



## AWF Cumulative Impact Document : Appendices and References

### Appendix 1, Extracts from SNH guidance on visibility & cumulative effect

**University of Newcastle (2002) Visual Assessment of Windfarms best practice. Scottish Natural Heritage commissioned report F01AA303A**

- 6.1 Visual Impact Assessment – Zone of visual influence, page 58-59

6.1.6 Where the degree of visibility is illustrated using a graded tone or a range of colours, careful thought on presentation and explanation is required to minimise the risk of creating a distorted impression. This can arise because the number of turbines visible sometimes increases as the distance increases, due to topography, whilst the relative size or visual effect decreases in parallel. A shaded ZVI that uses denser tones for areas where the number of visible turbines is greater can create an impression that is diametrically opposed to the probable magnitude and significance of the visual effects. One solution might be to adopt the use of the term ZTV (Zone of Theoretical Visibility) for what is now commonly referred to as the ZVI in order to emphasize the theoretical, potential and limited nature of the information shown in such a map. Another solution might be to produce a second map (perhaps called the Zones of Visual Effect: ZVE) where the predicted magnitude of the effects (Table 18 and Section 6.2) is translated onto the ZTV to illustrate the effects that distance (and other factors) are expected to have on the size and intensity of the visual effects. Finally, a composite map (perhaps called the Zones of Visual Significance) could be considered which combines the ZTV and the ZVE with the thresholds and criteria used for assessing significance, to illustrate graphically what is now only explored using a limited number of key viewpoints. We are not aware that such presentation techniques have been attempted experimentally, nor have we explored fully the potential conceptual, technical and interpretational difficulties, but this may be an area for further research and development in the application of CAD and GIS tools.

6.1.8 Based on our diagnoses concerning the effects of distance, our arguments that relatively small effects could be significant for highly sensitive receptors, the precautionary principle which is now widely established as best practice in environmental policy, and taking account of the increasing sizes proposed for new developments, we recommend the general guidelines shown in Table 17.

Table 17: Recommendations for ZVI in Relation to Overall Height.

Height of turbines (total including rotors (m))	Recommended ZVI distance (km)
50	15
70	20
85	25
100	30

- 6.2 Effect of Distance, Receptor Sensitivity & Significance page 62-65

#### An Alternative Schema

6.2.2 We have therefore devised the following schema as an alternative to the Sinclair-Thomas or other distance-magnitude guidelines, based on the results from the current research project. This schema is offered as a suggestion for testing and further evaluation, and our earlier comments on issues of magnitude and significance

should underline the inherent difficulties in devising any schema that is likely to enjoy universal consensus, even among trained professionals. We suggest that the following approach might at least help clarify the issues sometimes hidden within the generalised statements that appear in some literature.

6.2.3 First, we suggest use of the conceptual model shown in Figure 2. The issues are complex and this cannot be wished away. The first factor to be considered is physical form of the development, which varies with the windfarm structures, their number and layout. The second factor to be considered is visibility in a physical sense, including distance to the viewpoint, weather effects and the seasons – what we have termed the ambient conditions in Figure 2. The third consideration in terms of magnitude (left side of Figure 2) is a large number of factors that modify the visual effect, some related to human perception and some related to physical elements and design of the environment. We believe that this is a structured and enlightened approach to the assessment of magnitude.

6.2.4 Second, we suggest that magnitude be described as shown in Table 18. The terms large, small etc are used because magnitude means size. For each size class, we offer a single keyword descriptor, which is then qualified with other words to try to paint a verbal picture of the size effect. Each class is a range, and the boundaries are explicitly not fixed or defined. It is important to emphasise that no judgement of significance is implied in this table and the words have been chosen to describe size only, in so far as this is possible.

6.2.5 Our judgement is that in the very large, large and negligible distance zones, there are very few factors that modify the physical visual effects to any great extent, although all will have some slight modifying effect. However, a host of modifying factors needs to be considered in the broad middle distance zones. These are listed in Figure 2, divided into those that tend to increase the perception of magnitude and those that tend to reduce it. In judging the appropriate size class for any predicted visual effect at a particular viewpoint, these factors need to be considered explicitly.

6.2.6 It is important to stress that the critical classification is the visual size class and not the distance. Three examples emphasise this point. It is the size class descriptor *prominent* that is important visually, not whether the viewpoint happens to be at 1 km or 2 km from the turbines. If the prevailing wind is such that the turning rotors will appear directly facing the viewer for most of the time, the turbines will appear more visible than if the prevailing view is to blades at right angles to the viewer; in this case, it is perfectly feasible for the perceived magnitude to be judged as *conspicuous* rather than *apparent*. If meteorological data shows that aerial visibility will be low for a high proportion of the year, the average magnitude of the visual effect will be correspondingly lower; in this case, it is perfectly feasible for the perceived magnitude to be *apparent* rather than *conspicuous*.

6.2.7 Magnitude must then be linked with sensitivity to seek evaluation of significance, discussed in the next sections.

Table 18: Size Classes, Names and Descriptors for Visual Effect (Magnitude)

Size Class	Name	Descriptor – appearance in central vision field	Modifying factors
Very Large	Dominant	Commanding, controlling the view	Few
Large	Prominant	Standing out, striking, sharp, unmistakable, easily seen	Few
Medium	Conspicuous	Noticable, distinct, catching the eye or attention, clearly visible, well defined	Many
Small	Apparent	Visible, evident, obvious	Many  Limit of potential visual significance
Very Small	Inconspicuous	Lacking sharpness of definition, not clear, obscured, blurred, indefinite	Many  Limit of ZVI
Negligible	Faint	Weak, not legible, near limit of human eye	Few

**Scottish Natural Heritage Guidance; Cumulative effect of Wind Farms issued  
12/08/2003**

- Consideration of **cumulative effects**, chapter 2, page 1

The overriding principle applied by planning authorities when determining planning applications is that each case must be determined on its “individual merits”, and that there is a presumption in favour of development which accords with the development plan, although other ‘material considerations’ may outweigh the plan’s policies. However, recognition is increasing, both within planning authorities and within government guidance (e.g. NPPG 6 and 15) that such ‘material considerations’ may include **cumulative effects**.

- **Cumulative effects** on visual amenity chapters 37 & 38 page 10

**37 Cumulative effects** on visual amenity consist of combined visibility and sequential effects.

- Combined visibility occurs where the observer is able to see two or more developments from one viewpoint. When considering the **cumulative effects** arising from combined visibility, it is necessary to consider, for each of the viewpoints within the ZVI of the windfarm concerned, the combined effect of all windfarms which are (or would be) visible from these viewpoints. Combined visibility may either be in combination (where several windfarms are within the observer’s arc of vision at the same time) or in succession (where the observer has to turn to see the various windfarms).

- Sequential effects occur when the observer has to move to another viewpoint to see different developments. Sequential effects should be assessed for travel along regularly-used routes like major roads or popular paths. The occurrence of sequential effects may range from *frequently sequential* (the features appear regularly and with short time lapses between, depending on speed of travel and distance between the viewpoints) to *occasionally sequential* (long time lapses between appearances, because the observer is moving very slowly and / or the there are large distances between the viewpoints.)

**38 Cumulative visual effects** will vary in degree with; the number and sensitivity of visual receptors; the duration, frequency and nature of combined and sequential views (glimpses or more prolonged views; oblique, filtered or more direct views; time separation between sequential views); and the relative impact of each individual windfarm, with regard to visual amenity

- **Cumulative** landscape effects chapter 39 & 40 page 10 & 11

**39** These affect the physical fabric or character of the landscape, or any special values attached to the landscape.

- **Cumulative** effects on the *physical fabric* of the landscape arise when two or more developments affect landscape components such as woodland, dykes or hedgerows. Although this may not significantly affect the landscape character, the cumulative effect on these components may be significant – for example, where the last remnants of former shelterbelts are completely removed by two or more developments.

- **Cumulative** effects on *landscape character* arise from two or more windfarm developments. Windfarms introduce new features into the landscape. In this way, they can so change the landscape character that they can create a different landscape character type, in a similar way to large scale afforestation. That change need not be adverse; some derelict or industrialised landscapes may be enhanced as a result of such a change in landscape character. The **cumulative** effects on landscape character may include other changes, for example trends or pressures for change over long time periods, which should form part of any consideration of a particular project.

**40.** Windfarms may also have a cumulative effect on the character and integrity of landscapes that are recognised to be of *special value*. These landscapes may be recognised as being rare, unusual, highly distinctive or the best or most

representative example in a given area. This recognition may take the form of local or national designations, citations in development plans, community plans or other documents.

- Further information and advice; 59 page 16

The issues of landscape capacity for windfarms and the **cumulative effects** of windfarms on landscape character and birds are discussed in more detail within ETSU's report, though as stated above SNH does not necessarily endorse all the recommendations in that report and this guidance should be regarded as taking precedence. Detailed advice relating to the cumulative effects on landscape and birds associated with specific proposals should be obtained from Advisory Services Landscape and Species Groups.

## Appendix 2, Extracts from National Planning Documents and Circulars:

### Scottish Planning Policy SPP1, The Planning System November 2002

- Environmental Quality, Chapter 15:

Protecting and enhancing the quality of the environment, in both urban and rural areas, is a key objective of the planning system. The condition of our surroundings has a direct impact on the quality of life. Safeguarding Scotland's rich and diverse natural heritage and built environment including the wider historic and cultural landscape, improving areas through regeneration, safeguarding biodiversity, environmental improvement and restoration, encouraging efficient use of resources and enabling access to recreational opportunities and open spaces in urban and rural areas can all be supported by a proactive approach to planning. The conservation and enhancement of both the natural and built environment bring benefits to local communities and provide opportunities for economic and social progress. Environmental justice requires us to recognise the **cumulative impact** of environmental disbenefits and work towards ensuring people do not have to live in degraded surroundings. It also means not making unrealistic demands on the environment to absorb waste and pollution.

### Planning Advice Notice PAN 45 (Revised 2002) Renewable Energy Technologies

- Cumulative Impact: Page 35, chapter 89, 90 & 91

89. The **cumulative impact** of a number of neighbouring developments may also be a relevant consideration. The nature and character of the location, and the landscape in which a development is located, will in part determine the acceptability or otherwise of siting proposals in proximity to each other.

90. A number of factors have influenced the current geographic distribution of wind farm proposals in Scotland, for example :

- the distribution of the viable wind resource;
- technical and economic constraints to the viability of exploiting different wind speeds;
- electricity grid access constraints;
- protected areas;
- planning policy.

These have tended to focus developments in a relatively limited number of areas. However there have been few instances where cumulative effect has had to be addressed but with more proposals coming forward this could change.

91. The cumulative effects of wind farm development can arise as the combined consequences of:

- an existing wind energy development and a proposed extension to that development;
- proposals for more than one wind energy development within an area;

- proposal(s) for new wind energy development(s) in an area with one or more existing development(s);
- any combination of the above.

In assessing **cumulative effects**, it is unreasonable to expect this to extend beyond schemes in the vicinity that have been built, those which have permissions and those that are currently the subject of undetermined applications

### **Securing a Renewable Future: Scotland's Renewable Energy, published by the Scottish Executive (March 2003)**

- Chapter 8, Page 5:

We can expect established technologies such as on-shore wind and hydro to continue to play a major part in achieving our 18% target by 2010. However, the **cumulative impact** of on-shore wind farms, coupled with the scarcity of suitable remaining hydro sites, make it unlikely that Scotland could achieve a substantially increased target by 2020 based on these technologies alone. Instead, the key to exploiting Scotland's renewable future to the full is likely to lie in our ability to promote the development of new technologies such as offshore wind, biomass, wave and tidal power. It is this potential to achieve a diverse mix of renewables technologies which has led Ministers to conclude that Scotland should aspire to generate 40% of its electricity from renewable sources by 2020.

- Chapter 29, Page 17:

Concerns were also voiced about the cumulative impact of a number of wind farm developments within a small area of the country. The planning process already provides for issues of **cumulative impact** to be taken into account in considering applications for consent. As the pace and scale of on-shore wind developments in particular increases we would expect increased significance to be attached to consideration of cumulative impact in specific areas

### **Scottish Planning Policy SPP15 February 2005**

- Development Control, chapter 39, page 12

A more positive approach to development in rural Scotland must be accompanied by effective regulation. It will be particularly important that a consistent approach to decision making is adopted so that individuals, communities, conservation and development interests are clear about what will be allowed and the standards that will be sought in terms of siting and design. **Equally, it should be clear what will not be permitted.**

### **National Planning Policy Guideline NPPG6 Revised 2000 Renewable Energy Developments**

- Wind: Page 15, chapter 36

The characteristics associated with wind farms raise a number of issues that require to be considered, and where appropriate, addressed. These relate to: Visual impact - the size and scale of the development and its relationship to the characteristics of the locality and landform in which it is to be built will be a relevant consideration. The visibility of a wind farm may in some circumstances raise concerns, although distance as well as landscape and topography will affect its prominence. Additionally the **cumulative impact** of neighbouring wind developments may in some circumstances be relevant.

## Appendix 3, Extracts from Argyll and Bute Planning Policy Documents:

### Argyll and Bute Wind Farm Policy - Adopted 15<sup>th</sup> March 1995

- Status

It should be recognised that *this policy document* has not been subject to the formal procedures required for statutory local plan production. Furthermore, it has not been subject to any form of public consultation. As such, under the provisions of the Planning and Compensation (Scotland) Act 1991, this policy document may only be regarded as a "material consideration" in addition to the relevant, existing adopted Local Plan.

- Pol WF 1

Subject to existing policies in the Development Plan, the District Council will support the development of wind farms where they meet established best practice criteria. However the District Council will resist those developments which it considers, individually or **cumulatively**, by virtue of their scale, location, setting or design, will have an adverse impact on the environment.

### Argyll and Bute Structure Plan 2002 – Approved 2002

- STRAT DC 8 Landscape and Development Control

A) Development which, by reason of location, siting, scale, form, design or **cumulative impact**, damages or undermines the key environmental features of a visually contained or wider landscape or coastline shall be treated as 'non-sustainable' and is contrary to this policy.

- STRAT RE 1 Wind Farm/Wind Turbine Development

A) Wind farm development is encouraged where it is consistent with STRAT 7, 8 & 9. Proposals shall be supported where it can be demonstrated there is no significant adverse effect on:

- local communities
- natural environment
- landscape character and visual amenity
- historic environment
- telecommunications etc

The council will identify, with appropriate justification in the Local Plan areas of search or, where appropriate, specific sites where wind energy development may be permitted. The council will also indicate sensitive areas or sites which it is judged that for overriding environmental reasons, proposals for wind farm development would only be considered in exceptional circumstances in line with the criteria set out above. Issues associated with the **cumulative impact** of wind farm and wind turbine development will be addressed. This will be done in partnership with the industry and other interested parties including local communities,

### Argyll and Bute finalised draft local plan, published May 2005;

- Policy LP ENV 1 Development Impact on the General Environment page 27

In all development control zones the Council will assess applications for planning permission for their impact on both the natural, human and built environment. When considering development proposals, the following general considerations will be taken into account, namely:

(A) Likely impacts, including **cumulative impacts**, on amenity, access to the countryside and the environment as a whole;

- Economic Proposals, Section 6, chapter 3, page 36
  - d) The following Projects that are being taken forward during the period of the Plan by the Council and its partners.
    - To prepare supplementary guidance for design and siting of renewable energy installations, including a **cumulative impact** study for new wind farm developments in Kintyre.
  
- Policy LP REN 1, Commercial Wind Farm\* and Wind Turbine Development page 60
  - B) Areas with some capacity to accommodate commercial wind farms and wind turbines are indicated in the Wind Farm Policy Maps and are categorised as 'Preferred Areas of Search' for commercial wind farms; and include sites with planning permission. Wind farms and turbines located within these 'preferred areas of search' shall be supported where it can be demonstrated the proposal will not conflict with the sensitive features of the area and in all cases that there are no adverse effects, directly, indirectly or **cumulatively** on:
    - communities, settlements and their settings;
    - areas and interests of nature conservation significance;
    - landscape character; scenic quality and visual amenity;
    - core paths, rights of way or other well-used access routes;
    - sites of historic or archaeological interest and their settings;
    - telecommunications

## Appendix 4, AWF Wind Farm Categorisation:

### Wind Farms in the Kintyre/Arran Basin.

- Constructed, In Planning and In Advanced Scoping within the study area:

Wind Farm Name	Status	Map Reference*	No. of Turbines*	Height of Turbines*	Rotor Blade Radius*	Recommended ZVI distance**
Tangy	Existing	NR677285	15	75m	26m	22.5km
Tangy Extension	Consented	NR677285	7	75m	26m	22.5km
Beinn an Tuirc 2	In Planning	NR738339	21	100m	40m	30km
Beinn an Tuirc (North)	Built	NR744367	23	64m	23.5m	18km
Beinn an Tuirc (South)	Built	NR739355	23	64m	23.5m	18km
Deucheran Hill	Built	NR762441	9	79 & 93m	33m	25km
Gigha	Built	NR 637 469	3	30m	13.5m	10km
Largie	In Planning	NR739503	19	107m	40m	35km
North Kintyre	Advanced Scoping	NR880618	22	118m	40m+	35km
Ardrossan	Built	NS233471	12	100m	40m	30km
Wardlaw Wood	Consented	NS256507	16	122m	40m+	35km
Kelburn Estate	In Planning	NS250551	19	102m	40m	35km
Waterhead Moor	In Planning	NS254625	44	100m+	40m+	35km

Source: British Wind Energy, Planning Application or Scoping document. Map reference corresponds to the centre of the wind farm. \*\* SNH

Note – for mapping purposes AWF have considered the limit of ‘apparent visibility’ for all modern turbines as 30km. This should most probably be viewed as a conservative limit and very sensitive receptors such as Goat Fell will experience significant impact at this distance.

- Constructed, In Planning and In Advanced Scoping within the study area:

Wind Farm Name	Status	Map Reference*	No. of Turbines*	Height to blade tip
‘South Kintyre’	Anemometry	NR726144**	Unknown	100m+?
Allt Dearg	Advanced scoping	NR823764	14	115m
Cruach Mhor	Built	NS034875	35	71m
‘Dunoon’	Anemometry	NS132754**	Unknown	100m+?
Greenock (formerly Gryff Reservoir)	In Planning	NS271727**	22	100m
Hunterston Hydrogen	Advanced Scoping	NS301595	30	100m+
Lissens Moss	Anemometry	NS342468**	unknown	100m+?

- \*Source: British Wind Energy, Planning Application or Scoping document. Map reference corresponds to the approximate centre of the wind farm; \*\* approximate location

- Wind Farm Observations: To inform the discussion on visibility, repeated observations of the following wind farms were made by AWF.

<b>Beinn an Tuirc Wind Farm</b>				
Distance	View Point	Map Ref.	Nearest Turbine Map Ref	Comments
18.38km & 18.34km	B880 nr Shiskine, Arran	NR925314	South NR746355 North NR750369	South: 3 turbines seen above hub height, 2 tips only. North: 6 turbines seen above hub height, 1 tips only. Visible rotor blade movement seen only in clear light and approaching edge of visible range - Just APPARENT
16.14km & 16.76km	Blackwater foot, Arran	NR894281	South NR745343 North NR749365	South: 7 turbines seen above hub height, 1 tips only. North: 3 turbines seen above hub height, 1 tips only Visible rotor blade movement seen in clear light. Can be eye catching in good light - APPARENT
14.31km & 14.01km	A841, inside NSA, Arran	NR889359	South NR746353 North NR749365	South: 5 turbines visible with rotor blade movement seen in most light. North: 13 turbines visible with rotor blade movement seen in most light. Sit on high point in Kintyre & can be eye catching - APPARENT
12.72km & 11.88km	A841, nr Imachar, Arran	NR865401	South: NR746356 North: NR750371	South: 2 turbines visible with rotor blade movement seen in clear light. North: 9 turbines visible with rotor blade movement easily seen in clear light. Sit on high point in Kintyre & can be very eye catching - APPARENT
6.71km	Barr Glen, Kintyre	NR671367	NR738370	North: 15-20 turbines visible along the first 2km of the minor road through the glen, rotor blade movement very obvious in most conditions - PROMINANT
5km	Saddle Glen, Kintyre	NR788325	NR745351	South: 4 turbines visible, rotor movement very obvious in most conditions – Very PROMINANT
3.14km	Barr Glen, Kintyre	NR709382	NR738370	15 turbines visible, appearing very large above the buildings in all but inclement weather - DOMINANT

Deucheran Hill Wind Farm				
Distance	View Point	Map Ref	Nearest Turbine Map Ref	Comments
23.2km	Cnoc an Tigh Odhair, Knapdale	NR829667	NR761445	9 turbines visible in very clear weather or under lighting conditions where sunlight is reflected from blades, approaching edge of visible range - Just APPARENT
20.37km	B880 nr Shiskine, Arran	NR925314	NR765440	9 turbines visible, with rotor blade movement visible in clear weather, much more visible than Beinn an Tuirc from same point - APPARENT
16.74km	A841 nr Lochranza ferry, Arran	NR918507	NR765439	9 turbines visible, appearing large in good light with rotor blade movement visible in most clear weather - APPARENT
14.81km	A841, inside NSA, Arran	NR889359	NR765440	9 turbines visible, appearing large in good light with rotor blade movement visible in most clear weather - APPARENT
12.91km	A83 nr Clachan, Kintyre	NR778573	NR761445	9 turbines visible, appearing large in good light with rotor blade movement visible in most weather – APPARENT, but verging on PROMINANT
11.16km	A841, nr Imachar, Arran	NR865401	NR759436	9 turbines visible, appearing surprisingly large in good light. Rotor blade movement visible in all but inclement weather - PROMINANT
10.71km	A841, Pirmill, Arran	NR872443	NR765439	9 turbines visible, appearing surprisingly large in good light. Rotor blade movement visible in all but inclement weather - PROMINANT
4.34km	Beinn Bhreac, Kintyre	NR791477	NR764443	9 turbines visible, appearing very large in all but inclement weather – Very DOMINANT
3.92km	Brackley, Kintyre	NR796416	NR765440	7 turbines visible along B842 for 200m. Turbines very large and visible in all but inclement weather – Very DOMINANT

<b>Ardrossan Wind Farm</b>				
Distance	View Point	Map Ref	Nearest Turbine Map Ref	Comments
33.56km	Skipness Castle, Kintyre	NR909574	NS229473	All 12 turbines and rotor blade movement visible in very clear weather. Only eye catching when light by sunlight - INCONSPICUOUS
24.5km	Goatfell View Point, Arran	NR991415	NS229473	All 12 turbines fully visible with rotor blade movement very easily seen in good hill walking conditions. Largest structure seen on Ayrshire coast & can be very eye catching - APPARENT
23.75km	Brodick Sea Front, Arran	NS016360	NS230463	All 12 turbines fully visible. Rotor blade movement easily seen in clear light, can be very eye catching - APPARENT
20.81km	A841 nr Corrie, Arran	NS025432	NS229473	All 12 turbines fully visible. Rotor blade movement easily seen, can be very eye catching - APPARENT

<b>Wind Farms Visible From Skipness Map Ref NR903578</b>			
Wind Farm	Wind Farm Centre Map Ref	Distance	Comments
Cruach Mhor	NS034875	32.5km	Only visible on very clear day – INCONSPICUOUS
Ardrossan	NS233470	34.7km	All turbines visible on clear day, with rotor movement visible, Can be Apparent but classed as INCONSPICUOUS
Deucheran Hill	NR761443	19.6km	All turbines visible with rotor blade movement visible in clear weather - APPARENT
Beinn an Tuirc	NR742360	27.1km	Only visible on very clear day – INCONSPICUOUS

## References:

- 1) University of Newcastle (2002) Visual Assessment of Windfarms best practice. Scottish Natural Heritage commissioned report F01AA303A , see appendix 1
- 2) Scottish Natural Heritage Guidance; Cumulative effect of Wind Farms issued 12/08/2003, see appendix 1
- 3) Securing a Renewable Future: Scotland's Renewable Energy, published by the Scottish Executive (March 2003), see appendix 2
- 4) National Planning Policy Guideline NPPG6 Revised 2000 (Renewable Energy Developments), see appendix 2
- 5) Planning Advice Notice PAN 45 (Revised 2002) Renewable Energy Technologies, see appendix 2
- 6) Argyll and Bute Wind Farm Policy - Adopted 15<sup>th</sup> March 1995, see appendix 3
- 7) Argyll and Bute Structure Plan 2002 – Approved 2002, see appendix 3
- 8) Argyll and Bute finalised draft local plan, published May 2005, see appendix 3
- 9) Scottish Planning Policy SPP1, The Planning System November 2002, see appendix 2
- 10) Scottish Planning Policy SPP15 February 2005, see appendix 2