- While development set along coast could relate to the strong pattern of settlement in the area, if sited in between settlements it would affect the distinct spatial arrangement of settlements by appearing to 'join' settlements by an arm of built development along coast.
- All development typologies (1-4) would contrast with the scale and distinct architectural integrity of settlements.
- All typologies would affect designed landscapes and the setting to estate houses and settlements eg Dirleton and Archerfield, by filling open space between policy woodlands and affecting the appreciation of relative scale ie) the house would not appear to be the largest element in the landscape. High

Industrial and Infrastructure Elements

There are very few industrial features present in this area although some warehouses and other light industrial buildings are present on the fringes of Dunbar.

- All development typologies would introduce new large-scale industrial features into this landscape where none presently exist. High

Landscape Pattern and Foci

Policy woodlands associated with the Gosford, Archerfield, Luffness, Biel and Tyninghame estates are a strong landscape feature; these interspersed with large-scale arable fields. There is a consistent spatial sequence of bay, promontory, settlement and woodlands as recurring elements along this coastal margin. Key foci are the settlements and the diverse coastal edge.

- All development typologies would affect the pattern and proportion of open space to policy woodlands.
- The contrast of scale and form of turbines would disrupt the rhythmic pattern of elements along the coast.
- Key foci would be dominated by all development typologies. High

Landscape Context

The Firth, Bass Rock, distant Isle of May and Fife to the North form a striking backdrop to this character area. The Agricultural Plain gradually merges with this area to the south, particularly where woodlands or containing landforms are not a key feature. eg south of Dirleton and Gullane.

- Large development typologies (3+4) would affect the appreciation of the strongly horizontal emphasis of the Firth (breaking the horizon line in some views) and the focus of its islands. Smaller typologies (1+2) could be sited to avoid intrusion, dependant on viewpoint and location of development.
- Development could affect the appreciation of vertical scale of the distinct outcrop hills eg North Berwick Law present in the eastern part of the Agricultural Plain. Med-High

Landscape Composition

The repetition of policies and settlements woodlands set along a richly varied coastline gives a strong integrity to the landscape and an ordered, balanced composition. All development typologies would disrupt this integrity and balance by introducing discordant built features that would not relate to key components. High

Degree of Modification/Remoteness

The coastal edge has natural qualities particularly evident away from settlement and where tidal dynamism strong. Although this coast is well-settled and frequented, a sense of remoteness can occur in some coastal areas away from roads and

settlements and where the hinterland is less visible.

- Turbines could intrude on the sense of seclusion felt along parts of the coastline and would provide a visual reference/orientation, unwelcome in terms of the sudden revelation of small scale bays and headlands experienced when walking along these more isolated sections of the coast. Med-High

Key Views from the character area

A relatively well-settled area with views from settlements focussing on the coastal edge and sea. The A198, a designated tourist route, is elevated in parts and allows some views over the Firth, although the coastal edge is seldom visible. Extensive policy woodlands limit views in many parts of this character area. The narrow coastal edge, which accommodates a number of recreational facilities, allows open views out to sea and along the coast but restricted views of the hinterland, which is often screened by dunes and woodland. Elevated views are possible over a wide area from Bass Rock and Dirleton Castle and views over the adjoining Agricultural Plain to the distant Lammermuir Plateau are possible from the Tyne estuary area.

- The coastal edge and sea are key elements in views for greatest number of potential receptors from settlements and recreational facilities. As views tend to focus up and down the coastal edge, development would generally be more visible on headlands than set back from the coast. Larger numbers of turbines (3+ 4) would increase spread of development and intrusion on these views
- The narrow coastal edge and policy woodlands could limit views of development types (1 and 2) sited within the hinterland from some recreational facilities and settlement along the coast, although larger types (3 and 4) could not be accommodated without significant impacts on views.
- All development typologies located close to open bays would be highly visible from roads which tend to be aligned around them and could intrude on wider views.

High

General visibility of character area

This character area is highly visible in views from the adjacent Agricultural Plain and Garleton Hills with elevated views from North Berwick Law taking in much of the coast. The Lammermuir Plateau and foothill areas also provide elevated distant views where the coastal edge and Firth are a key focus. There are distant views of this area from parts of Fife, where light reflective objects are distinct in clear conditions.

- All development typologies would be visible from adjacent character areas and larger typologies (3+4) would particularly intrude on views of the Firth and focus of islands. High

Overall Landscape and Visual Sensitivity

High Sensitivity: While development could fit with the 'borrowed' scale of the expansive Firth of Forth and could relate to the less indented coastal edge of broader bays and flatter areas inland, the distinctive spatial pattern and architectural integrity of settlements and designed landscapes along the coast would be compromised by the radically different form and scale of all development typologies, as would the sequential pattern of recurring elements. The perceived naturalness and diversity of the coast would be a key limiting factor and the well-settled character of this area and its popularity for recreation also increases sensitivity to all development typologies. The Firth and its islands are a key focus of views both from within this character area and from elevated areas of East Lothian. Development would intrude on these views and larger typologies (3 +4) in particular, would increase the extent of intrusion along the coastal margin.

Capacity

There is **no capacity** to accommodate windfarm development in the Northern Coastal Margin without significant adverse impacts occurring on both landscape character and views and visibility.

4.3 MUSSELBURGH/PRESTONPANS FRINGE

A narrow, densely developed coastal fringe at the western extremity of East Lothian. This character area is tightly contained by the Mayfield/Tranent Ridge to the south and tends to be perceived as an extension of development around the wider basin of the Firth of Forth and Edinburgh.

Gently undulating coastal plain contained by rising ground but with an open sea aspect

Settlement is largely contiguous along the coast but broken by occasional policy woodlands and farmland

Cockenzie Power Station is a dominant feature on the eastern edge of this area

MUSSELBURGH/PRESTONPANS FRINGE: SENSITIVITY ASSESSMENT

Scale

Narrow coastal plain edged by the Tranent Ridge to the south and the Firth to the north. Densely built up with relatively little open land occurring between the A1 and the coastal edge although the Firth provides openness. While the Firth is expansive, the scale of the landscape is generally small-medium due to the densely built up character and narrowness of this fringe landscape.

- Larger development typologies (3+4) would not relate to the small scale of piecemeal open space present on the fringes of settlement. Smaller typologies (1+2) would be more appropriate and could fit with the openness of the Firth. Medium

Landform and Shape

A flat to gently undulating plain, curving around the Mayfield/Tranent Ridge. The form of the coastal edge is heavily modified with sea walls, roads, man-made lagoons, bunds and former tips. The A1 and railway embankments are also a feature. The shape of open ground is often irregular and fragmented, being cut by roads and other building development.

- Turbines could relate to the simple natural landform of this area and fit with less complex man-made forms and coastal edge eg. rounded lagoon edges, on top of retaining walls etc although could increase visual confusion where modified landform features are more complex. The larger development typologies (3+4) could not be physically accommodated within the available open space. Medium

Settlement

Coastal strip almost continuously settled with Prestonpans, Cockenzie and Musselburgh set in linear form tight against the coast. Wallyford and Whitecrag former mining villages differ in having a less defined relationship to the landscape. Wooded policies of Levenhall estate are important in separating and visually containing settlements. There is often a strong contrast between open space and the built edge.

- If located on the south-eastern edge of this character area or between settlements where open space exists, all development typologies would appear to extend the urban edge outwards and would affect the present landscape setting to settlements (which although varied in quality does allow a degree of separation and definition to settlements) and strong relationship to the coastal edge. Sensitivity would be reduced if lower height band (42m) turbines of typology (2) were located on the coast where open space is less integral to the setting of the settlement, provided there are few immediate conflicts of scale with domestic buildings. Single (1) and larger typologies (3+4) would dominate. Med-High

Industrial and infrastructure elements

Bounded and criss-crossed by dominant network of transport routes. Large-scale industrial buildings are present on the eastern edge and include Cockenzie power station (chimneys 149m high and discordant in scale and form with surrounding domestic scale buildings) and a number of converging power lines (47-50m high towers). Warehousing, former coal workings also combine to create an industrialised character on the fringes of settlements.

- While larger turbines could fit with the scale of the power station they would increase the dominance and clutter of built elements and discordant juxtaposition with settlement, already characteristic of the eastern part of this area. The lower height band (42m) turbines of typology (2) would fit more readily with warehousing on the edge of settlements. Medium

Landscape Pattern and Foci

Often fragmented pattern of arable land on fringes of settlement and dissected by transport routes. Some limited woodland associated with estates and aligning the River Esk. Cockenzie Power station and clutter of power lines are key foci in this landscape.

- Turbines would increase the fragmentation of agricultural land between the A1 and settlement but could be sited close to the coast where a strong pattern of development occurs. They would not form overall dominant foci in the context of the scale and complexity of Cockenzie Power Station. Medium

Landscape Context

This area is backed by the Mayfield/Tranent Ridge and merges with the urban area of south-east Edinburgh. The Firth of Forth and distant Fife coast are key features.

- Development may conflict with the focus of the Firth in some views, with larger numbers of turbines (typologies 3+4) interrupting the simple composition of sea, sky and the focus of Fife and the distant horizon. They would however fit with the developed character of the coastal edge seen around the bay within Edinburgh and would have little indirect effect on the character of the Mayfield/Tranent Ridge. Med-Low

Landscape Composition

Discordant and overly complex landscape composition to the east due to the diversity of built form and infrastructure, although to the west, there is a strong relationship between the coast and settlement which gives a degree of unity.

- All development typologies would add to the complexity characteristic of parts of this area although the small typology (2) could fit within less complex areas particularly if related to a distinct landform feature and thus appearing more 'rooted' than other industrial features in this landscape. Medium

Degree of Modification/Remoteness

This is a highly modified landscape in terms of built infrastructure, industry and settlement and is easily accessible. All development typologies would accentuate this character. Low

Key views from the area

This character area forms a transition between the urban area of Edinburgh and the predominantly rural East Lothian. Coastal settlements tend to focus on sea views while views from the major transport route of the A1 within this area take in Edinburgh, with Arthur's Seat a key focus, and the wider landscape setting of the Firth of Forth and Fife. Sea views from the coastal B1348 road are largely screened by buildings.

- All development typologies could intrude on open sea views from some sections of the A1 and from coastal settlements and on the focus of Arthur's Seat present in many views. There may however be some limited opportunities to locate small height and number of turbines (typology 2) away from key views. The presence of a number of tall built structures within Edinburgh (which often provides the backdrop to long views) reduces visual sensitivity. Med-high

General visibility of the character area

The Mayfield/Tranent Ridge limits visibility of this area from the south and east. Views of this character area are possible from densely populated areas along the east coast of Edinburgh and, although more distant, also from the south coast of Fife.

- Tall chimneys (Cockenzie Power Station) and powerlines break the skyline in many of these views and although turbines would add to this, the urban context to the foreground of views and distance would reduce sensitivity. Medium

Overall Landscape and Visual Sensitivity

Medium Sensitivity: The narrowness of this coastal fringe and its general lack of openness limits the scale of development that can be accommodated. Open space is limited but is important in providing a contrast with, and landscape setting to, settlement. Development in the open spaces between the A1 and settlements would have the effect of extending built development outwards, increasing the present fragmentation of edges and affecting the strong coastal settlement pattern and may also affect views of Edinburgh and the Firth of Forth from the well-used A1. Windfarm development associated with Cockenzie Power Station would increase complexity and the clutter of elements characteristic in some areas, although the presence of these large-scale industrial structures and other infrastructure and buildings also reduces visual sensitivity in terms of views to and from the area.

Capacity for Development and Guidance on Siting and Design

There is **Moderate** capacity for development in the Musselburgh/Prestonpans Fringe. There is some very limited scope to associate wind energy development with the simpler man-made coastal edge where a degree of separation exists with settlement. The scale of turbines would, however, need to fit with adjacent domestic scale settlement so the lower height band (42m) turbines of development typology (2), would be the only scenario appropriate in terms of limiting effects on landscape character and views. Development would need to be sited to avoid intrusion on key views of the Firth from the A1 and from settlements. Proximity to Cockenzie Power station and power lines should also be avoided so as not to accentuate the present visual discord of disparate elements and direct contrasts of scale with domestic settlements.

4.4 AGRICULTURAL PLAIN

The Agricultural Plain extends over much of the lowlands of East Lothian comprising the heartland of the county. The plain has a simpler landscape composition to the coastal edge with fewer components and generally less complexity of form, pattern and settlement.

The gently undulating farmed plain forms a series of broad shallow valleys and ridges with large arable fields and generally sparse woodland

The plain is more open and low-lying to the west and isolated industrial development is an occasional feature

Isolated outcrop hills and ridges increase containment to the west

AGRICULTURAL PLAIN: SENSITIVITY ASSESSMENT

Scale

Large to medium scale and generally open farmland with woodlands and landform reducing scale in the east. A more open character is evident in the west around Macmerry and the Drem/Fenton Barns area, where a gently undulating landform and weaker enclosure pattern prevails.

- While all development typologies (1-4) could relate to the broader scaled and more open areas in the west, single and larger typologies (1, 3+4) would affect the smaller scale containment offered by outcrop hills and ridges and woodland and perception of the vertical scale of the distinctive 'Laws' which predominantly occur to the east. Low-Med

Landform

An extensive plain, undulating gently in a series of low gentle east/ west aligned ridges and broad shallow valleys, and with a strong horizontal emphasis particularly in the west. A number of craggy outcrops interrupt the plain, the most notable of these being the distinctly conical forms of North Berwick Law and Traprain Law; their ruggedness belying their relatively lowly height. Landform is increasingly rolling to the east at the transition with the foothills of the Eastern Lammermuir Fringe and this increases sensitivity to development.

- Turbines would affect the appreciation of the landform of distinctive outcrop features but could relate to broader ridges or valleys in the west where the small-scale development type (2) would fit with the height of shallow valleys and low ridges (all other typologies would dominate). A greater number of turbines (up to 7nr) could be accommodated to fit with the broad horizontal scale of the more expansive and open parts of the plain. Low-Med

Settlement

A dispersed pattern of settlements and farms. Haddington and Tranent form the largest settlements within this area. Mansion houses and associated policies located along edge of the Tyne valley and include Lennoxlove and Winton House.

- Development should avoid direct scale comparisons with smaller settlements and houses and be sited away from policies which often comprise part of the wider setting to settlements as well as notable buildings. Large (120m) typologies (1, 3+4) would dominate settlement, although there is sufficient space between settlements in some very limited areas to accommodate the typology (2) but at the lower 42m height band to minimise impacts. Med-high

Industrial and Infrastructure Elements

Former airfields and military installations with groupings of industrial sheds at Fenton

Barns (conspicuous in open landscape where no other similar scaled features present). Industrial development at Macmerry also appears dislocated and indicative of increasing industrialisation on the western edge of this area and associated with A1, a major transport route crossing the plain.

- There is scope for development to relate to industrial buildings however variety of styles of some of these may inhibit visual compatibility with simple form of turbines. Smaller scale typology (2) would limit impacts and fit with pattern and, to some extent, the relative scale of industrial buildings if located close by but should be at the lower end of the turbine height band (42m). Low-Med

Landscape Pattern and Foci

Extensive tracts of arable land divided into a large-scale field pattern by hedgerows, stone walls and fences. Weaker pattern in some areas, particularly to the west, and Blindwells former open cast workings lack landscape structure of unmodified landscape. Woodlands strengthen landscape pattern to the east and these often accentuate small outcrops and ridges. Berwick and Traprain Laws are key foci visible over a wide area. Industry and power lines form localised foci in the west of the area.

- Scope to site wind farms where weaker pattern prevails avoiding more diverse landform and patterning of woodlands and impact on key foci such as the Laws. Small scale typology (2) would relate better to the simple enclosure pattern and scale of fields and, if sited in the western parts of the plain, minimise dominance over existing foci of the Laws. Low-Med

Landscape Context

The Garleton Hills sit within the Agricultural Plain and have a flattened profile when seen from the south but a more pronounced rugged northern profile. The Northern Coastal Margin lies to the north of this character area and the Firth forms a backdrop to the Agricultural Plain.

- Development should be sited away from the Garleton Hills, avoiding interruption of views from the north where the appreciation of their rugged form, vertical scale and focus would be diminished by tall structures. Smaller development typologies (2) would be more appropriate but would still need to be sited well away from key views of the Hills. Development should avoid areas where a more gradual transition occurs between the Agricultural Plain and the Northern Coastal Margin eg south of Dirleton where the containing effect of woodland is less of a feature (see also views to and from the character area). Medium

Landscape Composition

Generally simple but with some diverse areas where policy landscapes or outcrop landforms are prominent. Development could relate to areas with a simpler landscape composition but would interrupt the irregularity of form and pattern increasingly

present to the east. Medium

Degree of modification/Remoteness

This is a highly managed agricultural landscape. A more naturalistic character is present on the uncultivated outcrop hills and steeper river valley sections and development should therefore avoid these in order to retain the contrast with intensive farmland. It is a well-settled and accessible landscape with a number of major transport routes (road and rail) traversing it. Although all development typologies would impinge on the rural qualities of this landscape, there is a stronger perceived rationale for development where occasional industrial development is present in the west. Low-Med

Key views from the character area

The low-lying and open nature of much of the Agricultural Plain and the network of roads crossing it allow extensive views, particularly in the west and north. Views from the relatively low-lying core of Haddington are generally limited due to the screening provided by the Garleton Hills, although more extensive views across the plain are possible from more elevated parts of the town. Key foci are North Berwick and Traprain Laws, the Garleton Hills and the distant containing ridge of the Lammermuir Plateau. Views from the Laws also reveal panoramas of this extensive character area. The A1 and main East Coast Railway provide views of East Lothian for many travellers. Views of the Northern Coastal Margin are possible where the Firth is visible from elevated areas although woodland often limits visibility.

- All development typologies could intrude on views of the Lammermuir ridge, although would be distant (beyond 10km) and single and small-scale typologies (1+2) would only occupy a small portion of the view due to the extensive nature of both the ridge and views. Development could also intrude on views of the focal points provided by the Laws the Garleton Hills and the Firth and this increases sensitivity in parts of this area. The presence of industry and infrastructure decreases sensitivity in limited parts of this area. Med-High

General visibility of the character area

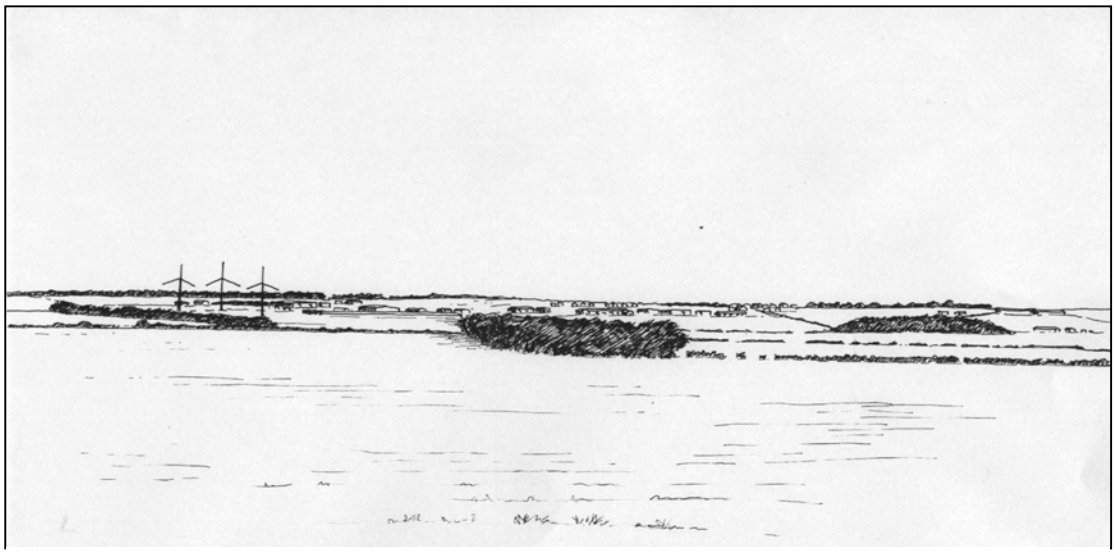
The Agricultural Plain is highly visible, featuring in panoramic, although distant, views from the Lammermuir Plateau and 'foothill' character areas. There is also a strong inter-visibility with the adjacent Northern Coastal Margin, particularly south of Gullane and Dirleton where woodland is not present. The Garleton Hills provide a vantage point for panoramic views where the Agricultural Plain generally forms a simple but extensive foreground to the focus of the coast and Firth to the north and Lammermuir Ridge to the south.

- Development could be visible from some settlements in the Northern Coastal Margin. The small-scale typology (2) would be more appropriate in order to limit any intrusion that may occur on views from the Garleton Hills to open horizons

of the Firth and the coastal edge. Med-High

Overall Landscape and Visual Sensitivity

Medium Sensitivity: While the small-scale development typology (2) could relate to the broad scale and form of shallow valleys and ridges and the general openness of parts of the Agricultural Plain, all development typologies would dominate existing small-scale settlement and the distinctive outcrop hills and ridges and stronger pattern of woodlands that increasingly occur in the east. The Agricultural Plain is highly visible from transport routes, many settlements and elevated walking routes on the Laws, Garleton Hills and Lammermuirs and all development typologies would be visible across a wide area, although smaller scale development (2) would limit intrusion on key views.



Turbines could relate to the broader scale of more open areas. Where industry is present they should be closely associated with this so as to limit the spread of development.

Capacity for Development and Guidance on Siting and Design

There is **moderate** capacity to accommodate windfarm development within the Agricultural Plain. Scope exists to locate limited small typology development (2) at the lower band of turbine height (42 m) only in more open farmed areas or in association with existing industry, largely in the west and central part of the Plain. Greater numbers of turbines could be accommodated on particularly open areas of the plain, up to approximately 7 nr, although this may be limited by proximity to settlement. Development should be sited to minimise intrusion on views of the Laws, Firth of Forth, Garleton Hills and Lammermuir Plateau which form key foci in views from this and adjacent character areas.

Scope for development lies mainly in the west covering three broad areas with a more open expansive character. It is considered that only 1 or 2 separate developments could be accommodated in each of these areas depending on geographic area and other constraints such as proximity to settlement. Although these areas are dislocated from each other with a wide separation, there may be some inter-visibility between developments from elevated viewpoints and sequential impacts would also occur when travelling by road and rail. Further detail on potential cumulative effects is contained in 4.10.

Turbines should be sited to relate to the existing field pattern by either aligning field boundaries or being located on gentle ridges or side slopes, in areas where the field pattern is weaker. Formally constructed access tracks should be avoided to reduce impacts where open and elevated views are possible. Removable matting should be used during construction and simple reinforced grass tracks, aligned close to the edge of field boundaries, installed where necessary post construction. All grid connections should be buried underground to accord with the general absence of overhead wires in this low-lying landscape where wide open skies are a key characteristic.

4.5 MAYFIELD/TRANENT RIDGE

Located on the edge of East Lothian and extending into Midlothian, this area comprises an elongated north-east/south-west orientated low, undulating ridge.

A low elongated ridge, forming a predominantly rural backdrop to Edinburgh

A rolling landform of valleys and long narrow ridges with a stronger field pattern and framework of woodlands in the south

Extensive views are possible from the more open northern part of the ridge

MAYFIELD/TRANENT RIDGE: SENSITIVITY ASSESSMENT

Scale

This is not a high ridge as it only rises up to 260 metres. The height differential is less when viewed from East Lothian and the ridge appears more prominent from the north. It is a predominantly open landscape with woodland providing some limited containment on the south - western part of the ridge. Undulating landform in the interior reduces scale to medium.

- Even small height (42m-65m) turbines would form dominant features in terms of the vertical height of this relatively shallow ridge seen in views from the north-west. The small typology (2) could however relate to the more open and medium scale landscape present in the north where vertical scale contrasts would be less obvious. Med-High

Landform and Shape

Seen as a simple even ridge in many views from the north but internally this landscape has an undulating plateau-like landform of rolling ridges and valleys.

- Large development typologies (1, 3+ 4) would dominate the subtle undulations of the rolling plateau having the effect of 'flattening' dips and ridges although small scale typology (2) could fit with broader ridges. Medium

Settlement

Large urban settlements occur on lower slopes at the edge of this area. The peripheral housing of urban areas such as Tranent and Mayfield contrasts with the few compact villages dispersed across the interior such as Cousland.

- There is limited scope to site even the lowest height band turbines within typology (2) so as to avoid contrasts in scale with small villages in the interior of the ridge and the domestic scale of housing in larger urban centres. Med-High

Industrial and Infrastructure Elements

A number of quarries, bings and landfill sites are present. Power lines (towers between 47-50m high) crossing the western slopes of ridge are visually prominent and detractive features.

- While existing large scale vertical built structures are already present in this landscape, all development typologies would add to the visual confusion and complexity created by existing power lines. High

Landscape Pattern and Foci

An agricultural landscape of large arable fields divided by hedges and low walls. Small woodlands and mixed shelterbelts curve along the hill slopes, cap hill tops and enclose farmsteads and villages and, together with a strongly enclosed field pattern,

are more of a feature to the south-west, many associated with the Oxenfoord estate. Altered field pattern and scarcity of mature trees in the north are a result of former opencast mining and give an open landscape of simple pattern. Castle at Falside Hill, masts and power lines and occasional bings form key foci.

- All development typologies would detract from the smaller scale woodland pattern to the south-west but could fit with the weaker pattern and more open landscape in the north of the ridge. Medium

Landscape Context

The ridge forms a rim of high ground between south-east Edinburgh and East Lothian, containing views and presenting a visual backdrop and predominantly rural landscape setting for the city. This landscape is important in providing a contrast with surrounding densely built up areas.

- The rural character and setting to Edinburgh and other Midlothian settlements could be further compromised by all development typologies. High

Landscape Composition

Although a simple undulating ridge, infrastructure and settlement introduces complexity and visual clutter in places. All development typologies would accentuate the clutter of elements and extend the spread of dominant built features into areas with a simpler visual composition thus diminishing the contrast experienced within the interior of the Ridge. Medium

Degree of Modification/Remoteness

A modified landscape formerly mined in parts and this is evident in some areas. Occasional industrial development tends to be located in valley bottoms and is therefore not widely visible although power lines dominate views. While this landscape is easily accessible, it can feel secluded within the internal rolling plateau away from fringing urban settlements and the developed coastal fringe. Development would emphasise the perception of a post industrial landscape and further erode the rural character of parts of the ridge. Low-Med

Key views from the character area

Some dramatic views of the Pentland Hills, Edinburgh and the Firth from elevated roads eg the A68, an important 'tourist' route to Edinburgh. Views from roads and the few small settlements within the interior of the ridge tend not to be extensive, being contained by the undulating landform and larger settlements occupy side slopes and tend to face away from the character area.

- All development typologies could intrude on views from elevated roads if sited close to the edge of the ridge although the interior landscape, away from key transport routes, is generally less sensitive in respect of views. Medium

General visibility of character area

This area forms a prominent feature against the skyline visible from much of south-east Edinburgh and all development typologies would be highly visible. It is less visible from settlements in the west of East Lothian and within Midlothian (see visibility analysis, Appendix D). High

Overall Landscape and Visual Sensitivity

Medium - High Sensitivity: All development typologies sited within this area would diminish the appreciation of the apparent vertical scale of the ridge by providing an element of 'scaling' (this is compromised to some extent already by prominent power lines) and would further compromise the presently predominantly rural backdrop which it provides to the wider setting of Edinburgh and the Dalkeith area. Development would be highly visible both from external views and from within the undulating plateau which forms the interior landscape of this ridge. While there is some limited scope for small-scale development (2) to be located to relate to more open areas with a weaker landscape pattern, they would interact with the dominant foci of power lines and create visual confusion of competing elements.

Capacity for Development and Guidance on Siting and Design

There is **low** capacity for development within the Mayfield/Tranent Ridge character area. Wind energy development should be the lower height band of typology (2) to fit with the scale of the rolling plateau landform and small settlements within its interior. This development typology could only be sited within the more open northern part of this landscape and should relate to broader long ridges within the interior but should avoid exacerbating the clutter created by power lines. There is very little scope for development to be sited to avoid impacts on the appreciation of the vertical scale of this relatively low ridge that is a highly visible feature and forms an important rural backdrop to Edinburgh.

4.6 GARLETON HILLS

The Garleton Hills are a prominent landmark within East Lothian. They form one of the larger igneous intrusions of a broad band of volcanic rocks aligned north-east across the Agricultural Plain and cumulating in Berwick Law and the Bass Rock.

The rugged northern face of the hills provide a strong contrast with the surrounding low-lying Agricultural Plain

The flattened profile of the hills seen from the south as a backdrop to Haddington

A rich diversity of landform and vegetation is found within the hills

GARLETON HILLS: SENSITIVITY ASSESSMENT

Scale

Although not high (186 metres at highest point), the vertical scale of the Garleton Hills is accentuated by the low-lying ground surrounding them. Hill tops are small and largely open although woodland covers the steeper north facing hill slopes.

- All development typologies sited close to and on these hills would diminish the appreciation of their apparent vertical scale by providing an element of 'scaling'. These hills are small so large numbers of turbines could not be accommodated. High

Landform and Shape

The hills are noticeably steeper on the western and northern sides with gentler elongated ridge tailing to the north-east and south. The ruggedness of the west and north hill slopes contrasts with the smooth arable land of the surrounding plain and gives the impression of height.

- The sleek form and industrial character of all development typologies and associated roads infrastructure would physically damage and detract from the diversity and ruggedness of the landform present to north and west. Southern slopes are less sensitive as a more rounded blander landform exists but due to the compactness of these hills, development would still affect more sensitive areas. High

Settlement

The small village of Athelstaneford is sited on lower north-eastern slopes and some farms are also present. The prominent landmark of Hopetoun Monument is perched atop a particularly well-defined crag.

- All development typologies would dominate and diminish the perceived scale of the backdrop and setting provided by these hills to the low houses and compact form of Athelstaneford. High

Industrial and Infrastructure Elements

The A6137 and a minor road cross the main ridge of the hills. There is a disused quarry within the hills and telecom masts, the latter particularly prominent due to their hill top location.

- All development typologies would add to the clutter of man-made elements already present on these hill tops and further detrimentally affect the appreciation of the scale and landform of these hills. High

Landscape Pattern and Foci

There is a strong pattern of coarse textured grass, gorse scrub and broadleaved woodland occurring on steepest north facing slopes and accentuating the craggy

landform. Exposed rock and quarry faces, the smooth enclosed pastures covering long ridges to the north-east and small rolling areas of grassland within the hills, contribute to the rich diversity of the area. The outlying Kilduff Hill to the north carries a more extensive area of denser mixed woodland. The Hopetoun Monument and telecomm masts are key foci.

- The strong pattern and integrity of vegetation cover would be physically disrupted by construction of turbines and access roads. The simple form and scale of turbines would detract from the intricate, organic patterning of exposed rock and vegetation and all typologies would dominate present foci. High

Landscape Context

The Garleton Hills provide a contrast with the intensively managed and less diverse Agricultural Plain. They also form part of the landscape setting to Haddington in views from the south.

- All development typologies on these hills would affect the setting to Haddington by dominating the hills and diminishing the backdrop they provide to the town. High

Landscape Composition

A balanced and harmonious landscape composition comprising a number of diverse components with a strong relationship to each other eg woodland on steeper north facing slopes of hills; pasture on long smooth ridges and few discordant features. All development typologies would affect this balance by introducing industrial features that would be visually discordant to the organic forms of landform and vegetation. High

Degree of Modification/Remoteness

While existing telecomm masts detract from the rugged naturalistic qualities of the hills, this character area still provides a contrast with the surrounding intensively managed Agricultural Plain. This is an easily accessible area. Med-High

Key views

The hills are crossed by minor roads and the A6137 and there is a popular walking route to the Hopetoun Monument and eastwards along the ridge, offering views to the Firth and distant Lammermuir ridge.

- Due to their small scale, all development typologies sited within this character area would intrude on extensive and striking views from footpaths and roads. High

General visibility of character area

The Garleton Hills form a focus in views over an extensive area of East Lothian and all development typologies located within the character area would be highly visible. High

Overall Landscape and Visual Sensitivity

High Sensitivity: All development typologies sited anywhere within the Garleton Hills would be highly visible from an extensive area and diminish the appreciation of their apparent vertical scale by providing an element of 'scaling' (this is compromised to some extent already by existing structures). Turbines would detract from the diversity of landform present and would add to the clutter of man-made elements already present on some hill tops. Development would visually compete with the focus presently provided by the hills, particularly in views from the north where they have a diverse rugged landform and, due to their small scale, would intrude on views from popular walking routes within the hills.

Capacity

There is **no capacity** to accommodate windfarm development in the Garleton Hills as none of the development typologies considered could be accommodated without significant adverse impacts arising on both landscape character and views and visibility.

4.7 HUMBIE/GIFFORD AND WHITTINGHAME RIVER VALLEYS

The Humbie, Gifford and Whittinghame Waters cut in a generally north/south alignment through the Agricultural Plain. They lie within consistently incised valleys characterised by dense woodland cover and policy landscapes.

Incised flat bottomed valley contained by steep sides and with an often visually insignificant water course

Settlement within the River Valleys has a strong architectural integrity

Riparian woodland merges with policy plantings on hill slopes; small-scale pastures are sited on the steeper valley slopes

HUMBIE/GIFFORD AND WHITTINGHAME RIVER VALLEYS: SENSITIVITY ASSESSMENT

Scale

Landform and woodland provides strong containment and results in an intimate scale, particularly experienced within valleys. Scale increases on elevated ground although few open areas are present.

- All development typologies would affect the appreciation of the intimate scale of valleys and could not be physically accommodated within valley bottoms and on steep slopes. Turbines would diminish the perception of containment and depth of the valleys if located within or on tops. High

Landform and Shape

Deeply incised narrow valleys formed by interlocking convex spurs which are emphasise by smaller tributaries cutting side slopes. Rivers have a sinuous form and occasional small flat areas occur where valley bottoms widen.

- Development typologies (3+4) could not be physically accommodated in this character area. In terms of typologies (1+2), the simple form of turbines would conflict with the complexity of the interlocking landform of side slopes and diverse form of the river and rock cuttings and development would physically affect the form of steep side slopes to accommodate access tracks and other ancillary elements. High

Settlement

There is a notable architectural integrity of settlement within these valleys through consistent use of stone and vernacular style. Dispersed settlement pattern of small villages and isolated farms. Many estate houses (these not generally located to be widely seen) and number of planned villages, notably Gifford. Policies of nearby estate houses provide setting to settlements.

- All typologies would be incompatible in scale, form and style with existing settlement and could affect the wider setting to settlements and setting to important historic houses. High

Industrial and Infrastructure Elements

There are no large scale industrial elements present within this character area and only minor twisting roads traverse these valleys.

- All development typologies would introduce new industrial features to this area and diminish the undeveloped character of the valleys. High

Landscape Pattern and Foci

A rich and variable pattern of mixed estate woodlands extend across the slopes and

merge with riparian planting. Scrub colonises areas of eroded ground; hedges and fences sub-divide rolling fields. While designed landscapes are a consistent feature, estate houses are not readily visible and the villages tend to be the main foci. Strong relationship between landform and landcover.

- All development typologies would affect the proportion and pattern of open space to woodland and disrupt the appreciation of the diverse land cover of the valleys. Turbines would form a dominant focus in the landscape. High

Landscape Context

This is an internalised landscape with its character really only appreciated when within it. Development may have some limited effects on views of key features within the adjoining Agricultural Plain (Traprain Law) and views over the foothills to the Lammermuir Plateau. Low-Med

Landscape Composition

The River Valleys have a balanced landscape composition with consistent features and a strong relationship between elements eg policy woodlands and small pastures on steep riparian slopes; villages at bridging points; riparian woodland along valleys. Development would diminish this harmonious landscape composition by introducing a new industrial feature, discordant with the form and pattern of existing elements. High

Degree of Modification/Remoteness

The River Valleys have a strongly rural character and architectural integrity which give a sense of timelessness. Twisting narrow roads and the strong containment experienced within the valley give a sense of isolation in parts although the relatively well-settled nature of the area counters this perception to some extent.

- Turbines would provide a visual reference within the valleys and diminish the seclusion felt in valley bottoms and affect the strongly rural character and integrity of the character area. Med-High

Key views from the character area

Views from roads and settlements within this character area are largely constrained by the convex form of valley sides and dense woodland. Glimpsed and contained views are however experienced sequentially when travelling through this area on minor roads and footpaths and focus on small sections of the valley rather than on views outwith the character area. More extensive views are possible on the few elevated open slopes and hills present.

- All development typologies would extend beyond the containment offered by the valleys and be visible from areas of higher open ground and would also form dominant features in views from within valleys. Medium

General visibility of the character area

Views of the river valleys are limited although all development typologies would be visible from adjoining areas whether located within the valleys or on upper (less steep) side slopes. High

Overall Landscape and Visual Sensitivity

High Sensitivity Large development typologies (3+4) could not be physically accommodated in the River Valleys. The intimate scale, diverse pattern of land cover and architectural integrity of settlement are the principal limiting factors for development typologies (1+2) within the River Valleys. Although the River Valleys are not highly visible from adjacent areas and views from this character area are restricted by landform and vegetation, the scale of all development typologies would result in intrusion on views as turbines would extend beyond the visual containment offered by the valley landform and appear truncated.

Capacity

There is **no capacity** to accommodate windfarm development in the River Valleys and all development typologies would incur significant adverse impacts on both landscape character and views and visibility

.

4.8 EASTERN LAMMERMUIR FRINGE

The Eastern Lammermuir Fringe comprises a broad apron of land sweeping round the coast and forming rolling foothills to the Lammermuir Plateau.

A rolling landscape of rounded hills and valleys with landform and woodlands providing containment

Rounded hill tops are visually prominent from the Eastern Coastal Margin and major transport routes

The complex landform at the transition with the East Lammermuir Plateau

EASTERN LAMMERMUIR FRINGE: SENSITIVITY ASSESSMENT

Scale

A complex configuration of domed shaped hills and ridges with convex slopes provides containment and limits landscape scale to medium/small and restricts the degree of openness. Woodlands emphasise the enclosure experienced within tightly incised valleys.

- All development typologies would dominate the narrow valleys and affect the perception of the vertical scale of the hills due to their relatively lowly height. High

Landform and Shape

Rolling hills and ridges rise towards the south-east to the summit of Blackcastle Hill at 319m. This is a strongly moulded landform composed of interlocking smooth rounded hills and slopes, dissected by many streams passing through steep sided valleys; these often edged by craggy rock outcrops and exposed slopes.

- Turbines would detract from the dramatic sheer-sided narrow valleys and diverse organic forms of small dips and hills and edges at the transition with the East Lammermuir Plateau. They could however relate to broader hill tops although only the single and small scale development typology (1+ 2) would physically fit the scale of these tops. Med-High

Settlement

Small compact villages of Spott, Innerwick and Oldhamstocks are sited at the transition with the Eastern Coastal Margin. Villages such as Garvald and smaller settlements and farms are tucked away within narrow valleys. Settlement generally has a traditional architectural character.

- All development typologies would contrast with the scale and character of settlements. Even if sited on hills, the compactness of the area would result in direct scale comparisons being made with settlement set within valleys. High

Industrial and Infrastructure Elements

Two highly visible pylon lines (towers 47 – 50m high) extend east to west across the hill slopes and a telecommunication mast is prominently sited on Blackcastle Hill. There are no other significant industrial features in this area.

- Turbines would not be the only vertical elements into the landscape but would be substantially larger, more light reflective and involve movement. They would increase the visual clutter of infrastructure elements already adversely affecting the small scale, complex landform of this area in the east. High

Landscape Pattern and Foci

Overall pattern of predominantly open-topped interlocking elongated hills and narrow wooded valleys creates a landscape with a strong rhythmic quality. A well-managed landscape of fields enclosed by stone walls and beech hedges with deciduous woodland and gorse scrub colonising steep valley sides. Medium scale coniferous plantations and shelterbelts occur across hill slopes and close to farm buildings. Key foci are the power lines and telecommunication mast.

- All development typologies would disrupt the strongly rhythmic landform pattern of predominantly open topped hills and valleys and would form new dominant foci in the landscape. Med-High

Landscape Context

It may be possible to see the Phase II Crystal Rig development turbines within the adjacent East Lammermuir Plateau and cumulative landscape and visual impacts would occur with any development within the Eastern Lammermuir Fringe. Elongated hill tops eg. Pinkerton Hill, Spott Dod, Blackcastle Hill, are all visually prominent from the coastal fringe.

- All development typologies within this character area would be inter-visible and within 10km of development in adjacent character areas and may lead to cumulative effects on views, landscape character and experience of the landscape when travelling through this and adjoining character areas. Turbines sited close to the transition with the East Lammermuir Plateau could dominate the intimate scale of this character area. High

Landscape Composition

A strongly unified yet diverse landscape composition due to the rolling landform and consistent pattern of prominent domed hills and incised valleys. All development typologies would diminish the unity of this landscape, which is slightly affected to some degree by prominent built infrastructure (powerlines) but still a consistent feature of the character area. High

Degree of Modification/Remoteness

Traditional architectural character of settlement and relatively non-intensive farming practices where woodlands, stone walls and hedgerows are strong landscape features and fords cross burns, result in a distinctively rural character and a perception of timelessness. Narrow, hedge-lined ‘Roller Coaster’ narrow roads and the strong containment experienced within the valleys give a sense of isolation in parts.

- Turbines could provide a visual reference within the valleys and diminish the

feeling of isolation. Med-High

Key views from the character area

Views from the narrow minor roads within this character area are largely contained by the rolling landform, although some limited extensive views of the coast, Firth and islands are suddenly revealed; some of these are framed by hills and dramatically focus down valleys. Views from settlements such as Innerwick focus on the adjacent Eastern Coastal Margin although in general settlements within this area are located within valleys so have restricted views. Views from hill tops are striking although generally not widely accessible. A number of Rights of Way (eg. The Herring Road) traverse the area and offer elevated and extensive views in the proximity of the Lothian Edge.

- Although the landform restricts visibility, development on hill tops could intrude on the composition of dramatic framed views from roads and in the foreground of more extensive views possible from Rights of Way at the transition with the East Lammermuir Plateau character area. Med-High

General visibility of the character area

This character area features in views from the northern and eastern edges of the East Lammermuir Plateau. The distinctive small hills and elongated ridges of Pinkerton and Blackcastle Hills and Spott Dod are prominent features in views from the A1 and Main East Coast Railway within the Eastern Coastal Margin and seen from parts of Dunbar.

- All development typologies could be highly visible from main transport routes and from Dunbar if located on prominent hills close to the coastal margins. Med-High

Overall Landscape and Visual Sensitivity

High Sensitivity: All development typologies would diminish the vertical scale of small hills and affect the pattern of predominantly open tops and contained wooded valleys. The distinctively rural and diverse character and organic form of this landscape would be diminished by the regimented form of turbines. They would also exacerbate the visual clutter associated with pylons and masts in the eastern part of this area and may have cumulative landscape and visual effects with the Phase II Crystal Rig windfarm extension and any future development located close to the transition with the adjacent East Lammermuir Plateau character area. While views from this area are often restricted by landform, extensive and dramatic views from footpaths are possible at the transition with the East Lammermuir Plateau and, occasionally, from elevated roads and all development typologies would impinge on the foreground of these views. All development typologies would be visually prominent if sited on the broader topped hills adjacent to the coastal margin.

Capacity

There is **no capacity** to accommodate windfarm development in the East Lammermuir Fringe. Larger development typologies (3+4) are unlikely to be able to be physically accommodated within this area and all development typologies would incur significant adverse impacts on both landscape character and views and visibility.

4.9 NORTH LAMMERMUIR PLATFORM

An extensive sweep of undulating farmland and hill slopes forming an east/ west band along the northern margin of the Lammermuir Hills. This character area extends west into Midlothian.

Undulating landform of broad hills cut by occasional narrow valleys

Large arable fields are edged by long shelterbelts and woodlands which coalesce in long views to give an impression of a well wooded landscape

The rugged northern face and high point of Lammer Law forms a distinctive backdrop to this character area

NORTH LAMMERMUIR PLATFORM: SENSITIVITY ASSESSMENT

Scale

An undulating landform of broad hills cut by incised narrow valleys, with some enclosure provided by long shelterbelts and woodlands, which gives an overall medium scale landscape with an open character in some areas. Valleys and dips in landform tend to create more localised enclosure and intimate scale.

- Single and larger development typologies (1, 3+4) would dominate the scale of this landscape. Small-scale development (2) could relate to more open areas but should be sited to avoid dominating the intimate scale of occasional valleys. Medium

Landform and Shape

Long slopes interlock to form a smoothly undulating landform. These are frequently intersected by small streams set within 'V' shaped valleys and gullies on steep scarp slopes at the transition with the Lammermuir Plateau. Deposition mounds associated with river courses interrupt the smoothness of slopes in places. The terrain flattens to form a gentler blander landform at the transition with the Agricultural Plain to the north.

- Larger typologies (3+4) would dominate the undulating landform although small scale development (2) could fit with the simpler gently undulating landform that occurs at the transition with the Agricultural Plain or on broader smoother ridges. Distinctive geological deposition features, valleys and steeper hill slopes of the lower Lammermuir Plateau would need to be avoided as these add interest within the overall scene. Medium

Settlement

There are a few small villages (Fala and Humbie) and an irregular dispersed pattern of isolated farms, small estate houses and a number of castles. Settlement in this area has a strong architectural integrity.

- There is no scope to locate larger development typologies (3+4) sufficiently away from dispersed settlement so as to avoid direct comparisons of scale although the lower height band (42m) turbines of typology (2) would have a better fit within this settled landscape. The height of the single turbine development typology (1) would dominate the scale of domestic buildings. Med-High

Industrial and Infrastructural Elements

Some B roads traverse the area and numerous narrow dead end roads wind through slopes serving large farmsteads. Power lines cut northwards through hill slopes but are generally well absorbed by the broadly undulating landform and long shelterbelts. A sand and gravel quarry is the only significant industrial feature present in the area.

- Turbines (all typologies) would introduce new large-scale industrial elements into this landscape where few presently exist. Med-High

Landscape Pattern and Foci

Large arable fields on lower ground to the north give way to smaller unimproved pastures at the transition with the Lammermuir Hills. Woodlands and angular shelterbelts and hedgerows are a consistent feature throughout the area and these tend to coalesce in long views to create an impression of a well wooded landscape. There are no dominant foci in this character area.

- Single and larger scale typologies (1, 3+4) would dominate the scale of woodlands and (3+4) would be likely to physically disrupt the field and woodland pattern. The small scale typology (2) could relate to the medium scale pattern of long angular shelterbelts and fields but should be sited away from areas where policy plantings such as avenue trees, high beech hedges, roundels and woodlands form a distinctive and consistent pattern, where they would disrupt the integrity of these. Medium

Landscape Context

This area is important in providing a foreground or visual 'plinth' to the distinctive northern face and profile of Lammer Law; the highest point on the Lammermuir ridge seen from East Lothian.

- Windfarm development could affect the perceived vertical scale of Lammer Law (only 527m but the relatively rugged character of this north face makes it appear higher). 120m high turbines typologies (1, 3+4) would affect the perception of the vertical scale of the Central Lammermuir Plateau and larger numbers of turbines may also affect the appreciation of the landform of the north face. The lower height band of typology (2) could be accommodated provided turbines were located away from key views where direct comparisons of scale would occur and where they may interrupt the distinct spurs and cavities often highlighted on this northern face. High

Landscape Composition

This is a unified landscape with few discordant features and with an overall limited number of components giving a simple and balance composition. Development (all typologies) could relate to the simpler areas where components are less diverse but

could disrupt the unity of landform and open sweep and continuity of foothills. Med-High

Degree of Modification/Remoteness

The architectural integrity of settlement and well-managed character found in parts of this area with strong landscape features of woodlands, policy plantings and hedgerows, result in a distinctively rural character. The area can feel secluded in places but is not remote. Windfarm development would affect the perception of rural character although the lowest turbine height band of typology (2) is less likely to be perceived as being large scale industrialisation, fitting better with the pattern of existing landuse. Med-High

Key views from the character area

Views from buildings and minor roads are often screened by woodland and high hedges. The scarp slopes and ridge of the Central Lammermuir Plateau are prominent from some minor roads (B6368) and a few dispersed buildings. Development could intrude on these views and this increases visual sensitivity close to roads at key viewpoints. Med-High

General visibility of character area

Part of this character area is visible from the busy A68 and Soutra Hill where it forms the foreground to extensive views across East Lothian and the Firth of Forth. Development sited on hill slopes at the transition with the Plateau Grassland character area could intrude on the foreground and disrupt the expansiveness of these dramatic views. Medium

Overall Landscape and Visual Sensitivity

Medium - High Sensitivity: A number of key constraints limit scope for accommodating single and larger scale development typologies (1, 3+4) in this area. These principally relate to the effect of tall turbines on the scale of the undulating landform, on the consistent pattern of dispersed settlement, field and woodland pattern and on the perceived scale and rugged form of Lammer Law within the adjacent Central Lammermuir Plateau character area. Occasional distinctive landform features would be highly sensitive to development as would the lower hill slopes of the Lammermuir Hills. This character area provides the foreground to extensive views to and from the Lammermuir Plateau and sensitivity to development is thus increased.

Capacity for Development and Guidance on Siting and Design

There is **low** capacity for development within the North Lammermuir Platform character area. Wind energy development should be the lower height band (42m) turbine of typology (2) and be located on gently undulating areas at the transition with the Agricultural Plain and on broader ridges. Development should avoid intrusion on views of the northern face of the Central Lammermuir Plateau from main roads.

Landscape and visual constraints will limit multiple developments within the North Lammermuir Platform. Within this area a wide spacing between developments is recommended so wind turbines do not dominate the strong coalescing pattern of woodlands and trees, thus providing occasional and widely dispersed focal points in the landscape. There may be cumulative landscape and visual effects arising in combination with any future expansion on the adjacent Plateau Grassland character area.

Development should relate to the strong pattern of woodlands, with turbines either being arranged parallel to shelterbelts, or if this is not technically possible, be located within a single field to avoid disruption of the often strong field pattern. Where broader ridges have a domed form, turbines could be arranged to relate to landform rather than be positioned in a geometric layout. Access tracks should be positioned on the edge of fields, taking advantage of any screening provided by hedgerows and trees and overhead power line connections avoided in order to minimise clutter in this simple but unified character area.

4.10 CUMULATIVE LANDSCAPE AND VISUAL ISSUES IN THE LOWLANDS

Introduction

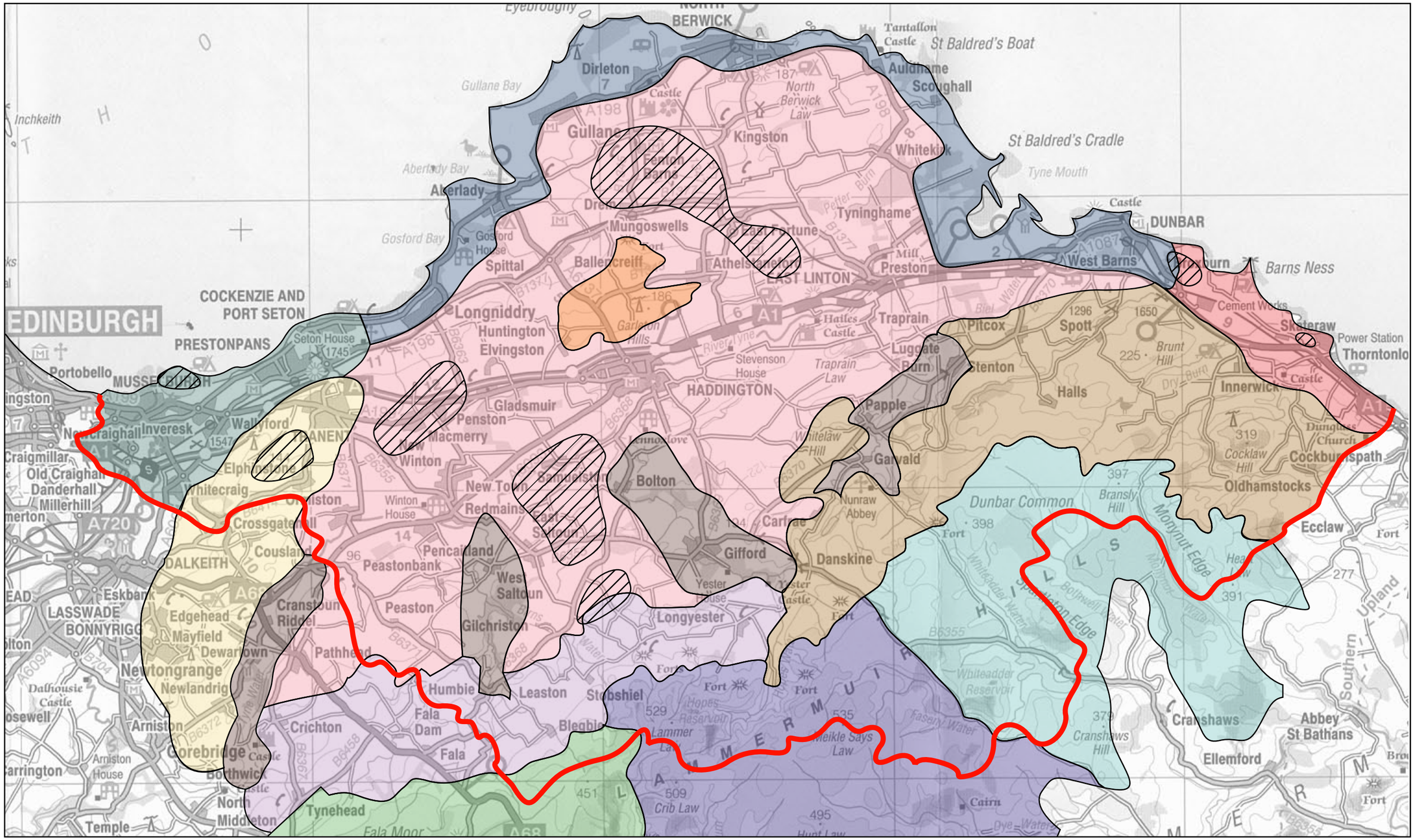
This section of the report considers cumulative landscape and visual issues associated with siting windfarm development within the lowland character areas. It appraises potential effects on landscape character, and the perceptual qualities associated with it, landscape and visual effects on skyline and on fixed and sequential views.

Cumulative issues are considered in the context of the landscape and visual sensitivities identified in the assessment set out in the preceding pages, with the potential cumulative effects of wind turbine development only being considered in landscape character areas identified as having some capacity to accommodate such development. In the context of this study this would exclude only those character areas assessed as having a high sensitivity where significant adverse impacts would occur across most of the sensitivity categories used in the assessment. Within the lowlands, the following landscape character areas fall into this category:

- Eastern Coastal Margin
- Musselburgh/Prestonpans Fringe
- Agricultural Plain
- Mayfield/Tranent Ridge
- North Lammermuir Platform

Within all the lowland landscape character areas the assessment concluded that only the small-scale development typology (2) (turbines between 42m and 65m height) could be accommodated. There are constraints on siting wind turbines present within all of these character areas and these limit the geographic area that could be taken up by development, for example, the need to avoid the more distinctive outcrop landform features and stronger framework of woodland present in the east of the Agricultural Plain. Should wind turbine development occur in all of these landscape character areas, and assuming cognizance is taken of all constraints, it is likely to be widely dispersed throughout East Lothian and as such, inter-visibility would generally be limited.

Figure 4.1 shows potential areas for development in the lowland character areas. These areas are indicative and only consider broad landscape and visual sensitivities. They do not take into account local landscape and visual constraints, such as effects on specific views, the setting of settlement and distinct vegetation patterns, for example and are intended only to inform the assessment of potential cumulative landscape and visual effects. Inclusion of a potential ‘search’ area is not an indication that development would have no associated significant adverse landscape and visual impacts and the findings



Landscape Character Areas Assessed in Capacity Study

- Eastern Coastal Margin
- Northern Coastal Margin
- Musselburgh / Prestonpans Fringe
- Agricultural Plain
- Garleton Hills
- Mayfield / Tranent Ridge
- Humbie / Gifford / Whittinghame River Valleys
- Eastern Lammermuir Fringe
- North Lammermuir Platform
- Plateau Grassland
- Central Lammermuir Plateau
- East Lammermuir Plateau

Potential Areas for Small Scale Typology (2)

N.B. These areas are indicative only and local landscape and visual constraints will apply. They are intended to inform the assessment of potential cumulative landuse and visual effects only.

0 2 4 6 km

1 : 125,000

Landscape Capacity Study for Wind Turbine Development in East Lothian

Potential Areas for wind turbine development in the Lowlands

Fig No: 4.1

should therefore be treated with caution and with reference made to the assessment outlined in the preceding pages. Potential cumulative landscape and visual impacts appraised in this section of the report will preclude or restrict windfarm development in some of the indicative search areas shown in Figure 4.1.

Other environmental issues such as noise, archaeological and aviation requirements have not been taken into account in identifying these search areas and these are likely to severely constrain windfarm development in many areas.

Potential Cumulative Landscape and Visual Effects

Landscape and visual constraints and the relatively small geographic size of the Musselburgh/Prestonpans Fringe and Mayfield/Tranent Ridge are likely to limit wind turbine development to a single development site within each character area of up to 5 nr 42m maximum height turbines. In the Musselburgh/Prestonpans Fringe development could potentially be sited close to the coast and to the west of the character area; in the Mayfield/Tranent Ridge it could potentially be located in the more open landscape present in the north. Although significant landscape and visual constraints would limit scope for multiple developments, the proximity of these two character areas would result in cumulative impacts on views from Edinburgh and from a restricted number of viewpoints within each of the character areas.

Within the much larger Agricultural Plain character area, scope for development lies mainly in the west covering three broad areas with a more open and expansive character. It was considered that subject to careful siting and design measures being addressed, up to two small-scale typology developments (2) could be accommodated in each of these areas, depending on geographic area and distance from settlement. Although these 'potential development areas' are widely separated there would be some inter-visibility from elevated viewpoints eg the Garleton Hills, and sequential impacts would also occur when travelling on local roads and by rail (although major cumulative impacts from the A1 are unlikely due to distance and the screening effect of the Garleton Hills). There could be cumulative landscape and visual effects arising from inter-visibility of development on the western parts of the Agricultural Plain around Macmerry and the northern part of the Mayfield/Tranent Ridge

Landscape and visual constraints would limit multiple developments within the North Lammermuir Platform. Within this area a wide spacing between developments is recommended so wind turbines do not dominate the strong, coalescing pattern of woodlands and trees, providing occasional and widely dispersed focal points in the landscape. It is recommended that a maximum of two small-scale wind turbine developments could be accommodated in this character area, generally in the gentler

landform at the ‘transition’ with the adjacent Agricultural Plain. Cumulative impacts may occur in connection with the adjacent Plateau Grassland character area within the Uplands, where the existing Dun Law windfarm, and any future extension to this, is likely to be inter-visible. Impacts may be significant depending on detailed siting and the distance between potential developments influencing whether multiple development might compete as visual foci or be perceived as dominating or ‘crowding’ the viewer. There may also be some inter-visibility with wind turbine development in the Agricultural Plain.

Opportunities for multiple developments are constrained in the Eastern Coastal Margin. Two ‘potential development areas’ complying with the landscape and visual constraints were identified, although the assessment concluded that it was only appropriate to develop one or the other of these areas, not both. This was because of the relatively small size of the character area and the effects on views from the A1, where multiple development would be inter-visible with existing industrial development within this character area. Cumulative landscape and visual effects may occur between developments located on the Eastern Coastal Margin and the East Lammermuir Plateau, potentially having indirect effects on the character of the Eastern Lammermuir Fringe, which lies between the two areas, and also affecting views from the A1 and Main East Coast Railway.

Potential Cumulative Issues Affecting the Wider Study Area

The cumulative landscape and visual effects associated with wind turbine development located in character areas lying in the west of East Lothian (Agricultural Plain, Musselburgh/Prestonpans Fringe, Mayfield/Tranent Ridge) and those with capacity to the east (Eastern Coastal Margin) would be limited due to the wide geographic spread of development.

Multiple developments throughout East Lothian may affect the perception of the rural qualities of landscape character, particularly when viewed sequentially. This may occur in association with existing large-scale industrial development already present in the western and eastern extremities of East Lothian, where wind turbine development could be perceived as ‘spreading’ industrial structures from more developed areas into the more distinctly rural landscapes, for example, into the Mayfield/Tranent Ridge and parts of the Agricultural Plain.

Effects on the sense of scale and distance and on focal points

In the populated lowlands there are a number of scale references and some existing large-scale industrial features. Multiple windfarm development may diminish the sense of expansiveness and openness present in some areas, but is more likely to dominate the scale of domestic settlement that is a key characteristic. This effect is likely to extend outwith the individual character area due to the expansive views and inter-visibility across the low lying and predominantly open coastal and agricultural landscapes of the lowlands.

Key focal points in the lowlands are Berwick and Traprain Laws, Bass Rock, the Garleton Hills and the distant Lammermuir Plateau. Potential cumulative effects on the character and views of the Lammermuir Plateau are considered in 5.4 in the uplands section of the report. Focal points beyond East Lothian include the Firth of Forth, Edinburgh and Arthur's Seat, the latter particularly visible from the west of the county. There may be situations where wind turbine development affects views of key focal points, although provided that the constraints outlined in the sensitivity assessment are adhered to, cumulative impacts should not be significant.

Skyline Effects

The SNH guidance on cumulative effects (SNH 2004) states that: *"A viewer's eye tends to be drawn towards the skyline. Where an existing windfarm is already prominent on a skyline the introduction of additional structures along the horizon may result in development that is proportionally dominant. The proportion of developed to non-developed skyline is therefore an important landscape consideration."* The effects of cumulative development on the skyline is also inter-related to other cumulative issues such as those on landscape character; many of these already addressed by the landscape and visual sensitivity assessment.

The effects of cumulative development on views from the lowlands to the Lammermuir Plateau are described in 5.4. The scale and location of wind turbine development recommended for the lowlands in the capacity assessment would limit any significant cumulative effects on views of the Lammermuir Plateau from the lowland character areas.

In terms of views from the Lammermuir Plateau to lowland East Lothian, these are distant and wind turbine development in the lowlands would not interrupt the focus of the Firth of Forth or the skyline due to the elevation of viewpoints and the wide panoramic views possible. Multiple wind turbine development may be simultaneously visible but it is considered that the lower height band of the small-scale typology (2) generally

recommended would not significantly impact on these expansive views and the overall rural character of views would be maintained.

The skyline viewed from within the low lying coastal areas and the northern parts of the Agricultural Plain, focuses on the horizon of the Firth of Forth and this could be affected by development in these character areas. The continuity of the skyline would be broken in some views although the scale of turbine development recommended would limit the extent of interruption in what is often a wide panorama.

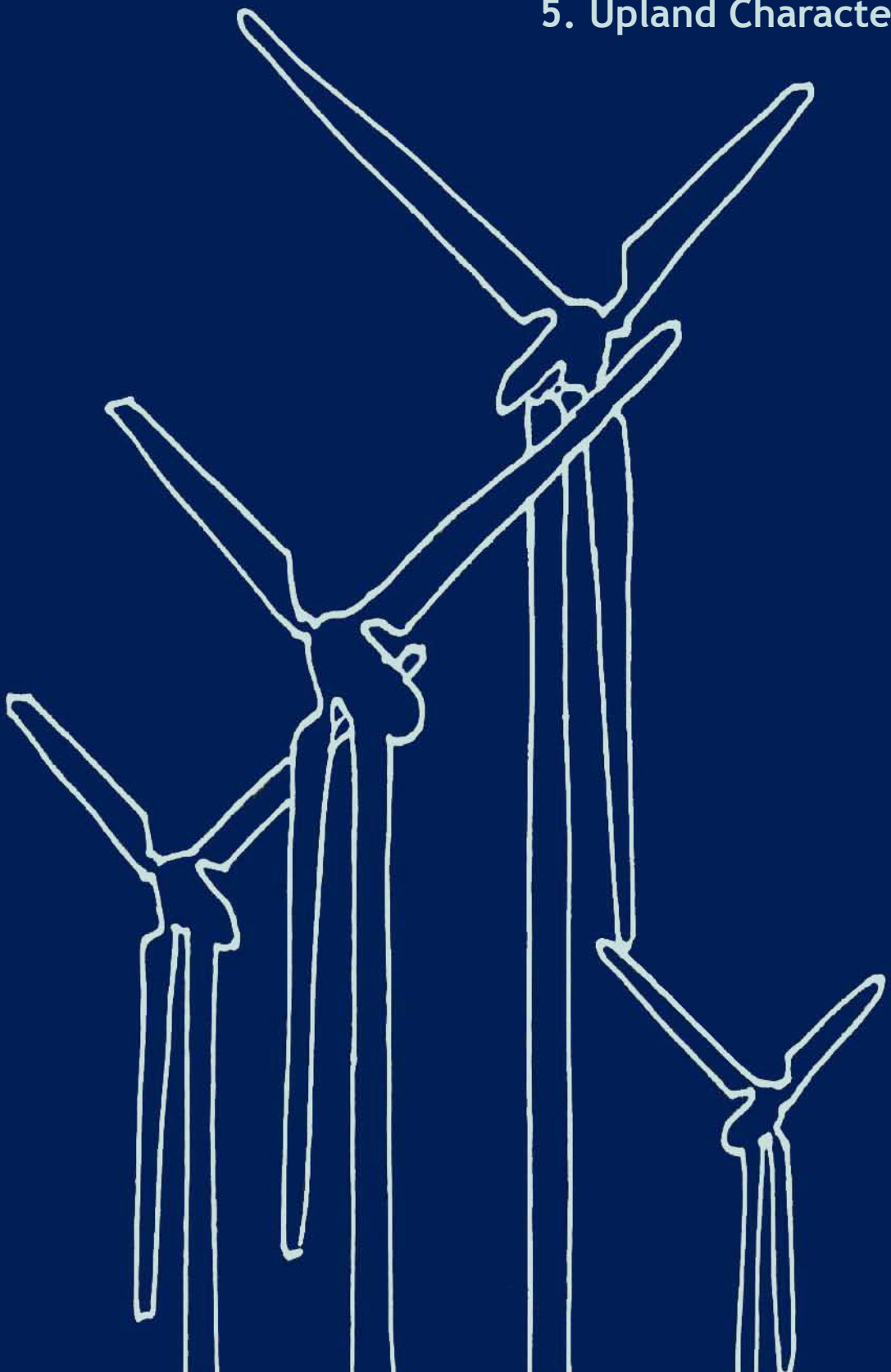
Conclusions on Cumulative Effects in the Lowlands

Cumulative landscape and visual effects would be limited within the lowland landscape character areas largely due to the constraints imposed on wind turbine development, as set out in the assessment of capacity. The small-scale development typology (2) only is recommended in five landscape character areas. In summary, key cumulative issues that could potentially arise include:

- Potential inter-visibility of wind turbine developments sited within the adjacent Mayfield/Tranent Ridge and Musselburgh/Prestonpans Fringe with views from Edinburgh, the A1 and some settlements in this part of the coast being affected.
- Potential cumulative landscape and visual effects arising from development on the western parts of the Agricultural Plain around Macmerry and the Mayfield/Tranent Ridge.
- Potential inter-visibility between any development within the North Lammermuir Platform and the existing Dun Law (and any future extension) windfarm within the adjacent Plateau Grassland character area within the uplands. Impacts may be significant depending on detailed siting and the distance between potential developments. There may also be some inter-visibility with wind turbine development in the Agricultural Plain.
- Potential sequential cumulative effects on views from key transport routes including the A1 and Main East Coast Railway, although these would be limited by the wide geographical spacing between development in the east and west of the study area. These are most likely to occur in relation to development in both the East Lammermuir Plateau and Eastern Coastal Margin.

It is recommended that potential cumulative effects should be considered in the detailed siting, design and assessment of all proposals for wind turbine development.

5. Upland Character Areas



5.1 PLATEAU GRASSLAND

The Plateau Grassland covers the western part of the Lammermuir Hills and comprises an upland plateau of smooth, gently undulating hills covered by coarse grassland. Only a small part of the Plateau Grassland falls within East Lothian with the majority of this character type being found in the Scottish Borders.

A broad, gently undulating plateau with large horizontal scale and open character

Uniform grassland cover is interrupted by long coniferous shelterbelts

Forestry, the A68 and existing windfarm development characterise this area

PLATEAU GRASSLAND: LANDSCAPE SENSITIVITY ASSESSMENT

Scale

Broad undulating upland plateau between 320-450m high and with a large horizontal scale and open character. Stunted shelterbelts and forestry give only a limited degree of enclosure as the expansiveness of the landform dominates.

- Larger development typologies (3+4) could relate to the expansive scale of this landscape. The relatively low number of turbines in the single turbine and small scale typologies (1+2) would appear trivial within the expansive horizontal scale of this upland plateau (although typology (2) could relate to existing windfarm development – see under 'Industrial and Infrastructure'). Low

Landform and Shape

A gently undulating plateau with smooth convex slopes and rounded indistinct tops. Gently dished areas of flatter ground occur in places; Fala Moor being the largest of these. Narrow shallow gullies cut into slopes and provide subtle variations in relief.

- All development typologies could relate to the simplicity of the landform and the absence of notable landform features. Low

Settlement

This is a sparsely settled area with isolated farms generally located in valleys.

- The sparseness of settlement allows scope for all development typologies to be accommodated without unfavourable comparisons of scale and character with domestic buildings, providing populated valleys are avoided. Low-Med

Industrial and Infrastructure Elements

The A68 cuts through this area and is a major transport route. Power lines and an existing windfarm development (26 turbines, 63.5 m blade tip height) at Dun Law. Are highly visible built elements in this open landscape.

- Existing wind energy development is present and other prominent infrastructure also characterises the area. Association of additional new development with existing windfarm infrastructure (typology 5) would concentrate built elements in part of this character area although turbine height will be a limiting factor and the smaller height (65m) typology (2) would fit better with the scale of existing turbines if sited in close proximity (although there is scope for greater numbers of turbines than development scenario (2) to be accommodated). Low-Med

Landscape Pattern and Foci

Landcover is uniform and dominated by grassland. The heather and wetland cover of Fala Moor is an exception to this. Angular coniferous shelterbelts and forest blocks create an arbitrary and fragmented pattern; their dark colour pronounced against pale grass moorland. The existing Dun Law windfarm is the principal focus in this landscape.

- Turbines sited as distinctly separate groups to existing windfarm development could accentuate the fragmented pattern of forestry and shelterbelts and create competing foci in the landscape, particularly if the scale (height and number of turbines) of development is significantly different from the existing windfarm. Although the reduced height of turbines of typologies (1+2) would produce a more consistent 'match' with existing Dun Law turbines, the smaller numbers of turbines could increase spatial fragmentation. Medium

Landscape Context

The Plateau Grassland forms a ridge of high ground, providing the backdrop to foothills and lowland areas to the north and south. There are some sensitivities associated with locating single and larger scale typologies (1, 3+4) on this ridge in terms of potential effects on the appreciation of vertical scale and containment when viewed from adjacent lowland areas, although this part of the ridge is relatively low and uniform and semi-contained either side by the more pronounced Moorfoot hills to the south-west and the higher Central Lammermuir Plateau character area to the north-east (see also section 5.4 on cumulative effects). Medium

Landscape Composition

This landscape has a semi-complex character in parts arising from the fragmented pattern of forestry and infrastructure. Fala Moor, in contrast, has a strong visual integrity, largely unaffected by forestry or built development. All development typologies would affect the integrity of Fala Moor but could be accommodated where the landscape is more fragmented and in association with existing windfarm development, where additional windfarm development would consolidate this aspect of landscape character. Low-Med

Degree of Modification/Remoteness

The wetland of Fala Moor has a naturalness not evident elsewhere in the character area, much of which has been modified by forestry and built infrastructure. Rushes and poor semi-improved pasture give a perception of marginal farming. This area is not isolated but the sparseness of settlement can make it feel slightly remote away from the busy A68. Medium

Key views from the character area

This character area is highly visible from the busy A68 and from the B6368. Views north-west from the B6368 are edged by the Moorfoot Hills and take in Fala Moor in the foreground, ranging over the Esk valleys to the distant Pentland Hills. There are restricted views from settlement as this is sparse and tends to be located in valleys. Panoramic views from the A68 at Soutra Hill over the lowlands of East Lothian to the distant Firth of Forth are striking.

- While this area is highly visible, the presence of existing windfarm and other infrastructure reduces sensitivity. Development should avoid intrusion on extensive views from the edge of the plateau. Medium

General visibility of character area

Highly visible from hill tops within the adjacent Central Lammermuir Plateau to the east. The ridge line of the Lammermuir plateau is a dominant feature seen from much of East Lothian to the north and parts of the Borders to the south although areas of slacker landform within the plateau are generally less visible from closer viewpoints within the foothill areas. The relatively low position of the Plateau Grassland on the wider Lammermuir ridge reduces visual sensitivity (see 5.4 on cumulative skyline effects).

- Development typologies (1, 3+4) could be highly visible on the skyline although would generally be seen over some distance from settlements both within East Lothian and the Borders. Existing windfarm development reduces sensitivity. Medium

Overall Landscape and Visual Sensitivity

Low – Medium Sensitivity: While there are sensitivities associated with the integrity and naturalness of Fala Moor, larger development typologies (3+4) could fit with the expansive scale and simple landform/pattern of the majority of this character area. They would however conflict with the scale of existing turbines within the Dun Law windfarm. Single and small scale typologies (1+2) would not fit the broad horizontal scale of this landscape type, appearing trivial in comparison, although the height of turbines would provide a better fit with existing turbines at Dun Law. Extensions to existing development (5) would be limited by the need to fit with the height, spread, spacing and design of existing turbines particularly in the context of the close views possible from the A68. Although this character area is highly visible from the A68 and the Lammermuir ridge is seen extensively from East Lothian and Borders, sensitivity is reduced by the existence of existing windfarm development and by the relatively low-lying and semi-contained location of the Plateau Grassland within the overall Lammermuir Plateau.

Capacity for Development and Guidance on Siting and Design

There is **Moderate to High** capacity for development within the Plateau Grassland character area. While the higher turbines of development typologies (3+4) would relate to the scale and simple landform of much of the Plateau Grassland, they would conflict with the scale, spacing and sequence of blade movement of existing wind turbines at Dun Law if located closeby. The smaller height turbines of development typologies (1+2) would have a better visual relationship with existing turbines but should be designed as an extension (5) to the existing windfarm in order to attain a cohesive pattern of development or expanded to include more turbines than the defined typology (2) so as not to appear trivial in the context of the large scale of this landscape. This form of extension typology (5) is considered to be the optimum development proposal in terms of minimising landscape and visual impacts.

If larger typologies (3+4) are considered, proposals should either include replacement of existing turbines with a similar typology to those proposed or should explore the possibilities of forming a distinct grouping from the existing Dun Law windfarm. The success of the latter option in lessening the inter-visibility and visual confusion of two tiers of moving blades and different rotor speeds and cut in/out wind speeds occurring in close views from the A68 may be constrained by the relatively small tract of land of this part of the Plateau Grassland lying within the study area. One option might be to utilise the present separation provided by the A68 and the nature of the views from it, by locating larger turbines to the east and existing smaller (63.5m) turbines to the west of the road (relocating 9nr existing smaller turbines to the western site). However, a significant gap would need to be retained between the two developments to emphasise the distinct groupings of turbines and minimise impacts. More detailed study would need to be undertaken of the visual and landscape impacts associated with the groupings of different scales of turbine within the Plateau Grassland and it could be that other constraints (such as the need to retain views from the northern edge of the plateau, as described below) may restrict the amount of space available to attain a sufficient gap between groupings of different turbines.

The number of turbines that could be accommodated will be limited by the necessity to minimise impacts on the North Lammermuir Platform by siting turbines away from the ‘rim’ of the scarp (a subtle ridge of ground which provides a degree of containment to the shallow bowl landform on the top of the plateau) and to avoid intrusion on extensive views from the A68 over East Lothian. The potential cumulative effects on wider views of the Lammermuir Plateau are considered in 5.4.

Opportunities should be taken to ameliorate existing forestry, where this is close to a potential windfarm development site, in order to minimise discordant visual relationships between turbines and forestry and reduce fragmentation of the landscape pattern. Due to the high visibility of this character area in close views from the A68, it will be important to retain the simplicity of this landscape and reduce visual clutter of built elements by constructing low key access tracks, reduced in width and partially seeded post construction, undergrounding cabling and restoring and managing disturbed ground.

5.2 CENTRAL LAMMERMUIR PLATEAU

The Central Lammermuir Plateau lies at the heart of the Lammermuir Hills and is characterised by the scale of the hills, the intactness of the heather moor cover and its relatively remote and undeveloped character.

The steep spurs and gullies of the northern edge of Lammer Law are dramatic in views from East Lothian

Heather moorland covers the smooth sweeping rounded hills and narrow valleys of this area

Successive broad summits give a strong sense of expansiveness and openness

CENTRAL LAMMERMUIR PLATEAU: LANDSCAPE SENSITIVITY ASSESSMENT

Scale

A large scale and open upland landscape with hills generally over 400 metres, cumulating in the summits of Lammer Law (527) and Meikle Says Law (535m). Lammer Law is a distinct high point on the Lammermuir ridge when viewed from the north. Scale is greatly reduced within the valleys which cut into the hills.

- Larger development scenarios (3+4) could relate to the large scale of broad summits and ridges. Single and small numbers of turbines would appear trivial in the context of the expansive horizontal scale of the plateau. Turbines (both 65m+120m height) could affect the appreciation of the vertical scale of Lammer Law and other distinctly higher hills if sited close by. Medium

Landform and Shape

Smooth, long ridges extend above convex hill slopes and are dissected by narrow valleys. The steep, north-facing hill scarp on the East Lothian side comprises distinctive rounded spurs, gullies and scooped cavities creating a long sequence of sculptural folds. The summits of the hills coalesce to form a rolling plateau of relatively subtle relief forming long sweeping skylines.

- Turbines (all typologies) could fit with the generally simple landform of the summit plateaux although would disrupt the rolling, open sweeping skyline of these hills. Development should avoid interrupting the extensive rugged and dramatic landform of the north face of Lammer Law and the incised steep sided valleys. Med-High

Settlement

Very sparsely settled with only a few isolated farmsteads set within the Hope valley at the foot of Lammer Law.

- The absence of settlement allows scope for all development typologies to be accommodated without unfavourable comparisons of scale and character with domestic buildings. Low

Industry and Infrastructure Elements

One of the key defining characteristics of this landscape is the relative absence of industrial and significant built infrastructure. There are no public roads although paths and rough tracks follow valleys and some ridges. The small Hope reservoir lies within a sheer sided valley but is not readily visible. A prominent power line (towers 47-50m high) cuts east-west through the southern part of these hills.

- Windfarm development would introduce a new large-scale industrial element to this landscape which is characterised by its relative absence of built

development. High

Landscape Pattern and Foci

This landscape has strong rhythmic qualities of successive interlocking domed summits and incised valleys. It has a consistent land cover of managed heather moorland and is notable for its absence of forestry and woodland. Landscape pattern is very simple with a uniform low land cover and few other elements present. There are no single foci although cairns mark hill summits and Lammer Law is identifiable as a distinct summit.

- All development typologies would fragment the simplicity of this landscape pattern and affect the strongly unified character by disrupting the smooth flow of heather-clad rolling hills. Turbines and associated infrastructure, such as roads, would also introduce foci in an area where the simple expansive sweep of the skyline dominates visual experience. High

Landscape Context

The Central Lammermuir Plateau is important in providing a contrasting backdrop of uplands to the foothills and lowlands of East Lothian and a key focus, in terms of relative height and diversity of landform, along the Lammermuir ridge as a whole.

- All development typologies would affect the appreciation of vertical scale and detract from the relatively diverse landform visible on the north face of the Lammermuir scarp. High

Landscape Composition

This is a simple but very unified landscape where the consistent heather moorland landcover accentuates the broad sweeping openness of rolling summits and long smooth ridges. All development typologies would diminish this strongly unified character by disrupting the smooth flow of rolling hills. High

Degree of Modification/Remoteness

Although obviously managed, the integrity of heather moorland cover and relative absence of man-made elements in this character area gives a strong perception of naturalness. The area is large and relatively inaccessible and it can feel remote and secluded. All development typologies would significantly affect the sense of naturalness and relative remoteness (see also cumulative effects in 5.4). High

Key views from the character area

The minor road south of the B6355, and on the edge of this character area, provides views into this landscape. There is no notable settlement in this character area but well used Rights of Way and the hill summits provide extensive views across the Lammermuir Hills and East Lothian. Existing windfarm developments at Crystal Rig and Dun Law are visible from Lammer Law and other hills.

- The absence of public roads and settlement in this area reduces numbers of viewers that would be affected by development. However, development could intrude on views from more popular hill summits and footpath routes. Medium

General visibility of character area

Views of the steep northern scarp face and summit of Lammer Law are possible from foothill areas in East Lothian. Views from the Borders settlement are distant (beyond 10km). Although views of this character area from many East Lothian settlements extend beyond the 10km 'cut off' used in the visibility analysis (see Appendix D), the ridgeline of the plateau is an important backdrop to many views from within lowland parts of East Lothian and the high point of Lammer Law draws the eye in the context of the whole extent of the Lammermuir ridge.

- Development would be visually prominent on the skyline although would be less visible from the Borders where fewer roads and settlements are present. Some limited visual containment could be offered by landform. Cumulative impacts may occur in relation to the plateau skyline (see paragraph 5.4).

Med-High

Overall Landscape and Visual Sensitivity

High Sensitivity: While larger scale development typologies (3+4) could fit with the expansive scale and generally simple landform of the Central Lammermuir Plateau, the more rugged north face and vertical scale of Lammer Law and other relatively high hills are key limiting factors to development. All development typologies would disrupt the intactness and unity of this landscape, which is further emphasised by the continuity of long sweeping horizons. Turbines and associated infrastructure would also undermine the perception of naturalness and strong sense of relative remoteness and seclusion.

Capacity

There is **no capacity** to accommodate windfarm development in the Central Lammermuir Plateau as all development typologies would incur a number of significant adverse impacts on both landscape character and views and visibility.

5.3 EAST LAMMERMUIR PLATEAU

An undulating plateau forming a backdrop to the eastern coastal plain and foothills of East Lothian and to the sparsely populated farmed valleys of the Borders to the south.

Extensive undulating upland plateau of broad ridges, rounded hills and valleys covered with heather/grass moorland and occasional forestry.

The sheer sided 'Edges' provide interest within an overall simple landform

Existing windfarm development at Crystal Rig is sited on the edge of the huge shallow bowl landform of Dunbar Common

EAST LAMMERMUIR PLATEAU: LANDSCAPE SENSITIVITY ASSESSMENT

Scale

An expansive landscape with a largely open, horizontal emphasis. Forestry and existing windfarm development restricts openness to some degree in the Crystal Rig/Moneynut area. Scale is significantly reduced within occasional narrow valleys where convex side slopes provide strong containment.

- Larger development scenarios (3+4) could relate to the large scale of broad summits and ridges. Single and small numbers of turbines would appear trivial in the context of the expansive horizontal scale of the plateau. All development typologies would compromise the perception of scale within valleys. Low-Med

Landform and Shape

An undulating upland plateau forming broad, long ridges and rounded hills with smooth convex slopes. The plateau is dissected by distinct valleys; some of these narrow and incised, others broad and flat bottomed accommodating larger rivers and water bodies such as Whiteadder Water Reservoir. Some more defined hills such as Spartleton (468m) although lower rounded hill landforms generally coalesce and have an indistinct form within the overall plateau. Dunbar Common comprises a shallow bowl of ground on the northern edge of the plateau, contained by rising ground and Spartleton Hill. The sheer sided spurs and gullies of Moneynut, Sparleton and Lothian Edge are interesting features in the context of this generally simple landform.

- Turbines (all typologies) could fit with the simpler landforms present in this undulating upland plateau such as ridges and shallow basins. The presence of the more dramatic 'Edge' landforms, steeply incised valleys and more distinct hill tops increases sensitivity however. The predominantly open sweeping character of the rolling plateau would be affected although there are some lower-lying areas which are more contained and thus less distinctive in terms of the skyline (see also cumulative issues in 5.4). Medium

Settlement

Sparsely populated with isolated farmsteads located within valleys; larger buildings at Mayshiel.

- The sparseness of settlement allows scope for all development typologies to be accommodated without unfavourable comparisons of scale and character with domestic buildings, providing populated valleys are avoided. Low-Med

Industrial and Infrastructure Elements

Public roads tend to be routed through valleys, broadly aligned north/south. The B6355 crosses the plateau. A major power line is prominent (47-50m high towers)

and built infrastructure associated with Whiteadder reservoir. An existing windfarm is located at Crystal Rig (25 turbines, 100 m high to blade tip, soon to be increased by 56 turbines, 110m and 125 m height).

- Existing wind energy development is a key characteristic of this area and association of new development with existing infrastructure (5) would further emphasise this aspect of landscape character, concentrating built elements in part of this character area. New development sited elsewhere within this character area and dislocated from existing windfarm development would have the effect of spreading large scale development into landscapes where relatively little built infrastructure presently exists and affecting the proportion of open sweeping hills to developed areas. It would also affect the clear association between relatively low-lying landscapes and existing windfarm development. (see also cumulative issues in 5.4) Med-High

Landscape Context

This area is important in forming a backdrop to foothills and the coastal plain of East Lothian. It also provides a transition or 'buffer' against the more inaccessible and less modified central core of the Lammermuir Plateau to the west.

- Development could indirectly affect the adjacent Central Lammermuir Plateau if located in the western part of this character area by lessening the gradual transition to predominantly open sweeping hills and extending the more developed character (characterised by forestry and windfarm development) prevalent to the east. Med-High

Landscape Composition

This area generally has a semi-complex and fragmented landscape composition with some discordant features and where settlement and shelterbelts within valleys and existing windfarm development and power lines on higher plateau areas draw the eye. While development could consolidate this composition in some areas it may also affect the integrity of remaining open hill tops and moorland plateau. Med-High

Degree of Modification/Remoteness

While the open moorland of this area has some natural qualities, the presence of forestry, existing windfarm development and power lines, particularly prevalent to the east, reduces this perception. A degree of remoteness is felt due to the sparse settlement and exposed, open space of the plateau although public roads are relatively close by.

- Additional windfarm development is likely to compromise the remaining sense of remoteness within this area, but it is recognised that this is already a clearly modified, if upland, landscape. Interior walking routes, for example, Dunbar Common (crossed by a number of paths) from where the experience of

remoteness is most likely to be felt, are likely to be most sensitive to this type of development and although perception is affected already by existing windfarm development, and forestry to some degree, the sense of expansiveness and openness on the Common remains a key characteristic of the experience of walking in this area. Additional development would affect the walking experience in this area. Med-high

Key views from the character area

Public roads and settlement are generally located within valleys aligned northwest/southeast. Views are limited apart from elevated sections of the B6355 and the minor road to Longformacus which provide panoramic views over much of East Lothian and the upland plateau of the character area. The area is crossed by a number of footpaths, many of these historic routes, eg the Herring Road.

- Much of this area is highly visible from elevated minor public roads and footpaths although less so from valleys. Some areas of slacker ground eg Dunbar Common, are partially contained by hills and ridges and therefore less visible from roads. The presence of existing windfarm development and the sparsely settled nature of this character area reduces sensitivity. Medium

General visibility of the character area

Views of steep scarp faces eg Lothian Edge/Monynut Edge from foothill areas are dramatic although only appreciated from minor roads and footpaths. Some areas of slacker ground less widely visible from lowland areas eg Dunbar Common. The ridgeline of the plateau is an important backdrop to many views from within lowland parts of East Lothian, although is distant from the majority of key viewpoints with no settlements likely to have views from within the 10km cut off used in the visibility analysis.

- Development could be visually prominent on the skyline although would generally be seen over some distance from East Lothian and the Borders. Existing windfarm development reduces sensitivity to some extent although cumulative impacts may occur in relation to the overall skyline of the Lammermuir Plateau (see 5.3). Medium

Overall Landscape and Visual Sensitivity

Medium - High Sensitivity: Larger scale typologies (3+4) could relate to the large scale and essentially simple landform and patterning of forestry although the sheer-sided dramatic landform features of the Lothian, Spartleton and Monynut Edges and more distinct hill tops and valleys increase sensitivity. Development would diminish the unity and integrity of remaining open hill tops and moorland plateau with a less fragmented landscape pattern and the proportion of open sweeping hills to 'developed' interrupted skyline. Cumulative landscape and visual impacts will be a key limitation to additional development in this character area.

Capacity for Development and Guidance on Siting and Design

There is **low** capacity for development within the Eastern Lammermuir Plateau character area. Larger scale development typologies (3+4) would fit with the scale and generally simple landform of this area. Development on higher ground, such as broad ridges with a more fragmented landscape pattern, would not accord with the existing pattern of windfarm development located within slacker areas of landform with a degree of containment and would be particularly prominent on the skyline and therefore highly visible from both East Lothian and the Borders. There are very few, if any, remaining areas of similar slacker landform and dips surrounded by hills in this character area. Scope to accommodate extensions to the existing windfarm (5) is severely limited due to impacts on the sense of openness and expansiveness of Dunbar Common and on the landform of, and views from, the Lothian and Moneynut Edges. Although Phase II of the Crystal Rig development was considered as part of the baseline landscape within the study, scope for additional windfarm development in this area would need to be carefully judged against this extension once built as this would allow a more accurate assessment of effects on landscape and visual sensitivities and cumulative impacts.

5.4 CUMULATIVE LANDSCAPE AND VISUAL ISSUES WITHIN THE UPLANDS

5.4.1 *Introduction*

Cumulative effects were considered in part in the landscape and visual sensitivity assessment due to existing windfarm development being present within the uplands and with the effects of additional development in the Lammermuir Plateau being considered against this baseline. This section of the report considers cumulative landscape and visual issues associated with siting additional windfarm development within the uplands, describing the reasoning behind the landscape sensitivity assessment with regard to existing development, potential effects on landscape character and the perceptual qualities associated with it and landscape and visual effects on skyline and on fixed and sequential views.

5.4.2 *Existing Windfarm Development within the Study Area*

The existing windfarms of Crystal Rig (Phase I and II) and Dun Law were considered as part of the baseline character assessed in the sensitivity and capacity assessment of individual landscape character areas. Following our field survey and sensitivity assessment, we concluded that these two existing windfarms occupy the least sensitive sites within the Lammermuir Plateau. It was also noted that in terms of landscape character, both windfarms occupy broadly similar sites. Both are located towards the extremities of the Lammermuir range, located within elevated but relatively contained land, defined by surrounding rising ridges. The terrain in both cases is slightly undulating and the vegetation pattern is clearly modified by human use and characterised by a fragmented land use pattern of forestry and moorland.

In terms of landscape character, the Crystal Rig development lies within the ‘Eastern Lammermuir Plateau’ character area. This character area was assessed as having a medium to high landscape sensitivity. Without the existing windfarm, the sensitivity assessment would have concluded that this area had a relatively low sensitivity to windfarm development. However, the presence of the existing development at Crystal Rig (Phases I and II) limits the potential for additional development.

The existing Crystal Rig (Phases I and II) windfarm development occupies part of the Eastern Lammermuir Plateau where landform is generally indistinct (ie away from hill tops and the steep ‘Edges’) and where forestry, powerlines, improved pasture and moorland combine to produce a fragmented landscape composition. In a wider context, this windfarm is also sited within an area of slightly lower ground and at the eastern extremity of the Lammermuir ridge when seen from East Lothian and this reduces its visual effect.

The sensitivity assessment for the Eastern Lammermuir Plateau therefore considered the cumulative effects of additional windfarm development within the character area and concluded that there was very limited capacity to accommodate further development. This was due to a number of factors including; the need to retain a balance between the proportion of 'open' to 'developed' land, where additional development would tip the balance and adversely affect the key characteristic of open skyline present over much of this character area and; the shortage of remaining areas of less sensitive relatively lower lying land with a fragmented character. It may be that there are no suitable sites remaining within the Eastern Lammermuir Plateau where significant adverse landscape and visual impacts will not arise as a result of windfarm development.

The existing Dun Law windfarm development is located within the Plateau Grassland character and is defined as having a low to medium landscape sensitivity to development. The Dun Law windfarm similarly occupies a lower section of the Lammermuir ridge visible from East Lothian and is located towards the western extremity of the ridge. It is defined by higher ground and the more distinctive rounded hills of the Central Lammermuir Plateau to the north-east and the Moorfoot Hills to the south-west. In this case we considered that there was scope to accommodate additional windfarm development in this character area, largely due to the presence of less distinctive lower lying land with a fragmented pattern. However, we also recognised that there may be cumulative issues associated with varying sizes and spacing of turbines due to the likely proximity of existing windfarm development.

5.4.3 *Cumulative Effects on Landscape Character*

Cumulative Effects on the East Lammermuir Plateau and Plateau Grassland Character Areas

The landscape sensitivity assessment concluded that within the East Lammermuir Plateau character area, scope for further development was limited to areas of 'slacker' terrain, avoiding the more distinct landform of higher ridges and hill tops. Development should avoid spreading into less modified areas (where forestry is less dominant) where it would affect the proportion of open to developed hill tops and the swathe of sweeping open moorland which is a key characteristic of much of the area. Siting further development in close proximity to existing windfarms would consolidate development into a definable area, limiting spread and maintaining an associated between the fragmented, undulating and relatively contained terrain and windfarm development. Localised constraints such as the need to avoid distinct landform features, effects on character and views from adjoining 'foothill' character areas and the perception of expansiveness and openness for people travelling or using recreational routes are likely

to restrict the scale of additional development to acceptable levels in terms of overall numbers of turbines appropriate to the scale of this landscape.

The landscape sensitivity assessment further concluded that within the Plateau Grassland character area at the western end of the Lammermuir Plateau, scope for additional development was also limited to consolidating the existing pattern of development and association with landscapes characterised by their relatively low-lying contained landform and fragmented pattern. Constraints associated with the retention of views from the A68 and minimising landscape and visual effects on foothill areas would limit development to acceptable levels in terms of the overall numbers of turbines appropriate to the scale of the Plateau Grassland character area.

Cumulative Effects on Adjacent Character Areas

Indirect effects on the Central Lammermuir Plateau character area (assessed as having a high landscape sensitivity to windfarm development) could arise where further development either side impinges on the present gradual transition that occurs between the upland character areas, particularly in terms of retaining the characteristic openness simplicity and sense of expansiveness of the sweeping moorland and the relative remoteness and less modified character of this area. This additionally limits scope for further development on the western edge of the East Lammermuir Plateau and eastern edge of the Plateau Grassland.

Views of the existing Dun Law turbines are relatively limited within the adjacent North Lammermuir Platform character area. The Crystal Rig Phase II development will be more visible from the Eastern Lammermuir Fringe. Indirect cumulative landscape effects could occur on these ‘hill fringes’ where additional windfarm development sited at the transition with these areas would intrude on views and provide a more consistent reference feature on the skyline, affecting the intimate scale and rural character of these areas.

5.4.4 *Sense of scale and distance and effect on focal points*

In the uplands where scale and distance is often difficult to judge due to the general absence of scale references, multiple windfarm development may diminish the sense of expansiveness and ‘crowd’ or oppress the viewer. This effect is likely to extend outwith the individual character area due to the expansive views and inter-visibility across the upland Lammermuir Plateau. A dispersed pattern of windfarm development, where windfarms are scattered across the plateau, is likely to affect the perceived scale and sense of expansive distance from many viewpoints and in many directions resulting in a potentially significant cumulative impact. Focussing development in one or two areas,

particularly where existing developments or land uses provide visual scale references eg forestry, settlement, wind turbines and other man-made infrastructure, would limit this effect.

The degree of cumulative visual effect resulting from the introduction of different heights of towers/blades where new development is sited close to existing windfarm development will depend on the differential between heights and proximity of turbines to each other. Larger turbines will have different rotor speeds to smaller turbines and this could introduce an element of visual confusion.

In the case of the existing Dun Law windfarm, we noted in our field survey that the full height of all turbines is rarely seen from a single viewpoint within the context of this gently undulating landform. Distinct groupings of different heights of turbine may limit impacts particularly when seen in close views (see capacity statement in 5.3) although a distinct geographic separation will be necessary to minimise the effects of different rotor speeds. We consider that the discordant effects associated with different heights of turbine in close proximity is likely to be less significant in distant views. Taller turbines (120m height) may, however, affect the appreciation of the vertical scale of the Lammermuir Plateau when seen from lowland areas and it would therefore be necessary to take care in detailed siting to minimise visibility whilst accepting that some impacts are nonetheless still likely to occur.

The design of turbines and their spacing is of equal importance to consideration of height differentials in ensuring visual compatibility in terms of proportions of tower to blades, colour and form and spatial pattern and distance between turbines and this needs to be considered in detail at an individual project level.

5.4.5 *Skyline Effects*

The SNH guidance on cumulative effects (SNH 2004) states that: *"A viewer's eye tends to be drawn towards the skyline. Where an existing windfarm is already prominent on a skyline the introduction of additional structures along the horizon may result in development that is proportionally dominant. The proportion of developed to non-developed skyline is therefore an important landscape consideration."* The effects of cumulative development on the skyline is also inter-related to other cumulative issues such as those on landscape character; many of these already addressed by the landscape and visual sensitivity assessment.

5.4.6 *The Lammermuir Plateau seen from the Lowlands of East Lothian*

The Lammermuir Plateau forms a constant focus and backdrop to views from much of lowland East Lothian; its simple and often backlit darkened form providing a contrast with the more visually 'busy' lowlands below. Views of the long ridge from within the foothill areas fringing the plateau are generally close up and focus on the detail of the scarp face while from further north, views are more distant and therefore do not pick up landform details but take in the full extent of this long ridge It is from the middle areas of East Lothian for example, the B6368 south of Haddington, where relatively close views allow appreciation of both landform detail and the length of the ridge, that greater potential cumulative effects on the skyline may be experienced.

The horizontal profile of the Lammermuir Plateau seen from East Lothian is not particularly high but appears so in the context of the low-lying coastal plain. The continuity of the smooth, uninterrupted and middle section of the skyline associated with the Central Lammermuir Plateau is a key characteristic with the eye being drawn to higher points in the middle of the ridge (Lammer Law). The existing Dun Law and Crystal Rig windfarms are located within lower points of the ridge and at either end of it and thus a long central section of the ridge is intact (this also limits cumulative effects on many views within East Lothian as both existing windfarm developments can be seen simultaneously but with a large separation between and generally from distances over 10km). The rising landform of the Central Lammermuir Plateau also provides some visual containment of these lower lying sections and reinforces the dominance of open land within the view, as the higher, more visually prominent, land is left open.

It is important that the higher central section of the Lammermuir Plateau be kept open in order to retain its dominance and integrity as it adds interest within the long, generally even skyline. If windfarm development were to be located on high points it would form a more prominent skyline feature; if it were located in close proximity it would diminish the focus of these higher points of the ridge. Additional development seen on the skyline would fragment the long and open profile of the hills seen against the sky and its smooth flow, decrease the geographical separation of windfarm developments and potentially increase the number of viewpoints where simultaneous visibility may occur.

This is not a high ridge (400-500m) and even the relatively small turbines of the Dun Law windfarm can appear quite large from 16 km away (eg. From the Garleton Hills) despite being located on an area of generally slacker landform and comprising relatively small height turbines (63.5m). Further development visible on the Lammermuir ridge will diminish the sense of vertical scale experienced from both lowland East Lothian and from parts of the Borders to some extent.

5.4.7 *Views from within the Lammermuir Plateau*

The proportion of open space to 'developed' area is also important in the context of views from within the Lammermuir Plateau itself. In key views from the B6355 across the plateau, the existing Crystal Rig windfarm occupies a relatively small proportion of key views, allowing an extensive and largely unbroken skyline of rounded hill tops to dominate. Further development would affect this skyline and if dispersed from existing development, turbines could interrupt the flow of the eye along the smooth and rhythmic sweep of hill profiles. The relatively low lying location of the existing development means that from higher viewpoints, the turbines are seen against a partial backdrop and not skylined, and views can project over the tops of turbines to the lowlands and coast. There are limited areas where this can be replicated within the East Lammermuir Plateau.

In terms of skyline issues, expansion of existing windfarms is considered to be the best way to accommodate additional development without encroachment on the more interesting higher points of the ridge and without significantly affecting the characteristically long, uninterrupted central ridge.

5.4.8 *Simultaneous Visibility*

The distance limits for inter-visibility depend on the height of the turbine but are also modified by many factors, including the weather, human perception, and by intervening topography and landscape features. In terms of the sensitivities outlined for the upland character areas (and the distances between character areas judged to have medium and above capacity for development) and the strategy put forward for consolidating existing windfarm development, we consider that simultaneous visibility would occur but would not result in significant cumulative impacts.

5.4.9 *Sequential Visual Effects*

Sequential visibility occurs as the observer moves through the landscape or across the sea and will be more pronounced if the distance(s) between windfarms are short. A key factor is the time between sightings, so that a car driver will experience the sequential effect over longer distances and in a shorter time than a walker on the same route. Frequent or repeated sequential visibility can then lead to the perception of a wind energy landscape, where the wind turbines become the defining characteristic of that landscape. Two issues arise from sequential visual effects; effects on perception of landscape character and impacts on views.

Within the lowlands, views from the major transport routes of the A1 and Main East Railway often take in wide panoramas that include the Lammermuir ridge. Sequential and simultaneous cumulative visual effects associated with a greater extent of windfarm development being visible on the Lammermuir Plateau in views from the transport routes and other viewpoints within the lowlands would raise similar issues to those identified under cumulative effects on the skyline (paragraph 5.4.5) and the same recommendations therefore apply.

In the vicinity of the Dunbar/West Barns roundabout, only the eastern end of the Lammermuir ridge is visible and this is relatively close to the A1 as the coastal plain constricts. Glimpsed views of the Phase I Crystal Rig windfarm are currently possible and a greater extent of the Lammermuir ridge in view will be filled by the Crystal Rig Phase II windfarm extension (Natural Power-2004, ES Figure 6.6). Due to the relative proximity of the uplands to main transport routes in this area, cumulative sequential visual impacts may arise with any new windfarm development within the Eastern Coastal Margin (judged to be of medium capacity in the assessment). This is likely to be less of an issue in the broader lowland areas where the uplands are distant from areas identified as having some medium or above capacity for windfarm development eg the Agricultural Plain.

Within the uplands, the B6355 offers views and experience of the Lammermuir Plateau and the Borders landscapes. A number of well used Rights of Way also provide means of access in these areas. It will be important to consider wider sequential and simultaneous cumulative effects arising from other currently proposed windfarm developments within the Scottish Borders with existing and any proposed new developments in East Lothian. Detailed assessment is outwith the scope of this study but we would recommend that particular consideration should be given to the pattern and spatial arrangement of developments and their relationship to landscape character within the wider Lammermuir Plateau and Southern Uplands area.

Conclusions on Cumulative Effects in the Uplands

Cumulative landscape and visual effects across the uplands of the Lammermuir Plateau should be limited by consolidating existing locations for development and building on the existing relationship that exists between landscape character and windfarm development ie) sited on relatively low lying areas with some definition provided by higher ground surrounding them. This approach to future development would also limit cumulative effects on views and on the appreciation of landscape character from the lowland landscapes of the study area.

In terms of skyline and sequential/simultaneous visibility issues, expansion of existing windfarms (5) is considered to be the best way to accommodate additional development without encroachment on the more interesting higher points of the Lammermuir Plateau and without significantly affecting the characteristically long, uninterrupted central section of the ridge.

Indirect landscape and visual effects on foothill landscapes and sequential/simultaneous effects on views from key routes within the Eastern Coastal Margin are likely to occur and this needs to be considered in the detailed siting, design and assessment of any proposals for windfarm development.

6. CONCLUSIONS ON CAPACITY

6.1 Summary of Findings

6.1.1 *Background to the Study*

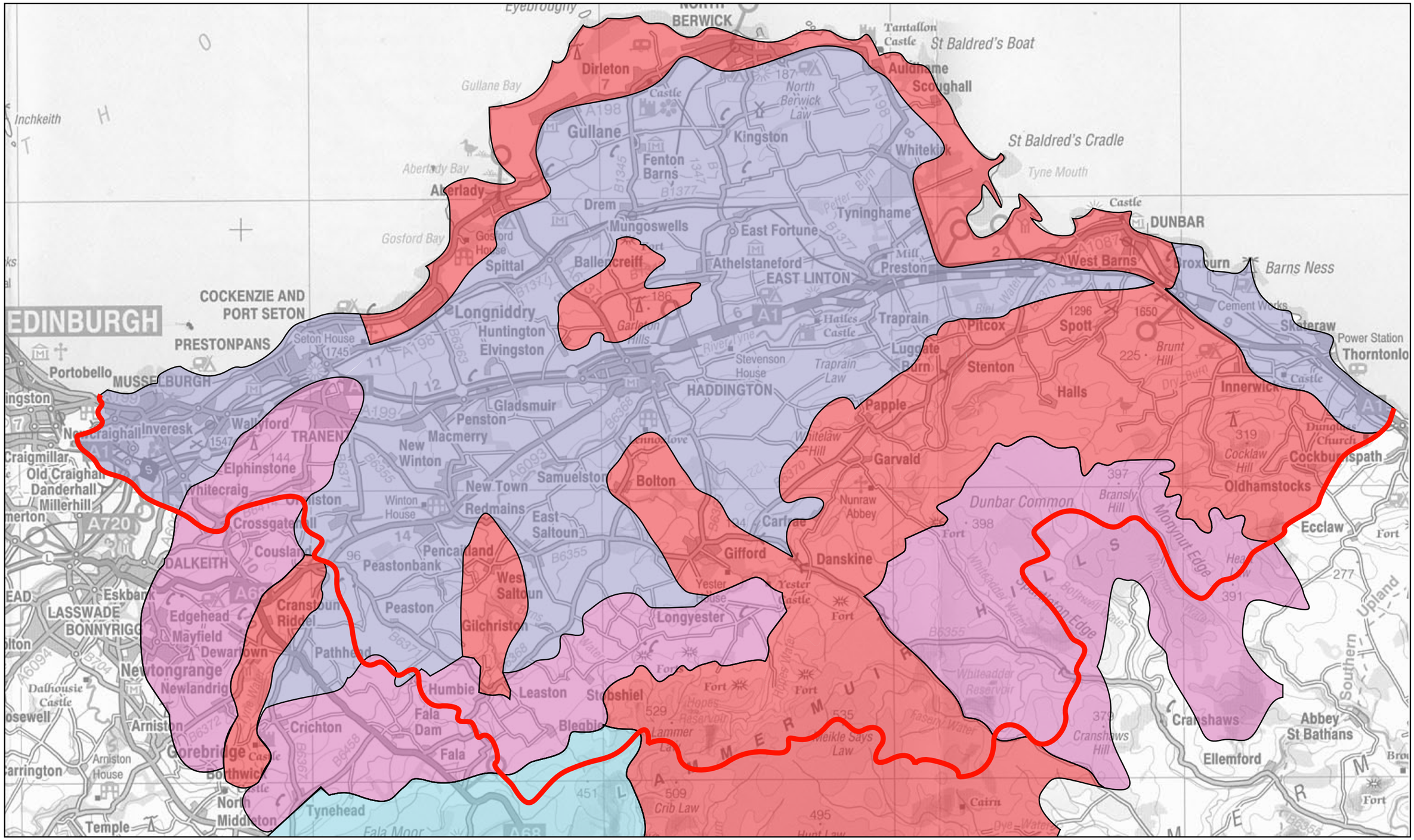
The study has assessed the sensitivity of twelve landscape character areas within the study area to a range of different wind turbine development scenarios, using a number of key landscape and visual criteria in the assessment. The capacity for wind turbine development within character areas has been appraised and general guidance given on the siting and design of wind turbine developments.

Landscape designations were not considered in the assessment. However, in accordance with the brief, a review of AGLVs was undertaken following the assessment to consider their relevance as a landscape policy designation to windfarm development. This review is outlined in Appendix E.

There are two existing windfarms within the study area, located within the Plateau Grassland and East Lammermuir Plateau landscape character areas. Cumulative landscape and visual effects were therefore considered in the sensitivity assessment for these character areas and within the wider study area, as the effects of additional development on landscape and visual character was judged. Potential landscape and visual cumulative issues were also considered collectively for lowland and upland character areas where greater consideration was given to wider views and landscape character throughout the study area.

6.1.2 *Landscape and Visual Sensitivity*

A summary of landscape sensitivity and capacity is illustrated in Figure 6.1 and set out for each landscape character type in Table 6.1 below:



Sensitivity Grading

- High Sensitivity
- Medium-High Sensitivity
- Medium Sensitivity
- Low-Medium Sensitivity

0 2 4 6 km

1 : 125,000

Landscape Capacity Study for Wind Turbine Development in East Lothian

Landscape Sensitivities

Fig No: 6.1

Table 6.1: Summary of sensitivity and capacity

Landscape Type	**Sensitivity**	**Capacity**
Eastern Coastal Margin	Medium	Moderate
Northern Coastal Margin	High	None
Musselburgh/Prestonpans Fringe	Medium	Moderate
Agricultural Plain	Medium	Moderate
Garleton Hills	High	None
Mayfield/Tranent Ridge	Medium-High	Low
River Valleys	High	None
Eastern Lammermuir Fringe	High	None
North Lammermuir Platform	Medium- High	Low
Plateau Grassland	Low - Medium	Moderate - High
Central Lammermuir Plateau	High	None
East Lammermuir Plateau	Medium - High	Low

None of the landscape character areas assessed was considered to have a low sensitivity to windfarm development. The lowest sensitivity was found within the Plateau Grassland character area, where there was considered to be moderate to high capacity for wind turbine development.

There was found to be moderate capacity for wind turbine development in three landscape character areas; the Eastern Coastal Margin, the Musselburgh/Prestonpans Fringe and the Agricultural Plain. It was considered that development in these areas would have some landscape and visual impacts but that these were unlikely to be as significant as those that would occur across a number of the sensitivity criteria for 'medium-high' and 'high' sensitivity evaluated landscapes. Development in these character areas with moderate capacity would be subject to a number of landscape and visual constraints, limiting scope for development.

Three landscape character areas were identified as having low capacity for wind turbine development. These were the North Lammermuir Platform, East Lammermuir Plateau and the Mayfield/Tranent Ridge. Development in these character areas would be severely constrained by a number of sensitivities and some significant landscape and visual impacts would be likely to occur on key sensitivity criterion even with careful siting and design.

There was considered to be no capacity for development within the Garleton Hills, the River Valleys, the Northern Coastal Margin, the Eastern Lammermuir Fringe and the Central Lammermuir Plateau due to the high sensitivity of the majority of key characteristics to all development scenarios.

Sensitivity to the five wind turbine development scenarios considered in the assessment is summarised against each of the landscape character areas in table 6.2 below:

Table 6.2: Summary of sensitivity to development scenarios

Landscape Character Area	**Single (1)**	**Small (2)**	**Med (3)**	**Large (4)**	**Ext (5)**
Eastern Coastal Margin	x	✓	x	x	x
Northern Coastal Margin	x	x	x	x	x
Musselburgh/Prestonpans Fringe	x	✓	x	x	x
Agricultural Plain	x	✓	x	x	x
Garleton Hills	x	x	x	x	x
Tranent/Mayfield Ridge	x	✓	x	x	x
River Valleys	x	x	x	x	x
Eastern Lammermuir Fringe	x	x	x	x	x
North Lammermuir Platform	x	✓	x	x	x
Plateau Grassland	x	x	x	✓	✓
Central Lammermuir Plateau	x	x	x	x	x
East Lammermuir Plateau	x	x	x	✓	✓

(Single 65m turbine, Small= 42m to 65m turbines/2-5nr turbines; Medium=120m turbines/6-20 turbines; Large=120m turbines/21+ nr, Ext= extensions to existing windfarms)

6.2 Capacity for Development in the Uplands and Lowlands

6.2.1 *The Landscapes of East Lothian*

Although covering a relatively small area, East Lothian has a diverse landscape character comprising coastal margins, farmed lowlands, river valleys and rolling foothills; edged by the long rim of the Lammermuir Plateau and set against the striking expanse of the Firth of Forth. The diversity and attractiveness of its landscapes and proximity to Edinburgh results in high recreational use and thus increases the importance of its landscapes to many people. A number of key transport routes linking north and south of the Border are aligned through the county and it offers a scenic introduction to Scotland for both new and regular travellers.

The assessment considered the context of East Lothian in terms of its overall diversity, the strong inter-visibility of landscapes across the county and its relatively compact geographical area. The findings of the study relate to East Lothian alone and although similar character areas may be found elsewhere within Scotland, they would not

necessarily have the same sensitivities associated with them due to differences in context and geography.

Existing windfarm development is already present in the study area and while one of these developments lies outwith East Lothian, it has an influence on landscape character and views within East Lothian. The study found that scope for additional wind turbine development was generally limited throughout East Lothian without significant adverse landscape and visual impacts arising.

It should be stressed that this study considered landscape and visual issues only. Technical and other environmental constraints would also need to be taken into account in determining potential areas of search for wind turbine development. Some significant landscape and visual effects associated with windfarm development may be deemed acceptable in the context of other overriding objectives and these conclusions and strategy are therefore the view of the consultants and intended as our recommendations only.

6.2.2 *The Uplands*

The majority of the Lammermuir Plateau lies within the study area. It is not a large upland area when compared with the extensive tracts of uplands present in other parts of Scotland. Existing windfarm development is already present in this upland area and was found to occupy the least sensitive parts of the plateau in terms of landscape character, sited within lower lying shallow basins with a degree of containment from adjacent higher ground and a more fragmented landscape pattern created by forestry and communications.

There are very few remaining sites within the Lammermuir Plateau which have similar landscape characteristics to the sites already occupied by existing windfarms. The study found that highest capacity exists in the Plateau Grassland character area where scope exists to accommodate additional wind turbines within a low lying shallow basin with a fragmented character. Although the East Lammermuir Plateau was found to have some capacity this was associated with shallow gradients and relatively contained land, much of which was already occupied by the existing Crystal Rig (Phases I and II) windfarm development. The capacity of the remaining landscape was therefore considered to be low. Constraints associated with the remaining ‘undeveloped’ landscape of the East Lammermuir Plateau include more diverse landform features and the need to retain the characteristic expansive scale and openness of the hill tops, upland ridges and Dunbar Common. In conclusion there may be no scope to accommodate additional turbines within the East Lammermuir Plateau, as in many areas development would incur a number of significant adverse landscape and visual impacts.

The Central Lammermuir Plateau character area comprises the 'core' of the wider Lammermuir Plateau forming an area of higher rounded hills with a distinctively rugged northern scarp. The consistent moorland cover, negligible settlement and absence of roads and windfarm development give this area a strongly unified, relatively remote and undeveloped landscape character. This character area was assessed as being of high sensitivity to windfarm development.

We therefore recommend that any additional wind turbine development in the uplands should be located in the Plateau Grassland character area and be associated with the existing Dun Law windfarm with the overall aim being to limit the spread of turbines on the skyline, consolidate wind turbine development within less sensitive lower lying sections of the plateau and thus avoid the more visually dominant higher central core of the ridge, defined as the Central Lammermuir Plateau.

In conclusion, while the Central Lammermuir Plateau is not especially rugged or dramatic when compared with many of the upland landscapes in the Scottish Highlands, in the context of the study area it makes a vital contribution to the overall diversity of the landscape of East Lothian. While it was outwith this study to consider recreation interests in full, the Lammermuir Plateau is also important in providing the experiential qualities of openness and expansiveness within a short distance from centres of population. Both these factors increase the sensitivity of the remaining largely undeveloped core of the Central Lammermuir Plateau.

6.2.3 *The Lowlands*

We considered that relatively few of the lowland character areas could accommodate wind turbine development without incurring significant landscape and visual impacts on a number of the key criteria used in the assessment. Within those character areas where some capacity for development was identified, we concluded that the small-scale development typology of 42-65m high turbines in a grouping of 2-5 number, would have a better relationship with the scale and increased complexity of landscape pattern and settlement present.

There are a number of localised constraints to siting wind turbine development within these lowland character areas including the need to retain a degree of separation from settlement, avoiding impacts on the pattern of fields and woodlands and on interesting landform features and focal points. These constraints are likely to severely limit suitable sites for development without significant landscape and visual impacts arising across the majority of the assessment criteria. There will also be perceptual issues relating to the degree of change that might be acceptable within settled lowland areas

that to date have not been associated with wind turbine development and this is considered more fully in paragraph 6.4 which follows.

6.3 Cumulative Issues

The appraisal of potential cumulative landscape and visual impacts was based on the premise that all character areas considered to have some capacity for wind turbine development were developed but took cognizance of the broad constraints identified in the assessment. We concluded that potential cumulative landscape and visual impacts may occur in some instances particularly to the west where development within the Musselburgh/Prestonpans Fringe, Agricultural Plain and Mayfield/Tranent Ridge could affect views and the perception of the rural qualities of landscapes. To the east, there may be cumulative impacts associated with existing wind turbine development in the East Lammermuir Plateau and any development in the Eastern Coastal Margin. It will be important to consider such cumulative effects in the detailed appraisal of any new proposals.

6.4 An Overall Strategy for the Study Area

While we have considered the potential sensitivity and capacity of individual landscape character areas and potential cumulative landscape and visual effects in the context of upland and lowland landscapes, issues associated with the overall pattern and rationale of development have only been partially appraised in the preceding text. A windfarm strategy should aim to consider how best to accommodate windfarm development based on the sensitivities and capacity findings identified by the study, as well as taking into account other interests that will affect the potential for development.

Existing windfarm development within the study area is associated with the upland landscapes. There is a perceived rationale to this established pattern in that wind turbines are associated with the more exposed and windier areas of East Lothian. This pattern of association of windfarms with a particular type of ‘upland’ landscape is more or less followed throughout Scotland, with perhaps the exception of more recent developments such as the windfarm at Ardrossan, which is located fairly close to settlement and against the coast, and the Black Law windfarm (currently under construction) which is close to a number of settlements within the Central Belt, albeit, sited in a sparsely populated area of lowland moorland and forest.

Conversely, within North East England, for example, a number of small windfarm developments are located relatively close to settled areas and the upland landscapes have been kept largely free of development to date. Although this has occurred principally due to the constraints imposed by the MOD and landscape designations, it

has, nonetheless established a different association between windfarm development and landscape character to that seen in most of Scotland.

A strategy for wind energy in East Lothian would need to take into account the existing pattern of windfarm development within the upland landscapes and consideration of the rationale for the development being associated with exposed and open upland landscapes.

The established pattern of development in the uplands of the study area comprises turbines (63+ m to 120m high) set within elevated open and sparsely populated moorland landscapes. This pattern has largely occurred due to the interaction of technical requirements and the financial marketplace with the relative lack of constraint in terms of avoiding conflicts with settlement (noise, visual impacts etc) also an influencing factor. The changing financial and technical situation for the wind industry combined with competition for suitable sites has led to a greater number of proposals coming forward in less windy lowland areas. However, the question needs to be asked as to what the landscape and visual effects would be of introducing commercial scale wind turbines to other landscapes where they are not currently a feature and where no association or rationale exists in terms of both the study area and its surrounding regional context.

The diversity of East Lothian's landscapes is important, as highlighted in 6.2.1, and one of the key potential effects of siting windfarms in both upland and lowland landscapes may be the diminishing of this diversity through the introduction of an element of generic form, such as a modern wind turbine, into areas of notably different landscape character. This may also counter the perceived rationale of putting turbines in the most windy and less settled places. The capacity study has already taken this into account to some extent by identifying upland areas consistent in character with existing windfarm sites as having some capacity for development.

There is already an established clear association between larger developments and some of the upland landscape character areas. If development was to be accommodated in the lowland landscapes, then a strategy should ensure that the height, extent and pattern, as well as more specific locational issues, should combine to create a strong relationship between appropriately scaled and designed windfarm development and a certain type of lowland landscape. Emphasising the difference between upland and lowland windfarm types and location in this way could help reduce some potential cumulative effects and may assist in accommodating development by creating windfarms that are particular to the character of the landscape.

This capacity study has sought to identify sensitivities and broad capacities for windfarm development within the study area. It only considers 'commercial' scales of development, although at the smaller scale, some of these are not currently considered to be economically viable by most developers. In terms of a strategy for wind energy development in East Lothian, we would recommend that only areas identified as having a moderate or high to moderate capacity for windfarm development should be considered in any policy. This excludes character areas identified as having a medium to high sensitivity/low capacity due to the significant landscape and visual effects that would occur on a number of key characteristics (see table 6.1) and those identified as having high sensitivity/no capacity.

We recommend that only smaller scale developments are sited in the lowland areas, with the lowest height range of the smaller typology (42m) being more appropriate in the Agricultural Plain and the Musselburgh and Prestonpans Fringe where the pattern and extent of existing settlement increases sensitivity.

Such an approach to height differential begins to establish a strategy for accommodating development in lowland landscapes but would need to be further developed in terms of appropriate pattern, extent and localised site opportunities within the areas identified in the study before potential cumulative effects could be fully assessed. It was noted, for example, that the existing Dun Law turbines located in the uplands are 63.5 metres high, which is relatively small in height for an upland location in today's market and as such, it may be difficult to distinguish between the height of lowland and upland developments.

A policy which focussed on smaller 'domestic' or 'community' scale developments in the lowlands (turbines generally below 19m height) would achieve a more significant scale differential with existing windfarm development in the uplands. Adoption of a smaller scale development type would reduce sensitivity and generally increase capacity in landscape character areas within the lowlands. A strategy for windfarm development within East Lothian would need to consider this domestic scale of development in more detail.

6.5 Guidance on Aspects of Detailed Design

6.5.1 *Introduction*

Detailed siting and design guidance was outlined for each character areas where there was considered to be some capacity for development. The following issues are common to all these landscape character areas.

6.5.2 *Turbine Design*

From our observations in the field, we found that the Dun Law turbines had a particularly elegant design in terms of the proportion of blade to tower. We felt that the turbines used at the Crystal Rig development were less successful however in design terms, having a bulky nacelle with control room (windows within the control room invoking a sinister impression with their resemblance to two 'eyes', a reaction common to other landscape professionals known to us who have visited this development). The proportion of blade to tower also produces a less elegant turbine with a heavy, relatively short upright tower and large diameter rotor giving a consequent 'dumpy' appearance.

Close views of turbines will be possible within the Plateau Grassland character area and lowland areas where some capacity exists for development, due to the proximity of roads, and/or settlement. It is therefore important to also select turbines on the basis of their aesthetic qualities rather than solely on the basis of their technical suitability.

6.5.3 Ancillary Elements

It is good design practice to construct minimum width access tracks, reducing width by restoring edges post construction, with the aim of minimising landscape and visual impacts. Quality restoration is rarely undertaken, however, in many windfarm developments and disturbed ground and rough stone tracks left post construction often detract from the simple form of turbines. It will be essential in the case of all the areas identified as having some capacity for development within the study area, for access tracks and other construction areas such as around the base of turbines, to be carefully designed and restored post construction due to the relatively high visibility of potential wind turbine sites from nearby roads and footpaths. The routeing of tracks in relation to existing topography is especially important for upland landscapes and methods for achieving restoration should include a range of best practice techniques such as scarifying and partial seeding and replacing stored turves post construction.

Where small scale wind turbine development is recommended, there is more scope for access tracks to be narrow and possibly temporary, using roll-up matting for smaller cranes and construction vehicles, for example. Within lowland landscapes, tracks should be aligned, where possible, at the base of field boundaries, where hedgerows or shelterbelts provide some partial screening and rationale in terms of fitting with the existing landscape pattern.

In both the upland and lowland areas, all electricity connections should be buried underground to avoid a clutter of elements. Electricity sub stations should be associated with existing buildings, where possible, or related to other landscape features such as

woodland or hedgerows if not. Their design should be of high quality, matching the scale and materials of existing buildings. Security fencing and lighting should be avoided or designed to be as unobtrusive as possible.

APPENDIX A: REFERENCES

ASH Consulting Group. 1998. *The Borders Landscape Character Assessment*. Scottish Natural Heritage Review No 112.

ASH Consulting Group. 1998. *The Lothians Landscape Character Assessment.* Scottish Natural Heritage Review NO 91.

Benson, J.F., Scott, K.E., Anderson, C., Macfarlane, R., Dunsford, H. and Turner, K. 2004. *An Assessment of the Sensitivity and Capacity of the Scottish Seascape in Relation to Offshore Windfarms.* Draft Report. SNH

East Lothian Council. *The East Lothian Local Plan 2000.* Written Statement and Plan, adopted April 2001.

Grant, Alison. 2004. *Study Identifying the Cumulative Effects of Wind Farms in Argyll and Bute*. Commissioned unpublished study. SNH.

Landscape Design Associates. 2000. *Cumulative Effects of Wind Turbines – A guide to assessing the cumulative effects of wind energy development*, report for ETSU W/14/00538/REP.

Landscape Institute & Institute of Environmental Management & Assessment (LI-IEMA). 2002. *Guidelines for Landscape and Visual Impact Assessment*. 2nd Edition. London: Spon Press.

Land Use Consultants. 2002. *Assessment of the Sensitivity of landscapes to Windfarm Development in Argyll and Bute.* (Draft report), Scottish Natural Heritage

Land Use Consultants. 2003. *Wind Turbine Development: Landscape Assessment, Evaluation and Guidance*. Commissioned report for Breckland Council and King's Lynn and West Norfolk Borough Council.

Land Use Consultants 1988. *An Inventory of Gardens and Designed Landscapes in Scotland. Vol.5 Lothian and Borders*. Countryside Commission for Scotland and Historic Scotland

Macaulay Land Use Research Institute and Edinburgh College of Art. 2003. *Landscape Capacity Study for Wind Energy Development in East and North Highland and Moray*. SNH Commissioned Report No.070 (ROAME No. F02AA302)

Macaulay Enterprises Limited. 2003. *Visibility Mapping for Windfarm Development* . Unpublished report for The Scottish Borders Council

Natural Power. 2004. *Environmental Statement for Crystal Rig (Phase II), East Lothian and Scottish Borders*

Ordnance Survey 1995. *Edinburgh and the Borders Walks*. Pathfinder Guide

Purdy, Derek. 1996. *25 Cycle Routes, Edinburgh and Lothian*. HMSO Publications, Edinburgh.

Scottish Executive. 2001. *NPPG6* (National Planning Policy Guideline): *Renewable Energy Development.* Edinburgh: The Scottish Office.

Scottish Natural Heritage. 2000. *Proposed Assessment Process to Determine Landscape Sensitivity and Acceptability of Windfarms*. Internal Document. SNH. Edinburgh.

Scottish Natural Heritage. 2001. *Guidelines on the Environmental Impacts of Windfarms and Small Scale Hydroelectric Schemes*. Perth: Redgorton.

Scottish Natural Heritage. 2002. *Strategic Locational Guidance for Onshore Wind Farms in Respect of the Natural Heritage*. Policy Statement 02/02. Edinburgh.

Scottish Natural Heritage (Advisory Services Landscape Group). May 2004. *Guidance For The Assessment Of Cumulative Landscape And Visual Impacts Arising From Windfarm Developments*. 4th Draft Unpublished Guidance Note.

Swanwick, C and Land Use Consultants, 2002. *Landscape Character Assessment: Guidance for England and Scotland.* Countryside Agency & Scottish Natural Heritage. CAX 84, CA, Cheltenham.

University of Newcastle. 2002. *Visual Assessment of Windfarms: Best Practice.* Scottish Natural Heritage Report. Edinburgh: SNH.

University of Newcastle. 2003. *Landscape Appraisal for Onshore Wind Development.* Government Office North East, Newcastle.

University of Newcastle. 2004. *Landscape Capacity Study for Onshore Wind Energy Development in the Western Isles.* SNH Commissioned Report No. 042 (ROAME No. F02LC04)

APPENDIX B: SENSITIVITIES OF LANDSCAPE CHARACTER AREAS LYING OUTWITH EAST LOTHIAN

Introduction

Figure 3.2 shows landscape character areas lying outwith East Lothian but within the 10km buffer included in the study area. The North Esk, Coastal Farmland, Platform Farmland and Upland Valley with Farmland landscape character areas are broadly assessed below for sensitivities in relation to views to and from East Lothian and the potential for any indirect effects on the landscape character of East Lothian, should windfarm development occur within these outlying character areas.

North Esk

This landscape character area is defined within the Lothians LCA. It lies to the south-west of East Lothian and principally comprises the valley of the North Esk river. The river is located within a steep sided valley; this sometimes forming a gorge edged by exposed rock bluffs. Rising above the valley and opening out to either side are enclosing slopes of broad smooth undulating ground, these cut by numerous side streams.

The valley sides are densely wooded. At the head of the North Esk valley, woodland is interspersed with fields of improved pasture and some arable land, enclosed by walls and hedges and shelterbelts. Policies and designed landscapes are a dominant feature within this character area.

The character area is well-settled with towns and villages sited adjacent to the river. The largest of these include Loanhead, Penicuik and Bonnyrigg. Settlements are surrounded by substantial 20th c housing development and light industry. Major roads are aligned through this area and it is more developed towards the urban fringe of Edinburgh where power lines, warehousing, industry and the City by-pass combine to create a complex landscape composition.

There is a strong sense of enclosure within the North Esk valley due to the steep confining slopes and woodland, but more open views occur towards the Pentland Hills and Edinburgh fringes.

Landscape and Visual Sensitivities with regard to development

- This landscape character area has little visual relationship with the landscapes of East Lothian due to the screening provided by the Mayfield/Tranent Ridge.
- There are very few locations within East Lothian where the North Esk character area is visible and development located in this area would be unlikely to have a

significant effect on views from within East Lothian. An exception to this would be if windfarm development were located to the south-east of Edinburgh where it could potentially be visible from some parts of the Musselburgh/Prestonpans Fringe and the Mayfield/Tranent Ridge. If turbines were sited on flatter land between the Esk and Edinburgh (this area likely to be more acceptable for development in terms of avoidance of the physical and landscape constraints of the valley, designed landscapes and woodlands), the proximity of urban development on the fringes of Edinburgh could reduce sensitivity in terms of views from East Lothian. Similar constraints should apply as those outlined for the Musselburgh/Prestonpans Fringe in terms of the need to retain key views of Arthur's Seat.

- Windfarm development located in this area would not affect landscape character areas in East Lothian due to the visual and geographic separation that occurs. It could however affect the appreciation of the vertical scale and predominantly rural edge provided by the Mayfield/Tranent Ridge in some views from Edinburgh but only if located close to this character area ie) at the base of the ridge

Coastal Farmland + Coastal Moorland

These adjacent, and closely related, landscape character types are defined in the Borders LCA. The Coastal Farmland forms a transition with the Eastern Coastal Margin assessed in the main body of the capacity study (see 4.1) and shares similar characteristics with the area around Dunglass. It is also similar to the Eastern Lammermuir Fringe in terms of its strongly rolling landform and often intimate scale, although the coastal edge and more open and exposed aspect of these character types provides the key differentiation. This is a relatively small landscape character type and further to the south-east, it merges with the Coastal Moorland (Coldingham Moor) where a more open and elevated character prevails.

The rolling landform is cut by narrow deeply incised and densely wooded 'cleughs' in the west of the character area. The coastline is formed by high, near vertical cliffs. Landcover is dominated by arable and pastoral fields with gorse and other scrub common on steep slopes and in other exposed locations. Narrow riparian woodland and scrub occurs in sheltered valleys while coniferous and mixed woodland blocks and shelterbelts are interspersed with pasture on higher ground.

Scattered farmsteads and dwellings are aligned along a network of roads. Buildings are typically small and stone built. Camping and caravan sites are prominent features particularly in the south near Coldingham.

The Coastal Moorland character type largely lies outwith the study area. It forms an open and expansive, flat to gently rolling plateau sloping steeply to rugged cliffs at the coast at St Abbs and is punctuated by occasional grassy knolls and rock outcrops. Coarse grassland and rush occurs on flatter ground with heather moorland on more elevated slopes. Angular coniferous plantations are locally prominent. Widely dispersed farmsteads are located against minor roads. The coastal moorland has a barren and exposed character with dramatic open views over clifftops to the North Sea.

Overall these landscapes are largely open with dramatic views along the rugged coastline and to the North Sea. Some localised enclosure is found within valleys.

Landscape and Visual Sensitivities with regard to development

- Both the Coastal Farmland and Coastal Moorland character types are not widely visible from within East Lothian due to the enclosure provided by the Lammermuir Hills and associated rolling foothills as they extend closer to the coast to the east. There are, however, some views of these character types from the higher ground on the edge of the East Lammermuir Plateau, eg from the Moneynut Edge and from a few elevated minor roads (the striking view from West Steel takes in part of the Coastal Farmland and the more distant Coastal Moor). Views from the A1 and railway line within the Eastern Coastal Margin to these character areas are distinctive and focus on the headland and dramatic cliffs between Pease Bay and Fast Castle Head and the even and less dramatic skyline of the Coastal Moorland of Coldingham Common extending from the coastline to the west.
- Windfarm development within these character types could have impacts on some key views from within East Lothian. Development breaching the skyline and/or intruding on the focus of views may have significant impacts. This could occur where development is located close to parts of the coastal edge which either comprise dramatic features such as high cliffs (eg views from the A1 when travelling south to the high cliffs of the St Abbs headland) or interrupt views of the sea (eg from West Steel where the view is funnelled down a narrow cleugh and opens out to the sea).
- The proposed Drone Hill windfarm would be located within the Coastal Moorland character type. It would have impacts on views from parts of the Eastern Coastal Margin within East Lothian and parts of the East Lammermuir Plateau. This development would not have significant impacts on views from the East Lammermuir Plateau, including the West Steel viewpoint, but could affect the appreciation of the dramatic cliff scenery of part of the St Abbs headland by way of introducing a competing (and moving) focus in key views

from the A1 and nearby settlement within East Lothian. While this development would not affect the character of landscapes within East Lothian there would be sequential cumulative effects arising when travelling on the major transport routes such as the A1 between this proposal and the Crystal Rig Phase II development.

Platform Farmland

The Platform Farmland landscape type is defined in the Borders LCA. It is located on the south-eastern fringe of the Lammermuir Plateau where it tilts gently seawards towards the Eye Water Valley. It comprises an upland fringe landscape with a large scale and smooth, even landform of gently undulating hills. A simple pattern of very large arable and pasture fields is emphasised by contrasting coniferous shelterbelts and plantations. Fields are enclosed by stone walls or fences. This is an open and exposed landscape with a simple uniform character.

Landscape and Visual Sensitivities with regard to development

- This character type is only visible from high hill tops and the south-eastern edge of the Lammermuir Plateau within East Lothian. The Lammermuir Plateau forms a backdrop in views from the Platform Farmland and the existing Crystal Rig (Phase I and II) windfarm development is visible from parts of this character type.
- Windfarm development within the Platform Farmland would not be widely visible from East Lothian but cumulative landscape and visual impacts could occur on some limited viewpoints within East Lothian eg from the Moneynut Edge due to the relative proximity of the Crystal Rig development.

Upland Valley with Farmland

The Upland Valley with Farmland character type is defined in the Borders LCA. It comprises the broad flat valley floor of the upper Leader and Whiteadder valleys which abut and cut into the Lammermuir Plateau to the south. The valleys have a distinct, often broad, floodplain and meandering river channel. Arable and improved pasture with medium to large sized fields, are generally enclosed by thorn hedgerows. Valley bottom and lower valley sides are well wooded with small woodlands and coniferous plantations locally prominent.

Views along the valleys are long and open. The Lammermuir Plateau forms a backdrop to views to the north from the Borders Region. Many settlements are located close to the rivers at bridging points and have more contained views.

Landscape and Visual Sensitivities with regard to development

- This character type is only seen from high hill tops and the southern edge of the Lammermuir Plateau within East Lothian. The Lammermuir Plateau forms a backdrop in views from the Upland Valley with Farmland character type and the existing Crystal Rig (Phase I and II) windfarm development is highly visible from more open areas within this character type.
- Windfarm development within the Upland Valley with Farmland would not be widely visible from East Lothian but would have cumulative landscape and visual impacts due to the relative proximity of the Crystal Rig development, for example, from hills tops and the B6355, where views of this character type comprise the foreground to extensive views over the Borders landscape (the Eildon Hills forming a distant focus on the skyline).

APPENDIX C: LANDSCAPE SENSITIVITY ASSESSMENT CRITERIA

This checklist provided key points to consider when assessing how wind energy development would relate to each of the key landscape characteristics.

Physical Characteristics

Scale	Consideration of the size of the landscape taking into account horizontal and vertical scale and the extent of land visible. Identification of areas of containment where scale reduces. Assessment of how the development would relate to the scale of the landscape including whether it would be likely to dominate, appear compatible in scale or appear trivial and therefore be a detracting element. Consideration of how development would affect expansiveness and sense of distance.
Landform/Shape	Consideration of the overall shape and degree of complexity of landform including identification of any distinct features. Assessment of how development would relate to landform and whether it would intrude or be visually confusing if close to distinctive landform features. In general, the simpler the landform the better the visual relationship with the simple form of turbines.
Settlement	Consideration of the pattern, scale, character of settlement and its setting and relationship to the landscape. Assessment of how development might impinge on these characteristics; whether it is able to fit with the settlement pattern and if there is scope to attain some visual separation in order to avoid contrasts of scale between windfarm development and domestic settlement.
Industry Infrastructure	Can be related in part with the above criterion, particularly where larger industrial buildings are associated with settlements. Consideration of large scale built development and infrastructure and how windfarm development might relate to the form, scale and location of other tall vertical structures such as towers, masts or power lines.

Landscape Pattern/ Foci	Consideration of scale and complexity of landcover pattern (field units, woodlands, hedgerows and man-made features such as roads infrastructure) and whether pattern is strong or distinctly repeated or where pattern is more fragmented or discordant. Assessment of how development could relate to pattern – whether it might disrupt strong pattern, fit with areas where pattern is weaker or increase visual discord where pattern is very fragmented. Identification of key foci (either natural or man-made features) and assessment of whether development might dominate, compete with or be subservient to existing focal points.
Landscape Context	Consideration of how adjacent landscape character areas alter physical sensitivities (eg provide containment, increase scale, landform complexity etc) whether a gradual or distinct 'transition' occurs between areas and whether foci in adjacent areas have significance. Assessment of potential effects of development on adjacent character areas and vice versa.
Landscape Composition	Brings together consideration of the above criterion by identifying overall composition in terms of landscape components. A balanced composition occurs where components have a strong relationship to each other and provide a balanced or unified whole, often with consistent and repeated features eg policy woodlands, pasture and traditional villages of the river valleys, strongly related to landform.

Perceptual Characteristics

Degree of Modification/ Remoteness	Presence/absence and character of modification by man e.g. roads, farming, settlement, forestry, masts and consideration of how development could affect perceptions of naturalness or modification. Perception of remoteness in terms of ease of access, containment felt as an aspect of scale (as opposed to physical remoteness) and whether and how development would alter these perceptions.

APPENDIX D: VISIBILITY ANALYSIS METHODOLOGY

1. Background

The brief for the East Lothian landscape capacity study for windfarm development requested that factors relating to visibility and amenity be considered. This paper sets out in further detail the methodology for the visibility analysis following consultation with the Council, SNH, field survey and review of a number of similar studies. Envision 3D undertook the specialist computer aided visibility studies and advised on the methodology.

2. Review of Similar Visibility Studies

A number of visibility studies were considered in our review. While most of these visibility studies informed wider landscape and visual capacity assessments for wind energy, one 'stand-alone' visibility study was also reviewed. The following studies were considered in most detail in our review:

- Visibility Mapping for Windfarm Development – The Scottish Borders (Macaulay Enterprises Limited, 2003)
- Study into landscape potential for wind turbine development in East and North Highland and Moray (Macaulay Land Use Research Institute and Edinburgh College Art for SNH, 2004)
- Landscape capacity study for onshore wind energy development in the Western Isles (Newcastle University for SNH, 2004.)
- Wind Turbine Development: Landscape Assessment, Evaluaton and Guidance (Land Use Consultants for Breckland Council and King's Lynn and West Norfolk Borough Council, 2003)

The Macaulay study is a 'stand-alone' computer-aided visibility analysis aimed to define areas of land where a 100 m high wind turbine would be visible from residential property. All settlements and residential properties were considered within the Scottish Borders, with separate mapping produced for each. Potential screening by vegetation was considered in the calculation and 'observer' heights of 1.8 and 5 metres (representing first floor windows) were considered. The study area included a 2.5km buffer zone beyond the Scottish Borders boundary. The study did not consider views from transport routes and recreation sites.

The East and North Highland and Moray study is a wider landscape capacity study based on a complex GIS-based analysis of landscape and visual factors of the study area as a whole, rather than on the basis of pre-determined landscape character types. The visual sensitivity of the landscape to the siting of wind turbines is

determined by the assessment of three factors; visibility of the landscape; the nature of the viewing experience and; the numbers of people viewing the landscape. The analysis of the extent of visibility used a digital elevation model with no account taken of intervening buildings/vegetation. An analysis of visibility along roads, footpaths, Munro summits and settlements etc was incorporated into the GIS visibility study with a weighting given to the relative importance of viewpoints. It is not clear from the report what height of turbine(s) the visibility analysis was based on and if/and how, numbers of people viewing the landscape were actually taken into account in the study.

The Newcastle University study defined 10, 20 and 35km theoretical computer generated visibility zones taken from 50 selected viewpoints, viewpoints from ferry routes and A and B roads and also calculated from points based on a 1km grid overlaid over the whole of the Western Isles. 60 and 120 metre turbine heights were considered and no account was taken of screening by buildings and vegetation. Similar visibility studies using this method have also been undertaken for a strategic study of off-shore wind capacity for Scotland, where points based on a 1km grid applied over the study area are used to calculate theoretical views to and from land and sea.

The Land Use Consultants study of west Norfolk comprises a wider capacity study based on landscape character and its sensitivity to single/small/medium and large development scenarios. Visibility is not considered within a separate section of the report but rather as an aspect of landscape character. While there is no computer-aided analysis of visibility, an evaluation of visual issues relating to ‘skyline’ and ‘views and connections with adjacent landscapes’ is clearly set out within the assessment of landscape sensitivity; these factors evidently being established on the basis of detailed field work.

Conclusions

We concluded that the consideration of individual residential properties, as undertaken for the Scottish Borders, would be too onerous to do in terms of budget and would not be a useful exercise to undertake in East Lothian where population is relatively high within the coastal plain areas and inter-visibility across the study area is also likely to be high. A key limitation of the Macaulay study is that it considers the Borders in isolation with only a 2.5km buffer extended beyond the boundary of the region. The authors of the study also concluded that the 5m (first floor) height visibility analysis undertaken had little impact on outputs.

The Western Isles and Moray studies provide a useful general appraisal of the relative visibility of ground, particularly suited to a more strategic study covering an extensive

area. Both these studies involved identification of important viewpoints along transport routes and in areas used for recreation, relying on field work to establish these. We considered the weighting of viewpoints carried out for the Moray study to be overly complex and preferred to adopt a simpler methodology in this respect. The main limitation of applying these methodologies is the bare ground analysis which was adopted. We considered that a greater degree of accuracy could be achieved, appropriate to the smaller size of the East Lothian study area, by considering the effects of major woodlands.

The West Norfolk study did not undertake computer-aided visibility analysis but, despite this, provided a clear assessment of visibility issues as part of landscape character. This approach may be appropriate in terms of the characteristics of the study area, where the landform in the main is low-lying and inter-visibility a constant factor, with few, if any, areas of 'dead ground' occurring. However, we considered that a computer-aided study would be useful in defining relative visibility within the more varied topography of East Lothian but also favour the clear analysis of data, based on detailed field survey, evident in this study.

3. Approach to the study

Views and visibility issues were considered through a combination of computer-aided theoretical visibility studies, field work and analysis. Due to budget limitations, the computer-aided work needed to be focussed and simple to generate. Our aim was to provide a clear assessment of visibility while identifying the limitations of the exercise. The visibility analysis considered a study area extending 10km beyond the East Lothian boundary (see Figure 1.1) and involved the following tasks:

- Identification of key views from major roads/designated tourist routes, promoted footpaths and popular outdoor recreation sites to inform the computer-generated visibility study.
- Definition of potential visibility from the principal settlements within East Lothian and within 10km of the county boundary in Midlothian and Borders (a cluster of points was used to cover settlements) and a selection of smaller settlements as described in paragraph 2.8 of the main report.
- A cut-off of 10km for each viewpoint was used for the visibility studies, this being considered to generally accord with potential significance of windfarm development on views.
- Representative views from Edinburgh covered by viewpoints selected on the A1 and Arthur's Seat.
- Screening by woodlands was taken into account, the latter using National Inventory of Woodlands and Trees data, based on 20m height for mature woodlands, 5m

height for scrub/young trees. An observer height of 1.8m from viewpoints was used for the study.

- Computer generation of theoretical visibility of a 120 metre and 65 metre height turbine to blade tip using the defined key 'viewpoints' listed in Tables 1 and 2 and based on a 1:50,000 OS Digital Terrain Model.

4. List of Key Viewpoints for Visibility Analysis

The following viewpoints were identified largely through field survey, consultation with East Lothian Council and SNH, review of literature (eg walking guides for the area) and our knowledge of the area. The viewpoints focus on views from busy roads, popular walking routes and recreational sites. Inventory designed landscapes were excluded from the analysis due to their relative inaccessibility to the public and the screening provided by policy woodlands around main buildings.

A single viewpoint was identified only along the Herring Road Right of Way with this being specifically selected at a point where views to the north are presently unaffected by existing wind turbine development (Crystal Rig Phases I and II).

Grid references used in the following tables were determined with a greater level of detail for the study in order to ensure accuracy in the selection of viewpoints.

Table 1: Key transport routes/recreational site viewpoints

KEY VIEWPOINTS	REASON FOR SELECTION	GRID REF
Main Transport Routes		
A1: Cockburnspath	First view of coast from south	778 718
A199: Pencraig Wood	Views of Tyne estuary and bay	575 766
A1: Haddington	View over Tyne Valley to Lammermuirs	493 740
A1: Wallyford	Views over Musselburgh to Arthur's Seat/Edinburgh	381 726
A1: Edinburgh	Views over Musselburgh and Firth to Tranent Ridge	292 755
A1: West Barns	Views of Lothian Edge, East end of Lammermuirs	642 774
Main East Coast Railway/West Barns	Views of Tyne estuary and bay	651 776
East Coast Railway/Drem	Views over North Berwick Plain to Gullane	500 791
A198: Tantallon	Views over Firth of Forth and coast	590 851
A198: Gullane Golf Course	Open views across North Berwick Plain	479 820
A198: Aberlady	Views over Aberlady Bay and Gullane/Luffness Links	468 802
A198: Whitekirk	Views to Eastern Lammermuir ridge	597 815
A68: Soutra Hill	Panoramic views over East Lothian	460 595
B6368: NE Soutra Aisle	Views over Fala Moor and Dun Law windfarm	453 584
B6355:Lammermuirs	One of few routes crossing the Lammermuir Hills and offering extensive views east over the eastern plateau and Crystal Rig windfarm	609 648
B6355: Lammermuirs	Extensive views north/NW over East Lothian and Firth	602 647
A6093: Pencaitland to Haddington at Samuelston	Open views over the Agricultural Plain and to distant hills	474 714
A6137: Haddington to Aberlady at Bangley Hill	Elevated views from edge of Garleton Hills to coast	496 764
Minor Road to Longformacus	View of Whiteadder Reservoir/Lammermuir plateau and Crystal Rig windfarm	645 613

Minor Road Thurston Mains to Crystal Rig at West Steel	View along Oldhamstocks Burn over East Lothian and coast	688 704

Footpaths/Recreation Sites		
North Berwick Law	Popular local/ tourist attraction and panoramic views	555 843
Traprain Law	Popular local attraction and panoramic views	582 747
Garleton Hills	Popular local attraction and panoramic views	508 764
Arthur's Seat, Edinburgh	Popular local/tourist attraction and views towards East Lothian coast and Tranent Ridge	275 730
Gullane Point	Representative of the few open views along a largely contained coastal fringe	461 831
Coastal viewpoint at Industrial Museum, Prestonpans	Representative of few open views obtained in built up area	373 742
Barns Ness, Dunbar	Lighthouse, camp site and car park on coast	723 773
Meikle Says Law	Highest hill in Lammermuirs	581 618
Lammer Law	Accessed by popular walking/cycling route	524 618
Herring Road, Dunbar Common	Open views from Right of Way over Lothian Edge to coast	657 709
John Muir Country Park	View from top of dunes at northern end of beach	643 800
Dirleton Castle	View from upper level of coast	515 839
Southern Upland Way, near Longformacus	Views of Lammermuir Plateau and Crystal Rig windfarm	715 575
Southern Upland Way, Twin Law	Views of Lammermuir Plateau	631 551

Table 2: Key settlements defined within East Lothian and 10km buffer zone into adjoining local authority areas

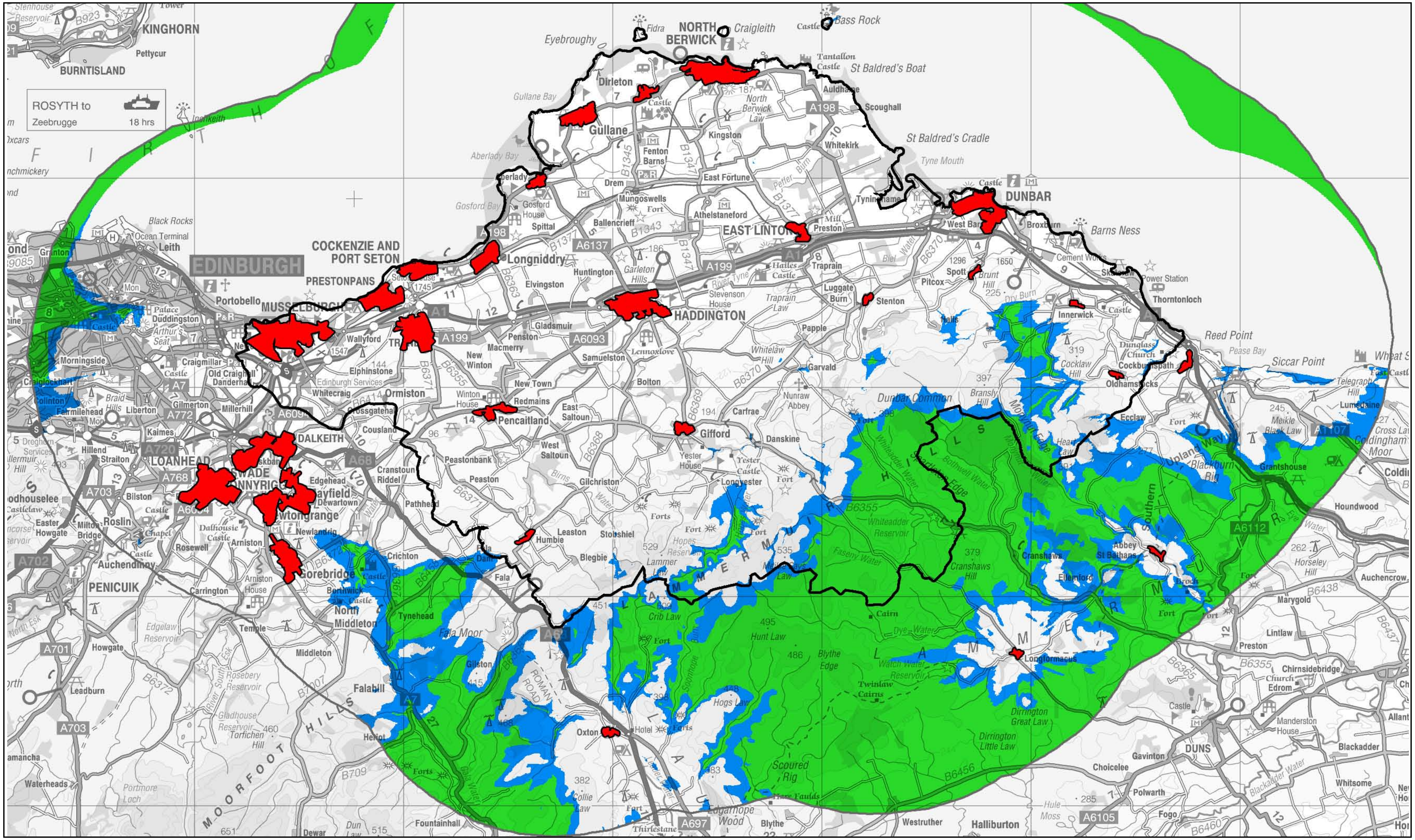
Settlements

East Lothian	***Midlothian***	***Borders***
Dunbar	Gorebridge	Cockburnspath
North Berwick	Newtongrange	Abbey St Bathans
Dirleton	Lasswade	Longformacus
Gullane	Dalkeith	Oxton
Longniddry		
Haddington		
Pencaitland		
Tranent		
Cockenzie/Port Seton		
Prestonpans		
Musselburgh		
Aberlady		
Gifford		
East Linton		
Stenton		
Humbie		
Innerwick		
Spott		
Oldhamstocks		

5. List of Key Viewpoints for Visibility Analysis

Figures D1, D2 and D3 illustrate the visibility analysis, showing theoretically visibility of 65m turbine hubs (coloured blue) and 120m turbine hubs (coloured green) in relation to transport routes, recreation and settlement viewpoints.

The visibility analysis allowed an evaluation of potential effects on views and visibility, supplementing the assessment work undertaken in the field. This evaluation formed an essential part of the capacity study and was also taken into account in the consideration of potential cumulative effects on static and sequential views.



Theoretical visibility taking into account the screening effect of woodlands and imposing a 10 km cut off to views.

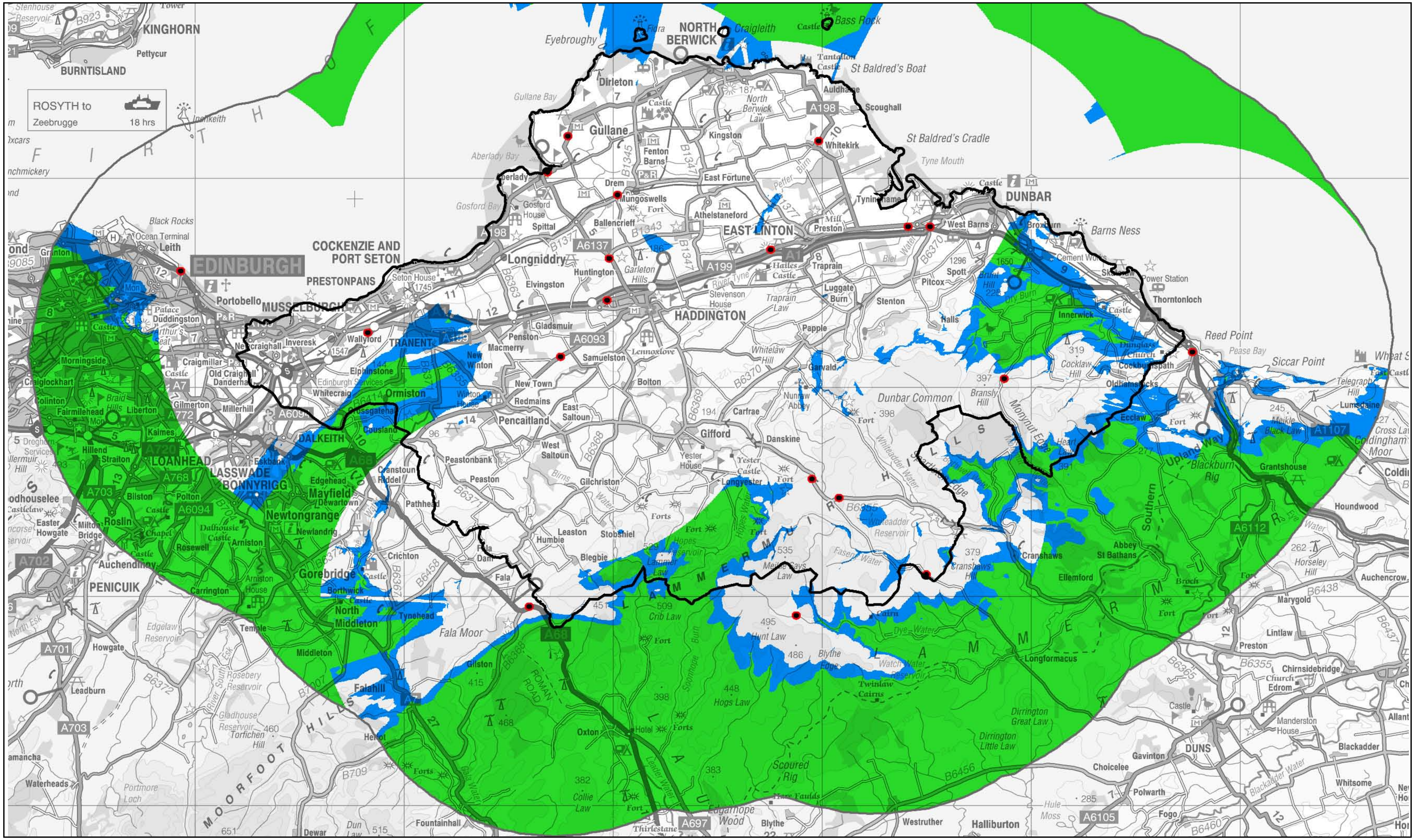
- 120m and 56m high turbines would not be visible from key viewpoints
- 65m high turbines would not be visible from key viewpoints
- Key viewpoints used in theoretical visibility calculation

0 2 4 6 km
1 : 175,000

Landscape Capacity Study for Wind Turbine Development in East Lothian

Visibility from Settlements

Fig No: D1



Theoretical visibility taking into account the screening effect of woodlands and imposing a 10 km cut off to views.

- 120m and 65m high turbines would not be visible from key viewpoints
- 65m high turbines would not be visible from key viewpoints
- Key viewpoints used in theoretical visibility calculation

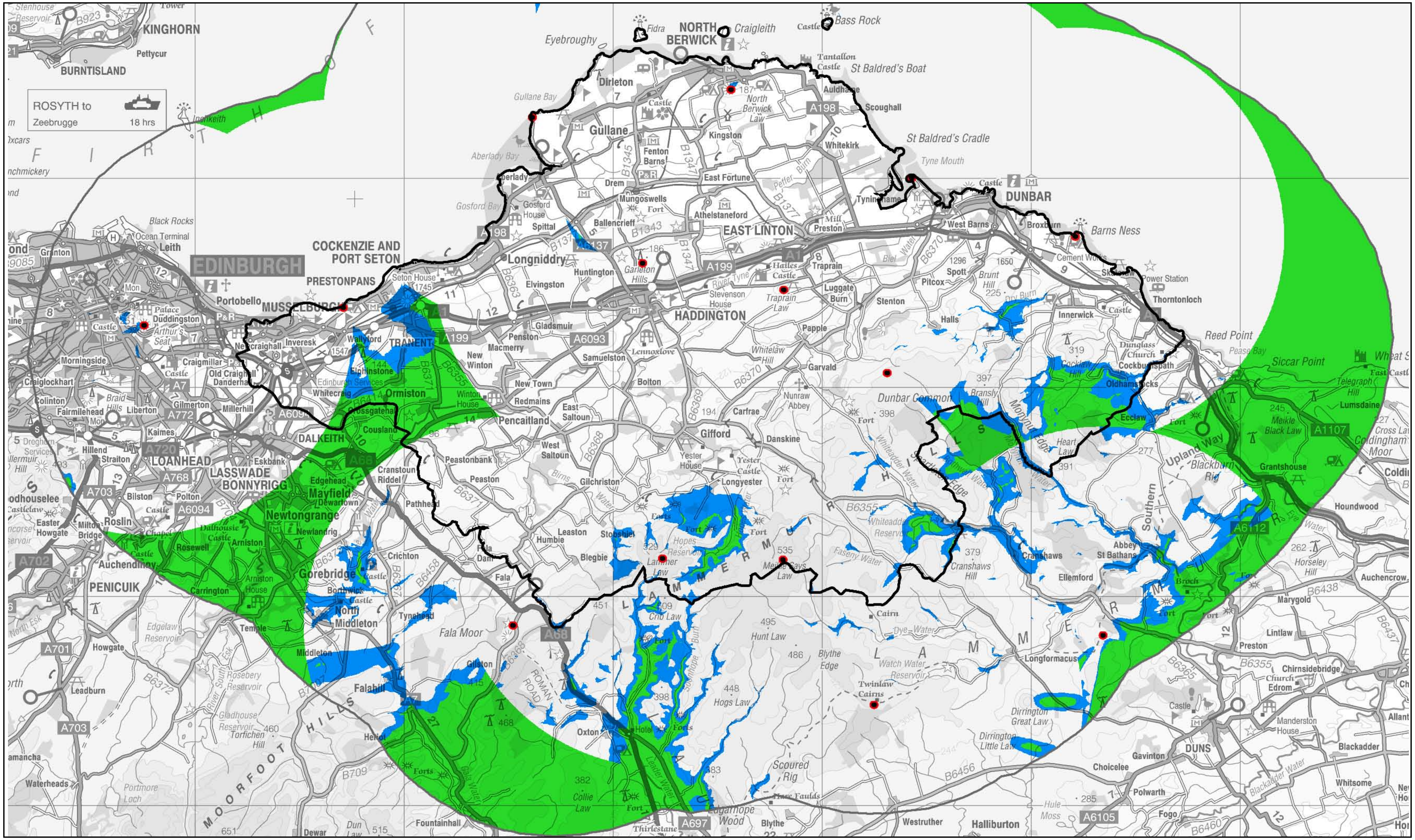
0 2 4 6 km

1 : 175,000

Landscape Capacity Study for Wind Turbine Development in East Lothian

Visibility from Key Transport Routes

Fig No: D2



Theoretical visibility taking into account the screening effect of woodlands and imposing a 10 km cut off to views.

- (green) 120m and 65m high turbines would not be visible from key viewpoints
- (blue) 65m high turbines would not be visible from key viewpoints
- (red dot) Key viewpoints used in theoretical visibility calculation

0 2 4 6 km

1 : 175,000

Landscape Capacity Study for Wind Turbine Development in East Lothian

Visibility from Recreational Sites and Key Routes

Fig No: D3

APPENDIX E: AREA OF GREAT LANDSCAPE VALUE (AGLV) REVIEW

Introduction

A number of Areas of Great Landscape Value (AGLVs) are defined in the East Lothian Local Plan (adopted April 20001). These cover much of the Lammermuir Hills, the undeveloped coastline, some policy woodlands and other wooded areas, the Garleton Hills, Berwick Law and Traprain Law.

The study brief requested that AGLVs should not be considered as 'no go' areas for wind turbine development and these were therefore not considered as separate sensitivity criterion in the assessment. However, a review of the relevance of AGLVs as a landscape policy designation to windfarm development was a requirement of the brief.

This review principally considers the correlations between landscape character areas and the location of AGLVs together with analysis of the findings of the study. Conclusions are then drawn on the relevance of the AGLV designation in relation to decision-making on windfarm development. Each of the general landscape areas covered by the designation are examined against the sensitivity assessment as follows and illustrated in Figure E.1:

The Coastal Areas

The Northern Coastal Margin was identified as a separate landscape character area within the capacity study on the basis of its naturalistic coastline and distinctive pattern of settlement and policy landscapes. It was assessed as being of high sensitivity with no capacity for wind turbine development. The AGLV covers the coast and some, but not all, of the policy landscapes and excludes all settlements. The majority of the area covered by the AGLV designation falls within the boundary of the Northern Coastal Margin character area. The exception is an area of farmland to the west of the A198 near Tyninghame, which we have defined as Agricultural Plain and assessed as being of medium sensitivity and with some moderate capacity for wind turbine development. The area covered by the AGLV however lies within part of the Agricultural Plain with a more distinct landform and woodland pattern in places and this has been identified as a localised constraint to development within the character area.

We defined the coastal area lying to the south-east of Dunbar as the Eastern Coastal Margin and considered it to have some moderate capacity for development. The coastal part of this area is covered by an AGLV. Some sensitivities were identified in relation to the coast in the capacity assessment.

The Garleton Hills and Laws

The Garleton Hills formed a distinct landscape character area in the assessment and was considered to be of high sensitivity with no capacity for development. The AGLV area covers the main core of the hills but excludes Bangly Hill to the west. Berwick Law (wholly) and Traprain Law (partially) are covered by AGLV designations. Although both Laws lie within the Agricultural Plain landscape character area, defined as having moderate capacity for wind turbine development, they are identified as being key foci in the landscape with constraints on development on or nearby them being applied in the assessment.

The Lammermuir Hills

This is the most extensive AGLV within East Lothian, taking in much of the Lammermuir Hills and the northern scarp face and extending to cover part of the intimately scaled wooded 'foothill' and 'valley' landscapes around Whittinghame, Pressmennan and Carfrae. The AGLVs were originally identified in the 1970's and commercial forestry and windfarm development now lies in the eastern part of the Lammermuir Plateau covered by an AGLV designation.

Three distinct landscape character areas were defined within the Lammermuir plateau and two character areas within the 'foothill' landscapes. The Central Lammermuir Plateau was found to be of high sensitivity while the Eastern Lammermuir Plateau was found to be of medium-high sensitivity. Part of the area defined as Plateau Grassland covered by the AGLV was assessed as being of medium-low sensitivity. The Eastern Lammermuir Plateau and Plateau Grasslands are already characterised by existing windfarm development. Within the 'foothill' landscapes, the Eastern Lammermuirs Fringe was found to have a high sensitivity to wind turbine development and the North Lammermuir Platform, medium-high sensitivity. Only relatively small parts of these 'foothill' character areas are covered by AGLV designations.

Areas not covered by AGLV designation

There are a number of anomalies in terms of landscape character areas defined as being of high sensitivity to wind turbine in the assessment but not covered by an AGLV designation. These are the Eastern Lammermuir Fringe and the river valleys of Gifford and Humbie Waters (Whittinghame being largely covered by an AGLV).

Conclusions

The AGLV designation aimed to identify outstanding areas of scenic attraction in accordance with the Scottish Office Circular 2/1962. It is not clear whether this aim was consistently applied in defining AGLVs in East Lothian and it is outwith the scope of this study to verify the criteria for designating particular landscapes. The landscape and visual qualities contributing to 'scenic attraction' can occur in a wide spectrum and in East Lothian the AGLV designation includes a diversity of landscapes from coastal margin to uplands.

Policy DC4 in the Local Plan states *"Development that harms the landscape character and visual amenity of Areas of Great Landscape Value will not be permitted."* It is our view that wind turbine development within areas defined as being of high sensitivity in the assessment would incur significant adverse impacts on a wide number of the key landscape character and/or visual amenity citeria. There would also be some significant landscape and visual impacts associated with wind turbine development within areas defined as having medium to high sensitivity in the assessment and localised constraints to development occur in all landscape character areas.

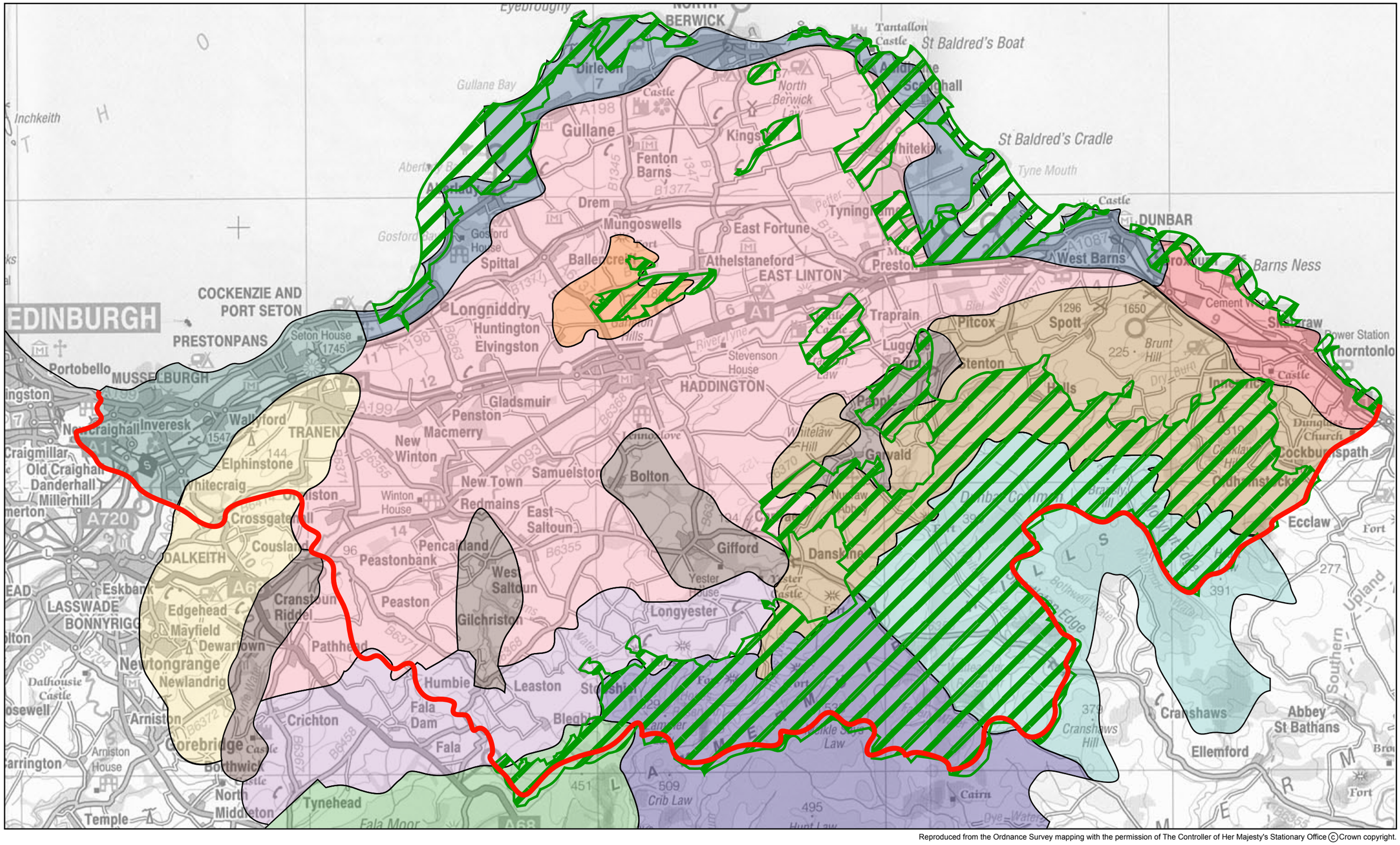
Many of the AGLV designated areas accord with 'high' sensitivity landscape character areas; some do not. Scenic quality or attraction was not assessed in the capacity study. The assessment only considered one type of development and scale, landform and pattern were key sensitivity criteria. Small-scale landscapes within East Lothian tend to have a more complex landform and intricate landscape pattern that cannot accommodate large-scale development such as wind turbines. Areas such as the Eastern Lammermuir Fringe and River Valleys were therefore considered to be of high sensitivity in the context of this study but are largely excluded from the AGLV designation. Some of the qualities associated with the extensive scale and landform and fragmented vegetation pattern of parts of the uplands, can accommodate wind turbine development, despite being largely covered by AGLV designation.

Landscape and visual sensitivities to wind turbine development are not fully reflected in the AGLV designation around the Northern Coastal Margin, the Garleton Hills and the 'foothill' and valley landscapes. The AGLV designation also does not reflect the differences in character and sensitivity evident within the Lammermuir Plateau, taking no account of the effect of existing windfarm development, forestry and other infrastructure on scenic quality.

AGLVs do not preclude development but rather aim to protect landscape character and visual amenity from types of development that may be damaging on these interests. Wind turbine development is most likely to be able to be accommodated in those

AGLVs where, as elsewhere, landscape character and visual amenity is not significantly adversely affected by turbine development. The capacity study provides a more detailed appraisal of how wind turbine development may affect landscape character and visual amenity and this review has shown that not all AGLVs would be equally and consistently affected by wind turbine development as the landscape character and visual amenity associated with each is very different.

In conclusion, it is considered that AGLVs could only be used to guide the location wind turbine development if the reasons for designation were clear in terms of defining the specific landscape qualities to be conserved within each scenically different area. The potential impacts of wind turbine development on the qualities for which the AGLV was designated could then be assessed with a comparison made with the findings of the capacity study where there is some correlation between character areas and the AGLV.



Reproduced from the Ordnance Survey mapping with the permission of The Controller of Her Majesty's Stationary Office ©Crown copyright.

Landscape Character Areas Assessed in Capacity Study

- Eastern Coastal Margin
- Northern Coastal Margin
- Musselburgh / Prestonpans Fringe
- Agricultural Plain
- Garleton Hills
- Mayfield / Tranent Ridge
- Humbie / Gifford / Whittinghame River Valleys
- Eastern Lammermuirs Fringe
- North Lammermuir Platform
- Plateau Grassland
- Central Lammermuir Plateau
- East Lammermuir Plateau
- Approximate Areas of Great Landscape Value (AGLVs)

0 2 4 6 km

1 : 125,000

Landscape Capacity Study for Wind Turbine Development in East Lothian

Areas of Great Landscape Value (AGLVs)

Fig No: E1