

Chacewater Wind Feasibility Assessment

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Summary

In order to assess the suitability for wind development in Chacewater, a parish wide assessment has been undertaken to inform recommendations for potential site areas. Using a selection of indicators, including physical and planning constraints, the assessment will broadly identify areas based on technical feasibility and potential planning risk.

Planning sensitive areas have been mapped in relation to the parish boundary. A World Heritage Site (WHS) designation covers all but a small area of the parish. The village itself, located centrally within the parish, is largely designated as a Conservation Area. Areas of Outstanding Natural Beauty (AONB) are present to the north-west and south-east of the parish, however predominantly at a distance over 5km from the parish boundary, limiting the likelihood of significant impacts from a wind turbine development. Located within the parish are a number of scheduled monuments and Grade II listed buildings, as well as a few Sites of Special Scientific Interest (SSSI), which are located on the parish boundary. Designated landscapes and features have been considered in conjunction with physical constraints, to establish most suitable potential areas for a wind turbine development.

A key consideration for siting a wind turbine development will always be the visual impact on heritage assets. Also worth noting, from a review of previously submitted planning applications (as available on the Cornwall Council Planning Portal), two applications have been made for 50kW wind turbines at a hub height of 25m, which were refused on a point of MOD interference with the air defence radar at Portreath and on heritage impacts. To date, one wind turbine with a 12m hub height has been granted permission in the parish.

Grid connection

When assessing site suitability two key considerations include proximity to transmission infrastructure, for example an electricity substation and appropriate transmission line, and local grid capacity where a turbine would not consume or store all generated electricity on site.

At present there are capacity restrictions that are limiting new connection offers across the South West of the UK. Exceptions to this may exist for smaller installations where export is lower and where a grid connection has an existing, unallocated capacity. Western Power Distribution (WPD) should be contacted to determine available grid capacity once a site has been selected. Other technological solutions do exist for grid constrained sites, which can be considered on a case by case basis.

Physical constraints

There are a number of physical constraints within the landscape that will affect the siting of a proposed wind turbine. This will include the position of roads, footpaths and power lines; the location of hedgerows and watercourses, as well as the position of residential buildings.

The location of a turbine in relation to roads, Public Rights of Way and power lines is determined by issues of safety. Guidance exists from relevant organisations including The Highways Agency, Department for Transport, the National Grid and Distribution Network Operators. Using guidance, the required set back distance relating to safety that has been used is the height of the turbine, plus 50m or 1.5 times the height of the turbine, whichever is the lesser.

Separation distances from hedgerows should be considered in the context of potential ecological impacts. In order to avoid potentially unacceptable impacts on bat species, wind turbines should be placed a minimum distance of 50m from a hedgerow. This should be applied to hedgerows in any field site wherein a turbine has been proposed.

The position of properties and buildings relates to issues of noise and shadow flicker, which must be deemed acceptable for an application to proceed. The minimum separation distance between wind turbines and occupied buildings is based on expected noise levels and visual impact, this distance will often be greater than necessary to meet safety requirements.

UK planning guidance refers to the ETSU-R-97 guidelines for noise assessment and determination of separation distances, however local topography and the properties of individual turbine models makes this assessment procedure very project specific. As a general limit, a noise limit of 35dB should be met for nearby residences, with a higher limit of 45dB acceptable for those financially involved.

To be able to determine some potential sites, specific figures for noise will be obtained by selecting three turbine models, to provide a range of distances, rated outputs and turbine sizes. Due to the spread of houses across the parish and in light of planning sensitive areas and features (which will be discussed further on), the turbines selected fall within or very close to the Cornwall Council defined category of 'very small turbines' (see below).

Turbine heights

- Very small turbines (approx. 18-25 metres to tip, excludes roof mounted turbines);
- Small sized turbines (approx. 26-60 metres to tip);
- Medium sized turbines (approx. 61-99 metres to tip);
- Large turbines (approx. 100-150 metres to tip).

The details of the turbines selected for the purpose of this study can be seen in Figure 1 below.

Figure 1: Turbine models and properties

Turbine Model	Rated power	Hub height (m)	Rotor diameter (m)	Tip height (m)	Distance to 35db
Britwind R9000	5kW	15	5.5	17.75	200
Lely Aircon	9.8kW	18	7.5	21.75	105
CF 25	25kW	20	13.1	26.55	190

Full specifications for each of these models can be seen as Appendix 1.

For each of the turbines, the following figures (1-3) show the relevant buffers to meet the required distance for noise at 35dB or below and the fall over distances required from roads and highways, PRow, overhead power lines and rivers. The areas unshaded are those that fall outside of any of the physical restrictions that have been set. Given that a financially involved premises does not require as lower a noise limit, it may be that there are other areas suitable. A more detailed assessment of a site could also include other factors such as topography, land cover and other background noise, which may alter these boundaries, however this would require more detail than is possible for a parish wide assessment of sites.

Key for Figures 2, 3 & 4







	Chacewater Parish Boundary
	Noise buffer for residential properties to 35dB
	Fall over distance buffer (Roads and Highways)
	Fall over distance buffer (Public Rights of Way)
	Fall over distance buffer (overhead power lines)
	Fall over distance buffer (Rivers)

Figure 2: Lely Aircon mapping of physical constraints

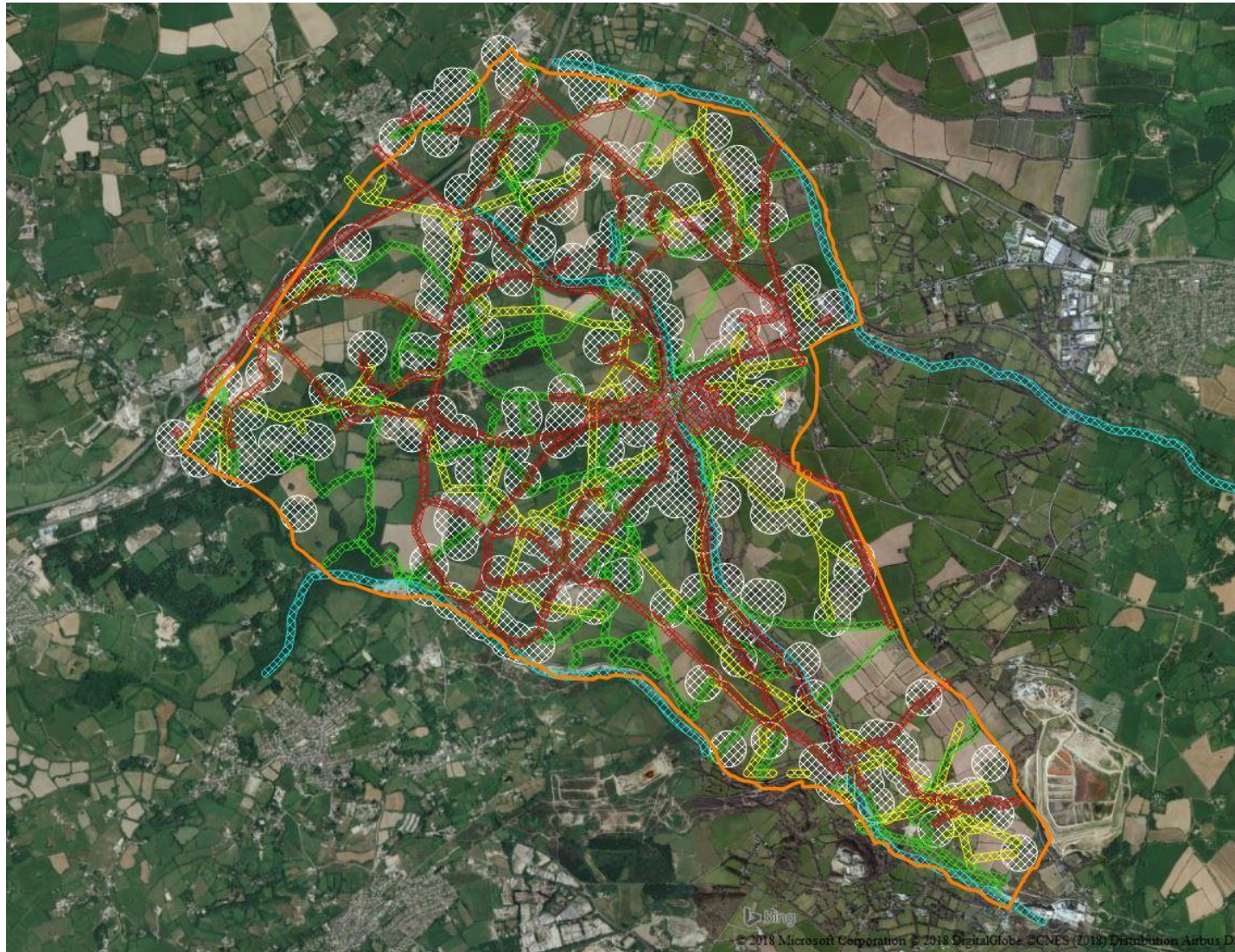


Figure 3: Britwind R9000 mapping of physical constraints

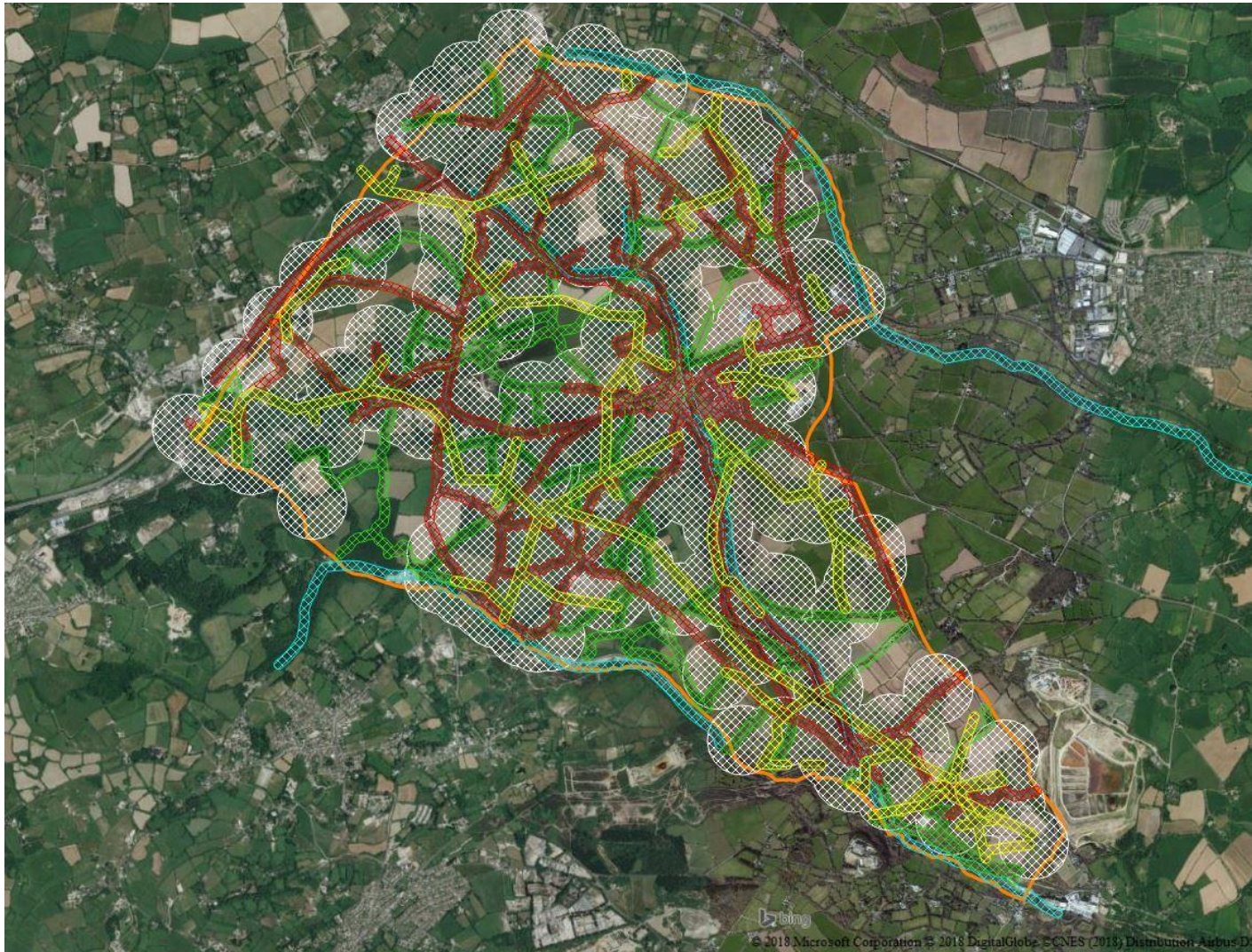
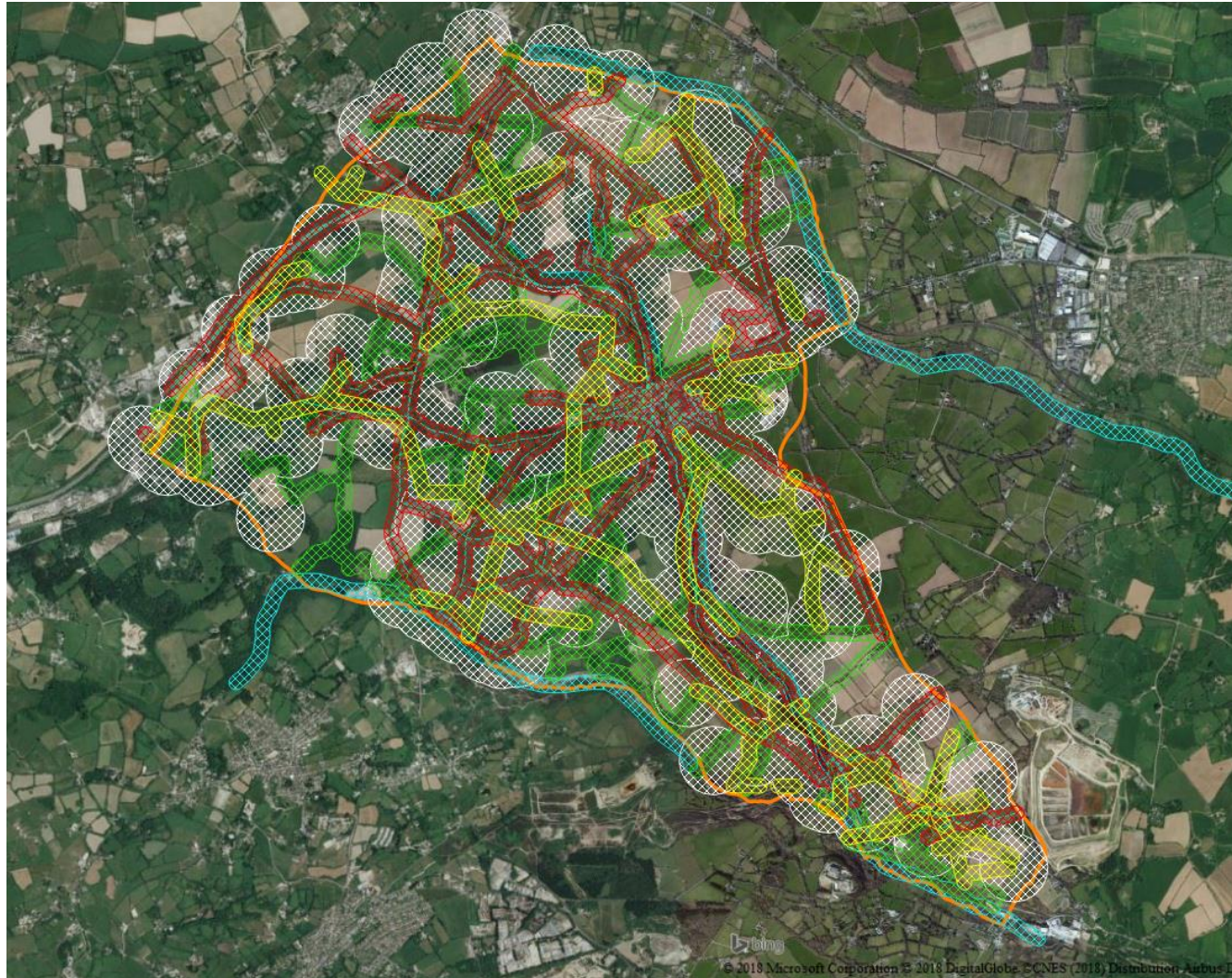


Figure 4: CF 25 mapping of physical constraints

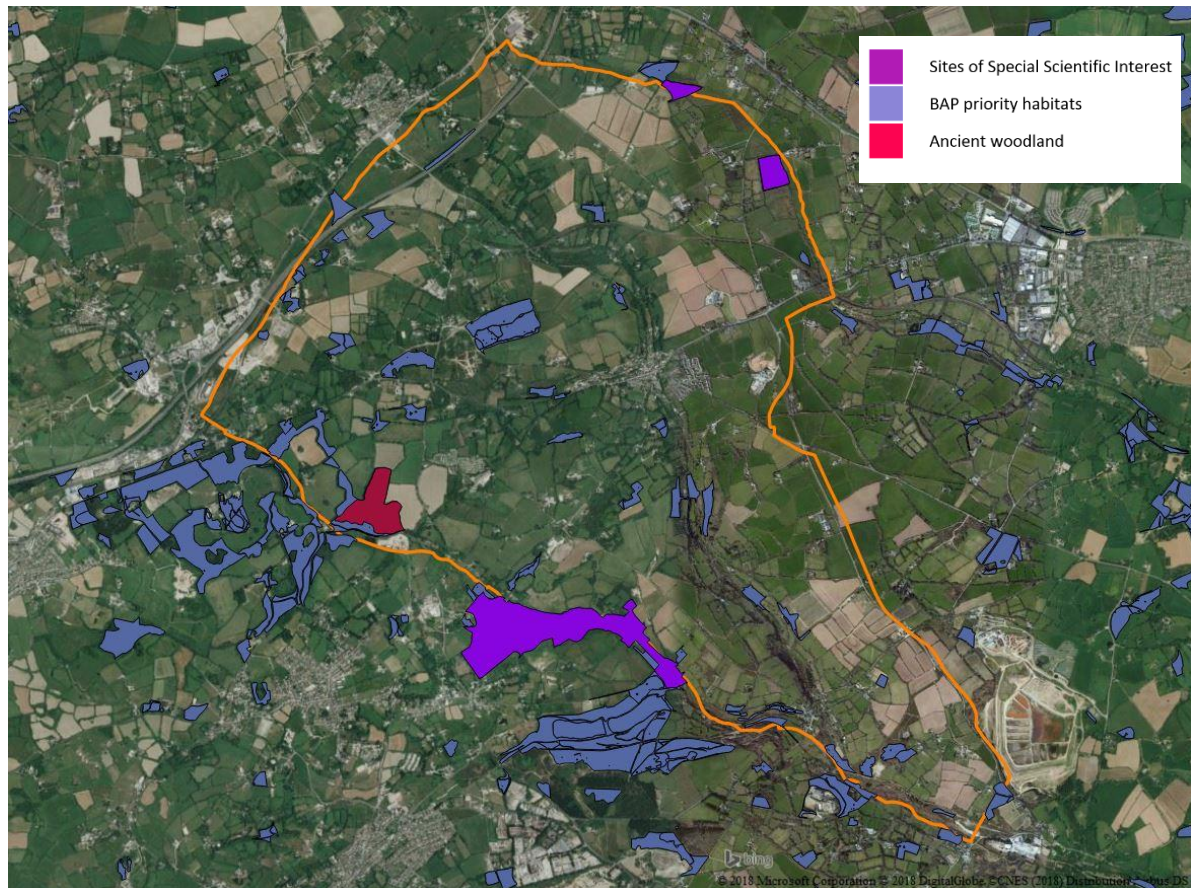


Planning sensitive areas

Further guidance in siting can be suggested by looking at the location of other sites designated for their historic, landscape or ecological value.

Although primary consideration in siting a wind turbine will often relate to its potential landscape and visual impacts, due to the vertical scale of a turbine, sites where disturbance may cause damage to species or habitats of value should also be considered. The applicable ecologically designated sites have been mapped in Figure 5 below.

Figure 5: Map of ecologically designated areas within Chacewater



Indicated above, Sites of Special Scientific Interest, ancient woodland and priority habitats. The planning weight attached, particularly to the latter two, would not necessarily rule out a development in these areas but does indicate that they may be more valuable than alternative unrecognised areas of land.

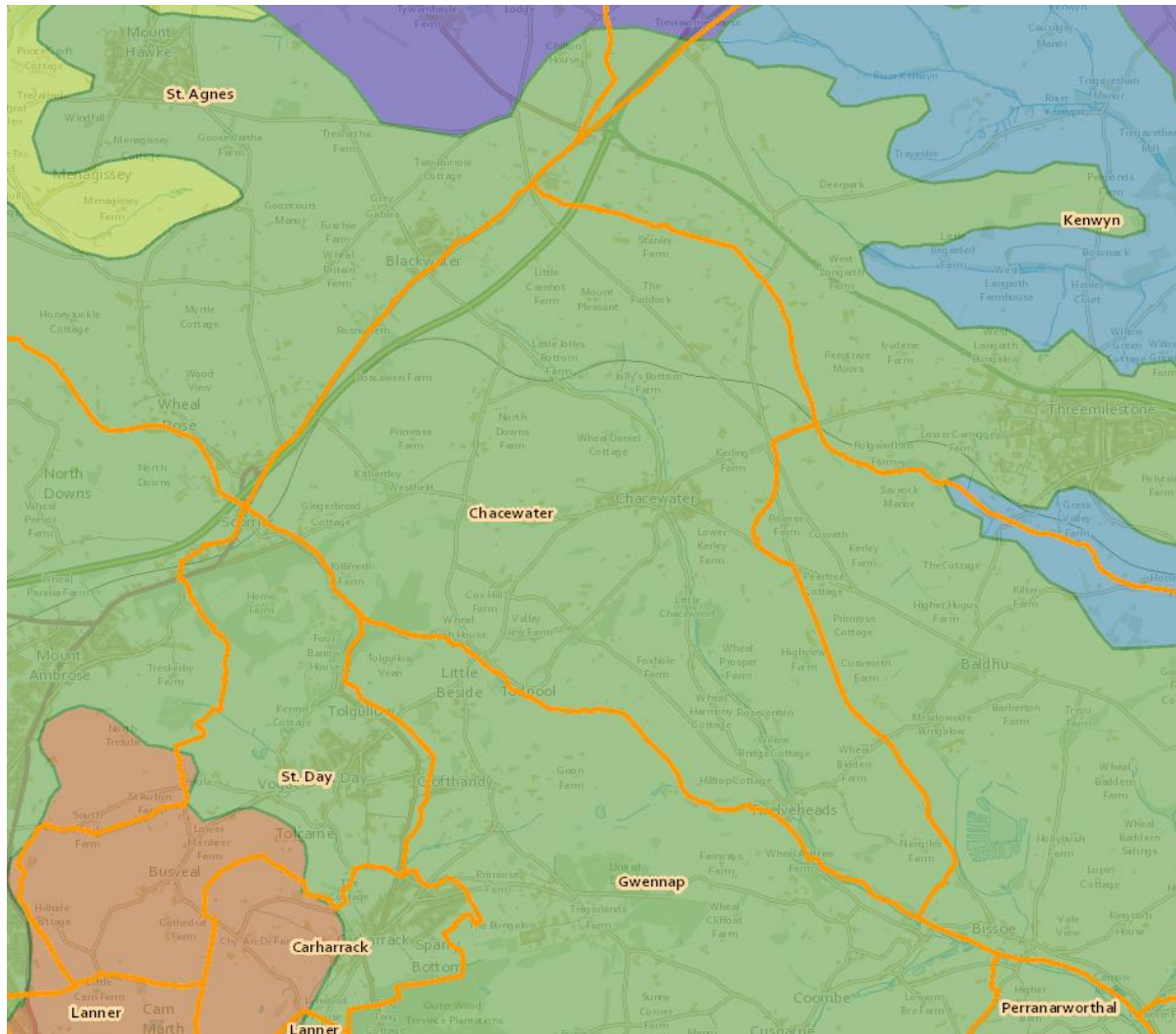
The significance of the impact of a proposed development will be dependent on the sensitivity of the landscape. An assessment has been made to determine the sensitivity of the landscape based on guidance from statutory designations, such as Historic England, and from Local Authority studies. Guidance on the general perception of wind farms in an open landscape has been used, supplementary to Cumulative Impact Assessment Guidance, to determine potential significant effects on landscape character, as well as visual effects. From available guidance, where appropriate, a buffer has been drawn from designated areas, to suggest the most suitable, low risk sites for wind energy developments.

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Landscape Character Assessments provide a route through which to assess a particular landscape based on its defining features and guide what development may be suitable within the confines of these characteristics. The elements considered within this characterisation process are fairly extensive; looking at landform, land use, historic value and scenic quality, and as such the information is valuable in making best recommendations for potential wind energy sites. The choice of site and development type should respect the specific sensitivity of the site and Landscape Character Area concerned.

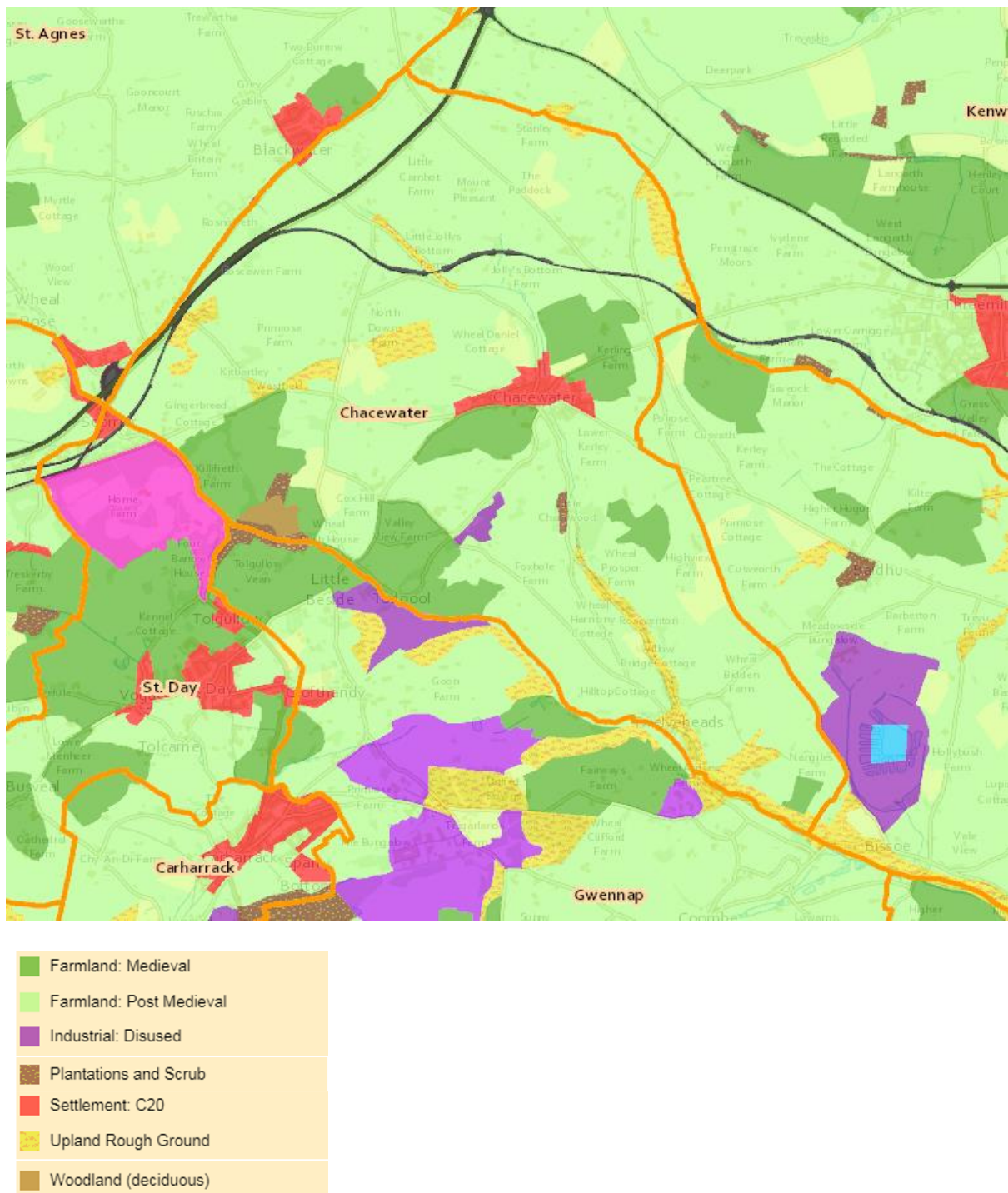
The parish of Chacewater falls completely to the LCA CA11 for Redruth, Camborne and Gwennap.

Figure 6: Landscape Character Area for Chacewater Parish



Cornwall Council's Historic Landscape Characterisation (HLC) sensitivity mapping for wind turbines assess the HLC type 'post-medieval farmland', which makes up a significant proportion of the parish, as being of moderate vulnerability to wind turbines. With areas of 'medieval farmland' assessed as moderate-high in vulnerability and areas of 'upland rough ground' to be highly vulnerable.

Figure 7: Historic Landscape Characterisation mapping for Chacewater Parish



Overall the Landscape Character Area, within which Chacewater falls, is considered to have a relatively low scenic quality with significant presence of man’s influence. However the relatively small scale of the landscape, with prominent features such as engine houses and the overall complexity increases sensitivity to a moderate sensitivity overall. Large scale turbines over 100m would not be appropriate and in areas close to small historic features, the landscape would best suit small turbines up to 26m in height.

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Sensitivity of the landscape can also be determined in part by the proximity or location of the site in relation to a designated landscape. Landscape designations are used to recognise special qualities within the landscape and they range from international and nation designations, to those of local or regional importance. To ensure that those qualities for which a landscape is designated are impacted as least as possible, buffer distances can be used to suggest areas where a wind turbine development would be most appropriate and at what scale.

Most significant to the development of wind projects is the heavy prevalence of historic features and designations within the parish, as seen in Figure 8 below, which includes World Heritage Site designations, Conservation Areas, Listed Buildings and Scheduled Monuments. Other landscape designations have also been mapped, which include Areas of Outstanding Natural Beauty and Areas of Great Landscape Value, see Figures 9 and 10.

Figure 8: Historically designated features within and in proximity to Chacewater Parish

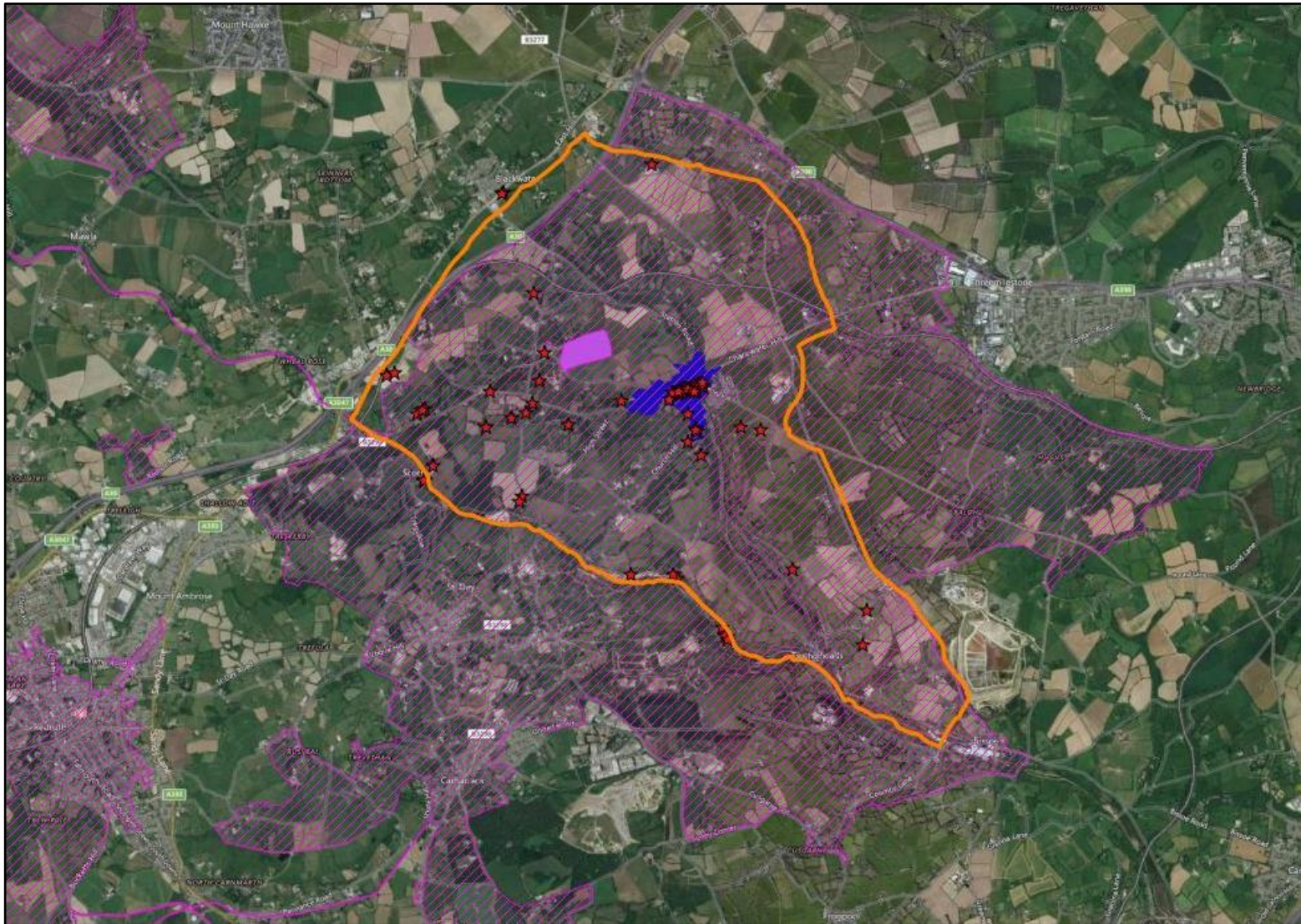
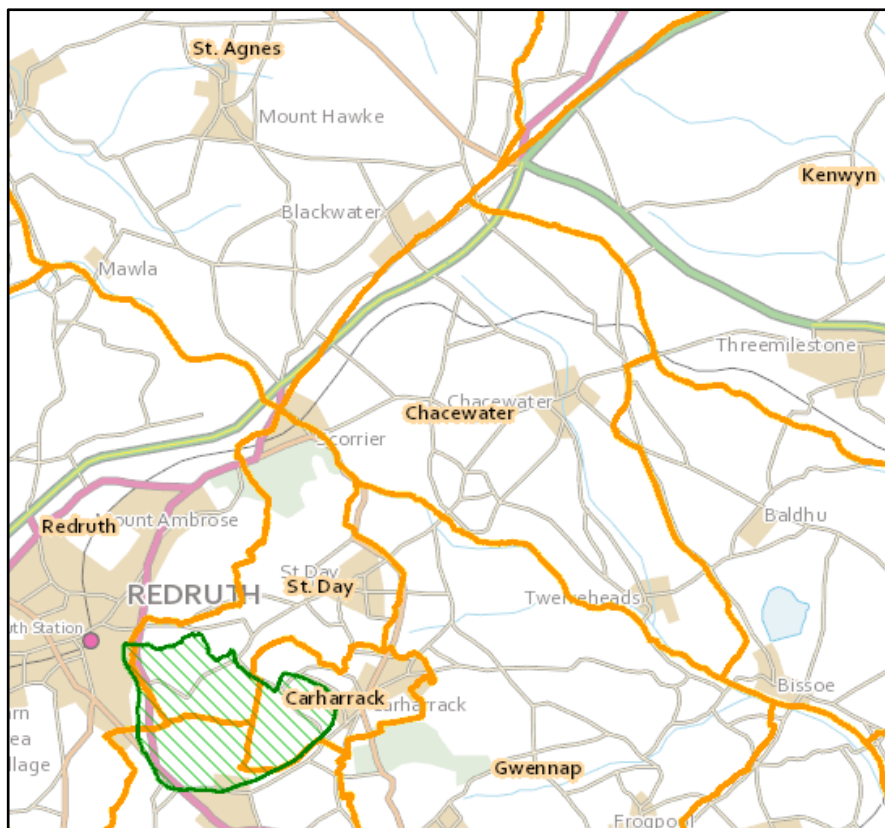


Figure 9: Areas of Outstanding Natural Beauty in proximity to Chacewater Parish



Figure 10: Areas of Great Landscape Value in proximity to Chacewater Parish



A turbine will have an effect visually either by changing the perception of the landscape character or by effecting the views in which it will become a feature. An impact can be assessed where these effects can be seen in relation to a designated landscape. In order to set a buffer distance, within which a significant impact is likely, guidance from Cornwall Council and Scottish Natural Heritage (SNH) has been used.

SNH has provided an assessment on the siting and designing of wind farms in the landscape. Within this useful guidance has been provided on perception of a wind farm in the landscape. Up to 2km, a wind turbine is likely to be seen as a prominent feature in the landscape and up to 5 km it is still a relatively prominent feature. Greater than 5km, the turbine is potentially prominent in clear visibility, but would be seen as a part of the wider landscape. Above 15km a development is only likely to be seen in very clear visibility and only as a minor element in the landscape.

Information has also been taken from Cornwall Council’s Cumulative Impact Assessment Guidance for onshore wind a large scale solar PV in Cornwall, see Figure 9. Due to the diverse nature of the Cornish landscape, it is impossible to provide a definitive radii to use in establishing potential impacts, however information has been put together to indicate a distance for which a turbine of a specific height would have a potentially significant effect on landscape character and visual effect.

Figure 11: Table to show distance of potentially significant visual and landscape character impacts at varying turbine tip heights.

Turbine height to blade tip	Circle radius from the base of the turbine for potentially significant effects on landscape character
Up to 40m	1km
40 – 50m	2km
50 – 70m	3km
70 – 100m	4km
100m plus	4km ⁹

Turbine height to blade tip	Circle radius from the base of the turbine for potentially significant visual effects
Up to 40m	3km
40 – 50m	6km
50 – 70m	8km
70 – 100m	10km
100m plus	10km ¹⁰

In order to determine buffer distances a suggested maximum turbine height has been determined and as information previously provided, three turbine models have been used from which to determine appropriate buffer distances.

The maximum tip height of the turbines selected is 26.55m. In line with the Cornwall Council guidance in Figure 11, turbines would fall within the category of 'Up to 40m', with a potentially significant impact on landscape character within 1km and with potentially significant visual effects within 3km. Figure 12 below shows a buffer of 3km from AONBs in closest proximity to the parish. As can be seen, this buffer distance does not fall within the parish boundary and as such, from the scale of turbine selected, there would be no significant impact to landscape character or visual impacts within the AONBs.

Figure 12: Map illustrating a 3km buffer from Areas of Outstanding Natural Beauty



GIS data for the Area of Great Landscape Value in proximity to the parish has not been freely obtainable and as such a buffer has not been created. Using measurement tools, the closest distance of the AGLV to the parish boundary is approximately 2km. It is therefore unlikely that a wind turbine of the scale proposed would have an unacceptable impact on the designation, given it does not carry the same significance of weighting as an AONB designation and there remains a reasonable separation distance.

In consideration of visual and landscape character impacts on historic features, the vast majority of the parish is within a World Heritage Site and as such impacts can only be minimised and not avoided (See Figure 8). It is inescapable that a wind turbine development would fall within the WHS designation and this is a key reason for the choice in wind turbine models/scales that this report considers.

Other features within the Parish that are planning sensitive include Listed Building, Scheduled Monuments and the Conservation Area. Covering the main Chacewater village, the Conservation

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Area is a clear area where a wind turbine would not be suitable. There are a number of Grade II listed buildings within the parish, which will be more sensitive to a development, however the relative impact on each would relate to the use of the building and reason for its designation. As such a buffer distance around these buildings would potentially be misleading in excluding potential areas for development and a distance difficult to determine. The impacts on Listed Buildings and Scheduled Monuments are largely going to be based on visual disturbance, the topography of the land and vegetative features in the landscape will also play a significant role in where best to site a wind turbine.

Site Selection

In order to select a final site for a wind development, the information and mapping so far would need to be combined with wind speed data, elevations and further information to determine where a wind turbine could be sited to allow it to be operational and financially viable. Wind speeds in the Parish can be seen in Figure 13 below.

Figure 13: Map of wind speeds at 10m covering Chacewater Parish



As mentioned within the introduction to physical constraints, there are ecological considerations concerned with distance from hedgerows. In order to ensure that there is no adverse impacts on bat species, which use linear features such as hedgerows as flight paths and foraging habitats, a turbine must be sited at least 50m from a hedgerow or a bat survey must be undertaken.

Once other limitations have been accounted for, remaining suitable sites can be assessed for their suitability with regards to the aforementioned. To quickly identify fields where a wind turbine could 'fit' with adequate distance from hedgerows, each can be tested for their ability to contain a circle with a radius of 50m. This will narrow down the appropriate fields, from which a more accurate 50m buffer from field boundaries can then be drawn.

Conclusions

When concluding on the best site for a wind turbine development, it is important to assess which of the potential impacts are likely to have a significant negative impact. As there are so many potential impacts, it is often about finding a balance to achieve the most viable project with the least negative impact.

In order to look at the parish as a whole, it has been necessary to limit the data considered. The turbine models have the option of varying tip heights, lowering the height of the turbine may reduce noise, topography will have an effect as to how noise travels and financially involved receptors are able to have a higher noise limit. Fall over distance and the resultant buffers required will also be reduced with lowering the turbine height.

The main limitations for the parish in terms of a suitable location appear to be the noise restrictions that need to be met for residential properties and the potential impacts on historic features. The first is more easily determined using broad scale mapping techniques, however landscape character and visual impacts are subjective and each application would be on a site by site basis. Although a site may fall within an area where there is a potentially significant effect, this only suggests areas with a higher risk attached to them. When other factors such as local screening are considered, alongside topography, as well as the scale of the turbine, these areas should not be ruled out.

A compromise that considers the actual benefit brought by the turbine, against any potential impact it would have will likely be needed. The use of the energy generated and the social and community benefits will have a significant weighting and local knowledge should be considered, alongside the information provided, to identify the most suitable site options.

The aim of the study has been to provide a starting point for the scale of turbine and potential site locations and to summarise the key considerations that will determine both of these. The turbine models used for the purpose of mapping are not exhaustive of the scale category being considered and it is not to say that a larger scale turbine would not be appropriate for a specific site. Information can be adjusted to include project specific information as it becomes available.