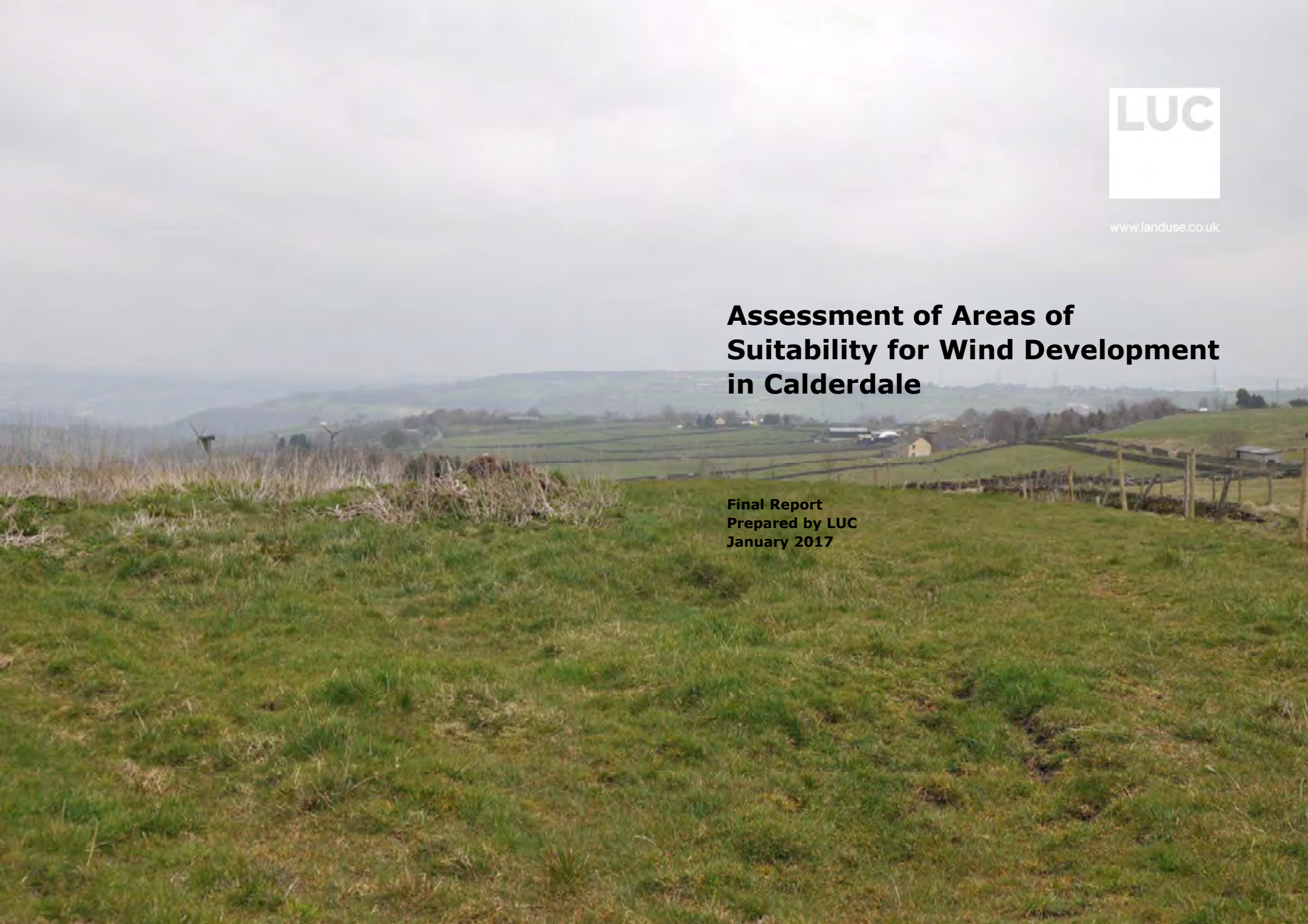

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Assessment of Areas of Suitability for Wind Development in Calderdale

Final Report
Prepared by LUC
January 2017

Project Title: Assessment of Areas of Suitability for Wind Development in Calderdale

Client: Calderdale Borough Council

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Contents

Tables

1 Executive Summary

1.1 On the 18th June 2015, the former Secretary of State for Communities and Local Government (Greg Clark) released a Ministerial Statement in relation to onshore wind energy. This stated that:

"When considering applications for wind energy development, local planning authorities should (subject to the transitional arrangement) only grant planning permission if:

- *the development site is in an area identified as suitable for wind energy development in a Local or Neighbourhood Plan; and*
- *following consultation, it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed and therefore the proposal has their backing.*

Whether the proposal has the backing of the affected local community is a planning judgement for the local planning authority."

1.2 Whilst Planning Practice Guidance (PPG), paragraph 005 (Renewable and Low Carbon Energy) recognises that there are no hard and fast rules for identifying suitable areas, it sets out that when identifying suitable areas, local planning authorities will need to ensure they take into account the requirements of the technology.

1.3 To this end, Calderdale Borough Council commissioned a study to identify those areas within Calderdale that are not suited to wind energy development based on the technical considerations for wind turbines, and conversely the areas that could be considered suitable.

1.4 The methodology is based on a refinement of the DECC Methodology – *Renewable and Low Carbon Energy Capacity Methodology for the English Regions* (2010). This methodology has been adapted to reflect new guidance and local factors relevant to Calderdale.

1.5 The assessment has been undertaken for five sizes of wind turbine:

- Very large (130m+).
- Large (90-129m).
- Medium (60-89m).
- Small (25-59m).
- Very small (18-24m).

1.6 These size bands have been taken from the study '*South Pennines Wind Energy Landscape Study*' (2014) and the supporting *South Pennines Wind Energy Database*[1] to ensure that the categories used can be correlated between the two studies.

1.7 The study found that only a small proportion of the Borough is considered technically suitable for wind energy development at the various scales. A number of the identified areas have also already been developed or have consented schemes.

1.8 Maps have been produced overlaying the results of the technical assessment with the findings of the landscape sensitivity assessment. This study does not however comment on the level of sensitivity that is considered to be 'acceptable' for identifying suitable areas for wind energy development. That is a matter for further consideration by the Calderdale Borough Council.

1.9 It is important to note that if areas of suitability for wind are identified in Local Plan or Neighbourhood Plans, it does not provide a definitive statement of the suitability of particular location for wind energy. Site specific assessment and design would still be required and all applications would still be assessed on their individual merits.

[1] http://lucmaps.co.uk/SPWED/mainmenu.html

2 Introduction

Policy context

2.1 On the 18th June 2015, the former Secretary of State for Communities and Local Government (Greg Clark) released a Ministerial Statement in relation to onshore wind energy. This stated that:

"When considering applications for wind energy development, local planning authorities should (subject to the transitional arrangement) only grant planning permission if:

- *the development site is in an area identified as suitable for wind energy development in a Local or Neighbourhood Plan; and*
- *following consultation, it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed and therefore the proposal has their backing.*

Whether the proposal has the backing of the affected local community is a planning judgement for the local planning authority."

2.2 The Ministerial Statement was subsequently incorporated into the National Planning Practice Guidance (PPG) (see Paragraph: 033 of the Renewable and Low Carbon Section).

2.3 In terms of identifying suitable area for wind energy development, Planning Practice Guidance, paragraph 005 (Renewable and Low Carbon Energy) states that:

"There are no hard and fast rules about how suitable areas for renewable energy should be identified, but in considering locations, local planning authorities will need to ensure they take into account the requirements of the technology and, critically, the potential impacts on the local environment, including from cumulative impacts."

2.4 It goes on to state that…

"There is a methodology available from the Department of Energy and Climate Change's website on assessing the capacity for renewable energy development which can be used and there may be existing local assessments. However, the impact of some types of technologies may have changed since assessments were drawn up (e.g. the size of wind turbines has been increasing). In considering impacts, assessments can use tools to identify where impacts are likely to be acceptable. For example, landscape character areas could form the basis for considering which technologies at which scale may be appropriate in different types of location."

2.5 Paragraph 008 also explains that "*local planning authorities should not rule out otherwise acceptable renewable energy developments through inflexible rules on buffer zones or separation distances. Other than when dealing with set back distances for safety, distance of itself does not necessarily determine whether the impact of a proposal is unacceptable."*

2.6 In response to the above policy and guidance, Calderdale Borough Council commissioned LUC to undertake an assessment of the areas that are technically suitable for wind energy development in Calderdale. The results of this assessment will be reviewed in conjunction with the outputs from '*South Pennines Wind Energy Landscape Study'* (2014) for further consideration.

Previous renewable and low carbon energy capacity assessments

2.7 This study follows a Renewable and Low Carbon Energy Study undertaken by Maslen Environmental in 2010. This study assessed the opportunities for renewable and low carbon energy in the South Pennines authorities. The study included an assessment of both commercial and small-scale wind energy capacity.

Description of technology

2.8 Onshore wind power is an established and proven technology with thousands of installations currently deployed across many countries. The UK has the largest wind energy resource in Europe. *The UK Renewable Energy Strategy* (2009) sets out a lead scenario in which wind generation, both onshore and offshore, will provide over two thirds of our renewable electricity supply by 2020.

2.9 Wind power uses energy from the wind to turn a rotor connected to an electrical generator. Although there are no rigid categories relating to the scale of wind turbines, for the purpose of this study, five size bands have been considered as follows:

- Very large (130m+).
- Large (90-129m).
- Medium (60-89m).
- Small (25-59m).
- Very small (18-24m).

2.10 These size bands have been taken from the 2014 *South Pennines Wind Energy Landscape Study* to ensure that the categories used can be correlated between the two studies.

2.11 The remainder of this report is structured as follows:

- **Chapter 3**: sets out the methodology used to undertake the assessment – including the opportunities and constraints considered;
- **Chapter 4**: sets out the results of the application of these constraints and opportunities; and,
- **Chapter 5**: provides a summary of the results.

Current wind energy development in Calderdale

2.12 As at August 2016, there are 14 operational wind schemes in Calderdale with a combined total of 42 turbines. In addition, there are 39 consented schemes (52 turbines in total) and three schemes for which the planning applications have not yet been determined (6 turbines).

2.13 These schemes range in size with the largest turbines being 125m to tip. The majority of the operational turbines are small (25-59m to tip). **Table 2.1** shows the breakdown of operational schemes in Calderdale by height class and group class[2].

Table 2.1: Number of operational schemes in Calderdale

Row Labels	Single	2 or 3 turbines	4 or 5 turbines	21 to 30 turbines	Total
Very large turbines					0
Large turbine			1 (5 turbines)		1 (5 turbines
Medium turbines					0
Small turbine	3			1 (23 turbines)	4 (26 turbines)
Very small turbine	7	2 (4 turbines)			9 (11 turbines)
Total	**10**	**2**	**1**	**1**	**14**

[2] As defined in the 2014 Landscape Study.

3 Methodology

3.1 An assessment was undertaken of the land that could be suitable for wind energy development. This type of assessment is undertaken using Geographic Information Systems (GIS) and considers a range of opportunities and constraints that relate to wind energy development. This is a desk-based assessment and no verification has been undertaken in the field.

3.2 Drawing on the guidance set out in the PPG, the methodology is based on a refinement of the DECC Methodology – *Renewable and Low Carbon Energy Capacity Methodology for the English Regions* (2010)[3]. The refinement involved a review of the data sources and assumptions used to ensure that the assessment reflects the local characteristics of Calderdale. It also took account of the five turbine size categories used in the report *South Pennines Wind Energy Landscape Study* (2014) in order for the results of the two studies to be integrated.

3.3 The study commenced with a meeting with officers from the Calderdale Development Strategy Team and the LUC project team to identify the constraints and opportunities for wind energy development in Calderdale. Based on an initial list of constraints and associated data sources, each criterion was discussed in turn and agreed for inclusion (as a constraint) or exclusion (as a constraint) from the assessment.

3.4 **Table 3.1** lists the criteria used in this assessment, the justification for their inclusion, and the data sources used to undertake the assessment. **Table 3.2** lists the criteria that were considered for inclusion, but discounted. It also records the reason for excluding them from the assessment.

3.5 Each of the layers detailed in **Table 3.1** were collated in an ESRI geodatabase. These layers were added to a map and organised according to topics. Layers listed in italics are considered constraints, but are not relevant in Calderdale.

3.6 The layers were combined in GIS using a 'Union' in order to create a single layer of 'constrained' land that was unsuitable for onshore wind energy development. Using GIS, these unsuitable areas were subtracted from the Borough boundary in order to identify the land that remained once the constraints had been applied. For the purposes of this study, this has been identified on a series of maps as 'Unconstrained' land.

[3] In March 2010, DECC published a methodology for quantifying the opportunities and constraints for deploying renewables and low carbon energy in the English Regions. The purpose of this methodology was to ensure that a consistent approach was used for the assessment of resource potential across the English regions. The methodology sets out a series of assumptions for calculating the technical potential for renewable energy within a region.

Table 3.1: Criteria used in the assessment of suitability

Parameter	Assumption	Data source	Justification and notes
Opportunities			
Wind Speed **(see Map 1)**	All areas with wind speed 5 m/s at 45m above ground level (agl)	NOABL Industry practice	The majority of Calderdale experiences wind speeds that exceed 5m/s. Consultation with a small number of developers who operate in the area suggested that under current government policy, there is a reluctance to develop schemes where wind speeds are below 7m/s. However, as government policy could change in the future, and technological advances mean that turbines can be viable under lower wind speed conditions, a 5m/s threshold was considered appropriate. The DECC Methodology (2010) also recommends using 5m/s. The previous Maslen Environmental study used a threshold of 6m/s which was considered appropriate at the time.
Wind turbine size	Assess five turbine sizes as per the Landscape Sensitivity Study: • Very large (130m+) • Large (90-129m) • Medium (60-89m) • Small (25-59m) • Very small (18-24m)	Calderdale/LUC	South Pennines Wind Energy Landscape Study, Julie Martin Associates and LUC, (2014).

Parameter	Assumption	Data source	Justification and notes
Constraints			
Infrastructure **(see map 2** which shows the constraints for very large turbines. These constraints have been applied for all turbine size categories and the buffer distances reduced accordingly)	Roads with a buffer of the height of the turbine (to blade tip height)+ 10% (of the tip height).	Ordnance Survey Open Roads. Note: Linear road data were categorised as single or dual carriageways. In order to create a footprint from the road centrelines data, it was assumed that single carriageways were 10m in width and dual carriageways were 20m in width.	This buffer is applied as a safety consideration.
(see map 2 which shows the constraints for very large turbines. These constraints have been applied for all turbine size categories and the buffer distances reduced accordingly)	Railways with a buffer of the height of the turbine (to blade tip height) + 10% (of the tip height).	Ordnance Survey VectorMap District. Note: In order to create a footprint from the railway centrelines data, it was assumed that railways were 15m in width.	This buffer is applied as a safety consideration. The Maslen Environmental study applied a buffer of 150m to roads and railways for commercial-scale turbines.
(see map 2 which shows the constraints for very large turbines. These constraints have been applied for all turbine size categories and the buffer distances reduced accordingly)	Major transmission lines with a buffer of the height of the turbine (to blade tip height) + 10% (of the tip height): • 400kV lines • 275kV lines	National Grid	This buffer is applied as a safety consideration. This constraint was not considered in the Maslen Environmental study.
(see map 2 which shows the constraints for very large turbines. These constraints have been applied for all turbine size categories and the buffer distances reduced accordingly)	Public Rights of Way with a buffer of the height of the turbine (to blade tip height) + 10% (of the tip height).	Calderdale Borough Council	The Steering Group agreed that it was not necessary to apply a larger buffer to bridleways than other Rights of Way.

Parameter	Assumption	Data source	Justification and notes
Noise and visual amenity (**See Map 3**)	Residential and commercial buffer zones - Residential and commercial properties with a buffer to exclude areas within which it would be categorically impossible to meet the ETSU-R-97 noise limits for small and very small turbines: • Very small: 200m for residential, 150m for business • Small: 200m for residential, 150m for business and highly unlikely to meet the ETSU-R-97 noise limits for medium, large and very large turbines: • Medium: : 500m for residential, 200m for business • Large: 500m for residential, 200m for business • Very large: 500m for residential, 200m for business For properties outside of (but close to) the Borough Boundary, indicative buffers have been applied to the available property/buildings data. As it is not possible to differentiate between residential or commercial properties within the publicly available data, it has been assumed that all properties are residential: • Very small and small: 200m buffer	Calderdale Local Land and Property Gazetteer (LLPG) Residential and Business address points OS OpenMapLocal Buildings layer for buildings adjacent to the Borough Boundary	As outlined in paragraph 2.7.6 of the national policy statement for Renewable Energy Infrastructure (EN-3), the two main issues that determine the acceptable separation distance between residential properties and wind energy developments are visual amenity and noise. Commercial-scale wind turbines are large structures and can have an effect on visual amenity from residential properties. All wind turbines also generate sound during their operation. As such, appropriate distances should be maintained between wind turbines and sensitive receptors to protect residential amenity. The key question however is whether buffer distances should be applied (to take account of noise issues) when identifying suitable areas for wind energy developments. In order to secure planning permission, wind turbine applications have to provide evidence that they adhere to the required noise thresholds set out in the ETSU Guidance – The Assessment and Rating of Noise from Wind Farms (1995). Based on the opinion of acoustic specialists, buffers have been defined for areas within which it would categorically not be possible to meet the ETSU-R-97 noise limits[4]. For medium, large and very large turbines, an additional buffer has been applied to rule out areas within which it would be highly unlikely, but not categorically impossible, to site wind turbines and still meet ETSU-R-97 noise limits. For large turbines, the Maslen study used an 800m buffer around residential buildings. Shadow flicker has not been considered as a constraint in this study as modern turbines are now equipped with the technology to be able to turn off when shadow flicker is predicted to occur. The Maslen Environmental study used a 1km buffer (10x rotor diameter) around settlements. This incorporated both noise and shadow flicker considerations.

[4] Modelling was undertaken by wind energy Acoustic Specialists in accordance with the ISO 9613-2 standard and the standard prediction parameters set out in the Institute of Acoustics Good Practice Guide on Wind Turbine Noise (May 2013).

Parameter	Assumption	Data source	Justification and notes
	• Medium, large and very large: 500m buffer		
Natural features **(see Map 4)**	Slopes greater than 15 degrees	Ordnance Survey Terrain50	This is a development/operational constraint. Developers have indicated that this is the maximum slope they would consider for development.
	Rivers and waterbodies with a 50m buffer.	Ordnance Survey VectorMap District: Surface Water Area	A 50m buffer has been applied around all rivers and waterbodies to take account of good practice such as pollution control during construction. The Maslen Environmental study used a 150m buffer.
Biodiversity **(see Map 5)**	International designations: • Special Areas of Conservation • Special Protection Areas • *Ramsar sites*	Natural England	As protected by: Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, commonly known as the Habitats Directive. Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds, commonly known as the Birds Directive. Conservation of Habitats and Species Regulations 2010 (as amended).
	National designations: • Sites of Special Scientific Interest • *National Nature Reserves*	Natural England	As protected by: Wildlife and Countryside Act 1981. Conservation of Habitats and Species Regulations 2010 (as amended).
	Other designations: • Ancient woodland • Local Nature Reserves	Natural England Calderdale Borough Council	National Planning Policy Framework. Natural Environment and Rural Communities Act 2006.
	Species • Woodland (+50m buffer)	Forestry Commission Natural England	Natural England advocates a 50m buffer round woodlands/hedgerows because of potential bat impact. Hedgerow data not available.
Cultural heritage **(see Map 6)**	Designated sites • *World Heritage Sites*	Historic England	National Planning Policy Framework. The Convention Concerning the Protection of the World Cultural and Natural Heritage.

Parameter	Assumption	Data source	Justification and notes
	• Historic Parks and Gardens • Scheduled Monuments • Listed Buildings • *Registered battlefields*		National Heritage Act 1983. Ancient Monuments and Archaeological Areas Act of 1979. Planning (Listed Buildings and Conservation Areas) Act 1990. *Note: A 10m buffer has been applied to Listed Buildings (which area a point dataset) to approximate a footprint on the ground. This is not intended to identify a 'setting' zone.*
	Other cultural heritage considerations: • Conservation Areas	Calderdale Borough Council	National Planning Policy Framework. Planning (Listed Buildings and Conservation Areas) Act 1990.

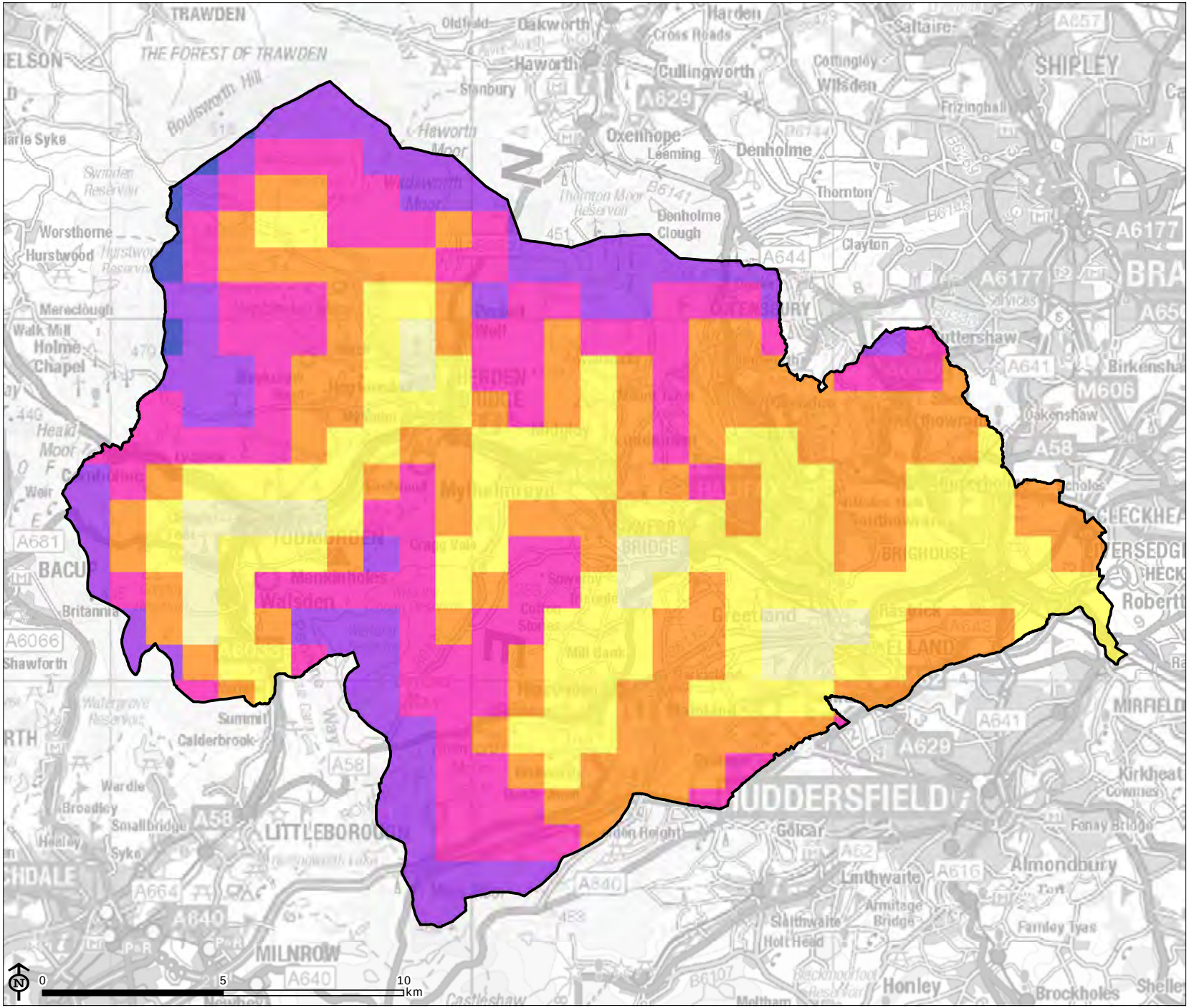
Table 3.2: Criteria not used in the assessment of suitability

Parameter	Assumption	Data source	Justification
Infrastructure	• Airports and airfields	CAA	Leeds Bradfield Airport is approximately 15km from the Borough boundary. The CAA acknowledges that wind turbine developments and aviation need to co-exist in order for the UK to achieve its renewable energy targets. As such, no blanket exclusion rule exists – the CAA state that 'due to the complex nature of aviation operations, and the impact of local environmental constraints, all instances of potential negative impact of proposed wind turbine developments on aviation operations must be considered on a case by- case basis.'[5] One this basis, no exclusion zones have been applied for these airports/airfields.

[5] http://www.caa.co.uk/default.aspx?catid=1959

Parameter	Assumption	Data source	Justification
	• MOD considerations		For some constraints such as aviation (i.e. radar impacts) and telecommunication links, it is not possible to apply constraints at this stage as they will vary on a site by site basis (and the specific locations of any proposed turbines). These constraints would therefore need to be considered at the planning application stage.
Bird sensitivity	• RSPB bird sensitivity	RSPB Mapped and written guidance in relation to birds and onshore wind energy development in England (2009)[6]	Whilst there are large areas of Calderdale classified as having a high sensitivity to wind energy development in terms of birds, these areas are largely overlapped by the Special Protection Area boundaries which are already constrained. Bird surveys will be required for applications likely to have an impact on bird populations in the vicinity of the Special Protection Area.
Local Nature Conservation	• Local Wildlife SitesBAP Habitats	CMBC	Some, but not all sites of nature conservation value will be unsuitable. Ecological surveys and assessments will be required to assess suitability at site level.
Landscape Designations	• National Parks • Areas of Outstanding Natural Beauty	Natural England	There are no designated landscapes in Calderdale, however the west of the District is covered by UDP Policy NE 8-10 'Area Around Todmorden' which sets out what types of development are considered appropriate within this area.

[6] http://www.rspb.org.uk/Images/EnglishSensitivityMap_tcm9-237359.pdf



Calderdale
Wind Energy Suitability

Map 1: Wind Speed at 45m above ground level

Calderdale Council Boundary

Wind Speed at 45m AGL

- 0 - 4.9 m/s
- 5.0 - 5.9 m/s
- 6.0 - 6.9 m/s
- 7.0 - 7.9 m/s
- 8.0 - 8.9 m/s
- 9.0 - 10.0 m/s

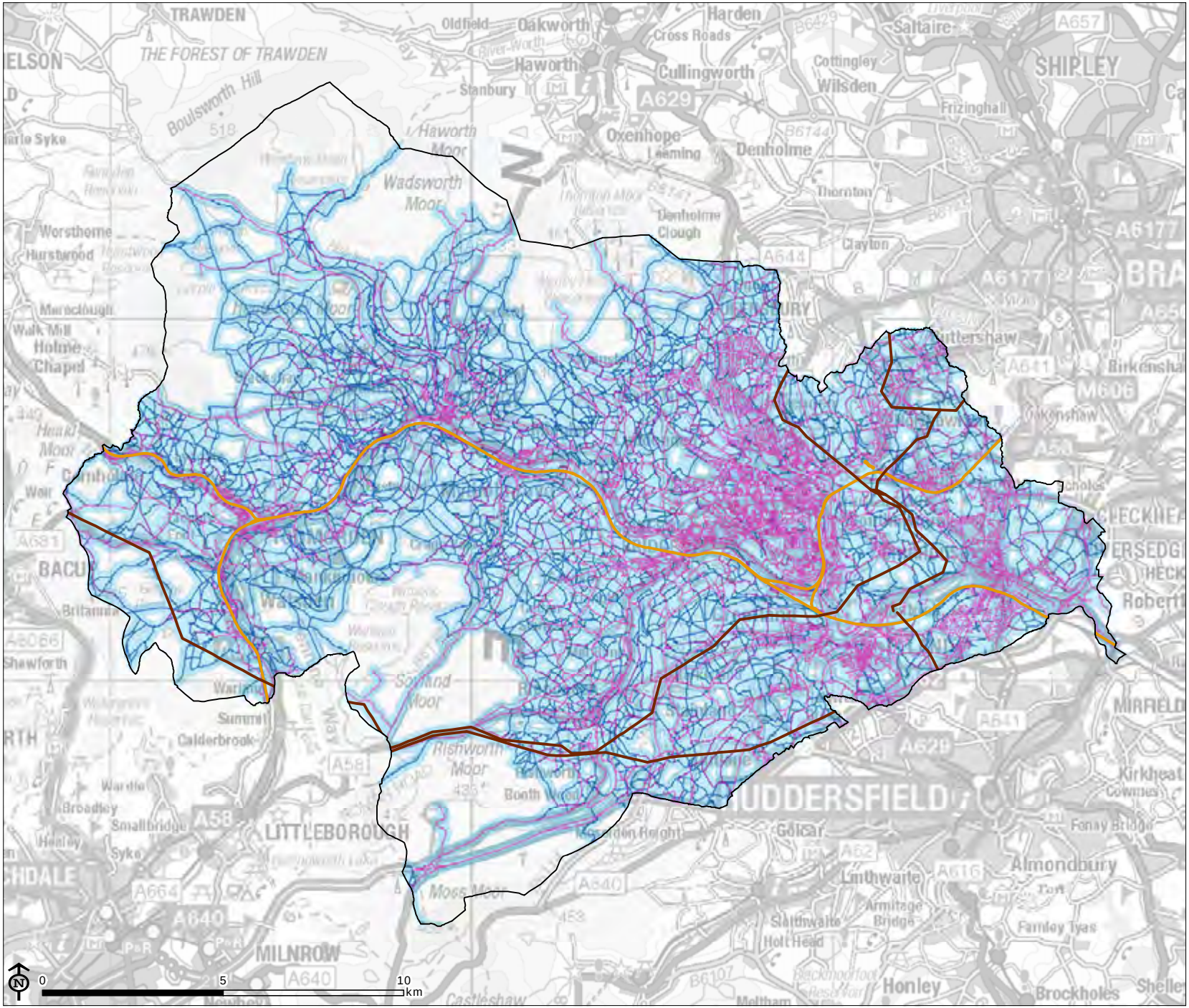
Source: NOABL

Map Scale @ A4: 1:150,000

LUC

Calderdale Council

CB:KS EB:Stenson_K LUCBRI MAP1_6719_002_r1_Wind_Speed_A4L 04/08/2016



Calderdale
Wind Energy Suitability

Map 2: Infrastructure safety constraints: Very large turbines (130m+)

- Calderdale Council Boundary
- Transmission lines
- Railway lines
- Roads
- Public Rights of Way
- Constrained Land*

*Constrained land was calculated by adding a safety buffer to the footprint of transmission lines, railway lines, roads and rights of way. The safety buffer is the turbine tip height plus 10%. For a very large turbine, the safety buffer is 165m.

Source: National Grid, Ordnance Survey

Map Scale @ A4: 1:150,000

LUC

Calderdale Council

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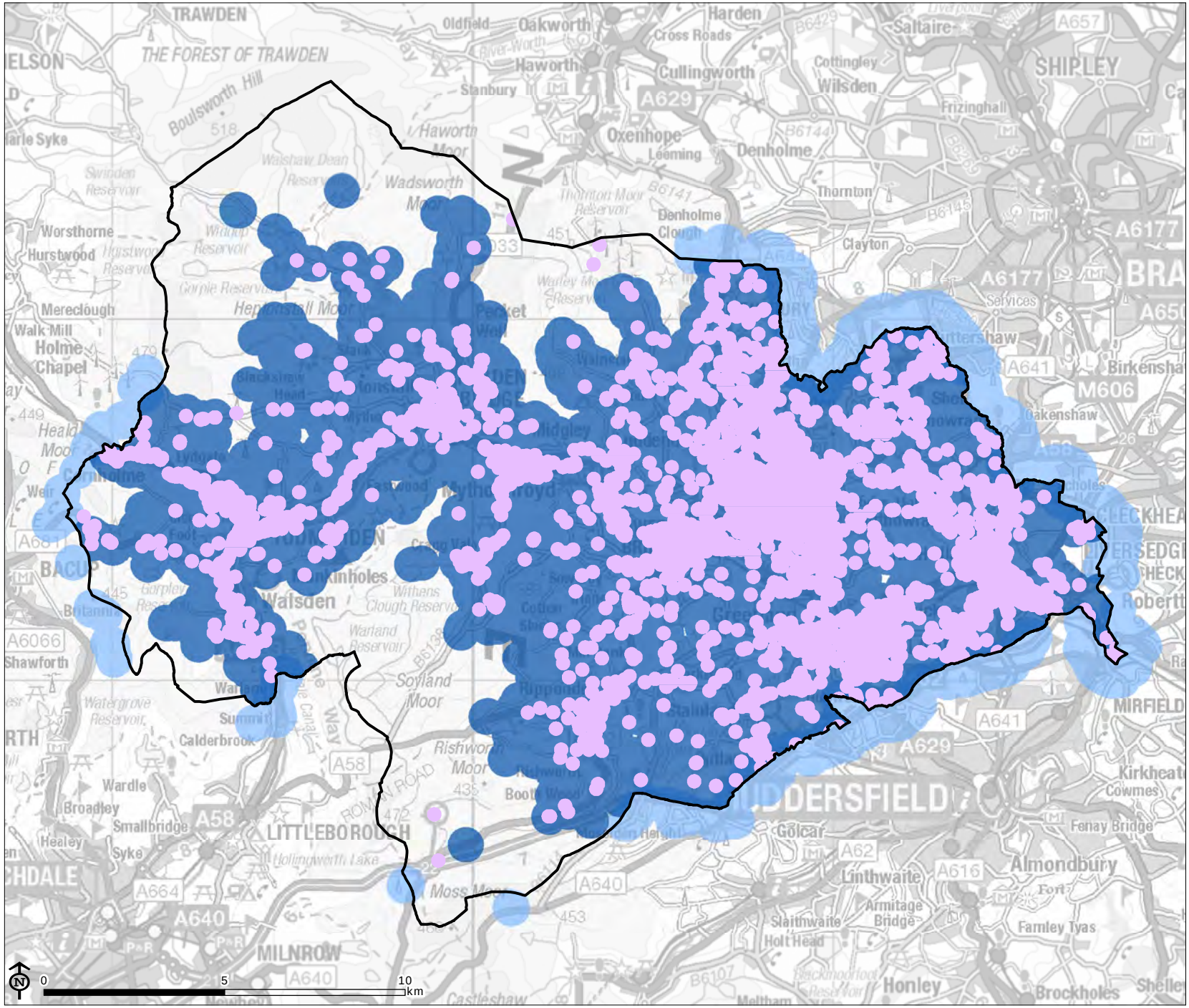

Calderdale
Wind Energy Suitability

Map 3: Building safety constraints: Very large turbines (**130m+**)*

- Calderdale Council Boundary
- Business properties
- Residential properties
- Potential residential properties outside of the Borough**

*For this turbine size, a buffer of 500m has been applied to residential properties and 200m to commercial properties to exclude areas within which it would be highly unlikely to meet the ETSU-R-97 noise limits

**Indicative only as data were not available to differentiate between residential and commercial properties outside of the Borough.

Source: CMBC LLPG

Map Scale @ A4: 1:150,000

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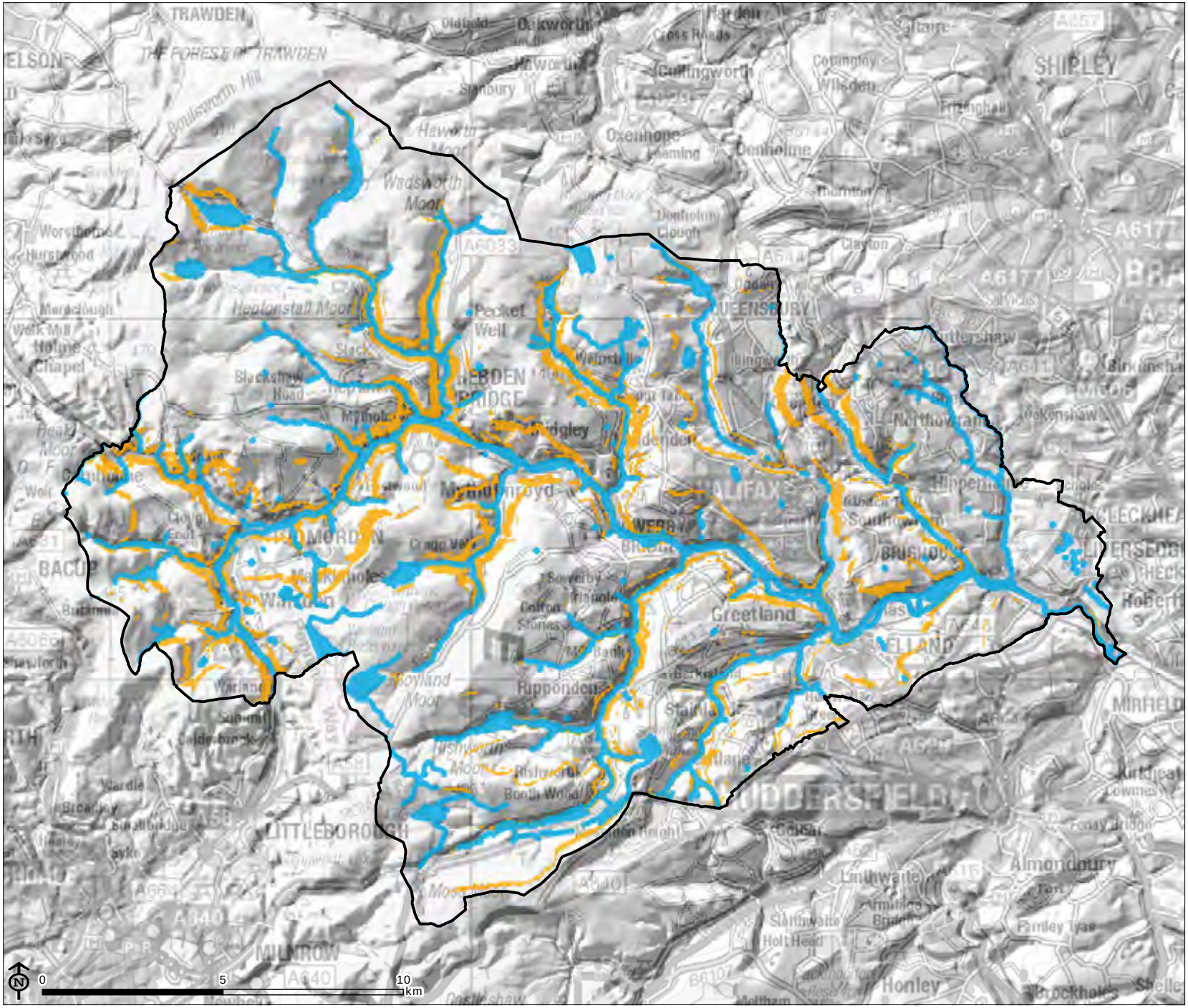

Calderdale
Wind Energy Suitability

Map 4: Natural Constraints

- Calderdale Council Boundary
- Rivers and waterbodies (with 50m buffer)
- Slopes greater than 15 degrees

Source: Ordnance Survey

Map Scale @ A4: 1:150,000

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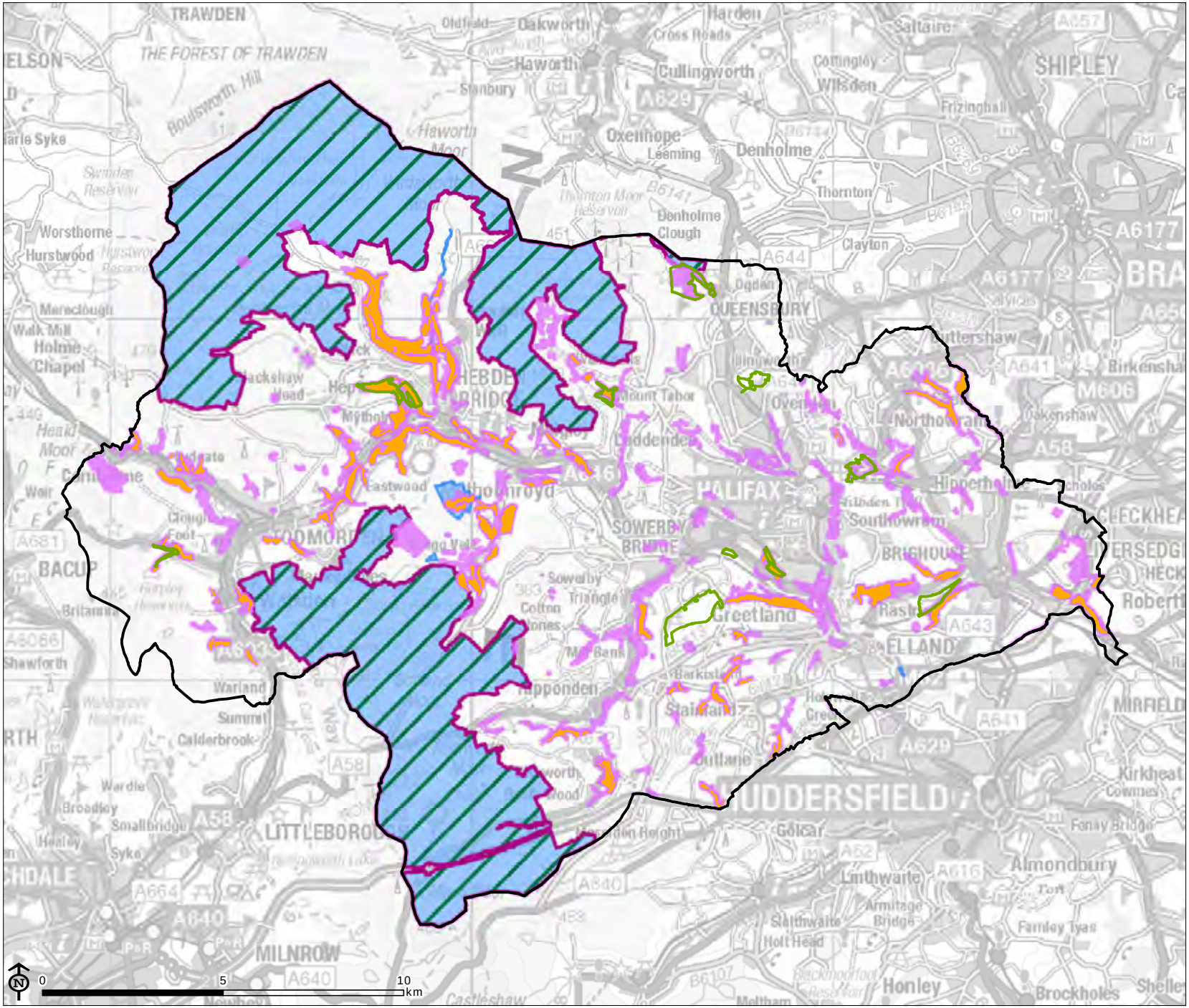
Calderdale Council

CB:KS EB:Manson D LUCBRI MAP4_6719_006_r2_Natural_Constraints_A4L 25/01/2017



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Map 5: Biodiversity constraints

- Calderdale Council Boundary
- Local Nature Reserve
- Ancient Woodland
- Woodland (with 50m buffer)
- Special Protection Area
- Special Area of Conservation
- Site of Special Scientific Interest

Source: JNCC, Natural England, Forestry Commission

Map Scale @ A4: 1:150,000

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Calderdale Council

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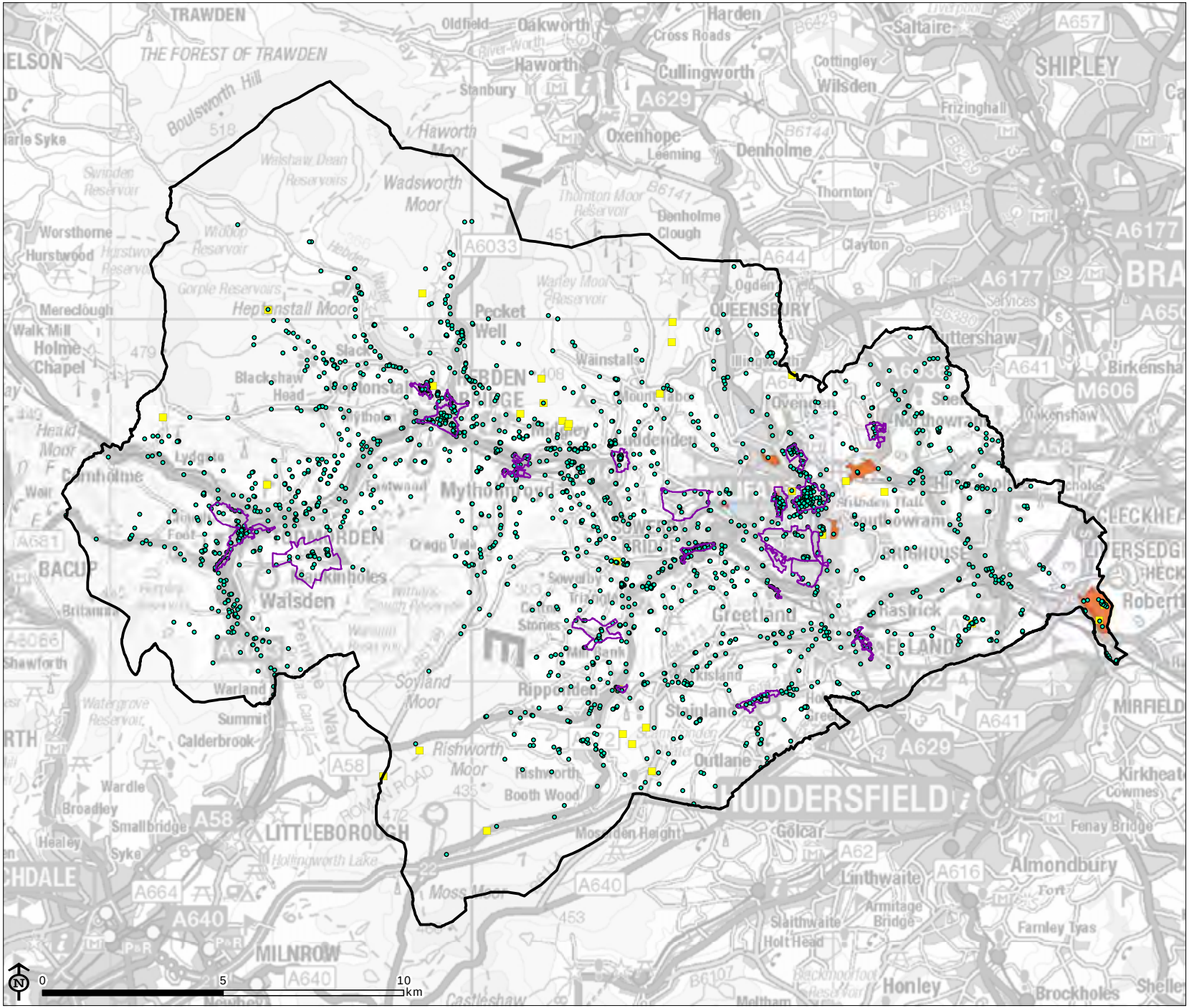

Calderdale
Wind Energy Suitability

Map 6: Cultural heritage constraints

- Calderdale Council Boundary
- Listed Buildings
- Scheduled Ancient Monuments
- Conservation Areas
- Registered Parks and Gardens

Source: Historic England

Map Scale @ A4: 1:150,000

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4 Findings

'Unconstrained' land

4.1 The assessment has been completed for each of the wind turbine size categories. An extract of the current and planned wind energy schemes has been overlaid onto the resultant layers. The results are shown in **Maps 7 – 11**.

Incorporating landscape sensitivity

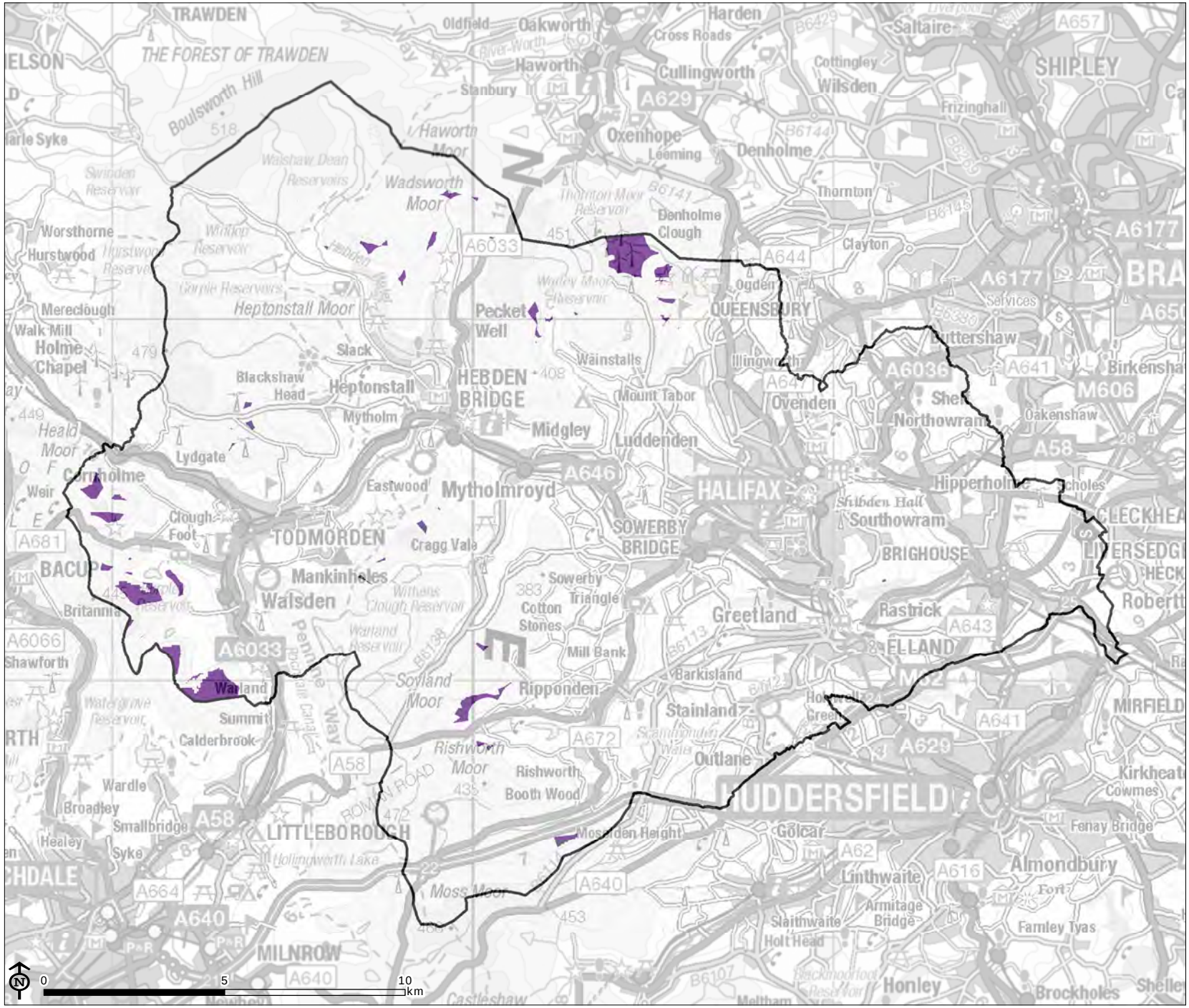
4.2 One of the key factors determining the acceptability or otherwise of wind turbines is their potential impacts on the local landscape – this is due to their height and the movement they introduce into the landscape (i.e. rotating blades). Different landscapes present different opportunities for renewable energy, and the use of landscape sensitivity studies can assist both planners and developers identifying what scale of development may be appropriate in which areas. This approach is endorsed by the PPG which states that "*landscape character areas could form the basis for considering which technologies at which scale may be appropriate in different types of location.*"

4.3 The results of the areas of suitability assessment have been overlain with the results of the landscape sensitivity assessment to identify the amount of suitable land that lies within each sensitivity category. The results are shown in **Maps 12 – 16**. A judgement has not however been made regarding the level of sensitivity that is considered to be acceptable, as this is a matter for the Borough Council's consideration.

Suitable areas

4.4 It is important to note that if areas of suitability for wind are identified in Local Plan or Neighbourhood Plans, it does not provide a definitive statement of the suitability of particular location for wind energy. Site specific assessment and design would still be required and all applications would still be assessed on their individual merits. It is also not possible at a strategic level, to take into account cumulative effects. Residential amenity, the setting of heritage assets, telecommunications, ecology and air traffic safety etc., would also need to be carefully considered at a site level.

4.5 All applications would also have to meet second test set out in the PPG i.e. that it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed and therefore the proposal has their backing.



Calderdale
Wind Energy Suitability

Map 7: 'Unconstrained' Land: Very Large Turbines (130m+)

- Calderdale Council Boundary
- 'Unconstrained' land

Please note: Properties in adjacent Local Authorities have been taken into consideration as far as possible by adding a 500m buffer around all buildings recorded in the OSOpenMap Local dataset.

Source: Various - see report

Map Scale @ A4: 1:150,000

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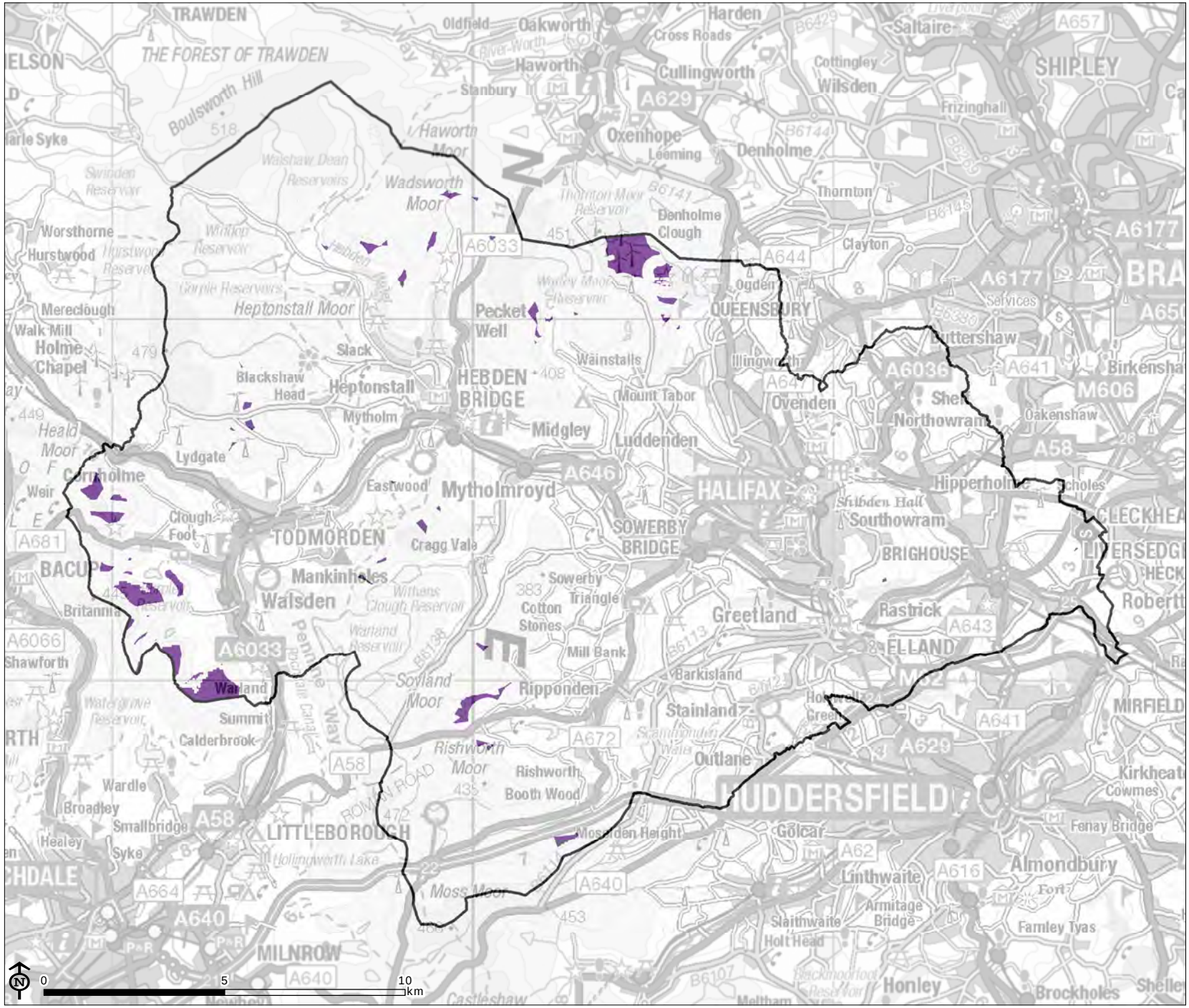

Calderdale
Wind Energy Suitability

Map 8: 'Unconstrained' Land: Large Turbines (90-129m)

- Calderdale Council Boundary
- 'Unconstrained' land

Please note: Properties in adjacent Local Authorities have been taken into consideration as far as possible by adding a 500m buffer around all buildings recorded in the OSOpenMap Local dataset.

Source: Various - see report

Map Scale @ A4: 1:150,000

LUC

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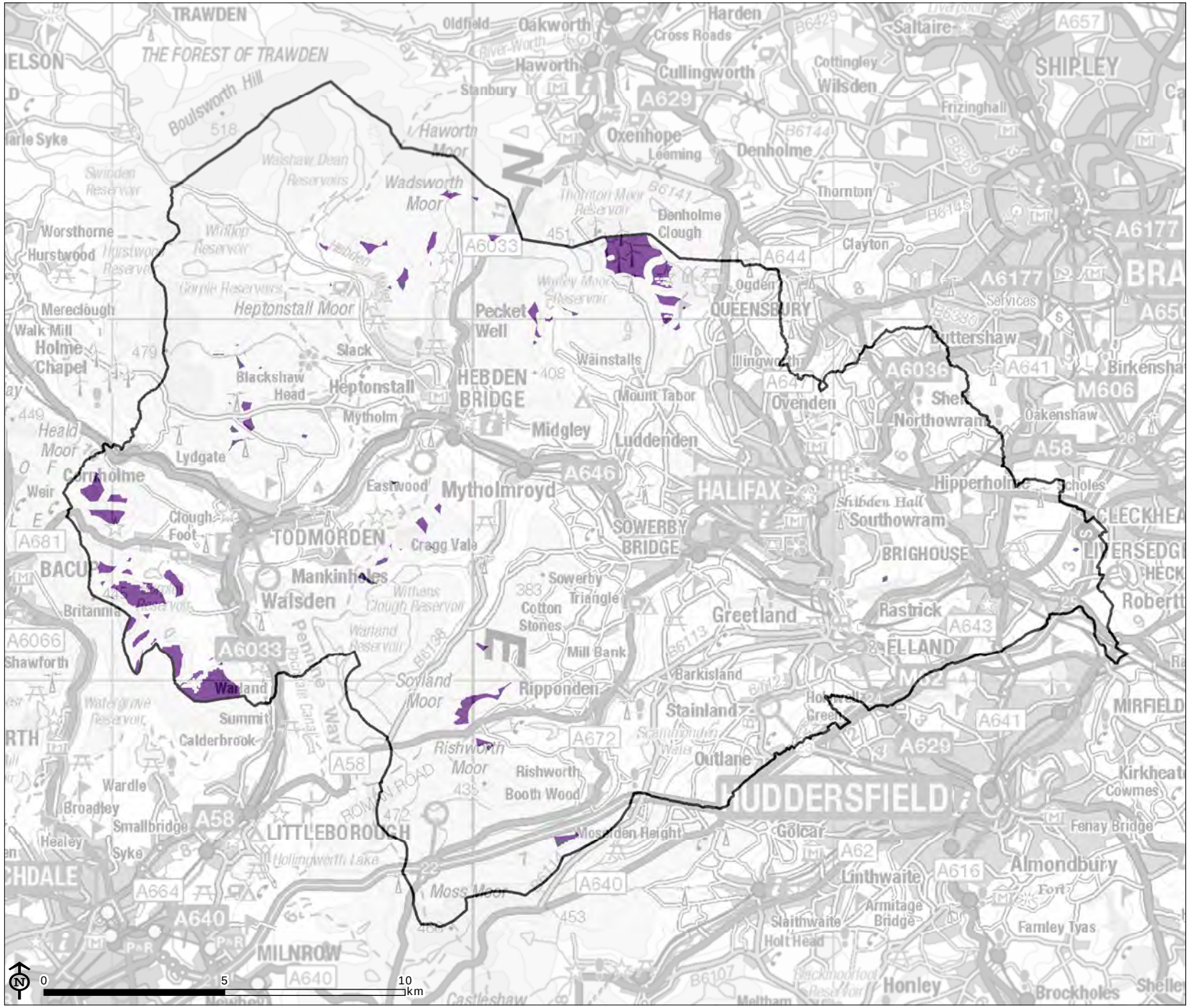
CB:KS EB:Stenson_K LUCBRI MAP8_6719_008_r2_L_Turbine_Combined_Constraints_A4L 23/01/2017



Calderdale
Wind Energy Suitability

Map 9: 'Unconstrained' Land: Medium Turbines (60-89m)

Calderdale Council Boundary

'Unconstrained' land

Please note: Properties in adjacent Local Authorities have been taken into consideration as far as possible by adding a 500m buffer around all buildings recorded in the OSOpenMap Local dataset.

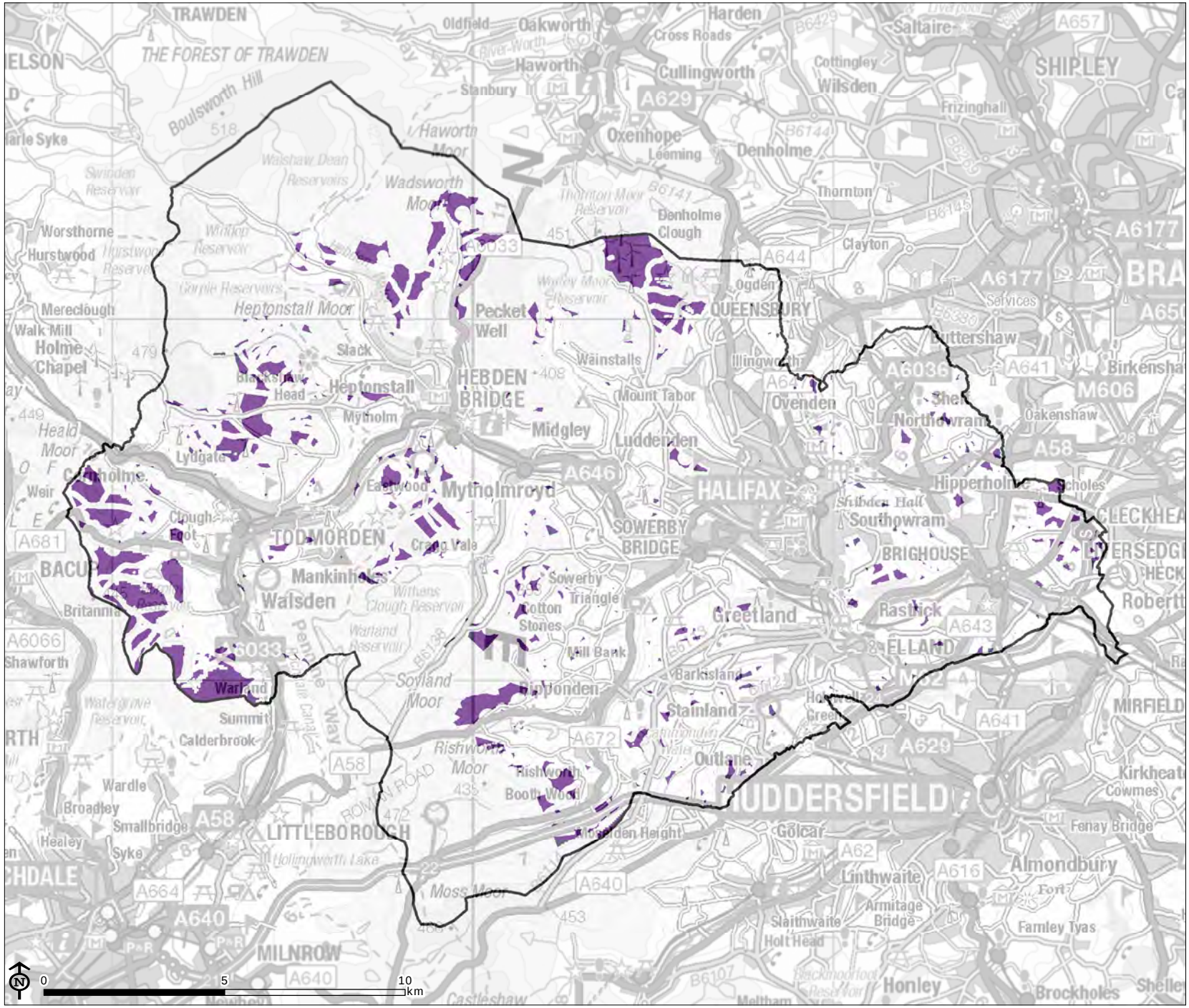
Source: Various - see report

Map Scale @ A4: 1:150,000

LUC

Calderdale Council

CB:KS EB:Stenson_K LUCBRI MAP9_6719_009_r2_M_Turbine_Combined_Constraints_A4L 23/01/2017



Calderdale
Wind Energy Suitability

Map 10: 'Unconstrained' Land: Small Turbines (25-59m)

Calderdale Council Boundary

'Unconstrained' land

Please note: Properties in adjacent Local Authorities have been taken into consideration as far as possible by adding a 200m buffer around all buildings recorded in the OSOpenMap Local dataset.

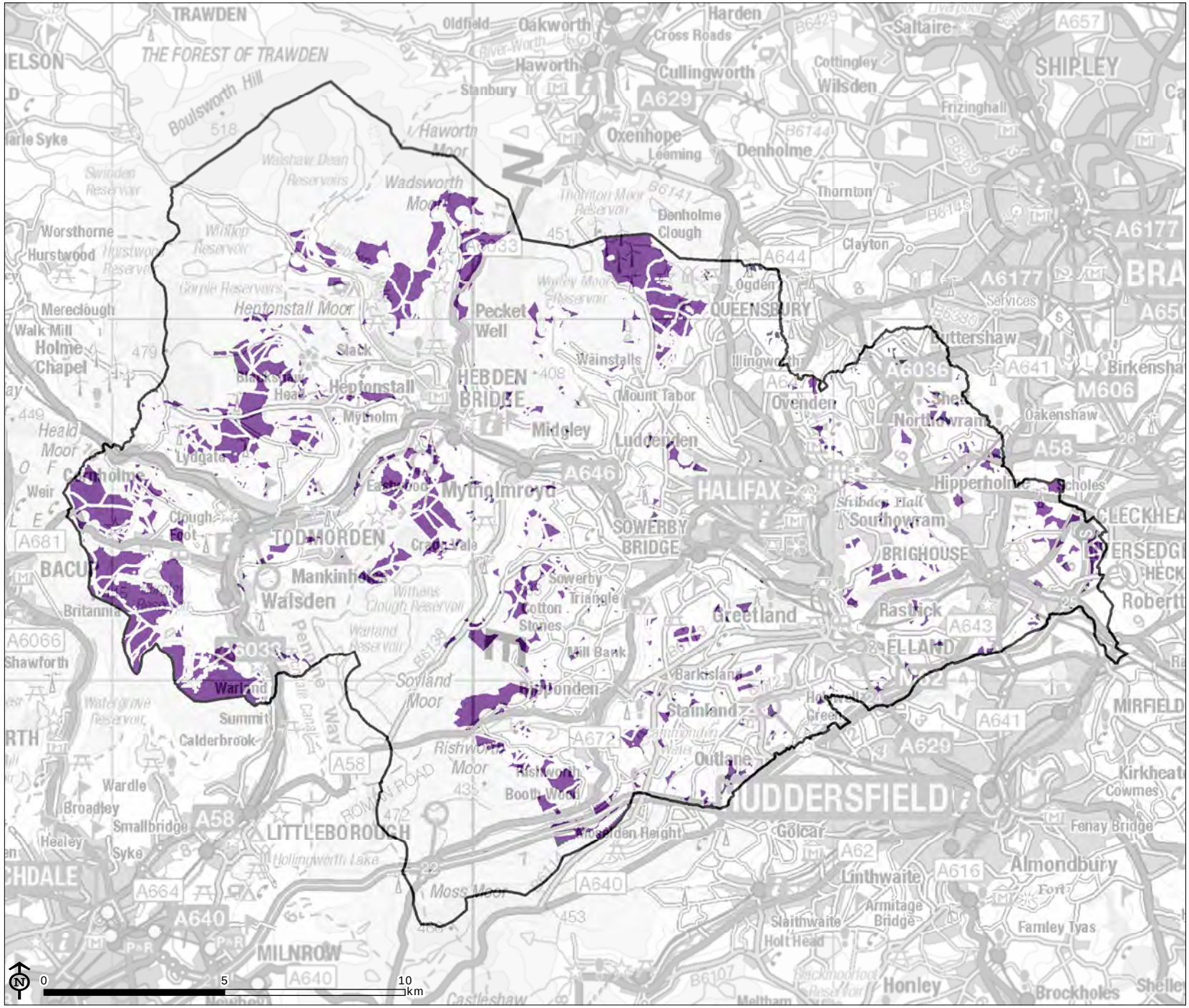
Source: Various - see report

Map Scale @ A4: 1:150,000

LUC

Calderdale Council

CB:KS EB:Stenson_K LUCBRI MAP10_6719_010_r2_S_Turbine_Combined_Constraints_A4L 23/01/2017



Calderdale
Wind Energy Suitability

Map 11: 'Unconstrained' Land: Very Small Turbines (18-24m)

Calderdale Council Boundary

'Unconstrained' land

Please note: Properties in adjacent Local Authorities have been taken into consideration as far as possible by adding a 200m buffer around all buildings recorded in the OSOpenMap Local dataset.

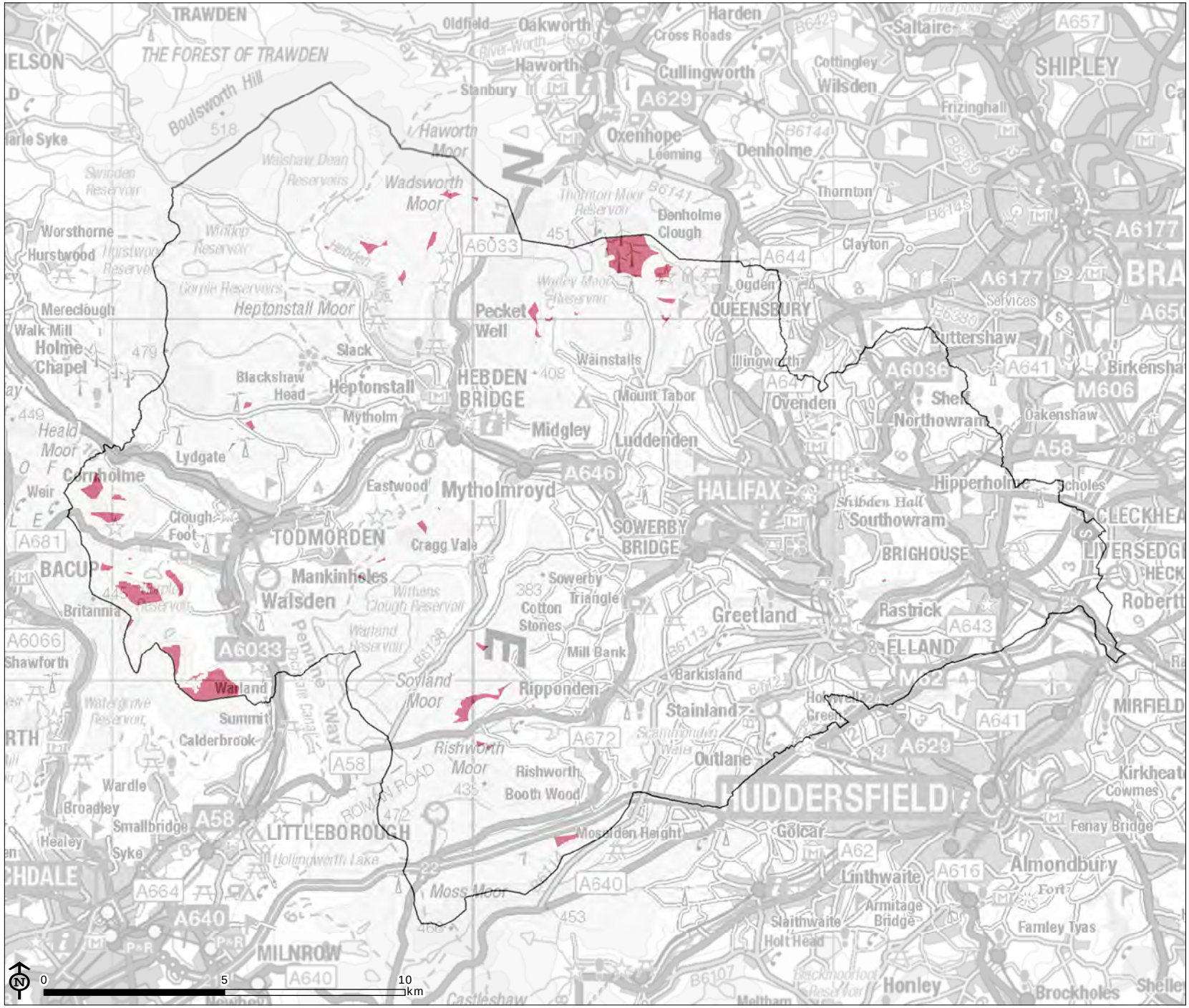
Source: Various - see report

Map Scale @ A4: 1:150,000

LUC

Calderdale Council

CB:KS EB:Stenson_K LUCBRI MAP11_6719_011_r2_VS_Turbine_Combined_Constraints_A4L 23/01/2017



Calderdale
Wind Energy Suitability

Map 12: Sensitivity of 'Unconstrained' Land: Very Large Turbines (130m+)

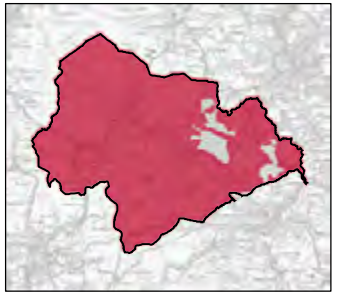
Calderdale Council Boundary

Landscape sensitivity to very large wind energy developments

- Low
- Low - Moderate
- Moderate
- Moderate - High
- High
- Urban area

Sensitivity data from: South Pennines Wind Energy Landscape Study, Julie Martin Associates and LUC, 2014

Calderdale Landscape Sensitivity



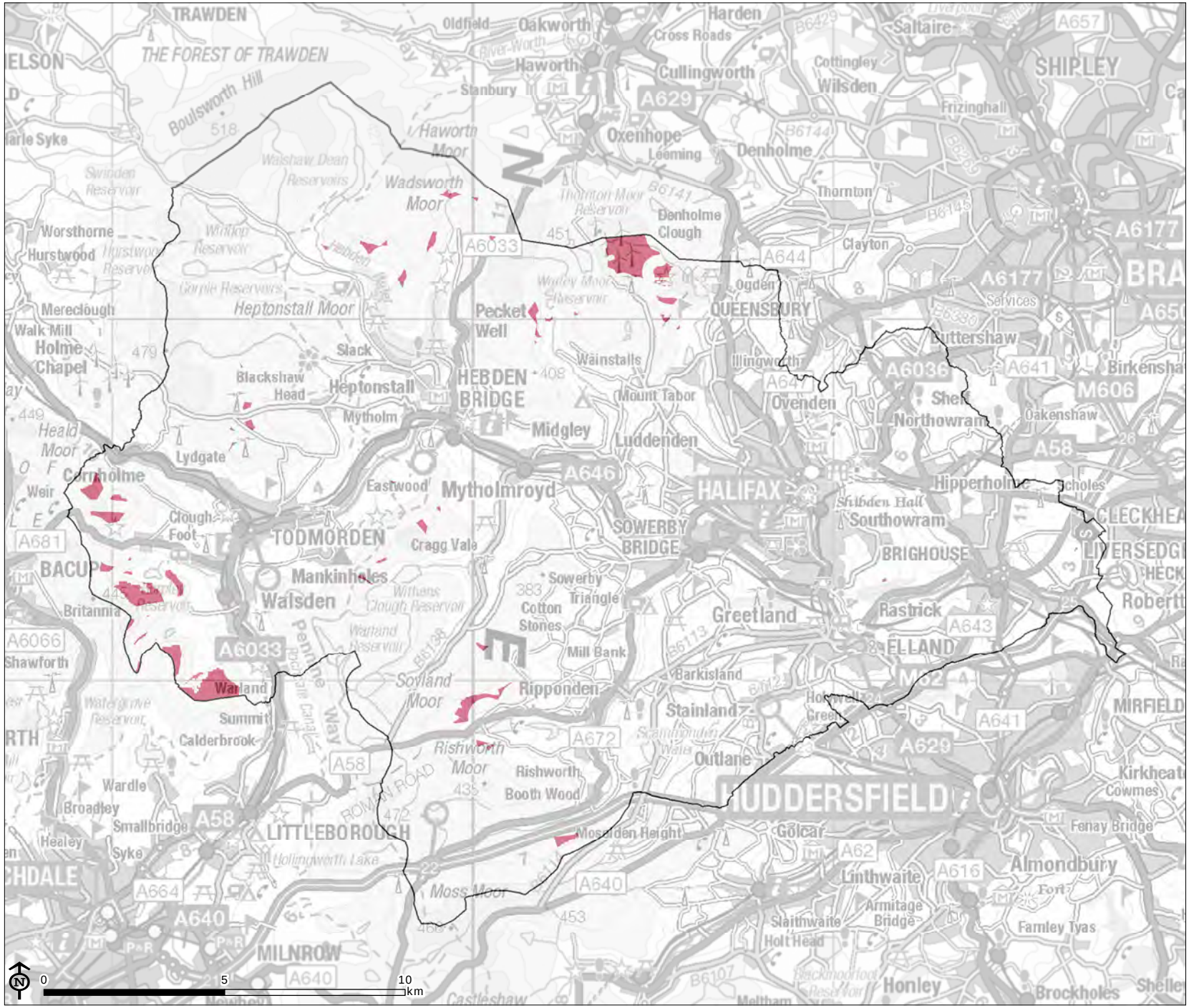
Source: Various - see report

Map Scale @ A4: 1:150,000

LUC

Calderdale Council

CB:KS EB:Stenson_K LUCBRI MAP12_6719_012_r2_VL_Turbine_Land_Sensitivity_A4L 23/01/2017



Calderdale
Wind Energy Suitability

Map 13: Sensitivity of 'Unconstrained' Land: Large Turbines (90-129m)

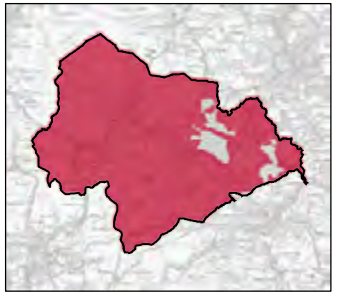
Calderdale Council Boundary

Landscape sensitivity to large wind energy developments

- Low
- Low - Moderate
- Moderate
- Moderate - High
- High
- Urban area

Sensitivity data from: South Pennines Wind Energy Landscape Study, Julie Martin Associates and LUC, 2014

Calderdale Landscape Sensitivity



Source: Various - see report

Map Scale @ A4: 1:150,000

LUC

Calderdale Council

Calderdale Wind Energy Suitability

Map 14: Sensitivity of 'Unconstrained' Land: Medium Turbines (60-89m)

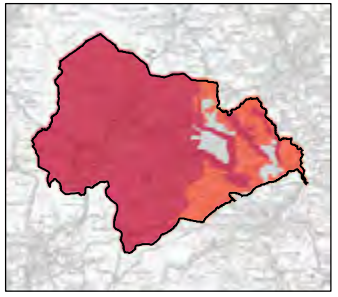
Calderdale Council Boundary

Landscape sensitivity to medium wind energy developments

- Low
- Low - Moderate
- Moderate
- Moderate - High
- High
- Urban area

Sensitivity data from: South Pennines Wind Energy Landscape Study, Julie Martin Associates and LUC, 2014

Calderdale Landscape Sensitivity



Source: Various - see report

Map Scale @ A4: 1:150,000

LUC

Calderdale Council

0 5 10 km

CB:KS EB:Stenson_K LUCBRI MAP14_6719_014_r2_M_Turbine_Land_Sensitivity_A4L 23/01/2017

Calderdale Wind Energy Suitability

Map 15: Sensitivity of 'Unconstrained' Land: Small Turbines (25-59m)

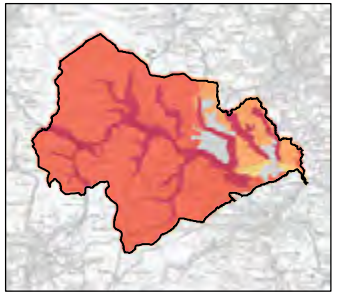
Calderdale Council Boundary

Landscape sensitivity to small wind energy developments

- Low
- Low - Moderate
- Moderate
- Moderate - High
- High
- Urban area

Sensitivity data from: South Pennines Wind Energy Landscape Study, Julie Martin Associates and LUC, 2014

Calderdale Landscape Sensitivity

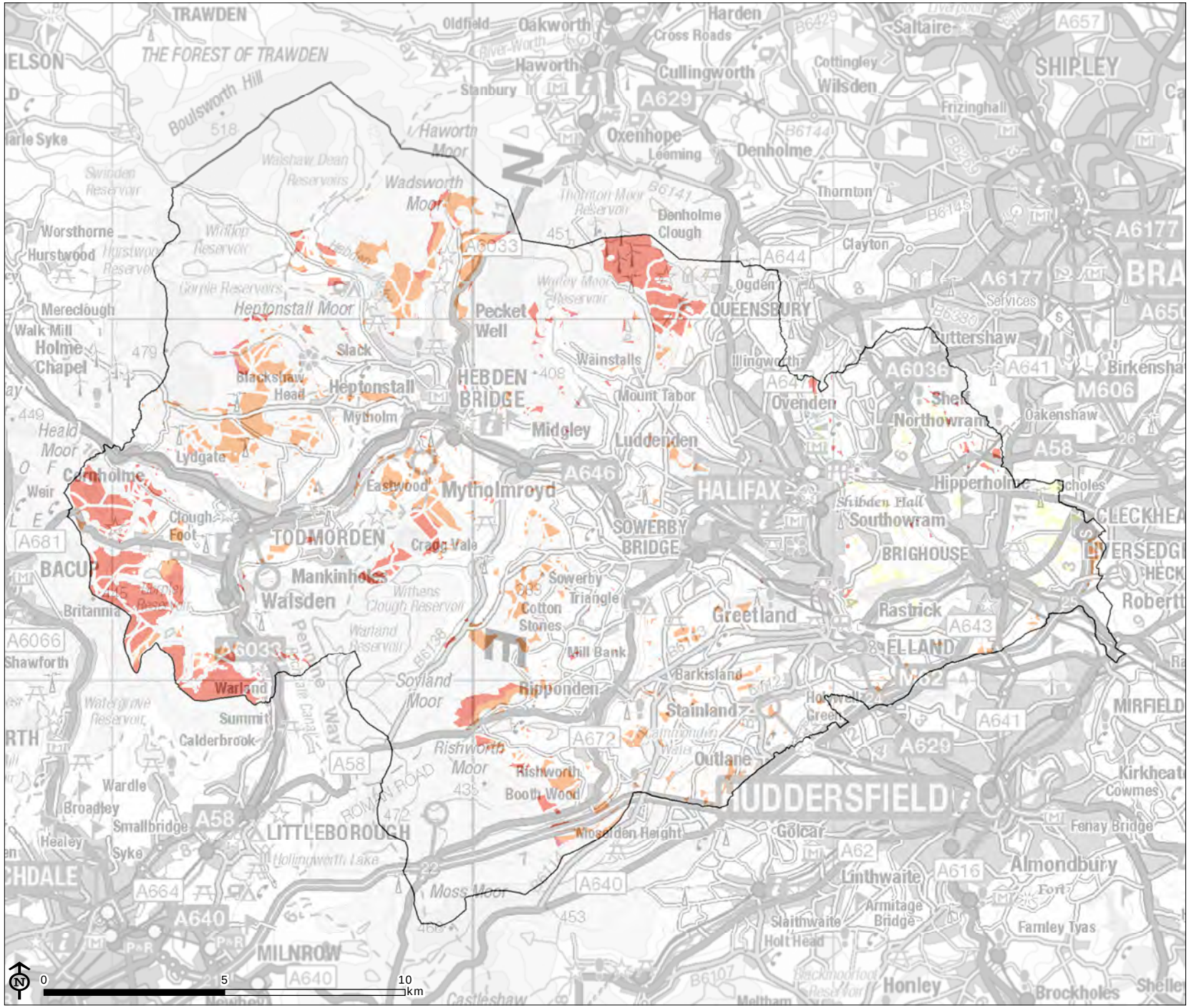


Source: Various - see report

Map Scale @ A4: 1:150,000

LUC

Calderdale Council



Calderdale Wind Energy Suitability

Map 16: Sensitivity of 'Unconstrained' Land: Very Small Turbines (18-24m)

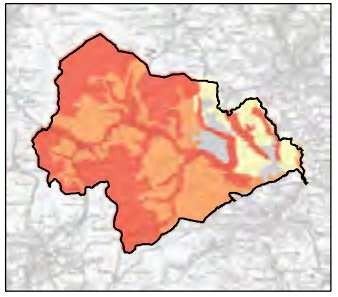
Calderdale Council Boundary

Landscape sensitivity to very small wind energy developments

- Low
- Low - Moderate
- Moderate
- Moderate - High
- High
- Urban area

Sensitivity data from: South Pennines Wind Energy Landscape Study, Julie Martin Associates and LUC, 2014

Calderdale Landscape Sensitivity



Source: Various - see report

Map Scale @ A4: 1:150,000

LUC

Calderdale Council

CB:KS EB:Stenson_K LUCBRI MAP16_6719_016_r2_VS_Turbine_Land_Sensitivity_A4L 23/01/2017