

# CHAPTER 2

## PROPOSED ACTION AND ALTERNATIVES

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This chapter describes the Proposed Action and the No Action Alternative to be analyzed as part of this environmental assessment.

### 2.1 PROPOSED ACTION

The proposed exploration calls for construction of 10 vertical temperature gradient wells for geothermal resource identification and analyses in the project area in Salt Wells, Nevada (Figure 2-1). The construction and maintenance requirements associated with these wells are described below.

#### ***Exploratory Drilling***

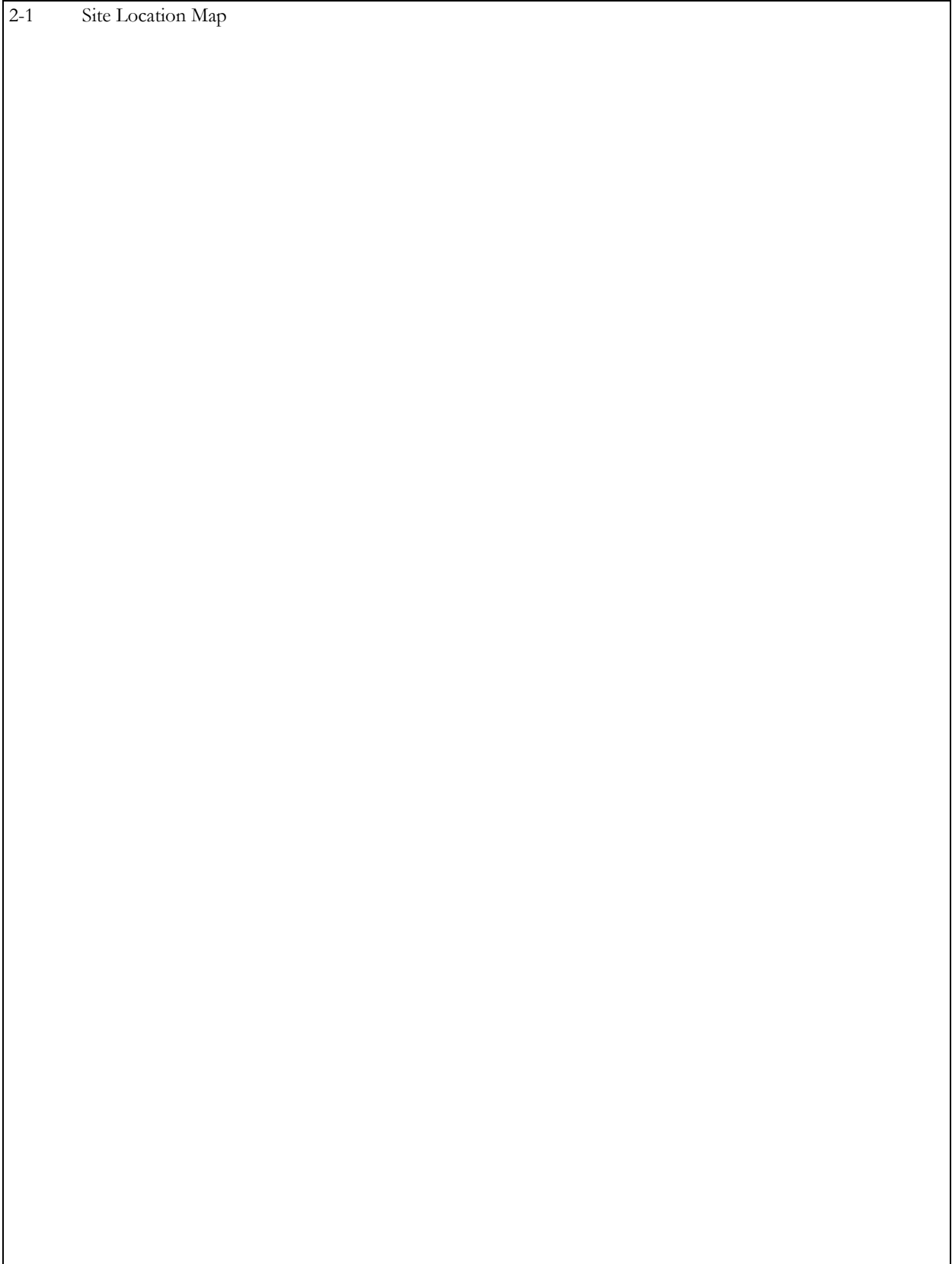
##### *Construction of Drill Sites*

Each proposed well would require the construction of a well pad (See a typical well pad design in Figure 2-2). Initial well drilling operations would be conducted within ten 300 x 150 ft. well pads. Vegetation clearing and minor grading would allow access and placement of the drill rig and associated equipment needed to drill the wells. Each drill site would be constructed by approximately 5-6 employees and would take 4 to 10 days to construct. If the geothermal resource is productive the well pads would be expanded to 400 x 400 ft. and deep exploration drilling would be conducted.

##### *Exploratory Drilling Operation*

Initial exploratory drilling would involve drilling a well approximately 8½ inches in diameter to a depth of approximately 500 feet below ground surface (bgs) at each site. Drilling typically involves the use of a truck mounted drill rig (Figure 2-3). A Brewster N-4 rotary drill rig or equivalent would drill the wells using a mill tooth or tungsten carbide drill bit. The drill rig has a 650 horsepower engine. Two portable diesel generators with 600 horsepower would also be used to install the wellhead and power the blow out prevention equipment. Blow out prevention equipment would be installed on a wellhead to prevent the escape of

2-1 Site Location Map



2-2 Proposed Well Pad Layout



**Figure 2-3** Photo Depicting a Typical Drill Rig



fluid pressure during drilling and well completion operations. The drill rig would be operated by a crew of 5 per 12hr shift plus one tool pusher. A tool pusher is the person responsible for all operations on a land drilling rig. It is expected that each well would be drilled within 7-10 days.

A mud slurry may be added to improve the rate of penetration and well cleanup during drilling. Freshwater may be encountered from 50-150 ft bgs and would be cased off to ensure protection of the water source. A cement casing would be created at 500 feet to stabilize the well shaft and drilling would continue to a depth of 2500 feet at each well.

If a productive geothermal resource is discovered, Vulcan Power proposes to proceed with deep exploration drilling. Deep exploratory drilling would require constructing sumps at each productive well site and expanding the associated well pad to an area of 400 x 400 sq. ft. The well sumps would be used to hold drill cuttings and excess drilling fluids produced during the drilling phase. The well sumps would be approximately 400 x 100 x 15 ft on each location and lined with local clays.

In addition to the geothermal fluid, two main types of hazardous materials would be used and maintained at the well sites: lubricants for the rotating equipment, and diesel fuel for the

drill rig. The diesel fuel would be stored in a tank at the drill rig site. Both the drill rig and diesel fuel tank would be stored within a secondary containment fuel berm.

### Roads

An existing gravel road runs from Hwy 50 to the project area. The existing road passes through the project area north to south. This existing road would serve as a main transportation corridor from Hwy 50. Two miles of existing connector roads would need to be upgraded to access the well sites. Three miles of newly developed road would be constructed to access the proposed drill sites (Figure 2-1). Each new access road would be approximately 10 feet wide. Vulcan Power would enter into a mineral material sale contract with the BLM to withdraw gravel from the community borrow pit in Section 14 of the Salt Wells lease area in order to surface well pads and upgrade roads during construction and operation of the well sites. Approximately 40,000 cubic yards of gravel would be needed to upgrade existing and establish new access roads.

### Water Well

Water would be needed for dust suppression during construction of roads and well pads, and to create drilling mud for use during drilling the exploratory wells. Drilling mud is a mixture of water and clay that is used to cool and lubricate the drill bit and remove cuttings from the well. It is estimated that approximately 10,000 gallons of water per day would be needed to supply water for dust abatement and drilling.

Water for drilling the exploratory wells and dust abatement would be trucked to the project area either from an existing water well located in Fallon or from a new water well that would be drilled just south of proposed exploratory well 31-14 along the main entrance road (Figure 2-1). If a new water well would be needed for the project, Vulcan Power would apply to the State Engineer for a "waiver to use water to explore for oil, gas or geothermal resources" under Nevada Administrative Code (NAC) 534.444 prior to field development. The new well would be drilled to approximately 100 feet bgs.

If a new water well south of 31-14 is needed to supply water for construction and drilling operations, and the exploratory wells are found not to be productive, the water well will be permanently capped following cessation of drilling.

### Standard Operating Procedures, Best Management Practices, and Proposed Mitigation

Standard Operating Procedures and Best Management Practices (BMPs) would reduce the effects on the human and natural environment. In addition to procedures identified in The State of Nevada Handbook of Best Management Practices, the following mitigation measures would be followed to reduce any impacts:

- During construction soil erosion would be prevented by minimizing cut to fill and the use of silt barriers and rip rap;
- Existing roads would be evaluated and properly graded and repaired in areas that show evidence of enhanced erosion;

- Construction sites would be designed to avoid cultural sites;
- Water trucks would be provided during construction and rig moves to control atmospheric dust;
- The sites would be surrounded by a soil berm to restrict surface water from entering the site. The drill rig fuel tanks and lubricants would be located within a soil berm to contain spillage. The site would be graded in order that runoff is directed to the mud sump;
- The known ground water zones would be cased off while drilling the well to prevent contamination by geothermal fluids;
- An archeological evaluation of each well site would be completed prior to construction. In the event that any artifacts or remains are found during construction or drilling, work would cease within 150 feet of the discovery and the State Division of Historic Preservation and Archeology immediately notified at (775) 684-3448;
- No wetlands would be impacted by this construction;
- Sanitary facilities would be provided during construction and drilling by use of portable toilets.

## **2.2 NO ACTION ALTERNATIVE**

Under the No Action Alternative the exploration drilling would not be conducted.

## **2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED**

During the process of developing Vulcan Power well sites, numerous locations were considered for establishing designated well sites and access roads to the sites. The initial consideration of potential locations resulted in a variety of alternatives for well site locations which were considered but subsequently deemed unsuitable.

Subsequent analysis and investigations revealed that several of the original sites had to be modified because they failed to meet any or all of the project objectives in a cost-effective way or with regards to minimizing impacts to archaeological resources.

Sites (and access roads) that had been chosen based on geological features that indicated they could potentially be productive, were immediately changed upon a site visit due to the actual topography (ravines, narrow or steep valleys, etc.) which would be prohibitive to the drill rig process. Other sites were eliminated as well, based on their presence in run off areas or areas of high water flows i.e. getting the drill equipment on site or having access to the sites would be too difficult or unpredictable. Because of the above factors, several sites were eliminated or moved.

There were additional alternatives which were eliminated from further consideration because they failed to meet any or all of the following project objectives in terms of cultural criteria. Onsite surveys were done for the original sites and in several instances, were found to contain cultural artifacts eligible for the National Register of Historic Places (NRHP) that

necessitated changing the original locations. Proposed access roads and drill sites were relocated wherever possible in order to avoid impacts to archaeological sites that were found during the survey. The Sites evaluated and changes made to avoid cultural impacts are as follows:

Drill Sites CLB 33-33 and 11-20 were eliminated from use and the sites moved in order to avoid impact to artifacts that were present at the original locations.

Drill Site CLB 51-16 was eliminated from use and the access road moved in order to avoid impacts to artifacts that were present on the road that was originally intended for use.

Drill Site CLB 85-15 had an access road that was eliminated from use. A modified and preferred road was implemented. This new road would extend approximately 0.15 mi (240 meters) northwest from the western edge of an existing gravel pit to the drill site. It will follow an existing road within the gravel pit, and connect with the north-south graded road at the western edge of the project area. The site was moved in order to avoid impacts to artifacts that were present on the road that was originally intended for use.

Drill site CLB 32-11 and its access road were eliminated from use and moved. The proposed access road to this drill site passed through a NRHP site, so the Drill Site was relocated 100 feet (30 meters) to the south of the site.

Drill site CLB 57-14 was eliminated from use because an NRHP site was located on the eastern half of the original site. The Drill Site was shifted approximately 400 feet (120 meters) to the west.

The choice of new alternatives was accomplished and the new Drill Sites and access roads be consistent with the project purpose and need, be cost-effective, and will no have effect on historic properties (either prehistoric or historic archeological sites which are eligible for recommendation to the NRHP). Through review and use of the alternative section criteria, and additional site investigation, ten Drill Sites are currently chosen for further development and evaluation.

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