

The Use of Computer Graphics in the Visual Analysis of the Proposed Sunshine Ski Area Expansion¹

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Abstract: This paper describes the use of computer graphics in designing part of the Sunshine Ski Area in Banff National Park. The program used was capable of generating perspective landscape drawings from a number of different viewpoints. This allowed managers to predict, and subsequently reduce, the adverse visual impacts of ski-run development. Computer graphics have proven, in this case, to be an effective and economical tool in ski-area design.

BACKGROUND

In 1977, the Sunshine Village resort was given permission by Parks Canada to proceed with an expansion plan for the Sunshine Ski Area. This expansion was to include a new gondola, several new ski runs and numerous visitor facilities. Prior to construction, however, a working plan was required that would minimize adverse environmental impacts resulting from the new developments. Of these, the effects of expansion on the visual resource were considered by all to be of utmost importance. This becomes apparent when one realizes that summer use of the area is increasing rapidly due to the availability of all season facilities (fig. 2). Furthermore, most of the area to be developed is visible from the village as well as from numerous hiking trails, the most notable of which is the Egypt Lake - Mt. Assiniboine trail corridor (fig. 3). With these considerations in mind, it was decided that the most effective

means of assessing and reducing visual impacts should be applied to this area, and the use of computer graphics as a predictive analysis tool was determined to be appropriate. This technique has previously been applied to timber harvesting and hydro line design, but the Sunshine project would be its first application to the more detailed needs of ski area development.

PROJECT SUMMARY

The initial step of this particular project was to outline the proposed expansion area on a 1" to 200' topographic map (fig. 1). Once this was completed, the map contours and appropriate vegetation data (obtained from air photos and on-site observations) were digitized and incorporated into the PREVIEW computer graphics system developed by Wager and Myklestad (1976) recently modified by Angelo (fig. 4).

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Following this, locations of both runs and lifts were chosen as to their suitability for skiing, and then delineated on the topographic map. Coordinates of the clearings were added to the existing data base and graphic drawings illustrating perspective views from selected vantage points were produced.

These drawings were carefully reviewed as they allowed managers to predict the visual impact of the proposed expansion project. During this analysis, those areas where impacts were considered to be unacceptable were designated, and new treatments (i.e.,

glading, reduced clearing widths, feathering of edges, etc.) were prescribed. After several computer runs, an acceptable visual management plan was obtained (figs. 4-11).

The cost of using computer graphics in this particular project was very reasonable, but it does tend to vary somewhat depending on the equipment. In this case, using an IBM 370 with calcomp plotter, each individual drawing was estimated to cost \$15-\$17. The initial digitizing of the topographic data was our only major expenditure costing approximately \$175 for a 4000' by 5000' area.

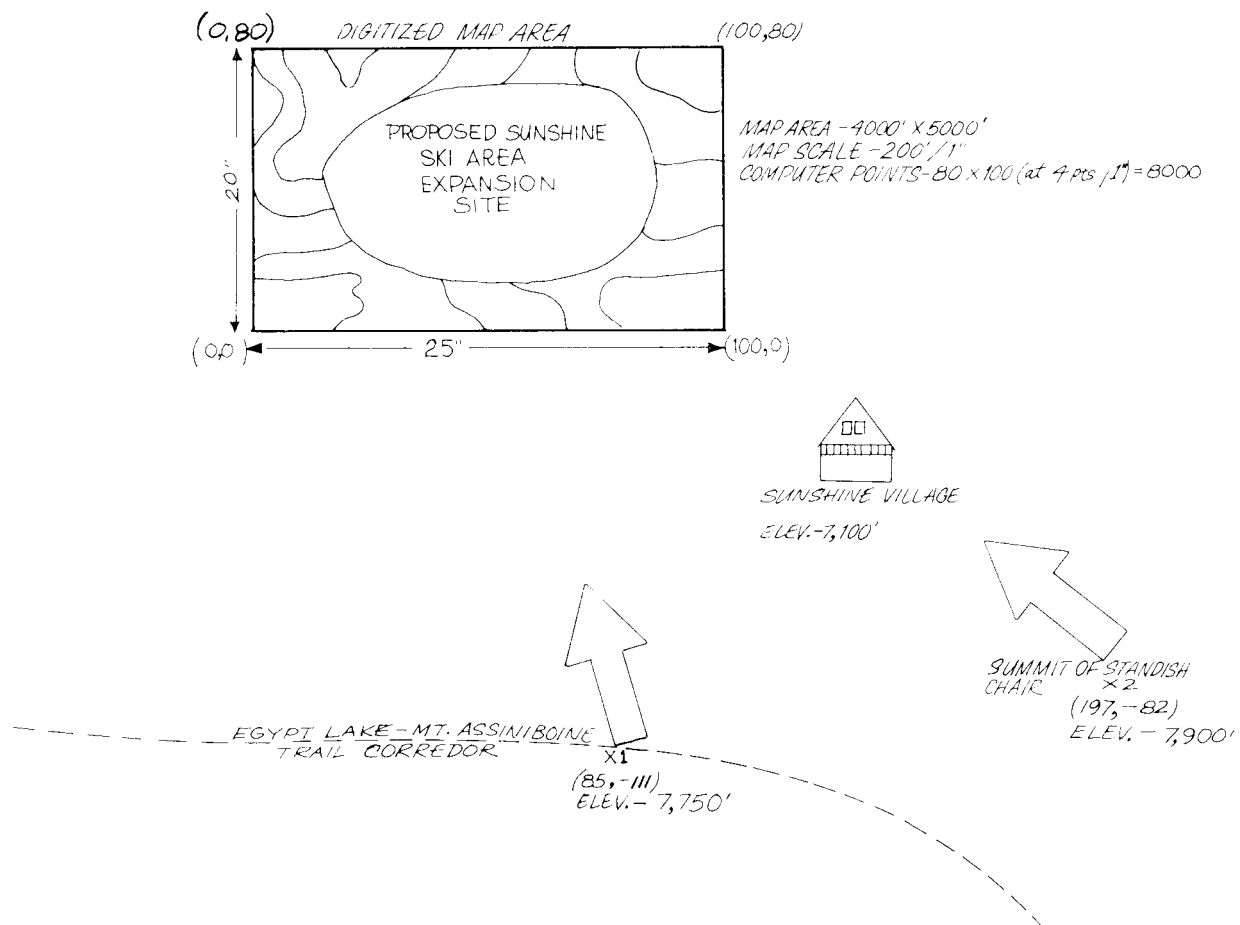


Figure 1. Perspective views of the proposed development were generated from points X1 and X2. These locations were not within the digitized map area and hence, elevations as well as the usual coordinate data had to be supplied.



Figure 2. This picture of the proposed expansion site (which encompasses the two large openings on the far ridge) was taken from the top of the Standish Chairlift, which is becoming a very popular all season facility.



Figure 3. This is a view of the same area from a point along the popular Egypt Lake - Mt. Assiniboine trail corridor on Wawa Ridge.

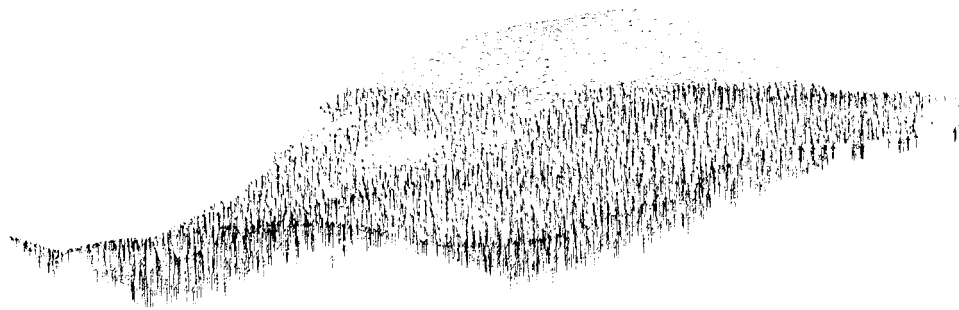


Figure 4. The incorporation of vegetation data into PREVIEW (as seen in this cover drawing of the expansion site from Mr. Standish) did prove to be a slightly repetitive procedure. The original program required that an entire area be designated as one vegetation type on a 2-A card, and any corrections (i.e., different cover symbols, varying densities, etc.) were then added on 2-B cards. This process was later modified so that additional 2-A cards could be used thus enabling program users to designate changing surface or cover types more rapidly.

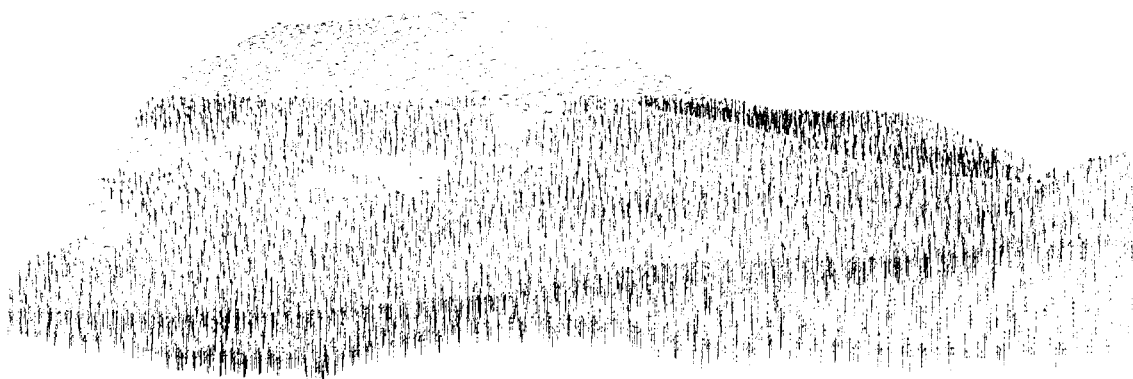


Figure 5. In this vegetative cover drawing from Wawa Ridge, the author attempted to include several areas that were outside the boundaries of the original digitized map area. This was accomplished by digitizing the adjacent area, and then overlapping the two drawings. The darker section in the upper right corner of this particular graphic is part of the second drawing.

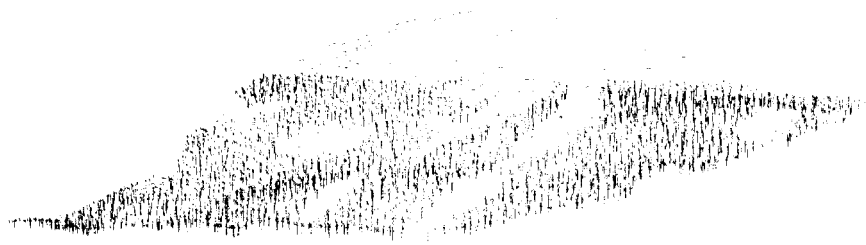


Figure 6. This graphic illustrates how one of the more popular extension proposals would appear to visitors on top of Mt. Standish. Visual impacts were still not totally acceptable however, and further modifications were required.

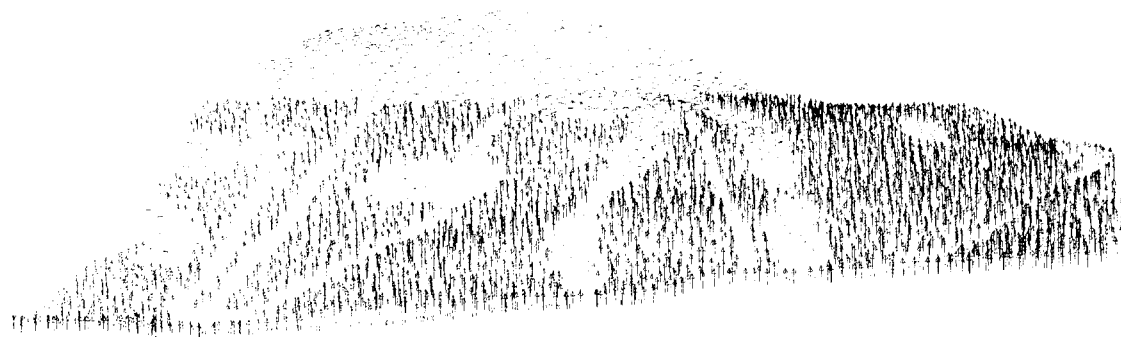


Figure 7. The proposal referred to in Figure 6 would appear this way to hikers on part of the Egypt Lake - Mt. Assiniboine trail.

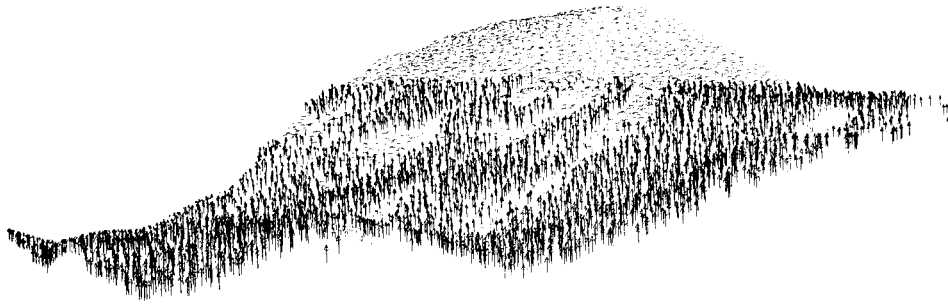


Figure 8. After several modifications, a final proposal was accepted in which adverse visual impacts were reduced through glading, feathering of edges, reduced clearing widths at selected locations, and the protection of vegetation between towers. It should be noted that the forest communities existing on the site (i.e. all-aged stands of larch-fir and spruce-fir) were conducive to these treatments.

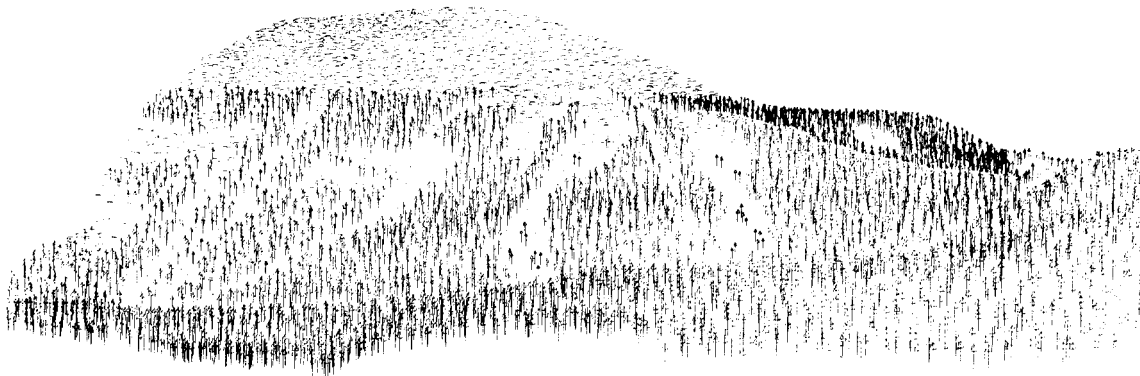


Figure 9. Despite attempts to conceal certain openings, some runs remain easily seen from parts of the trail. Yet, negative impacts on the landscape will be minimized through the use of helicopters (for both logging and construction), over-the-snow removal of debris, and selected seeding where necessary.

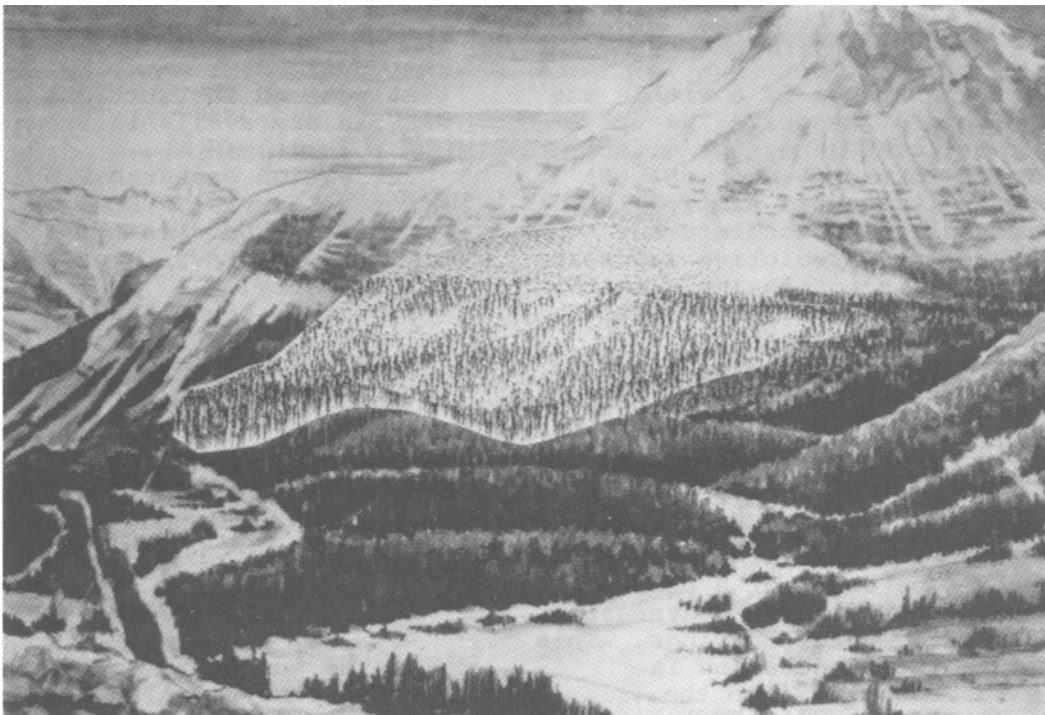


Figure 10. Graphics illustrating run location were placed within an artist's sketch of the surrounding landscape so that managers could more accurately predict the visual impacts of development.

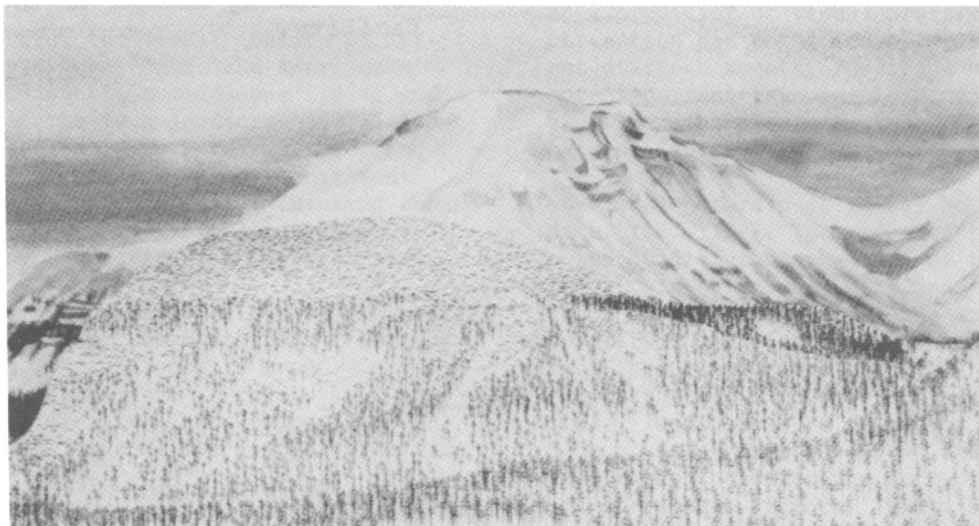


Figure 11. See Figure 10.

CONCLUSION

Computer graphics is a viable and economic method of assessing visual impacts of selected landscape alterations. Prior to the development of this technique, managers simply did not have access to an accurate and efficient means of predictive landscape analysis. This is not to imply that computer models are the only solution to landscape analysis problems, but if access to suitable equipment can be obtained, programs like PREVIEW can allow the manager to generate a number of perspective views in a very short period of time.

Despite its effectiveness however, users of this, and similar computer systems should be aware of a problem that may be encountered when assessing the quality of computer drawings. This stems from the way vegetation is initially incorporated into the program. Simply stated, vegetation symbols used in PREVIEW are randomly spaced around selected points, and sometimes, visual impacts don't appear as harsh on the graphic model as they may appear on the ground. Yet, if small scale drawings are used in conjunction with photographs, maps, and on-site observations, this effect can easily be minimized.

Listings and instructions for using PREVIEW are available from:

Recreation Research Project,
Forest Service, USDA,
c/o State University of New York,
College of Environmental Science
& Forestry,
Syracuse, New York
13201

LITERATURE CITED

Myklestad, Erik and J. Alan Wager, 1976.
PREVIEW: Computer assistance for visual
management of forested landscapes. USDA
For. Serv. Northeast For. Exp. Stn.,
Upper Darby, Pa. 12 p., illus.

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