CASE STUDIES FOR EVALUATING PHOTOSIMULATIONS FOR VISUAL IMPACT ASSESSMENT

Principle

Focal length and horizontal angle of view

Statement

The simulation photograph should be taken with a "normal" lens (50mm effective focal length), which has a horizontal angle of view of approximately 40°.

Explanation

A photosimulation should be prepared so that when a person holds it in a comfortable manner the project elements are scaled as they would be if seen at the viewpoint. Said another way, the viewer should hold the photosimulations so that if it was printed on clear plastic the landscape features would all line up (i.e., it is in the perspective picture plane). For instance, when a person holds a letter sized sheet of paper it is commonly held at comfortable book-reading length — 14± inches; a tabloid sheet of paper is held at arm's length — 20± inches.

The camera sensor and focal length of the lens used to photograph the view determines its horizontal angle of view (HAoV). Because many different sized sensors are used, it has become common to describe the lens' effective focal length (EFL) or the focal length on a 35mm film camera that would have the same HAoV. Table 1 gives the appropriate viewing distance for photographs printed in landscape mode on letter (10 inch wide) and tabloid (16 inch wide) sheets for selected effective focal lengths and their horizontal angle of view. The viewing distances for photographs taken with a 50 mm EFL are most comparable with comfortable reading lengths. This indicates that a photograph — or photosimulation — will most likely be viewed at the appropriate distance.

TABLE 1. Viewing distance for photographs printed on letter and tabloid sheets for selected equivalent focal lengths and horizontal angle of views.

		VIEWING DISTANCE	
EFL	**HAoV**	**10 in width**	**16 in width**
28mm	65.5°	7.8	12.4
50mm	39.6°	13.9	22.2
75mm	27.0°	20.8	33.3
85mm	23.9°	23.6	37.8

Case Study. View of Pisgah Mountain Wind from Eagle Bluff

Silver Maple Wind is a five turbine 20 MW expansion project that will visually appear to be part of the existing five turbine 9 MW Pisgah Mountain Wind project. The photograph in Figure 2 shows the existing Pisgah Mountain Wind turbines from Eagle Bluff. It was included in the Silver Maple Wind VIA to show the existing condition and was used as the base-photograph for a simulation.

The photograph from Eagle Bluff was taken with an iPhone 8 Plus and has an EFL of 28mm. Figure 1 is an aerial photograph that shows the horizontal angle of view for this photograph in orange. Figure 3 crops this photograph to an area equivalent to a photograph taken by a 50mm EFL lens and its horizontal angle of view is represented by the white lines in Figure 1.

Discussion

The use of a 28mm EFL lens for a base-photograph has the effect of minimizing the scale of the wind turbines. As shown in Table 1, if Figure 2 is printed as formatted on letter-sized paper it would need to be held approximately 7.5 inches from the eyes — an uncomfortable distance. The viewing distance if printed on tabloid paper is similarly uncomfortable. However, if Figure 3 is printed as formatted on letter-sized paper it would be held at a comfortable reading distance — approximately 13 inches — and the wind turbines would be represented at the appropriate visual scale.

This geometry is the reason that simulation photography should be taken with a 50mm EFL, the so called "normal" lens. It is not "normal" because it most closely represents the focal length of the eye — it does not, since the eye is a very different visual system than a camera and lens. It is best professional practice to use a "normal" lens because it results in a photograph that is most natural and comfortable for us to hold at the appropriate distance when printed on standard media.

FIGURE 1. An aerial photograph showing the horizontal angle of view for Figure 2 in orange and Figure 3 in white.

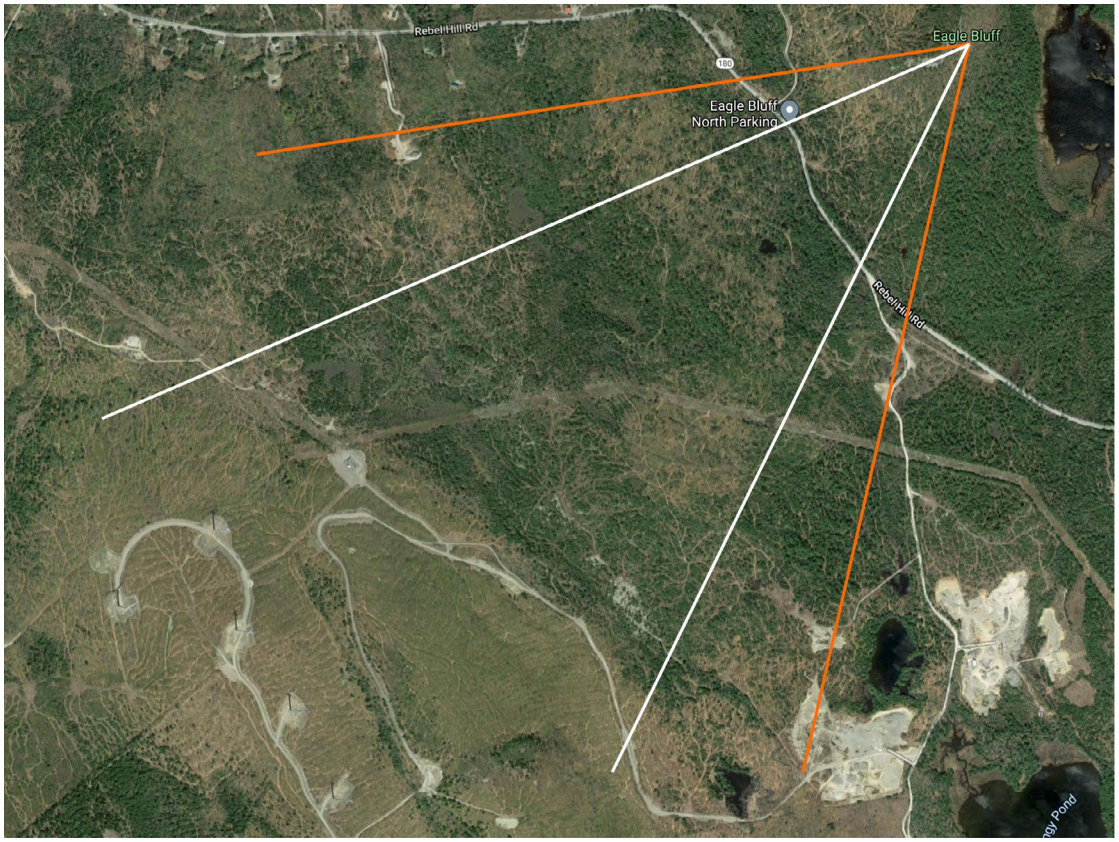

FIGURE 2. A photograph of the Pisgah Mountain Wind project from Eagle Bluff taken with a 28mm EFL.



FIGURE 3. A photograph of the Pisgah Mountain Wind project from Eagle Bluff taken with a 50mm EFL.



Statement of Limitations: The simulations presented here were entered into the public record as part of a permitting process. They were prepared to be printed on 11-by-17-inch paper. However, in the process of distribution as PDFs they may have been substantially compressed. The figures presented here were clipped from these PDFs, converted to high quality JPGs and their resolution reduced. The original photosimulation has been substantially changed and as presented here should be used only as learning material.

Source: The figures used in this case study are taken from materials submitted to the Maine Department of Environmental Protection.