3.0 DESCRIPTION OF ACTIVITIES

3.1. APPROVED OPERATIONS

In this Plan, activities previously approved by Forest Service under P.O.O. No. 01-12-002 and associated amendments are identified. These operations would continue to be conducted in accordance with the procedures established in P.O.O. No. 01-12-002 and associated amendments. Approved activities include the continued use of nine sites for exploration and groundwater monitoring purposes (Appendix B and Figure 1), the improvement and maintenance of Forest Service roadways within the Resolution Parcel (Figure 1), and the placement of aboveground plastic pipe and storage tanks for potable water transfer across the Resolution Parcel (Figure 1). Appendix B provides detailed descriptions of the approved activities and identifies those activities that would continue as part of this Plan.

The Resolution Parcel has been the subject of extensive resource investigations, and biological and cultural resources surveys have been completed in the previously approved activity areas within the parcel. Adverse effects to resources of concern would continue to be avoided as operations proceed.

3.2. EXPLORATION DRILLING

3.2.1. Purpose and Location of Activity

Five exploration drill holes are proposed as part of this plan. Three of these sites, Sites MB-03, QC-04, and OF-2, would be placed on previously disturbed lands. MB-03 and QC-04 would be placed on previously used drill pads along the west boundary of the Resolution Parcel, and OF-2 would be placed within an area along Magma Mine Road that was previously disturbed from road construction activities (Figure 1; Table 1). Complete detailed descriptions of proposed exploration activities are provided in Appendix C. Plan views of proposed activities with 2007 aerial base mapping and 10-foot contour intervals are provided in Appendix D.

Table 1. Exploration Site Locations and Claim Information

Hole #	Northing	Easting	Section	Township	Range	Claim Name
QC-04	3683222	492518	NE ¼ NE ¼ of 2	2S	12E	Hard Rock #7 Hard Rock #12
MB-03	3682705	492777	NW ¼ SW ¼ of 1	2S	12E	Hard Rock #6 Apache Leap
OF-1	3683843	495926	SW ¼ SE ¼ of 33	1S	13E	Sun #40 Sun #41
OF-2	3684934	494510	NE ¼ SE ¼ of 32	1S	13E	Oak No. 43 Oak No. 44
OF-3	3683885	495375	SW ¼ SW ¼ of 33	1S	13E	Sun #40 Sun #41

Note: Detailed claim information for proposed exploration drilling and associated access is provided in Appendix E.

The purpose of drilling QC-04 and MB-03 is to intersect an important structure (West Boundary Fault) concealed beneath the cover rocks of Apache Leap. At present, there are only two pierce points to the north from underground drilling in the old Magma Mine. Two deflections would be drilled from each side in a rough fan shape towards the east at an angle between 20 and 30 degrees from vertical to depths between 1,100 and 1,300 meters. OF-1, OF-2, and OF-3 would be drilled for mineral exploration purposes. No directional drilling would be conducted under Oak Flat Campground while it remains removed from mineral entry.

Roadway improvements required to gain access to the proposed exploration drill sites are identified in Figure 1 and Section 3.7.

3.2.2. Description of Drilling Operations

The exploration drill sites proposed as part of this Plan have an approximately 80- by 100-foot disturbance footprint. This disturbance footprint provides required space for the placement of drill pads, and associated equipment and mud pits (Figure 2). Some sites would require additional area for grading and fill slopes. The estimated disturbance for the placement of the proposed exploration drill sites is 1.3 acres. The estimated disturbance area for each individual site is identified in Section 3.12 of this Plan.

At each exploration site, a trunk hole would be drilled to a depth of approximately 3,000 feet using open-hole technique. The trunk hole is then deepened to 7,000 feet by diamond drilling. Multiple deflections would be drilled by motor/diamond drilling. No directional drilling would occur under the Oak Flat Campground.

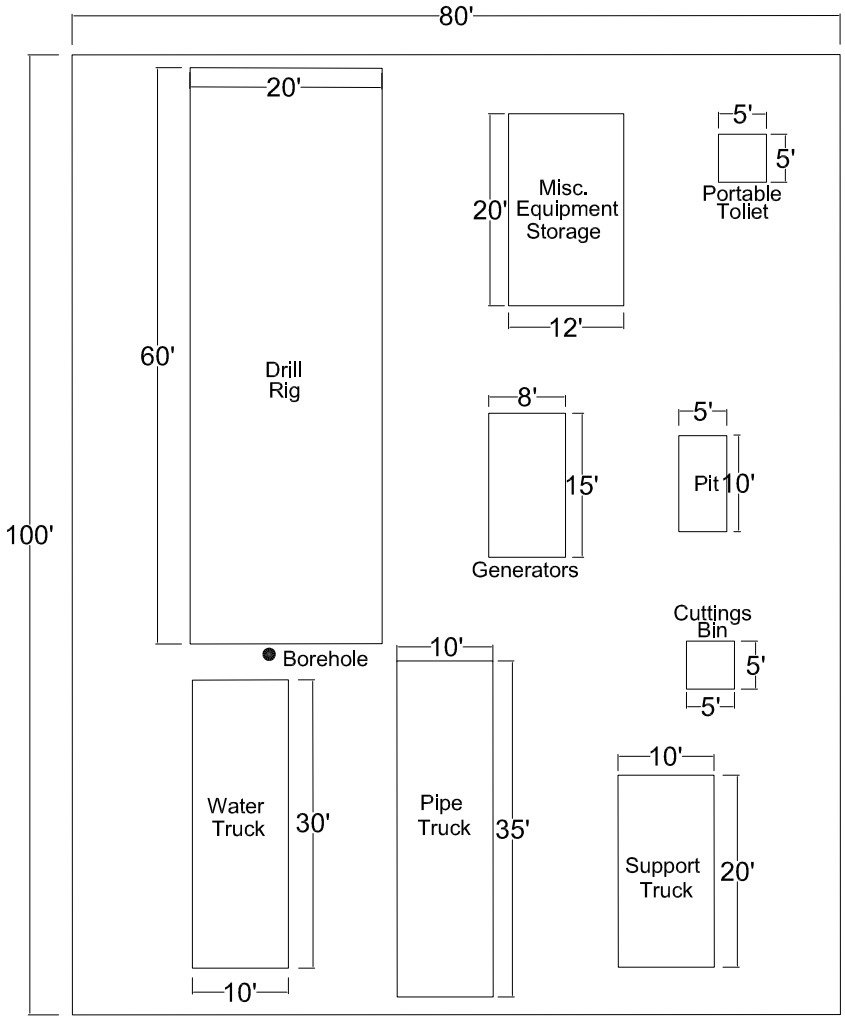
Temporary structures for equipment storage may be used by the drillers for shelter at each active rig (Figure 2). In addition, a portable toilet would be placed at each active drill site and would be serviced periodically by a contractor (Figure 2).

An equipment list for the proposed fault drilling operations is provided in Section 3.9 of this Plan.

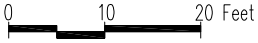
3.3. DEEP HYDROGEOLOGIC TESTING AND MONITORING WELLS

3.3.1. Purpose and Location of Activity

Three deep hydrogeologic testing and monitoring well sites, Sites DHTW-01, DHTW-02, and DHTW-03, would be drilled for hydrogeologic testing (Figure 1 and Table 2). One of these sites, DHTW-03, would be placed within areas previously disturbed by drilling activities.



Note: Layout will vary depending on site conditions



SCALE: 1" = 20 Feet

WestLand Resources Inc.
Engineering and Environmental Consultants
4001 E. Paradise Falls Drive
Tucson, Az 85712 (520) 206-9585

RESOLUTION COPPER MINING
Plan of Operations

Conceptual Drill Site Disturbance Footprint

Figure 2

M:\projects\807.12\USFS POO 2007\Fig2_drill-pad_layout.dwg

Table 2. Deep Hydrogeologic Testing and Monitoring Well Locations, Elevation, and Claim Information

Hole #	Northing	Easting	Elevation (m)	Legal Description	Claim Name
DHTW-01	3685909	496582	1,250	T1S, R13E, Sec 28 N ½ SE ¼	Sun #58 Sun #68
DHTW-02	3687219	495111	1,225	T1S, R13E, Sec 21 SW ¼ SW ¼	Kay 148 Kay 150
DHTW-03	3685230	498370	1,378	T1S. R13E, Sec 26 SW ¼ SW ¼	Margaret #275

Note: Detailed claim information for proposed deep hydrogeologic testing and monitoring wells and associated access is provided in Appendix E.

Geologic and hydrologic data to be obtained from the monitor wells would include: 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.

Roadway improvements required to gain access to the proposed deep hydrogeologic testing wells are identified in Figure 1 and Section 3.7.

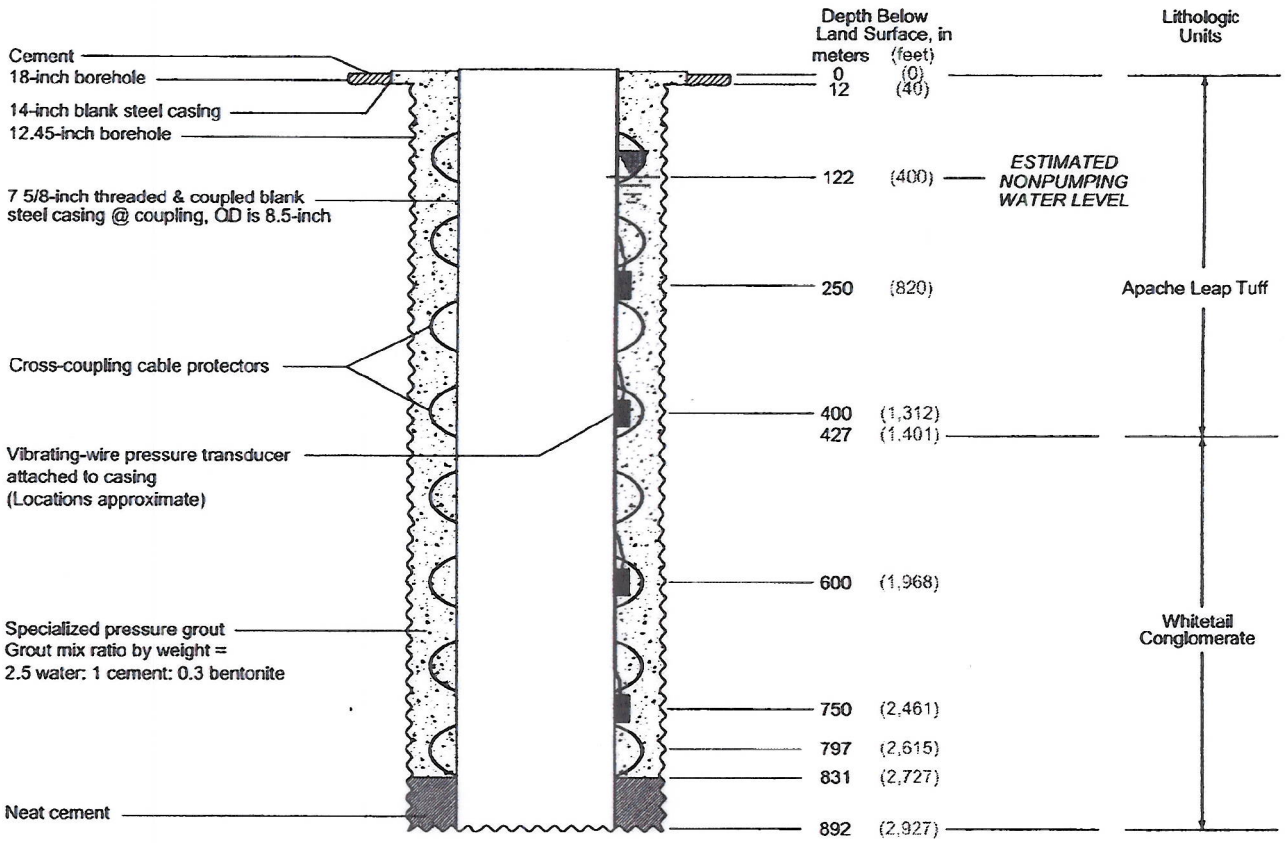
3.3.2. Deep Hydrologeologic Testing and Monitoring Well Drilling

The deep hydrogeologic testing and monitoring well sites proposed as part of this Plan have an approximately 80- by 100-foot disturbance footprint. This disturbance footprint provides required space for the placement of drill pads, and associated equipment and mud pits (Figure 2). Some sites would require additional area for grading and fill slopes. The estimated disturbance for the placement of the proposed deep hydrogeologic well sites is 0.9 acre. The estimated disturbance area for each individual site is identified in Section 3.12 of this Plan.

Complete descriptions of proposed deep hydrogeologic testing and monitoring activities are provided in Appendix C. Plan views of proposed activities with 2007 aerial base mapping and 10-foot contour intervals are provided in Appendix D.

Each site would be core drilled to approximately 2,000 meters with the same method used at proposed exploration holes. Each drill hole would be completed with a 4-inch steel casing for hydrogeology testing and groundwater level monitoring. A schematic diagram of a typical deep hydrogeologic testing well is provided in Figures 3a through 3c.

A minimum 16-inch diameter hole would be drilled, and 12-inch diameter steel surface casing would be set and cemented to a depth of 20 feet. A vertical 9 $^{7}/_{8}$-inch diameter borehole would be drilled using the reverse-circulation air-drilling technique to a depth of 450 to 800 meters. Careful observation of any formation water entering the borehole would be made, and drilling may be paused periodically to evaluate



Source Data:

ERROL L. MONTGOMERY & ASSOCIATES, INC.

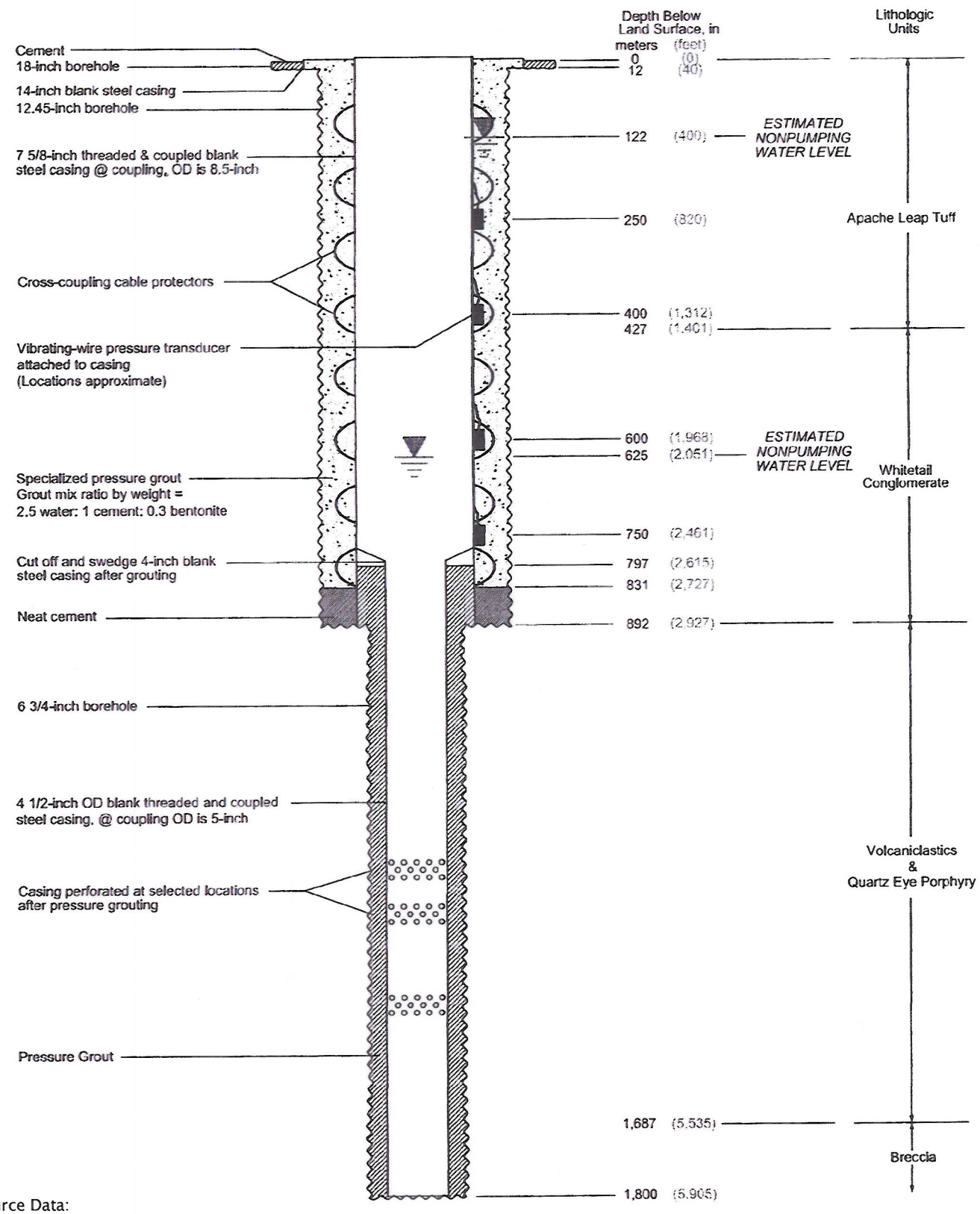
M:\projects\807.12\USFS POO 2007\FIGS 3-4 Hydro Wells 1-30-08.dwg

WestLand Resources Inc.
Engineering and Environmental Consultants
4001 E. Paradise Falls Drive
Tucson, Az 85712 (520) 206-9585

RESOLUTION COPPER MINING
PLAN OF OPERATIONS

SCHEMATIC DIAGRAM OF DEEP HYDROGEOLOGY TESTING AND MONITORING WELL

Figure 3A



Source Data:

ERROL L. MONTGOMERY & ASSOCIATES, INC.

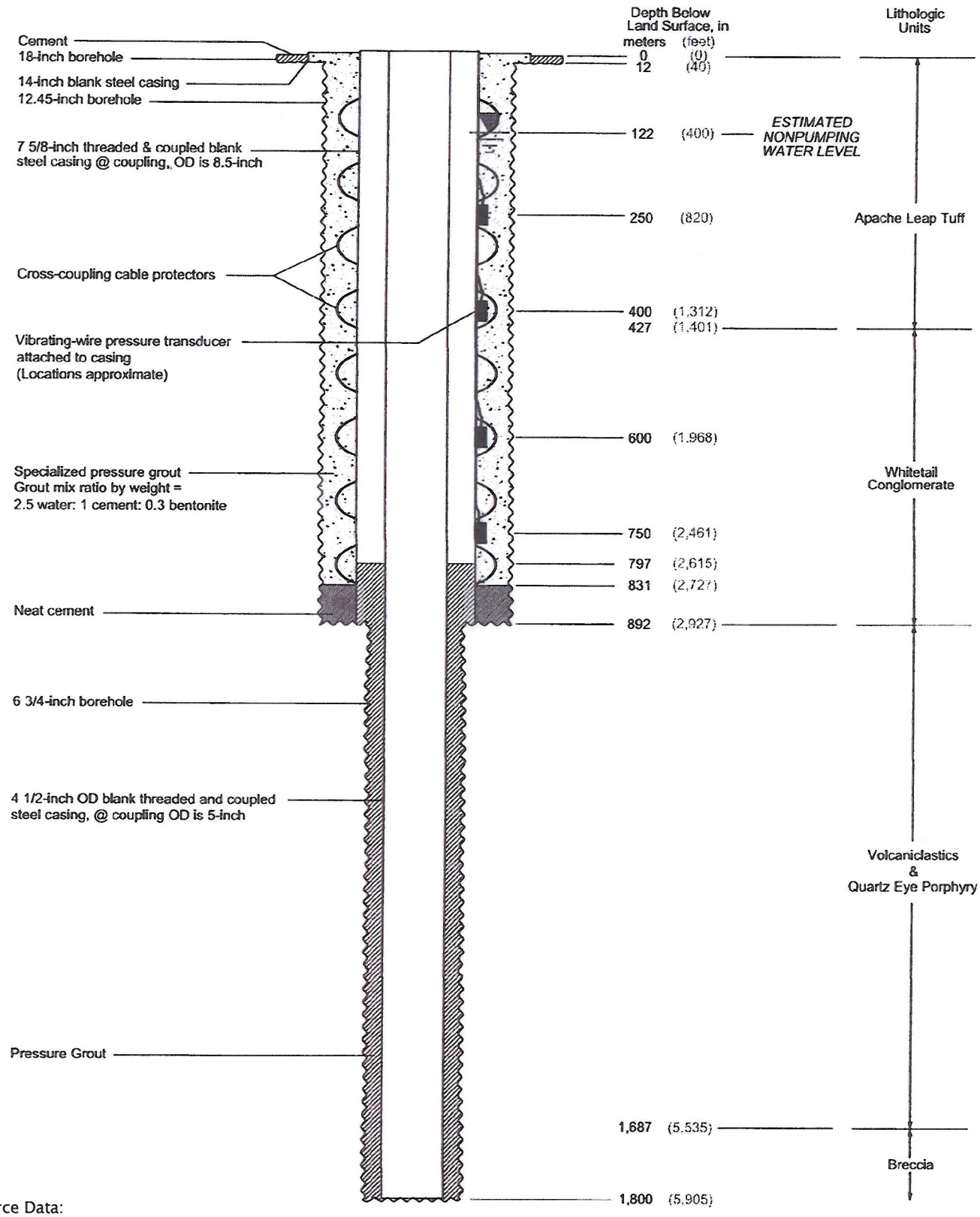
WestLand Resources Inc.
Engineering and Environmental Consultants
4001 E. Paradise Falls Drive
Tucson, Az 85712 (520) 206-9585

RESOLUTION COPPER MINING
PLAN OF OPERATIONS

SCHEMATIC DIAGRAM OF DEEP HYDROGEOLOGY TESTING AND MONITORING WELL

Figure 3B

M:\projects\807.12\USFS POO 2007\FIGS 3-4 Hydro Wells 1-30-08.dwg



Source Data:

ERROL L. MONTGOMERY & ASSOCIATES, INC.

WestLand Resources Inc.
Engineering and Environmental Consultants
4001 E. Paradise Falls Drive
Tucson, Az 85712 (520) 206-9585

M:\projects\807.12\USFS POO 2007\FIGS 3-4 Hydro Wells 1-30-08.dwg

RESOLUTION COPPER MINING
PLAN OF OPERATIONS

SCHEMATIC DIAGRAM OF DEEP HYDROGEOLOGY TESTING AND MONITORING WELL

Figure 3C

the quantity and quality of the groundwater entering the borehole by airlift pumping. A hydrologist would monitor the drilling operations.

A nominal 4-inch diameter (with 0.25-inch wall thickness) blank and perforated steel casing would be installed to the total borehole depth. Based on the results of drilling and borehole geophysical logging operations, a part of the borehole may be backfilled and capped with bentonite seal. Gravel would be installed in the annulus between the 4½-inch OD casing and $9^{7}/_{8}$-inch borehole walls to a depth of 10 meters above the perforated zone. Once gravel is installed, an airline would be lowered into the well for airlift development of the perforated zone. If airlift is not possible, a bailer of swab may be used to develop the perforated zone prior to the placement of a bentonite seal (if required) on top of the gravel. Additional gravel and bentonite may be installed at several intervals within the annulus for potential future perforation and testing of perched zones that may occur higher in the formation.

A small-capacity electric submersible pump would be installed in the well for well testing using the drill rig. Hydrologic testing would include a 12-hour, constant-rate pumping test followed by a 12-hour recovery. As many as three tests may be conducted at each well. Testing of multiple perforated zones would require perforation of the 4-inch casing adjacent to identified perch zones of interest, installation of a bridge packer below each successive perforated zone, and development of each additional perforated zone by airlift pumping or bailing prior to pump installation.

Once testing operations are completed, a 1-meter by 1-meter by 15-centimeter thick concrete pad would be installed at the wellhead. A locking steel security vault would be installed over the well head. The hydrologic testing sequence proposed as part of this Plan is identified in Section 3.5.

Temporary structures for equipment storage may be used by the drillers for shelter at each active rig (Figure 2). In addition, a portable toilet would be placed at each active drill site and would be serviced periodically by a contractor (Figure 2).

An equipment list for the proposed deep groundwater monitoring well drilling is provided in Section 3.9 of this Plan.

3.4. SHALLOW HYDROLOGIC MONITORING WELLS

3.4.1. Purpose and Location of Activity

Six shallow groundwater monitoring wells would be drilled on Forest Service lands (Figure 1, Table 3). Roadway improvements required to gain access to the proposed shallow groundwater monitoring wells are identified in Figure 1 and Section 3.7.

Table 3. Shallow Hydrologic Monitoring Well Locations, Elevation, and Claim Information

ID #	Northing	Easting	Elevation (Feet, MSL)	Legal Description	Claim Name
H-C	3678575	496860	3,850	T2S, R13E, Sec 20 NE ¼ NE ¼	--
H-E	3681030	494375	4,450	T2S, R13E, Sec 7 NW ¼ SW ¼	Dan 15 Dan 16 Dacite No. 12 Dacite No. 13
H-F	3685660	497525	4,300	T1S, R13E, Sec 27 NW ¼ SE ¼	Margaret #261 Margaret #263
H-G	3687527	497628	4,240	T1S, R13E, Sec 22 SW ¼ NE ¼	Margaret #162 Margaret #163
H-I	3685580	499150	4,280	T1S, R13E, Sec 26 SW ¼ NW ¼	LD No. 5 LD No. 6
H-K	3687219	495111	4,140	T1S, R13E, Sec 21 SW ¼ SW ¼	Kay 148 Kay 150

Note: Detailed claim information for proposed shallow hydrologic monitoring wells and associated access is provided in Appendix E.

The groundwater exploration objectives for the shallow monitoring well sites are provided in Table 4.

Table 4. Shallow Hydrologic Monitoring Well Exploration Objectives

ID	Groundwater Exploration Objectives
H-C	Explore groundwater in Whitetail Conglomerate of underlying units where Apache Leap Tuff is absent; provide additional control for direction and magnitude of water level gradients south of the Resolution Parcel; provide aquifer parameters for Whitetail of underlying units
H-E	Evaluate present water levels/aquifer conditions in Apace Leap Tuff/Whitetail Conglomerate/Older units near edge of Apace Leap
H-F	Evaluate potential enhanced fracturing on downthrown side of main north-south (NS) fault east of Devils Canyon, east from the Resolution Parcel; provide additional control in Apache Leap Tuff aquifer for direction and magnitude of water level gradients northeast of the Resolution Parcel; provide additional aquifer parameters
H-G	Evaluate potential enhanced fracturing on downthrown side of main NS fault east of Devils Canyon; provide additional control in Apache Leap Tuff aquifer for direction and magnitude of water level gradients northeast of the Resolution Parcel; provide additional aquifer parameters for tuff; provide baseline and long-term monitoring data for potential impacts to Top-of-the-World area wells
H-I	Provide additional control in Apache Leap Tuff aquifer for direction and magnitude of water level gradients in east part of Devils Canyon drainage basin; provide additional aquifer parameters for tuff
H-K	Provide additional control in Apache Leap Tuff aquifer on water level gradient direction and magnitude north of Resolution Parcel; provide additional aquifer parameters for tuff

3.4.2. Shallow Hydrologic Monitoring Well Drilling

The shallow monitoring well sites proposed as part of this Plan have an approximately 80- by 100-foot disturbance footprint (Figure 2). This disturbance footprint provides required space for the placement of drill pads, and associated equipment and mud pits. Some sites would require additional area for grading and fill slopes. The estimated disturbance for the placement of the proposed shallow monitoring well sites is 1.3 acres. The estimated disturbance area for each individual site is identified in Section 3.12 of this Plan.

Complete detailed descriptions of proposed shallow hydrologic monitoring activities are provided in Appendix C and plan views of proposed activities with 2007 aerial base mapping and 10-ft contour intervals are provided in Appendix D.

Shallow hydrologic monitoring wells would be drilled at a depth of approximately 1,500 feet. These borings would be advanced using rotary and/or percussion methods using air and water for circulation. The wells would be drilled using a bit with a maximum diameter of 12 inches to start then reduced to 9 inches and then 6 inches depending on the depth. Arizona state regulations require construction of a small concrete pad around the monitoring well surface casing. The concrete pad would be approximately 3 by 3 feet. Wells would be completed with steel casing, pump and/or transducers, gravel pack, sounder access, and inflatable packers designed for continuous monitoring. A schematic drawing of a typical shallow monitoring well is provided in Figure 4.

Temporary structures for equipment storage may be used by the drillers for shelter at each active rig (Figure 2). In addition, a portable toilet would be placed at each active drill site and would be serviced periodically by a contractor (Figure 2).

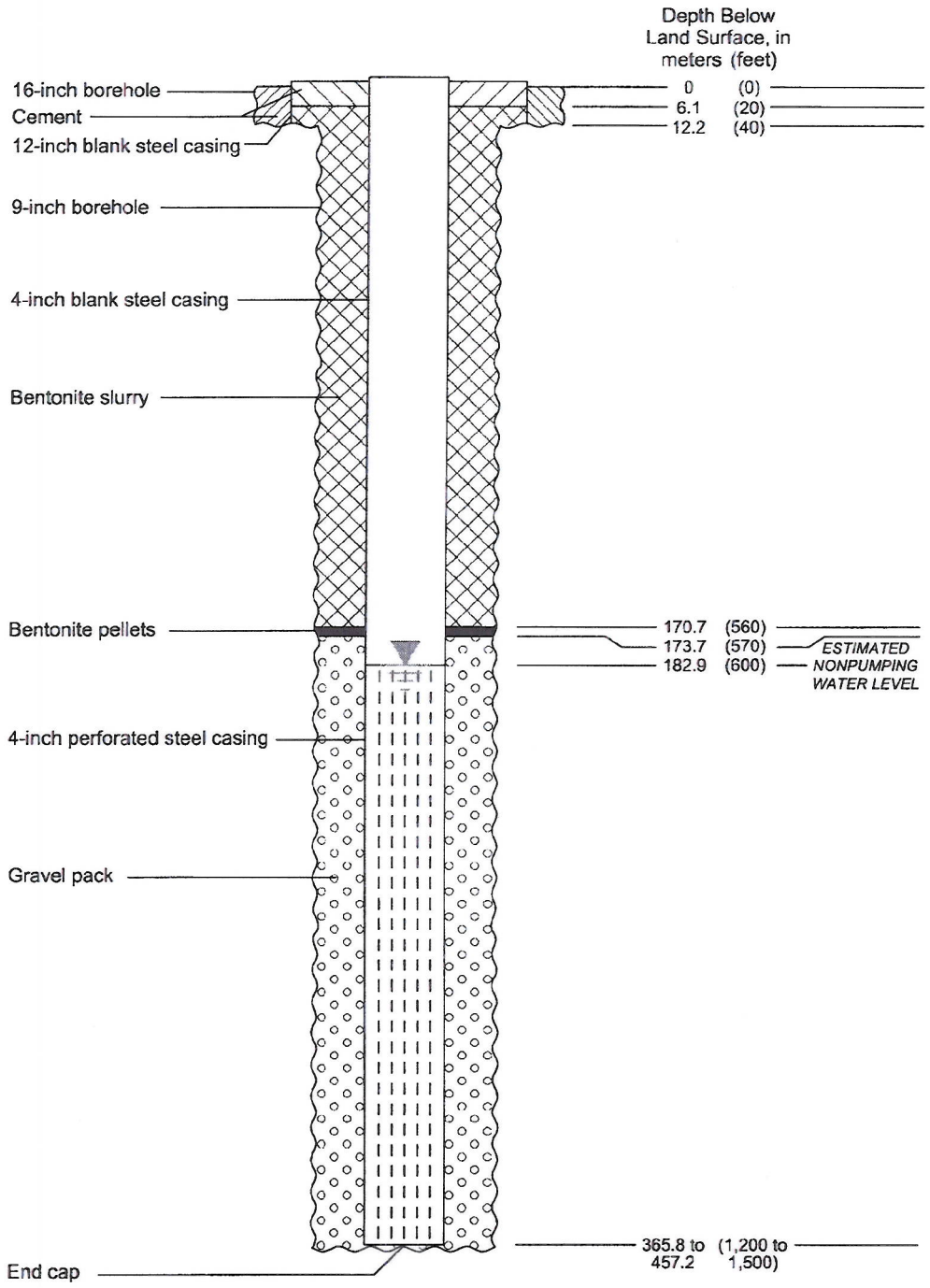
An equipment list for the proposed shallow groundwater monitoring well drilling is provided in Section 3.9 of this Plan.

3.5. HYDROLOGIC TESTING SEQUENCE

After drilling boreholes to total depth, geological and geophysical logging (e.g., televiewer, resistivity, and sonic) would be conducted to identify zones of frequent rock fractures. After logging, open borehole airlift operations would be conducted for development of the borehole prior to casing and for preliminary indication of specific capacity (a measure of discharge rate and maximum groundwater level drawdown during pumping). Development is a term used to indicate procedures used by drillers for maximizing groundwater yield. Objectives of development are to repair well borehole damage caused by drilling processes by smearing clays on the borehole wall, to remove fines in the aquifer caused by drill cuttings, and to enhance the physical characteristics of the borehole to allow free movement of groundwater.

After completing open borehole airlift operations, blank and perforated steel casing would be installed to isolate fracture intervals. Annular bentonite seals would be installed between the borehole wall and blank steel casing at isolated fracture intervals and perforated casing strings would allow for hydraulic testing and monitoring of isolated fractured rock intervals. The hydraulic testing program would be preceded by composite testing of multiple fracture zones intersected within the well and detailed hydrologic characterization testing of isolated fracture zone(s) using inflatable packers.

A normal test sequence for hydrologic testing would include the following elements:



Source Data:

ERROL L. MONTGOMERY & ASSOCIATES, INC.

RESOLUTION COPPER MINING
PLAN OF OPERATIONS

SCHEMATIC DIAGRAM OF SHALLOW
HYDROLOGIC MONITORING WELL

Figure 4

WestLand Resources Inc.
Engineering and Environmental Consultants
4001 E. Paradise Falls Drive
Tucson, Az 85712 (520) 206-9585

M:\projects\807.12\USFS POO 2007\FIGS 3-4 Hydro Wells 1-30-08.dwg

Open Borehole Airlift Operations. These operations would provide: 1) development of the borehole to reduce impacts of 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 and isotopic analysis.

Constant-Rate Pumping Tests (Drawdown). Drawdown data obtained during constant-rate pumping tests would be used to diagnostically evaluate operative aquifer conditions (e.g., leaky aquifer or unconfined aquifer), and detect the presence of nearby hydrogeologic features (e.g., boundaries such as faults or surface water). Pumping tests also would provide opportunities for the collection of representative water samples for detailed hydrochemical and isotopic analysis, which are useful for assessing the source and origin of groundwater and evaluating hydrologic connection with surface water sources.

Constant-Rate Pumping Tests (Recovery). Analysis of groundwater level recovery data would provide corroborative information (i.e., to drawdown response) during the constant-rate pumping test.

A packer assembly would be used to isolate fracture intervals in the well opposite perforated casing. The packer assembly would help determine vertical hydraulic gradient in the well, testing of isolated fracture sets, and obtaining groundwater samples to identify hydrochemistry. Normal procedures with the packer assembly would include:

Packer Inflation. The test tool would be positioned and packers would be inflated to isolate the test interval.

Pressure Stabilization The down hole shut-in tool would be closed and pressure would be monitored to establish the static formation pressure.

Constant-Rate Pumping Test. A constant-rate pumping test would be conducted to determine aquifer parameters for the discrete fracture interval open in the well to pumping.

Prior to pumping tests, short-duration pre-tests would routinely be conducted. Pre-testing would be conducted primarily for additional well development and for determining pumping rates for the constant-rate discharge test.

3.6. TUNNEL CHARACTERIZATION BOREHOLES

3.6.1. Purpose and Location of Activity

A total of nine cored boreholes are proposed on Forest Service lands (Figure 1, Table 5) along two potential tunnel alignments. These boreholes are required to further define rock conditions along a

planned conveyor tunnel alignment. All boreholes would be logged for geology and rock mass properties by a competent rock mechanics engineer, geological engineer or engineering geologist.

Table 5. Tunnel Characterization Borehole Locations, Dimensions, and Claim Information

Hole #	Northing	Easting	Elevation	Tunnel Elevation	Depth	Tilt
PVT-3	3685533	494897	1,201	900	301	-90
PVT-4	3685900	496630	21,286	930	356	-90
PVT-5	3686712	497417	1,329	945	384	-90
PVT-6	3687667	499292	1,413	960	453	-70
PVT-7	3688152	500363	1,478	970	508	-90
PVT-8	3690714	502741	1,440	990	450	-90
PVT-9	3691544	503389	1,490	1,000	490	-90
APV-6	3686990	499270	1,437	960	477	-90
APV-8	3690549	499378	1,440	970	470	-90

Note: Detailed claim information for the tunnel characterization boreholes and associated access is provided as Appendix E.

Roadway improvements required to gain access to the tunnel characterization boreholes are identified in Figure 1 and Section 3.7.

3.6.2. Tunnel Characterization Borehole Drilling

The tunnel characterization sites proposed as part of this Plan have an approximately 60- by 100-foot disturbance footprint. This disturbance footprint provides required space for the placement of drill pads, and associated equipment and mud pits (Figure 2). Some sites would require additional area for grading and fill slopes. The estimated disturbance for the placement of the proposed tunnel characterization sites is 1.8 acres. The estimated disturbance area for each individual site is identified in Section 3.12 of this Plan.

Complete detailed descriptions of proposed tunnel characterization activities are provided in Appendix C. Plan views of proposed activities with 2007 aerial base mapping and 10-foot contour intervals are provided in Appendix D.

Boreholes would be core drilled to depths between 301 meters and 508 meters, depending on collar elevation (Table 5). Tunnel characterization boreholes would be core drilled with the same method used at the proposed exploration holes.

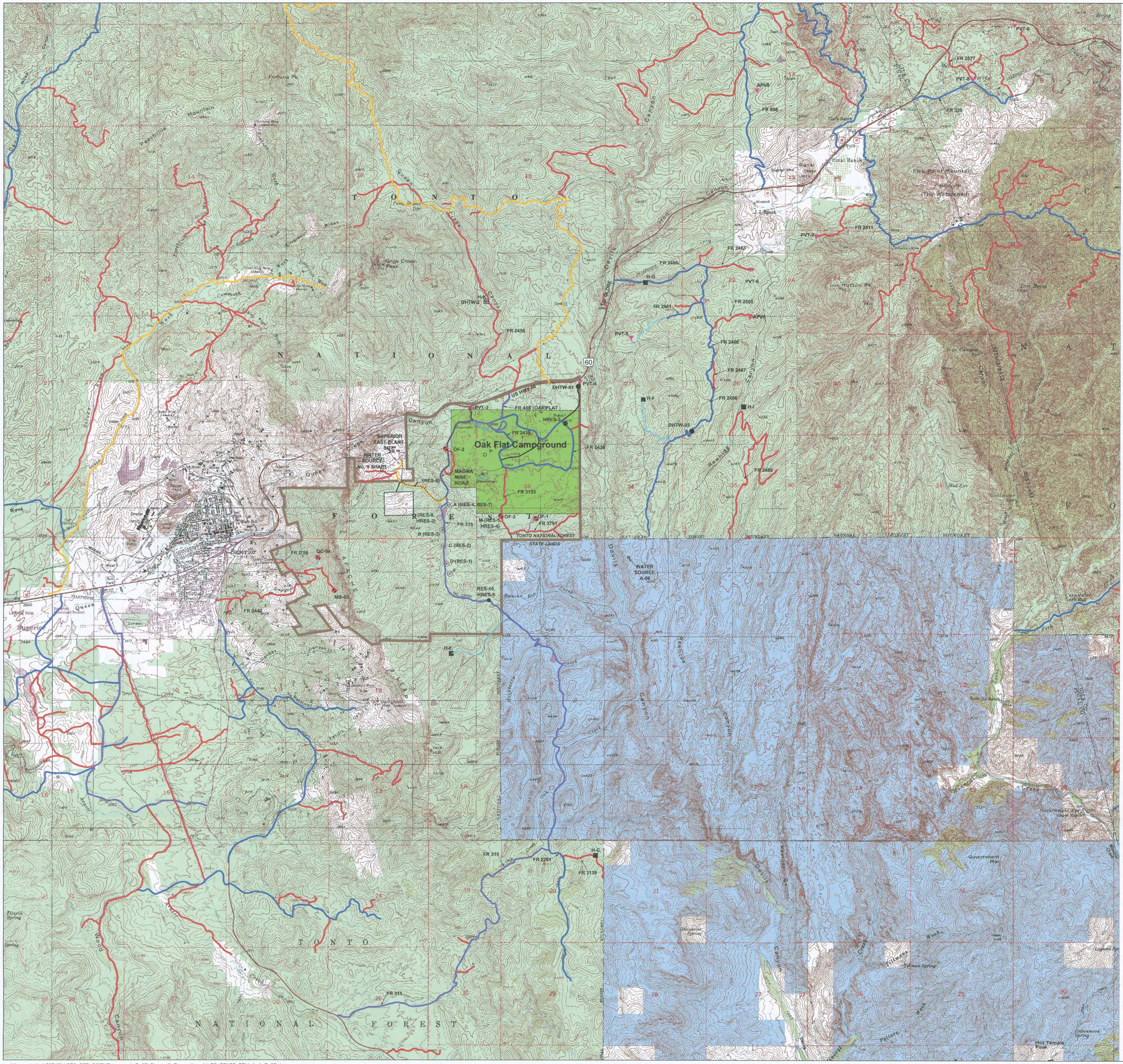
Temporary structures for equipment storage may be used by the drillers for shelter at each active rig (Figure 2). In addition, a portable toilet would be placed at each active drill site and would be serviced periodically by a contractor (Figure 2). An equipment list for the proposed tunnel characterization borehole drilling is provided in Section 3.9 of this Plan.

3.7. ACCESS

Access to proposed drilling operations would generally be gained from either US Highway 60 or State Route 177 through Forest Service lands. Within Forest Service lands approximately 16.9 miles of existing road are proposed for improvement and approximately 0.3 mile of new access road are planned (Figure 1 and Tables 6.1 and 6.2). In addition, approximately 3.2 miles of the proposed access road improvements would traverse state and privately owned lands that are adjacent to Tonto National Forest (Appendix G). The current Forest Service Road Maintenance Levels within proposed activity areas are shown on Figure 5.

Since the terrain is rocky within proposed activity areas, boulders may narrowly constrict some portions of the road or the curve radii may be too small for the long drill rigs. The use of dozers, hammer-hoes, or track hoes would be required to modify these constrictions. Access road improvements would be minimized to the greatest extent practicable. Based on the current understanding of conditions along the proposed access routes, cuts and fills would be balanced onsite in a manner that minimizes disturbance. Complete detailed descriptions of proposed access within Forest Service lands are provided in Appendix C and plan views of proposed access route improvements with 2007 aerial base mapping and 10-foot contour intervals are provided in Appendix D. Access to PVT-7 is currently planned to be helicopter-supported along FR 2511 (Figure1). Ground access options for this site are still under consideration.

Public access of proposed activity areas would be managed by crew members during roadway construction and improvements. To the extent practicable, roadway activities proposed as part of this plan would be conducted in a manner that would allow continued use by the public. Temporary road closures causing limited access may occur for short periods. Traffic control signage would be posted to identify, when possible, detour routes for public access. To the extent practicable turn-outs would be provided along roadways to allow the public to pass construction areas. All closure, restrictions, and signing for access management would comply with the guidelines in the Manual on Uniform Traffic Control Devices (FSM 7103.3) for signs and markers. The contractor will provide a traffic management plan and coordinate with the Department of Public Safety for access to Forest roads from any state or federal highway to ensure public safety.



LEGEND

- Resolution Parcel Boundary
- Exploration Drill Site
- Tunnel Characterization Bore Holes
- Deep Hydrogeology Testing / Monitor Wells
- Shallow Hydrogeology Well Site
- Drill Site (Approved Under November 2004 Modification)
- Drill Site (Approved Under The Original February 2001 P.O.O.)

- User Created Road (To Be Improved)
- New Road (No RATM Designation)
- Other User Created Road (To Be Maintained)
- Brushing/Clearing Along Roadway

Forest Service Transportation Management Maintenance Levels:

- Level 1-Basic Custodial Care (closed)
- Level 2-High Clearance Vehicles
- Level 3-Suitable for Passenger Cars
- Level 4-Moderate Degree of User Comfort
- Level 5- High Degree of User Comfort (Not found on this map)

Forest Service Transportation Management Maintenance Levels are defined in FSH 7709.58, 10, 12.3:

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 can 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.

Note: No Convert Use or Decommission Roads occur within the view of this map.

- Tonto National Forest
- State Trust Lands

N
W E
S

0' 2000' 4000'

SCALE 1" = 2000'

Pinal County, Arizona
Superior, Pinal Ranch &
Teapot Mountain 7.5'
USGS Maps

WestLand Resources Inc.
Engineering and Environmental Consultants

RESOLUTION COPPER MINING
PLAN OF OPERATIONS

LOCATION MAP WITH
FOREST ROAD CLASSIFICATIONS
Figure 5

Table 6.1. Proposed Access Road Improvements within Tonto National Forest

Road	Current Forest Service Road Maintenance Level (1, 2)	Planned Road Condition During Pre-feasibility 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 will 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
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	1,389	0.26
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	4,643	0.88
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

Table 6.1 Proposed Access Road Improvements within Tonto National Forest (Continued)

Road	Current Forest Service Road Maintenance Level (1,2)	Planned Road Condition During Pre-feasibility Plan of Operations Activities (2)	Length (4)	
			Feet	Miles
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 3786	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	1,968	0.37
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 US 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 in-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 Length of Existing Road Improvements	**89,150**	**16.86**

Note 1: Data provided as a shape file by Tonto National Forest on December 4, 2007, file name - Globerd_rds.shp. These are transportation management designations and do not necessarily reflect the current condition or drivability of the specific road segment in question.
Note 2: Forest Service Transportation Management Maintenance Standards are defined in FSH 7709.58, 10, 12.3:
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.
Note 3: User Created is the Forest Service terminology for roads that were not created and maintained under the Forest system road management plan. In all cases these roads existed prior Resolution Copper Mining activities in the region
Note 4: These values reflect an estimate of the linear distance of Forest system roads that will be used to access the pre-feasibility activities areas. As indicated on Sheets 1 to 53 in Appendix D various levels of improvement will be needed along these road segments. Improvements will range from minor dressing and maintenance activities to relatively extensive reconstruction to achieve the desired condition required to provide access for pre-feasibility activities.
Note 5: In addition to the proposed access improvements on Tonto National Forest, approximately 3.2 miles of existing roads would be improved on state and privately owned lands to access proposed activities on the Forest.

Table 6.2. New Temporary Access Roads Proposed within Tonto National Forest

Road	Current Forest Service Road Management Classification	Planned Road Condition During Pre-feasibility Plan of Operation Activities	Length	
			Feet	Miles
New Access from FR 2458 to 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	0.03
New Access from FR 2458 to DHTW-02	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 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 3791 to 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**

3.8. MAGMA MINE ROAD MAINTENANCE

Magma Mine Road is an existing paved road with deteriorating pavement. In order to improve visibility for the transport of heavy equipment along this roadway, the vegetation immediately adjacent to the paved roadway would be cleared and brushed regularly, as has been the practice in prior years.

3.9. EQUIPMENT REQUIRED FOR PROPOSED OPERATIONS

A list of equipment is displayed in Table 7 (similar equipment may be used, depending on which drilling contractor is selected). Equipment lists for each individual site are also provided in Appendix C.

Table 7. Equipment List

Quantity	Equipment	Size
Exploratory Drilling Operations		
1	UDR-5000 Core Drill Rig or equivalent	10 ft X 58 ft
1	CP-50 Core Drill Rig or equivalent	10 ft X 58 ft
1	Schram 685 Rotary Drill Rig or equivalent	10 ft X 40 ft
1	LF-90 Rotary Drill Rig or equivalent	10-ft X 40-ft
1	Mud Tank (associated with active drill rigs)	9,500-gallon
2	Pipe Truck	10 X 35 ft
1	Water Storage Tank (associated with active drill rigs)	1,000-gallon
2	Generators associated with Drill Rigs	8 ft X 15 ft
1	Cat Bulldozer	D-9
1	Track Hoe	10 ft X 20 ft
1	Tracked Jaw Crusher	10 ft X 20 ft
1	Water Truck	10 ft X 30 ft
Deep Hydrologic Well Drilling		
1	UDR-5000 Core Drill Rig or equivalent	10 ft X 58 ft
1	UDR-1500 Core Drill Rig or equivalent	10 ft X 58 ft
1	Lang LM-200 Series Tophead Rotary Rig or equivalent	10 ft X 40 ft
1	Schram 685 Rotary Drill Rig or equivalent	10 ft X 40 ft
1	Mud Tank (associated with active drill rigs)	9,500-gallon
2	Pipe Truck	10 X 35 ft
1	Water Storage Tank (associated with active drill rigs)	1,000-gallon
2	Generators associated with Drill Rigs	8 ft X 15 ft
1	Cat Bulldozer	D-9
1	Track Hoe	10 ft X 20 ft
1	Tracked Jaw Crusher	10 ft X 20 ft
1	Water Truck	10 ft X 30 ft
Shallow Hydrologic Well Drilling		
1	Lang LM-200 Series Tophead Rotary Rig or equivalent	10 ft X 40 ft
1	Mud Tank (associated with active drill rigs)	9,500-gallon
2	Pipe Truck	10 X 35 ft
1	Heavy duty air compressor	
1	Water Storage Tank (associated with active drill rigs)	1,000-gallon
2	Generators associated with Drill Rigs	8 ft X 15 ft
1	Front end loader	10 ft X 30 ft
1	Backhoe	10 ft X 20 ft
1	Tracked Jaw Crusher	10 ft X 20 ft
1	Water Truck	10 ft X 30 ft
Tunnel Characterization Boreholes		
1	Lang LM-200 Series Tophead Rotary Rig or equivalent	10 ft X 40 ft
1	UDR-1500 Core Drill Rig or equivalent	10 ft X 58 ft
1	Schram 685 Rotary Drill Rig or equivalent	10 ft X 40 ft
1	Mud Tank (associated with active drill rigs)	9,500-gallon
2	Pipe Truck	10 X 35 ft
1	Water Storage Tank (associated with active drill rigs)	1,000-gallon
2	Generators associated with Drill Rigs	8 ft X 15 ft
1	Cat Bulldozer	D-9
1	Track Hoe	10 ft X 20 ft

Table 7. Equipment List

Quantity	Equipment	Size
1	Tracked Jaw Crusher	10 ft X 20 ft
1	Water Truck	10 ft X 30 ft
Access Road Construction and Improvement		
1	Track Hoe	10 ft X 20 ft
1	Hammer hoe	10 ft X 20 ft
1	Front end loader	10 ft X 30 ft
1	Water truck	10 ft X 30 ft

3.10. WATER MANAGEMENT

Water would be used for dust suppression and some drilling processes. Water for the proposed drilling and dust suppression would be obtained from the Superior Mine's potable water tanks which originate from the approximately 500-foot level of the No. 9 Shaft underground workings (ADWR #59-524492; Figure 1) and from a well located within Township 2 South, Range 13 East, NW ¼ of Section 4, on adjacent state lands, Well A-06 (ADWR #55-214967; Figure 1). The water source at the No. 9 Shaft occurs within the Phoenix Active Management Area (AMA) and Well A-06 occurs outside the AMA. Water from Well A-06 would only be used along Forest Road (FR) 2466 and FR 2469. The remaining activity areas would use water from the underground workings of the No. 9 Shaft. Water trucks would be used to transport water from the water sources to proposed activity areas.

It is anticipated that drill holes may "make" water during drilling processes. In accordance with standard industry practices, water used for drilling purposes or emerging from the holes would be routed to a single large pit or a series of settling pits in order to settle the solids. These mud pits would be excavated alongside each drill site or at other nearby places where excavation is feasible. The excavation is usually done using a track hoe. The initial pit would contain water and ground rock pumped from the hole and would act as a decant-evaporation pit during open-hole drilling. The water in the pit would fully evaporate. The second and successive pits (if needed) would initially be used as back-up infiltration pits. If excessive mud is produced, the mud pits may be pumped out and the contents properly disposed of at a permitted landfill. Because of the in-place system of evaporation and infiltration pits, any discharges would be in compliance with the Arizona Department of Environmental Quality's (ADEQ's) Arizona Pollutant Discharge Elimination System (AZPDES) De Minimus General Permit for well development activities. Water bars and straw bales would be used as needed to prevent erosion.

The associated drill rig mud tank and/or settling pits would be used during drilling phases to hold drilling mud that is re-circulated down the hole to cool and lubricate the drill rods and the diamond bit, and to help carry ground up rock to the surface. While used for this purpose, the mud pit would be lined with plastic sheeting and/or the mud would be contained in one or more steel tanks. Drilling mud would be allowed to evaporate to dryness or may be periodically pumped and transported offsite for proper disposal. During reclamation activities, drilling mud would be removed from the site.

The Forest Service would be provided with any information gathered concerning the levels or formations where groundwater is encountered, and flow rates if known or determined.

3.11. BEST MANAGEMENT PRACTICES

Resolution will develop and implement a construction Stormwater Pollution Prevention Plan (SWPPP) in accordance with the regulations of the AZPDES Stormwater Construction General Permit (CGP). Sediment control features, such as silt fencing, would be used at the downgradient toe of fill slopes in order to catch sediment and keep it from entering drainages. Road engineering would avoid drainage channel bottoms to the greatest extent possible. Water bars would be provided to minimize erosion on steep sections of roadway. If maintenance is necessary, personnel may periodically grade the road surface. The cross slope, stormwater system design, erosion control features, and limited maintenance constitute Best Management Practices (BMPs) for the roadways.

The drilling operations would be conducted round-the-clock and notices would be posted along the access road in accordance with Forest Service guidelines.

For fire prevention measures, the Resolution 2007 Fire Restriction Response Plan (Appendix F) would be posted and implemented at each drill site. Resolution employees and their contractors would take care to always thoroughly extinguish all smoking materials. Litter would be cleared from around any ignition sources.

3.12. TOTAL ESTIMATED DISTURBANCE ACRES

An estimated 39.2 acres would be disturbed for proposed drilling operations, new access roads, and existing access road improvements (Table 8). The proposed new activities would require disturbance of approximately 5.3 acres for the placement of drill pads on new and existing drill sites, approximately 0.6 acre for the construction of approximately 0.3 mile of new access roads, and approximately 33.3 acres for the improvement of approximately 16.9 miles of existing roads for access. Areas of disturbance provided here are based on conservative estimates of the maximum area that would be required for proposed activities.

3.13. ACTIVITIES WITHIN STATE AND PRIVATELY OWNED LANDS

Resolution has conducted and proposes to continue exploration activities within state lands and privately owned lands in the vicinity of the proposed activities. An exploration plan of operations under Mineral Exploration Permit No. 08-110148 was approved by the Arizona State Land Department (ASLD) Minerals Section in July 2007 for the placement of two monitoring well sites, HRES-07 and HRES-08, and associated access improvements on State Lands (Appendix G). A Special Land Use Permit was obtained for hydrologic monitoring well site HRES-05 and associated access in 2004 and an exploration plan of operations under Mineral Exploration Permit No. 08-110147 was approved by the ASLD Minerals Section in 2006 for exploration site RES-12 (Appendix G). Appendix G identifies the locations and

provides detailed descriptions of other actions that are planned within adjacent state and privately owned lands.

3.14. SCHEDULE OF ACTIVITIES

Activities would be scheduled generally based on their proximity to major access routes that serve the area, US Highway 60, State Route 177, and Magma Mine Road. The proposed schedule for phasing and abandonment of each site and associated access routes are provided in Appendix C. This schedule is based on the current understanding of planned activities.

Table 8. Estimated Disturbance Acres

Disturbance Area	Description of Disturbance	Estimated Acres of Disturbance
Drill Pads		
QC-04	80-ft X 100-ft drill pad plus grading/fill area	0.3
MB-03	80-ft X 100-ft drill pad plus grading/fill area	0.3
OF-1	80-ft X 100-ft drill pad plus grading/fill area	0.2
OF-2	80-ft X 100-ft drill pad plus grading/fill area	0.3
OF-3	80-ft X 100-ft drill pad plus grading/fill area	0.2
	Subtotal	**1.3**
Deep Hydrogeology Testing/Monitor Wells		
DHTW-01	80-ft X 100-ft drill pad plus grading/fill area	0.3
DHTW-02	80-ft X 100-ft drill pad plus grading/fill area	0.3
DHTW-03	80-ft X 100-ft drill pad plus grading/fill area	0.3
	Subtotal	**0.9**
Shallow Hydrologic Monitor Wells		
H-C	80-ft X 100-ft drill pad plus grading/fill area	0.3
H-E	80-ft X 100-ft drill pad plus grading/fill area	0.2
H-F	80-ft X 100-ft drill pad plus grading/fill area	0.3
H-G	80-ft X 100-ft drill pad plus grading/fill area	0.3
H-I	80-ft X 100-ft drill pad plus grading/fill area	0.2
H-K	80-ft X 100-ft drill pad plus grading/fill area	*
	Subtotal	**1.3**
Conveyor Tunnel Boreholes		
PVT-3	60-ft X 100-ft drill pad plus grading/fill area	0.1
PVT-4	60-ft X 100-ft drill pad plus grading/fill area	0.2
PVT-5	60-ft X 100-ft drill pad plus grading/fill area	0.2
PVT-6	60-ft X 100-ft drill pad plus grading/fill area	0.2
PVT-7	60-ft X 100-ft drill pad plus grading/fill area	0.3
PVT-8	60-ft X 100-ft drill pad plus grading/fill area	0.2
PVT-9	60-ft X 100-ft drill pad plus grading/fill area	0.2
APV-6	60-ft X 100-ft drill pad plus grading/fill area	0.1
APV-8	60-ft X 100-ft drill pad plus grading/fill area	0.3
	Subtotal	**1.8**
Existing Access Road Improvements**	Road dressing/improvement along 16.9 miles	**33.3**
New Access Road ***	Grading/clearing for new road construction	**0.6**
Total Disturbance		**39.2**

* H-K would be located on the same site as deep hydrogeologic testing/monitoring well DHTW-02.

** Roadway improvements would be conducted along portions of approximately 16.9 miles of existing access roads. The maximum area of this disturbance for existing road improvements was estimated using roadway profiles created with 2007 aerial imagery and 10-foot contour intervals.

*** Approximately 0.3 mile of new access road would be required. The maximum area of disturbance was estimated using roadway profiles created with 2007 aerial imagery and 10-foot contour intervals and a maximum disturbance width of 15 feet.