4.0 VISUAL BASELINE

The following section details the analysis that was carried out to establish the relative visibility and potential visual sensitivity of different parts of Scottish Borders.

#### 4.1 Visual Receptors

In a study of landscape capacity and cumulative landscape impacts, it is important to consider visibility, and the effects of cumulative impact on visual receptors. This not only feeds into the assessment of landscape sensitivity and capacity (see Section 2.2), but also builds up a picture of where visual receptors in and around Scottish Borders would perceive wind turbines within the landscape.

The types of potentially sensitive visual receptors within the Scottish Borders are broadly categorised into three groups:

- Residents (dwellings and settlements)
- Travellers (roads, railway)
- Visitors (visitor destinations, viewpoints, recreational footpaths and cycle routes)

Whilst there are working receptors in the Scottish Borders, these have not been included, as people at work are considered to be lower sensitivity visual receptors.

Based on desk study and site analysis, three groups of receptors were identified as proxies:

- Settlements, representing concentrations of residential receptors;
- Routes, representing travelling receptors, and including the main A roads, promoted tourist routes, railways, and long-distance footpaths and cycleways;
- Viewpoints, representing visitors and residents, selected from popular walking destinations and long distance footpaths, visitor attractions, and viewpoints identified on OS maps. Selected in consultation with officers of Scottish Borders Council.

The locations of the settlements, routes, and viewpoints are illustrated on Figure 4.1. The assessment includes receptors in the study buffer area up to 15km beyond the Scottish Borders boundary.

Individual residential properties are not included in the visibility mapping although notice is taken of the frequency and distribution of dwellings in the analysis of each landscape character type.

#### 4.2 Visibility Analysis

An assessment of visibility was made from the settlements, routes and viewpoints illustrated in Figure 4.1. This was carried out using a computer based technique in which the intervisibility between receptors and topography, or objects of specific heights on the

landform, is determined. The more intervisibility, the greater the visibility from receptors is likely to be. The method is described in more detail in **Appendix 2**.

The extent of the visibility assessment was limited to a 15km radius from the receptors. In our experience, this is the distance within which the great majority of significant impacts from wind farms are likely to occur. Whilst it is recognised that impacts occur beyond this distance, up to 35km and beyond, as recognised by EIA best practice, this is not an EIA assessment and the results are considered to adequately distinguish between locations of potentially greater or lesser sensitivity.

Results of the visibility analysis are illustrated in Figures 4.3 a-e, 4.4 a-e & 4.5 a-e (in **Appendix 3**). The colours show the differences in visual sensitivity across the Scottish Borders area. Red colours indicate areas that are most visible from the greatest number of receptors, grading through orange, yellow and green to blue/ purple areas that are seen by fewest receptors and uncoloured areas that would not be seen at all.

#### 4.2.1 Settlements

Figures 4.3 a-e show that the areas most likely to be seen from settlements are located in the northern edge of the Pentland and Moorfoot Hills overlooking the Midland Valley; the Tweed lowlands and isolated landmark hills such as the Eildon Hills and Black Hill. These areas have visibility from the highest number of receptors due to elevation and proximity to centres of population. For all heights of turbine the most sensitive locations within Scottish Borders would be the Eildon Hills, Black Hill and the Scott's View area above the River Tweed. Turbines located around Hawick, Peebles, Kelso and Coldstream as well as the central Galashiels to Melrose cluster of settlements would also be more highly exposed to resident populations. Any height of turbine located on the Eildon Hills, Black Hill and the northern exposed slopes of the Moorfoot and Pentland Hills would be relatively more visible. The areas of least visibility from settlements are located within the core of upland areas including the Lammermuir Hills, Moorfoot Hills, Lauder Common, Southern Uplands and Cheviot Hills. The outer slopes of upland areas have a higher visibility than the core areas, reflecting the screening benefits of topographical containment as well as a much lower population density.

In terms of landscape character areas the most visually exposed to settlements are the Upland landscapes to the south of Edinburgh (*Upland and Upland Fringe*) and the central isolated hills (*Rolling Farmland* and *Lowland Margin with Hills*), followed by the slopes above settlements in the Upper Tweed and Teviot Valley's and the rolling Lowland landscapes of the Lowland with Drumlins around Kelso and Coldstream. These areas are visible from Edinburgh and the concentration of settlements within the Tweed Valley.

## 4.2.2 Routes

The routes (Figures 4.4 a-e) show a similar pattern of intervisibility as settlements, but with the areas of highest visibility shifting from the Moorfoot and Pentland Hills to the central lowland areas of Scottish Borders and much less area with no visibility. In particular the area around the Eildon Hills and Black Hill are highlighted. However, there are additional highly visible areas from Peniel Heugh to the area south of Kelso (Bowmont Forest), Dunion Hill (to the west of Jedburgh) and along the coastal border area around Ayton Hill

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elevated above the A1. The Merse area also has a relatively high intervisibility. This visibility mapping reflects the concentration of important routes through the Scottish Borders, especially the A68, A7, A697 and the coastal A1 route. The mapping also takes account of the East Coast Mainline railway and the Borders Railway alongside the A7 between Edinburgh and Galashiels.

The landscapes types most visible from settlements are again the prominent isolated hills within the central *Lowlands* and *River Valleys* seen prominently from many roads and railway lines. However, there are areas within the uplands landscapes, especially on the northern border between East Lothian at the Lammermuir Hills either side of the A68 and the area of the Moorfoot Hills bordering Mid Lothian either side of the A7 and the A703. Areas of the Southern Uplands east of Biggar also have a higher visibility and sensitivity.

The areas of least visibility are in the core of more elevated upland areas including the Moorfoot and Lammermuir Hills (south of the Mid- and East Lothian boundaries), the Southern Uplands and the Cheviot Hills. Nevertheless, there is a small pocket of higher visibility around the Carter Bar England/ Scotland border through which the A68 passes.

#### 4.2.3 Viewpoints

The viewpoints (Figures 4.5 a-e) show a similar story to that shown by the Settlements and Routes visibility mapping. Visibility from viewpoints is similar to the previous visibility mapping due to the topography of the central lowlands surrounded by *Upland Fringe* and *Upland Landscapes* roughly extending either side along the Tweed Valley.

There are however differences in the visibility within the Cheviot Hills area. This area has a higher visibility and sensitivity than the previous visibility mapping due to the location of the Pennine Way along the England/ Scotland Border and the number of viewpoints along this route looking onto the landscape. This includes the Carter Bar Viewpoint on the A68 England/ Scotland border which allows for a wide panoramic view over the Scottish Borders and provides a first impression of Scotland to visitors.

The central area between Selkirk and Jedburgh, south of Galashiels and Melrose is again of the highest visibility and sensitivity, this area includes the Eildon Hills and Black Hill. The higher ground either side of the A72 between Peebles and Selkirk has a higher visibility and sensitivity, due to the number of elevated viewpoints along the Southern Upland Way and the promoted viewpoints elevated above settlements in this area. There is again an area of higher visibility within the Lowland Merse area, coastal areas including Coldingham Moor and the area around Ayton Hill west of the A1 corridor.

On the basis of the viewpoints selected the areas with the least visibility are located in the upland areas of the Moorfoot Hills and Southern Uplands areas. This is closely followed by areas within the Lammermuir Hills and Pentlands.

#### 4.2.4 Analysis of Visibility

The visibility analysis confirms empirical observations of visual sensitivity across Scottish Borders, i.e. that it is the central areas close to populated areas that have the highest visual sensitivity as well as the northern escarpments of the Moorfoot and Pentland Hills facing the Midland Valley. However this analysis gives a more refined and nuanced

assessment, determining which geographical areas are likely to be the most and least visually sensitive.

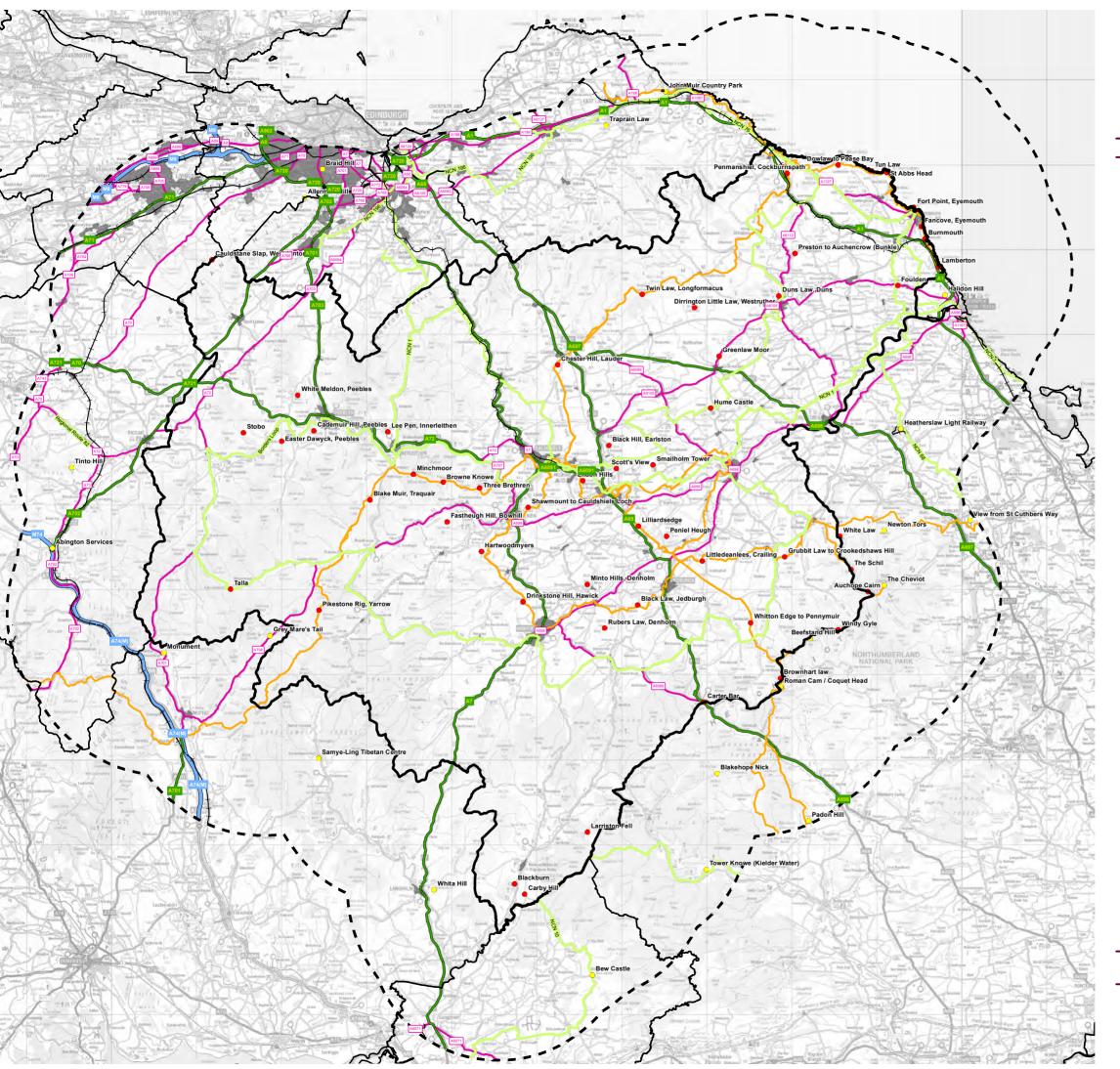
Based on the computer assessment and on observation, the following areas are likely to be of highest visual sensitivity, a factor that will have a bearing on their capacity for wind turbine development:

- The summits and northern slopes of the Pentlands and Moorfoot Hills overlooking the Midland Valley;
- The Central lowlands between Selkirk and Jedburgh to the south of Galashiels and Melrose;
- Prominent landmark hills fringing the central lowland areas including the Eildon Hills and Black Hill around Melrose, Peniel Heugh and Dunion Hill by Jedburgh;
- The higher coastal land to the west of the A1 north of the England Scotland border;
- The coastal zone bound by the A1 and East Coast Mainline;
- There are also smaller pockets of medium visual sensitivity within the Cheviot Hills, along the A7 between Selkirk and Peebles on the elevated land framing the valley and the higher land within the Scottish Borders north east of Biggar.

The areas likely to be least visually sensitive include:

- A large area of the Southern Uplands in the south west of the study area bordering South Lanarkshire in the west and Dumfries and Galloway in the south west;
- Areas of the Lammermuir and Moorfoot Hills bordering Midlothian and East Lothian.

Other smaller areas are also less sensitive but are not large enough to be considered on a strategic scale.





May 2016

## Legend

SBC Local Authority Boundary

Local Authority Boundary 15km Buffer

Other Local Authority Boundaries

Settlements

## Viewpoints

- Within SBC Boundary
- Outwith SBC Boundary

National Cycle Network and Borders Loop

Long Distance Footpaths

## **Road Classifications**

Motorway

Primary Road

/ A Road

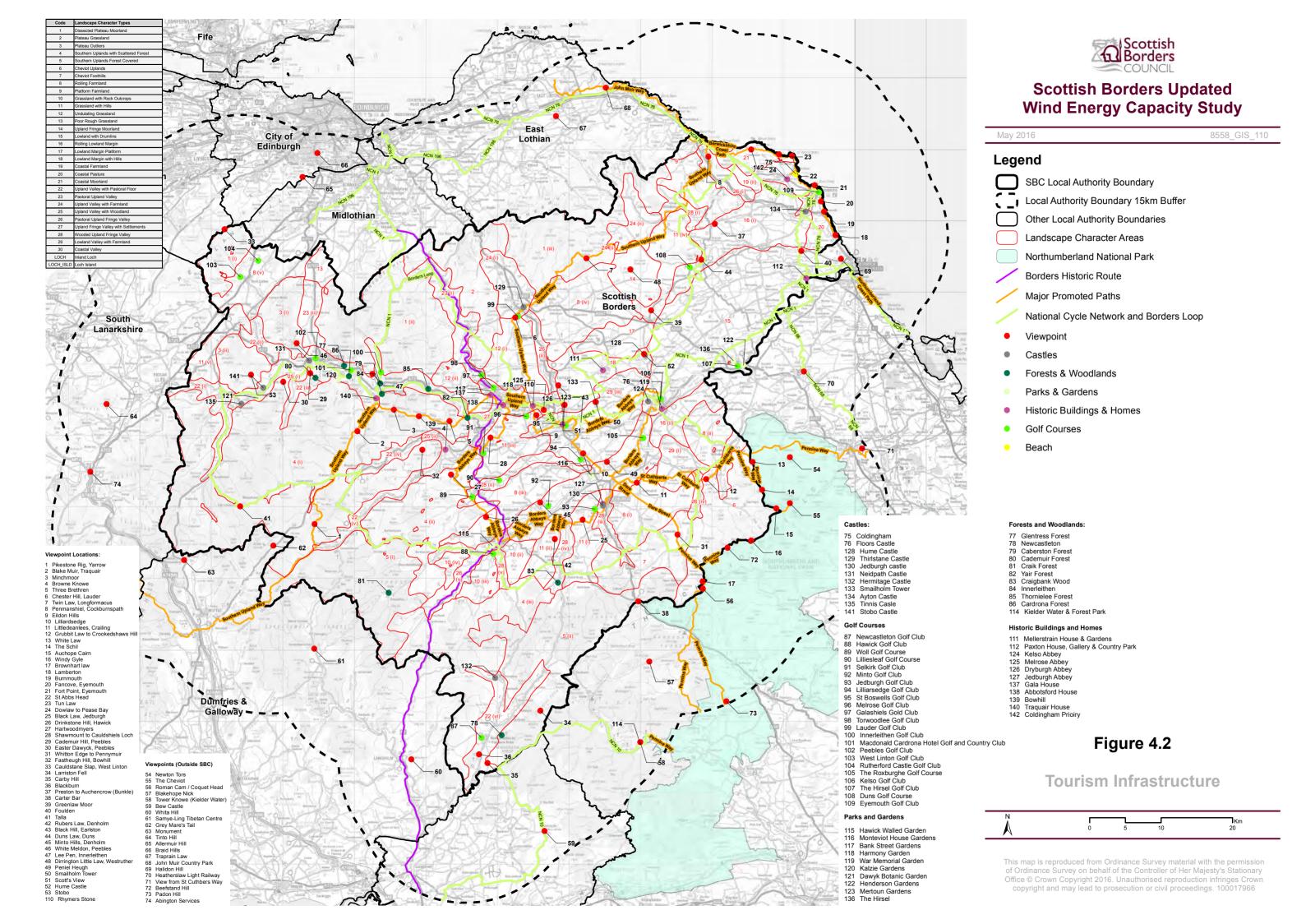
Existing Railway

Figure 4.1

**Transport Routes, Settlements & Viewpoints** 



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5.0 WIND TURBINES IN THE STUDY AREA

The following section describes the operating, consented and proposed wind turbine developments in Scottish Borders at July 2016 and rest of the study area according to available databases.

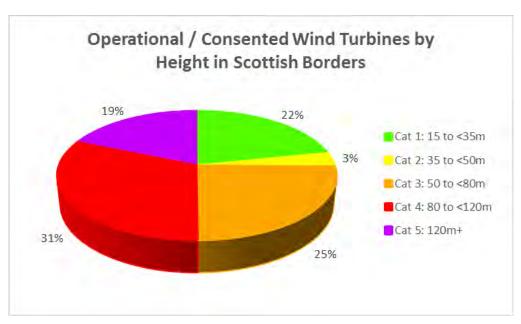
#### 5.1 Turbine Numbers and Distribution

The study area, for the purposes of visibility, landscape and visual impacts of turbines includes the Scottish Borders region, plus a 15km buffer around its boundary, taking in the majority of East Lothian and Midlothian, the southern area of Edinburgh City Council, the eastern area of West Lothian and South Lanarkshire and the north eastern area of Dumfries and Galloway. The study area also extends into northern England and includes the northern tip of Cumbria and the north western area of Northumberland. The extents of the study area are illustrated on Figure 3.1.

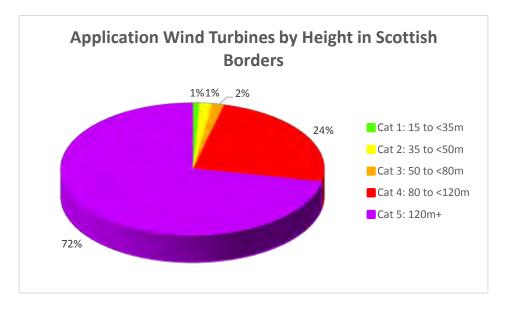
Consented and proposed wind energy developments within the study area are listed, together with details (where available) of location, number and height of turbines, etc, in Appendix 5. The locations are shown in Figure 5.1 (Scottish Borders) and 5.2 (whole study area).

At **July 2016** there were, within Scottish Borders, a total of 479 operational or consented turbines of 15m or greater height and 128 in planning or S36 applications awaiting a decision. Turbine numbers are according to the height categories listed in Chapter 2, Table 2.1.

Of those turbines consented, a significant proportion (240 or 50%) are in the two largest height categories, being 80m or more to blade tip, and 104 are in the smallest height category, below 35m in height. The following chart shows the distribution of sizes.



In the applications the vast majority of proposed turbines (123 or 96%) are 80m or more in blade height, as the following chart shows.



At or before July 2016 there are also very significant numbers of operational, consented and proposed wind turbines in the 15km buffer (Approximately 600 existing/consented and 74 proposed). This is particularly due to parts of the Crystal Rig/ Aikengall cluster extending into East Lothian; and Clyde windfarm and extension on the boundary with South Lanarkshire and significant developments in Dumfries and Galloway. Most of these turbines are 80m or taller to blade tip.

#### 5.2.1 Operating and Consented Wind Turbines

Scottish Borders, but particularly the wider study area, has a high number of windfarms with larger sized turbines when compared to many areas of Scotland. The largest windfarm within the study area and 15km buffer is Clyde Windfarm, (152x125m turbines) and Clyde Extension (54x125-142m turbines) located to the west of Scottish Borders, mainly within South Lanarkshire but three turbines within Scottish Borders. Of the consented and operational windfarms well within Scottish Borders, the two largest windfarms have over 50 turbines:

- Dun Law; 26x67.5m and 25x75m contiguous with two smaller windfarms (Pogbie and Keith Hill totalling 11 turbines) in East Lothian
- Crystal Rig/ Aikengall windfarm development cluster straddling the Scottish Borders and East Lothian boundary in total comprises 127 turbines, with 48 turbines of between 100 and 125m within Scottish Borders

There are four windfarms with between 20 and 50 turbines:

- Fallago Rig (48x110/125m)
- Bowbeat windfarm (24x80m)
- Black Hill windfarm; 22x78m
- Drone Hill Windfarm; 22x76m

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There are six medium sized windfarms with between 9 and 20 turbines:

- Quixwood Farm, 13x115m
- Penmanshiel Farm, 14x100m
- Toddleburn windfarm; 12x125m
- Long Park windfarm; 19x100m
- Glenkerie windfarm and extension; 17x100-125m
- Langhope Rig; 10x121.2
- Cloich Forest (18x115m),
- Windy Edge (7x125, 2x110)

There are three windfarms with three larger size turbines:

- Carcant windfarm; 3x107m
- Brockholes windfarm: 3x79m
- Hoprigshiels windfarm; 3x115m

A significant number of smaller non-commercial/FiT developments, single, 2 or 3 turbine developments, mainly with smaller turbines, are operational or are consented, particularly in the northeast and northwest of the study area.

#### 5.2.2 Proposed Windfarms

There are several proposed windfarms or windfarm extensions within the Scottish Borders. The main proposals at July 2016 are:

- Aikengall IIA (19x125-145m) on the eastern edge of the Lammermuirs (partly in East Lothian)
- Fallago Rig extension (12x126.4m) in the central Lammermuirs
- Inch Moor (16x126.5m) on the southern fringes of the Lammermuirs, west of Duns
- Earlshaugh (22x125m) and Whitelaw Brae (14x113.5m) in the Southern Uplands south of Tweeddale
- Kilrubie (7x115m) in the Plateau Outliers west of Eddleston
- Longpark Extension (7x100-110m)
- Birneyknowe (15x132m) south of Rubers Law
- Highlee Hill (13x176m) in the Wauchope Forest south of Chesters.

Within the 15km radius the following main schemes are at application stage:

- Fernylea II (6x115m) just east of Aikengall II windfarm in East Lothian
- Harestanes Extension (7x127m) and Loganhead (13x130m) in Dumfries and Galloway

There are scattered smaller turbine applications mainly in the northeast and northwest of Scottish Borders.

#### 5.3 Landscape Character of Turbine Locations

At July 2016 there were 462 turbines over 15m or taller operating, under construction or consented in Scottish Borders, with another 130 in application. Another 674 operational, consented and proposed turbines lie within 15km of the Scottish Borders boundary.

A clear pattern of wind energy development emerges, with the largest turbines and windfarms mainly located in the Uplands areas and the smaller schemes of three or fewer smaller size turbines located in Lowland and River Valley areas (see Fig 5.1 with reference to Fig. 3.3 Regional Landscape Character Types).

The operational windfarms are primarily in the Lammermuir and Moorfoot Hills regional landscape area to the north of the Tweed; although Clyde windfarm is located to the west of the Central Southern Uplands, just outside Scottish Borders. There are two mid-sized windfarms within the Central Southern Uplands, together with five further applications. In contrast, the Cheviot Hills regional area, predominantly Upland in character, is largely free of wind energy development.

There is also a significant concentration of consented smaller windfarms and small groups of larger turbines in the Upland Fringes south and east of the Lammermuirs extending into the neighbouring Coastal Zone.

The majority of smaller schemes, typically with 1-3 turbines below 50m, are found in the Upland Fringe and Lowlands. There are very few turbines within the River Valleys.

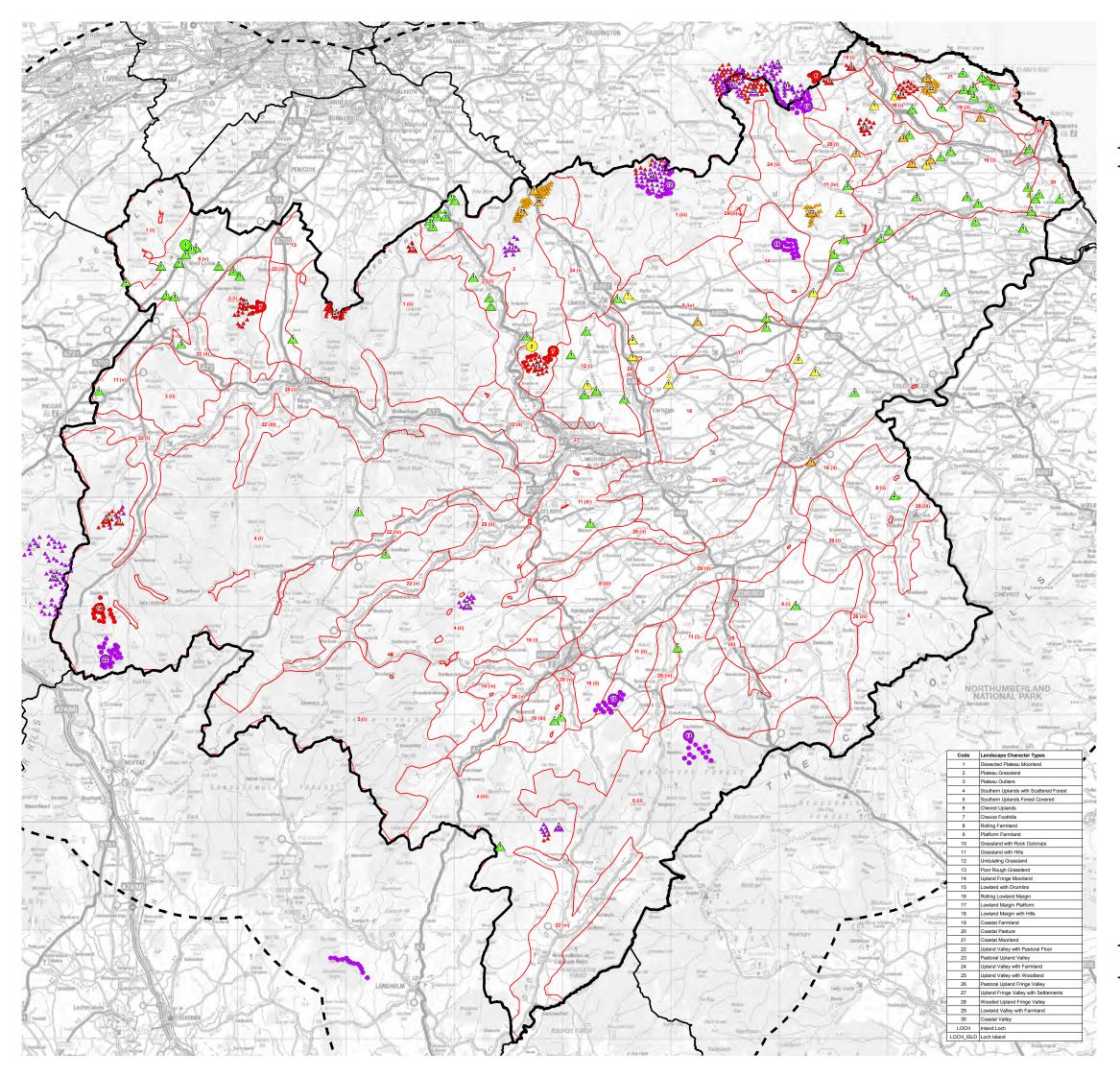
The tendency for windfarms and larger turbine development to be located within the Uplands and Upland Fringe landscapes is partly due to the large area of upland landscapes available, but mainly due to their scale and character. In landscape terms, Upland areas offer a larger-scale landscape, which can accommodate larger turbines, and it is rational to locate turbines in open and elevated areas to take advantage of higher wind speeds. Nevertheless, Upland areas are landscapes with a higher level of wildness characteristics and few overtly man-made features, in which wind turbines could be seen as an unwelcome industrial addition. Furthermore, some uplands have landforms of prominence, steepness or complexity which are unlikely to harmonise with large scale wind energy development.

Upland Fringe areas have lesser wildness characteristics, but are often of a relatively large scale and simplicity capable to some extent of accommodating larger schemes and turbines. However, within Scottish Borders there are notable landforms in some Upland Fringe areas, such as the Eildon Hills, that would not be suitable for wind energy development.

Coastal Zone landscape areas are often of larger scale, open, exposed, simple character comparable with the Uplands and Upland Fringe and capable of accommodating wind energy. Nevertheless in Scottish Borders the area is of limited size, with a complex and

scenic coastal edge and areas of more intimate settled character which can limit the scale of development to be accommodated.

In Lowland areas and River Valleys, the scale and pattern of the landscape is generally smaller, meaning that larger windfarms and turbines would appear incongruous, particularly given the greater array of "reference features" available such as trees, hedgerows and houses with which to compare them. Together with the proximity of settlements and properties there are clear landscape and visual sensitivities in such landscapes which would restrict their suitability for development. Nevertheless, a location within the lowland area better reflects the relationship between energy production and the consumer, as well as generally being easier to service in terms of both access and connection to the electricity grid.





# Scottish Borders Updated Wind Energy Capacity Study

August 2016

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## Legend

- SBC Local Authority Boundary
- Local Authority Boundary 15km Buffer
- Other Local Authority Boundaries
- Landscape Character Areas

## Windfarm: Status, Height Category

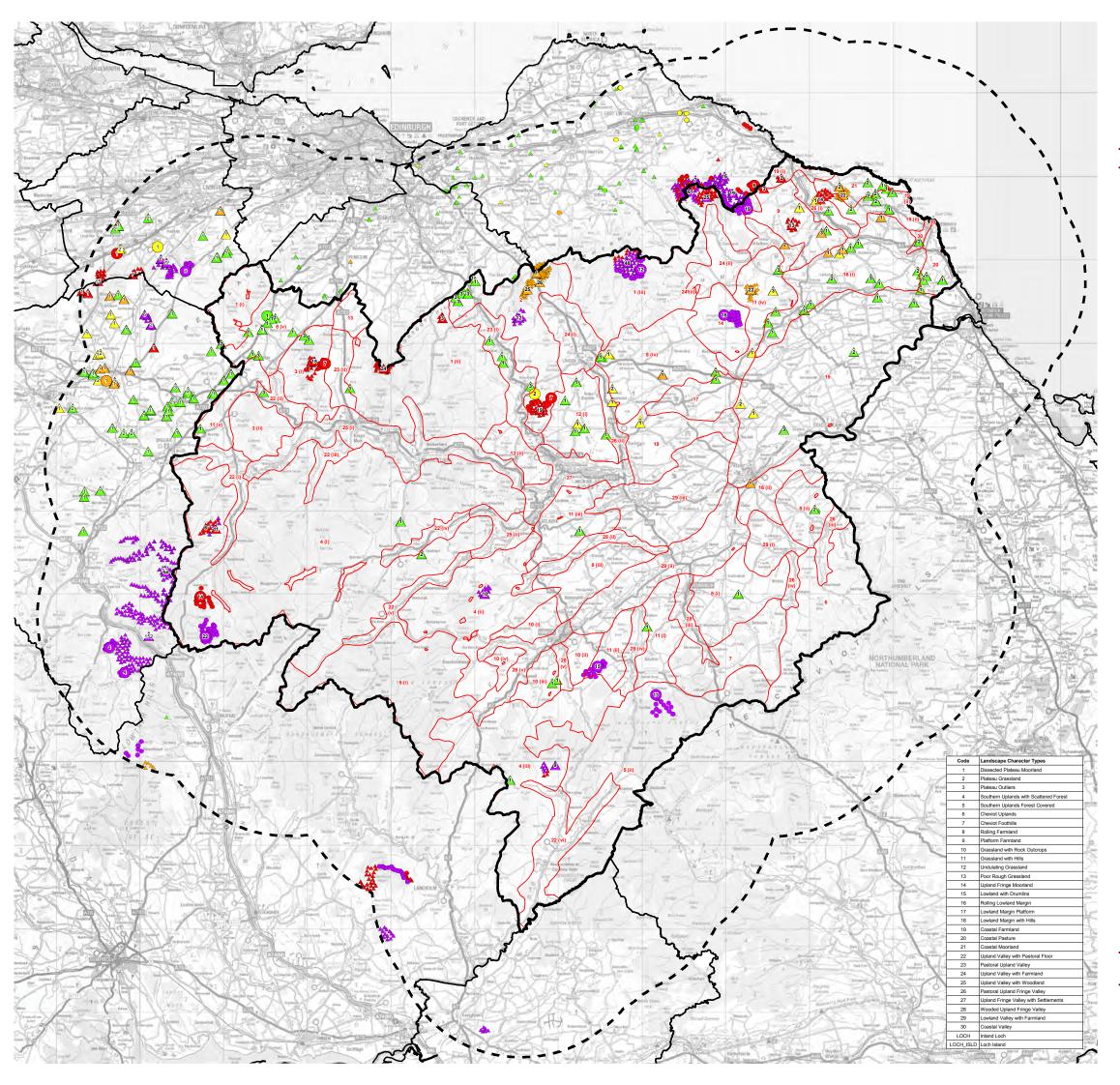
- △ Operational / Consented, Cat 1: 15 to <35m
- Operational / Consented, Cat 2: 35 to <50m
- Operational / Consented, Cat 3: 50 to <80m
- Operational / Consented, Cat 4: 80 to <120m
- Operational / Consented, Cat 5: 120m+
- Application, Cat 1: 15 to <35m</p>
- Application, Cat 2: 35 to <50m</p>
- Application, Cat 3: 50 to <80m
- Application, Cat 4: 80 to <120m</p>
- Application, Cat 5: 120m+

# Figure 5.1

Existing, Consented & Proposed Wind Turbines in Scottish Borders (as July 2016)



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# Scottish Borders Updated Wind Energy Capacity Study

August 2016

# Legend SBC Local Authority

SBC Local Authority Boundary

■ Local Authority Boundary 15km Buffer

Other Local Authority Boundaries

Landscape Character Areas

## Windfarm: Status, Height Category

△ Operational / Consented, Cat 1: 15 to <35m

Operational / Consented, Cat 2: 35 to <50m

Operational / Consented, Cat 3: 50 to <80m

Operational / Consented, Cat 4: 80 to <120m

Operational / Consented, Cat 5: 120m+

Application, Cat 1: 15 to <35m</p>

Application, Cat 2: 35 to <50m</p>

Application, Cat 3: 50 to <80m

Application, Cat 4: 80 to <120m

Application, Cat 5: 120m+

# Figure 5.2

**Existing, Consented & Proposed Wind Turbines in Study Area** 



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