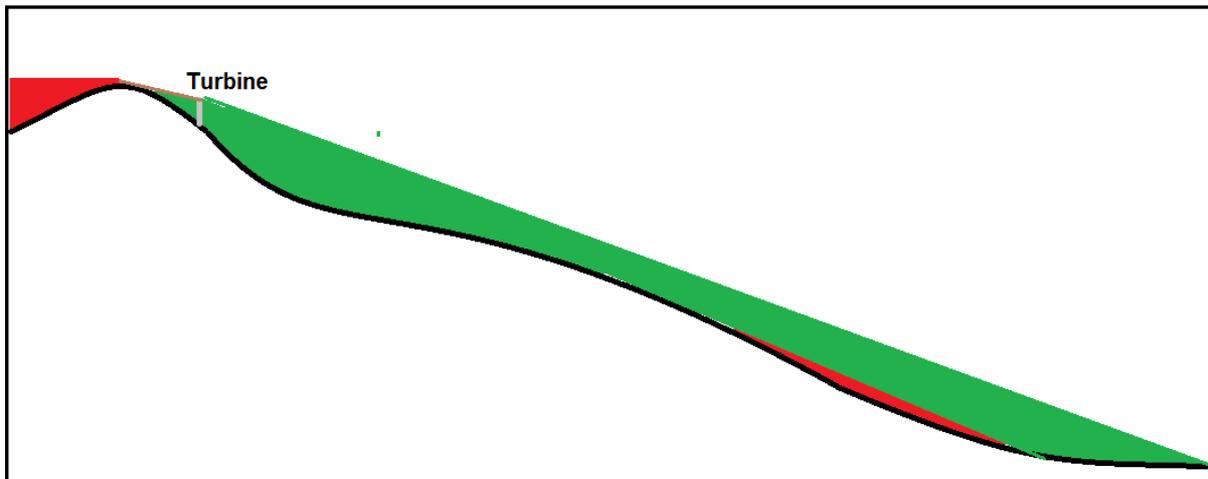


An Analysis of the Visibility and the Resulting Impact of the Proposed Helensburgh Wind Farm

Introduction

The visibility of a wind farm is normally assessed using what is known as the Zone of Theoretical Visibility (ZTV). This is generated using software such as Arc-Map. The fundamental idea is the “Line of Sight” as shown in Fig 1.



Somebody at the top of the turbine could not see anyone in the red zones. Similarly anyone in the red zones could not see the turbine.

In the software the map is split into small squares of say 10m*10m (you can decide) and each square is identified as having a line of sight to the turbine. For a wind farm of 5 turbines, each square is assessed for each turbine. The number of turbines that can be seen is recorded in the square.

In line with a recommendation of SNH, for this assessment it was assumed that visibility from over 15km is not an issue as it becomes extremely difficult to distinguish turbines.

The view is theoretical in that it normally ignores trees and buildings that might well block the view. Particularly in urban areas many properties could not be seen from the wind-farm and the wind-farm would not be in view from many of the properties.

Outcome

It is a requirement in the Planning system to produce a ZTF and this is normally undertaken by specialist GIS consultants. That produced by the developers for the Helensburgh wind farm was striking in that it suggested very, very extensive visibility throughout the area. Fig 2 is a ZTF created for further analysis of the populations affected and possible “costs”.

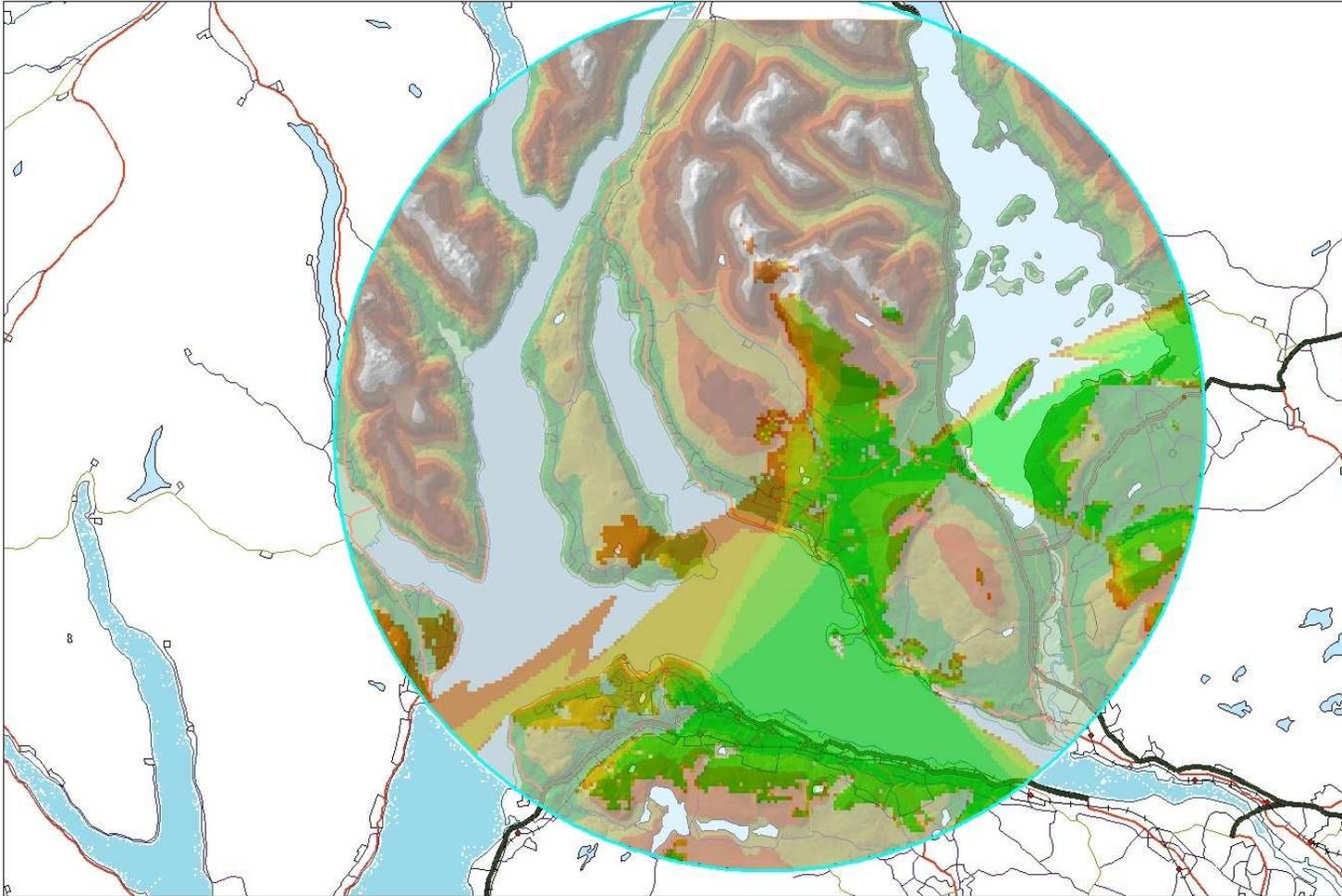


Figure 2: ZTF for a farm at proposed location with 60m turbines

The circle is the 15km boundary and the ZTF are the areas coloured green, yellow and brown. The areas coloured bright green is land that can see all five turbines and includes most of Helensburgh and all of Inverclyde. The wind farm would be visible from Dunoon, Gourock, Greenock and Port Glasgow on the south of the Clyde.. It can also be seen from key areas of the National Park; Balloch Country Park, the National Nature Reserve, Inchmurrin and of course the east of Glen Fruin. Worryingly it can be seen from the top of Conic Hill, an extremely important tourist destination on the West Highland Way. Golfers on the Carrick and Helensburgh courses will see it as will walkers on the Three Lochs and John Muir Trails. Unlike most such developments the closest community, Helensburgh, is almost totally in the ZTV. The first impression is that it is incredibly badly located.

Populations Affected

From the ZTF polygons were created for the areas with turbines in view. Population affected is estimated by relating the population in geographical areas to the ZTV. The geographical areas come from the census and the smallest defined units are known as Output Areas. In 2001 these were relatively small with around 80 people. In 2011, to ensure data confidentiality, the output area, also known as a datazone, was up to five times larger. Whilst relatively unimportant in urban areas, in rural areas, when trying to match sections of the ZTV to output areas, the errors can be substantial. Errors associated with population change are thought to be smaller than errors from misaligning areas and thus the smaller 2001 areas were used.

The ZTF polygons were then joined to the centroids of the Output Areas within the 15km circle. The OA population is attached to the centroid. The resulting table effectively allocates each OA to a polygon and each polygon contains details of the number of turbines that can be seen. We calculate the total by simply summing the population within 15km who live in an output area that has a view of one or more turbines. The population affected within 4km and 2km is assessed in a similar fashion and the results are shown in Table 1.

In summary 91,500 people would theoretically have a view, with over 60% seeing all five.

Economic Impact

The normal method of valuing something currently not paid for, such as landscapes, is to survey individuals on their Willingness To Pay (WTP) to retain it (or the Willingness To Accept a sum in compensation). Various techniques can be used to ensure sensible, considered responses and these are packaged together and termed Contingent Valuation.

An alternative method known as Revealed Preference uses a proxy to measure the value. One such proxy is House Price, since those properties with good views carry a premium over those without views. Assessing the premiums gives an indication of the value of the landscape. However it only provides an indication of the impact of a windfarm on the wellbeing of the individual if the landscape is changed by its introduction. Gibbons (2014) looked at 42,500 houses affected by wind farms over 40 quarterly periods. He found that wind farms caused a fall of between 1.5% and 2.5% in houses within 4km of the establishment and 5.5% loss to those within 2km. The sample size is such that these results cannot be dismissed.

The significant fall in capital values only has a monetary impact at point of sale. However it is indicative of a real drop in value on a day to day basis, which is a defined as an economic, as

opposed to monetary, impact. On the basis of Gibbons study this is put at in excess of £500,000 per annum to Helensburgh.

Impact on Usage of Long Distance Paths

Long Distance Paths are seen as important by the Scottish Government for three reasons

1. They provide a focus and a well surfaced path for walking . The benefits of walking on Health have long been identified
2. They offer a challenge for Scots, particularly youngsters.
3. They attract tourists which benefits local economies particularly in more remote areas.

Paths differ significantly but almost all run between villages with services and public transport. Where a path is close to urban areas such as the John Muir Way, the vast majority of walkers will be using the path for day (or shorter) walks, using public transport to return to the start (or walking back). It is important to recognise that over an hour (5km) dominated by a wind farm may substantially reduce the pleasure and, in time, usage of a path.

The proposed location of this windfarm is again surprisingly poor. On both the John Muir and Three Loch Ways from Balloch to Helensburgh, after the summit of Goukhill /Ben Bouie the foreground is dominated by the farm for over 5km at distances ranging from 4km to under 2km. Only foliage and, in town, buildings will mask it. On the Three Lochs Way from Helensburgh to Garelochhead up Glen Fruin the wind farm again dominates the view for 5.3km and for one section the path actually runs alongside the farm.

A Comparison

A claim is made in this paper that, far from taking care about location and design as demanded by Planning for this area squeezed between three protected areas (LLTNP, LLNSA and Helensburgh Greenbelt), the location and design could scarcely be worse. It is hypothesised that a Community Wind Farm must be adjacent or close to the Community and because that Community overlooks a densely populated estuary on one side and backs on to a National Scenic Area on the other the results discussed above are inevitable. However, even in this context better locations and designs might have been possibleⁱ

Fig 3 shows the ZTV for the planned windfarm with 86.5m Turbines and Fig 4 the ZTV for an alternative site at the north end of the hill for 5*60m turbines. This, it should be emphasised this is simply an example and this site could well prove impossible for a host of reasons including its visibility, proximity to the naval base, wind flows, land stability etc. In the analysis the turbine base is at the same height as that currently proposed.

¹ This section is a response to a challenge from one of the development team who conceded the problems but responded by asking for the location of a “better” location near Helensburgh.

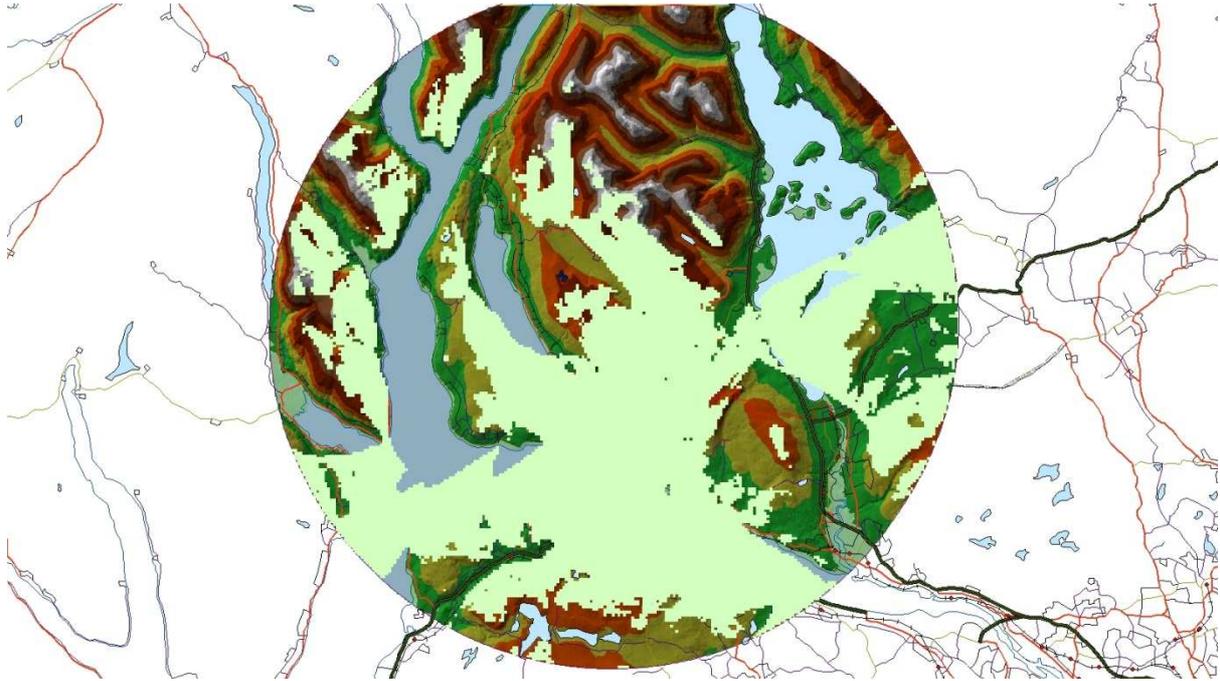


Fig3: Zone of Theoretical Visibility for Proposal

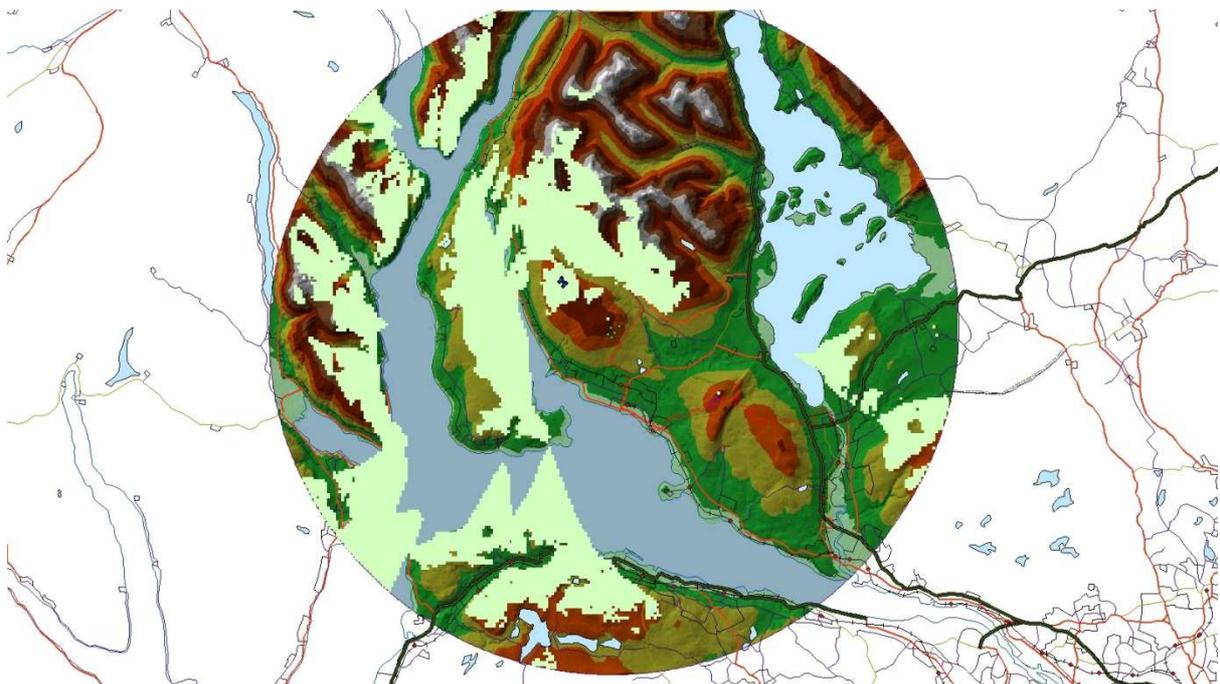


Fig4: Zone of Theoretical Visibility for a wind farm with 5*60m turbines at north end of Tom na h-Airidh.

The most obvious difference between the two is that the farm no longer overlooks Helensburgh nor the Port Glasgow area of Inverclyde. Its impact on the LLTNP is substantially reduced. Table 1 summarises the differences.

	Proposal	Alternative
Residents in ZTV within 15km	91,553	48,245
4km	12,743	146
2km	1,308	Under 10
Area of LLTNP within 15km in which windfarm is visible (Hect)	9,900	1,487
Area of NSA within 15km in which windfarm is visible (Hect)	4,268	3,981
Length of LDPs <5km from farm where farm is visible (Km)	19.1	7.42

On every criterion related to visibility the proposed location is inferior to an *ad hoc* alternative, in most cases by massive amounts. It is difficult to relate these results to a claim by the developers that the location and design are sensitive to the environment.

Conclusions

This analysis shows that the proposed wind farm is extremely poorly located. When combined with the proposed turbine height the resulting number of residents affected, the area of the LLTNP and the NSA that can see the wind farm and the length of LDP directly impacted should make the proposal completely unacceptable.

Finally the resulting economic value lost by Helensburgh residents on an annual basis is far greater than any projected economic value added by the farm.

Geoff Riddington 18/9/14