Appendix C

Updated Viewshed Technical Summary

VIEWSHED TECHNICAL SUMMARY

SKYLINE AGGREGATES
LASSEN COUNTY, CALIFORNIA

Prepared for

TLT Enterprises LLC

Prepared by

VESTRA Resources Inc.
5300 Aviation Drive
Redding, California 96002

MAY 2023
UPDATED DECEMBER 2025

VIEWSHED TECHNICAL SUMMARY

SKYLINE AGGREGATES
LASSEN COUNTY, CALIFORNIA

Prepared for

TLT Enterprises LLC

Prepared by

VESTRA Resources Inc.
5300 Aviation Drive
Redding, California 96002

71305

MAY 2023
UPDATED DECEMBER 2025

TABLE OF CONTENTS

SECTION

TABLE

FIGURES

1.0 INTRODUCTION

1.1 Background

The project site is located northeast of the city of Susanville and is situated approximately 0.3 miles east of Highway 139 and 0.7 miles northeast of Highway 36. The general site location is shown on Figure 1. The existing visual character of the site vicinity is that of high desert shrubland. Topography in Susanville area is sloped toward the Susan River, which transects the town.

This visual analysis is provided for CEQA review of the proposed mining operations and was conducted to present the change in visual quality associated with the project.

1.2 Project Area

The proposed mining operations will include excavation and processing of aggregate on a portion of an approximately 640-acre site located roughly 0.30 miles northeast of the City of Susanville, California. Approximately 460 acres of the project site will be directly affected by active mining operations, which will occur over forty years. No scenic highways or rivers are located in the project vicinity. The general site layout is shown on Figure 2.

During construction season, the site will operate 24 hours a day for 150 days to meet construction demand and Caltrans requirements for nighttime work.

The proposed activities include operation of a surface mine and sorting and processing of aggregate materials onsite. Initial activities include exploratory drilling at selected locations onsite to determine locations where future mining will take place within portions of the site. This area is projected to yield approximately sixteen million tons of material. The rate of mining will be governed by the market demands and local competition but will be a maximum of 10,000 tons per day.

The final configuration of the land following reclamation will depend on the conditions during the mining operation and the available amount of overburden. Once slopes are reclaimed to a stable configuration, the disturbed areas will be re-vegetated with native plant species to restore the Open Space and Agriculture Reserve. The site revegetation plan is designed to provide for the creation of high-quality wildlife habitat that is representative of the character of the surrounding areas and of the property.

1.3 Current Condition

The current visual condition of the site is undeveloped open space. Vegetation is sparse due to the nature of the geology and soils in the area as well as agricultural practices including grazing. This lack of vegetation is part of the current view.

2.0 VISUAL SIMULATION ANALYSIS

2.1 Process

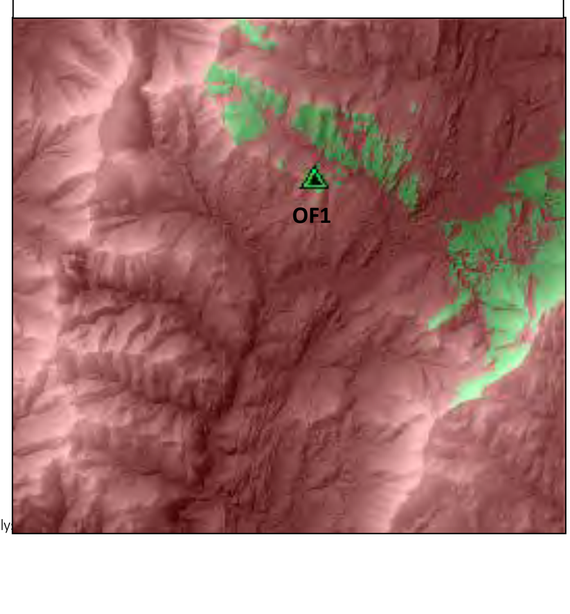
The shape of a terrain surface affects which portions of the surface area can be seen from any given point. To assess the visual components of this project, Geographic Information Systems (GIS) was used to evaluate visibility across the project area from various locations. GIS is a collection of computer hardware, software, and geographic data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. ArcGIS is a Geographic Information System package developed by Environmental Systems Research Institute (ESRI).

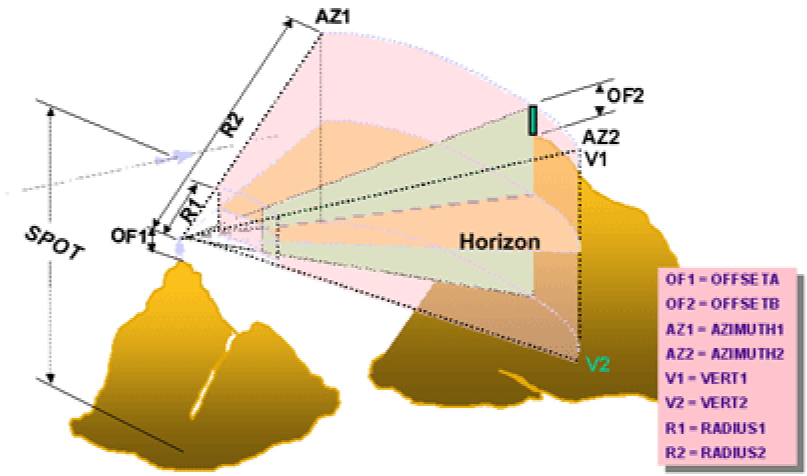
A viewshed identifies the locations in a given area that can be seen from one or more observation points. The elevation data used to perform viewshed analyses are raster-based data. Raster data is data in which a surface is divided into a grid and each cell in the grid contains an elevation value. The resolution of raster data is the distance, in surface units, of the sides of each cell in the grid. An example of this is the elevation data provided by the U.S. Geological Survey (USGS) for use in GIS. These data sets are commonly provided at either a 10-meter or 30-meter resolution. Viewshed analysis provides a value that indicates how many observer points can be seen from each location. If you have only one observer point, each cell from which the observer point can be seen is given a value of one. All cells from which the observer point cannot be seen are given a value of zero. Observer points can be points or linear features.

A viewshed is useful when you want to know how visible objects might be. Not only can you determine which cells can be seen from the observation point, if you have several observation points, you can also determine which observers can see each observed location. Knowing which observer can see which locations can affect decision making.

The image below graphically depicts how a viewshed analysis is performed. The observation point is on the mountaintop to the left (at OF1 in the image). The direction of the viewshed is within the cone looking to the right. You can control how much to offset the observation point from the surface (for example, the height of the tower), and the direction(s) to look in both the horizontal and vertical dimensions.

Displaying a hillshade underneath the elevation and the output from a Viewshed Analysis is a useful technique for visualizing the relationship between visibility and terrain.

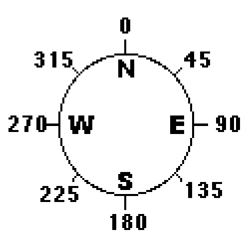




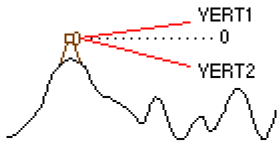
Nine characteristics of the viewshed are controlled as follow:

1. The surface elevations for the observation points (Spot)
2. The vertical distance in surface units to be added to the z-value of the observation points (OffsetA)
3. The vertical distance in surface units to add to the z-value of each cell as it is considered for visibility (OffsetB)

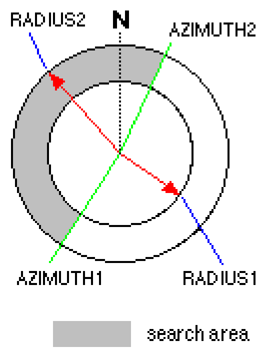
4. The start of the horizontal angle to limit the scan (Azimuth1)
5. The end of the horizontal angle to limit the scan (Azimuth2)



6. The top of the vertical angle to limit the scan (Vert1)
7. The bottom of the vertical angle to limit the scan (Vert2)



8. The inner radius that limits the search distance when identifying areas visible from each observation point (Radius1)
9. The outer radius that limits the search distance when identifying areas visible from each observation point (Radius2)



In order to perform a viewshed analysis, the elevation data should be as detailed as possible. For the Skyline project, the elevation data was derived from the USGS 10-meter digital elevation model (DEM) that is interpolated into a grid format.

Interpolation is a method of creating raster data specifically designed for the creation of hydrologically correct DEMs. It is based on the ANUDEM program developed by Michael Hutchinson (1988, 1989). See Hutchinson and Dowling (1991) for an example of a substantial application of ANUDEM and for additional associated references. A brief summary of ANUDEM and some applications are given in Hutchinson (1993). The version of ANUDEM used is 4.6.3.

The interpolation procedure has been designed to take advantage of the types of input data commonly available and the known characteristics of elevation surfaces. This method uses an iterative finite difference interpolation technique. It is optimized to have the computational efficiency of local interpolation methods, such as inverse distance weighted (IDW) interpolation, without losing the surface continuity of global interpolation methods, such as Kriging and Spline. It is essentially a discretized thin plate spline technique (Wahba, 1990), for which the roughness penalty has been modified to allow the fitted DEM to follow abrupt changes in terrain, such as streams and ridges. It is also the only ArcGIS interpolator specifically designed to work intelligently with contour inputs.

Contours are the most common method for storage and presentation of elevation information. Unfortunately, this method is also the most difficult to properly utilize with general interpolation techniques. The disadvantage lies in the undersampling of information between contours, especially in areas of low relief.

At the beginning of the interpolation process, ArcGIS uses information inherent to the contours to build a generalized drainage model. By identifying areas of local maximum curvature in each contour, the areas of steepest slope are identified and a network of streams and ridges is created (Hutchinson, 1988). This information is used to ensure proper hydrogeomorphic properties of the output DEM and can also be used to verify accuracy of the output DEM.

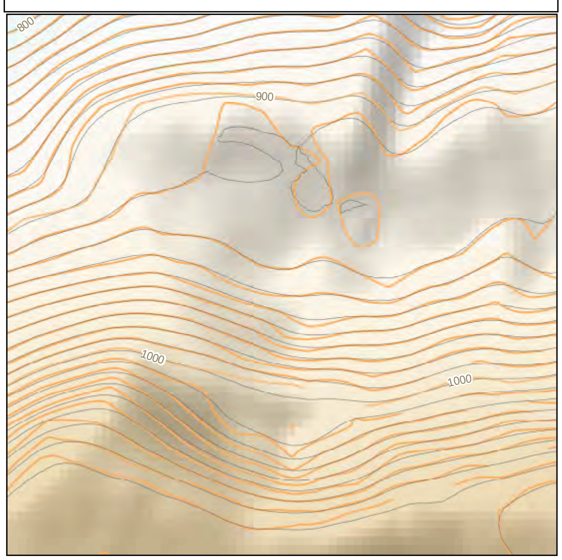
After the general morphology of the surface has been determined, contour data is also used in the interpolation of elevation values at each cell. When the contour data is used to interpolate elevation information, all contour data is read and generalized. A maximum of 50 data points are read from these contours within each cell. At the final resolution, only one critical point is used for each cell. For this reason, having a contour density with several contours crossing output cells is redundant.

Before using in a viewshed analysis, created surfaces should be evaluated to ensure that the data and parameters supplied to the program result in a realistic representation of the surface. There are many ways to evaluate the quality of an output surface, depending on the type of input available to create the surface.

The most common evaluation is to create contours from the new surface and compare them to the input contour data. It is best to create these new contours at one-half the original contour interval to examine the results between contours. Drawing the original contours and the newly created contours on top of one another can help identify interpolation errors.

In the example shown below, the contours created from the new surface are shown with the original 10-foot interval contour data for comparison (1:1,000 scale).

Original 10-foot interval contours compared to contours created from the new surface.



The comparison shows that the contours do differ in some areas, but the difference in this case is acceptable as the distance between the two sets of contour lines rarely exceeds 5 feet in length.

The product of the interpolation of the field survey contour data was the creation of 10-foot-resolution, hydrologically correct digital elevation model (DEM). It has been shown that there is a minor bias in the interpolation algorithm that causes the raster dataset to have slight variations from the input contours. This variation can result in a slight variation in the results when calculating the profile curvature of the output surface but is otherwise not noticeable, and does not affect the overall intended use in a viewshed analysis.

2.2 Observer Locations

The observer location points used in the viewshed analysis were determined using two observer points located at high and low site elevations. Using the viewshed analysis, the proposed mining operation was determined to be intermittently visible from areas along Highways 139, 36, and 295. These segment locations and proposed mining area are shown on Figure 4.

2.3 General Map Reference Data

A number of GIS data layers were obtained as reference data for the maps and figures created as a result of the viewshed analysis. Most of vector (linear) data layers are existing data sets from VESTRA's in-house GIS data catalog, which is a compilation of data from various federal, state, county, and municipal sources.

The primary display data layer of aerial imagery utilizes National Agriculture Imagery Program (NAIP) data. The NAIP acquires imagery during the agricultural growing seasons in the continental U.S. The 2018 NAIP imagery for Lassen County has a 50-centimeter ground sample distance (GSD) with a horizontal accuracy that matches within five meters of a reference ortho image.

3.0 VIEWSHED ANALYSIS RESULTS

The product of the viewshed analyses was the creation of 10-meter-resolution raster data layers showing visibility from two locations in the proposed mining area. This is from the proposed mining area outward (rather than from the outside looking inward toward the proposed mining area). The resulting projected data is shown on Figures 5 and 6. Table 1 shows the total linear feet from the viewshed analysis where the proposed mining area is visible from Highways 139, 36, and 395.

Table 1
VIEWSHED STATISTICS

Observation Location	Linear Feet of Highway 139	Linear Feet of Highway 36	Linear Feet of Highway 395
North Observation Point	12,610	27,750	12,756
South Observation Point	8,852	18,686	6,353

Using the viewshed analysis, the proposed mining operation was determined to be visible from three recreational areas as week as the grandstands at the Lassen County Fairgrounds. The recreational areas include Skyline Park (including the frisbee golf course), Skyline recreational trail, and Barry Reservoir. Figures 5 and 6 show the locations of the recreational areas and fairgrounds in relation to the proposed mining area.

In summary, the proposed mining area will be visible from portions of Highway 139, Highway 36, and Highway 395. The viewshed analysis also shows that three recreational areas and the grandstands at the fairgrounds will also be visible. This area is not subject to changes in vegetation as the vegetation at the proposed mining area is sparse. No state or federal scenic highways or rivers are located in the project vicinity. Lassen County's General Plan has designed the highways as scenic highways.

4.0 SUMMARY OF FINDINGS

To verify the results of the viewshed analysis, site visits were conducted on December 3 and 5, 2025, to collect photographs from three nearby recreational areas and the grandstands located at the Lassen County Fairgrounds that were found to be potentially impacted. Based on observations made during the site visit, the proposed mining area is not visible from Skyline Park, Skyline Recreational Trail, or Barry Reservoir. The construction of a berm and revegetation of disturbed ground around portions of the mining area will offer more protection to nearby scenic resources.

The proposed mining area was found to be visible during the site visit from the grandstands located at the fairgrounds. Impacts from cumulative lighting due to the proximity to Highway 139 and the Lassen County Fairgrounds were considered significant. To offset impacts, in addition to shielded lighting and use of natural materials with earth tone colors for structures and equipment, nighttime operations will be reduced for anticipated and scheduled events held at the fairgrounds.

5.0 REFERENCES

Goodchild, M. F. and D. M. Mark. 1987. The fractal nature of geographic phenomena. *Annals of Association of American Geographers*. 77 (2): 265-278.

Hutchinson, M.F. 1988. *Calculation of hydrologically sound digital elevation models*. Paper presented at Third International Symposium on Spatial Data Handling at Sydney, Australia.

-----. 1989. A new procedure for gridding elevation and stream line data with automatic removal of spurious pits. *Journal of Hydrology* 106: 211-232.

-----. 1993. Development of a continent-wide DEM with applications to terrain and climate analysis. In *Environmental Modeling with GIS*, ed. M. F. Goodchild et al., 392–399. New York: Oxford University Press.

-----. 1996. *A locally adaptive approach to the interpolation of digital elevation models*. In Proceedings, Third International Conference/Workshop on Integrating GIS and Environmental Modeling. Santa Barbara, CA: National Center for Geographic Information and Analysis. Available at : http://www.ncgia.ucsb.edu/conf/SANTA_FE_CD-ROM/sf_papers/hutchinson_michael_dem/local.html

----- and Dowling, T. I. 1991. A continental hydrological assessment of a new grid-based digital elevation model of Australia. *Hydrological Processes* 5: 45-58.

Wahba, G. 1990. *Spline models for Observational data*. Paper presented at CBMS-NSF Regional Conference Series in Applied Mathematics. Philadelphia: Soc. Ind. Appl. Maths.

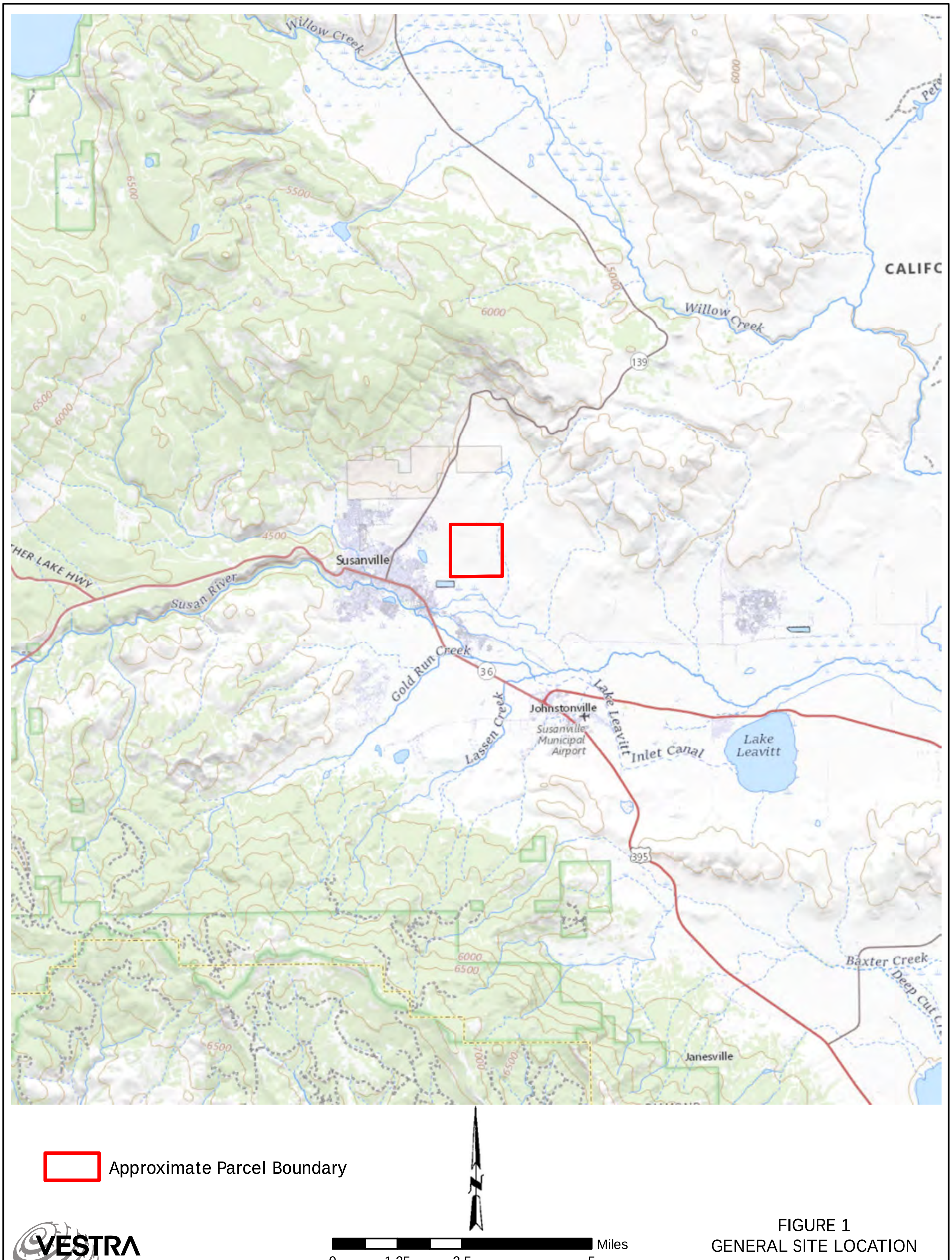
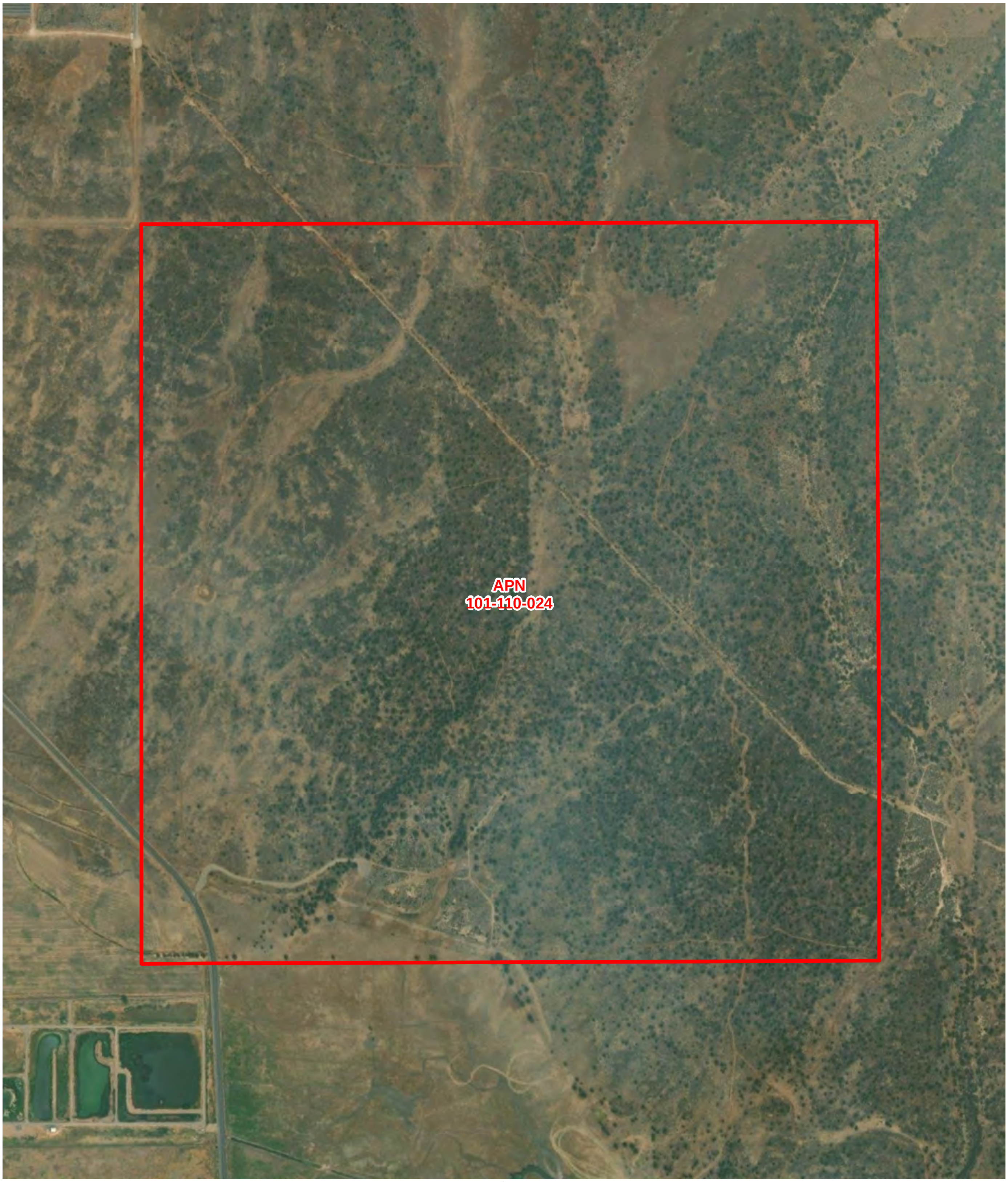


FIGURE 1
GENERAL SITE LOCATION
SKYLINE AGGREGATES
LASSEN COUNTY, CALIFORNIA

P:\GIS\71305\Skyline\Figures\Viewshed\71305_GeneralSiteLocation.mxd



Approximate Parcel Boundary

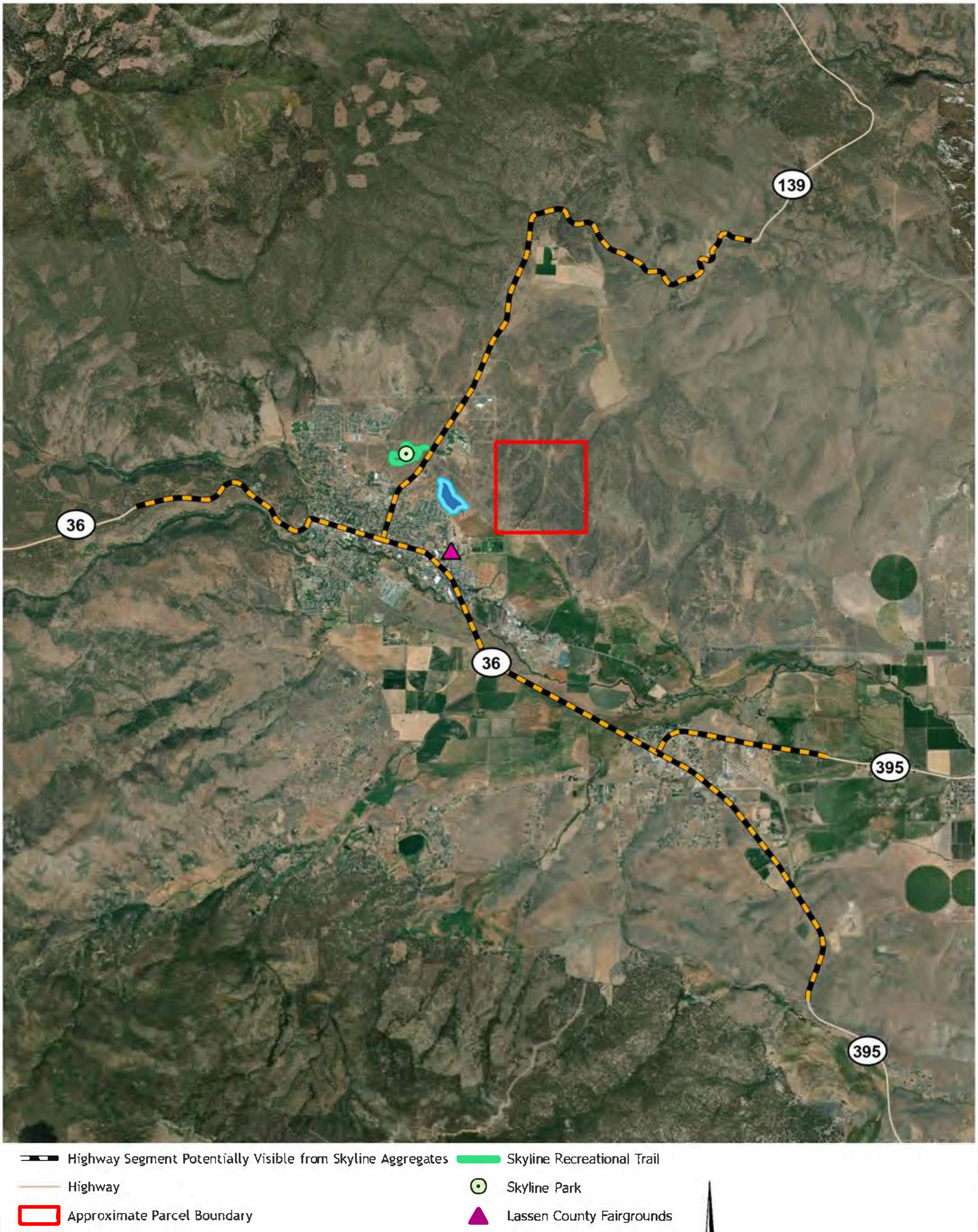
0 500 1,000 2,000 Feet

VESTRA

SOURCE: DIGITALGLOBE 2018 AERIAL PHOTOGRAPH

FIGURE 2
GENERAL SITE LAYOUT
SKYLINE AGGREGATES
SUSANVILLE, CALIFORNIA

P:\GIS\71305\Skyline\Figures\Viewshed\71305_GeneralSiteLayout.mxd



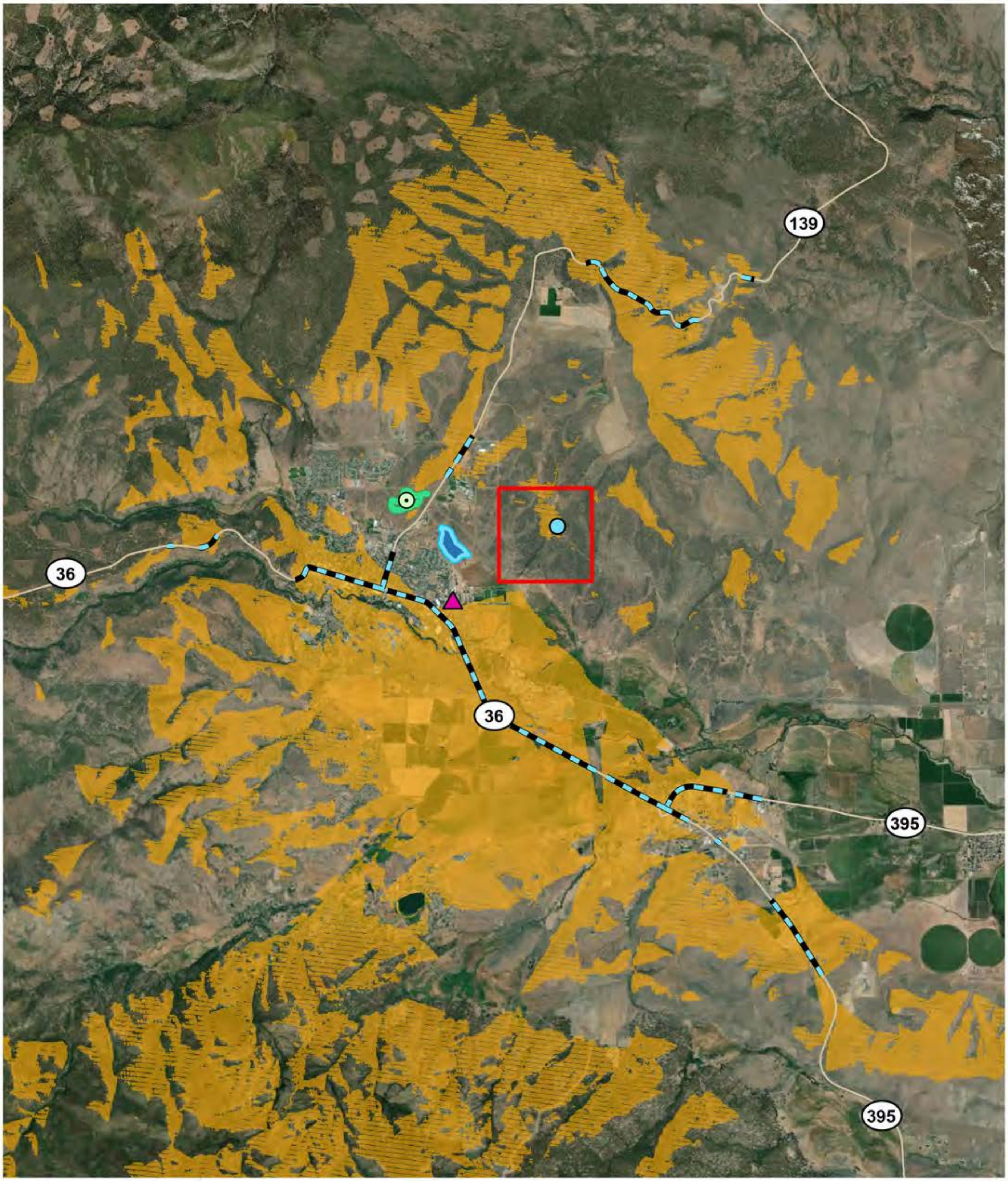
P:\GIS\71305\Skyline\Figures\Viewshed\Skyline_Mine\Skyline_Mine.aprx

VESTRA

SOURCE: EARTHSTAR 2025 AERIAL PHOTOGRAPH

FIGURE 3
HIGHWAY SEGMENTS AND PROPOSED PROJECT AREA
SKYLINE AGGREGATES
SUSANVILLE, CALIFORNIA

P:\GIS\72535\71305_HighwaySegments.pdf



North Observation Location
Segment of Highway Visible from North Observation Location
Viewshed Area Visible from North Observation Location
Highway
Approximate Parcel Boundary
Barry Reservoir
Skyline Recreational Trail
Skyline Park
Lassen County Fairgrounds

VESTRA

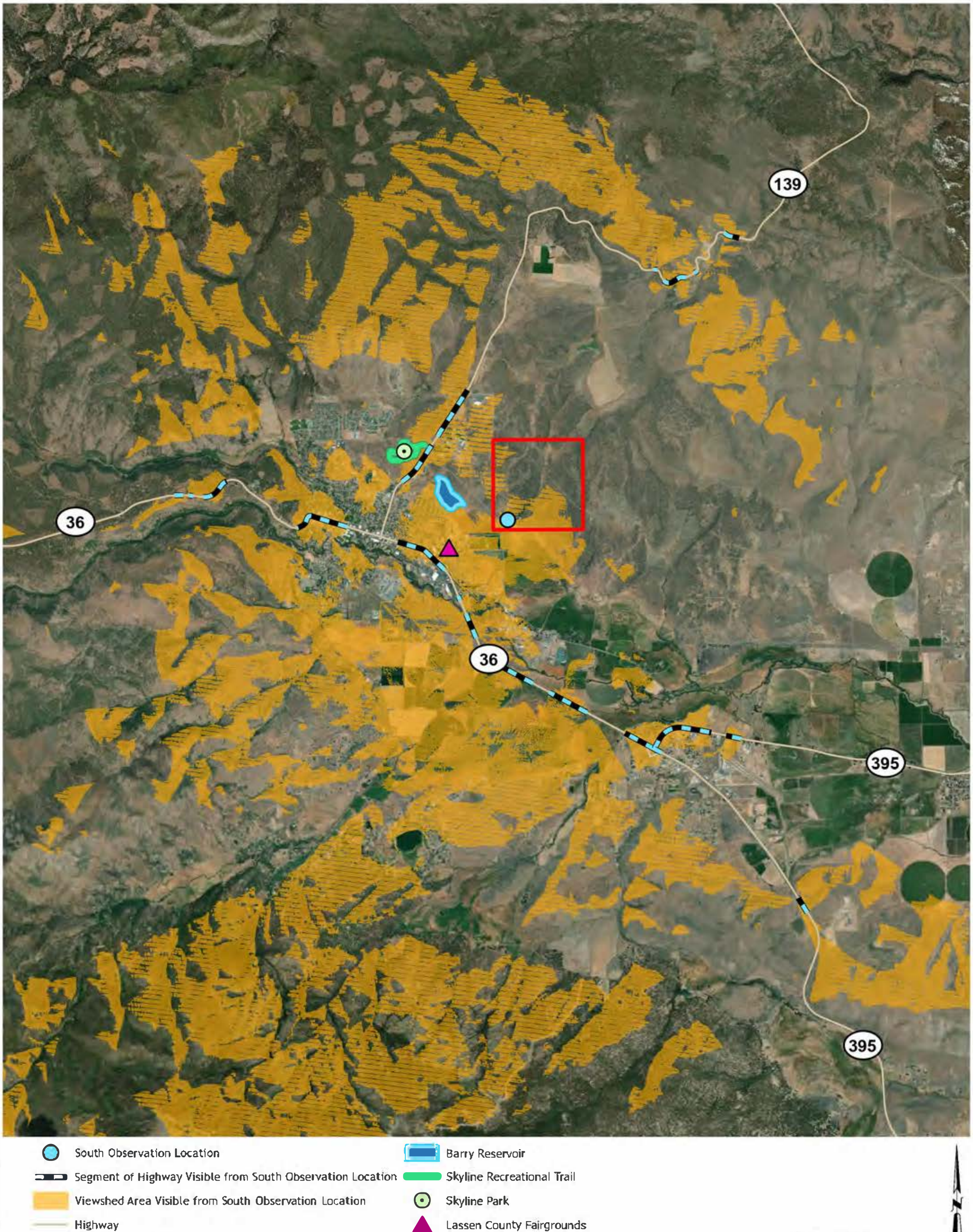
Miles: 0 | 0.75 | 1.5 | 3

SOURCE: EARTHSTAR 2025 AERIAL PHOTOGRAPH

FIGURE 4
VIEWSHED ANALYSIS WITHIN FIVE MILES OF NORTH OBSERVATION LOCATION
SKYLINE AGGREGATES
SUSANVILLE, CALIFORNIA

P:\GIS\71305\Skyline\Figures\Viewshed\Skyline_Mine\Skyline_Mine.aprx

P:\GIS\72535\71305_NorthObservationLocation.pdf



VESTRA

FIGURE 5
VIEWSHED ANALYSIS FROM SOUTH OBSERVATION LOCATION
SKYLINE AGGREGATES
SUSANVILLE, CALIFORNIA

SOURCE: EARTHSTAR 2025 AERIAL PHOTOGRAPH

P:\GIS\71305\Skyline\Figures\Viewshed\Skyline_Mine\Skyline_Mine.aprx

P:\GIS\72535\71305_SouthObservationLocation.pdf