

TECHNICAL REPORT

SCENIC RESOURCES INVENTORY and ASSESSMENT NEWBERRY VOLCANO EGS DEMONSTRATION PROJECT DESCHUTES COUNTY, OREGON



**Prepared for
PLS Environmental, LLC**

**Prepared by
Robert Scott Environmental Services, Inc.
2323 South Cook Street
Denver, Colorado 80210**

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V.1 INTRODUCTION

The objectives of the scenic resource study were to identify, describe, and map scenic resources which may be affected by the proposed project and ancillary facilities and equipment. The baseline data were recorded in sufficient detail for assessment of direct and indirect impacts of the project. The scenic resource study was conducted in compliance with federal guidelines established by the Forest Service Scenery Management System and was designed to provide information suitable for inclusion in the Newberry Volcano EGS Demonstration Project EA.

This investigation addressed an area of visual influence containing the proposed action and alternatives associated with the development and operation of the sites. The study area for visual resources was defined by an analysis of the relationship of the project site to the surrounding topographic and vegetative patterns relative to viewer locations.

The purpose of the analysis was to describe the existing visual condition of the potentially affected landscape and identify and describe how the alternatives could affect present views. The United States Forest Service (USFS), Deschutes National Forest conducted a visual resource inventory which includes the project area and the visual resources study area. The USFS Scenery Management System (SMS) inventory included mapping scenic attractiveness, scenic condition, and visual concern levels, and scenic classes.

Two appendices are supplied in this report. Appendix V-1 contains photographs of the study area. Appendix V-2 is a glossary of visual resource terminology commonly used throughout this report.

V.2 METHODS

V.2.1 Scenic Attractiveness

Levels of scenic attractiveness (scenic quality) were based on a set of criteria used in interpreting visual characteristics present in the landscape. The USFS' Scenery Management System establishes the scenic quality of landscapes into units and subunits through an analysis of landscape character types and landscape character subtypes. Landscape character type is a unit of physiographic area having common landscape features of landforms, rock formations, water forms, and vegetative patterns. Its delineation is based upon physiographic sections as described by Fenneman (1931). The importance of the character type is its establishment of a regional framework in which the scenic quality of a specific area can be determined.

Landscape character subtypes are local refinements of a particular landscape type. The subtypes have been defined as divisions of major character types which are significantly different in visual character from each other. The subtypes are used to identify portions of major character types having different degrees of visual diversity.

The characteristic landscape is the established landscape being viewed. It visually represents the basic vegetative patterns, landforms, rock formations and water forms which are in view. It usually makes up a small portion of a character subtype depending on how much is viewed. The following considerations developed by the USFS are critical physical and perceptual factors in evaluating and ranking scenic values in the study area.

- Expected Images Exist – Although studies of people’s images of forest and park areas result in varied response from one geographic region to another, one factor generally remains constant. People expect to see a naturally appearing landscape character within each general region.
- Aesthetic Concern Varies – Aesthetic concern varies among National Forest and Monument users. Those people most concerned about aesthetics are those who are in an area because of, or have a major interest in, the scenic qualities or amenities, e.g., recreation area visitors and travelers.
- View Duration is Critical – The visual impacts of project activities increase as the duration of view increases.
- Number of Viewers is Critical – The visual impacts of project activities become more important as the actual or potential number of viewers increases, particularly along travel routes and developed recreation areas.
- All Lands are Viewed – Because some National Forest and Monument lands in the area can be seen from popular high vista points, a minimum scenic quality objective should be determined.
- Viewing Distance is Critical – The visual impact of project activities usually decreases as viewing distance increases.
- Viewing Angle is Critical – Visual impact of project activities increases as the viewer’s line of sight tend to become perpendicular to the slope upon which a proposed activity is to take place.
- Diverse Landscape Character is Important – All USFS landscapes have a definable character and those with the greater variety or diversity have the greater potential for high scenic value.
- Retention of Character is Desirable – Landscapes with distinctive variety in form, line, color and/or texture should be retained and perpetuated.
- Focus of Viewer Attention is Critical – The visual impact of proposed activities increases as the amount of landscape alteration increases.
- Alteration of Character – Landscapes managed by USFS with little or no variety may be enhanced by alteration.

Through an examination of USGS 7.5 minute topographic quadrangle sheets, Google Earth color aerial photography, USFS visual resource inventory, NAIP 2009 aerial imagery, and Fenneman's (1931) description of physiographic provinces, and by field reconnaissance, landscape types and subtypes were reviewed and verified.

For each landscape subtype, scenic attractiveness has been determined by differentiating lands which are most important from those lands which are of lesser value based only on the standpoint of scenic quality of the natural landscape. The classification is based on the premise that all landscapes have some value, but those with the most variety or diversity may have the greatest potential for high scenic value.

The degrees of visual diversity are termed scenic attractiveness in the SMS system, and provide a means of measuring inherent scenic quality. There are three inherent scenic attractiveness classifications recognized by the USFS.

Class A - Distinctive – areas where features of landform, vegetative patterns, water forms, and rock formations are of unusual or outstanding visual quality. They are usually not common in the character types.

Class B – Common or Typical – areas where features contain variety in form, line, color and texture or combinations thereof but which tend to be common throughout the character type and are not outstanding in visual quality.

Class C – Undistinguished or Indistinctive – areas where features have little change in form, color or texture. Includes all areas not found under Classes A or B.

V.2.2 Landscape Visibility and Scenic Concern

Landscape Visibility is composed of two parts: human values as they relate to the relative importance to the public of various scenes and the relative sensitivity of scenes based on distance from an observer. Human values that affect perceptions of landscapes are derived from constituent analysis.

The Forest Service scenic concern inventory was based on identification and evaluation of road and trail activity, sensitive land uses, and cultural features. User volume data were reviewed to define numbers of viewers present along travel routes in the study area. Additionally, judgments about attitudes of travelers, recreation users and visitors toward visual change in the study area were reviewed.

Constituent Analysis serves as a guide to perceptions of attractiveness, helps identify special places, and helps to define the meaning people give to the subject landscape. Constituent analysis leads to a determination of the relative importance of aesthetics to the public; this importance is expressed as a Concern Level. Sites, travelways, special places, and other areas are assigned a Concern Level value of 1, 2, or 3 to reflect the relative High, Medium, or Low importance of aesthetics.

Scenic concern levels were identified in the study area. The sensitivity level most sensitive to the visual resource is Level 1. These areas include all areas seen from primary travel routes where a significant number of users or travelers may have a major concern for the scenic quality. Sensitivity Level 1 includes all primary roads including major highways and primary hiking trails and roads leading into and within Newberry National Volcanic Monument (NNVM).

Sensitivity Level 2 is where a smaller volume of travelers and visitors have concern for scenic qualities that are seen from travel routes or use areas. Sensitivity Level 3 includes all areas seen from travel routes and use areas which very few users or travelers have concern for scenic quality. Section V.3.3 provides a discussion regarding viewpoints of concern identified by USFS for the proposed project.

V.2.3 Seen Areas and Distance Zones

A landscape visibility inventory to the proposed project was based on the physical viewing distances of the project facilities from travel routes and use areas. Aerial photography, maps, photographs, and ground reconnaissance were used to develop and verify the extent of visibility, visual frequency, and visual distances of the project facilities.

One component of this inventory is visual distance zones. There are four identifiable distance zone levels recognized by the USFS; immediate foreground, foreground, middleground and background. The immediate foreground zone ranges from 0 to 300 feet. Individual landscape components such as leaves and birds are discernable. Foreground distance zone is the visible area which extends from the observer out to 300 feet to 1/2 mile. Normal foreground visual limits will include discernible texture and individual landscape forms. Middleground extends from the areas visible from the foreground zone out to 4 miles from the observer. The outer boundary of this zone is defined as the area where texture and form of individual shrubs and trees are no longer apparent in the landscape. Texture is more characteristic in masses of uniform tree stands. Individual tree forms are distinguishable in very open or sparse stands or in open areas and edges of clearcut harvesting. Most of the proposed project is located in the middleground zone. Background zone ranges from middleground to infinity. Texture in uniform tree stands of tree cover are weak or not discernible. In open, sparse, or areas of clearcut activity, texture is seen as groups or patterns of trees.

V.2.4 Scenic Condition Levels

The USFS combines the component inventories into Scenic Condition Levels (SCL). SCLs are objectives by which visual resources of an area are managed by the USFS. Scenic Condition Levels are determined by synthesizing in matrix form the inventories of scenic attractiveness, landscape visibility and visual concern, and seen areas and distance zones. An SMS rating system is applied to distinguish SCLs. Each SCL level describes a different degree of modification allowed in the basic elements of the landscape. Five classes of SCLs include:

Preservation-P

This SCL allows ecological changes only. Proposed activities, except for very low visual impact recreation facilities, are prohibited.

This objective applies to wilderness and primitive areas, other special classified areas, areas awaiting classification, and some unique forest management units which justify special classification.

Retention-R

In Retention areas, activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, pattern, etc., should not be visually evident.

Immediate reduction in form, line, color, and texture contrast in order to meet Retention should be accomplished either during project implementation or immediately after. It may be done by such means as seeding clearings and cut-and-fill slopes, design of structures, using sites that are less visible or noticeable, etc.

Partial Retention-PR

Management of proposed activities remain visually subordinate to the characteristic landscape according to the partial retention SCL. Activities may repeat form, line, color, or texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction, pattern, etc., remain visually subordinate to the existing landscape.

Activities may also introduce form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape. Reduction in form, line, color and texture to meet partial retention should be accomplished as soon as possible after project completion or at a minimum within the first year of operation. A bulk of the proposed project is located in PR.

Modification-M

Under the Modification SCL, management of proposed activities may visually dominate the existing characteristic landscape. However, activities which alter vegetative and landform must borrow from established form, line, color, or texture and at such a scale that its visual characteristics are similar to those of existing occurrences within the surrounding area of character type. Additional parts of these activities such as long-term structures or facilities roads, slash, cuts and fills, must remain visually subordinate.

Rehabilitation-REH

Landscape rehabilitation is a short-term management objective used to restore landscapes containing undesirable visual impacts to a desired visual quality. It may not always be possible

to immediately achieve the prescribed SCL with rehabilitation, but it should provide a more visually desirable landscape in the interim. Rehabilitation may be achieved through alteration, concealment, or removal of obtrusive elements. Such rehabilitation might include:

- Removal of vegetation would be placed in such a way that would not result in obtrusive edges, shapes, patterns, colors, etc.
- Terrain alterations to blend better with natural slopes.
- Alteration, concealment, or removal of structures containing obtrusive form, colors, or light reflections.
- Revegetation of cut-and-fill slopes.
- Alteration, concealment, or removal of slash, root wads, or construction debris.

V.2.5 Visual Absorption Capability

Each characteristic landscape has some capability to accept alteration without losing its inherent visual character. Within the study area, this capability results from the interaction among the physical factors of vegetation, topography, and soil productivity. For example, interactions would include the ability and the rate for vegetation to recover after landscape disturbances. Additionally, perceptual factors are critical. Among these include viewer position, viewer duration, number of viewpoints, whether views are parallel or perpendicular to the slope, number of viewers, and existing landscape characteristics.

In order to determine the visual impact of the proposed project, the extent of the change that can take place in the landscape without affecting its visual character must be considered. This capability is called the Visual Absorption Capability (VAC). The project specific inventory determines the extent to which project activity changes can take place in the landscape while maintaining the Scenic Condition Level. In some landscapes, it may be easier to meet a Retention level than Modification level due to the physical capability of the land to visually absorb a specific project activity. The VAC provides a basis to determine whether or not landscape modifications can meet the established Scenic Condition Levels, or how well the landscape will recover visually from such modifications.

The VAC has several physical or perceptual conditions that have been evaluated to establish the VAC for the proposed project. Following is a brief description of the physical and perceptual factors described for the project area and its effect on the VAC:

Landform Diversity

Landscapes of greater diversity or variety have a higher capability to absorb visual modification. Project activities on homogeneous landforms have a higher potential for creating contrasts in form, line, color, and texture. Also, depending on the observer's position, areas behind rises in topography may not be seen.

Aspect Relative to Viewer

The apparent size and visual impact of the Project activity is directly related to the angle between the viewer's line-of-sight and the slope being viewed. As this angle nears 90 degrees to the observer's line of sight, the proposed activity reaches its maximum visual exposure.

Slope

The apparent size of the proposed activity is directly related to the vertical angle at which it is being viewed. Project activities on lands with steeper slopes are generally more visible than those on lesser slopes. Also, more gentle slopes generally have a higher capability to revegetate after being disturbed than steeper slopes.

Aspect

For the geographic latitude of the project area, the sun's rays strike the soil much more obliquely on the north-facing slopes than on the south-facing slopes. Therefore, more moisture is retained on the north-facing slopes, making their vegetative regeneration potential substantially greater. A project activity on a north-facing slope may meet a higher VAC than the same activity on a south-facing slope because vegetative screening may be obtained much sooner.

Soil Productivity Relative to Growth Rates

Landscapes with suitable soils, soil depths, and growing conditions have higher capabilities to absorb visual modification than landscapes with soils of low fertility and shallow soils.

Potential Soil Color Contrast

Lands with the least color contrasts between subsoils or freshly exposed rock and the vegetative colors of existing surface have the highest capability to absorb visual modification.

Erosion Hazard Ratings and Soil Stability

Stable landscapes have higher capabilities to absorb visual modification than unstable landscapes due to better vegetative regeneration.

Vegetation

Even-age stands of trees and landscapes with little variety in vegetative forms, colors and textures have less capability to absorb a visual modification than landscapes with a high percent of vegetation variety.

Vegetative Height and Density

The potential screening ability of vegetation is directly proportional to its height and density. Much of the project area contains this factor. Relatively tall, denser stands of trees have a higher capability to absorb visual modification due to their lower transparency as opposed to clearcuts. However, this may not apply when the observer views project activities from a higher elevation or superior viewpoint.

Fire

Fire has a direct effect on the absorption capability of forest stands. In the case of wild or prescribed fires in the forest near the study area, the more densely patterned forest stands have become perceptually less opaque; effectively lowering its VAC. Views are extended to longer distances into the forest. For other forest stands, burns have created more visual diversity. In some areas, visually homogenous forest stands of uniform-appearing vegetation have been broken up into a mosaic of distinguishable patterns, colors, lines and textures, which has increased its VAC.

The VAC inventory was refined by orthophoto interpretation and field verification.

V.2.6 Existing Scenic Condition

The Existing Scenic Condition (ESC) is a description of the level of landscape disturbance to the visual resource which presently exists on the landscape. The Existing Scenic Condition inventory was refined with the assistance of the USFS using aerial photography and orthophotos. For the broader region including the study area, the ESC inventory contains six categories of identifiable visual modification:

1. Untouched – Those areas of significant size in which only ecological change has taken place, with the exception of trail construction. Size is “significant” when the use (such as trail hiking) is considered along with the visual resource in the use area. A one-quarter-acre area would not be considered significant as “Untouched” to a hiker-oriented view, while a 5000-acre “Untouched” area would be significant even to vehicle-oriented viewing.
2. Unnoticed – Areas where changes in the landscape are not visually evident to the casual observer unless pointed out.
3. Minor Disturbance – Changes in the landscape that are generally noticed by the average person, but they do not attract attention. The natural appearance of the landscape still remains dominant. Included in this category are older roads that have “healed,” and logged areas that have revegetated to a natural-appearing condition.
4. Disturbed – Areas where changes are easily noticed by the average person and may attract some attention.

5. Major Disturbance – Includes strong changes that would be obvious to anyone. These changes stand out as a dominant impression on the landscape, yet they are shaped so they might resemble natural patterns or have recovered to a point where they apply somewhat natural.
6. Drastic Disturbance – Areas in glaring contrast to the natural appearance; rehabilitation may be necessary.

The degree to which project features on the landscape adversely affects scenic attractiveness depends upon the amount of visual contrast created between the project activities proposed and the ESC of the landscape.

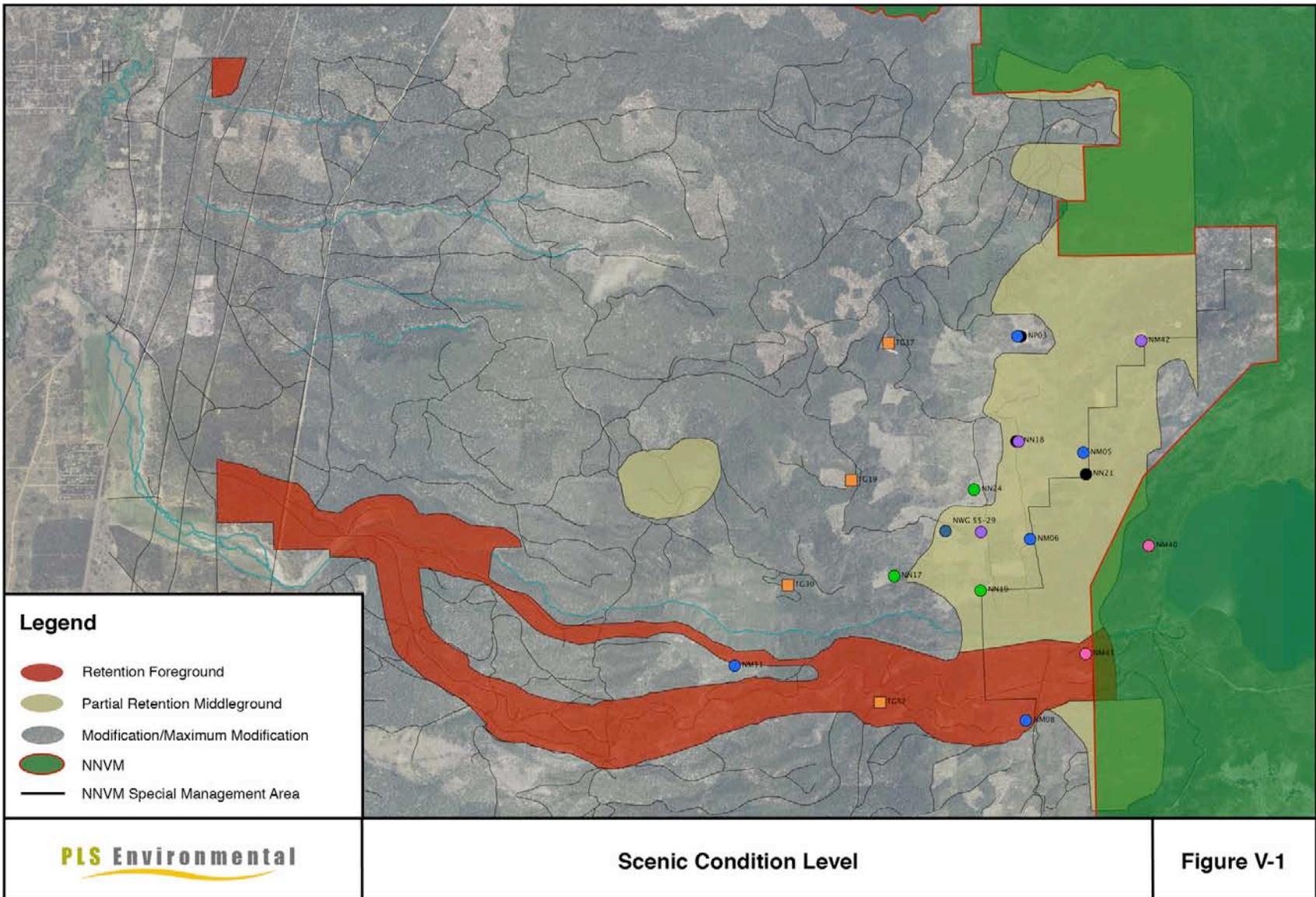
Consideration of the ability of the landscape to absorb visual change must also be considered. The amount of contrast between a proposed project and the Existing Scenic Condition can be measured by separating the landscape into its major features (land and water surface, vegetation, and structures), and then predicting the magnitude of change in contrast to each of the basic elements (form, line, color, and texture) to each of the features. Assessing the project's contrast in this manner indicates the severity of impact and guides the development of mitigation measures to reduce the contrast to the point where the requirements of the Scenic Condition Levels may potentially be met. This information is described in the following sections.

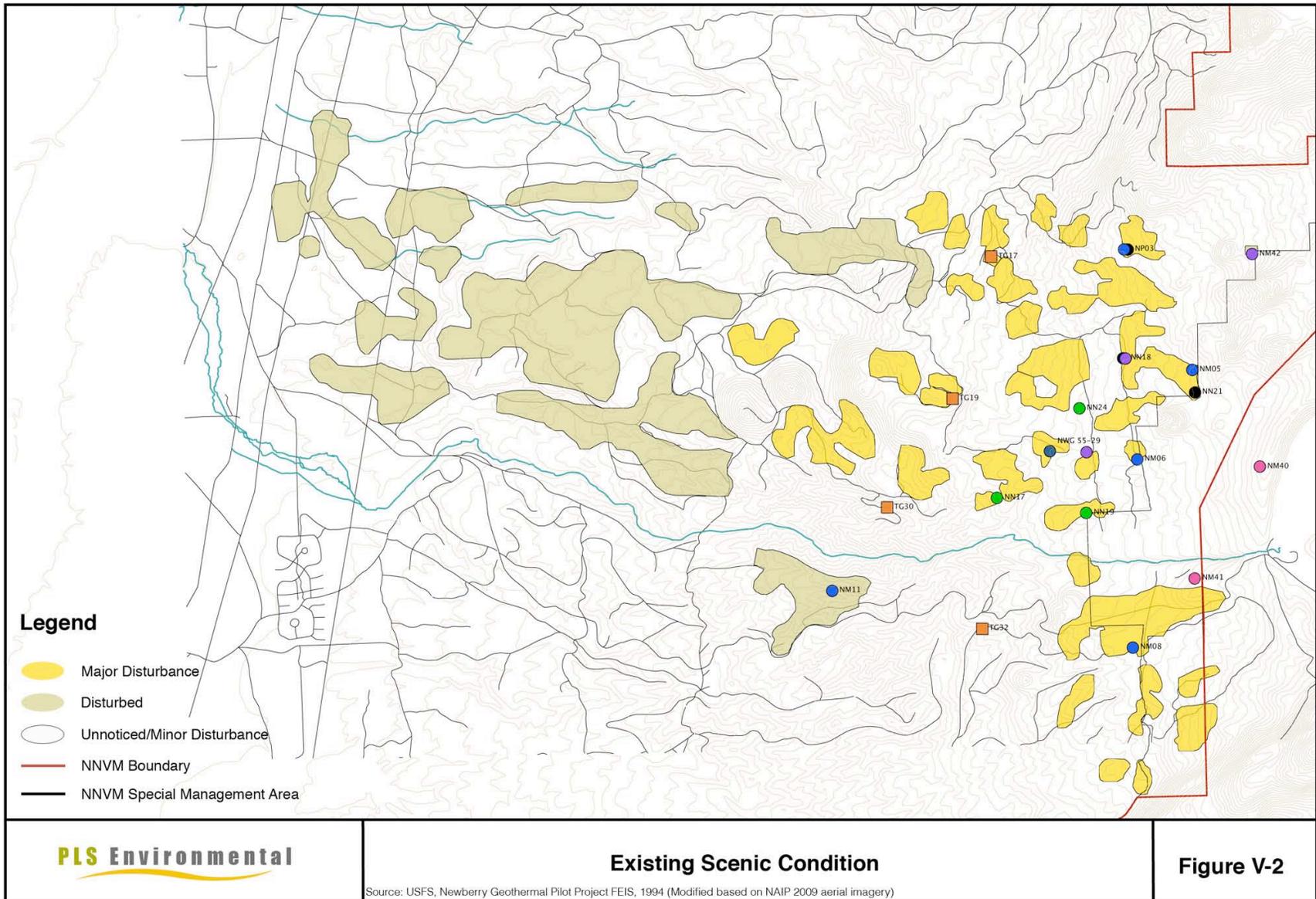
V.3 RESULTS

V.3.1 Study Area

This section provides a description of inventory results of the scenic resource baseline investigation for the proposed project including well pads, boreholes and access roads. Descriptions include inventories of Scenic Attractiveness Classes, Visibility and Scenic Concern, Seen Areas and Distance Zones, Visual Absorption Capability, Existing Scenic Condition, and visual change from Viewpoints of Concern. Table V-1 displays resource information of existing conditions for the major project facilities. Table V-2 represents a summary of baseline information compiled from the identified Viewpoints of Concern for the study area. Maps have been prepared for Scenic Condition Levels (Figure V-1), and Existing Scenic Condition (Figure V-2).

The study area is located within the Columbia Plateau Physiographic Province. This physiographic province is characterized by incised rivers, extensive plateaus, and anticlinal ridges. The project area itself consists of gently sloping to flat lands covered in coniferous forest. The potential effects of the proposed project would encompass an area along the western edge of the High Lava Plains of central Oregon (Franklin and Dyrness 1973). The study area for scenic resources is approximately 13 miles east of the Deschutes River along the western edge of the Paulina Mountains. The extent of the study area was based on an area of visual influence or potential viewshed containing the proposed EGS project. The study area was refined by means of a generalized visual analysis of the relationship of the proposed project to the surrounding topographic and vegetative patterns.





V.3.2 Existing Conditions

The general area, known for its volcanic features, is visually evident by numerous landforms, volcanic cones, and lava buttes rising from the surface of the surrounding lava plateau, and by the presence of lava flows. The Newberry Caldera contains two large lakes, Paulina and East lakes. Homogenous vegetative patterns present in the study area are dominated by mature stands of lodgepole pines, which are broken by areas of clearcuts and dissected with access roads. Table V-1 displays a summary of existing conditions for the project area.

Table V-1. Summary of Existing Conditions for Scenic Resources

Proposed Project Facility	SCL ¹	VAC ²	ESC ³
Well pad 55-29	PR	M-H	MAJ
Borehole NN17	M	H	UNN
Borehole NN24	M	H	UNN
Borehole NN19	PR	H	UNN

Source: U.S. Forest Service, field reconnaissance, and color aerial photography.

¹SCL – Scenic Condition Level: PR – Partial Retention, M – Modification

²VAC – Visual Absorption Capability: H – High, M – Moderate, L – Low

³ESC – Existing Scenic Condition: UNN – Unnoticeable, MIN – Minor Disturbance, D – Disturbed, MAJ – Major Disturbance

Major project facilities are located in Partial Retention and Modification Scenic Condition Levels as shown in Figure V-1 and described in Table V-1. The VAC for the project area ranges from moderate to high. The vegetation throughout the project area consists predominantly of dry pine forest (lodgepole and ponderosa) of various age classes with a few white fir trees mixed throughout. Some variation in topography adds to a higher VAC. The project area is located over several ESC levels (Figure V-2) from Major Disturbance to Unnoticeable Disturbance.

V.3.3 Viewpoints of Concern

The 1990 LRMP as amended and Management Area allocations guide all Deschutes National Forest management and activities, including geothermal development. Two sites (well pad 55-29, and borehole NN19) are located within the Scenic Views Management Area, MA-9. Management Area 9 has a general goal of providing Forest visitors with high quality scenery that represents the natural character of central Oregon. Most of the standards and guidelines for Scenic Views deal with timber management because the scenic resource is most often affected by timber harvest and resulting vegetation changes in the landscape.

One of the general objectives of the Scenic Views designation is that to the casual observer, results of activities either will not be evident or will be visually subordinate to the natural landscape. More specifically, LRMP standards and guidelines provide for energy development in Scenic Views if the facilities and improvements are located, designed, and maintained to blend with the characteristic landscape. The LRMP recognizes that Scenery Condition Levels may not always be met when the viewer is within the project site. Scenic Views standards and guidelines also allow for trees to be removed where necessary for access to geothermal sites.

The remainder of proposed project activities are located at existing borehole locations and well pads. These sites are within General Forest Management Area, MA-8, which emphasizes timber production and timber management.

Deschutes National Forest specialists identified six viewpoints of concern for the proposed project. Most of the viewpoint positions are inferior (lower in elevation) or normal (the same elevation) as the proposed project.

The following viewpoints were considered for comparison of impacts and consequences for each action alternative.

- VOP 1: U.S. Highway 97 between mileposts 150 and 167
- VOP 2: McKay Butte
- VOP 3: Forest Road 21 Viewpoint
- VOP 4: North (Crater) Rim Trail #57
- VOP 5: Paulina Peak summit
- VOP 6: Paulina Creek Trail #56

Appendix V-1 displays photographs from these viewpoints.

V.4 IMPACTS

V.4.1 Method of Assessment

The approach used to assess impacts to visual resources for the proposed project was based on USFS guidelines for identifying significant visual contrast. Visual contrast effects would be short-term (normally defined as less than 5 years). In general, geothermal exploration activities potentially may result in visual contrast affecting:

- The quality of any aesthetic resources
- Scenic resources having rare or unique value
- The view from or the visual setting of any designated or planned park, wilderness, or natural area, or of other visually sensitive land use
- The view from or the visual setting of any travel route
- The view from or the visual setting of any established, designated, or planned recreation, education, preservation, or scientific facility, use area activity, and viewpoint or vista

Scenic Condition Level of the visual environment is based on the synthesis of scenic attractiveness, landscape visibility and scenic concern and seen areas and distance zones. The amount of contrast between the proposed project and the existing landscape character was assessed by separating the landscape into its major features (landforms, vegetation, and structures), and then predicting the magnitude of change when contrasting each of the basic

visual elements (form, line, color, and texture) to each of the features. The assessment of visual resources was based upon the net visual change or contrast brought about by the proposed project, facilities, and activities.

Other criteria used to rate the level of visual change were scale and spatial dominance. The scale of the project modifications were compared to the scale of the entire landscape setting and placement in the viewshed. Spatial dominance was analyzed based upon the complexity of landscape composition, elevations, and position of the project to the Viewpoints of Concern. The analysis of visual change of features (e.g., landforms and vegetation) to landscape elements (e.g., form, line, texture, and color) was recorded and compared to the threshold defined by the Scenic Condition Level to determine the level of the impact.

The type of actual physical contrast for the proposed action and alternatives was examined by evaluating the following criteria: landforms, soil color and erosion potential, vegetative patterns and diversity, and structure compatibility. Several variables were considered in establishing overall visibility levels: view orientation, lighting conditions, seasonal effects, view distance, duration of view, visibility, viewer numbers, and use association.

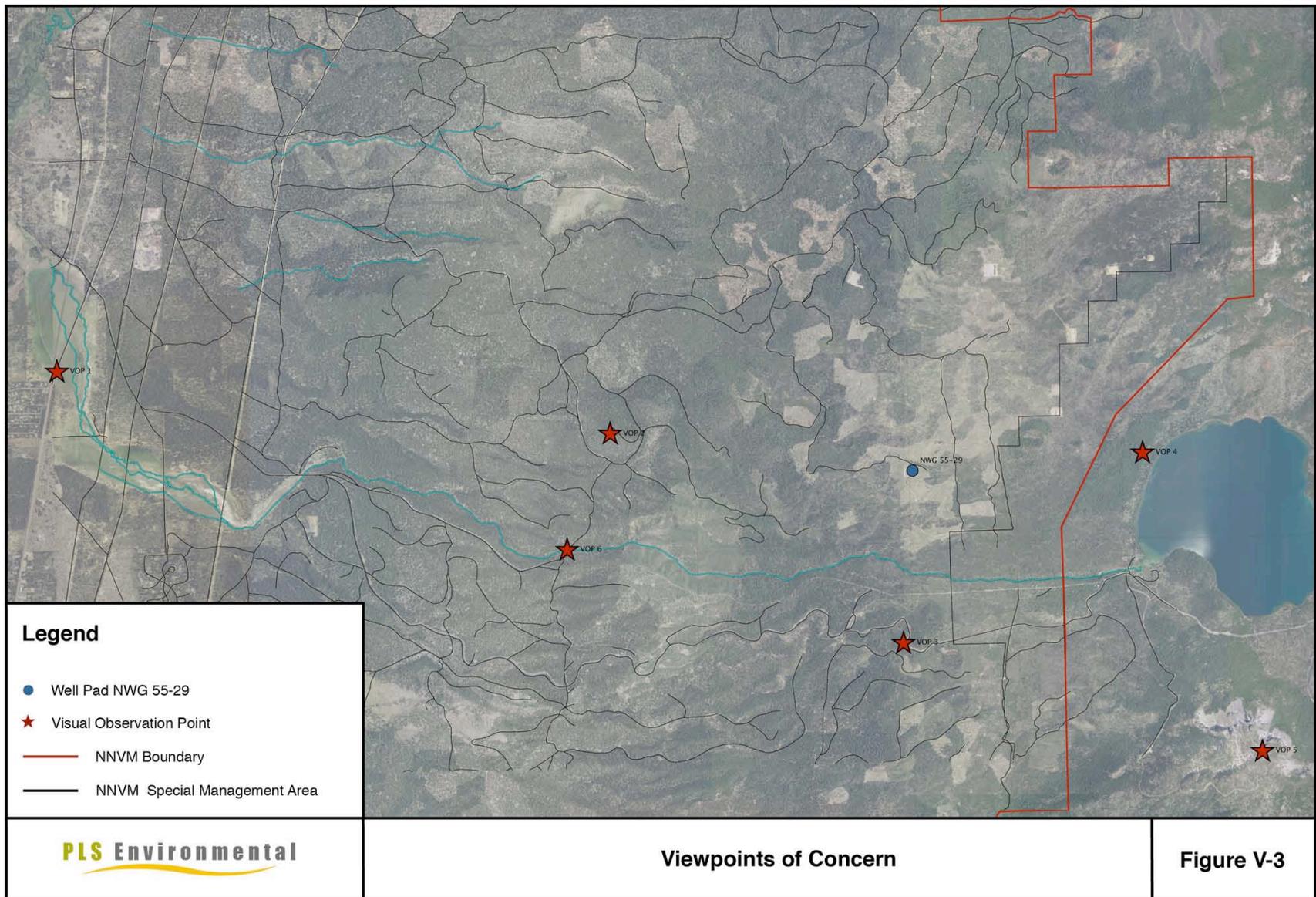
The assessment was based on the effects of visual contrast from identified Visual Observation Points (VOPs). The selection of six VOPs represent viewers potentially affected by the proposed action or alternatives. Six viewpoints were selected by the USFS as representative of the project area for travelers, forest users or recreationists. These include two locations in the NNVM (Paulina Peak and the Crater Rim Trail), one location along U.S. Highway 97 and one scenic pullout on Forest Road 21. Two other viewpoints included McKay Butte and the Paulina Creek Trail (Figure V-3).

V.4.2 Impact Overview

During scoping several issues and concerns were identified and include the following. Removal of vegetation on the microseismic monitoring sites has the potential to cause up to three areas of approximately one-quarter-acre each to not meet the goals for visual quality as seen from selected viewpoints. The Deschutes Forest LRMP Standards and Guidelines that supports this issue statement is M8-19. The venting of steam during the short and long term circulation tests may create a steam plume that may be visible at times from certain selected viewpoints. A drill rig may be visible on NWG 55-29 when drilling the two additional production wells. Circulation testing facilities may be visible from some key viewer locations.

Units of Measure:

- Number of sites and size in square feet of areas that would have vegetation removed sufficient to be seen from key viewer locations.
- The distance from selected viewpoints and ability to be seen by forest visitors.
- Height and duration of steam plumes as seen from key viewer locations.



These issues and concerns are addressed in the following sections. Assessment of circulation testing facility alternatives is provided further into this report under Section V.4.4, Project Impacts.

Short-term impacts to scenic resources from the Project would be primarily oriented toward dust resulting from traffic; well pad improvements, vegetation removal, site preparation for the boreholes, and the steam plume during venting. The top of the drill rig may be visible from nearby higher viewing points. The steam plume would draw visual attention from some viewing locations, especially on clear days during cooler seasons, and would create visual variety. The decommissioning phase would result in less visual change similar to the existing condition.

V.4.3 Impacts Common to the Proposed Action and Alternative B

Issues identified during scoping involve the level of visual contrast, the type and extent of actual physical contrast or aesthetic degradation from various viewer locations, and the level of visibility or viewshed disturbance caused by site location, structures and activities for the proposed project.

Except for the steam plume, most project facilities and activities of the Proposed Action and Alternative B would not be visible from most visual receptors or sensitive visual resources. For either action alternative, new tree clearing and surface drilling activities for boreholes NN17, NN24 and NN19 would be the same. For each new borehole, approximately one-quarter-acre of forest landscape would be disturbed. Equipment for clearing and drilling activities would include clearing and hauling equipment, a drilling rig and water truck, and a mud tank. Once drilling activities are completed a solar panel (approximately four by four feet on a seven feet tall pole) would be installed. A small data gathering box would be installed on the solar panel pole. A small (3 ft. long) telemetry antenna would be placed in a nearby tree, or possibly on a pole, if there were no suitable trees nearby. All other equipment would be placed down into the borehole.

For the other 7 borehole sites, no additional new surface disturbance would result as they would be located in existing well bores. Up to 10 surface stations would be installed, but would not require any drilling or surface disturbance. Similarly, as described above for the three new borehole sites, a solar panel and recording equipment would be installed. None of this equipment would draw visual attention.

Most of the project facilities and activities would not be visible from the six viewing points analyzed. This is primarily due to the small scale of the proposed project relative to the surrounding moderate to high Visual Absorption Capability. A portion of the facilities and activities would be visible from Paulina Peak and McKay Butte under certain circumstances.

Table V-2, Viewpoints of Concern, displays a summary of project facilities seen from each VOP location.

Table V-2. Viewpoints of Concern Summary

Viewpoint No.	Viewpoint Location	Jurisdiction	Elevation (feet)	View Direction (Viewpoint to Project)	Viewer Position ¹	View Distance to 55-29 (mi)	Project Facilities Seen ²				Steam Plume ³
							55-29	NN17	NN24	NN19	
VOP 1	U.S. Highway 97	Private	4,249	East	I	7.6	N	N	N	N	P
VOP 2	McKay Butte	USFS	5,250	East	I	2.7	N	N	N	N	P
VOP 3	Forest Rd. 21 Overlook	USFS	5,841	North	N	1.5	N	N	N	N	P
VOP 4	TR 57-Crater Rim Trail	NNVM (USFS)	6,591	West	S	2.0	N	N	N	N	N
VOP 5	Paulina Peak	NNVM (USFS)	7,947	Northwest	S	4.0	Y	P	P	P	Y
VOP 6	Paulina Creek TR 56	USFS	4,800	North	I	3.0	N	N	N	N	N

¹S – Superior, N – Normal, I – Inferior

²N – Not Visible, Y – Visible, P – Partially Visible

³Steam Plume Visibility – would be partially visible for either action alternative

Most of the landscape in and around the project area is not visually unique to the western flank of Newberry. If the general area is viewed from a distance or from an aerial position, the dominant features are the varied topography and the extensive timber harvest pattern of the forest vegetation. The proposed project is located within an area that has had a number of timber sales, thinning, and other timber management projects in the recent past, which has shaped the appearance of the landscape. All site locations including well pad and boreholes are located immediately adjacent to existing Forest Service roads.

One observation point, Paulina Peak, within NNVM would receive short-term indirect effects brought about by the project. During the exploratory phase, summer dust created by construction traffic along access roads, boreholes and well pads may draw some visual attention. However, geothermal well pad 55-29 already exists and is located in previously disturbed clearcut landscapes. In addition to dust, occasional vent plume visibility, particularly during winter, may draw visual interest from Paulina Peak. Also, the upper portion of the drill rig may be visible at pad 55-29. Due to numerous other features (lakes, lava flows, etc.) which draw visitors' attention from Paulina Peak, the distance from the project, topography, and vegetation screening, it is likely that the casual observer would notice very little of the EGS project while visiting Paulina Peak. Table V-2 displays a summary of visibility from each VOP location.

For all Project activities, the well pad and borehole locations would not be very visible, with only a portion of small clearings potentially, but not likely, to be noticed or seen from Paulina Peak. The venting activities resulting in a steam plume would be seen from Paulina Peak and would be partially visible from McKay Butte and the Forest Road 21 overlook under certain atmospheric conditions. Although most site facilities would not be visible, the steam plume would draw some visual attention from Paulina Peak on a clear day. The plume would attract occasional visual interest from hikers traveling in a counterclockwise direction from northeast segments of the Rim Trail. Viewers at the most distant VOP, U.S. Highway 97, would see a portion of the plume, but given the view distance (7.6 miles) the plume would be visually subordinate to the surrounding landscape. In addition to a short view duration, automobile viewers would not be visually drawn to it while travelling on the highway.

Steam capture structural equipment and facilities would result in a smooth metal texture and could create occasional glare if the metal is reflective, but this would not be different from other metal equipment or vehicles used on the project or travelling through the area. The structures and facilities would be in compliance with the Forest Plan Scenic Condition Levels for the management areas. Amendment Number Three of the Forest Plan specifically addresses visual aspects of a steam plume to account for the fact that the steam plume may exceed the classification of Partial Retention, particularly when viewed from Paulina Peak. This LRMP amendment was prepared to address a larger, long-term, and consistent steam plume associated with a proposed geothermal power plant in an area near the proposed EGS project. The steam plume from the EGS demonstration would be much smaller, temporary, and of short duration. As a result these visual impacts would not be significant.

Once the Project activities are completed, any disturbed areas are not likely to cause effects drawing visual concern. The steam plume would be eliminated creating some change in visual diversity. The feathered edges of the three new borehole sites would gradually fill in with

vegetation further reducing the line, texture, and color contrast. A discussion of impacts for each major project facility is presented below.

V.4.4 Project Impacts

The EGS Demonstration Project visual impacts for Proposed Action and Alternative B are similar except for the activities and facilities proposed for geothermal well pad 55-29. Alternative B would increase the amount of structures and equipment to capture more water vapor or steam. While Alternative B may reduce the overall size of the steam plume, additional facilities would need to be installed. These include enlarging the size and scale of air-cooled heat exchangers and adding more diesel generators and associated fuel tanks. Although the additional facilities would not increase the height of the structures (up to 40 feet), the scale of the layout would increase and utilize more area of the existing well pad and possibly may require enlarging the well pad. An increase in truck traffic and associated road dust would also occur. Visual contrast would include more blocky structural forms, increased lines and more smooth textures. The increased structural visual contrast could draw a slight increase in visual attention from Paulina Peak.

The additional facilities required by Alternative B would occasionally reflect more light and glare contrast. However, the size and scale of the steam plume would be reduced. Impacts to scenic resources resulting from either action alternative would not be significant.

Under the No Action alternative no adverse effects would result to scenic resources as a result of this geothermal activity. The EGS project would not take place and other Forest Service activities and uses would continue to occur.

V.4.5 Mitigation Recommendations

For reducing impacts to visual resources, there are three types of mitigation techniques: (1) strategic location, (2) minimization of disturbance, and (3) repetition of the basic landscape elements (form, line, color, texture). Based on these techniques, mitigation recommendations have been identified for project activities and described to effectively reduce visual contrast for the project facilities and activities.

During construction of the three new borehole sites (NN17, NN24 and NN19), clearing of land for project facilities or structures would use curvilinear boundaries where practicable instead of straight lines. Grading would be done in a manner which would minimize erosion and conform to the natural topography. The clearing of trees and vegetation for the project facilities would be limited to the minimum area required. To the extent possible, all foliage, particularly the coniferous trees adjacent to each site, would remain undisturbed to provide maximum screening of the installation of a given project facility.

Brush or small trees cleared and not otherwise disposed of would be spread to provide cover habitat for small mammals, reptiles and birds, and other woody materials would be randomly placed in areas to conform to adjacent vegetation patterns.

The use of the basic landscape elements for project planning, siting, and design would be considered. These measures would be one of the most effective techniques to reduce visual impact and improve aesthetics of the project. Activities would occur on sites already within or next to roads or openings and where other vegetation management or geothermal activities have previously occurred. Simplified structures would be used to enhance the overall appearance of the project area facilities. The project would be of short duration, further minimizing effects to visual resources.

If needed, night lighting for project facilities would be adequate for work safety and for protection of project facilities from sabotage and malicious mischief and would minimize reflective glow to the adjacent Newberry National Volcanic Monument. Night lighting would be selected and designed to reduce potential visual impacts due to disturbance of the night sky. Light shields will be considered.

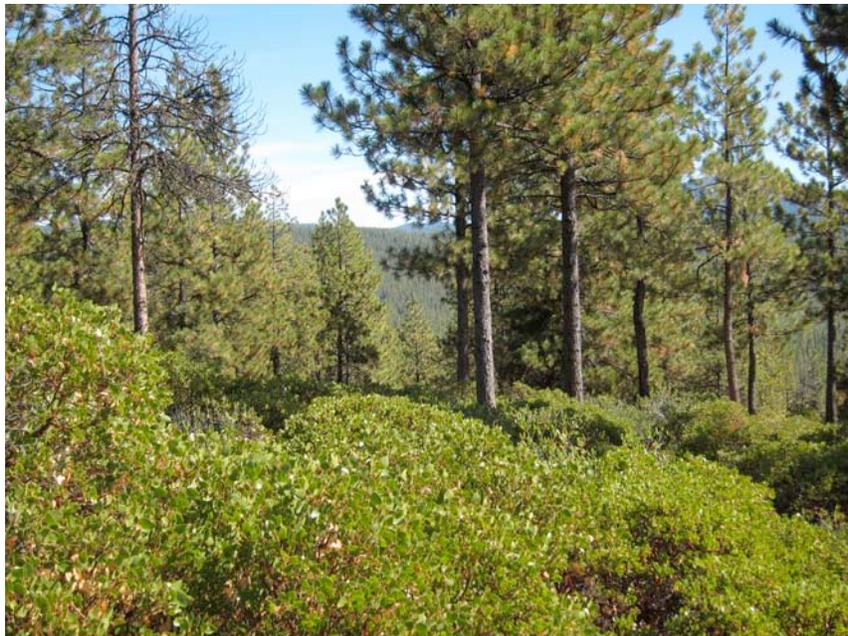
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VOP 1	U.S. Highway 97
VOP 2	McKay Butte
VOP 3	Forest Road 21 Overlook
VOP 4	Trail 57 – Crater Rim Trail
VOP 5	Paulina Peak
VOP 6	Paulina Creek Trail 56



VOP 1 U.S. Highway 97 (looking east)



VOP 2 McKay Butte (looking east)



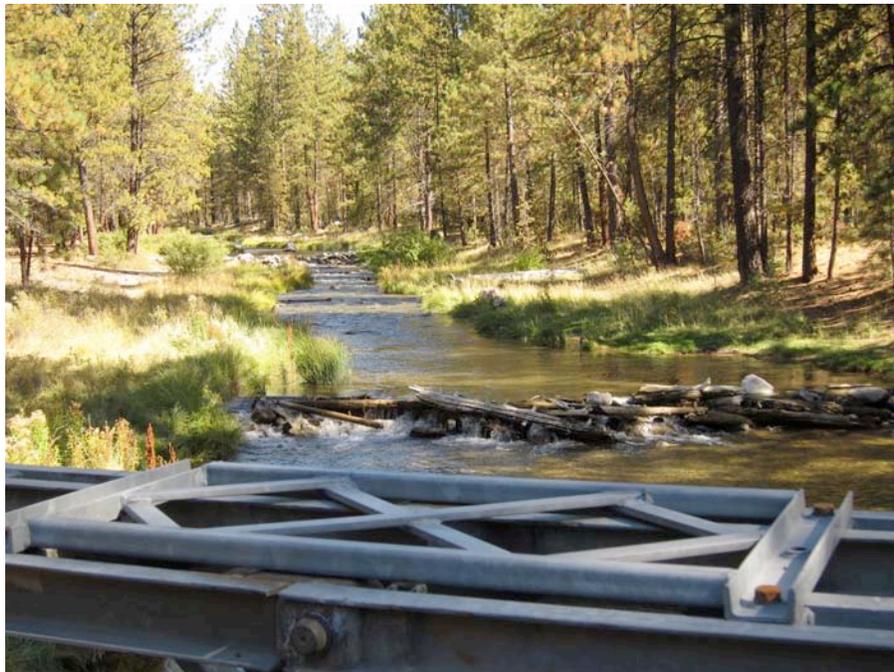
VOP 3 Forest Road 21 Overlook (looking north)



VOP 4 Trail 57 – Crater Rim Trail (looking west)



VOP 5 Paulina Peak (looking northwest)



VOP 6 Paulina Creek Trail 56 (looking west)

AESTHETICS (ESTHETICS). Generally, the study, science, or philosophy dealing with beauty and with judgments concerning beauty. In scenery management, it describes landscapes that give visual and sensory pleasure.

AREA OF VISUAL INFLUENCE. That portion of a landscape falling within a person's cone of vision.

BACKGROUND. The distant part of a landscape. The landscape area located from 4 miles to infinity from the viewer.

BALANCE. A visual stability produced, and an equilibrium established in a landscape, by natural forces or human intervention.

BASIC ELEMENTS. The four major elements (form, line, color, and texture) which determine how the character of a landscape is perceived.

CHARACTER. Qualities that constitute a character, that characterize a landscape; a distinguishing trait, feature, or quality; uniqueness; attribute.

LANDSCAPE CHARACTER TYPE. Large physiographic area of land which has common characteristics of landforms, rock formations, water forms, and vegetative patterns.

LANDSCAPE CHARACTER SUBTYPE. A division of a major character type which is significantly different in visual characteristics from the other subtypes.

CHARACTERISTIC LANDSCAPE. The established landscape within an area being viewed. The term does not necessarily mean a naturalistic character. It could refer to a farming community, a rural landscape, a primarily natural environment, or other landscape which has an identifiable character.

COLOR. The property of reflecting light of a particular wave-length that enables the eye to differentiate otherwise indistinguishable objects. A hue (red, green, blue, yellow, and so on), as contrasted with a value (black, white, or gray).

CONTRAST. Diversity or distinction of adjacent parts. Effect of striking differences in form, line, color, or texture of a landscape.

CULTURAL MODIFICATION. Any man-caused change in the land or water form or vegetation or the addition of a structure which creates a visual contrast in the basic elements (form, line, color, texture) of the naturalistic character of a landscape.

DEVIATION. Departure from existing landscape character or from landscape character goals. Deviation from existing landscape character can be positive, negative, or have no effect.

DISTANCE ZONE. Landscape areas denoted by specified distances from the observer. Used as a frame of reference in which to discuss landscape attributes or the scenic effect of human activities in a landscape.

DISTINCTIVE. Refers to extraordinarily and special landscapes. These landscapes are attractive, and they stand out from common landscapes.

DISTURBANCE. A discrete event, either natural or human induced, that causes a change in the existing condition of an ecological system.

DOMINANCE ELEMENTS. In scenery management, the dominance elements are form, line, color, and texture. They are the attributes that make up the landscape character.

EDGE. The line where an object or area begins or ends. Edge serves to define borders, limits, or boundaries.

EVIDENT. That which is noticeable, apparent, conspicuous, or obvious.

EXISTING SCENIC INTEGRITY. (“Existing visual condition”) Current state of the landscape, considering previous human alterations.

FEATURE. A visually distinct or outstanding part, quality, or characteristic of a landscape.

FOREGROUND. Detailed landscape generally found from the observer to 1/2 mile away.

FORM. Structure, mass, or shape of a landscape or of an object. Landscape form is often defined by edges or outlines of landforms, rockforms, vegetation patterns, or waterforms, or the enclosed spaces created by these attributes.

HIGH SCENIC INTEGRITY LEVEL. A scenic integrity level meaning human activities are not visually evident. In high scenic integrity areas, activities may only repeat attributes of form, line, color, and texture found in the existing landscape character.

INTACTNESS. Untouched or unaltered, especially by anything that harms or diminishes its character.

INTRUSION. A feature (land or water form, vegetation, or structure) which is generally considered out of context because of excessive contrast and disharmony with the characteristic landscape.

LANDFORM. One of the attributes or features that make up the earth’s surface, such as a plain, mountain, or valley.

LANDSCAPE. An area composed of interacting ecosystems that are repeated because of geology, land for, soils, climate, biota, and human influences throughout the area.

Landscapes are generally of a size, shape, and pattern which is determined by interacting ecosystems.

LANDSCAPE CHARACTER. Particular attributes, qualities, and traits of a landscape that give it an image and make it identifiable or unique.

LANDSCAPE FEATURES. The land and water forms, vegetation, and structures which compose the characteristic landscape.

LANDSCAPE SETTING. The context and environment in which a landscape is set; a landscape backdrop.

LANDSCAPE UNIT. A small area of land that, at a micro-scale, has similar existing landscape character attributes—landform, rockform, waterform, and vegetative communities patterns. A geographic area that is useful for inventoring and analyzing scenery.

LANDSCAPE VISIBILITY. Accessibility of the landscape to viewers, referring to one's ability to see and perceive landscapes.

LINE. An intersection of two planes; a point that has been extended; a silhouette of form. In landscapes—ridges, skylines, structures, changes in vegetation, or individual trees and branches—may be perceived as line.

LOW. A scenic integrity level meaning human activities must remain visually subordinate to the attributes of the existing landscape character. Activities may repeat form, line, color, or texture common to these landscape characters, but changes in quality of size, number, intensity, direction, pattern, and so on, must remain visually subordinate to these landscape characters.

MANAGEMENT ACTIVITY. An activity humans impose on a landscape for the purpose of managing natural resources.

MAXIMUM MODIFICATION. A Visual Quality Objective meaning management activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.

MIDDLEGROUND. The zone between the foreground and the background in a landscape. The area located from 1/2 mile to 4 miles from the observer.

MODIFICATION. A Visual Quality Objective meaning management activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.

NATURAL DISTURBANCE. Periodic impact or natural events such as fire, severe drought, insect or disease attack, or wind.

NATURAL LANDSCAPE CHARACTER. Landscape character that originated from natural disturbances, such as wildfires, glaciation, succession of plants from pioneer to climax species, or indirect activities of humans, such as inadvertent plant succession through fire prevention.

NATURAL-APPEARING LANDSCAPE CHARACTER. Landscape character that has resulted from human activities, yet appear natural, such as historic conversion of native forests into farmlands, pastures, and hedgerows that have reverted back to forests through reforestation activities or natural regeneration.

OBSERVER POINT. One or a series of observer positions on a travel route or at a use area, or a potential use area, used to determine seen area.

OBSERVER POSITION. Specific geographic position in the landscape where the viewer is located. Also known as viewer platform.

PARTIAL RETENTION. A Visual Quality Objective which in general means management activities may be evident but must remain subordinate to the characteristic landscape.

PATTERN. An arrangement of parts, elements, or details that suggests a design or somewhat orderly distribution.

PERCEPTION. Human impression of a landscape. Perception translates and evaluates the landscape that one “sees” in context of previous experiences and expected images.

PHYSIOGRAPHIC PROVINCE. An extensive portion of the landscape, normally encompassing many hundreds of square miles, which has common qualities of soil, rock, slope, and vegetation of the same geomorphic origin.

PRESERVATION. A Visual Quality Objective that provides for ecological change only.

REHABILITATION. A short-term management goal used to return a landscape with existing visual impacts and deviations to a desired level of scenic quality formerly found in the natural landscape.

RETENTION. A Visual Quality Objective which in general means management activities are not evident to the casual forest visitor.

ROCK FORM. A significant composition of mineral matter constituting the earth’s crust. One of the attributes or features that make up part of the earth’s surface, such as a mountain, cliff, peak, bluff, valley, wall, or bedrock.

SCALE. The degree of resolution at which ecological processes, structures, and changes across space and time are observed and measured.

SCENERY. General appearance of a place, general appearance of a landscape, or features of a landscape.

SCENERY MANAGEMENT. The art and science of arranging, planning, and designing landscape attributes relative to the appearance of places and expanses in outdoor settings.

SCENIC. Of or relating to landscape scenery; pertaining to natural or natural appearing scenery; constituting or affording pleasant views of natural landscape attributes or positive cultural elements.

SCENIC AREA. An area where landscape character has a high degree of a variety, harmony, and contrast among the basic visual elements which result in a landscape pleasant to view.

SCENIC ATTRACTIVENESS. The scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, rockform, waterform, and vegetation pattern. Reflects varying visual perception attributes of variety, unity, vividness, intactness, coherence, mystery, uniqueness, harmony, balance, and pattern. It is classified as:
A – Distinctive
B – Typical or common
C – Undistinguished.

SCENIC CLASS. A system of classification describing the importance or value of a particular landscape or portions of that landscape.

SCENIC INTEGRITY. State of naturalness or, conversely, the state of disturbance created by human activities or alteration. Integrity is stated in degrees of deviation from the existing landscape character in a natural forest.

SCENIC QUALITY. The essential attributes of landscape that when viewed by people, elicit psychological and physiological benefits to individuals and, therefore, to society in general.

SCENIC RESOURCE. Attributes, characteristics, and features of landscapes that provide varying responses from, and varying degrees of benefits to, humans.

SEEN AREA. The total landscape area observed based upon landform screening. Seen-areas may be divided into zones of immediate foreground, foreground, middleground, and background. Some landscapes are seldom seen by the public.

SELDOM-SEEN. Areas of the landscape that are infrequently viewed by the public.

SENSITIVITY. As applied to visual resource management, that degree of concern expressed by the user toward scenic quality and present or proposed visual change in a particular characteristic landscape.

SHAPE. Contour, spatial form, or configuration of a figure. Shape is similar to form, but shape is usually considered to be two-dimensional.

SPACE. A limited extension in one, two, or three dimensions or a volume. Expanse of a landscape, such as the floor, walls, and ceiling of an “outdoor room.”

SPATIAL SCALE. The level of resolution in space perceived or considered.

SUBORDINATE. Landscape features that are inferior to, or placed below, another in size, importance, brightness, and so on. Features that are secondary in visual impact or importance.

TEXTURE. Visual interplay of light and shadow created by variations in the surface of an object. Grain or nap of a landscape or a repetitive pattern of tiny forms. Visual texture can range from smooth to coarse.

TYPICAL OR COMMON LANDSCAPE. Refer to prevalent, usual, or widespread landscapes within a landscape province. It also refers to landscapes with ordinary and routine scenic attractiveness.

UNACCEPTABLE ALTERATION. A scenic integrity level (never an objective) where human activities of vegetative and landform alterations are excessive and totally dominate the natural or natural-appearing landscape character. Unacceptable alterations are “what not to do to any landscape,” regardless of the distance from which the management activity may be observed.

VARIETY. An intermixture, diversity, or succession of different things, forms, or qualities inherent in the landscape.

VERY LOW SCENIC INTEGRITY LEVEL. A scenic integrity level meaning human activities of vegetative and landform alterations may dominate the original, natural landscape character but should appear as natural occurrences when viewed at background distances.

VIEW. Something that is looked toward or kept in sight, especially a broad landscape or panorama. Act of looking toward this object or scene.

VIEWSHED. Total visible area from a single observer position, or the total visible area from multiple observer positions. Viewsheds are accumulated seen-areas from highways, trails, campgrounds, towns, cities, or other viewer locations. Examples are corridor, feature, or basin viewsheds.

VISTA. A confined view, especially one seen through a long passage, as between rows of trees or down a canyon. A vista often focuses upon a specific feature in the landscape. Unlike a view, the vista is sometimes human created and, if it is, thereby subject to design.

VISUAL. A mental image attained by sight.

VISUAL ABSORPTION CAPABILITY. A classification system used to denote relative ability of a landscape to accept human alterations without loss of character of scenic quality

VISUAL MAGNITUDE. A detailed classification system used to denote relative visibility of a landscape, including distance, slope and aspect relative to observer, and number of times seen.

VISUAL PERCEPTION. Human impression of an optical experience; comprehension of an object or a space based on the sense of sight. Perception translates and evaluates what one sees in the context of previous experiences and expected images.

VISUAL RESOURCE: The land, water, vegetative, animal, and other features that are visible on all lands (scenic values).

WATER FORM. One of the attributes or features, that make up the earth's surface, such as a pond, lake, stream, river, waterfall, estuary, or ocean.