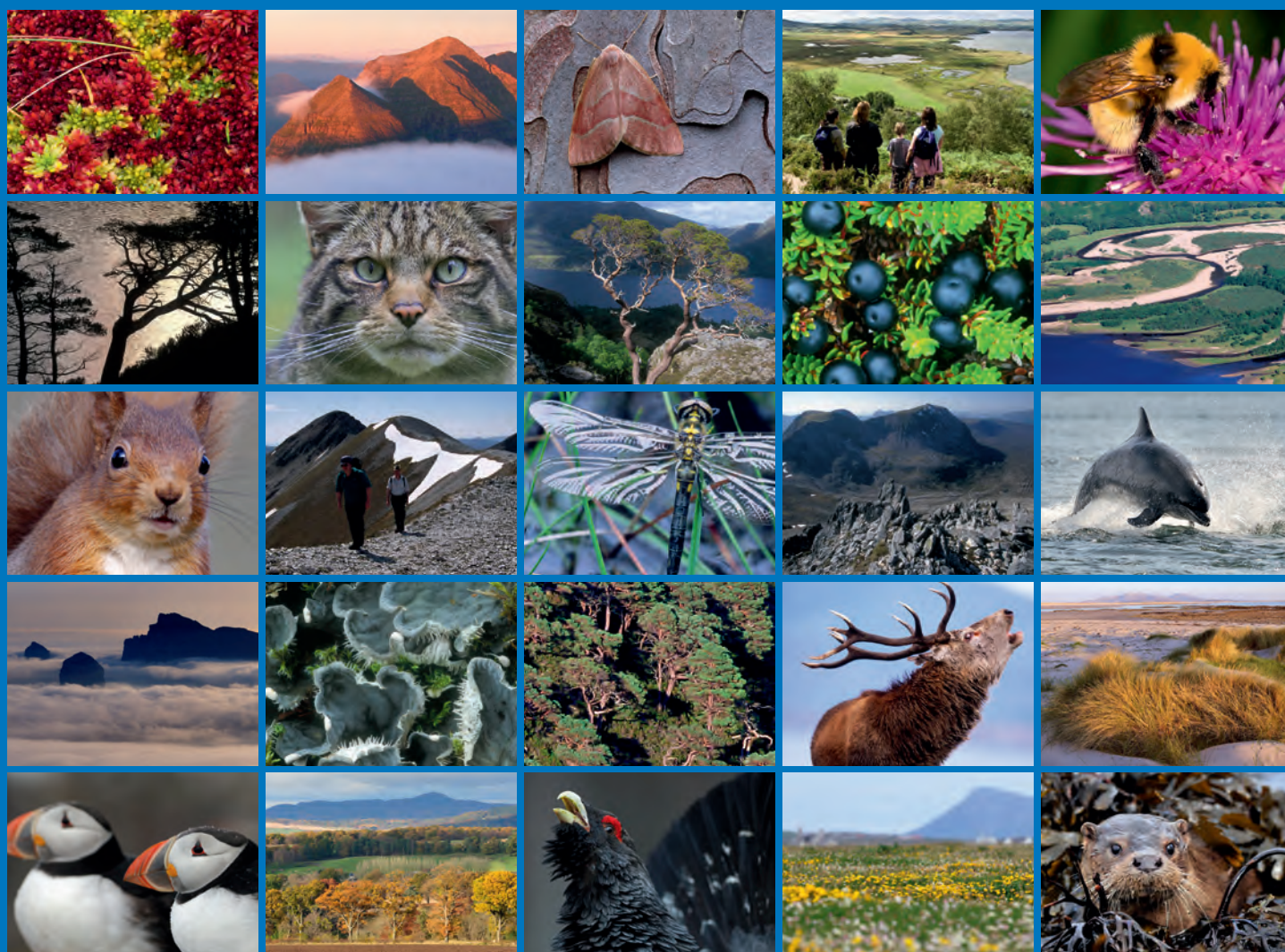


# Research on the use of wind farm visualisations by the public and decision- makers: Phase 1 - 2006 guidance





**Scottish Natural Heritage**  
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All of nature for all of Scotland  
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# COMMISSIONED REPORT

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**Commissioned Report No. 935**

**Research on the use of wind farm  
visualisations by the public and  
decision-makers: Phase 1 - 2006 guidance**

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## COMMISSIONED REPORT

# Summary

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## Research on the use of wind farm visualisations by the public and decision-makers: Phase 1 - 2006 guidance

**Commissioned Report No. 935**

**Project No: 15127**

**Contractor: Why Research**

**Year of publication: 2016**

### **Keywords**

Guidance; visualisations; wind farms; survey; planning and development.

### **Background**

SNH commissioned Why Research to look at how visualisations based on the Visual Representation of Wind Farms Good Practice Guidance (2006) are used in practice, in different settings, and to follow this by looking at visualisations based on the 2014 guidance (phase 2) to ascertain whether this updated version has enabled improvements in wind farm visualisations. This work was part funded by the Landscape Institute Scotland and the Landscape Institute Technical and Professional Committee.

### **Main findings**

The findings from phase 1 of the Survey show:

- Findings indicate that visualisations meet the needs of both professionals and members of the public, although some are seen as more useful than others and there are some additional visualisations that members of the public in particular would like to see. Professionals and elected members place a great deal of emphasis on site visits and would not rely purely on visualisations.
- While there are some issues with the composition or lighting of some photographs, visualisations are seen by most to be an accurate representation of the actual view of the landscape.
- 95% of professionals and 93% of residents think it is important that visualisations provide wider landscape and visual context.

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## **1. EXECUTIVE SUMMARY**

### **1.1 Key overview**

SNH commissioned Why Research to look at how visualisations based on the 2006 Visual Representation of Wind Farms Good Practice Guidance are used in practice, in different settings. This research will be followed by similar work – phase 2 - looking at the revised guidance published in 2014.

Two online surveys were carried out; amongst members of the general public living near wind farm developments (131 respondents) and amongst professionals who look at wind farm visualisations in Scotland (59 respondents).

In addition, face to face interviews were carried out with 24 members of the general public at wind farm exhibitions and with local authority planning committee elected members (8) and officers (4).

This provided a total sample of **226** people.

The work was completed between November 2014 and March 2015. Top level findings from the survey questions are outlined below.

### **1.2 Awareness of visualisations**

Almost all professionals (97%) said they had seen ZTV maps; this was the visualisation seen by the highest number from each of the professional groups. The visualisation seen by most residents was the panoramic photomontage (66%).

Most professionals (66%) said they receive both hard copy and electronic visualisations from developers and most (76%) said that this is how they prefer to receive them. When printing from electronic visualisations most professionals (69%) print in A3 size and almost all (92%) print in colour.

### **1.3 Use of visualisations**

When asked about viewing instructions when using visualisations, more professionals (50%) than residents (40%) said that they refer to the instructions. Planning officers (60%) refer to the instructions more than any other group. Almost all respondents from the professionals and residents surveys said that they found visualisations easy to use.

### **1.4 Online visualisations**

Less than half of respondents in both groups had viewed visualisations online (37% of professionals, 44% of residents). The majority of those said the instructions for using them were clear.

### **1.5 Use in field**

80% of professionals and 35% of residents said that they had visited one or more of the sites indicated on the visualisations to see the actual view. 77% of professionals and 86% of residents said the visualisation was an accurate representation of the actual view of the landscape.

## **1.6 Usefulness of visualisations**

When asked which visualisations they found useful, most professionals (93%) and residents (81%) chose a panoramic photomontage. 48% of professionals and 41% of residents found a single frame photomontage most useful.



## **2. INTRODUCTION**

Scottish Natural Heritage (SNH) is the government's adviser on all aspects of nature and landscape across Scotland and aims to help people understand, value and enjoy Scotland's nature, now and in the future. SNH promotes the care for and improvement of the natural heritage, including enabling greater understanding and awareness of it and its sustainable use. Its success depends on working with others. With regard to wind farm development, SNH's aim is to help achieve the right wind farms in the right places.

Most wind farm applications are subject to Environmental Impact Assessment (EIA) to ensure any environmental impacts are fully considered before a decision to proceed is made. A Landscape and Visual Impact Assessment (LVIA) forms part of the EIA and looks at the effect of any change in the landscape, including any potentially negative effects and how these can be avoided, reduced or offset. Studies indicate<sup>1</sup> that the visual impact of a wind farm can be an important barrier to its acceptance and deployment.

Within the Visual Impact Assessment (VIA) aspect of the LVIA, visualisations are used to show how a development may appear and where it might be seen from. As well as photographs and hand drawn sketches, visualisations also include wirelines (line diagrams illustrating the three-dimensional shape of the landscape) and photomontages (where an image of the proposed development is superimposed on a photograph or photographs).

### **2.1 Guidance**

In 2006, SNH published Visual Representation of Wind Farms Good Practice Guidance, and this was revised in 2014 to further improve the methodology. These visualisations have to meet the needs of a range of different people with different requirements. This includes landscape practitioners, planning officers and decision makers and the general public. The visualisations must also meet these needs regardless of where and in what format the visualisations are viewed.

### **2.2 A need for research**

SNH wished to commission research to look at how visualisations based on the 2006 guidance are used in practice, in different settings, and to follow this by looking at visualisations based on the 2014 guidance to ascertain whether this updated guidance has enabled improvements in wind farm visualisations. This report summarises the findings from research carried out in relation to the 2006 guidance.

The research focussed on the use of wireframes, photomontages and other visualisations to illustrate the landscape and visual effects from viewpoints and tested whether:

- members of the public, decision-makers and other users understand the visualisations and how to use them;
- users follow the instructions provided;
- there are further ways to improve the materials described within the guidance.

The research took the form of:

- an online survey amongst members of the general public;
- an online survey amongst local authority planning officers and other professionals;
- face-to-face interviews with members of the public visiting public exhibitions set up by wind farm developers;

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<sup>1</sup> <http://www.sciencedirect.com/science/article/pii/S1364032105001255>

- face-to-face and telephone interviews with elected members following planning committee meetings at which a wind farm application was heard. Researchers also accompanied elected members on a site visit.

### **2.3 Analysis and reporting**

Responses to the online surveys were imported directly into SNAP software for analysis and this report details the findings from these analyses.

Where base sizes allow, responses from respondent sub-groups were analysed to look for any differences or commonalities between groups and these are mentioned wherever relevant.

It should be noted that figures and tables throughout this report may not add to 100% either due to rounding or because respondents were allowed to select more than one answer to a question.

Comments made by members of the public, elected members or planning officers have been anonymised to preserve confidentiality.



### 3. ONLINE RESPONDENTS

#### 3.1 Residents

The survey amongst members of the general public living near a wind farm development was conducted between 7<sup>th</sup> November and 21<sup>st</sup> November 2014 using an online panel. The survey was sent to residents of specific postcode areas; these areas were compiled using information on the SNH wind farm maps 'Onshore Wind Farms in Scotland (August 2013)'. 1,010 adults replied to the survey and 131 of them fulfilled the criteria required to complete the full questionnaire: they were aware of a recent wind farm development proposal in their area; and had looked at visualisations of the proposed wind farm development that were available at a public exhibition or meeting.

#### 3.2 Professionals

Invitations to participate in an online survey were sent to key professionals who look at wind farm visualisations in Scotland. Invitations were sent both from Why Research and via SNH to SNH staff, Heads of Planning Scotland, the Energy Consents team and the reporters unit in Scottish Government. The survey ran from the 5<sup>th</sup> November until the 31<sup>st</sup> January 2015. 59 out of the 62 respondents who replied were eligible to complete the full survey as they had been involved in any work related to wind farm developments in the past 2 years and had viewed visualisations relating to wind farm developments.

#### 3.3 Respondent profile

All respondents were asked to provide a little background information and this information has been used to enable analysis as to whether any differences, or commonalities, appeared across the various different types of respondents that completed the surveys.

As can be seen in the following figure, more of the 131 who took part were female (56%) than male (44%). The 45 to 54 year old age range saw the biggest number responding (38) while just two each from the 18 to 24 year old and 75 years and over ranges replied.

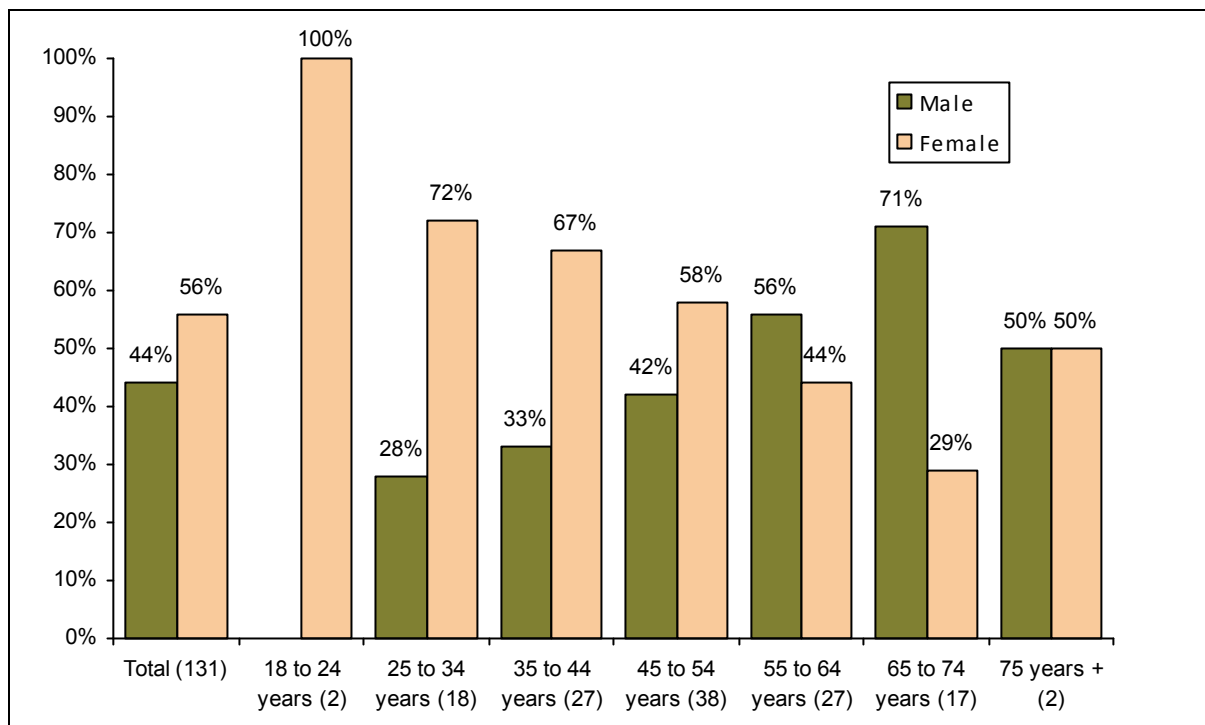


Figure 1. Resident profile

Looking at the 59 professionals who completed the survey:

- 36% (or 21 respondents) were SNH staff.
- 34% (or 20 respondents) were local authority planning officers.
- 31% (or 18 respondents) were other professionals including:
  - Scottish Government reporters.
  - Landscape architects.
  - Energy consents officers.
  - Various others.

### **3.4 Wind farm developments**

The 131 residents who said that they were aware of a proposed wind farm development in their area were asked to give its name:

- 63 could give the name of the development, those mentioned by the largest numbers (each by 3 respondents) were:
  - Wester Derry Wind Co-op
  - Whitelee Windfarm
  - Kype Muir Wind Farm
- 19 gave the location, the name of the developer or some other descriptor.
- 49 said they could not remember.

When asked to name the most recent wind farm development that they have viewed visualisations of, the professional respondents mentioned:

- Afton Wind Farm
- Balnacoil Lodge, Strath Brora, Sutherland
- Barcloy, Dumfries and Galloway
- Crystal Rig (3 and 4)
- Dalnessie Wind Farm
- Dersalloch
- Fauch Hill Wind farm and Harburnhead Wind farm, West Lothian
- Frandy Hill, Glendevon
- Glenmorrie
- Limekiln wind farm
- Muircleuch
- Mull Hill, Crieff
- Sandy Knowe
- Single and twin turbine proposals, Isle of Whithorn
- South of Meikleton of Ardonald, Cairnie, Huntly, Aberdeenshire
- Stronelaig
- Tullymurdoch and Bamff wind farms, Blairgowrie
- Twenty Shilling

#### 4. QUALITATIVE RESPONDENTS

Researchers attended wind farm exhibitions and planning committee meetings at various locations across Scotland between November 2014 and February 2015:

- Two wind farm exhibitions in the Highlands.
  - Both showed the full range of visualisations: Single frame and panoramic photomontages; wirelines; ZTV maps. One had a computer generated fly-through.
  - At one of these exhibitions there were markings on the floor to show viewing distance, although no respondents appeared to use this. When asked what they were for, respondents did not know and incorrect use was made even when given directions by the developers.
  - Discussions were held with 18 members of the public and both developer teams.
- One wind farm exhibition in East Lothian.
  - The developer had showed the full range of visualisations: Single frame and panoramic photomontages; wirelines; ZTV maps. There were two different panoramic photomontages on show: one created using the 2006 guidance and one produced using the updated guidance. They also had a computer generated fly-through.
  - Discussions were held with 6 members of the public and the developer team.
- One pre-application wind farm exhibition in South Lanarkshire.
  - The developer had maps showing the proposed location and some viewpoints.
  - Discussions were held with the developer team.
- One planning committee meeting in East Ayrshire.
  - Discussions were held with two Planning Officers and two elected members.
- One planning committee meeting in the Scottish Borders.
  - Discussions were held with two Planning Officers and two elected members.
- One planning committee meeting in Stirling.
  - The researchers accompanied the elected members on a site visit and, following this, discussions were held with four elected members.

Most of the members of the public that researchers talked to at the wind farm exhibitions were local residents and many were against the idea of a wind farm in their area, with limited interest in the visualisations.

In addition to talking about the visualisations, many elected members and developers commented on guidance in general for wind farm developments and related issues or comments on SNH's involvement in the planning system in relation to wind farm developments. Findings and comments from these discussions are included in the relevant sections in the following chapters; these mainly relate to the usefulness of visualisations, suggestions for improvements and other comments.

## 5. VISUALISATIONS

Resident and professional online respondents were asked a series of questions about specific visualisations and visualisations in general. The following images and information were provided within the residents' survey, the questionnaire for professionals contained an abbreviated version:




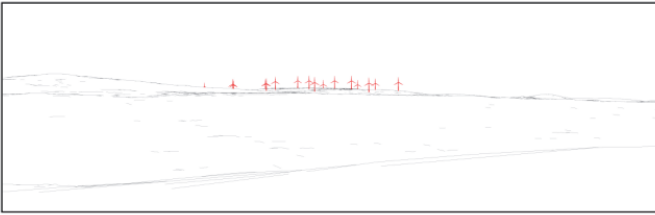
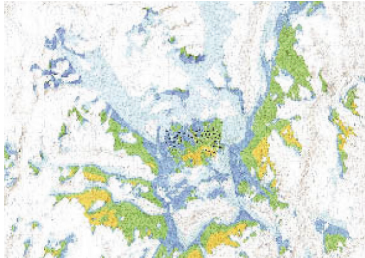
	<p>A panoramic photomontage</p> <p>A photomontage combines a photograph of the real view with a computer generated image of the wind farm proposal.</p>
	<p>A single frame photomontage</p> <p>A single frame photomontage is derived from a single photograph. A panoramic photomontage involves stitching several photos together.</p>
	<p>A baseline panoramic photograph and wireline</p> <p>These show the existing view and a matching wireline with the wind farm proposal(s)</p>
	<p>A wireline</p> <p>A wireline is a computer generated image depicting how the wind farm would look with no surface screening or vegetation</p>
	<p>A zone of theoretical visibility (ZTV) map</p> <p>A ZTV map shows where it might be possible to see the wind farm, depending on screening such as buildings and vegetation</p>

Figure 2. Examples of visualisations

## 6. AWARENESS OF VISUALISATIONS

Respondents were asked which visualisations they had seen. As can be seen in Figure 3, below, professionals have far greater experience than residents with all types of visualisations; as would be expected. Almost all professionals (97%) said they had seen ZTV maps; this was the visualisation seen by the highest number from each of the professional groups. The visualisation seen by most residents was the panoramic photomontage (66%).

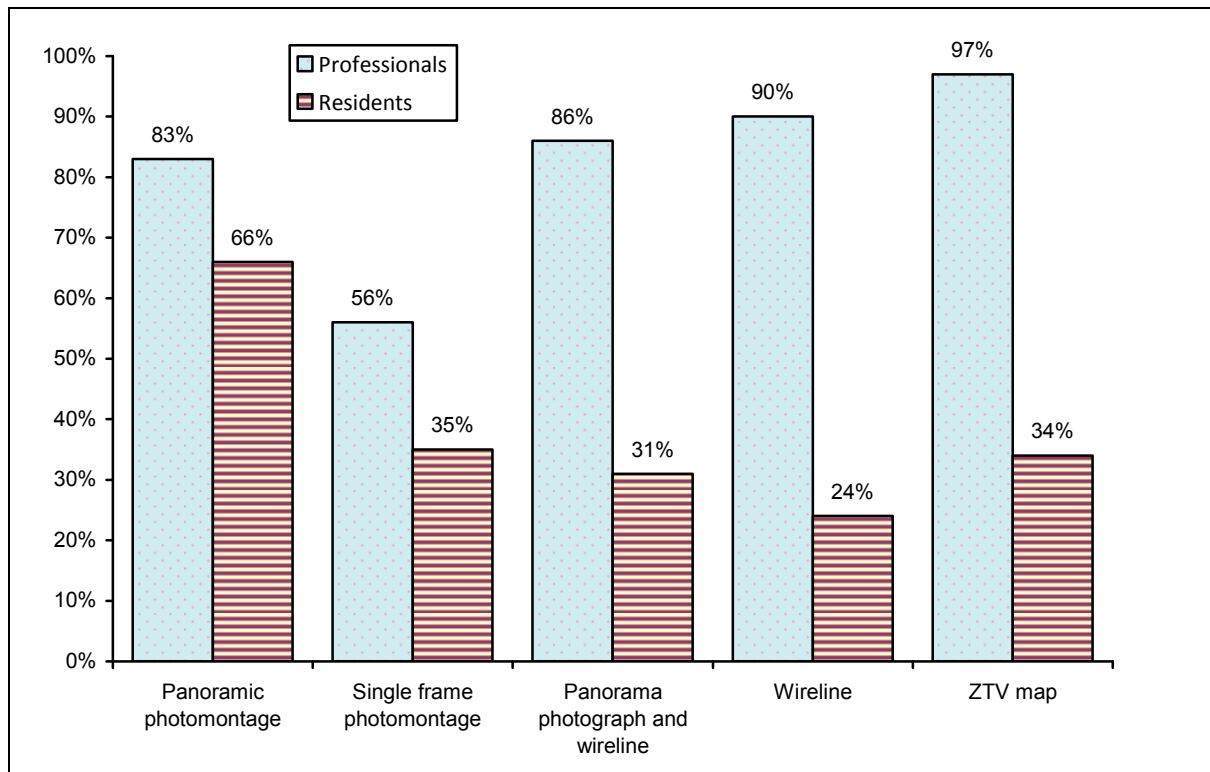


Figure 3. Visualisations seen

Professionals were asked a series of questions about the visualisations they receive from developers. When asked: 'Did the developer provide copies of visualisations for the wind farm development?' all said 'yes':

- 21% had received these in hard copy.
- 14% received them electronically.
- 66% received the visualisations in both hard copy and electronic format.

Almost all of those who had received hard copies said that they received sufficient copies (98%); 2% (one professional) said they had had to request more copies.

Those professionals who had received visualisations in electronic format were asked whether they had printed any copies and 28% (13 respondents) said that they had:

- Most (69%) had printed them A3 size; 23% had printed them at the size specified on the image; 15% printed them A4 size.
- 92% printed them in colour; 8% printed in both colour and black and white.

Professionals were also asked: 'What would be your preference for receiving visualisations?' As shown in the figure below, most would like to receive both hard copy and electronic visualisations. More SNH staff than other groups would like to receive only hard copies.

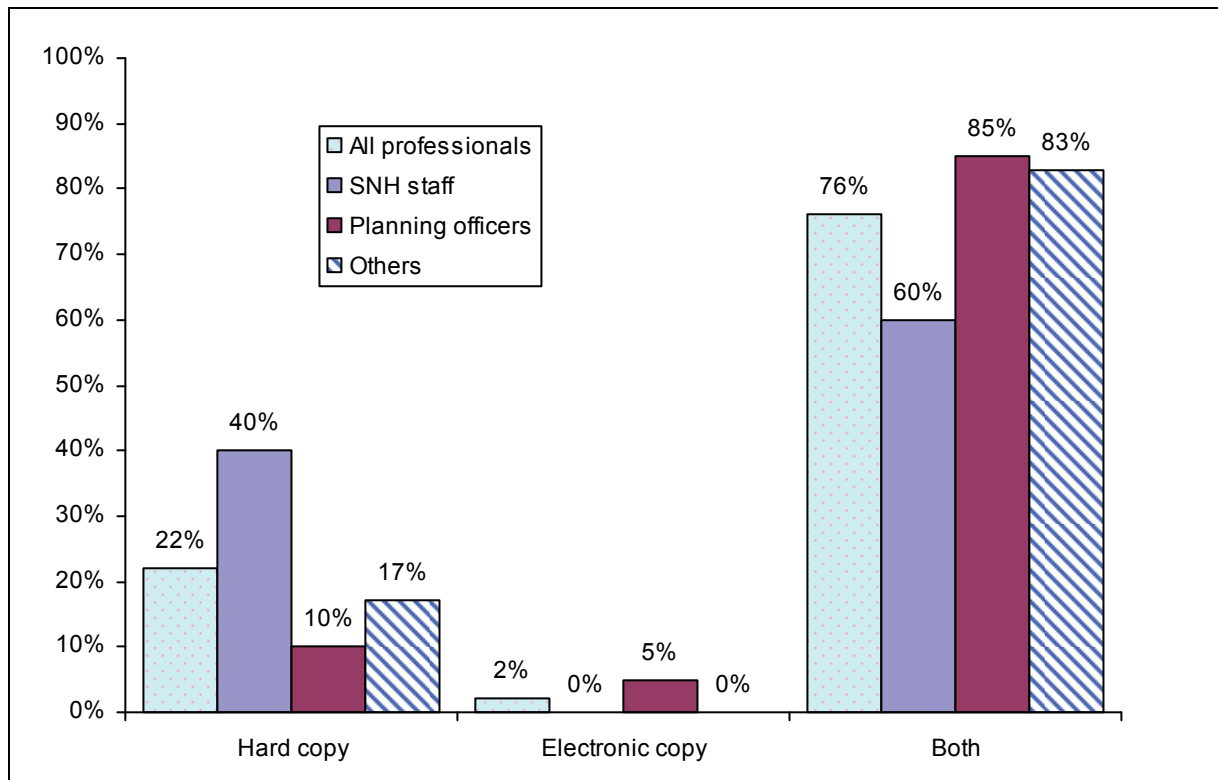


Figure 4. Professionals' preference

Looking at residents, most said that when they viewed visualisations they were in hard copy format:

- 56% saw hard copies of the visualisations.
- 25% saw electronic copies.
- 18% saw both formats.

## 7. USE OF VISUALISATIONS

Respondents, both professional and residents were asked a series of questions about the use of these visualisations.

Firstly, respondents were asked: 'Did you refer to the viewing instructions on the visualisations? More professionals (50%) than residents (40%) referred to the instructions. Planning officers (60%) referred to the instructions more than any other group. Over a third of residents (37%) and also over a third of planning officers (35%) did not see any instructions.

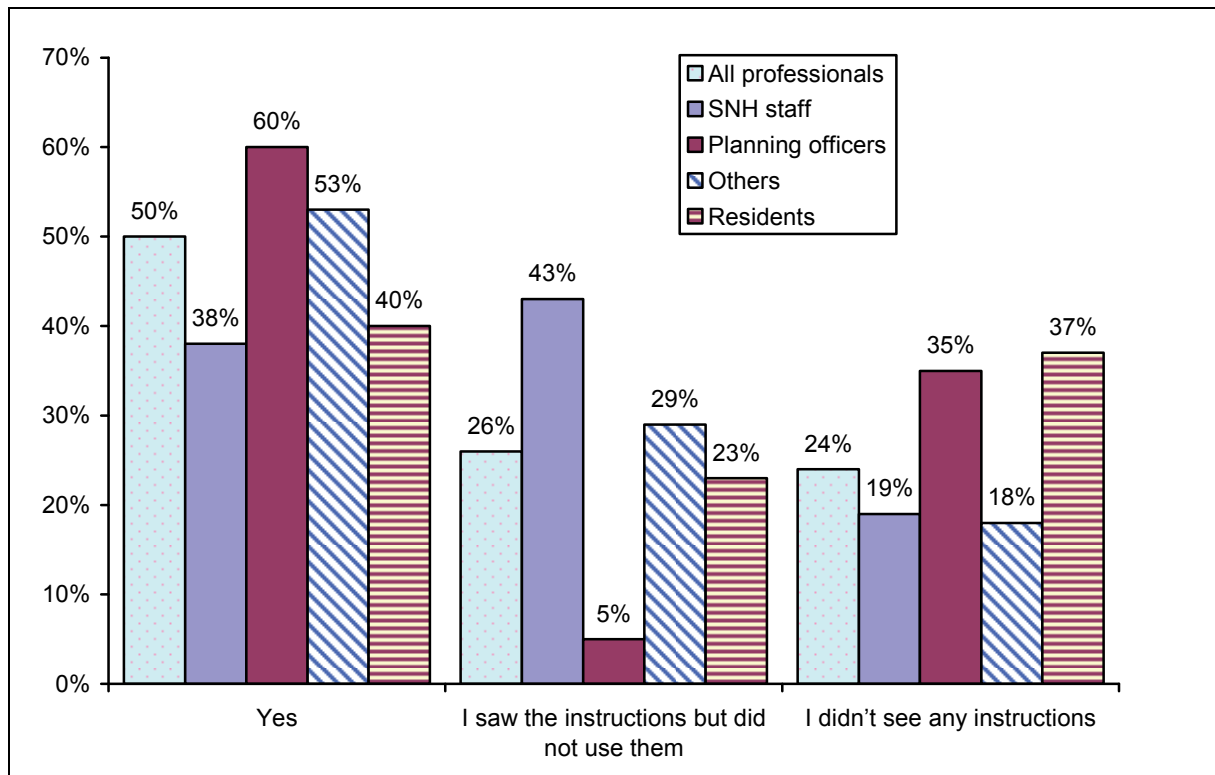


Figure 5. Whether referred to viewing instructions

Respondents were then asked: 'Did you find the visualisations easy to use?' The figure below shows that almost all respondents found the visualisations easy to use. A higher proportion from the 'other' professional group than all other groups said they did not find them easy to use (11%; 2 respondents).

At one of the exhibitions attended by researchers, viewing distances were marked on the floor. Attendees did not seem to notice these and when they were pointed out and explained, still did not use them.



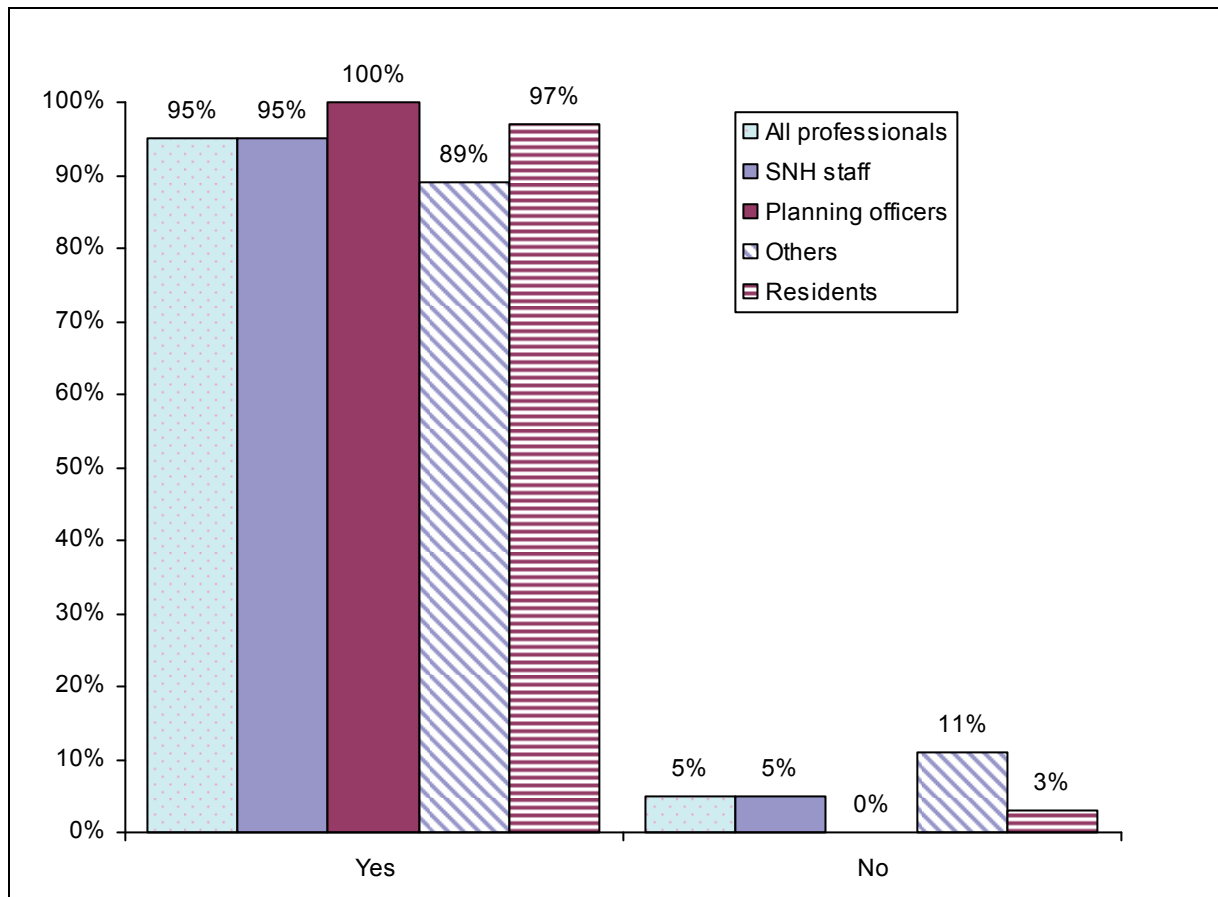


Figure 6. Whether visualisations easy to use

The four residents and three professionals who said they did not find the visualisations easy to use were asked to say why:

The residents said:

- Scale too small to accurately assess the damage they would do to the landscape.
- Could not visualise what it was meant to be.
- Too many arrows pointing on photo.
- 2d is always difficult to understand.

The professionals said:

- Only had access to the online versions on e-planning, where each figure is uploaded as a separate file. It takes time to select and download each individual figure separately.
- This is not a yes no answer question, the visualisation still required work to ensure they were understood properly. The single frame image was simply an enlargement of the panorama and I am not sure if it helped in this case.
- Poor light conditions therefore turbines were difficult to see against grey clouds in a grainy photograph - especially for more distant viewpoints.

At the exhibitions, attendees commented on many of the visualisations available for them. Some of these comments were positive, for example:

- That the images give an idea of the effect or impact.
- That the wirelines are effective in showing where the turbines are on the landscape; that the wirelines complement the photographs; that the wirelines are most useful.
- That the overall combination of different types of visualisations is useful and effective.
- That visualisations are extremely valuable.
- That visualisations make it clear what the development will look like.

However, there were also concerns and these included:

- A perception that the photomontages are deliberately deceptive in terms of size in relation to the landscape in order to minimise the impact; that the pictures are “too optimistic”.
- That the ZTV maps are confusing, even for those who know the area and especially for those who do not. That the ZTV maps are interesting but only theoretical; can they be believed?
- While visualisations are useful they do not demonstrate the impact of moving turbines or the noise from turbines.
- That the photomontages could cover a wider area.
- That there should be closer views centred on the turbine blades.

There were also comments that the detail in some visualisations is not clear due to the weather conditions, angle, breadth or sharpness of focus. Some suggested that photographs should be taken in a range of weather conditions / light. This issue was also of concern to elected members. They said that there can be a lack of clarity in the photographs; the developer often confuses or clutters the picture by including pylons, trees, gable ends etc. Other issues such as white turbines on a ridge line which are much more difficult to pick up, the colour of the sky can make it difficult to envisage how the development will actually look when built.

## 8. ONLINE VISUALISATIONS

In both the resident and professional surveys, respondents were asked a series of questions about viewing visualisations online. Firstly: 'Did you view any of the images online?'

- 37% (22 professionals) said 'yes'; 63% (37 professionals) said 'no'.
- 44% (58 residents) said 'yes'; 56% (73 residents) said 'no'.

Respondents who had viewed visualisations online were asked: 'Were they easy to download?'

- 18 professionals (86%) said they were, 3 said they were not and one did not reply.
- 49 residents said they were (86%), 8 said they were not and one did not reply.

Respondents were also asked 'Were the instructions on how to use them clear?' the table below shows that similar proportions of both professionals and residents found the instructions clear.

*Table 1. Whether instructions clear*

	Professionals	Residents
Yes	75%	69%
No they weren't clear	10%	7%
I didn't see any instructions	15%	24%

When asked 'Were they easy to use?':

- All of the professionals said 'yes'.
- 95% of residents said yes, 5% said 'no'.

The 3 residents who said that the visualisations were not easy to use were then asked to say why. Only one gave an answer saying that it "looked like a different area".

Respondents were also asked whether they had printed any of the visualisations they had viewed online and 11 professionals and 11 residents said that they had.

These respondents were asked 'What size did you print them?'

- Fit to page (one professional, 5 residents).
- At the size specified on the image (3 professionals, one resident).
- A4 (2 professionals, 4 residents).
- A3 (7 professionals).

Finally, respondents were asked 'Did you print them off in colour or black and white?', most had printed in colour.

- Colour (9 professionals, 8 residents).
- Black and white (no respondents).
- Both (2 professionals, 3 residents).

## 9. USE IN FIELD

The questionnaires also included a section on the use of visualisations in the field. Respondents were asked: 'Did you visit any of the sites indicated on the visualisations to see the actual view?'

- 80% (47) of professionals said that they had, 20% had not.
- 35% (46) of residents said that they had, 65% had not.

The residents were asked why they had visited the site and whether they had taken a copy of the visualisations with them:

- 51% said 'It's somewhere I visit regularly'.
- 49% said 'I went specifically to see how the actual view compared to the photograph'.
- However, only 28% had taken a copy of the visualisation with them.

All respondents who had visited the site were asked to say how easy they had found it to match the actual view with the view in the visualisation.

- All of the professionals had found it easy to some degree: 28% said very easy and 72% said quite easy.
- Some residents did not find it easy to match actual view with the view in the visualisation:
  - 36% said they found it very easy.
  - 51% said quite easy.
  - 9% said not very easy.
  - 4% said not at all easy.

When asked about instructions provided with the visualisations:

- 69% of professionals and 73% of residents said they were easy to follow.
- 2% of professionals and 4% of residents said they were not.
- 29% of professionals and 22% of residents said no instructions were provided.

Finally, in this section, respondents were asked: 'Was the visualisation an accurate representation of the actual view of the landscape?'

- 77% of professionals thought that it was, 23% did not.
- 86% of residents thought it was, 14% did not.

Elected members and planning officers saw site visits as particularly important and, at one meeting, elected members commented that one developer offers a real time view onsite, which they find useful.

At one site visit elected members were observed using the visualisations and members were also asked about their use following the visit. Observations and findings include:

- That viewing distances are not used in field. Weather conditions play a part in this, as the visualisations are difficult to use correctly in windy conditions - even when mounted on board. Elected members reported that visualisations are used more as a guideline, to show the general position of the installation, and that the actual view is of more use to them.
- That elected members would like more say in the choice of viewpoints and would also like more input from residents.

## 10. USEFULNESS

The majority of respondents, residents and professionals, said that the visualisations had met their needs.

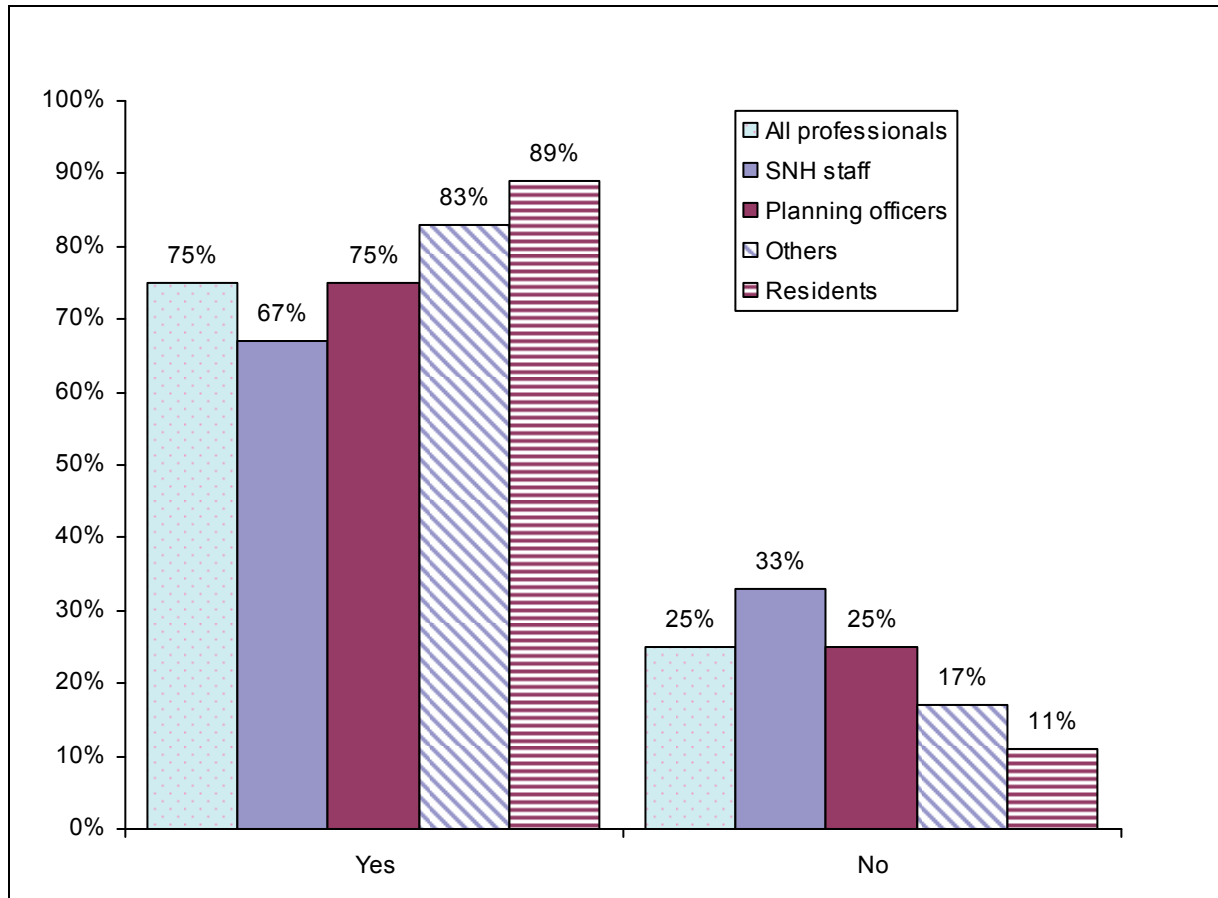


Figure 7. Whether visualisations met needs

The small number who said that the visualisations had not met their needs were asked to say why. Reasons given by the 15 professional respondents who said 'no' included:

- Some key viewpoints omitted (6 respondents)
- Vantage points poorly chosen (5 respondents)
- Poor quality / poor resolution (4 respondents)
- Visualisations inaccurate (3 respondents)
- Photomontages not included / inaccurate (2 respondents)
- Had to request additional visualisations (2 respondents)
- Needed updated after publication of Wild Land map (2 respondents)
- Did not show cumulative impact (one respondent)
- Visualisations did not meet guidance (one respondent)

The 15 residents who said 'no' gave the following reasons:

- Negative comments on wind farms (3 residents)
- Photo was too small / scale was too small (2 residents)
- It appeared to be taken in a way that minimised the visual impact (2 residents)
- Did not think it was an accurate representation of the scale (2 residents)

- It did not allow me to visualise what the development would actually look like (2 residents)
- Some properties were not included / was not an accurate representation of the area (2 residents)
- Only showed one angle (one resident)
- It was taken from angle other than the view from my house (one resident)

At one planning meeting, an elected member commented on the accuracy of the visualisations they are given: “The issue is that it is only guidance. What we need is reassurances of the accuracy of what is provided by the developer”. Other elected members reported that, to help with understanding the impact of planning applications, the planning officers and elected members often use Google Earth which they find more useful than visualisations.

There was some cynicism over what is provided by the developers and some questions over the accuracy of information provided, for example baseline surveys. Elected members suggested that developers can be selective in what they show and will select the ‘best case’ scenario. There were some suggestions that any visualisations presented should show the worst case scenario. The need for photomontages to show the cumulative impact was stressed.

Elected members said that while they understand the guidance they are reliant on the developer to follow the rules and it can be difficult to pick up on if they do not. They feel SNH should flag up any errors. They often rely on their landscape architects for advice on submitted applications. Elected members suggested that they will accept some movement away from the guidance if there is a good reason.

Two elected members did not find wirelines particularly useful, with one describing them as “limited”, although another saw them as particularly useful because of the clarity with which you can see the turbines and where they will be placed on the landscape and how they will impact on the skyline. This respondent liked the uncluttered appearance and felt that they show the positioning more clearly.

When asked which visualisation they found most useful, most professionals (48%) and residents (62%) chose a panoramic photomontage.

*Table 2. Most useful visualisation – first choice*

	<b>Residents</b>	<b>Professionals</b>
	<b>%</b>	<b>%</b>
A panoramic photomontage	<b>62</b>	<b>48</b>
A baseline panorama photograph and wireline	20	31
A zone of theoretical visibility (ZTV) map	5	9
A single frame photomontage	4	7
Other	-	5
A wireline	3	-
None of them	3	-
Don't know	3	-

Respondents were also asked which other visualisations they found useful and the table below shows the percentages selecting each type of visualisation at either the previous or this question.

As can be seen, a large percentage of professionals (93%) and residents (81%) selected a panoramic photomontage. Large percentages of professional respondents also said they found the ZTV map (91%) and baseline panorama with wireline (81%) useful.

*Table 3. Most useful visualisations – all choices*

	<b>Residents</b> %	<b>Professionals</b> %
A panoramic photomontage	<b>81</b>	<b>93</b>
A zone of theoretical visibility (ZTV) map	38	91
A baseline panorama photograph and wireline	57	81
A wireline	24	66
A single frame photomontage	41	48
Other	-	7
None of them	5	-
Don't know	5	-

Some elected members favoured the photomontages as the most important element, although some would prefer them to focus on a smaller number of viewpoints. The ZTV map was also seen as useful although this would be combined with the photomontages. Site visits where the photomontages are used were seen as most useful by many of the elected members.



## 11. SUGGESTIONS FOR IMPROVEMENTS AND OTHER COMMENTS

The final question in the online surveys asked: 'Do you think it is important that the visualisations provide wider landscape and visual context?'

Almost all respondents said that it is important, as shown in the table below.

*Table 4. Whether it is important that the visualisations provide wider landscape and visual context*

	<b>Residents</b>	<b>Professionals</b>
	<b>%</b>	<b>%</b>
Yes	93	95
No	2	5
Don't know	5	-

Finally, online respondents were invited to give any suggestions they might have on how wind farm visualisations might be improved. Their suggestions and other comments are set out below and, where a similar point was made by an exhibition attendee, developer or elected member this is also mentioned:

### **Suggestions for viewpoints**

These included:

- The need to avoid clutter and anything that may obstruct the view, such as trees and the need to take photographs in good weather (4 professionals and one resident).
- The need to ensure relevant viewpoints are used, not ones which show the least impact. Need for stronger guidance on number and choice of viewpoints (4 professionals).
- That all relevant / necessary viewpoints should be agreed with SNH / planning authority / other consultees at the earliest date or before submission (2 professionals)
- There should be more viewpoints (2 residents)

Exhibition attendees also commented on viewpoints querying how these are selected as, in some cases, residents felt they did not give views from locations that people visit or live in. There were requests for many more viewpoints and comments on the need for local input in their selection. One community councillor wanted to see more information such as a book of viewpoint information.

### **Suggestions for the use of visualisations**

Ten professionals commented on the use of visualisations. One expressed concern that while professionals are able to "mentally adjust the images to gain a realistic impression of the proposal", for planning committee members and members of the public without professional experience, this may not be the case. This means that if the visualisations presented are not clear or accurate anyone relying solely on the documents, without making a site visit, may not form a clear and correct impression. One resident responding to the online survey also called for accurate visualisations.

Two professionals said they feel more emphasis should be placed on the impacts of the development. One of these respondents also wanted to see more emphasis on the visualisations needed for site visits rather than producing so many different types. The other felt that visualisations "used in isolation of site experience" can be misleading.

Commenting on the visualisation binder, another professional commented that the binder needs to be of a type that can be opened and individual visualisations removed and did not want to see print sizes any larger than A3.

### **Suggestions for fly-through models**

Requests for 3D images, computer fly-throughs or videos; 11 residents and one professional would like to see computer based interactive maps used. At the exhibitions there was support for the computer generated 'fly-through' models.

Some developers also said that they find these useful as, although very costly, they can be used for things other than exhibitions such as repositioning turbines / access roads etc. Developers told us that people at exhibitions very much welcome these models and felt they had been worth the cost. They are able to do complete renderings of local buildings or for a less expensive model to just basic blocks to show buildings. Developers and those attending the exhibitions where computer programmes were on show felt these tools are useful to show people views at different times of the year as the sky can be lightened or darkened and the trees can appear with or without leaves. The number of viewpoints available is significantly larger; the models can show views from a particular resident's home or, for a hill walker, from the top of a hill.

One elected member would like to see these models used as standard. However, at one planning meeting planning officers and elected members suggested that there would be little confidence in using these as tools as there is no guidance to ensure they are compliant with a set standard.

### **Suggestions for standards**

There were comments, in seven professional and three resident responses, on the need for clear standards and examples of best practice:

- In respect of light and visibility.
- On the quality and type of visualisations.
- The need for truer interpretations.

### **Comments on visualisation types**

Seven respondents commented on different types of visualisations.

This included two respondents who talked about single frames; these are seen as being more representative in terms of scale. One of these professionals said "The single frame 75mm focal length image gives the best impression of the actual visual effect and is most easily understood by non-professionals".

Two professionals commented on ZTV maps: one said these were essential while another wanted them reduced to cover a smaller area to provide more detail. At one of the exhibitions two respondents, who enjoyed hill walking, said that they liked the ZTV map as they said they knew the area well and could picture a lot of the area in their mind's eye; they felt that the ZTV map would be useful to walkers.

One respondent commented that the wireframe is "best at the scale and context across a wider landscape" while another described them as "essential". Another, however, suggested that photowires would be preferable.

### **The need for standardisation**

Four professionals commented on the need for standardisation. One of these professionals suggested a “standard check list to make sure visualisations are produced properly i.e. appropriate camera type and lens etc”. Another suggested a standard approach “to provide close, intermediate, and distant views of representative views and impacts.”

Another professional respondent commented on the need to standardise requirements across relevant bodies; specifically, Highland Council and SNH.

One exhibition attendee, a local resident who is supportive of wind farm developments and has invested in a wind farm co-operative, suggested that the same lens should be used for all images so there is similarity across all. He did not understand why different photomontages use different distances from the turbines.

### **Comments on the revised guidance**

Eight professionals commented on the revised guidance.

One said they had seen recent visualisations created using the revised guidance. They felt the A1 versions were much easier to use in the office but were concerned the size would make them cumbersome to take on a site visit. This respondent said: “In discussion with the consultant we both felt that they would be an asset for decision makers and communities for hard to reach viewpoints, however care needs to be taken that the A1s don't lead to fewer site based evaluations of planning applications. From my experience with the new style visuals I think that following the new SNH guidance with a review after an initial settling-in period would improve visuals.”

There were comments supporting the revised guidance and one professional said that removing the requirement for a specific viewing distance would be helpful.

Another commented: “With all that in mind, the latest advice on visualisations seems to represent a good, pragmatic approach and should encourage more consistency, especially in helping to judge scale and context. A bit more advice on trying to show appropriate weather conditions / lighting / colour / contrast might be helpful”.

Three commented on the panoramic or digital viewer; two saw these as beneficial while the other felt there would be a need for improved hardware: “a better quality Apple-style backlit LED screen, or even an ipad with retina display, would be needed to enable visuals, especially wirelines, which are essential, to be easily read.”

Developers also commented on the new guidance; there was a feeling that although some additional work is required the end result is worth it. In particular they felt that the resultant photomontages and panoramas with wirelines were much improved.

### **Other comments**

Two professionals commented on the need for more emphasis on print quality, including higher quality photographic paper. “Too often there are decent enough visuals but poor printing”.

One professional wanted to see “options for darker turbine colours in sensitive locations” while two residents suggested that wind farms should be painted to blend with the countryside.

One professional said the existing visualisations are fit for purpose and two commented on visualisations that they have found to be particularly useful; two were specific: one who found transparencies helpful and the other who commented on the usefulness of: "Clear plans showing each VP position with clear 1:50k OS underlay and ZTV info". Six residents commented that they are happy with what is available

There was some concern, from online resident respondents and exhibition attendees, that visualisations do not adequately represent cumulative impact; and the issue of how to show this when there are developments proposed but not yet approved.

Residents and attendees saw the need for developers to ensure they conduct full consultation with local residents; although a number of attendees did comment on the responsiveness and helpfulness of the developers. Many of those attending the exhibitions felt that the opportunity to talk to and question developers was very important.

There were negative comments on wind farms in general from both exhibition attendees and from residents.

Other comments from the online resident survey included:

- That visualisations should include a known landmark to better show scale / other comments on need to give a better idea of scale (3 residents)
- That there needs to be some way to show the impact when they are moving / the noise made (2 residents)
- Need for simpler visualisations (2 residents)

Other comments from those who attended wind farm exhibitions included:

- Concerns over land designation and definition, especially land considered wild by locals but not designated as such.
- Concerns over the impact on local infrastructure and about the additional infrastructure that will be required to build and service a development. One attendee, living very close to a proposed development, suggested an overlay view on the map that includes the infrastructure that will need to be created for the development e.g. access roads and any buildings that will have to be erected and the concrete bases for the turbines etc. He felt these should be included on any visualisations to show the big picture.
- Queries over why turbines are built and then turned off.
- Assumptions that developments will go ahead regardless of the wishes of the local communities.

### **Comments on other guidance or wind farm planning in general**

Other comments made during discussions or in responses to the online surveys did not relate directly to the visualisation guidance.

One professional commented that "the requirement to provide visualisations for smaller developments can be a constraint for domestic micro generation proposals where the applicants do not have suitable access to resources".

There was some concern from developers that planning guidance issued by SNH is not consistent across officers and is not consistent with guidance given by others such as SEPA or local authority planning officers. Developers would like to see a named person at SNH dealing with a development at all stages. Some felt that a face to face meeting with all involved, held at the earliest possible stage, would be beneficial to all parties.

## APPENDIX: THE QUESTIONNAIRES

### Online survey amongst members of the general public

Please be assured all questionnaires will be treated in complete confidence. No personal information you disclose will be given to any other organisation and reports published will not identify the individuals who have taken part in the survey. All submitted questionnaires will be treated in confidence in compliance with the Data Protection Act. This survey has been commissioned by Scottish Natural Heritage (SNH).

A small number of questions require an answer to allow us to look for differences or commonalities across different types of respondents. These questions are marked \*\*\*

Q1. Are you aware of a recent wind farm development proposal in your area?

1	Yes	ASK Q2
2	No	THANK AND CLOSE

ALL CODED 1 at Q1

Q2. Did you see any photos, drawings or maps showing how the proposed development would look in the local landscape once it was built?

1	Yes	
2	No	THANK AND CLOSE

ASK ALL CODED 1 at Q2

Q3a. Please write in the name of the proposed wind farm development (If you've attended meetings, or seen information about more than one, please write in the name of the most recent).

Please answer the remaining questions thinking about this particular development

--



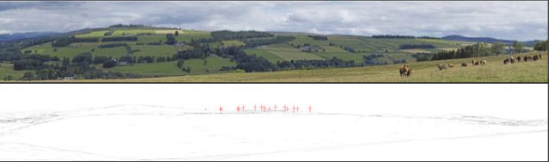
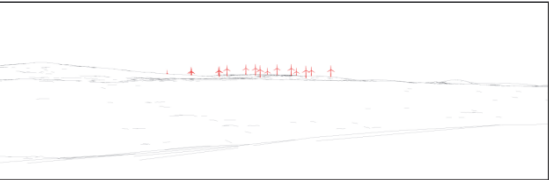
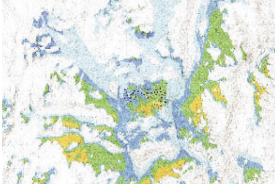
Q3b. Has this wind farm already been built?

1	Yes	
2	It is under construction	
3	No	

The photos and line drawings which are used to show how a wind farm development will look once it is built are called 'visualisations'.

### Examples of visualisations

These are examples of the types of visualisations you might have seen.

	<p>A panoramic photomontage</p> <p>A photomontage combines a photograph of the real view with a computer generated image of the wind farm proposal.</p>
	<p>A single frame photomontage</p> <p>A single frame photomontage is derived from a single photograph. A panoramic photomontage involves stitching several photos together.</p>
	<p>A baseline panoramic photograph and wireline.</p> <p>These show the existing view and a matching wireline with the wind farm proposal(s)</p>
	<p>A wireline</p> <p>A wireline is a computer generated image depicting how the wind farm would look with no surface screening or vegetation.</p>
	<p>A zone of theoretical visibility (ZTV) map</p> <p>A ZTV map shows where it might be possible to see the wind farm, depending on screening such as buildings and vegetation</p>

This survey is being conducted on behalf of Scottish Natural Heritage to find out how people use visualisations.

Q4. Did you look at the visualisations of the proposed wind farm development that were available at the exhibition/meeting? \*\*\*

1	Yes	
2	No	

Q5. Please say which of the following visualisations you saw?

PLEASE TICK ALL THAT APPLY

1	A panoramic photomontage	
2	A single frame photomontage	
3	A baseline panorama photograph and wireline	
4	A wireline	
5	A zone of theoretical visibility (ZTV) map	
6	Other (write in)	
7	None of the above	THANK AND CLOSE
8	Don't know	THANK AND CLOSE

Q6. Did you view the visualisations as a hard copy or digital copy?

1	Hard copy
2	Digital copy
3	Both

Q7a. Did the visualisations meet your needs?

1	Yes
2	No

IF NO

Q7b. Please tell us why the visualisations did not meet your needs

--

Q8a. Did you find the visualisations easy to use?

1	Yes
2	No

IF NO

Q8b. Please tell us why the visualisations were not easy to use

--

Q9. Did you refer to the viewing instructions on the visualisations?

1	Yes
2	I saw the instructions but did not use them
3	I didn't see any instructions

Q10a. Did you view any of the images online?

1	Yes
2	No

IF YES

Q10b. Were they easy to download?

1	Yes
2	No



Q10c. Were the instructions on how to use them clear?

1	Yes
2	No they weren't clear
3	I didn't see any instructions

Q10d. Were they easy to use?

1	Yes
2	No

IF NO

Q10e. Please tell us why the online visualisations were not easy to use

--

Q11a. Did you print any copies of the visualisations for your own use?

1	Yes
2	No

IF YES

Q11b. What size did you print them?

PLEASE TICK ALL THAT APPLY

1	Fit to page
2	Just hit print and let the computer decide
3	At the size specified on the image
4	A4
5	A3

Q11c. Did you print them off in colour or black and white?

1	Colour
2	Black and white
3	Both

ASK ALL

Q12a. Did you visit any of the sites indicated on the visualisations to see the actual view?

1	Yes
2	No

If YES

Q12b. Why did you visit the site?

1	It's somewhere I visit regularly
2	I went specifically to see how the actual view compared to the photograph
3	Other reason (please write in)

IF YES

Q12c. Did you take a copy of the visualisation with you?

1	Yes
2	No

IF YES

Q12d. How easy did you find it to match the actual view with the view in the visualisation?

1	Very easy
2	Quite easy
3	Not very easy
4	Not at all easy

IF YES

Q12e. Were the instructions provided with the visualisation easy to follow?

1	Yes
2	No

IF YES

Q12f. Was the visualisation an accurate representation of the actual view of the landscape?

1	Yes
2	No

Q13a. Which ONE type of visualisation do you think is the most useful?

PLEASE SELECT ONE ONLY

1	A panoramic photomontage
2	A single frame photomontage
3	A baseline panorama photograph and wireline
4	A wireline
5	A zone of theoretical visibility (ZTV) map
6	Other (write in)
7	None of them
8	Don't know

Q13b. Which other types of visualisation are useful?

PLEASE SELECT ALL THAT APPLY

1	A panoramic photomontage
2	A single frame photomontage
3	A baseline panorama photograph and wireline
4	A wireline
5	A zone of theoretical visibility (ZTV) map
6	Other (write in)
7	None of them
8	Don't know

Q14 Do you think it is important that the visualisations provide wider landscape and visual context ?

1	Yes
2	No
3	Don't know

Q15. Do you have any suggestions on how wind farm visualisations could be improved?

--

## Professionals

This survey is for Planning staff and SNH staff who may look at wind farm visualisations in the course of their work.

SNH has commissioned Why Research to conduct research on the way in which people use wind farm visualisations. The purpose of the research is to examine how visualisations are used in practice by members of the public and decision makers. It is not intended to 'test' the visualisations submitted on a specific application. It is to help SNH to understand how visualisations are actually used in practice.

Please be assured all questionnaires will be treated in complete confidence. No personal information you disclose will be given to any other organisation and reports published will not identify the individuals who have taken part in the survey. All submitted questionnaires will be treated in confidence in compliance with the Data Protection Act.

**The survey should take around 5 minutes to complete.**

Q1. Are you ...?

1	SNH staff
2	Planning officer
3	Other (please write in)

Q2. Have you been involved in any work related to wind farm developments in the past 2 years?

1	Yes	ASK Q3
2	No	THANK AND CLOSE

Q3. Have you viewed any visualisations relating to wind farm developments?

1	Yes	ASK Q4
2	No	THANK AND CLOSE

Q4. Please write in the name of the most recent wind farm development that you have viewed visualisations of.

Please answer all remaining questions in relation to your experiences with visualisations for this development.

--

Q5a. Please say which of the following visualisations you saw?  
PLEASE TICK ALL THAT APPLY

1	A panoramic photomontage (combining a photograph of the real view with a computer generated image of the wind farm proposal).	
2	A single frame photomontage (derived from a single photograph).	
3	A baseline panorama photograph and wireline (showing the existing view and a matching wireline with the wind farm proposal(s)).	
4	A wireline (a computer generated image depicting how the wind farm would look with no surface screening or vegetation).	
5	A zone of theoretical visibility (ZTV) map (showing where it might be possible to see the wind farm, depending on screening such as buildings and vegetation).	
6	Other	
7	None of the above	THANK AND CLOSE
8	Don't know	THANK AND CLOSE

Q5b. Did the developer provide copies of visualisations for the wind farm development?

1	Yes – they sent hard copies
2	Yes – they sent electronic copies
3	Yes – they send both hard copy and electronic copies
4	No

IF No

Q5c. How did you get copies of the visualisations?  
Please write in

--

FOR THOSE WHO SAID DEVELOPER SENT HARD COPIES

Q5d. Did you receive sufficient copies?

1	Yes
2	No – I had to photocopy more
3	No – I had to request more

FOR THOSE WHO PHOTOCOPIED

Q5e. What size did you copy them?

PLEASE TICK ALL THAT APPLY

1	At the size specified on the image
2	A4
3	A3
4	Other

Q5f. Did you copy them in colour or black and white?

1	Colour
2	Black and white
3	Both

FOR THOSE WHO SAID DEVELOPER SENT ELECTRONIC COPIES  
Q5g. Did you print any copies of the electronic visualisations?

1	Yes
2	No

IF YES

Q5h. What size did you print them?

PLEASE TICK ALL THAT APPLY

1	Fit to page
2	Just hit print and let the computer decide
3	At the size specified on the image
4	A4
5	A3
6	Other

Q5i. Did you print them off in colour or black and white?

1	Colour
2	Black and white
3	Both

ASK ALL

Q5j. What would be your preference for receiving visualisations?

1	Hard copies
2	Electronic copies
3	Both hard copy and electronic copies

ASK ALL

Q6a. Did the visualisations meet your needs?

1	Yes
2	No

IF NO

Q6b. Please tell us why the visualisations did not meet your needs

--

ASK ALL

Q7a. Did you find the visualisations easy to use?

1	Yes
2	No

IF NO

Q7b. Please tell us why the visualisations were not easy to use

--

ASK ALL

Q8. Did you refer to the viewing instructions on the visualisations?

1	Yes
2	I saw the instructions but did not use them
3	I didn't see any instructions

Q9a. Did you view any of the images online?

1	Yes
2	No

IF YES

Q9b. Were they easy to download?

1	Yes
2	No

IF YES

Q9c. Were the instructions on how to use them clear?

1	Yes
2	No they weren't clear
3	I didn't see any instructions

IF YES

Q9d. Were they easy to use?

1	Yes
2	No

IF NO

Q9e. Please tell us why the online visualisations were not easy to use

--

ASK THOSE WHO VIEWED ONLINE

Q10a. Did you print any copies of the visualisations for your own use?

1	Yes
2	No

IF YES

Q10b. What size did you print them?

PLEASE TICK ALL THAT APPLY

1	Fit to page
2	Just hit print and let the computer decide
3	At the size specified on the image
4	A4
5	A3

Q10c. Did you print them off in colour or black and white?

1	Colour
2	Black and white
3	Both

ASK ALL

Q11a. Did you visit any of the sites indicated on the visualisations to see the actual view?

1	Yes
2	No

IF YES

Q11b. How easy did you find it to match the actual view with the view in the visualisation?

1	Very easy
2	Quite easy
3	Not very easy
4	Not at all easy

IF YES

Q11c. Were the instructions provided with the visualisation easy to follow?

1	Yes
2	No

IF YES

Q11d. Was the visualisation an accurate representation of the actual view of the landscape?

1	Yes
2	No

Q12a. Which ONE type of visualisation do you think is the most useful?

PLEASE SELECT ONE ONLY

1	A panoramic photomontage
2	A single frame photomontage
3	A baseline panorama photograph and wireline
4	A wireline
5	A zone of theoretical visibility (ZTV) map
6	Other (write in)
7	None of them
8	Don't know

Q12b. Which other types of visualisation are useful?

PLEASE SELECT ALL THAT APPLY

1	A panoramic photomontage
2	A single frame photomontage
3	A baseline panorama photograph and wireline
4	A wireline
5	A zone of theoretical visibility (ZTV) map
6	Other (write in)
7	None of them
8	Don't know

Q13 Do you think it is important that the visualisations provide the wider landscape and visual context ?

1	Yes
2	No

Q14. Do you have any suggestions on how wind farm visualisations could be improved?

--



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**Dualchas Nàdair na h-Alba**

All of nature for all of Scotland  
Nàdar air fad airson Alba air fad