2. COMPARISON OF ALTERNATIVES

This chapter describes and compares the alternatives considered for the Pre-feasibility Plan of Operations. It defines the differences between the alternatives and provides the basis for evaluation of the alternatives. Section 2.1 describes the no action, the proposed action, and other alternatives considered in detail. Section 2.2 describes the alternatives considered but eliminated from detailed analysis during the preparation of this EA. Section 2.3 describes various mitigation and monitoring measures developed by the Forest Service during the course of our environmental analysis and review. Section 2.4 provides a concise comparison of the effects of the alternatives considered in detail.

Two sets of alternatives are identified. The first set of alternatives, including the no action alternative and the proposed action alternative, are considered detailed in this EA. This set includes the no action alternative, the proposed action alternative and three alternatives for specific components or elements of the proposed Pre-feasibility Activities that have been identified by the ID Team in response to specific scoping comments. The second set of alternatives are those alternative pre-feasibility elements that were identified during our analysis, but for administrative, environmental, or technical reasons have been eliminated from further analysis.

2.1. Alternatives Considered in Detail in this EA

2.1.1. Alternative 1 – No Action

NEPA requires consideration of a no action alternative. However, under Forest Service mining regulations at 36 CFR Part 228, Subpart A, this option can only be considered for comparison purposes in processing a plan of operations and cannot be selected by the Forest Service. Section 1.5 provides additional discussion regarding the Forest Service's decision framework.

Under the no action alternative, none of the Pre-feasibility Activities would be authorized on public lands administered by the Forest Service (National Forest System Lands). RCM would initiate reclamation and closure requirements for existing drill sites and user-created roads in accordance with the requirements of their previously authorized exploration and monitoring activities.

RCM would continue with their pre-feasibility studies on private and State lands. The Forest Service is required to provide reasonable access under U.S. Mining Laws. Drilling activities at RES-13 are expected to continue and access through the Oak Flat Withdrawal Area is considered the most reasonable existing

means of access. Activities at the Superior East Plant Site such as the dewatering of the Number 9 Shaft and the Sinking of the Number 10 Shaft would continue and RCM would continue to use Magma Mine Road to access this site

2.1.2. Alternative 2 – The Proposed Action

This alternative consists of those activities proposed by RCM in the Pre-feasibility Plan of Operations submitted in February 2008. Based on questions provided during public scoping, the Forest Service requested that clarifications of certain aspects of the Pre-feasibility Plan of Operations be provided by RCM. These clarifications have been included in the description of the proposed action.

The proposed action is described here in four subsections. First we present a general description of the Pre-feasibility Activities with a description of each element. The following section presents RCM's proposed water resource management activities, including the source and quantity of water required to implement various Pre-feasibility Activities. Proposed environmental protection measures identified by RCM in their Pre-feasibility Plan of Operations are presented then followed by proposed reclamation and closure measures.

Pre-Feasibility Activities

The Pre-feasibility Plan of Operations activities include:

1) Constructing five exploration drill sites that would impact approximately 1.14 acres and directional drilling on those sites;

2) Constructing eight drill sites to accommodate a total of three deep and six shallow groundwater testing and monitoring wells that would impact approximately 1.78 acres;

3) Constructing nine drill sites that would impact approximately 1.8 acres to accommodate a total of nine geotechnical characterization boreholes;

4) Continuing exploratory and monitoring activities at previously authorized drill sites that have impacted approximately 3.02 acres;

5) Completing necessary roadway improvements on approximately 16.97 miles of existing roads that would impact approximately 33.39 acres;

6) Construction of 0.33 mile of new roads that would impact 0.55 acre; and

7) Road maintenance for access to previously authorized drill sites and the new drill sites.

The proposed construction activities would occur on 38.66 acres and the Previously Authorized Activities have impacted 3.02 acres. Total impacts would be 41.68 acres of National Forest System Lands. Collectively, these activities described in the Pre-feasibility Plan of Operations are referred to in this EA as the Pre-feasibility Activities.

Each of the exploration and groundwater testing and monitoring drill sites would have an approximate 80-foot by 100-foot work area for the placement of drill pads and associated equipment, mud pits, temporary storage structures, and portable toilets (Figure 2-2). The actual dimensions of each site and the anticipated surface disturbance from construction of each site may be as much as 0.12 acre more than the minimum area requirement because of topographic and site constraints. The tunnel characterization drill sites will have a 60-foot by 100-foot work area. The requirements for cut and fill slopes to create a flat working area at these sites would result in up to 0.16 acre increase in disturbance foot print beyond the required footprint for the working area. The approximate area of impact identified for each of the sites is based on 2007 aerial photographs and 10-foot contour intervals (provided in Appendix D of the Pre-feasibility Plan of Operations). Roadway improvements would be necessary to gain access to many of the proposed drill sites. Table 2-1 provides a summary of surface disturbance for the proposed new Pre-feasibility Activities. Table 2-2 describes the expected occupancy period and authorization period for each of the Pre-feasibility Activities.

Table 2-1. Estimated Disturbance Area for New Pre-feasibility Activities

Pre-feasibility Activity Type	Disturbance Area (acres)
New Drill Site Disturbance	4.72
Existing Access Road Improvements	33.39
New Access Road Construction	0.55
Total Disturbance Area	**38.66**

The following sections provide general descriptions of the exploration drilling activities, the groundwater testing and monitoring well construction and testing and monitoring activities, the tunnel characterization drilling activities, and each of the drill sites associated with these Pre-feasibility Activities.

Exploration Drilling

A total of five exploration drill sites (QC-04, MB-03, OF-1, OF-2, and OF-3) are proposed as part of the Pre-feasibility Activities. Three of the drill sites, QC-04, MB-03, and OF-2, would be placed on previously disturbed National Forest System Lands. Each of these sites would be drilled for the purpose of mineral exploration. At exploration drill sites OF-1, OF-2, and OF-3, up to four trunk holes, or pre-collar holes, would be drilled to a depth of approximately 3,000 feet using the rotary drilling technique. Multiple core holes would then be drilled from each trunk hole to approximately 7,000 feet using diamond drilling. No directional drilling would be conducted under the Oak Flat Withdrawal Area. Exploration drill sites QC-04 and MB-03 would be used to collect geologic data regarding the North Boundary Fault. At each of these sites up to four exploration core holes would be drilled.

Table 2-2. Pre-feasibility Activities Proposed Duration and Authorization Period. Note that reclamation activities would commence the end of the authorization period.

Pre-Feasibility Activity	Drill Site Activity and Occupancy Periods	Authorization Period
Exploration Drilling (OF-1, OF-2, OF-3, North OF-2 alternative, MB-03, QC-04)	Continuous occupancy throughout the authorization period for all exploration drill sites with multiple re-occupancy allowed. However, occupancy for MB-03 and QC-04 is proposed for one continuous period that would not exceed 9 months.	December 31, 2014
Deep Groundwater Testing and Monitoring Well Construction (H-L, H-K, H-N)	Approximately 6 to 9 weeks of drilling activity during a maximum 9-month continuous occupancy period for each well.	December 31, 2014
Shallow Groundwater Testing and Monitoring Well Construction (H-C, H-E, H-F, H-G, H-I, H-K)	Approximately 6 to 9 weeks of drilling activity during a maximum 9-month occupancy period for each well.	December 31, 2014
Tunnel Characterization Geotechnical Borehole Drilling (PVT-3, PVT-4, PVT-5, PVT-6, PVT-7, PVT-8, PVT-9, APV-6, APV-8)	Approximately 3 to 5 weeks of drilling activity during a maximum 6-month occupancy period for each geotechnical borehole.	December 31, 2016
Groundwater Testing and Monitoring Activities	Throughout the authorization period for testing and monitoring purposes	December 31, 2025
Road and Drill Site Construction for Exploration and Deep and Shallow Groundwater Monitoring Wells	N/A	December 31, 2014
Road and Drill Site Construction for Tunnel Characterization Bore Holes	N/A	December 31, 2016
Road Maintenance for Groundwater Testing and Monitoring	N/A	December 31, 2025

Common Used Drilling Terms

- Diamond Drilling: A diamond bit on a hollow steel rod is driven into rock using a high speed rotary motion. Yields core sample for geologic analysis.
- Directional Drilling: Using specialized equipment to drill curved boreholes.
- Rotary Drilling: Using a rotary drill rig, an open hole is created by grinding up material in the hole which is brought up to the surface by air or water.
- Trunk Hole: A large diameter cased bore hole. Directional core drilling can be completed from the bottom of the trunk hole.

Drilling operations at exploration drill sites would end by December 31, 2014. Some of these exploration drill holes would be equipped with electronic monitoring instruments and long-term groundwater monitoring would continue through December 2025. After completion of drilling and testing activities, those sites not selected for monitoring would be graded and reclaimed.

Table 2-3 summarizes the total estimated surface disturbance expected for each of the exploration drill sites. Descriptions of each of the exploration drill sites follows.

Table 2-3. Estimated Disturbance Area for New Exploration Drill Sites. The typical working area dimension for exploration drill sites is 80 feet by 100 feet (0.18 acre) Because of topographic constraints, some drill sites would have a larger footprint than others. The area of disturbance for each proposed exploration drill site is based upon the drawings provided in Appendix D of the Pre-feasibility Plan of Operations. Total surface disturbance is reported, whether previously disturbed or not.

Drill Site	Acres of Disturbance
QC-041	0.26
MB-031	0.25
OF-1	0.18
OF-2[1]	0.22
OF-3	0.23
Total	**1.14**

[1] QC-04, MB-03, and OF-2 are located on previously disturbed sites.

Drill Site QC-04. QC-04 would be located on previously disturbed National Forest System Lands along the west side of Apache Leap in Township 2 South, Range 12 East, in the SE¼, NE¼, NE¼ of Section 2. Up to four exploration boreholes would be drilled at this site to collect geologic information about the West Boundary Fault. The total estimated surface disturbance for the construction of this drill site is 0.26 acre. QC-04 would be accessed from FR 2440 and an existing user-created road that continues to the drill site. FR 2440 would require improvements on approximately 0.9 mile of existing road. The existing user-created road from FR 2440 to QC-04 would require an additional 0.1 mile of improvements.

Drill Site MB-03. MB-03 would be located on previously disturbed National Forest System Lands along the west side of Apache Leap in Township 2 South, Range 12 East, in the NW¼, NW¼, SW¼ of Section 1. Up to four exploration boreholes would be drilled at this site to collect geologic information about the West Boundary Fault. The estimated surface disturbance for the construction of this drill site is 0.25 acre. MB-03 would be accessed from FR 2440 and 0.4 mile of additional improvement would be required for this road beyond the turn-off for QC-04.

Drill Site OF-1. OF-1 would be located on previously undisturbed National Forest System Lands south of the Oak Flat Withdrawal Area in Township 1 South, Range 13 East, in the NW¼, SW¼, SE¼ of Section 33. Up to three pre-collar rotary holes would be drilled within the footprint of disturbance and multiple core holes would be drilled from each of the pre-collar holes. A long-term groundwater monitoring well may be established within one of the core holes. Directional drilling would not be conducted under the Oak Flat Withdrawal Area. The estimated surface disturbance for the construction of this drill site is 0.18 acre. OF-1 would be accessed from Magma Mine Road within the Oak Flat Withdrawal Area by turning east on FR 2438, turning southwest on an existing user-created road, turning south on FR 3153, and then traveling 0.20 mile north along a proposed new access road segment.

Drill Site OF-2. OF-2 would be located on previously disturbed land west of the Oak Flat Withdrawal Area along Magma Mine Road in Township 1 South, Range 13 East, in the SE¼, NW¼, NE¼ of Section 32. Up to three pre-collar rotary holes would be drilled within the footprint of this drill pad and multiple core holes would be drilled from each of the pre-collar holes. A long-term groundwater

monitoring well may be established within one of the core holes. Directional drilling would not be conducted under the Oak Flat Withdrawal Area. The estimated surface disturbance for the construction of this drill site is 0.22 acre. OF-2 would be accessed from the Magma Mine Road. An access road from Magma Mine Road to the site already exists but would require approximately 75 feet of roadway improvements.

Drill Site OF-3. OF-3 would be located west of OF-1 and south of the Oak Flat Withdrawal Area on undisturbed National Forest System Lands in Township 1 South, Range 13 East, NE¼, SW¼, SW¼ of Section 33. Up to three pre-collar rotary holes would be drilled within the footprint of this drill site and multiple core holes would be drilled from each of the pre-collar holes. A long-term groundwater monitoring well may be established within one of the core holes. Directional drilling would not be conducted under the Oak Flat Withdrawal Area. The estimated surface disturbance for the construction of this drill site is 0.23 acre. Access to OF-3 would be accessed from the Magma Mine Road within the Oak Flat Withdrawal Area by turning east on FR 2438, then turning to the southwest along an existing user-created road, and then turning south on FR 3153. OF-3 is located immediately adjacent to FR 3153.

Groundwater Testing and Monitoring Wells

Deep and shallow groundwater testing and monitoring wells are proposed for construction as part of the Pre-feasibility Activities. Each of these well types and proposed testing and monitoring procedures is described in greater detail below.

Deep Groundwater Testing and Monitoring Wells. Three deep groundwater testing and monitoring wells are proposed. Well DHTW-01 would be located at H-L, well DHTW-02 would be located at H-K, and well DHTW-03 would be located at H-N. The purpose of the deep groundwater testing and monitoring wells is to obtain geologic and groundwater data, including: 1) depth to groundwater level; 2) lithology of drill cuttings; 3) aquifer hydraulic parameters, including transmissivity, hydraulic conductivity, and storage coefficients; and 4) chemical quality of groundwater. Drilling and well construction is expected to take from 6 to 8 weeks.

Common Terms

- Air Drilling: using compressed air or nitrogen to cool the drill bit and lift cuttings out of the bore hole.
- Casing: A large diameter pipe inserted into borehole and cemented into place.
- Drilling Mud: A fluid used to clean and cool the drill bit.
- Geophysical Logging: Making a detailed record of the geologic formations penetrated by a bore hole.
- Reverse Circulation Drilling: A method to bring the sample to the surface inside the drill rods to reduce contamination.

Construction of each deep groundwater testing and monitoring well would begin with a 16-inch diameter hole that would be drilled to a minimum of 20 feet followed by the placement of a 12-inch diameter steel surface casing that would be set and cemented into place. Once the surface casing is established, a vertical 12 7/8-inch diameter borehole would be drilled to a depth of 1,476 to 4,600 feet using the reverse-circulation air-drilling technique. When drilling is complete, a 7-inch steel casing would be installed. A specialized grout mixture would be used to fix four to six vibrating wire piezometers between

the 7-inch casing and the borehole wall. The location of the vibrating wire piezometers would be determined by inspecting the geophysical logs. Once the grout is cured, rotary drilling would resume and a 6 3/4-inch borehole would be drilled to a depth of approximately 7,000 feet. Upon completion of geophysical logging of this lower segment of the monitoring well, 4-inch blank and slotted casing would be installed. The depths of slotted casing would be based on geophysical logging. Electronic monitoring instruments to monitor depth to groundwater would be installed in the lower portion of the deep groundwater testing and monitoring wells. Figure 2-3 depicts a vertical cross section for the deep groundwater testing and monitoring wells. A 3-foot by 3-foot concrete pad would be constructed around the monitoring well surface casing once well construction is completed.

During drilling and well construction, careful observation of any formation water entering the borehole would be made. Drilling may be paused periodically to evaluate the quantity and quality of the groundwater entering the borehole. Airlift pumping would be used to raise the water to the surface to be evaluated. A hydrologist would monitor the drilling operations and a full suite of geophysical well logs would be documented before the casing is installed. As part of the well development process, open borehole airlift operations would provide: 1) development of the borehole to reduce impacts of the drilling process; 2) specific capacity of the well prior to well construction; 3) an estimate of aquifer transmissivity based on constant-rate pumping and recovery analysis; and, 4) an opportunity for collection of representative water samples for chemical analysis.

Well construction and development activities are not expected to exceed 9 months for each well. Construction of the three deep groundwater testing and monitoring wells would be completed by December 2014. Monitoring activities would be completed by December 2025.

Shallow Groundwater Testing and Monitoring Wells. Six shallow groundwater testing and monitoring wells are proposed in the Pre-feasibility Plan of Operations. The six shallow groundwater monitoring and testing wells would be located at drill sites H-C, H-E, H-F, H-G, H-I, and H-K. The purpose of the shallow monitoring wells is to obtain groundwater data, such as the direction and magnitude of water level gradients and aquifer parameters for geologic units. The monitoring wells would support environmental baseline data collection and long-term monitoring for pre-feasibility studies.

Construction of each shallow groundwater testing and monitoring well begins with a 16-inch diameter hole that would be drilled to a minimum 20-foot depth followed by the placement of a 12-inch diameter steel surface casing that would be set and cemented into place. Once the surface casing is established, a 6 3/4-inch borehole would be drilled to a depth of approximately 1,500 feet. Upon completion of geophysical logging, a 4-inch blank and slotted steel casing would be installed to the depth of each well. Determination of the interval(s) for placement of slotted casing would be based on geophysical logging and the results of well development testing. Well development would be conducted in the same manner as the deep groundwater testing and monitoring wells. A 3-foot by 3-foot concrete pad would be constructed around the monitoring well surface casing once well construction is complete. Monitoring activities

would be completed by December 2025. Figure 2-3 depicts a typical vertical cross section of a shallow groundwater testing and monitoring well.

Well construction and development activities are expected to take 6 to 9 weeks. Construction of the six shallow groundwater testing and monitoring wells would be completed by December 2014.

Groundwater Testing and Monitoring Procedures. The deep and shallow groundwater testing and monitoring wells would utilize similar testing and monitoring procedures. Quarterly testing would be conducted at each well to collect groundwater quality data. Groundwater for testing purposes would be collected from each well using a small-capacity electric submersible pump. These pumps would not be permanently installed in each testing and monitoring well, but would be placed into each well as needed for collection of water samples for chemical testing. Permanently installed electronic monitoring instruments and vibrating wire piezometers (in the deep testing and monitoring wells) would be used to measure groundwater elevation. RCM would provide the Forest Service with information collected from the deep and shallow groundwater testing and monitoring wells.

Analysis of groundwater draw down and recovery data obtained during constant-rate pumping tests would be periodically conducted to evaluate aquifer condition and function. The frequency and duration of aquifer testing would be based on the data needs for modeling in support of continuing pre-feasibility studies.

Groundwater Testing and Monitoring Well Drill Sites. Eight groundwater testing and monitoring well drill sites are proposed for construction as part of the Pre-feasibility Activities. Table 2-4 summarizes the total estimated surface disturbance expected for each of the groundwater testing and monitoring drill sites.

Table 2-4. Estimated Disturbance Area for New Groundwater Testing and Monitoring Drill Sites. The typical working area dimension for groundwater testing and monitoring drill sites is 80 feet by 100 feet (0.18 acre). Because of topographic constraints, some drill sites would have a larger footprint than others. The area of disturbance for each proposed drill site is based upon the drawings provided in Appendix D of the Pre-feasibility Plan of Operations.

Drill Site	Acres of Disturbance
H-C	0.27
H-E	0.16
H-F	0.25
H-G	0.20
H-I	0.18
H-K	0.30
H-L	0.15
H-N	0.27
Total Drill Site Disturbance Area	**1.78**

A description of each of the groundwater testing and monitoring drill sites follows.

Drill Site H-C. H-C would be developed for groundwater monitoring and testing and would be located along FR 3139 on undisturbed National Forest System Lands in Township 2 South, Range 13 East, in the SE¼, NE¼, NE¼ of Section 20. Shallow groundwater testing and monitoring well HRES-C would be drilled at H-C. Groundwater in underlying units of Whitetail Conglomerate where Apache Leap Tuff is absent would be evaluated to determine the direction and magnitude of water level gradients and define aquifer parameters. The total estimated surface disturbance for the construction of this drill site is 0.27 acre. H-C would be accessed from S.R. 177 by turning onto FR 315, turning north on to FR 2261, and then traveling east along FR 3139. FR 315 and FR 2261 would require 3.6 miles and 0.3 mile of improvements, respectively. Improvements would also be necessary along a 0.4-mile segment of FR 3139. These roads would be maintained to accommodate long-term groundwater testing and monitoring.

Drill Site H-E. H-E would be developed for groundwater monitoring and testing and would be located adjacent to a user-created road on undisturbed National Forest System Lands in Township 2 South, Range 13 East, in the SE¼, NW¼, NE¼ of Section 7. Shallow groundwater testing and monitoring well HRES-E would be drilled at H-E to evaluate existing aquifer conditions in the Apache Leap Tuff, Whitetail Conglomerate, and older units near the edge of Apache Leap. The estimated surface disturbance for the construction of this drill site is 0.16 acre. H-E would be accessed from the Magma Mine Road by turning south on FR 315, and then turning to the southwest on to an existing user-created road shortly after crossing over on State land. Approximately 0.8 mile of the user-created road would need to be improved.

Drill Site H-F. H-F would be developed for groundwater monitoring and testing and would be located adjacent to a user-created road on undisturbed National Forest System Lands, southeast of U.S. Highway 60 and east of Devils Canyon in Township 1 South, Range 13 East, in the SW¼, NW¼, SE¼ of Section 27. Shallow groundwater testing and monitoring well HRES-F would be drilled at H-F to evaluate fracturing on the downthrown side of a north-south fault east of Devils Canyon and to determine aquifer parameters including the direction and magnitude of water-level gradients of the Apache Leap Tuff. The total estimated surface disturbance for the construction of this drill site would be 0.25 acre. H-F would be accessed from U.S. Highway 60 by turning south on FR 2466 and then turning northwest on an existing user-created road. Approximately 4.2 miles of roadway improvements would be required along FR 2466 and approximately 0.7 mile of improvements would be required for the user-created road to gain access to the drill site.

Drill Site H-G. H-G would be located adjacent to FR 2466, east of U.S. Highway 60 and Devils Canyon on undisturbed National Forest System Lands in Township 1 South, Range 13 East, in the NE¼, NW¼, SE¼ of Section 22. Shallow groundwater monitoring well HRES-G would be drilled at H-G to evaluate fracturing on the downthrown side of a north-south fault east of Devils Canyon and to determine aquifer parameters, including the direction and magnitude of water-level gradients, of the Apache Leap Tuff. The estimated surface disturbance for the construction of this drill site would be 0.20 acre. H-G would be accessed from FR 2466. The access from U.S. Highway 60 would be improved by relocating the existing

cattle guard on FR 2466 just east of U.S. Highway 60 to allow large trucks to pull completely off the highway while gaining access to FR 2466. FR 2466 would be maintained through the duration of groundwater testing and monitoring activities to provide access to this site and other groundwater monitoring well sites accessed from FR 2466.

Drill Site H-I. H-I would be located on undisturbed National Forest System Lands adjacent to Rawhide Canyon along FR 2469 in Township 1 South, Range 13 East, in the SW¼, NW¼, SE¼ of Section 26. Shallow groundwater testing and monitoring well HRES-I would be drilled in the Apache Leap Tuff to collect aquifer data, including the direction and magnitude of water-level gradients in the eastern portions of the Devils Canyon drainage basin. The total estimated surface disturbance for the construction of this drill site would be 0.18 acre. H-I would be accessed from U.S. Highway 60 by turning south on FR 2466 to FR 2469. A 1.7-mile section of FR 2469 would require improvement to gain access to this site and portions of FR 2466 south of H-F would also need improvement.

Drill Site H-K. H-K would be located on previously undisturbed National Forest System Lands adjacent to FR 2458 in Township 1 South, Range 13 East, in the SW¼, NW¼, SW¼ of Section 21. Shallow groundwater testing and monitoring well HRES-K and a deep groundwater testing and monitoring well, DHTW-02, would be drilled at site H-K. HRES-K would be drilled to establish aquifer parameters within this portion of the Apache Leap Tuff, including the direction and magnitude of water-level gradients. DHTW-02 would be drilled to establish deep aquifer characteristics. The total estimated surface disturbance for the construction of this drill site would be 0.3 acre. H-K would be accessed from U.S. Highway 60 by turning north on FR 2458. Two new access road segments, one approximately 150 feet long and the other approximately 175 feet long, would be constructed from FR 2458 to H-K.

Drill Site H-L. H-L would be located on previously disturbed National Forest System Lands between the Oak Flat Withdrawal Area and U.S. Highway 60 in Township 1 South, Range 13 East, in the NE¼, NE¼, SE¼ of Section 28. Deep groundwater testing monitoring well DHTW-01 would be drilled at H-L to establish deep aquifer characteristics. The total estimated surface disturbance for the construction of this drill site would be 0.15 acre. H-L would be located on an existing user-created road accessed from FR 2438 in the Oak Flat Withdrawal Area. No road improvements would be required for access to this drill site.

Drill Site H-N. H-N is located on previously disturbed National Forest System Lands adjacent to FR 2466 east of Devils Canyon in Township 1 South, Range 13 East, in the SW¼, SW¼, SW¼ of Section 26. Deep groundwater testing and monitoring well DHTW-03 would be drilled at H-N to establish deep aquifer parameters. The total estimated surface disturbance for the construction of this drill site would be approximately 0.30 acre. H-N would be accessed from U.S. Highway 60 by turning south on FR 2466. Roadway improvements to FR 2466 would be required to access H-N and other nearby drill sites. Two short segments of new access road, each approximately 75 feet in length, would be constructed from FR 2466 to H-N. These segments would approach the site from the east and the west.

Tunnel Characterization Boreholes

One borehole would be located at each of nine tunnel characterization drill sites (PVT-3, PVT-4, PVT-5, PVT-6, PVT-7, PVT-8, PVT-9, APV-6, and APV-8) on National Forest System Lands. These boreholes are proposed to determine subsurface rock conditions along two possible tunnel alignments. Tunnel characterization boreholes would be drilled to depths ranging from approximately 990 to 1,670 feet. The geotechnical boreholes would be core drilled with the same techniques used for the exploration boreholes. Geotechnical boreholes would be 3 to 6 inches in diameter depending upon the final specification to be provided by the geotechnical engineer. Drilling activities and geotechnical testing at each drill site are expected to take 4 to 5 weeks. The maximum period of occupancy at each site would be 6 months. Drilling at these sites would be completed prior to December 2016. Upon completion of borehole drilling, each of the geotechnical boreholes could be used for groundwater testing and monitoring, if appropriate. Groundwater monitoring of selected boreholes would continue through December 31, 2025.

Nine tunnel characterization drill sites are proposed for construction as part of the Pre-feasibility Activities. Table 2-5 summarizes the total estimated surface disturbance expected for each of the tunnel characterization drill sites.

Table 2-5. Estimated Disturbance Area for New Tunnel Characterization Drill Sites. The typical working area dimension for groundwater testing and monitoring drill sites is 60 feet by 100 feet (0.14 acre). Because of topographic constraints, some drill sites would have a larger footprint than others. The area of disturbance for each proposed drill site is based upon the drawings provided in Appendix D of the Pre-feasibility Plan of Operations.

Drill Site	Acres of Disturbance
PVT-3	0.14
PVT-4	0.15
PVT-5	0.2
PVT-6	0.18
PVT-7	0.3
PVT-8	0.24
PVT-9	0.16
APV-6	0.14
APV-8	0.29
Total Drill Site Disturbance Area	**1.8**

A description of each of the tunnel characterization drill sites follows.

Drill Site PVT-3. PVT-3 would be located on partially disturbed National Forest System Lands adjacent to but outside of the northern boundary of the Oak Flat Withdrawal Area in Township 1 South, Range 13 East, in the SE¼, NE¼, SE¼ of Section 29. Geotechnical borehole PVT-3A would be drilled at PVT-3 and the disturbance from construction of this drill site would be approximately 0.14 acre. PVT-3 would be accessed from Magma Mine Road and an existing user-created road. No improvements are proposed for these access roads.

Drill Site PVT-4. This drill site would be located on partially disturbed National Forest System Lands northeast of Oak Flat and south of U.S. Highway 60 in Township 1 South, Range 13 East, in the SW¼, SW¼, NW¼ of Section 27. Geotechnical borehole PVT-4A would be drilled at PVT-4 and the disturbance from construction of this drill site would be approximately 0.15 acre. PVT-4 would be accessed from via the Magma Mine Road by turning east on FR 2438 in the Oak Flat Withdrawal Area and then north onto an existing user-created road. No improvements are proposed for these roads.

Drill Site PVT-5. This drill site would be located on partially disturbed National Forest System Lands, east of U.S. Highway 60 and Devils Canyon in Township 1 South, Range 13 East, in the NW¼, NW¼, NE¼ of Section 27. Geotechnical borehole PVT-5A would be drilled at PVT-5 and the disturbance from construction of this drill site would be approximately 0.20 acre. PVT-5 would be accessed from U.S. Highway 60 by turning east on FR 2466 then turning west on FR 2461 to a proposed new access road. Approximately 0.9 mile of FR 2461 would require improvements and approximately 330 feet of new access road would need to be constructed.

Drill Site PVT-6. This drill site would be located on previously disturbed National Forest System Lands southeast of U.S. Highway 60 and approximately 1.25 miles east of Devils Canyon in Township 1 South, Range 13 East, in the SE¼, SW¼, NE¼ of Section 23. Geotechnical borehole PVT-6A would be drilled at PVT-6 and the disturbance from construction of this drill site would be approximately 0.18 acre. PVT-6 would be accessed from U.S. Highway 60 by turning east on FR 2466 turning east on FR 2463 where FR 2466 turns to the south. Approximately 0.5 mile of FR 2463 would require improvements to access this drill site.

Drill Site PVT-7. This drill site would be located on partially disturbed National Forest System Lands south of Pinal Ranch and approximately 0.5 mile south of U.S. Highway 60 in Township 1 South, Range 13 East, in the NW¼, NE¼, NW¼ of Section 24. Geotechnical borehole PVT-7A would be drilled at PVT-7 and the disturbance from construction of this drill site would be approximately 0.30 acre. Approximately 0.5 mile of improvements to FR 2511 would be required for access to this drill site. Drilling equipment would be transported to PVT-7 via FR 2511 and a newly constructed access road from privately owned lands on Pinal Ranch. If access through Pinal Ranch cannot be secured, equipment would be transported to the site via helicopter. Crew and service equipment would reach the site by helicopter or by an improved trail from privately owned lands on the JI Ranch located west of PVT-7. The improved trail would achieve the management standards of a Level 1 Forest Service road, and would be maintained for high-clearance, four-wheel drive vehicles moving at low speeds. The road would not be suitable for passenger cars and would be closed to the public. The impacts associated with helipad construction, if necessary, are included in the calculation of impacts for improvement along FR 2511. If access is secured from Pinal Ranch, approximately 0.21 acre would be impacted on National Forest System Lands through the construction of an access road to FR 2511. If the trail from JI Ranch is improved for crew and service equipment access, approximately 0.40 acre would be impacted on National Forest System Lands.

Drill Site PVT-8. This drill site would be located on disturbed National Forest System Lands east of U.S. Highway 60 and northeast of Top of the World at the intersection of FR 320 and FR 2577 in Township 1 South, Range 14 East, in the NW¼, NE¼, SE¼ of Section 7. Geotechnical borehole PVT-8A would be drilled at PVT-8 and the disturbance from construction of this drill site would be approximately 0.24 acre. PVT-8 would be accessed from U.S. Highway 60 by turning east on FR 320. Approximately 0.6 mile of FR 320 would require improvement to provide access for equipment to this drill site.

Drill Site PVT-9. PVT-9 would be located on previously disturbed National Forest System Lands, south of U.S. Highway 60 and northeast of Top of the World in Township 1 South, Range 14 East, in the NE¼, NW¼, NW¼ of Section 8. Geotechnical borehole PVT-9A would be drilled at PVT-9 and the disturbance from construction of this drill site would be approximately 0.16 acre. PVT-9 would be accessed from U.S. Highway 60 turning south on an existing user-created road. Approximately 0.1 mile of this short road would require minor improvements.

Drill Site APV-6. This drill site would be located on previously disturbed National Forest System Lands approximately 1.25 miles east of Devils Canyon in Township 1 South, Range 13 East, in the NE¼, SW¼, SE¼ of Section 23. Geotechnical borehole APV-6A would be drilled at the APV-6 and the disturbance from construction of this drill site would be approximately 0.14 acre. APV-6 would be accessed from U.S. Highway 60 by turning east on FR 2466 and then turning west on FR 2505. Approximately 0.5 mile of FR 2505 and the intersection of FR 2505 and FR 2466 would require improvements to gain access to this drill site.

Drill Site APV-8. This drill site would be located on previously disturbed National Forest System Lands north of U.S. Highway 60 and east of Devils Canyon in Township 1 South, Range 13 East, in the SE¼, NW¼, SE¼ of Section 11. A geotechnical borehole, APV-8A, would be drilled at APV-8 and the disturbance from construction of this drill site would be 0.29 acre. APV-8 would be accessed from U.S. Highway 60 by turning north on FR 898 and then east on an existing user-created road. Approximately 0.7 mile of FR 898 and 0.1 mile of the user-created road would require improvements to access this drill site.

Access Road Improvement, Construction, and Maintenance

Most of the previously approved and proposed drill sites would be accessed from U.S. Highway 60 and Forest Service system and user-created roads. Three sites would be accessed from S.R. 177 and Forest Service system and user-created roads. If access from private lands is not secured for PVT-7, it would be accessed via helicopter. Seventeen Forest Service system and user-created roads totaling approximately 16.97 miles would require improvements to provide access to the proposed drill sites. In addition, four new access road segments totaling approximately 0.33 mile are planned.

Improvements to Existing Access Roads. Road Improvement Classifications: Three levels of roadway improvements were assumed in determining the maximum area of proposed roadway improvement impacts identified in the Pre-feasibility Plan of Operations. In this EA we refer to them as Level A, Level B and Level C road improvements.

Level A road improvements would require surface grading, minor road dressing, and edge treatment resulting in an average disturbance width of 6 feet, 3 feet on either side of the existing road.

Level B road improvements are more intensive than Level A improvements because of the topography of the existing road, state of repair, or geologic substrate. Level B road improvements would include surface grading, road dressing, and edge treatments resulting in an average disturbance width of 10 feet, with 5 feet on both sides of the existing road.

Level C road improvements are those areas identified in the Pre-feasibility Plan of Operations that have specifically identified disturbance boundaries. These areas were identified by RCM and called out in the Plan because of specifically identified needs to widen specific turns, widen narrow stretches of road, reduce road grade, and construct safety turn-outs and/or turn-arounds. Where Level C road improvements are located on a road designated for Level A improvements, 6 feet of additional disturbance has been assumed for impact calculation in the Level C area. Similarly, when a Level C road improvement is located on a road designated for Level B improvements, 10 feet of additional disturbance have been assumed for the Level C area.

Level A, B, and C road improvements would be made along portions of approximately 16.97 miles of existing access roads. Approximately 11.50 miles of existing access road would require Level A road improvements and approximately 5.47 miles of roadways would require Level B road improvements. Table 2-6 provides a summary of the proposed road improvements on National Forest System Lands.

Some existing roads would not require improvements to achieve the Level 2 High Clearance Vehicles maintenance standard; however, these roads would require periodic maintenance. Maintenance activities would not result in additional surface disturbance to maintain access to the Pre-feasibility Activities drill sites. Table 2-7 provides a summary of proposed maintenance activities by road.

Magma Mine Road is an existing two-lane, paved road that was originally constructed to provide access to the Superior East Plant Site in the 1970s. This road would continue to be used to access a number of existing drill sites on National Forest System Lands and the Superior East Plant Site. To maintain visibility for the transport of heavy equipment, the vegetation immediately adjacent to the paved roadway section would be cleared or trimmed regularly, as has been the practice in prior years.

Table 2-6. Proposed Improvement to Existing Roads within National Forest System Lands. All distances are distances within National Forest System Lands.

Level 1 (Basic Custodial Care) roads may be of any type, class or construction standard, and may be managed at any other maintenance level during the time they are open for traffic; however, while maintained at Level 1, they are closed to vehicular traffic, but may be open and suitable for non-motorized uses.

Level 2 (High Clearance Vehicles) roads are open for use by high clearance vehicles and have low traffic volume and speed. These roads typically are local and connect collector roadways, have at-grade drainage treatment; are not subject to the requirements of the Highway Safety Act; do not provide surface smoothness; and are not suitable for passenger cars.

Level 3 (Suitable for Passenger Cars) roads typically have low speed and a single lane with turnouts and spot surfacing. These roads have low to moderate traffic volume, typically connect to arterial and collector roads, and may include some dispersed recreation roads.

Level 4 (Moderate Degree of User Comfort) roads provide a moderate degree of user comfort and convenience at moderate travel speeds. These roads typically may connect to county roads, are usually considered collector roads, can be double-lane, aggregate surfaced, and dust-abated, and have culverts for drainage treatment.

Level 5 (High Degree of User Comfort) roads provide a high degree of user comfort and convenience. These roads provide the highest traffic volume and speeds, are usually arterial or collector roadways, and are normally double-lane, paved facilities. Some may be aggregate surfaced and dust abated.

Road	Forest Service Road Maintenance Level [1, 2]	Planned Road Condition During Pre-feasibility Plan of Operations Implementation Plan of Operation Activities [2]	Length [4, 5]	
			Feet	Miles
FR 315	Level 4 – Moderate Degree of User Comfort	Maintain and repair road segments that currently meet the Moderate Degree of User Comfort standard if they are damaged or adversely affected by planned activities and improve road segments where its condition is not sufficient to provide required access. When necessary, degraded road segments would be brought up to a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	19,164	3.63
FR 320	Level 2 – High Clearance Vehicles	Maintain and repair road segments that currently meet the Level 2 maintenance standard if they are damaged or adversely affected by planned activities and improve road segments where this current condition is not met to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	3,174	0.60
FR 898	Level 2 – High Clearance Vehicles	Maintain and repair road segments that currently meet the Level 2 maintenance standard if they are damaged or adversely affected by planned activities and improve road segments where this current condition is not met to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2,979	0.56
Existing Road from FR 898 to APV-8	User-Created[3]	Improve road segment to generally achieve the Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	486	0.09

Table 2-6. (Continued)

Road	Forest Service Road Maintenance Level [1, 2]	Planned Road Condition During Pre-feasibility Plan of Operations Implementation Plan of Operation Activities [2]	Length [4, 5]	
			Feet	Miles
FR 2261	Level 2 – High Clearance Vehicles	Maintain and repair road segments that currently meet the Level 2 maintenance standard if they are damaged or adversely affected by planned activities and improve road segments where this current condition is not met to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	1,466	0.28
FR 2440	Level 1 – Basic Custodial Care	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	6,554	1.24
FR 2461	Level 2 – High Clearance Vehicles	Maintain and repair road segments that currently meet the Level 2 maintenance standard if they are damaged or adversely affected by planned activities and improve road segments where this current condition is not met to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2,106	0.40
Existing Extension of 2461	User-Created (3)	Improve road segments to generally achieve the Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2,477	0.47
FR 2463	Level 1 – Basic Custodial Care	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2,606	0.49
FR 2466 (and small portion of FR 2467)	Level 2 – High Clearance Vehicles	Maintain and repair road segments that currently meet the Level 2 maintenance standard if they are damaged or adversely affected by planned activities and improve road segments where this current condition is not met to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	22,285	4.22
FR 2469	Level 1 – Basic Custodial Care	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	9,029	1.71
FR 2505	Level 1 – Basic Custodial Care	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2,523	0.48
FR 2511	Level 1 – Basic Custodial Care	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2,640	0.50
FR 3139	Level 1 – Basic Custodial Care	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2283	0.43
FR 3153	Level 2 – High Clearance Vehicles	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	373	0.07

Table 2-6. (Continued)

Road	Forest Service Road Maintenance Level [1, 2]	Planned Road Condition During Pre-feasibility Plan of Operations Implementation Plan of Operation Activities [2]	Length [4, 5]	
			Feet	Miles
Existing Road from FR 315 to H-E	User-Created[3]	Improve road segments to generally achieve the Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	4,183	0.79
Existing Road from FR 2440 to QC-04	User-Created[3]	Improve road segments to generally achieve the Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	522	0.10
Existing Road from FR 2466 to H-F	User-Created[3]	Improve road segments to generally achieve the Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	3,746	0.71
Existing Road from U.S. Highway 60 to PVT-9	User-Created[3]	Improve road segments to generally achieve the Level maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	336	0.06
Existing Road from Magma Mine Road to private holding	User-Created[3]	Improve road segments to generally achieve the Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	651	0.12
		Total	**89,583**	**16.97**

[1] Data provided as a shape file by TNF on December 4, 2007 (Globerd_rds.shp). These are transportation management designations and do not necessarily reflect the current condition or drivability of the specific road segment.

[2] Forest Service Transportation Management Maintenance Standards are defined in FSH 7709.58, 10, 12.3:

[3] User-Created is the Forest Service terminology for roads that were not created and maintained under the Forest Road management plan. In all cases these roads existed prior RCM activities in the region

[4] These values reflect an estimate of the linear distance of Forest Roads that would be used to access the PAA. As indicated on Sheets 1 to 53 in Appendix D of the Pre-feasibility Plan of Operations, various levels of improvement would be needed along these road segments. Improvements would range from minor dressing and maintenance activities to relatively extensive reconstruction to achieve the desired condition required to provide access for Pre-feasibility Activities. These reconstruction and maintenance levels are referred to as Level A, B, and C in the detailed summary provided in Appendix A of this EA.

[5] In addition to the proposed access improvements on TNF, approximately 3.2 miles of existing roads would be improved on State and privately owned lands to access proposed activities on National Forest System Lands.

Table 2-7. Existing Roads within National Forest System Lands that do not Require Improvements but will Require Periodic Maintenance to Maintain Level 2 Maintenance Standard during Pre-feasibility Activities. For definition of terms and notes see Table 2-6. All distances are distance within National Forest System Lands. Magma Mine Road has multiple Forest Service road designations. For purposes of this discussion and analysis the Magma Mine Road begins at its intersection with U.S. Highway 60 and ends at the Superior East Plant Site.

Road	Forest Service Road Maintenance Level [1, 2]	Planned Road Condition During Pre-feasibility Plan of Operations Implementation Plan of Operation Activities [2]	Length [4, 5]	
			Feet	Miles
Magma Mine Road	Level 5	Vegetation trimming and clearing to maintain visibility for heavy equipment transport.	10,842	2.05
Existing Road from Magma Mine Road, near Superior East Plant Site south to private in-holding.	User-Created	Continue to maintain this road segment to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	562	0.11
Existing Road From Magma Mine Road to Site #1	User-Created	Continue to maintain this road segment to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	699	0.13
Existing User-Created Road From Magma Mine Road north to Drill Site PVT-3	User-Created	Continue to maintain this road segment to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	743	0.14
FR 2438 from Magma Mine Road east to a user-created bypass Road to FR 3153	Level 2	Continue to maintain this road segment to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2,562	0.49
User-created bypass road from FR 2438 to FR 3153	User-Created	Continue to maintain this road segment to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2,533	0.48
User-created road (old U.S. Highway 60) from 2438 to Drill Sites H-L and PVT-4	User-Created	Continue to maintain this road segment to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	4,100	0.78
FR 3153 south to proposed new road to OF-1	Level 2	Continue to maintain this road segment to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	5,002	0.95
		Total	**27,043**	**5.13**

Within the Oak Flat Withdrawal Area, RCM would continue to maintain the existing roads to access drill site M and an existing drill site on State lands south of the withdrawal boundary. In the past, most of RCM's road maintenance efforts within the Oak Flat Withdrawal Area have focused on FR 3153. This section of road has been maintained with sand from the north intersection with FR 2438 and with coarse fill material made from crushed boulders within the roadway. In the future, coarse fill would be provided from the Superior East Plant Site using Apache Leap Tuff. Existing roadway alignments within the Oak Flat Withdrawal Area would not be altered and a hammer hoe or similar equipment would not be used for maintenance of FR 3153. A user-created road exists in Oak Flat between FR 2438 and FR 3153.

Construction of New Access Road Segments. The total estimated surface disturbance area for the 0.33 mile of new access road is approximately 0.55 acre. This was calculated based upon a maximum disturbance width of 15 feet. A summary of proposed new access roads is provided in Table 2-8.

Table 2-8. New Access Roads within Tonto National Forest

Road	Road Management Classification	Planned Road Condition During Pre-feasibility Plan of Operation Activities	Length	
			Feet	Miles
Two New Access Roads from FR 2458 to Drill Site H-K	No Classification	Improve road segments to generally achieve the High Clearance Vehicles management standard suitable for the equipment required to accomplish planned activities	177	0.04
	No Classification	Improve road segments to generally achieve the High Clearance Vehicles management standard suitable for the equipment required to accomplish planned activities	151	0.03
New Access from FR 2461 to Drill Site PVT-5	No Classification	Improve road segments to generally achieve the High Clearance Vehicles management standard suitable for the equipment required to accomplish planned activities	330	0.06
New Access from FR 3153 to Drill Site OF-1	No Classification	Improve road segments to generally achieve the High Clearance Vehicles management standard suitable for the equipment required to accomplish planned activities	1,069	0.20
		Total Length of New Access	**1,727**	**0.33**

Public Access and Traffic Management. The contractors hired to conduct road maintenance and construction activities would be responsible for public access in road construction areas. No roadway closures are planned. Short duration travel restrictions would be enforced during some periods of road construction to protect the public and limit the extent of surface disturbance associated with road construction and maintenance activities. Traffic control signage would be posted to notify the public of these travel restrictions and to identify alternative routes for public access. Where possible, turn-outs would be provided along roadways to allow the public to pass construction areas. The contractors responsible for road improvements would prepare and provide a traffic control plan for Forest Service approval prior to initiation of any road improvements. Signage used for construction and access management would comply with the guidelines in the Manual on Uniform Traffic Control Devices (FSM 7103.3).

Continuation of Previously Authorized Activities

Previously authorized exploration activities were approved by the Forest Service under the Resolution Project Exploratory Drilling Plan of Operations No. 01-12-02-002. The Previously Authorized Activities include: 1) nine combination exploration and groundwater monitoring well sites (Drill sites A, B, C, D, F, M, #1, #2, and #3); 2) one groundwater monitoring well (HRES-3 on the DOE Well Site); 3) improvement and maintenance of six Forest Service system and user-created roads for drill site access; and, 4) the placement of aboveground plastic pipe and tanks for potable water transfer and storage.

All of the approved drill site construction, roadway improvements and water system construction activities have been completed, except at Site F, which remains unoccupied. The disturbance footprints for the constructed drill sites vary. Any additional drilling at these sites would be planned for completion by December 2014. Access for groundwater testing and monitoring wells would be maintained through 2025. Table 2.9 provides a summary of the surface disturbance associated with the drill sites established as part of the Previously Authorized Activities.

Table 2-9. Estimated Disturbance Area for Drill Sites Established as Part of the Previously Authorized Activities. These estimates were made from recently flown aerial photography. (Site F has not been impacted at this time but it is included in this analysis as acres of previously authorized disturbance. The DOE Well Site was developed by the Department of Energy in 1990. Total disturbed area is approximately 0.66 acre. No additional clearing or site development was required to construct HRES-3 at this site).

Drill Site	Acres of Disturbance
Drill Site A	0.25
Drill Site B	0.07
Drill Site C	0.27
Drill Site D	0.21
Drill Site F	0.15
Drill Site M	0.55
Drill Site #1	0.94
Drill Site #2	0.28
Drill Site #3	0.30
DOE Well Site	No New Disturbance
Total Area	**3.02**

A brief description of the Previously Authorized Activity drill sites follows.

Drill Site A. Drill site A is located along FR 315 in Township 1 South, Range 13 East, in the SE¼, NW¼, SE¼ of Section 32. Two pre-collar holes (RES-4 and RES-7) with multiple core holes and one deep groundwater testing well (DHRES-2) have been developed at this drill site. Future activities at this drill site would include construction of up to two new pre-collar holes, A-3 and A-4, each with multiple core holes and ongoing monitoring at DHRES-2. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill pad and no changes to the configuration of this drill site are proposed.

Drill Site B. Drill site B is located along FR 315 south of Magma Mine Road in Township 1 South, Range 13 East, in the SE¼, SW¼, SE¼ of Section 32. RES-3 is an exploration drill hole developed at this drill site and consists of a single a pre-collar hole with multiple core holes. Future activities at this drill site would include construction of up to two new pre-collar holes, labeled B-2 and B-3, each with multiple core holes. RES-3 has been equipped with an electronic monitoring instrument for continual groundwater monitoring. New exploration pre-collar drill holes could be constructed within the footprint of the existing site and no changes to the configuration of this site are proposed.

Drill Site C. Drill site C is a previously approved site located along FR 315 south of Magma Mine Road in Township 2 South, Range 13 East, in a portion of Lot 3 in Section 6. Pre-collar exploration holes RES-2 and RES-17 have been constructed at the site and each has multiple core holes. Future activities at this drill site would include continued drilling of core holes at RES-2 and RES-17 and construction of one new pre-collar hole, labeled C-3, with multiple core holes. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill site and no changes to the configuration of this drill site are proposed.

Drill Site D. Drill site D is located along FR 315, south of Magma Mine Road in Township 2 South, Range 13 East, in a portion of Lot 4 in Section 6. Pre-collar exploration holes RES-1 and RES-14 have been developed at this site and each has multiple core holes. Planned activities would include continued drilling of core holes at RES-1 and RES-14 and construction of one new pre-collar hole, D-3, with multiple core holes. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill pad and no changes to the configuration of this drill site are proposed.

Drill Site F. Drill site F is located along FR 315, south of Magma Mine Road in Township 2 South, Range 13 East, in portions of Lot 4 in Section 6. Drilling activities have not been initiated at this drill site. Planned activities would include construction of one pre-collar hole, labeled F-1, with multiple core holes. The disturbance from construction of this drill site would be approximately 0.18 acre.

Drill Site M. Drill site M is located south of the Oak Flat Withdrawal Area and east of FR 3153 in Township 1 South, Range 13 East, in the SE¼, SW¼, SW¼ of Section 33. Two exploration pre-collar holes (RES-5 and RES-15) with multiple core holes, one shallow groundwater testing and monitoring well (HRES-4), and one deep groundwater testing and monitoring well (DHRES-1) have been constructed at this drill site. Groundwater testing and monitoring is ongoing. Planned activities would include continued drilling of core holes from RES-5 and RES-15 and construction of up to two new pre-collar holes, labeled M-3 and M-4, with multiple core holes. Groundwater monitoring and testing would continue at HRES-4 and DHRES-1. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill pad and no changes to the configuration of this drill site are proposed.

Drill Site #1. Drill site #1 is located southeast of the Superior East Plant Site, north of the Magma Mine Road in Township 1 South, Range 13 East, in the SE¼, SE¼, NW¼ of Section 32. Exploration drill hole RES-6 with multiple core holes has been developed at this drill site. Future activities would include

continued drilling of core holes at RES-6 and construction of up to two new pre-collar holes, labeled #1-2 and #1-3, with multiple cores. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill site and no changes to the configuration of this drill site are proposed.

Drill Site #2. Drill site #2 is located along FR 315, south of Magma Mine Road in Township 1 South, Range 13 East, in the NE¼, SW¼, SE¼ of Section 32. Exploration drill hole RES-9 with multiple core holes and shallow groundwater monitoring well HRES-2 have been developed at this site. Future activities would include continued drilling of multiple core holes at RES-9, continued groundwater testing and monitoring of HRES-2, and construction of a new pre-collar hole, labeled #2-2, with multiple deflection core holes. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill site and no changes to the configuration of this site are proposed.

Drill Site #3. Drill site #3 is located along FR 315 in Township 2 South, Range 13 East, in the SE¼, NE¼, SE¼ of Section 6. Exploration pre-collar holes RES-10, RES-11, and RES-16 have been constructed at this drill site, each with multiple core holes. Planned activities would include drilling additional deflection core holes at each of the three existing pre-collar holes and construction of one new pre-collar hole, labeled #3-4, with multiple core holes. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill site and no changes to the configuration of this drill site are proposed.

DOE Well Site. This drill site is located within the Oak Flat Withdrawal Area along FR 2438 in Township 1 South, Range 13 East, in the SW¼, SE¼, SE¼ of Section 28. The site contains two hydrology monitoring wells, HRES-3 and DOE well #USWUZP-5. HRES-3 and DOE well #USWUZP-5 are each completed into the Apache Leap Tuff and neither hole is drilled deep enough to penetrate into the ore body. The DOE well is approximately 936 feet deep and HRES-3 is approximately 1,200 feet deep. Planned activities at this site are limited to groundwater testing and monitoring.

Water Management

The Pre-feasibility Activities require water for dust suppression and drilling processes. Water for these activities would be obtained from the following sources:

- Superior East Plant Site No. 9 Shaft (ADWR #59-524492)
- Superior West Plant Site
- Well A-06 (ADWR #55-214967) on State lands (T2S, R13E, NW ¼ of Section 4)
- Arizona Water Company

Previously authorized exploration drill sites #1, #2, A, B, C, D, F, and M all occur within the Phoenix Active Management Area (AMA) and are served by an existing 2-inch polyethylene water line from the No. 9 Shaft. This same line would be extended to OF-1 and OF-3. OF-2 and PVT-3 would be served by a 2-inch polyethylene water line from the No. 9 Shaft. This line would be placed on top of the ground along Magma Mine Road. For QC-04 and MB-03, water would be pumped from a tank set up on private lands along FR 2440. This tank would be filled by a water truck with water from the Superior West Plant site. H-K is within the Phoenix AMA and would be serviced by water trucks. Within the AMA, RCM will monitor and report its industrial water uses annually to ADWR in accordance with their established reporting requirements.

Outside of the Phoenix AMA, Well A-06 would be used for Pre-feasibility Activities along FR 2466 and FR 2469, principally drill sites H-F, H-I, and H-N. These sites may also be serviced by water purchased from the Arizona Water Company. Drill sites #3, H-C, H-E, H-L, H-G, PVT-4, PVT-5, PVT-6, PVT-7, PVT-8, PVT-9 APV-6, and APV-8 are also outside of the Phoenix AMA and water would be provided by Arizona Water Company.

The quantity of water needed for Pre-feasibility Activities varies by activity type. The shallow groundwater testing and monitoring wells would use an air drill and water would only be required for dust control of cycloned rock fragments from drilling activities and other miscellaneous site needs. The deep groundwater testing and monitoring wells, the geotechnical boreholes, and the exploration drill holes would require both rotary and core drilling techniques and would use, on average, 6,000 gallons of water per day. This water would be provided by water "made"[3] during the drilling process and supplemented with water from one of the appropriate water sources described above. On average, one 5,000-gallon water-truck trip per day would be required to support an active drill rig.

Drill rigs use drilling mud to cool and lubricate the rods and the diamond bit and to help carry cuttings to the surface. Drilling mud would be collected in large storage tanks (with 9,500 to 22,000 gallon capacities) and/or in settling pits constructed within the footprint of each drill site. The mud tanks and/or settling pits would be used during drilling operations to hold drilling mud that is re-circulated down the borehole. RCM would collect excess cuttings and drilling mud generated during drilling activities and remove them from National Forest System Lands. These materials would be disposed of in accordance with applicable Arizona law.

Applicant Proposed Environmental Protection Measures

The following environmental protection measures were identified by RCM in their Pre-feasibility Plan of Operations.

Air Quality. RCM proposes to minimize impacts to air quality using the following dust suppression techniques: 1) applying water and DusTreat DC9112 during road construction activities; 2) using water at

[3] Minor amounts of water generated during drilling activities.

all times during the active drilling process; and 3) driving slowly when in service vehicles on dirt roads and adjusting speed depending on conditions to avoid creating a dust trail.

Water Quality. RCM would collect excess cuttings and mud generated during drilling activities and remove them from National Forest System Lands. These materials would be disposed of in accordance with applicable Arizona law.

RCM would develop and implement a construction Stormwater Pollution Prevention Plan (SWPPP) for road improvements and drill site construction activities. The effects of erosion and sediment discharge into off-site drainages would be mitigated through the use of water bars on the steeper sections of roadway and silt fences or other best management practices.

RCM would obtain authorization under the Arizona Pollutant Discharge Elimination System (AZPDES) *de minimus* General Permit from Arizona Department of Environmental Quality (ADEQ) for well development and testing activities.

In accordance with ADWR requirements, the strategic installation of bentonite seals and professional drilling practices would minimize potential impacts of the drilling activities to the existing groundwater aquifer system.

Solid Wastes. As part of its drilling program, RCM would collect cuttings and mud generated during the drilling process, contain them, transport them off National Forest System Lands, and dispose of them in accordance with applicable Arizona law. All other wastes, such as paper and food waste, would be stored in garbage sacks and removed from the site each day. A portable toilet would be placed at each active drill site and serviced periodically by a contractor.

Scenic Values. Scenic values would be protected by good housekeeping practices, minimizing disturbance, and reclaiming the sites in a timely manner.

Hazardous Substances/Petroleum Products/Drilling Materials. RCM would use a Spill Prevention Control, and Countermeasures SPCC plan to guide implementation of appropriate practices to prevent releases when handling and storing petroleum products. At the active drill sites, small secondary containment structures would be used to store one or two 5-gallon containers of hydraulic oil, a 5-gallon container of diesel, two 5-gallon containers of gasoline, tubes of grease, a 5-gallon bucket of grease, and other miscellaneous small containers, such as spray lubricants, typically found on drill sites. Fifty-gallon drums for storing used oil and oily rags would be placed in secondary containment structures within the drill site. Large quantities of fuel associated with the rig and mud mixing equipment would be held in fuel tanks, all within secondary containment structures. An adequate supply of fire extinguishers would be placed at these containment structures and each active rig would maintain enough spill supplies for any incidental releases. During drilling operations, drill rigs would be parked on top of plastic sheeting overlain by absorbent material. Plastic and absorbent materials would also be used under other gas or diesel motors, or other equipment that may leak oil, as needed. Refuse containers designated for disposal

of the absorbent materials would be located at each drill rig. This material would be disposed of off site in accordance with applicable laws and regulations.

Reclamation and Closure

Drill Sites. RCM would notify the Forest Service prior to the commencement of reclamation activities. Following the completion of all drilling, solids and desiccated drilling mud in the mud pits would be excavated and removed from the site. These inert materials would be disposed of in accordance with applicable regulations. The drill sites and mud pits would then be returned to natural grade with a track hoe using rocks and soil set aside during site construction and mud pit excavation. Each drill site would be mulched and seeded in accordance with National Forest Service guidelines using approved seed mixes of native species.

After completion of drilling activities for groundwater testing and monitoring wells and exploration drill holes and geotechnical bore holes selected for groundwater testing and monitoring, a portion of each of the drill sites would be re-graded and reclaimed. The remaining portion of the drill site would be maintained to allow vehicle access, including pumping rigs and support vehicles for periodic groundwater monitoring and testing.

Drill Holes. Drill hole abandonment would be conducted in accordance with AAC R12-15 and ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. In general, the procedures for each type of drill hole are provided in Table 2-10.

Roads. Table 2-11 identifies the Forest Service Road Maintenance Level for each segment of access roadway and describes the proposed reclamation and the post Pre-feasibility Activity condition of the roadways based on the existing Forest Service Travel Management Guidelines for Road Maintenance Levels.

Appurtenances. Pumps, signs, and any other items would be removed from National Forest System Lands.

2.1.3. Alternative 3 – North OF-2 Exploration Drill Site

The North OF-2 exploration drill site is located approximately 1,000 feet north of the proposed OF-2 site, both of which are west of Magma Mine Road (Figure 2-4). This site was identified as an alternative to the proposed OF-2 site provided in the Plan of Operations to avoid impacts to the Boulder Campsite and Campground Boulder, popular recreation and climbing area, located at the OF-2 drill site.

Table 2-10. Proposed Drill Hole Abandonment Procedures

Drill Hole Type	Abandonment Timing	Abandonment Procedures
Exploration	Holes developed for groundwater monitoring would be immediately abandoned at the end of monitoring. Holes not developed for groundwater monitoring would be abandoned by the end of 2014.	Drill hole abandonment would be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, administered by the Arizona Department of Water Resources (ADWR) In general, this procedure includes the following steps: After completion of each deflection, that portion of the hole would be filled with bentonite mud of sufficient density to prevent movement of groundwater between any aquifers. After completion of all deflections, the cased trunk holes would be filled with bentonite mud and a cement grout plug would be placed extending from 2 feet below grade to a minimum of 20 feet below grade.
Deep Groundwater	At the end of monitoring wells would be immediately abandoned. Abandonment would be conducted immediately in the event of a lost hole or insufficient data collection from a well.	Wells would be abandoned in accordance with the same ADWR procedures as the RCM exploration holes.
Tunnel Characterization	Drill holes developed for groundwater monitoring would be abandoned at the end of monitoring. Drill holes not necessary for groundwater studies would be abandoned immediately after geotechnical data is obtained.	Once selected for abandonment these holes would be abandoned in accordance with ADWR standards similar to the exploration holes with slight modifications due to the relatively shallow depth and absence of deflections. A bentonite cement plug would be placed in the bottom 40 feet of the hole. Bentonite grout would fill the entire hole with the exception of the top 20 feet. A cement plug would be placed from 2 feet below grade to a minimum of 20 feet below grade.
Shallow Groundwater	At the end of monitoring wells would be immediately abandoned in accordance with the same ADWR procedures as the RCM exploration holes. Abandonment would be conducted immediately in the event of a lost hole or insufficient data collection from a well.	Wells would be abandoned in accordance with the same ADWR procedures as the tunnel characterization holes.

Table 2-11. RCM's Proposed Road Reclamation and Post Pre-feasibility Study Management Designation

Road	Current Forest Service Road Maintenance Level	Post Pre-feasibility Study Forest Service Road Maintenance Level and Reclamation Activities
FR 315	Level 4 – Moderate Degree of User Comfort	The road would retain its current Forest Service designation subject to Forest Service maintenance and repair activities. No reclamation or restoration is proposed for the roadway travel area.
FR 320	Level 2 – High Clearance Vehicles	The road would retain its current Forest Service designation subject to Forest Service maintenance and repair activities. No reclamation or restoration is proposed for the roadway travel area.
FR 898	Level 2 – High Clearance Vehicles	The road would retain its current Forest Service designation subject to Forest Service maintenance and repair activities. No reclamation or restoration is proposed for the roadway travel area.
Existing Road from FR 898 to APV-8	User-created	Level 1 closure would be accomplished by placing an earthen berm at the start of this user-created road's intersection with FR 898 when the roadway is no longer required for access to pre-feasibility study activities.
FR 2261	Level 2 – High Clearance Vehicles	The road would retain its current Forest Service designation subject to Forest Service maintenance and repair activities. No reclamation or restoration is proposed for the roadway travel area.
FR 2440	Level 1 – Basic Custodial Care	Level 1 closure would be accomplished by placing an earthen berm at the start of FR 2440 when the roadway is no longer required for access to pre-feasibility study activities.
FR 2461	Level 2 – High Clearance Vehicles	The road would retain its current Forest Service designation subject to Forest Service maintenance and repair activities. No reclamation or restoration is proposed for the roadway travel area.
FR 2440	Level 1 – Basic Custodial Care	Level 1 closure would be accomplished by placing an earthen berm at the start of FR 2440 when the roadway is no longer required for access to pre-feasibility study activities.
FR 2461	Level 2 – High Clearance Vehicles	The road would retain its current Forest Service designation subject to Forest Service maintenance and repair activities. No reclamation or restoration is proposed for the roadway travel area.
Existing Extension of 2461	User-created	Level 1 closure of this extension of FR 2461 would be accomplished by construction of an earthen berm at the start of the user-created roadway when the roadway is no longer required for access to pre-feasibility study activities.
FR 2463	Level 1 – Basic Custodial Care	The road would retain its current Forest Service designation. Level 1 closure would be accomplished by placing an earthen berm at the start of FR 2463 when the roadway is no longer required for access to pre-feasibility study activities.
FR 2466 (and small portion of FR 2467)	Level 2 – High Clearance Vehicles	The road would retain its current Forest Service designation subject to Forest Service maintenance and repair activities. No reclamation or restoration is proposed for the roadway travel area.

Table 2-11. (Continued)

Road	Current Forest Service Road Maintenance Level	Post Pre-feasibility Study Forest Service Road Maintenance Level and Reclamation Activities
FR 2469	Level 1 – Basic Custodial Care	The road would retain its current Forest Service designation. Level 1 closure would be accomplished by placing an earthen berm at the start of FR 2469 when the roadway is no longer required for access to pre-feasibility study activities.
FR 2505	Level 1 – Basic Custodial Care	The road would retain its current Forest Service designation. Level 1 closure would be accomplished by placing an earthen berm at the start of FR 2505 when the roadway is no longer required for access to pre-feasibility study activities.
FR 2511	Level 1 – Basic Custodial Care	The road would retain its current Forest Service designation. Level 1 closure would be accomplished by placing an earthen berm at the start of FR 2511 when the roadway is no longer required for access to pre-feasibility study activities.
FR 3139	Level 1 – Basic Custodial Care	The road would retain its current Forest Service designation. Level 1 closure would be accomplished by placing an earthen berm at the start of FR 3139 when the roadway is no longer required for access to pre-feasibility study activities.
FR 3786	Level 1 – Basic Custodial Care	The road would retain its current Forest Service designation. Level 1 closure would be accomplished by placing an earthen berm at the start of FR 3786 when the roadway is no longer required for access to pre-feasibility study activities.
Existing Road from FR 315 to H-E	User-created	Level 1 closure would be accomplished by placing an earthen berm at the start of this user-created road's intersection with FR 315 when the roadway is no longer required for access to pre-feasibility study activities.
Existing Road from FR 2440 to QC-04	User-created	Level 1 closure would be accomplished by placing an earthen berm at the start of this user-created roads, intersection with FR 2440 when the roadway is no longer required for access to pre-feasibility study activities.

2.1.4. Alternative 4 – West Access Route 4a

West Access Route 4a has been identified as alternative to the existing roads within the Oak Flat Withdrawal Area and would be used to gain access to OF-1, OF-3, M, and RES-13 (Figures 2-5). This alternative was developed in response to public scoping comments that suggested an alternative route be built off FR 315 to avoid traffic concerns in the Oak Flat Withdrawal Area. West Access Route 4a would initiate at FR 315 and would terminate at drill site RES-13 on State lands. The total length of new road along West Access Route 4a would be approximately 4,211 feet. Construction of the road would impact 2.31 acres of National Forest System Lands and 0.41 acres of State land. Total disturbed area from construction of the West Access Route 4a would be 2.72 acres. The turn offs for this route at FR 315 and at RES-13 would be gated to prevent public use.

RCM would construct two additional exploration drill sites that would be accessible from this road, 4W and 4E. Both would be located on the south side of the West Access Route 4a alignment (Figures 2-5). Drill site 4W would occupy 0.23 acre and drill site 4E would occupy 0.28 acre and both are immediately adjacent to the West Access Route 4a alignment. The allowed occupancy period of drill sites 4W and 4E would be the same as allowed for the other exploration drill sites (see Table 2-2). The West Access Route 4a and the two drill sites would be closed and reclaimed at the end of the Pre-feasibility Activities in accordance with the requirements outlined for the proposed action and a final closure plan approved by the Forest Service.

As part of this alternative, RCM would also limit the time of year that drilling activities could occur at drill sites PVT-3, PVT-4, and H-L. Drill activities at these sites would be restricted from October 1 through March 31 of the following calendar year, the primary season of use at the Oak Flat Campground. There would be no seasonal limitation for access to groundwater testing and monitoring well sites for testing and monitoring purposes. Drill sites OF-1, OF-3, M, and RES-13 would not be reoccupied for drilling activities until this alternative access route is constructed. Use of roads within the Oak Flat Withdrawal Area for emergency vehicle access to drill sites and emergency evacuation from drill sites south of the Oak Flat Withdrawal Area are allowed as part of this alternative.

2.1.5. Alternative 5 – West Access Route 4b

Access Route 4b has been identified as an alternative to the existing roads within the Oak Flat Withdrawal Area and would be used to gain access to OF-1, OF-3, M, and RES-13 (Figures 2-6). This alternative was developed in response to public scoping comments that suggested an alternative route be built off FR 315 to avoid traffic concerns in Oak Flat. West Access Route 4b would initiate at FR 315 and extend to RES-13. The total length of new road along West Access Route 4a would be approximately 4,999 feet. Construction of the road would impact 2.76 acres of National Forest System Lands and 0.41 acre of State land. Total disturbed area from construction of West Access Route 4a would be 3.27 acres. The turn offs for this route at FR 315 and at RES-13 would be gated to prevent public use f this roadway.

RCM would construct two additional exploration drill sites that would be accessible from this road, 4W and 4E. These drill sites would be placed on the north side of the West Access Route 4b alignment (Figure 2-6). Drill site 4W would occupy 0.25 acre and drill site 4E would occupy 0.23 acre. Both sites are immediately adjacent to the West Access Route 4b alignment. The allowed occupancy period of drill sites 4W and 4E would be the same as the other exploration drill sites (see Table 2-2). The West Access Route 4b and the two drill sites would be closed and reclaimed at the end of the Pre-feasibility Plan of Operations in accordance with the requirements outlined for the proposed action and a final closure plan approved by the Forest Service.

As part of this alternative, RCM would also limit the time of year that drilling activities could occur at drill sites PVT-3, PVT-4, and H-L. Drill activities at these sites would not be allowed from October 1 through March 31 of the following calendar year, the primary season of use at the Oak Flat Campground.

There would be no seasonal limitation for access to groundwater testing and monitoring well sites for testing and monitoring purposes. Drill sites OF-1, OF-3, M, and RES-13 would not be reoccupied for drilling activities until this alternative access route is constructed. Use of roads within the Oak Flat Withdrawal Area for emergency vehicle access to drill sites and emergency evacuation from drill sites south of the Oak Flat Withdrawal Area is allowed as part of this alternative.

2.2. Alternatives Considered but Eliminated

During RCM's development of the Plan of Operations, Forest Service plan completeness review, and in response to public scoping comments, a number of alternatives to proposed plan elements were identified and then eliminated from further consideration because of administrative, environmental and/or technical concerns. Each of these is described in the following sections.

Elimination of all Drill Sites or Selected Drill Sites Adjacent to the Oak Flat Picnic and Campground Withdrawal Area. In light of public comments regarding the relationship of proposed Pre-feasibility Activities to the Oak Flat Withdrawal Area and the Oak Flat Campground several alternatives that eliminated drill sites proximate to the Oak Flat Withdrawal Area were considered, including:

- Elimination of OF-1, OF-2 and OF-3
- Elimination of PVT-3, PVT-4 and H-L
- Elimination of OF-1, OF-2, OF-3, PVT-3, PVT-4, and H-L

These various combinations would have reduced traffic levels through the Oak Flat Withdrawal Area and the Oak Flat Campground and addressed impacts to recreational users and safety concerns. The removal of OF-1 and OF-3 would have reduced visibility impacts to some dispersed campsites and roads within the Oak Flat Withdrawal Area. However, this alternative would be inconsistent with RCM's rights under U.S. Mining Laws. After considering these various alternatives and the scoping issues associated with them, it was determined that the issues of concern and potential impacts to recreational users could be addressed by the development of other alternatives, as well as mitigation and monitoring measures. For these reasons, this alternative was eliminated from further consideration.

Helicopter Access to Drill Sites. RCM has indicated in their Pre-feasibility Plan of Operations that it can access PVT-7 by helicopter if access through nearby private lands is not obtained. Based upon their assertion, consideration was given to whether or not access to a larger group or all of the drill sites that require roads on National Forest System Lands for vehicular access could be achieved using helicopters and smaller four-wheel-drive vehicles to minimize surface disturbance. This alternative was determined not to be reasonable from a logistical perspective after considering the extent of existing road

infrastructure that exists within the PAA and the frequency that drill sites need to be accessed while drilling operations are ongoing. This alternative means of accessing all or some of the existing and proposed drill sites has been eliminated from further consideration.

Original Location for Drill Site OF-2. OF-2 was originally proposed to be located immediately east of Magma Mine Road, near to the west boundary of the Oak Flat Withdrawal Area (Figure 2-4). Because of the extent of vegetation removal associated with the development of this site and the availability of a previously disturbed alternative location, the original location of OF-2 was eliminated from further consideration.

Original Location for Drill Site H-C. H-C was originally proposed to be located south of its currently proposed location. Early in the Pre-feasibility Plan of Operations development by RCM, cultural resources were discovered in the vicinity of the originally proposed drill site location. H-C, as currently proposed in RCM's Pre-feasibility Plan of Operations, avoids impacts to cultural resources and the original location of H-C was eliminated from further consideration.

Original Location for Drill Site H-L. The original location for H-L was identified at the end of an existing dirt road approximately 300 feet east of Oak Flat Withdrawal Area's east boundary. During the Pre-feasibility Plan of Operations completeness review, the Forest Service suggested that RCM identify an alternate site that would be less visible to recreational users of designated campsites within the Oak Flat Campground and dispersed camping sites within the Oak Flat Withdrawal Area. As a result, an alternative location for H-L was identified and included in the Pre-feasibility Plan of Operations. The original location of H-L was eliminated from further consideration.

South Access Route to Drill Sites OF-1, OF-3, M, and RES-13. In response to public comments, a systematic search for another access route to OF-1, OF-3, M, and RES-13 was initiated. The South Access Route initially proposed followed FR 315 from Magma Mine Road for approximately 1.5 miles, and then turned to the north along an existing road through State lands for approximately 1 mile. RCM expressed concerns about the logistics of using this route, including increased travel time to and from the sites, and additional fuel consumption, and increased costs. The Forest Service eliminated the South Access Route from further consideration upon review of the probable extent of cut and fill required to establish a maximum grade of 15 percent along the northernmost portion of the alignment.

West Access Routes 1, 2, and 3 to Drill Sites OF-1, OF-3, M, and RES-13. In addition to the identification and review of the South Access Route to OF-1, OF-3, M, and RES-13, three of five western access routes from FR-315 were eliminated from further consideration because of potential adverse impacts to cultural resources.

Original Location for Drill Site H-G. The location of H-G was originally proposed on the north side of FR 2466. During plan completeness review by the Forest Service, this site was relocated south of

FR 2466 to avoid impacts to an adjacent ephemeral drainage and two Arizona hedgehog cacti identified during survey.

Original Location for Drill Site PVT-4. PVT-4 was originally located on the west side of a user-created road near the intersection with U.S. Highway 60. During early coordination efforts with the Forest Service, this drill site was relocated avoid potential impacts known archaeological resources.

Original Access to Drill Site PVT-7. PVT-7, located south of Pinal Ranch, was originally proposed to be accessed from U.S. Highway 60, south along FR 3 for approximately 1 mile and then west along FR 2511 for approximately 0.5 mile. This access route was eliminated from further consideration because it occurs along the western boundary of an area that has been set aside by the Forest Service as mitigation for the endangered Arizona hedgehog cactus.

2.3. Mitigation and Monitoring Measures

In response to public comments on the proposal and Forest review and evaluation of project impacts, the following list of proposed mitigation and monitoring measures was developed. The issues referenced here refer to the issues identified in Section 1.7.

1. Minimize Dust Emissions Along Access Roads (Issue 1). Unpaved access roads will be watered as necessary during periods of regular use by RCM employees or contractors.

2. Limit Air Emissions at Drill Sites (Issue 1). Drill rigs and other mobile and stationary sources of air emissions at drill sites must be operated consistently with past practices to limit oxides of nitrogen (NO_x) emissions from Pre-feasibility Activities to peak estimated emission levels reported in this EA. Using readily available data, RCM will document their conformance with this requirement annually to the Forest Service.

3. RCM will Reduce Vehicle Traffic to the Extent Practical (Issue 1 and 5). To the extent practical and consistent with the efficient and safe implementation of Pre-feasibility Activities, RCM will reduce vehicle traffic on National Forest System Lands.

4. Erosion Control (Issue 2). Prior to implementation of any ground disturbing activities, the SWPPP will be provided to the Forest Service for review and approval.

5. Water Quality (Issue 2). RCM will provide the Forest Service with copies of all applicable water quality permits required for well development and testing prior to ground disturbing activities at drill sites.

6. Stormwater and Spill Prevention Plan (Issue 2). Exploration and Pre-Feasibility activities would not result in the release of any hazardous or nuisance substances to the environment and, if such release occurs, immediate corrective actions will be taken by RCM. An SPCC plan would be prepared in accordance with ADEQ regulations and incorporated into the Pre-feasibility Plan of Operations prior to ground disturbing activity.

7. Temporary and Interim Reclamation Measures (Issue 2). RCM will be required to develop both temporary shutdown and interim reclamation plans for review and approval by the Forest Service. These plans will address periods of non-activity at exploration drill sites and partial reclamation of drill sites that are transitioning from active drilling phases to groundwater monitoring phases. Upon approval by the Forest Service these plans will be incorporated into the Pre-feasibility Plan of Operations. Final reclamation will be conducted on all sites not selected for groundwater monitoring immediately after completion of drilling activities.

8. Minimize Safety Pull-out Size (Issues 2, 3, and 4). RCM will coordinate with the Forest Service prior to construction of any Safety pull-outs identified in the Pre-feasibility Plan of Operations to ensure that the size of the pull-out is minimized to the extent practical.

9. Use of Rock Riprap and Aggregate Surfacing Material (Issue 2 and 5). Riprap or aggregate used during road preparation will be angular and the color will match native soil. Non-native aggregate surfacing placed on drill sites will be removed or buried at closure.

10. Biological Monitoring (Issues 3 & 4). During construction of road improvements along FR 2466, RCM will provide a qualified biologist who will monitor immediately prior to and during initial grading and clearing activities to establish and verify the location of fencing at the grading limits. The biological monitor would be responsible for ensuring that construction activities do not impact any Arizona hedgehog cacti. A qualified biologist, provided by RCM, will also be required to conduct this monitoring during interim or final reclamation. In the unlikely event that Arizona hedgehog cacti are identified in the footprint of planned construction or reclamation activities, activities in that vicinity would stop until a means of construction that avoids any adverse impact to Arizona hedgehog cacti is identified and implemented.

11. Fire Plan (Issues 3 and 4). Fire restrictions and provisions of the Tonto National Forest Fire Plan will be incorporated into the Pre-feasibility Plan of Operations. This may include shut down to comply with red-flag conditions unless measures to minimize the risk of fire are employed and agreed to prior to fire seasons.

12. Management of Noxious Weeds (Issue 3 and 4). All seed mixes to be used in reclamation are required to be certified weed free of seeds listed on the Tonto National Forest weed list. All equipment must be cleaned prior to use on the project. Cleaning will remove all dirt, plant parts, and material that could carry noxious weed seeds. Only equipment cleaned and inspected will be allowed to operate in the

PAA and RCM must provide an annual record of this activity to the Forest Service. Cleaning must occur off National Forest System Lands. This requirement does not apply to service vehicles used for transportation to and from the reclamation sites.

13. Well and Borehole Abandonment (Issue 3 and 6). All wells and boreholes will be abandoned in accordance with the State of Arizona well abandonment rules (Arizona Administrative Code Rule R12-15-816). Copies of Arizona Well Drill Reports and Well Log Forms and Well Abandonment Completion Reports will be provided to the Forest Service annually.

14. Down-gradient Rock Guards (Issue 4). RCM will provide a qualified biologist to survey for the presence of Arizona hedgehog cacti at any locations adjacent to road or drill pad construction areas where there is potential for rock to be dislodged and roll downhill. The qualified biologist would ensure that in these locations appropriately constructed metal guards would be placed over the individual Arizona hedgehog cactus and secured prior to initiation of construction activities in uphill locations. The metal guards will remain in place during construction activities in these areas. A qualified biologist, provided by RCM, will also be required to re-survey for the presence of any Arizona hedgehog cacti and ensure their safety during required interim and final reclamation.

15. Configuration of North OF-2 Drilling Equipment (Issue 5). The drilling equipment at the North OF-2 drill site will be configured so that the power pack, or the engine of the drill if it is integral to the rig, is oriented away from Boulder Campsite to minimize noise impacts to the recreational users at that campsite.

16. Visual Screening (Issue 5). An assessment of the need for screening will be made by the Forest following drill setup. RCM will place camouflage netting materials on exploration drill sites OF-1 and OF-3 where they face Oak Flat Campground, if screening from existing boulders or vegetation is not sufficient. The material will be placed so that views of the drill equipment to a maximum height of 15-feet from the Oak Flat Withdrawal Area will be blocked.

17. Retention of Existing Boulders at Drill Site OF-3 (Issue 5). At exploration drill site OF-3, RCM will leave the large boulders along the eastern edge of the proposed exploration drill pad nearest the road. These boulders could provide some screening and from the road and facilitate reclamation efforts upon completion of exploration drilling at this location.

18. Retention of Boulders at Drill Site H-N (Issue 5). At drill site H-N, RCM will leave the large boulders along the eastern edge of this drill site nearest the road to provide some screening to the road and to facilitate reclamation efforts.

19. Rock Treatment to Minimize Visual Impacts (Issue 5). Annually, RCM will work with the Forest Service to 1) identify any disturbed areas associated with the construction of new roads, improvements of existing roads, and construction of drill sites and 2) develop a rock staining (simulated desert varnish) implementation plan for the following year to reduce visual impacts.

20. Minimize Night Light Effects to Recreation Area (Issue 5). Lights used for night work and safety at drill sites will be directed or shielded to minimize night light effects to recreational areas.

21. Salvage and Stockpile Boulders for Reclamation (Issues 5 and 8). RCM will, to the extent practical, collect and set aside suitable boulders within the footprint of the proposed disturbance area for later use at drill sites or other reclamation activities. When used for closure and reclamation, salvaged boulders will be placed in a fashion or pattern that mimics boulder configuration in adjacent undisturbed areas.

22. Administrative Traffic Controls (Issue 6). RCM will work with the Forest Service to develop and implement an administrative access control plan to address safety concerns identified during public scoping. Specific items that could be addressed in the plan include, but may not be limited to: 1) signage, 2) training programs and documentation, 3) performance standards and specific policies to identify problems and discipline offenders, 4) plans for limiting traffic during periods of high-use public events, 5) plans to incorporate traffic safety issues into regular "lunch box" safety meetings on site, 6) a traffic monitor when and where appropriate, and 7) a collection agreement to fund Forest Service oversight of the traffic monitor.

23. Diligent Care and Maintenance of Magma Mine Road (Issue 6). RCM will be responsible for the maintenance and care of Magma Mine Road.

24. Restrict Travel to Certain Roads within the Oak Flat Withdrawal Area (Issue 6). When conducting Pre-feasibility Activities, RCM will restrict its use of roads within the Oak Flat Withdrawal Area to Magma Mine Road, FR 2438, the 2438 Bypass, FR 3153, and those portions of Old U.S. Highway 60 that are used to access drill sites PVT-3, PVT-4, and H-L.

25. Cadastral survey of the Oak Flat Withdrawal Boundary and Drill Site Monitoring (Issue 7). RCM will conduct a cadastral survey at proposal drill sites adjacent to the Oak Flat Withdrawal Area to ensure that exploration activities do not encroach on the withdrawal lands. Annual drilling information will be provided to the Forest Service for exploration drill holes in the vicinity of the Oak Flat Withdrawal Area that is of sufficient detail to document that directional drilling activities do not extend under the Oak Flat Withdrawal Area.

26. Travel Management (Issue 8). The road system utilized by the Pre-feasibility Activities will be required to conform to the Travel Management goals during use and at reclamation and closure. Reclamation activities will be conducted to achieve those goals.

27. Archaeological Monitor (Issue 9). During construction of road improvements for the West Access Routes 4a or 4b, the PVT-8 access route, the PVT-7 access route, and drill site construction pad improvements for H-C and PVT-8, RCM will provide a qualified archaeologist who will be present to ensure that the limits of construction are established and maintained during construction.

28. Placement of Outfall Structure to Protect Cultural Resource Site (Issue 9). A cultural resources site is located adjacent to H-C. The outfall structure for this well will be placed along the opposite wall of the drill pad to avoid water flow over the cultural resources site. Expelled water will flow along an eastward gradient from this location and will be intercepted by an existing livestock watering tank.

29. Avoidance of Unidentified Cultural Resources (Issue 9). If previously unidentified cultural resources are encountered during construction activities, work will cease at that location and Forest Service archaeologists will be contacted for instruction before work continues at that location.

30. Placement of Clean Fill in Potholes in the Early 1920's Superior-Miami Highway (Issue 9). This existing road segment will be used to access a drill site. RCM will fill the numerous existing potholes within this road with clean fill material to slow erosion of the historic highway.

2.4. Comparison of Alternatives

Table 2-12 provides a summary of the effects of implementing each alternative by key issue. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 2-12. Comparison of Alternatives

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 North OF-2	Alternative 4 West Access Route 4a	Alternative 5 West Access Route 4b
Issue 1 Air Quality	The no action alternative would result in no development of new drill sites on Forest Service lands and all drill activities would be restricted to State and private lands. In the short term drilling activities may equal peak activity levels outlined in proposed action. Air emissions would be equivalent during those periods of time. As the new drilling targets that provide quality data to support RCM's pre-feasibility studies diminishes, drilling activity would be reduced with associated reductions in air emissions.	Air emissions anticipated as a result of Pre-Feasibility Activities are analyzed, inventoried and totaled per activity and for the anticipated peak activity levels. All values are tons per year. Total Peak Year Combustion Emissions: CO = 42.5; NO_x = 190.6; PM_{10} = 13.4; $PM_{2.5}$ = 12.5; SO_x = 12.5; VOC = 15.7 Total Peak Year Fugitive Emissions: PM_{10} = 43.1; $PM_{2.5}$ = 4.4	Air emissions from the implementation of this alternative are not expected to be different from the emissions estimated using the OF-2 drill site.	Overall travel distance from the Superior East Plant Site to the intersection of FR 3153 and the user-created road that provides access to RES-13 would be 1.39 miles shorter than the proposed action and would result in fewer air emissions from vehicle travel than the proposed action. Additional emissions from construction of the road in tons per year are: Combustion Emissions: CO = 0.0656 NO_x= 0.2991 PM_{10} = 0.0219 $PM_{2.5}$ = 0.0219 SO_x = 0.0219 VOC = 0.0219 Fugitive Emissions: PM_{10} = 0.1021 $PM_{2.5}$=0.0073	Overall travel distance from the Superior East Plant Site to RES-13 would be 1.24 miles shorter than the proposed action and would result in fewer air emissions from vehicle travel than the proposed alternative but slightly more than West Access Route 4a. Additional emissions from construction of the road in tons per year are: Combustion Emissions: CO = 0.0754 NO_x= 0.3436 PM_{10} = 0.0251 $PM_{2.5}$ = 0.0251 SO_x = 0. 0.0251 VOC = 0.00.0251 Fugitive Emissions: PM_{10} = 0.1173 $PM_{2.5}$=0.0084

Table 2-12. (Continued)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 North OF-2	Alternative 4 West Access Route 4a	Alternative 5 West Access Route 4b
Issue 2 Roadway Sediment and Erosion Control	Implementation of the no action alternative would require RCM to reclaim drill sites developed as part of the Previously Authorized Activities. Existing Forest Roads would remain in their present condition. In the short term, erosion and soil loss from these roads would not change from the current condition.	Much of the PAA is underlain by rock and would not be erodible; however, the overall foot print of disturbance within the vicinity of the PAA would be increased by 41.68 acres. Implementation of BMPs to control and limit erosion and sedimentation would reduce the overall volume of soil loss from the proposed road and drill site improvements. Ephemeral drainage systems and the few intermittent or perennial water courses in the vicinity of the PAA are not expected to be adversely impacted.	There would be less than an approximately 0.25 acre increase in overall surface disturbance in the PAA over the proposed action. Effects of mitigation would be the same as the proposed action.	A 2.82 acre increase in overall surface disturbance in the PAA; access road would cross a small ephemeral drainage; gating this road would limit use and reduce mechanical erosion from general recreational vehicle travel. This alternative would also reduce the vehicle trips on roads within the Oak Flat Withdrawal Area, reducing the rate of mechanical erosion on those roads. Effects of mitigation would be the same as the proposed action.	A 3.24 acre increase in overall surface disturbance in the PAA; West Access Route 4b would follow a small ephemeral drainage for approximately 1,100 feet; gating this road to limit public access and would reduce mechanical erosion from general recreational vehicle travel. This alternative would also reduce vehicle trips on roads within the Oak Flat Withdrawal, reducing the rate of mechanical erosion on those roads. Effects of mitigation would be the same as the proposed action.
Issue 3 Wildlife	There would be no new surface disturbing activities. Closure and reclamation of existing, previously authorized drill sites on National Forest System Lands would commence in accordance with the previously authorized Plan of	Approximately 38.66 acres of previously undisturbed National Forest System Lands would be impacted, with the majority of the Impact Area immediately adjacent to previously disturbed areas.	This alternative component of the Pre-feasibility Activities would increase the acreage of Interior Chaparral habitat impacted by 0.25 acres over the proposed action.	This route and its associated drill sites would increase impacts to Interior Chaparral habitats in the vicinity of the PAA by 2.82 acres of National Forest System Lands and 0.41 acre of impact on State land.	This route and its associated drill sites would increase impacts to Interior Chaparral habitats in the vicinity of the PAA on National Forest System Lands by 3.24 acres. It would create approximately 0.95 mile

Table 2-12. (Continued)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 North OF-2	Alternative 4 West Access Route 4a	Alternative 5 West Access Route 4b
	Operations. The level of daily human activity, particularly along FR 315 would be decreased from current levels. Periods of peak use associated with four-wheel drive recreational traffic and other recreational uses may increase.	Approximately 28.58 acres of interior chaparral, 0.16 acres of Madrean evergreen woodland, and 9.92 acres of Sonoran desertscrub habitat would be affected, primarily along 16.97 miles of existing roadways. Some impacts to Management Indicator Species (MIS) individuals, but impacts to these species as a whole are expected to be transitory and extremely limited. Pre-feasibility Activities are not expected to result detectable population level impacts to MIS species.		It would create approximately 0.80 mile of new road between FR 315 and drill site RES-13; A total of 0.66 mile of new road would be constructed on National Forest System Lands.	of new road between FR 315 and drill site RES-13; A total of 0.81 mile of this new road would be constructed on National Forest System Lands.
Issue 4 Arizona Hedgehog Cactus	The no action alternative would not have any direct or indirect effect to Arizona hedgehog cactus.	The Forest Service has determined that the implementation of the Pre-feasibility Activities may affect but is not likely to adversely affect Arizona hedgehog cactus. No individuals are expected to be directly affected by the proposed action. Approximately 28.66 acres of potentially suitable habitat would be	Survey did not detect any Arizona hedgehog cacti on or in the vicinity of North OF-2 and implementation of this action. This alternative would not have any direct or indirect affect on Arizona hedgehog cactus.	Survey did not detect any Arizona hedgehog cacti on or in the vicinity of this access alternative and associated drill sites. This alternative access route and the two associated drill sites would not have any direct or indirect affect on Arizona hedgehog cactus.	Survey did not detect any Arizona hedgehog cacti on or in the vicinity of this access alternative and associated drill sites. This alternative access route and the two associated drill sites would not have any direct or indirect affect on Arizona hedgehog cactus.

Table 2-12. (Continued)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 North OF-2	Alternative 4 West Access Route 4a	Alternative 5 West Access Route 4b
		disturbed by Pre-feasibility Activities. Monitoring activities and other mitigation measures would ensure avoidance of individual plants.			
Issue 5 Recreational Activities in and Around Oak Flat General Considerations	No new drill sites would be developed on National Forest System Lands. All drill activities would be restricted to State and private lands. Drill traffic would be limited to the use of Forest Roads to access private and State land.	Would preclude use of the Boulder Campsite and access point to Euro Dog Valley Climbing Area.	Selection of the North OF-2 exploration drill site would allow for the continued use of the Boulder Campsite. This would also maintain an existing access point to the Euro Dog Valley Climbing Area.	Would reduce impacts to recreational users of Oak Flat Campground by routing drill site traffic outside of the Oak Flat Withdrawal.	Would reduce impacts to recreational users of Oak Flat Campground by routing drill site traffic outside of the Oak Flat Withdrawal.
Issue 5 Recreational Activities in and Around Oak Flat Noise Effects	Under this alternative, noise levels in the Oak Flat Campgrounds are expected to stay at their current levels.	No increase in sound levels at the designated campsites in the Oak Flat Campground. Sound levels at dispersed campsites within the Oak Flat Withdrawal Area would increase by less than 1 dBA; 3 dBA is usually considered the minimum noticeable change in sound level.	Noise effects for designated and dispersed campsites within the Oak Flat Withdrawal Area are the same as the proposed action. Noise levels at the Boulder Campsite would range from 42 dBA at a background noise level of 30dBA to 44 dBA at a background noise level of 40 dBA.	Impacts to the recreational users of Oak Flat Campground from fixed drill site locations (e.g., OF-1, OF-2, and OF-3) would not change. Overall noise impacts to recreational users of Oak Flat Campground would be reduced because of the reduced traffic from drill site mobilization and demobilization activities, service vehicles, and shift changes.	Impacts to the recreational users of Oak Flat Campground from fixed drill site locations (eg OF-1, OF-2, and OF-3) would not change. Overall noise impacts to recreational users of Oak Flat Campground would be reduced because of the reduced traffic from drill site mobilization and demobilization activities, service vehicles, and shift changes.

Table 2-12. (Continued)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 North OF-2	Alternative 4 West Access Route 4a	Alternative 5 West Access Route 4b
Issue 5 Recreational Activities in and Around Oak Flat Visual Effects	There would be no new exploration drill rigs visible from the designated campsites, dispersed campsites, or the roadways within the Oak Flat Campground. RES-13 may be visible from FR 3153 and other areas within the Oak Flat Withdrawal Area when this drill site is being utilized.	Users of the designated campgrounds would not see drill sites OF-1, OF-2, and OF-3. Users of some dispersed campsites would see drill sites OF-1, OF-2, and OF-3. Drill site H-L and PVT-4 would be more visible to recreationists in the campground and drivers along U.S. Highway 60, but occupancy of these sites for drilling is relatively short term.	North OF-2 would not be visible from the designated campsites within Oak Flat Campground. The upper portion of the drill rig mast would be visible from the Boulder Campsite and portions of the Euro Dog Valley Rock Climbing Area would be able to see North 0F-2. Users of one dispersed campsite would see North OF-2.	Based on a visual analysis that relies on topography, it appears that this route is not generally visible to the public, particularly in the Oak Flat Withdrawal Area. Forest users who travel FR 315 and travel south through the Oak Flat Withdrawal Area to State lands would be able to see portions of this road.	Based on a visual analysis that relies on topography, it appears that this route is not generally visible to the public, particularly in the Oak Flat Withdrawal Area. Forest users who travel FR 315 and travel south through the Oak Flat Withdrawal Area to State lands would be able to see portions of this road.
Issue 5 Recreational Activities in and Around Oak Flat Traffic Effects	One drill site, RES-13, located on State lands immediately south of the Oak Flat Campground would continue to be used for exploration drilling purposes. Access to this drill site for mobilization and demobilization drilling equipment, service vehicles and personnel is through Oak Flat Campground and would continue. The volume of traffic accessing this drill site would be approximately 6 to 14 trips per day.	Long term occupancy drill sites OF-1, OF-2, OF-3, Site M, and RES-13 on State land would be accessed via Forest Roads in Oak Flat Campground. Short term occupancy sites PVT-3, PVT-4, and H-L would also use Forest Roads but for a relatively short duration of time. Depending upon occupancy, the maximum increase in vehicle trips per day may be as high as 88 vehicle trips per day.	The North OF-2 Exploration Drill Site Location would not affect traffic within Oak Flat Campground and would not change the total number of vehicle trips per day on Magma Mine Road from the levels anticipated in the proposed action.	West Access Route 4a would reroute traffic that would otherwise utilize existing roads within the Oak Flat Campground. Construction of West Access Route 4a would eliminate drilling related traffic in Oak Flat associated with sites OF-1, OF-3, Site M, and RES-13. Short term traffic impacts associated with the construction of tunnel characterization bore holes PVT-3 and PVT-4 and deep groundwater testing and monitoring well at H-	Impacts would be the same as West Access Route 4b alternative.

Table 2-12. (Continued)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 North OF-2	Alternative 4 West Access Route 4a	Alternative 5 West Access Route 4b
				L would occur. These effects are mitigated by seasonal restrictions on access to PVT-3, PVT-4 and H-L. After drilling at these sites, traffic would only occur for testing and monitoring.	
Issue 6 Safety	Safety concerns associated with the volume of traffic under the No Action Alternative would be at a maximum 75 percent less than that associated with the maximum traffic generated within the Oak Flat Campground by the proposed action. The only traffic generated within Oak Flat Campground by the selection of the No action Alternative would be the traffic used to access and service exploration drill site RES-13 on State lands immediately south of the Oak Flat Campground.	At its peak approximately 88 vehicle trips per day would be added to the base traffic condition on FR 2438. During much of the authorization period for the proposed action the actual number of vehicles using the roads in Oak Flat to service adjacent drill sites or access groundwater monitoring well sites would be much less.	Traffic safety consequences of this alternative would be the same as for the proposed action.	RCM vehicle use in the Oak Flat Campground for the Pre-feasibility Activities would be substantially less if West Access Route 4a was constructed. The only traffic use in Oak Flat Campground would be for the short period of construction at H-L and PVT-4. Construction would be seasonal and limited to periods of lowest use. Once drill sites are constructed, traffic through Oak Flat Campground would be for groundwater testing and monitoring at the DOE Well Site, HRES-3, H-L, and PVT-4.	The safety consequences of this alternative would be the same as for West Access Route 4a.

Table 2-12. (Continued)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 North OF-2	Alternative 4 West Access Route 4a	Alternative 5 West Access Route 4b
Issue 7 Conflicts with Oak Flat Withdrawal Area	Exploration drill sites OF-1, OF-2, and OF-3 would not be constructed, and exploration drilling activities would not take place on National Forest System Lands in proximity to the Oak Flat Withdrawal Area. Closure and reclamation of previously authorized drill site M would be implemented. There would be no directional drilling in these areas and the physical potential for RCM to directionally drill under the Oak Flat Withdrawal Area would be substantially eliminated.	Exploration drilling activities would occur at drill sites OF-1, OF-2, OF-3, and M as described in the Pre-feasibility Plan of Operations. Any exploration drilling under the Oak Flat Withdrawal Area would be considered a mineral entry or appropriation in violation of the withdrawal. RCM has committed to the Forest Service that it would not drill under the Oak Flat Withdrawal Area. The implementation of proposed mitigation would provide assurances to the Public that RCM is operating in conformance with the requirements of the Oak Flat Withdrawal Area.	Impacts would be the same as the proposed action.	Impacts would be the same as the proposed action.	Impacts would be the same as the proposed action.
Issue 8 Travel Management	There would no change in current use patterns or designations for the existing roads within National Forest System Lands. If a future closure determination is made for	Travel management planning is underway and the Forest Service cannot predict with certainty the outcome of this planning process with regard to any of the specific Forest Roads and user-created	Impacts would be the same as the proposed action.	Impacts would be the same as the proposed action.	Impacts would be the same as the proposed action.

Table 2-12. (Continued)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 North OF-2	Alternative 4 West Access Route 4a	Alternative 5 West Access Route 4b
	any of the roads through the Forest Service's travel management planning process, the Forest Service would be responsible.	roads proposed for improvement, maintenance, or construction in the Pre-feasibility Plan of Operations. Mitigation measures would require that the road system utilized by the Pre-feasibility Activities conform to the Travel Management goals that may be developed during the time proposed for implementation of the Pre-feasibility Activities. This mitigation measure would apply during use and at reclamation and closure.			
Issue 9 Cultural Resources	The no action alternative would not adversely impact any cultural resource sites.	The proposed action would result in no adverse impacts to cultural resources. Monitoring activities and other mitigation measures would ensure avoidance.	The North OF-2 drill site alternative will not have any direct or indirect adverse impact to cultural resource sites. Monitoring activities and other mitigation measures would ensure avoidance.	West Access Route 4a would not have any adverse impact to cultural resource sites. Monitoring activities and other mitigation measures would ensure avoidance.	West Access Route 4b would not have any adverse impact to cultural resource sites. Monitoring activities and other mitigation measures would ensure avoidance.

Table 2-12. (Continued)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 North OF-2	Alternative 4 West Access Route 4a	Alternative 5 West Access Route 4b
Issue 10 Native American Religious Practices	The no action alternative would not affect Native American religious practices. It is not expected to increase the accessibility of any sacred sites to Native Americans nor would it limit access.	In a comment letter prepared by legal counsel for the San Carlos Apache, it was stated that "Oak Flat, Apache Leap, Devil's Canyon and the related canyons, geologic formations, and springs in the area of proposed activity are holy, sacred, and consecrated lands." During ongoing consultation, Native American Tribes have not provided information on any specific sacred sites within or near the PAA or any of the alternative sites considered in this EA. Native American groups will not be precluded from using the Oak Flat Withdrawal Area and surrounding National Forest Lands while the proposed Pre-feasibility Activities or any alternatives considered in this EA are underway. Some effect to subjective religious experience may occur from the proposed action but it is not anticipated that this experience would be substantially burdened.			
Cost Comparisons	RCM would be responsible for completion of closure and reclamation activities in accordance with existing authorizations.	Mitigation measures outlined in Section 2.3 would substantially increase implementation costs. The current estimated cost to provide a traffic monitor at the Oak Flat Campground during daylight hours, while drill sites are operable, is approximately $440,000 for the five year drilling period. Cost estimates for rock staining, boulder salvage, and implementation of the other mitigation measures are not available at this time.	This alternative is not expected to substantially change the implementation costs from the proposed action.	This alternative would reduce the cost of implementation of mitigation measures by removing the requirement for a traffic monitor at Oak Flat Campground. The estimated cost to construct West Access Route 4a is $145,000. The cost for reclamation using standard Bureau of Land Management (BLM) calculation factors is estimated to be $11,000. Other costs for mitigation measures would be similar to the proposed action.	This alternative would reduce the cost of implementation of mitigation measures by removing the requirement for a traffic monitor at Oak Flat Campground. The estimated cost to construct West Access Route 4b is $180,000. The cost for reclamation using standard Bureau of Land Management calculation factors is estimated to be $13,000. Other costs for mitigation measures would be similar to the proposed action.

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Figure 2-1. Proposed Pre-feasibility Activities Overview

Figure 2-2. Conceptual Drill Site Layout

Figure 2-3. Schematic Diagram of Deep & Shallow Groundwater Testing and Monitoring Wells

Figure 2-4. Original OF-2, OF-2, and North OF-2 Drill Site Locations

Figure 2-5. Alternative Access Route 4a and Drill Site Locations 4E and 4W

Figure 2-6. Alternative Access Route 4b and Drill Site Locations 4E and 4W