

MIS

The project activities are not expected to result in a loss of suitable habitat for any of the MIS species analyzed and are not expected to affect the forest-wide habitat trend because of the limited extent of impacts and the short-term nature of the project. The impacts from the Hermosa Drilling Project are analyzed in detail in the MIS report (Tetra Tech, 2014d) where potential impacts are discussed in detail.

Implementation of specific AMI proposed EPMs in Sections 2.3.3.3 and 2.3.3.6 and Forest Service required Design Features in Sections 2.3.5.1 and 2.3.5.2 will reduce negative impacts to special status wildlife and plants.

3.6.4 Compliance with Forest Plan and Other Regulations

The project would comply with standards in the Coronado National Forest Plan. The project would also comply with Federal and State laws and regulations regarding threatened, endangered, proposed or candidate species, Forest Service sensitive species, and Coronado National Forest MIS. Project activities are not likely to jeopardize the continued existence of listed threatened or endangered species or modify their critical habitat. Effects of the project on Forest Service sensitive species and MIS have been analyzed and have been found not likely to result in a loss of viability in the area, nor cause a trend toward federal listing for sensitive species, and are not expected to affect the forest-wide habitat trend for MIS.

3.7 Heritage and Native American Interests

3.7.1 Regulatory Framework

3.7.1.1 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (16 U.S.C. 470w-3) and the Archaeological Resources Protection Act (16 U.S.C. 470hh) require agencies to consider the effects of their undertakings on historic properties. Historic properties are defined in the National Historic Preservation Act as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register of Historic Places. In Arizona, applicable state laws include, but may not be limited to, Arizona Revised Statute Title 39, Section 125.

3.7.1.2 Coronado Forest Plan

Forest-wide standards for cultural and historical resources applicable to the Hermosa Drilling Project EA include (page 29 of the Forest Plan):

1. The Forest will comply with the National Historic Preservation Act (NHPA), as amended, and will undertake active management which recognizes cultural resources as equal in importance to other multiple uses. Cultural resources will be managed in coordination with the State Historic Preservation Plan and planning activities of the SHPO and State Archaeologist, and in accordance with the Forest Service Manual and the Coronado National Forest Planning Assessment.
2. Forest authorized projects will be managed to comply with 36 CFR 800, the Forest Service Manual and the Coronado National Forest Planning Assessment.

All consultation responsibilities with the SHPO will be followed. The area of the undertaking's potential environmental impact will be inventoried for cultural resources.

Inventory standards will be as specified in the Forest Service Manual. The identification of areas of Native American religious use will be sought during the project scoping portion of the environmental analysis process. Native American groups descended from groups that occupied the project vicinity aboriginally will be consulted as appropriate.

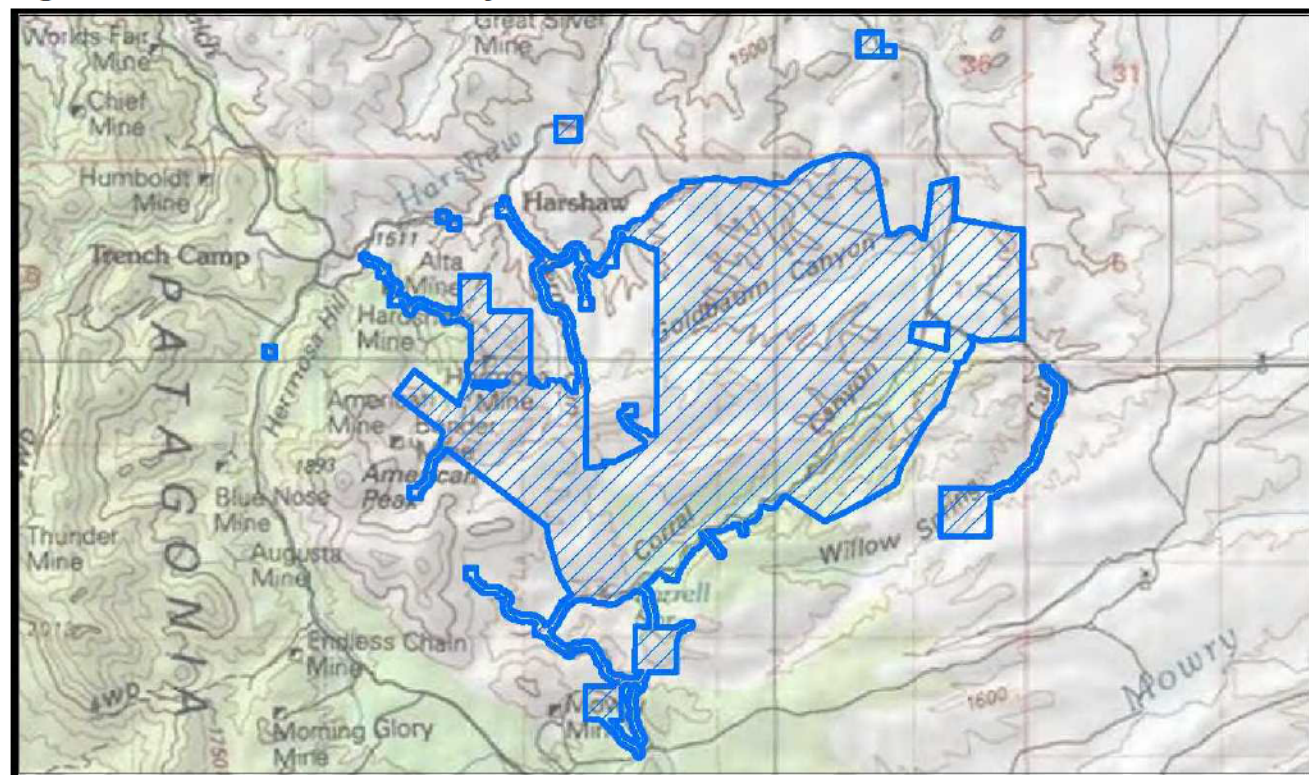
3. During the conduct of undertakings, the preferred management of sites listed in, nominated to, eligible for, or potentially eligible for the National Register is avoidance and protection. [Protect] cultural properties from damage by project activities through project design, individual site identification, protection measures, training, monitoring and coordination with law enforcement staff. Unevaluated sites will be managed as if eligible, unless consultation with the SHPO indicates otherwise. Management will attempt to achieve a "No Effect" determination in undertakings. When this is not feasible, a "No Adverse Effect" determination will be the preferred standard. This may include cases where consultation with the SHPO indicated that data recovery and interpretation are appropriate. The procedures in 36 CFR 800 will be followed in reaching a management decision.
4. The Forest will provide for the stabilization of cultural resources with priorities determined by National Register status, the inherent scientific and interpretive values of the resource, and by the feasibility of current technology to arrest further deterioration. The procedures in 36 CFR 800 will be followed in reaching a final decision.
5. A cultural resources professional will inspect each site that may be affected by an undertaking. At least 20 percent of the sites designated for protection within each undertaking, including all National Register and eligible properties, will be inspected by a cultural resource specialist, sale administrator, contracting officer's representative, or project inspector. If damage to the cultural resource is discovered, the procedures in the Forest Service Manual and Forest Service Handbook 2309.24 will be followed.

3.7.2 Existing Conditions

The analysis area for Heritage and Native American interests is the project area. A field survey to locate and identify cultural and historical resources was conducted in the area of the project (Chamorro, King, Trask, Tinseth, & White III, 2013)², covering 2,359 acres of NFS lands and 275 acres of private lands (**Figure 5**). A total of 2,634 acres were surveyed. Of the sites recorded:

- One site, the James Finley House is listed on the National Register of Historic Places (National Register No. 74000462, listed in 1974);
- 32 sites are recommended as eligible for listing on the National Register of Historic Places;
- 5 sites and all of the isolated occurrences identified during the survey are recommended as ineligible for the National Register of Historic Places;
- Surface evidence at 8 sites is inadequate to determine National Register eligibility; and
- One previously documented site was not evaluated because it could not be relocated during the survey.

² Information pertaining to cultural resource site locations is considered confidential and are not published.

Figure 5. Cultural Resource Survey Areas

T22S, R16E, Portions of Sections 34 and 35,
 T23S, R16E, Portions of Sections 1-5, 9-12, and 15,
 T23S, R17E, Portion of Section 7,
 Santa Cruz County, Arizona

Nogales USGS 1:100,000 Quadrangle
 Projection: UTM NAD83, Zone 12
 Data Source: ArcGIS Online

Legend

 Project Area


 WestLand Resources, Inc.
 Tucson • Phoenix • Flagstaff
 4801 E. Baseline Falls Drive
 Tucson, Arizona 85712 (520) 206-9585

0 0.5 1 Miles
 0 1 2 Kilometers



Source: (Chamorro, King, Trask, Tinseth, & White III, 2013).

Note: The “Project Area” in the figure above is the “Cultural Resource Survey Project Area”. The figure is replicated from the survey report. The Cultural Resource Survey Project Area is not the same as the Hermosa Drilling Project Area (see **Figure 3**)."

Information on the historical context of the area summarized in this section is from WestLand Resources, Inc.’s cultural resources survey report (Chamorro, King, Trask, Tinseth, & White III, 2013). The oldest archaeological evidence of human occupation in the Southwest dates before 8500 BC. Various cultures developed throughout the region during the following millennia. It appears that the project area in the Patagonia Mountains was primarily used for hunting and gathering. Over time, agriculture became more important. The Archaic period (8500 B.C. to A.D. 150), formally referred to as the Cochise culture, was followed by the distinctive Hohokam culture throughout much of southern Arizona during the Formative period (A.D. 1/150 TO 1450).

Native Americans inhabited the area throughout the pre-Colonial era and developed various forms of habitation structures, subsistence practices, and agricultural techniques. Native American cultures changed between 1450 and 1691. Low population densities are assumed based on a lack of pottery, storage facilities, and irrigation features.

The Spanish arrived after 1600. Between 1691 and 1854 Jesuit priests established missions. Mexico became independent of Spain and Mexican settlers populated the area. Several missions and Mexican settlements were influenced by conflicts with Native communities.

Mining and ranching were well-established in the area by the mid-1800s. Silver mining increased after the Civil War and several short-lived mines were developed. Sporadic mining activity occurred after 1893, with minor booms in the late 1930s and early 1940s. The primary mines of the Harshaw and Patagonia mining districts were the Hermosa and Mowry respectively. Ranching increased after 1880.

3.7.3 Environmental Consequences

3.7.3.1 Direct and Indirect Effects from No Action

Because no project-related ground disturbing activities would occur, the no action alternative would have no direct or indirect effects on cultural resources.

3.7.3.2 Direct and Indirect Effects of the Proposed Action

WestLand Resources, Inc. recommended that information regarding the locations and types of sites found should be used by AMI to place characterization sites, TARs, and overland travel routes to avoid adversely affecting cultural resources (Chamorro, King, Trask, Tinseth, & White III, 2013). Following the Forest-wide standards for management of cultural and historical resources (section 3.7.1), AMI modified their proposal to accommodate this recommendation before submitting their Plan of Operations (AMI, 2013b), revising some of the locations to avoid adverse effect on several sites.

The Plan of Operations calls for avoidance of all historic properties. To ensure that adverse effects on historic properties are avoided, AMI would train employees and contractors involved in surface disturbing operations on how to recognize and avoid cultural resource sites that may be encountered during operations.

As required, AMI's Plan of Operation includes the following term and condition:

If previously undiscovered cultural resources (historic or prehistoric objects, artifacts, or sites) are exposed as a result of operations, those operations will not proceed until notification is received from the Authorized Officer that provisions for mitigating unforeseen impacts as required by 36 CFR 228.4(e) and 36 CFR 800 have been complied with.

For the purpose of Section 106 of the National Historic Preservation Act, the determination is that there would be no adverse effects to historic properties, monitoring for cultural resources would occur during operations, and known sites will be flagged and avoided.

With the completion of cultural surveys, once consultation is completed and with the required monitoring and personnel training prior to implementation (see Section 2.3.3.6), it is unlikely that the Hermosa Drilling Project would result in any adverse effects to cultural resources. The activities proposed are located about a ½ mile away from the only site listed on the National Register of Historic Places, the James Finley House. It is possible that unrecorded cultural resources could be accidentally damaged before discovery, or damaged through an unforeseen indirect event such as a wildland fire or fire suppression. The risk of this damage occurring is considered minor because previous inventories have been completed to locate historical and cultural resources along with

implementation of specific AMI proposed EPMs in section 2.3.3.7 and the Forest Service Required Design Features in Section 2.3.5.7 (CUL-1 through CUL-5).

3.7.4 Compliance with Forest Plan and Other Regulations

The Hermosa Drilling Project is consistent with the Forest Plan standards for management of cultural and historical resources and the National Historic Preservation Act, 36 CFR 800. Consultation with SHPO is underway, inventory standards were followed during the survey, project design was and will be modified to protect cultural resources, and sites within the area of potential effect will be monitored by cultural resource professionals to assure adverse effects are avoided.

3.8 Range

3.8.1 Regulatory Framework

3.8.1.1 National Direction

National direction on range management is addressed in FSM 2200 Range Management and FSH 2209.13 Grazing Permit Administration Handbook.

3.8.1.2 Coronado Forest Plan

Applicable Forest-wide management (USFS, 1986) (page 38) standards for range include:

3. Specific standards and guidelines for livestock grazing operations are those contained in:

- Region-Wide Standards and Guidelines (Forest Plan page 22)
- FSH 2209.21 (Range Analysis Handbook)
- FSH 2209.22 (Structural Range Improvement Handbook)
- FSH 2209.23 (Non-structural Range Improvement Handbook)

Management areas provide specific direction for how range should be managed, however these standards are not relevant to the Hermosa Drilling Project so there are not repeated here.

3.8.2 Existing Conditions

The analysis area for range conditions is the project area, including the portions of grazing allotments within the project area. Most of the project area is suitable for grazing. The project area is primarily in the Farrell Allotment, with limited activities conducted in the San Rafael, Duquesne, and Bender Allotments. A portion of the Harshaw Allotment is in the project area; however, no Hermosa Drilling Project activities would occur in this allotment. The permitted use for each allotment is as follows:

- Farrell Allotment – permitted 60 cow/calf pairs year round.
- Duquesne Allotment – permitted 185 cow/calf pairs yearlong.
- San Rafael Allotment – permitted 475 cow/calf pairs yearlong.
- Harshaw Allotment – permitted 83 cow/calf pairs yearlong (no activities would occur in this allotment)
- Bender Allotment – vacant, no plans for future stocking or projects.

The Forest Service manages several grazing allotments in and around the project area (**Figure 6**). Grazing on Forest Service Allotments are administered in accordance with the Terms and Conditions of the Term Grazing Permit. Part three of the permit includes the Annual Operating Instructions and an Allotment Management Plan.

Allotment Management Plans specify goals and objectives of management, management strategies, range improvements, and monitoring requirements. The Allotment Management plans designate the level of use permitted. Typical range improvement consist of livestock handling facilities, fence construction, water system construction, and in some cases vegetation treatments.

3.8.3 Environmental Consequences

3.8.3.1 Direct and Indirect Effects from No Action

As no ground disturbing activities or project-related vehicle use would occur because of the no action alternative, there would be no impacts on range.

3.8.3.2 Direct and Indirect Effects from the Proposed Action

Approximately 11.06 acres of disturbance would occur in the 5,800-acre Farrell Allotment, accounting for approximately 0.19 percent of the allotment. This level of disturbance is not likely to cause a need for a reduction in the permitted use. Drill pads would be reclaimed except for well heads. Access will be on foot to these sites for monitoring activities and for final abandonment and reclamation. No vehicle access would be required once wells are installed and initial testing is completed.

Within the San Rafael Allotment, NFS Road 58 would be maintained (no additional disturbance) and approximately 1.89 acres of disturbance would be associated with characterization site CS-36 and TAR 6. This site would be used as a monitoring well, so the disturbance would remain for up to 15 years. Forage would be reestablished as revegetation occurs as part of reclamation of characterization the site, however TAR 6 would be maintained as a system road. This level of disturbance is not expected to affect the level of permitted use.

In the Duquesne Allotment, NFS Road 5525 would be maintained but no additional disturbance would occur from that activity. Characterization site CS-35 and TAR 8 would be placed in this allotment, disturbing 0.81 acres. This site would also be used for monitoring; therefore the disturbance would remain for up to 15 years. Forage would be reestablished as revegetation occurs as part of reclamation of the characterizations site, however, TAR 8 would remain as a system road. This level of disturbance is not expected to affect the level of permitted use.

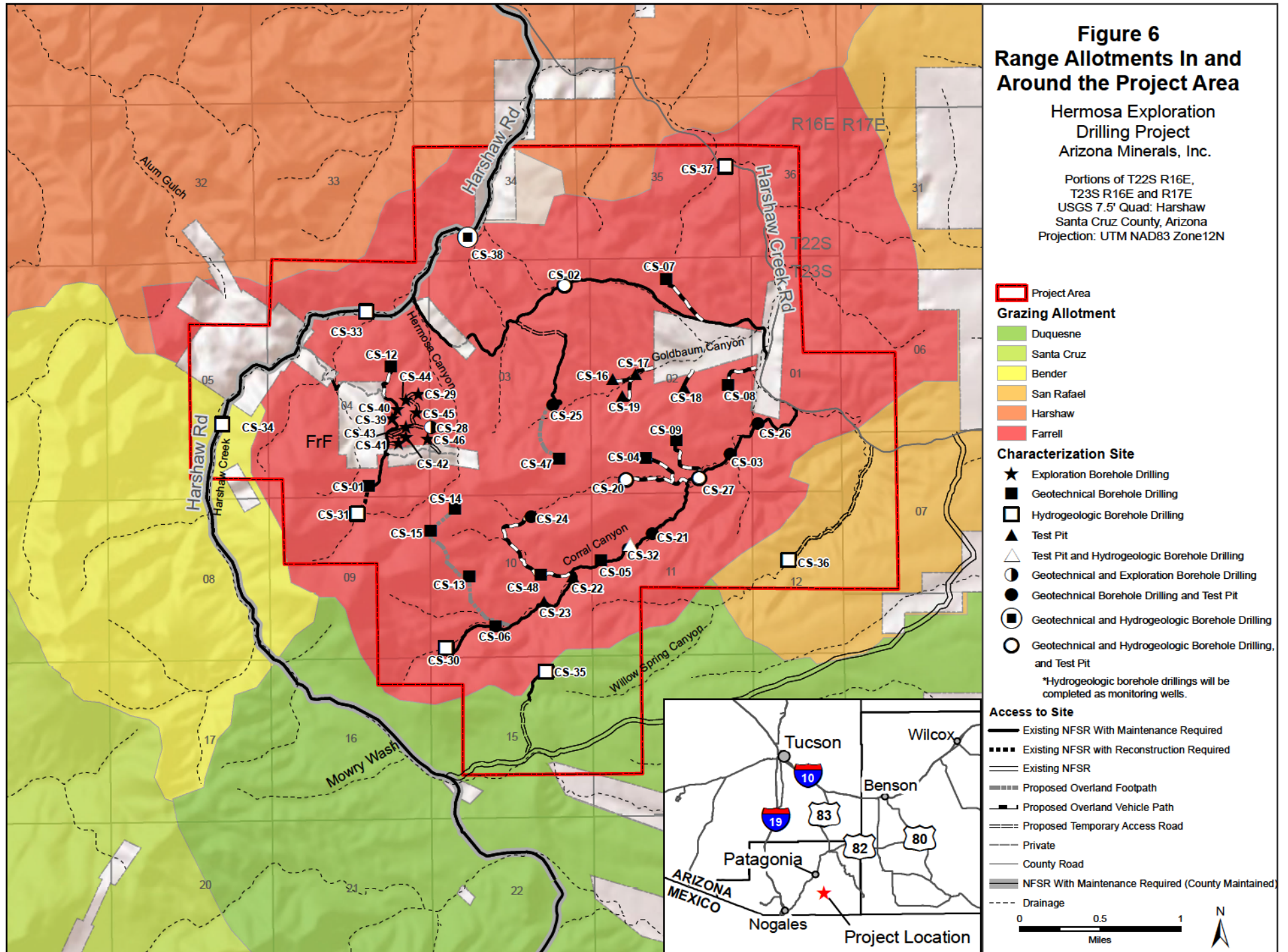
In the Bender Allotment, characterization site CS-34 would disturb approximately 0.14 acres; however, as this allotment has no permitted stocking, there would be no effect on range resources. This site is a monitoring location and disturbance would remain up to 15 years.

Invasive plants can adversely affect forage quality or quantity. Although the risk of spreading invasive plants is moderate to high (Section 3.5.3.2), implementation of specific AMI proposed EPMS in Section 2.3.3.3 and Forest Service Required Design Features in Section 2.3.5.2 will help reduce the spread of invasive plants. Post-reclamation monitoring would allow for quick treatment to eradicate infestations that do occur.

Figure 6
Range Allotments In and
Around the Project Area

Hermosa Exploration
 Drilling Project
 Arizona Minerals, Inc.

Portions of T22S R16E,
 T23S R16E and R17E
 USGS 7.5' Quad: Harshaw
 Santa Cruz County, Arizona
 Projection: UTM NAD83 Zone12N



In all allotments except Harshaw, where no activities would occur, reclamation would be done on TARs, overland vehicle paths, and characterization sites. An important part of reclamation is revegetation success, which also reestablishes forage for livestock. Livestock grazing could be detrimental to reclamation success. The Forest Service would not require the allotment permittee to change their management practices to ensure reclamation success. AMI may be required, at their own expense, to fence cattle out of reclaimed sites if necessary for reclamation efforts to succeed. Any fencing would make that forage temporarily unavailable to cattle during the reclamation period, similar to the extent of the effects of the vegetation disturbance described above.

Effects on range would be a short-term loss of 13.90 acres of forage. The small amount of forage loss compared to available forage is too small a scale to warrant a loss of carrying capacity for the livestock operations. Vegetation would be reestablished through AMI's Reclamation Plan (Section 2.3.4) and Forest Service Required Design Features (Sections 2.3.5.2 and 2.3.5.9, VEG 2, VEG-3, VEG-4 and VEG-6). Implementation of AMI's EPMs in Section 2.3.3.3 and Forest Service Required Design Features in Section 2.3.5.2 (VEG-1 and VEG-5) would minimize impacts from invasive plants.

3.8.4 Compliance with Forest Plan and Other Regulations

The proposed action is in compliance with the Forest Plan, FSM, and other laws and policy directed toward range management and will not preclude permittees from meeting Forest Plan management area standards on how range is to be managed.

3.9 Woodlands

3.9.1 Regulatory Framework

3.9.1.1 Coronado Forest Plan

The Forest Plan Forest-Wide standards for Timber Management do not apply to the Hermosa Drilling Project. Management Area 7B is unsuitable for timber production. The Timber Sale Preparation & Administration standard (page 69) that apply to the Hermosa Drilling Project is:

2. Use fuel wood sales to accomplish other management objectives such as hazard reduction, visual quality maintenance, range improvement and wildlife habitat improvement.

3.9.2 Existing Conditions

The Vegetation Section 3.4.2 provides information on the woodlands found in the project area. The analysis area for woodlands is the project area.

3.9.3 Environmental Consequences

3.9.3.1 Direct and Indirect Effects from No Action

No woodlands would be disturbed under the no action alternative. The no action alternative would have no direct or indirect effects on woodlands.

3.9.3.2 Direct and Indirect Effects from the Proposed Action

As shown in **Table 12** approximately 8.52 acres of woodland would be disturbed. An estimated five cords per acre would be removed at an average value of \$10 per cord (Wilcox, 2013). This would

result in approximately \$425 worth of wood, which would likely be used for reclamation or sold to AMI. Impacts on woodlands would be minimized by Forest Service Required Design Features (Section 2.3.5.1, BIO-1).

3.9.4 Compliance with Forest Plan and Other Regulations

Activities in the Hermosa Drilling Project are consistent with the Forest Plan standards for timber management. Silvicultural activities would not occur, nor would collection of other species such as cactus, agave, yucca, etc.

3.10 Soils

3.10.1 Regulatory Framework

3.10.1.1 Coronado Forest Plan

Protection of soil and watershed resources for this project would be managed using guidelines established from the Forest Plan standards for soils including:

Forest-Wide Management Prescriptions Applicable to the Hermosa Drilling Project (page 39 of the Forest Plan)

12. Restrict equipment use to terrain and climatic conditions where soil damage will be minimal.
13. Manage riparian areas in accordance with legal requirements regarding flood plains, wetlands, wild and scenic rivers, and cultural and other resources. Recognize the importance and distinct values of riparian areas in Forest Plans.
14. Manage riparian areas to protect the productivity and diversity of riparian-dependent resources by requiring actions within or affecting riparian areas to protect and, where applicable, improve dependent resources (FSM 2526). Emphasize protection of soil, water, vegetation, and wildlife and fish resources prior to implementing projects (FSM 2526).

Management Area 1 Standards for Watershed and Soil Maintenance and Improvement (page 48 of the Forest Management Plan)

Forest Plan direction for Management Area 1 does not contain standards specific to soil that apply to the Hermosa Drilling Project. Activities in this area are subject to the Forest-Wide standards listed above.

Management Areas 4 and 7 Prescriptions A and B Watershed and Soil Maintenance and Improvement (pages 65, 69, and 73 of the Forest Management Plan)

Forest Plan Management Area 4, 7A and 7B standards for maintenance of watershed and soil include maintaining existing NFS roads as per an approved Road Use Plan. The Forest Plan includes the following standard for water:

- Manage all programs to eliminate or minimize onsite and downstream water pollution.

3.10.2 Existing Conditions

The analysis area for soils is the project area. It contains project activity locations including characterization sites, access roads, temporary access routes, overland vehicle paths, and foot paths.

The project area is located in the Patagonia Mountains, specifically the Harshaw Mining District. Geology for the Harshaw Mining District consists of five general bedrock formations; limestone, quartz diorite, granite porphyry, rhyolite, and andesite. Rhyolite formations form the northern portion of the district and are the most dominant. The next most common bedrock is the andesite, mainly present as lava flows and tuffs throughout the northern portion of the analysis area. The quartz diorite and granite porphyry are found interspersed within the central, northern, and western portion of the area. Paleozoic limestone occurs in a small east-west belt along the middle portion of the southern border of the district. In addition, Quaternary period gravel deeply covers the underlying bedrock in the northeast and southwest borders of the district (MinDat, 2013). There are no known karst type formations, caves, or unique geologic features within the project area.

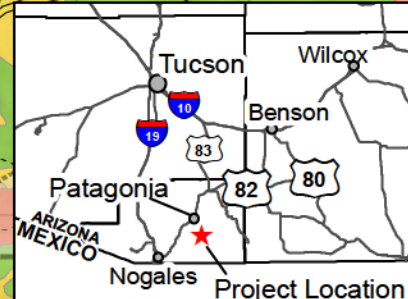
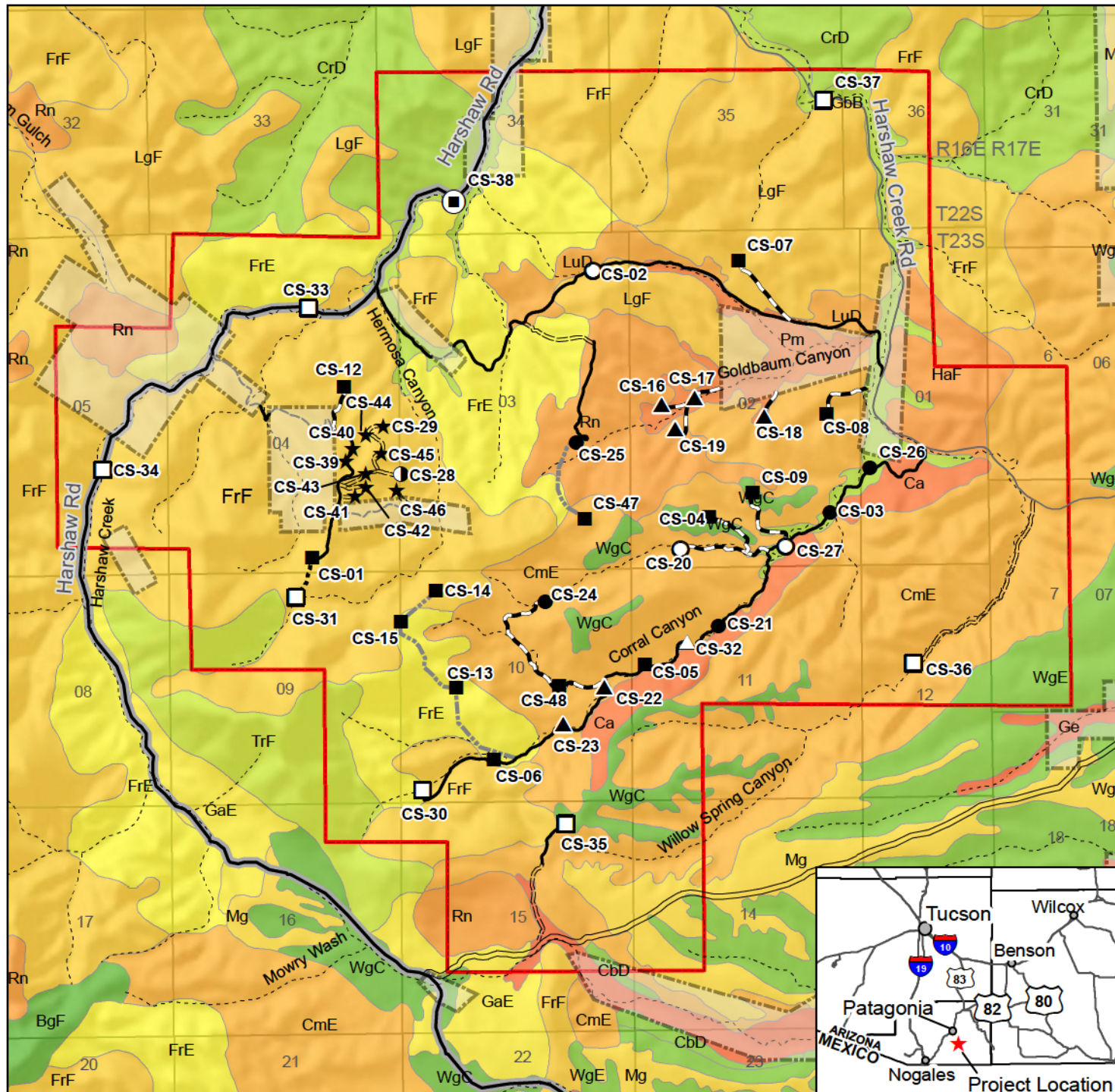
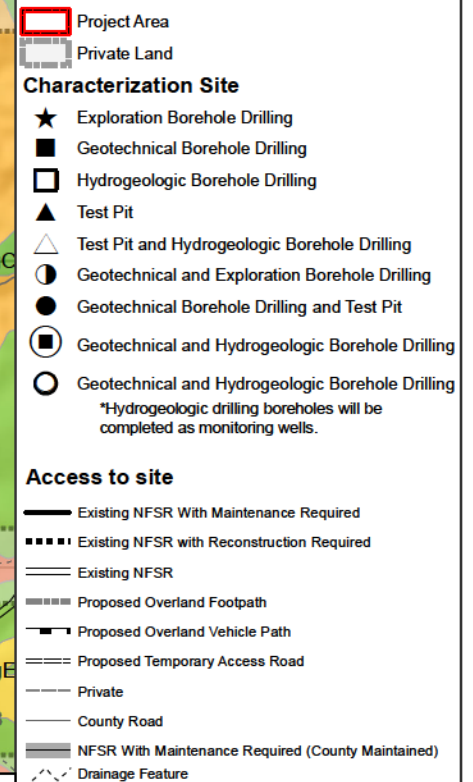
Soils in the project area are typical of desert mountain landscapes found in southern Arizona. Topography is mountainous, with gentle to steep gradient slopes. In general, soils can be described as low to moderately well-drained, with soil productivity limited by the dry climate. A literature search found no current or historic landslides in the project area.

The National Resources Conservation Service (NRCS) web soil survey identifies 15 soils present (**Figure 7**), whose characteristics are shown in **Table 17** (USDA, 1979). The Soil Survey provides limitation ratings for various land uses based on multiple soil properties and factors. Determinations of potential for soil compaction ratings of slight, moderate, or severe were based on evaluations of 1) limitations and ratings for the use of the soil for local roads and street construction, 2) soil plasticity index, 3) soil texture, 4) percent clay, and 5) the shrink swell potential. The degree of soil compaction also is dependent on the soil moisture content at the time of stress or disturbance. The soil unit descriptions for the project area are detailed in the Draft Watershed Technical Report (Tetra Tech, 2014e).

Figure 7
Soil Classifications

Hermosa Exploration
Drilling Project
Arizona Minerals, Inc.

Portions of T22S R16E,
T23S R16E and R17E
USGS 7.5' Quad: Harshaw
Santa Cruz County, Arizona
Projection: UTM NAD83 Zone12N



**Soil Survey Data provided by Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at <http://websoilsurvey.nrcs.usda.gov/>. Accessed October 2013.*

Table 17. Soil Units for the Analysis Area

Hermosa Drilling Project Area Soil Units and Acres of Soil Disturbance							
Unit Name ¹	Slope Percent ¹	Erosion Class ¹	Compaction Limitation ¹	Overland Vehicle Paths	Temporary Access and Reconst.	Sites	Total Acres Disturbed
Calciorthids-Haplargids Association (Ca)	30 to 60	High	Too variable to be interpreted ³	0	0	0	0
Canelo gravelly sandy loam (CbD)	0 to 20	Moderate	Moderate	0	0	0	0
Casto (CmE)	10 to 40	Moderate	Moderate at 10 to 15 percent slopes; severe at greater than 15 percent slopes	1.85	1.95	0.78	4.58
Chiricahua-Lampshire association (CrD)	5 to 45	Moderate	Moderate bedrock at a depth of 10 to 20 inches; severe at bedrock	0	0	0	0
Faraway-Rock outcrop complex (FrE)	10 to 30	Moderate	Severe bedrock at a depth of 5 to 20 inches	0	0.50	0.40	0.90
Faraway-Rock outcrop complex (FrF)	35 to 50	High	Severe bedrock at a depth of 5 to 20 inches	0.27	2.86	1.64	4.77
Grabe-Comoro complex (GbB)	0 to 5	Slight	Moderate; generally slight	0.36	0	0.57	0.93
Gaddes (GaE)	0 to 5	Moderate	Moderate	0	0.46		0.46
Hathaway gravelly sandy loam (HaF)	20 to 50	Moderate	Severe for slopes greater than 15 percent	0	0	0	0
Lampshire-Graham-Rock outcrop association (LgF)	20 to 60	Moderate	Severe at bedrock at a depth of 4 to 20 inches	0.38	0	0.21	0.59
Luzena gravelly loam (LuD)	5 to 20	Moderate	Severe		0.05		0.05
Martinez gravelly loam (Mg)	0 to 3	Slight	Severe	0	0	0	0
Pima soils (Pm)	0 to 3	Slight	Severe high shrink-swell potential to a depth of 26 inches	0.63	0	0.07	0.71
Rock outcrop-Lithic Haplustolls association (Rn)	15 to 60	Not Noted ²	Properties too variable to be interpreted ³	0.14	0.07	0.05	0.26
Tortugas-rock outcrop complex (TrF)	25 to 60	Moderate	Severe bedrock at a depth of 6 to 20 inches	0	0	0	0
White House gravelly loam (WgC)	0 to 10	Slight	Severe high shrink-swell potential	0.37	0	0.28	0.65
Total							13.90

1 Source: (USDA, 1979)

2 While erosion class is not noted, for the analysis it is assumed to be high.

3 For the purposes of the analysis, the compaction limitation is assumed to be severe.

3.10.3 Environmental Consequences

3.10.3.1 Direct and Indirect Effects from No Action

There would be no soil disturbance under the no action alternative. Therefore, there would be no direct or indirect effects on soils.

3.10.3.2 Direct and Indirect Effects from the Proposed Action

Direct effects include soil disturbance and potential compaction from drilling, road use, and road construction and maintenance activities. Indirect effects include soil erosion due to wind and water, which would be minimized once vegetation becomes established on the disturbed areas.

Approximately 13.90 acres would be disturbed by the proposed action. The proposed exploration activities would be conducted on primarily eight of the soils types found within the project area, as discussed in **Table 17**. In general proposed activities would be performed on soils identified to have slight, moderate, or high erosion class. Of the activities proposed,

- 1.64 acres would be on soils with slight erosion potential,
- 6.58 acres on soils with moderate erosion potential, and
- 5.03 acres on soils with high potential.

However, consideration should be noted that rock outcrop areas are also included and fall within the high potential.

As noted from **Table 17** in Section 3.10.2, the proposed activities can result in a potential degree of compaction of moderate to severe. Compaction information is limited for some soil units due to variability within the association and is therefore not included in the following calculations. Project activities would be conducted on approximately 5.97 acres of soils with moderate compaction limitations, and on approximately 7.93 acres of soils with severe compaction limitations.

Implementation of specific AMI proposed EPMs in Section 2.3.3.4 and Forest Service Required Design Features in Section 2.3.5 (GEO-1 through GEO-4, HYD-1, HYD-6, and HYD-10, HAZ-4, and VEG-6) would ensure the project activities are not likely to have an adverse effect on soils as discussed below. Overland vehicle travel is prohibited when soils are saturated or on slopes greater than 40 percent. All mechanical ground disturbing activities will be avoided when soils are saturated. The stockpiled topsoil and overburden piles will be surrounded with silt fence or straw wattles to minimize soil loss. Application of purged groundwater from monitor well testing, development, or exploration drilling activities would be one method used to manage dust on the access roads within the project area. Once testing activities are completed, use of access roads would be minimal (access for reclamation). Efforts have also been made to minimize amount of surface disturbance by using a single access road to more than one characterization site; thereby reducing the amount of soil disturbance. Water bars would be constructed to control flow along an access road to minimize sediment mobilization (erosion) in the event of heavy rainfall. Additionally, reclamation activities, including recontouring and reseeding, would be conducted as soon as project activities are completed at each site to help prevent erosion. Characterization sites and associated access routes would be reclaimed within two years, except for monitoring wells, which would be reclaimed in 15 years. Eleven of the 12 monitoring wells are located adjacent to NFS roads. The remaining monitoring well, at CS-20, will be accessed by foot for monitoring activities and abandonment. EPMs (Section 2.3.3.2), Forest Service Required Design Features (Section 2.3.5.4), and the short

duration of the project would minimize the potential impacts from erosion. Impacts on soils would be minor.

3.10.4 Compliance with Forest Plan and Other Regulations

The project is consistent with the Forest-wide and Forest Plan management area direction standards for soil.

3.11 Surface and Ground Water

3.11.1 Regulatory Framework

3.11.1.1 Clean Water Act

The CWA (33 U.S.C. § 1250 et seq.) is the foundation for surface water quality protection. The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. The CWA of 1948, as amended in 1972 and 1987, establishes the control of point and non-point pollution and assigns the States the primary responsibility for control of water pollution. Each State designates uses to be protected for each jurisdictional waterbody within its boundaries. States must also adopt water quality criteria to protect the designated uses. Water quality criteria must be approved by the EPA.

Section 303(c) of the CWA provides the basis of federal law for Arizona's surface water quality standards program, whose key elements are the following:

1. A water quality standard is defined as consisting of the designated beneficial uses of a water body and water quality criteria necessary to support the designated uses;
2. The following minimum beneficial uses must be considered when establishing surface water quality standards under the CWA: 1) public water supply; 2) the propagation of fish, shellfish, and wildlife; 3) recreation; 4) agricultural uses; 5) industrial uses; and 6) navigation;
3. Arizona's water quality standards must protect public health and welfare, enhance the quality of water, and serve the purposes of the CWA; and
4. The surface water quality standards rules must be reviewed at least once every three years using a process that includes public participation.

Section 402 of the CWA established the National Pollutant Discharge Elimination System (NPDES) program that prohibits the point source discharge of pollutants to waters of the U.S. unless authorized by an NPDES permit. US EPA delegated implementation of the NPDES program to Arizona. The ADEQ established the Arizona Pollutant Discharge Elimination System requirements in the ARS, Title 49, Chap 2, Article 3.1 and the AAC Title 18, Chapter 9, Article 9. ADEQ issues both individual AZPDES permits and general AZPDES permits (general permits apply to categories of discharges, such as stormwater). The ADEQ CGP (EA Section 2.3.3.2) authorizes storm water discharges from construction-related activities where discharges have a potential to enter surface waters of the United States or a storm drain system.

In general, the ADEQ CGP requires operators of construction activities to submit a permit application (Notice of Intent), develop a SWPPP, and select, identify, implement, and maintain BMPs in order to prevent, minimize, and control the discharge of pollutants in stormwater to protect the beneficial uses of the receiving waters.

3.11.1.2 ARS Title 45

The State of Arizona regulates and manages groundwater. Under Arizona law ARS Title 45: the state is divided into “Active Management Areas” (AMA) for groundwater and areas which have not yet been designated for active management. In an AMA, groundwater rights and uses are regulated due to a history of groundwater overdrafts (Holub, 2013). Outside of an AMA, there are no groundwater rights per se, and the doctrine of “reasonable use” applies. It is only in AMAs where groundwater rights are quantified and regulated (Holub, 2013). The ADWR is the agency that manages groundwater, to ensure long-term, sufficient and secure water supply.

3.11.1.3 Coronado Forest Plan

The Coronado Forest Plan establishes practices and guidelines for the long term management of NFS lands. Protection of soil and watershed resources for this project would be managed using guidelines established from the Coronado Forest Plan guidance. Coronado Forest Plan standards for surface and groundwater are:

Forest-Wide Management Prescriptions Applicable To (page 39) to the Hermosa Drilling Project

- Restrict equipment use to terrain and climatic conditions where soil damage will be minimal.
- Manage riparian areas in accordance with legal requirements regarding flood plains, wetlands, wild and scenic rivers, and cultural and other resources. Recognize the importance and distinct values of riparian areas in Forest Plans.
- Manage riparian areas to protect the productivity and diversity of riparian-dependent resources by requiring actions within or affecting riparian areas to protect and, where applicable, improve dependent resources (FSM 2526). Emphasize protection of soil, water, vegetation, and wildlife and fish resources prior to implementing projects (FSM 2526).

Management Area 1 Standards for Watershed and Soil Maintenance and Improvement (page 48)

Forest Plan direction for Management Area 1 does not contain standards specific to water and soil that apply to the Hermosa Drilling Project. Activities in this area are subject to the Forest-Wide standards listed above.

Management Areas 4 and 7 Prescriptions A and B Watershed and Soil Maintenance and Improvement (pages 65, 69, and 73)

Forest Plan standards for maintenance of watershed and soil include maintaining existing NFS roads as per an approved Road Use Plan. The Forest Plan includes the following standard for water:

- Manage all programs to eliminate or minimize onsite and downstream water pollution.

3.11.2 Existing Conditions

3.11.2.1 Surface Water

The analysis area for surface and ground water quality is the project area boundary. The surface disturbing activities are being conducted in the Harshaw Creek HUC. The project area includes segments of five drainages (Corral Canyon, Goldbaum Canyon, Harshaw Creek, Hermosa Canyon, and Willow Spring Canyon), and is within the 6th level Hydrologic Unit Code (HUC) Harshaw Creek (150503010203), and minor portions of Mowry Wash-Santa Cruz River (150503010102), and Middle Sonoita Creek (150503010206)(**Figure 8**).

WestLand Resources, Inc. completed surveys of aquatic features (WestLand Resources, Inc., 2013c) in August 2012 and then September 2012. Twenty eight aquatic features were identified within the project area, 11 of which are stock drinkers, seven are earthen stock drinkers, nine are lotic bodies of water, and one is a hand-dug mine adit cut into a canyon wall. Most of the surface water identified was present in August 2012, and absent in September 2012.

ADEQ determined that specific portions of Harshaw Creek qualified under the 303[d] list for impaired waters. In 2003, the ADEQ conducted sampling to help develop the Total Maximum Daily Load (TMDL) on Harshaw Creek (ADEQ, 2003). The primary tributary to the listed portion of Harshaw Creek is from an un-named canyon containing the Endless Chain Mine (ADEQ, 2003). The ADEQ divided Upper Harshaw Creek into three sections:

1. The headwaters and uppermost tributaries occupied by the Morning Glory Mine area. The Endless Chain Tributary, which consists of the mine and mill site, and an undisturbed basin.
2. The middle portion is between the mouth of the Endless Chain tributary and the Trench Camp Mine, which is in the area of the Augusta Mine, Blue Nose Mine, and several other small unnamed mines.
3. The lower portion of the Creek includes the dump number 3 of the Trench Camp Mine and a spring near the downstream end of the reach.

The headwaters and middle portions are not within the Hermosa project area. Three miles of the lower portion of Upper Harshaw Creek (referenced by number 3 above) is considered impaired because cadmium and pH exceeded drinking water standards in 1996 and 1998. Some of this lower portion is within the project area (**Figure 8**). ADEQ noted the contribution of this lower reach may be influenced by a nearby spring (ADEQ, 2003).

A review of the Flood Insurance Rate Map (FEMA, 2013) for the project area identified special flood hazard areas subject to inundation by the 1 percent annual chance flood (100-year event). Portions of the existing Harshaw Road are within the special flood hazard zone.

3.11.2.2 Groundwater

The project area is the analysis area for groundwater resources. The project is located in the Cienega Creek, and San Rafael groundwater basins (**Figure 9**). Approximately 90 percent of the project area is within the Cienega Creek basin, and the remaining 10 percent of the project area is within the San Rafael basin (**Figure 9**). No drilling activities would occur in the San Rafael basin and therefore it would not be affected and is not discussed further.

The Cienega Creek basin encompasses approximately 606 square miles (**Figure 9**). Groundwater in the Cienega Creek basin occurs in two main aquifers: streambed alluvium and basin-fill deposits (ADEQ, 2012a). The streambed alluvium is composed of sand and gravel deposited along major waterways for the lower portion of the Cienega Creek basin and is the main aquifer conduit. Groundwater recharge comes from mountain front recharge and streambed infiltration along Cienega and Sonoita creeks. The Cienega Creek basin consists of a narrow northeast trending alluvial valley, drained by Cienega and Sonoita creeks, and surrounded by fault-block mountains (ADWR, 2009b).

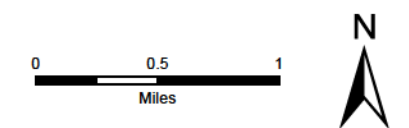
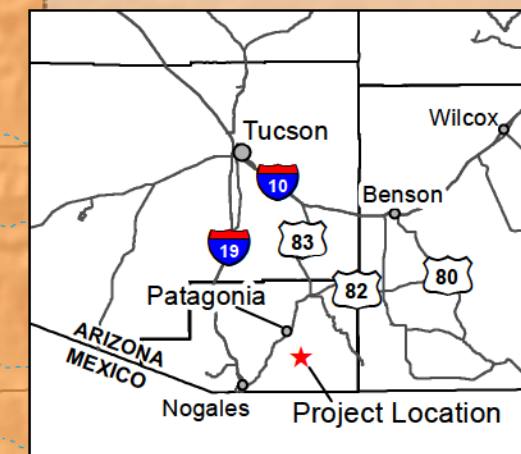
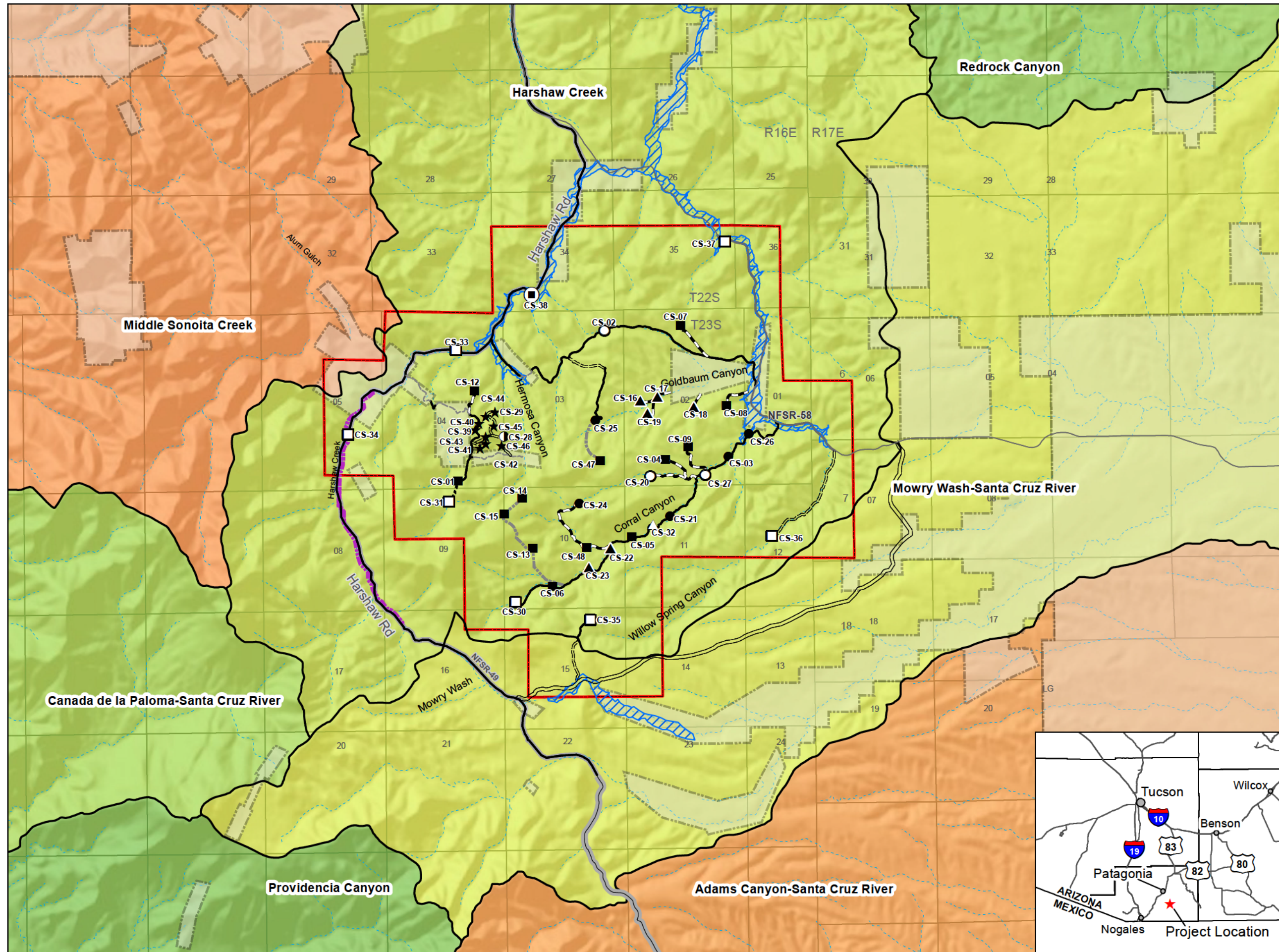
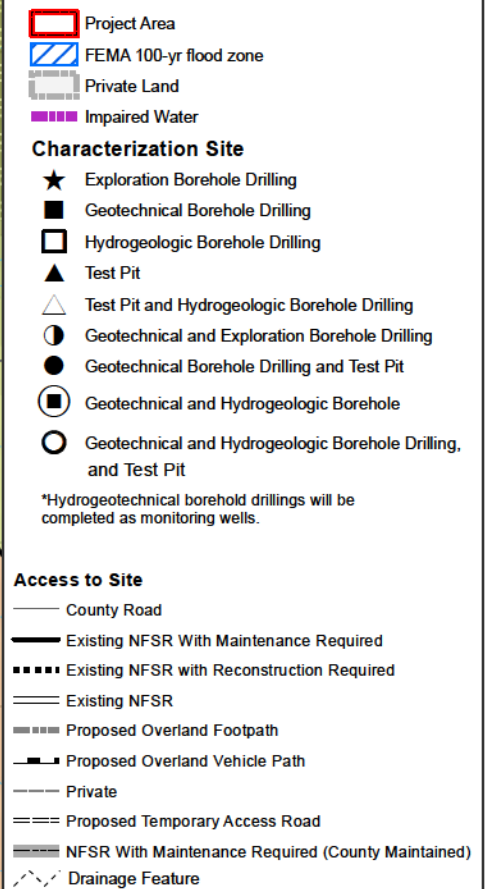
Groundwater quality data for the project area is limited. There are no public wells located on NFS lands, and previous activities in the area have not produced groundwater quality information that is publically available. There are no towns or communities within the project area; however, there are some private residences. AMI has three wells installed on private land holdings within the project.

Figure 8 Surface Drainage and 6th Level Hydrological Units

Hermosa Exploration
Drilling Project

Arizona Minerals, Inc.

Portions of T22S R16E,
T23S R16E and R17E
USGS 7.5' Quad: Harshaw
Santa Cruz County, Arizona
Projection: UTM NAD83 Zone12N



*6th code hydrological unit data from USGS
URL: <http://water.usgs.gov/GIS/huc.html>

**FEMA 100-year flood data provided
FEMA Map Service Center
URL: <http://msc.fema.gov>

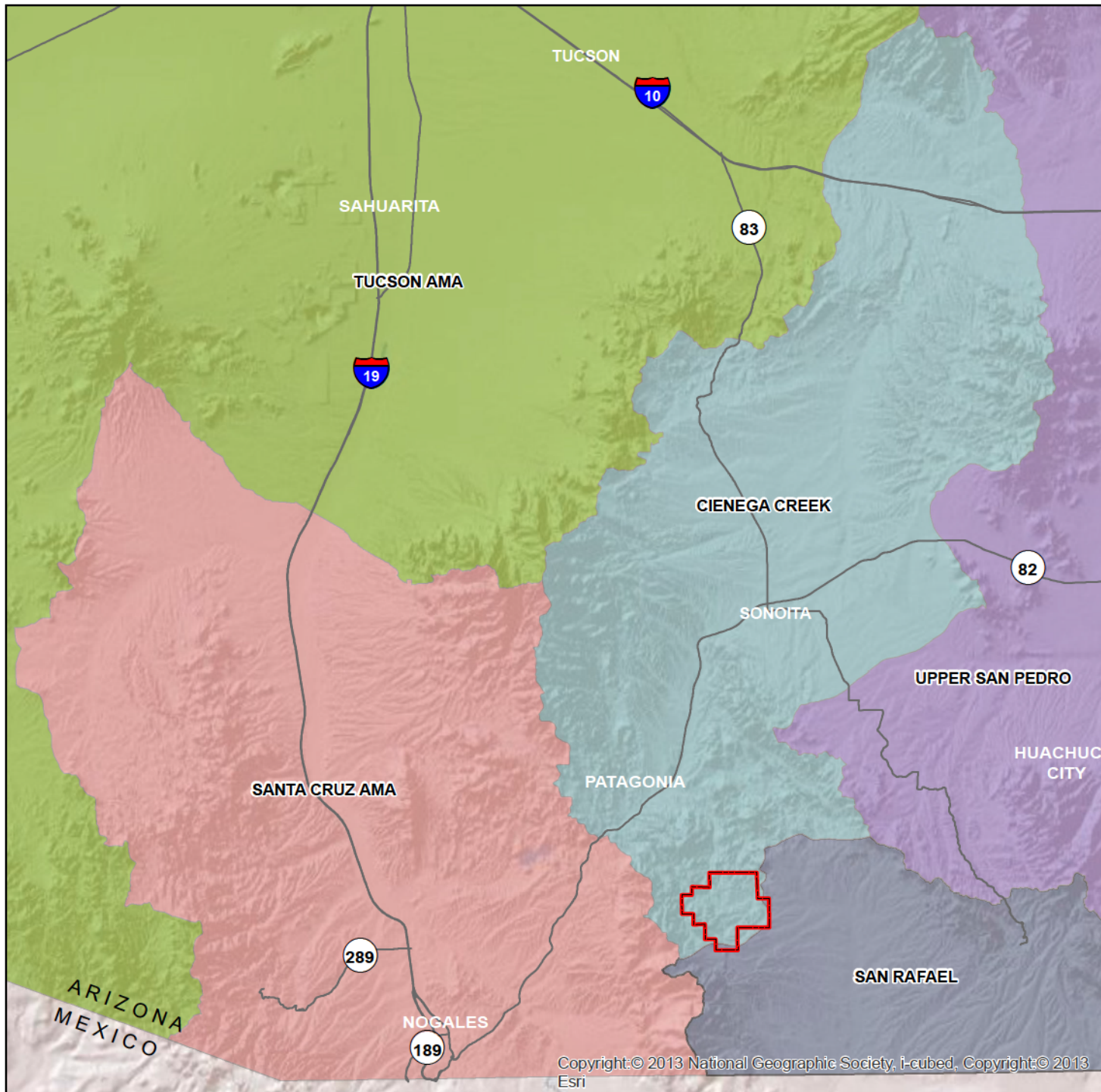
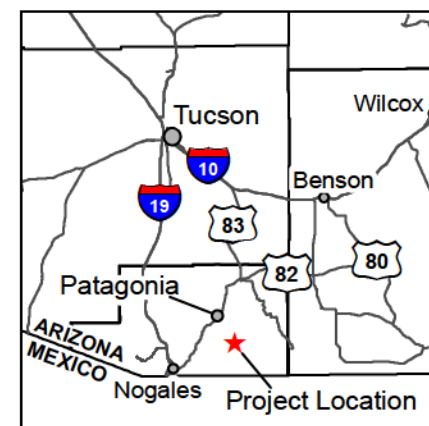
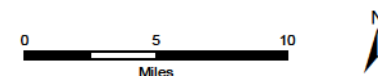


Figure 9
Portions of Area
Groundwater Basins

Hermosa Exploration
 Drilling Project
 Arizona Minerals, Inc.

Portions of T22S R16E,
 T23S R16E and R17E
 USGS 7.5' Quad: Harshaw
 Santa Cruz County, Arizona
 Projection: UTM NAD83 Zone12N

 Project Area



*Groundwater basin data provided by
 Arizona Department of Water Resources (ADWR)

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area. One of AMI's existing wells is considered a monitor well; the other two are classified as "other" (ADWR, 2013a). The "other" classification includes exploration, cathodic geotechnical, vadose zone, air sparging, soil vapor extraction, etc., (ADWR, 2013b).

The groundwater within the Cienega Creek basin is predominantly of calcium-bicarbonate chemistry; slightly alkaline with hardness concentrations varied from moderately hard to very hard (ADEQ, 2012a). According to the ADEQ, the analysis of the 20 samples taken indicated the groundwater in the Cienega Creek basin generally meets drinking water standards. The few groundwater quality exceedances appear to be the result of natural chemical reactions through sulfate and total dissolved solids and the historic mining activity.

3.11.3 Environmental Consequences

3.11.3.1 Direct and Indirect Effects from No Action

The no action alternative would result in no construction of characterization sites, access, or drilling and therefore would have no direct or indirect effects on surface or groundwater quality or quantity.

3.11.3.2 Direct and Indirect Effects from the Proposed Action

Surface Water Quality and Quantity

This section evaluates potential effects to surface water including: potential direct effects due to stormwater discharges from site disturbing activities (construction, drilling, site access); potential effects due to potential release of petroleum products or other products used for site activities, and potential indirect effects on surface water due to groundwater withdrawals for water supply (dust abatement and drilling) and aquifer testing.

Groundwater that is evacuated during drilling activities, pump testing, and monitoring will be contained and not directly discharged to the environment (AMI's EPMs in Section 2.3.3.2). The collected groundwater will be used for dust abatement activities and this use is considered acceptable since groundwater quality is expected to be the same as that from the water supply well that is also being used for dust abatement. The use of groundwater for dust abatement is not expected to impact surface water quality.

Petroleum products and chemicals used on site and their management are described in Section 2.3.3.7 of the EA and in Appendix E of the Plan of Operations. Chemical and petroleum product management is focused on prevention of spills and release to the environment via use of appropriate handling techniques and containment, which are described in the Plan of Operations and Section 2.3.3.7. The potential for impacts from substances that are released depends on the responsible use of these chemicals and immediate containment and adequate cleanup in the event of unintentional release. Potential impacts from fuel spills or other spills are expected to be low via implementation of the Spill Response Procedures and other EPMs described in Section 2.3.3.7.

Impacts to surface water from stormwater and sediment during site activities are not anticipated because characterization sites would be located at least 15 feet from active stream banks (HYD-2, see Section 2.3.5.4), under an approved SWPPP (Section 2.3.3.2), and reclaimed following site activities. Construction and reconstruction of roads would also occur under the SWPPP (Section 2.3.3.2) and Forest Service Required Design Features (Sections 2.3.3.2, 2.3.5.3 and 2.3.5.4, GEO-1, HYD1, HYD-6, and HYD-9). All TARs, except TAR 6 and TAR 8, and overland vehicle paths would be reclaimed. Any stormwater discharges that do occur would be managed under the SWPPP and CGP that would require management by established BMPs.

As mentioned in Section 2.3.2, water needed for operations would come from existing AMI supply well MW-2 on private lands. Aquifer testing on the supply well indicated water at a depth of 230 feet, and a drawdown of 10.25 feet when pumping at 31.7 gallons per minute and recovery after 12 hours (NewFields, 2013). There is one surface drainage feature on NFS lands noted in the WestLand Report (WestLand Resources, Inc., 2013c) within 500 feet of the well location; an intermittent streambed in an unnamed tributary to Harshaw Creek with water present in August 2012 (**Photo 1**). Other features mentioned in Section 3.11.2.1 are far enough from the supply well that they would not likely be affected due to the limited drawdown that would occur. In addition, according to Kingston (Kingston, 2014), it is likely that the surface water features in the area are a result of perched groundwater, making it unlikely that pumping of water from an aquifer below the perched groundwater, such as from the water supply well, would affect the water supply to the surface water feature.

Based on this information, water supply pumping is not anticipated to affect the surface water features due to the drawdown results of the previously completed aquifer testing, although it is not impossible. Implementing the Forest Service Required Design Feature (HYD-11) would help verify these assumptions and provide an early opportunity to modify activities if effects are identified.

Indirect effects on surface water due to groundwater testing were considered. **Table 4** summarizes the testing that will occur and **Table 3** summarizes the water use. Because only one pump test per site would be conducted for 12 hours or less per site, the indirect effect on surface waters from temporary drawdown of groundwater is anticipated to be negligible.

Due to the minimal amount of surface water in the project area and the siting and management of drilling activities to avoid surface water, seeps, and riparian areas and adhere to AMI's EPMs (Section 2.3.3.2) and Forest Service Required Design Features (Section 2.3.5.4), effects on surface water quality would be unlikely. The Forest Service Required Design Feature (HYD-11) would help verify these assumptions and provide an early opportunity to modify activities if effects are identified.

Three of AMI's characterization sites are located at the fringes of the flood hazard zones (FEMA, 2013), CS-26, CS-37, and CS-38. AMI would be required to comply with the Santa Cruz County Floodplain and Erosion Hazard Management Ordinance, prior to conducting drilling activities within the flood hazard zone. As the characterization sites would not increase the potential for flooding due to concurrent reclamation, there would be no impact on the floodplain.



Photo 1. Unnamed Tributary of Harshaw Creek

Source: Photo 113 (WestLand Resources, Inc., 2013c) taken 8/24/2012.

Groundwater Quality and Quantity

This section evaluates potential effects to groundwater, including: potential effects on groundwater quality due to use of drilling fluids and additives and potential effects on groundwater quantity due to groundwater use for project activities.

Groundwater quality would not be adversely affected by the use of drilling water and additives, because these fluids are mostly water with various drilling additives which are non-toxic, biodegradable synthetic mud products, based from mineral, organic, or vegetable products. The ingredients and all regulatory information (MSDS) required for each drilling product used for these activities can be found in Appendix E of the Plan of Operations (AMI, 2013b). The amount of drilling fluid lost from the boreholes that could possibly enter groundwater would be minimized by the implementation of proper drilling procedures.

Anticipated water use for drilling, aquifer testing, and dust suppression is shown in **Table 3** and over the life of the project totals 3,528,800 gallons or 10.82 acre feet. Total water use is made up of approximately 239,800 gallons for drilling supply water, 432,000 gallons (maximum) for aquifer testing, and 2.8 million gallons (maximum) for dust suppression. The drilling supply and dust suppression water would come from AMI's existing supply wells on private land, except where aquifer testing water is collected and used for dust suppression. Aquifer testing would require water from each of the proposed hydrogeological wells on NFS lands. The water evacuated during the aquifer testing would be collected and used for dust suppression, replacing some of the water that would otherwise be pumped from AMI's existing supply well for dust suppression or trucked to reservoirs and cattle tanks.

The amount of water purged from each monitor well to obtain water quality samples would vary according to the total depth drilled, casing diameter, and final depth to water in the well casing. EPA groundwater sampling protocol (EPA, 1995) typically recommends evacuating up to three well volumes of water prior to taking a water sample.

Groundwater quantity would be temporarily reduced because of pumping from AMI's supply wells for drilling water and dust suppression water, and by aquifer testing and collection of produced water during well drilling. AMI would supply drilling water from a well located on private land (MW-02 **Figure 3**). The aquifer well tests would involve pumping water from the 12 hydrogeological wells to be installed as part of the proposed action using a temporarily installed submersible pump. Extraction of water from the monitoring wells on NFS lands would be authorized for testing purposes only. Extraction of water from monitoring wells would not be authorized for any other purpose.

The average annual water demand for the Cienega Creek Basin was 1,250 acre-feet between 2001 and 2006 (ADWR, 2009b). The amount of water used by the town of Patagonia for 2012 was approximately 130 acre feet (ADWR, 2013c) for 391 residential connections. That equates to approximately 0.33 acre feet of water used annually per residential connection. The estimated project water usage (3.5 million gallons or 10.82 acre feet) when compared to the average annual demand from the basin equates to 0.87 percent of the annual overall Cienega Creek Basin consumption.

Because AMI would perform drilling activities in accordance with the proposed EPM's in Section 2.3.3.2 and Forest Service Required Design Features in Section 2.3.3.2 (HYD-1, HYD-3, HYD-4 and HYD-9), and monitoring in HYD-11 as discussed above, drilling activities would not adversely affect groundwater quality. The quantity of water needed for the project (0.87 percent of the annual

overall Cienega Creek Basin consumption) is small and is temporary (six months) and therefore, adverse effects on groundwater availability for other users is not anticipated.

3.11.4 Compliance with Forest Plan and Other Regulations

The project is consistent with the Forest Plan standards for soil and water and the CWA.

AMI is expected to operate within compliance of the Stormwater CGP for protection of surface waters from stormwater discharges. AMI would be in compliance with Arizona Pollutant Discharge Elimination System *De Minimis* General Permit from ADEQ for well development activities. The monitoring wells, proposed by AMI, would be completed in accordance with the ADWR water well regulations and guidelines. All of the hydrogeological boreholes would be drilled by a drilling contractor licensed by the ADWR. Post well completion, the wells would be developed by bailing, surging, and pumping groundwater. During the installation and well development, the clean purge water would be collected in water trucks and used for dust suppression or trucked to reservoirs and cattle tanks on private lands. Surface disturbance is minimized through drill pad size, access road placement, implementing erosion control measures within disturbed areas, placing drill pads as close as possible to existing roads, retaining and preserving existing vegetation, and use of water bars or other designs to control storm event precipitation (AMI, 2013b).

By implementing the EPMs (Section 2.3.3) and Forest Service Required Design Features (Section 2.3.5.4), the project is consistent with the CWA, ARS, Forest-wide and Forest Plan Forest Plan management area direction standards for water.

3.12 Visual Resources

3.12.1 Regulatory Framework

3.12.1.1 Coronado National Forest Plan

Current direction in the Forest Plan (USFS, 1986) includes the following Forest-wide Standards and Guidelines for Visual Resource Management (page 28):

- Maintain and protect the visual integrity of the landscape.
- Rehabilitate or enhance the existing visual quality in the process of accomplishing other resource management practices.

The proposed project lies within Management Areas 1, 4, and 7. Scenic quality standards and guidelines for Management Area 1 and 7 require that "Visual quality objectives will be met" (pages 47, 62, and 67 of the Forest Plan). Scenic quality standards and guidelines for Management Area 4 require that "Visual quality objectives will be met or exceeded" (see Management Emphasis and Intensity on page 62 of the Forest Plan).

Visual Quality Objectives (VQO) for every acre of the Coronado NF were established in the early 1980s and incorporated into the Forest Plan. VQOs are based on two components:

1. Variety Class: A measure of the visual variety or diversity of landscape character. The three variety classes are A (Distinctive), B (Common), and C (Minimal).
2. Sensitivity Levels (Concern Levels in SMS) and Distance Zones: Sensitivity Levels are a measure of the viewer interest in scenic qualities of a landscape. The three levels are 1 (Highest), 2

(Average), and 3 (Lowest). Distance Zones include Foreground (up to 1/2 mile), Middleground (1/2 mile to 5 miles), and Background (over 5 miles).

A review of the VQO maps indicates that Harshaw Road is Sensitivity Level 1 and FR58 is Sensitivity Level 2. SMS mapping provides additional information about sensitive travelways in the area. **Figure 10** shows the Concern Levels in the area.

3.12.2 Existing Conditions

The analysis area for visual resource quality is the western half of the Huachuca Ecosystem Management Area. The existing condition of scenic resources in the project area is generally good. Although effects from wildfire and human modifications are evident in most areas outside of wilderness, visitors are treated to mostly natural landscapes that are markedly different from the more urban settings where their journey began.

VQOs were established in the Forest Plan and range from Retention to Maximum Modification in the analysis area (**Figure 10**). Definitions for VQOs are:

- Retention: Management activities should not be evident to the casual forest visitor.
- Partial Retention: Management activities must be visually subordinate to the characteristic landscape.
- Modification: Management activities may dominate the characteristic landscape, but must, at the same time, utilize naturally established form, line, color, and texture.
- Maximum Modification: Management activities may dominate the characteristic landscape, but should appear as natural occurrences when viewed as background.

The landscape character in the proposed project area is a mosaic of grasslands, oak woodlands, and riparian areas on topography that varies from gently rolling to rugged hills and low mountains. Ridgetops are generally more grassy and open. Lower areas and canyon bottoms often have large trees and denser vegetation. Elevations range from 4,600 to 5,600 feet.

Although nature and scenery are primary attractions for visitors, the valued landscape also includes a system of roads (see **Photo 2**) and several historic sites including adobe structures and a historic cemetery.

Photo 2. Scenery Along Forest Road 4690



Hermosa Exploration
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 Project Area

- Retention (fg1B B/R)
- Partial Retention (fg2B/PR)
- Partial Retention (mg1B/PR)
- Modification (Mg2B/M)
- Modification (3B/M)
- Maximum Modification (3B/MM)
- Maximum Modification (3C/MM)

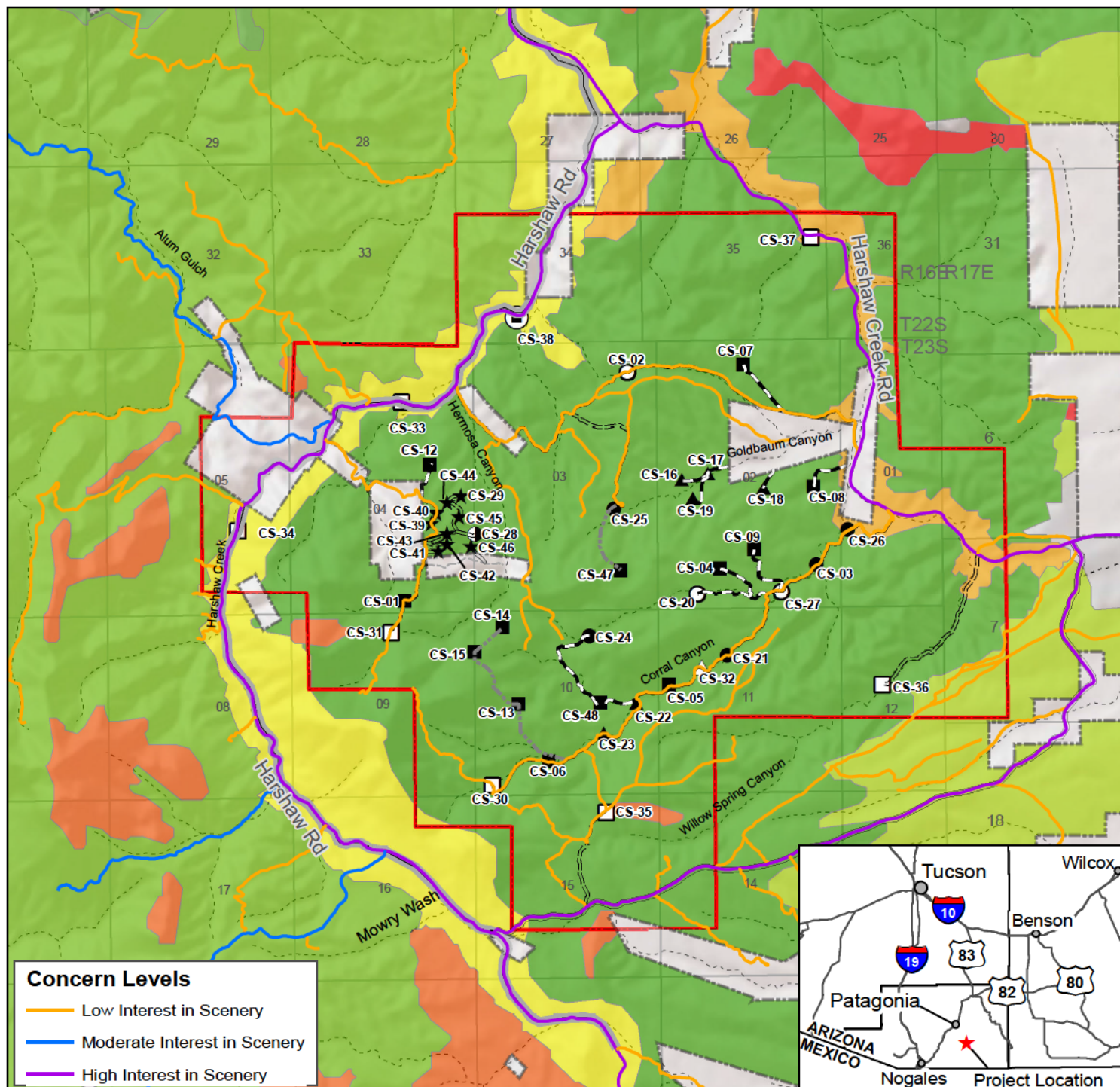
- ★ Exploration Borehole Drilling
- Geotechnical Borehole Drilling
- Hydrogeologic Borehole Drilling
- ▲ Test Pit
- △ Test Pit and Hydrogeologic Borehole Drilling
- ◐ Geotechnical and Exploration Borehole Drilling
- Geotechnical Borehole Drilling and Test Pit
- ◑ Geotechnical and Hydrogeologic Borehole
- Geotechnical and Hydrogeologic Borehole Drilling, and Test Pit

Access to Site

 County Road
 Existing NFSR With Maintenance Required
 Existing NFSR with Reconstruction Required
 Existing NFSR
 Proposed Overland Footpath
 Proposed Overland Vehicle Path
 Proposed Temporary Access Road
 Private
 NFSR With Maintenance Required (County Maintained)
 Drainage Feature



February 25, 2014



Modifications to the valued landscape character include range fences and dispersed campsites, which are visible in some areas but have little impact on scenic quality, and past wildfires including the 2011 Wildcat fire, which burned many trees but is recovering well (see **Photo 3**). Development on private lands has degraded the natural setting in some areas, particularly private residences and mine exploration roads and pads (see **Photo 4**) and private residences.

Photo 3. Trees killed by the 2011 Wildcat Fire



Photo 4. Mine exploration on private land in the project area



3.12.3 Environmental Consequences

3.12.3.1 Direct and Indirect Effects from No Action

Under the No Action alternative, mineral exploration activities would not occur. No drilling, road maintenance or reconstruction, or overland access routes would occur. Scenery would remain as it presently exists, subject to existing trends and conditions described in Existing Conditions.

3.12.3.2 Direct and Indirect Effects of Proposed Action

Topography and vegetation throughout the area varies widely. Some drilling sites and access routes would be visible due to their locations in elevated and/or exposed areas with little vegetative screening. Other drill sites would be tucked into valleys where they are less visible from afar and partially screened by denser vegetation. However, roads in these valley areas are popular for scenic driving and are used by the public to access dispersed recreation opportunities. These sites would be highly visible in foreground views.

Drill site features and many of the access routes would contrast with the natural landscape and therefore negatively impact scenery. Three drill sites (CS-33, CS-34, CS-38) along Harshaw Road are located in VQO Retention, and although the sites and activities would be visually evident during construction and operation, reclamation of the site impacts would be accomplished immediately after drilling is complete and would therefore meet the VQO. Two sites (CS-26 and CS-37) are located in VQO Partial Retention. CS-26 is approximately 1,000 feet away from the travelway (viewing location), so it is expected to meet this VQO during operations and after reclamation. CS-37 is 150 feet away from the travelway and may not meet this VQO during exploration activities, but will after reclamation. Other sites are located in VQOs Modification and Maximum Modification and would be consistent with those VQOs.

Maintenance and reconstruction of existing roads would have minor impacts to scenery, primarily from grading activities which result in exposed soils. The disturbance area for maintenance of existing roads would be limited to the existing roadbeds and selective vegetation removal (trimming trees, clearing fallen trees, and removal of live vegetation only when necessary). Reconstruction of existing roads would also be limited to the original roadbed area, and work may include filling eroded areas, installation of culverts, and placement of aggregate surfacing. Overland routes and footpaths would require minimal vegetation removal and would have no long-term effects. TARs would have fairly major impacts to scenery during construction, use, and reclamation activities, though reclamation is expected to mitigate long-term effects. No TARs are proposed in VQO Retention. Water tanks on private lands may be visible from NFS land, but would have only a minor visual impact. Water pipelines are not expected to impact scenery, as they would be laid on the ground along access roads and would be buried in the roadway at road crossings.

The Arizona National Scenic Trail (AZNST) lies north of the proposed project. It is unlikely that the project would be visible from the trail because of the relatively small sizes of the drill sites and the distance between the trail and sites (the nearest is over three miles away). Additionally, the undulating topography and vegetation would provide screening for most sites. The Patagonia-Sonoita Scenic Road (SR82) is northwest of the proposed project. It is unlikely that the project would be visible from the trail for the same reasons. However, project-related traffic on SR82 and along Harshaw Road and at the AZNST trailhead along Harshaw Road would be visible to forest visitors during construction and operations.

Impacts from monitoring wells include 12 relatively small (8-inch square) lock boxes that would have very minor visual impact.

Although the SMS does not specifically require analysis of night-time project effects, drilling activities include night time lighting at each site, which would alter the scenery and dark night-time setting and may be distracting to night-time travelers. Impacts would be localized (near each drill site) and would be partially screened by topography and vegetation, and there would be no long-term effects. Lighting at site CS-26 may be visible from a private residence for up to two weeks.

AMI's EPMs and Forest Service Required Design Features for scenery are described in Section 2.3.3.4 (VIS-1 through VIS-6), along with planned reclamation and some of the Design Features required for other resources would reduce impacts to scenery (see **Photo 5**). One example is the water quality EPM Section 2.3.3.2 that would require minimizing drill pad size, retaining and preserving existing vegetation, and immediate reclamation after completion of drilling. These measures would help minimize impacts to scenery. With implementation of AMI's Environmental Protection Measures and Forest Service Required Design Features, the proposed project is expected to meet VQOs.

3.12.4 Compliance with Forest Plan and Other Regulations

Once reclamation is complete and recommended scenery mitigation measures applied, the Hermosa Drilling Project would be consistent with the Coronado Forest Plan Visual Quality Objectives.



Photo 5. Reclaimed mine exploration on private land in the project area

Bright green areas near the center of this photo (indicated by the red arrow) show reclamation of temporary mine exploration roads on private land in the project area. Mitigation for this project would include similar reclamation, though woody species in the seed mix is recommended because it would help naturalize the linear disturbances more fully.

3.13 Transportation, Traffic, and Access

3.13.1 Regulatory Framework

Travel, transportation, and road management on the Coronado National Forest are governed by the Coronado Forest Plan (USFS, 1986) and Title 36 CFR, Part 212.

3.13.1.1 Title 36 CFR, Part 212

36 CFR 212 – Travel Management

This part of the CFR provides definitions for Forest Roads, designations, motor vehicles, road construction or reconstruction, and temporary roads. It also specifies road system management. Selected portions of the regulations applicable to the Hermosa Drilling Project are listed below.

36 CFR Part 212.1 - Definitions

Motor vehicle use map. A map reflecting designated roads, trails, and areas on an administrative unit or a Ranger District of the NFS. The applicable motor vehicle use map for Nogales and Sierra Vista Ranger Districts can be viewed online at http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5325443.pdf.

Road. A motor vehicle route over 50 inches wide, unless identified and managed as a trail.

Road construction or reconstruction. Supervising, inspecting, actual building, and incurrence of all costs incidental to the construction or reconstruction of a road.

Temporary road or trail. A road or trail necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a Forest Road or trail and that is not included in a transportation atlas.

36 CFR Part 212.51 Designation of roads, trails, and areas

(a) General. Motor vehicle use on NFS roads, on NFS trails, and in areas on NFS lands shall be designated by vehicle class and, if appropriate, by time of year by the responsible official on administrative units or Ranger Districts of the NFS provided that the following vehicles and uses are exempted from these designations:

- (1) Aircraft;
- (2) Watercraft;
- (3) Over-snow vehicles;
- (4) Limited administrative use by the Forest Service;
- (5) Use of any fire, military, emergency, or law enforcement vehicle for emergency purposes;
- (6) Authorized use of any combat or combat support vehicle for national defense purposes;
- (7) Law enforcement response to violations of law, including pursuit;
- (8) Motor vehicle use that is specifically authorized under a written authorization issued under Federal law or regulations.

3.13.1.2 Coronado National Forest Plan

The Forest Plan provides direction on road maintenance, construction and management of the transportation system. Below are the management practices applicable to the Hermosa Drilling Project.

Forest-wide management practices for Transportation System Planning (page 44)

4. Road Maintenance activities will be conducted primarily for protection of our road investment, resource protection, user safety, and user economy. Funding will continue to be the primary constraint on the intensity of road maintenance efforts. When roads in need of maintenance cannot be serviced because of budget constraints, they will be closed if unacceptable resource damage is occurring. Maintenance agreements with local government and private organizations will be sought to supplement Forest Service funding.

Management Area 1 Road and Trail Maintenance Management Practices (page 49)

1. Bring existing roads that are to be retained on the system to a maintainable standard which is suitable for the planned use and provides for minimum safety, and resource protection. Maintain roads to level 2.

Management Area 4 Road Standards (page 65)

1. Bring existing roads and trails that are to be retained on the system to a maintainable standard which is suitable for the planned use and provides for safety and resource protection.

Management Area 7 Road and Trail Planning Standard (pages 69 and 73)

1. Attempt to avoid these areas with new road and trail development.

2. Bring existing roads and trails that are to be retained on the system to a maintainable standard which is suitable for the planned use and provides for minimum safety and resource protection. Maintain roads to level 2.

Patagonia Town Code of Ordinances

It is not within the Forest Service's authority to enforce the rules and regulations of local jurisdictions. However, public comment was received regarding the local ordinances that the town of Patagonia has implemented as they relate to the Hermosa Drilling Project. For vehicles over 17,500 pounds gross vehicle weight, with some exceptions, the ordinance (Article 11-4) requires the use of the designated truck routes (Harshaw Road, McKeown Avenue from Taylor Avenue to Harshaw Road, First Avenue/Temporal Road, and Taylor Avenue). The ordinance does not apply to state highways.

Page 5 of AMI's Plan of Operations (AMI, 2013b) specifies the access to the site.

...traffic will proceed from SR [State Route] 82 in Patagonia onto Taylor Avenue and then eastward onto McKeown Avenue, which becomes Harshaw Road after 0.10 miles.

3.13.2 Existing Conditions

The Coronado National Forest published a motor vehicle use map to designate specific routes under USFS jurisdiction as open to motorized use pursuant to 36 CFR 212.51.

The analysis area for transportation, traffic, and access is the project area and Harshaw road from the town of Patagonia to the project area. NFS roads that would be used for the project, their current motor vehicle use map status and a description of their maintenance levels are shown in **Table 18**. Additionally, user-created roads that are not part of the NFS are located in the project area.

Table 18. Coronado National Forest Travel Plan for Roads Used by Hermosa Drilling Project		
Road	Motor Vehicle Use Map Status	Maintenance Level Description
NFS Road-58 Harshaw Creek Road	Open to Highway Legal Vehicles	This road is listed as Maintenance Level 3 by the Coronado National Forest. However this road is claimed by, and maintained and operated solely by and to standards set by Santa Cruz County.
NFS Road-49 Harshaw Road	Open to Highway Legal Vehicles	This road is listed as Maintenance Level 3 by the Coronado National Forest. However this road is claimed by, and maintained and operated solely by and to standards set by Santa Cruz County.
NFS Road-5521	Open to all vehicles	The operated and maintained at Maintenance Level 2, which exhibits the following characteristics: Management direction requires that the road be open for limited passage of traffic. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Road in this maintenance level are normally characterized as single lane, primitive type facilities intended for use by high clearance vehicles. Passenger car traffic is not a consideration.
NFS Road-5522	Open to all vehicles	
NFS Road-5525	Open to all vehicles	
NFS Road-4694	Open to all vehicles	
NFS Road-4687	Open to all vehicles	
NFS Road-4686	Open to all vehicles	
NFS Road-4690	Open to all vehicles	

Source: Table A-1 (AMI, 2013b), modified to identify NFS roads versus Private Roads.

In 2011, available road traffic volumes were analyzed for roads between Patagonia and the project area (Tetra Tech, 2011). Traffic was counted coming from either direction. The Average Daily Traffic (ADT) volumes were calculated. The traffic counts were taken while AMI was conducting exploration drilling on their privately owned lands, which contributed 69 round trips per day. **Table 19** shows the counts for various locations.

Table 19. 2011 Annual Daily Traffic Counts

Node (see Figure 11)	Location	Source	ADT
1	Harshaw Avenue	Town of Patagonia	1,560
2	Patagonia town limits on Harshaw Road	Time Mark Inc., January 2011	892
3	Harshaw Creek road north of intersection with Harshaw Road	Time Mark Inc., January 2011	264
4	Harshaw Road south of intersection with San Rafael Valley Road	Time Mark Inc., January 2011	110

Source: (Tetra Tech, 2011).

Figure 11. Locations of 2011 Traffic Counts



Note: blue numbers on figure indicated bridges. The red triangle #1 is a culvert.

3.13.3 Environmental Consequences

3.13.3.1 Direct and Indirect Effects from No Action

Under the no action alternative, no additional roads would be constructed or repaired, no overland vehicle paths would be created, and no traffic would be added to the normal use in the area. Therefore, there would be no impacts on access, transportation, or traffic.

3.13.3.2 Direct and Indirect Effects from the Proposed Action

AMI has identified the need to complete minor repair and maintenance of several existing National Forest System Roads, which they listed in Appendix A, Table A-1 of the Plan of Operations (AMI, 2013b). Roads to be repaired, maintained, or improved include NFS roads 5521, 4697, 4648, 4646, 4690 (see **Figure 3**). Most of these roads are not currently meeting the resource recommendations for erosion control, and therefore AMI's repair or improvement of these roads would be a benefit to the road system and Forest Service maintenance objectives.

Some user-created roads, which are not part of the NFS would be used as overland vehicle paths and temporary access roads. These user-created roads would be decommissioned when exploration activities are complete which would be a benefit to the road system by removing them from the landscape and reducing unauthorized use. Specifically, TAR 7 and overland vehicle paths 2, 3, and 10 (**Figure 3**) would result in removal of user-created roads when decommissioned.

Most of the vehicle use that would occur from the project would be between the staging area on AMI's land to the characterization sites. Traffic created by the project outside of this area (on NFS Road 49 and NFS Road-58) would, according to Table 5 in the Plan of Operations (AMI, 2013b), consist of:

- Mobilization of the drill rigs and support vehicles to the site. Up to two track-mounted drilling rigs, one track-mounted excavator, and their support vehicles would be mobilized on 18-wheeled tractor-trailers. Up to three road-approved truck-mounted drill rigs would be driven to the site. These mobilizations may be considered as six separate events since it is unlikely the mobilizations would occur on the same day.
- Daily crew trips to and from the site would likely include two or three passenger vehicles (pickups, SUV's) into site in the morning from the Patagonia and one trip out in the evening. Up to three drill crews and the test pit excavation crew may be active on certain days, but on most days only one or two crews would be active.
- No more than two trips per week during active drilling to the project staging area by a tractor-trailer (10-wheeled or 18-wheeled vehicle) to provide drilling supplies.
- Daily trips by a pump support truck over the period of about two weeks while aquifer testing is underway.
- At least one trip per week by a contracted pump truck traveling to the site to remove sanitary waste from the portable toilets. Trash pickup would occur as needed and no less frequently than once per month.
- Demobilization of drill rigs and support vehicles at the end of drilling activities. This would be done the same way as the mobilization patterns described above. Demobilizations of more than one site are not likely to occur on the same day.

The daily mobilization and demobilization of up to three drilling crews of three vehicles each in pickups or SUVs would contribute up to nine additional pickup truck trips to the use of the roads in Patagonia or on NFS lands. It is expected that crew mobilizations would obey all posted speed limits and safety requirements of any normal driver. Violations would be the responsibility of law enforcement and the individual drivers.

Up to two trips per week of a single 10- or 18-wheeled trailer truck, the single daily pump truck trip during aquifer testing, and the waste service trucks would also not increase the industrial traffic beyond the capabilities of the roads, streets, or towns, other drivers or other road users. It is anticipated that these commercial drivers would obey all posted speed limits and safety requirements of any normal driver. Violations would be the responsibility of law enforcement and the individual drivers.

Drill rigs would make the trip to the staging area once, then move between characterization sites without passing through town or using the main roads into the project area more than a few times. Demobilization of the equipment would occur once, not contributing to the industrial traffic in the area. No more than two large trucks (such as standard 80,000 pound gross vehicle weight tractor-trailer) trips per week would be made to haul materials from the site.

On a daily basis, each site will result in up to 20 additional vehicle trips per day during the two-week drilling operation. This level of additional use is likely to be not noticeable by the public (see **Table 19**) but may be noticeable to nearby residents. This activity would occur at shift change. Additional extra use of the roads from the Hermosa Drilling Project is also not expected to cause the roads (town, county or state) to deteriorate. AMI would have to maintain the NFSR used, or contribute funds to the maintenance of these roads, should the use cause maintenance to be needed. As AMI would be improving the condition of the forest roads through maintenance and reconstruction to be suitable for use, the overall impact on the NFSRs would be beneficial and meeting resource recommendations for erosion control. Public concern was raised about the use of the roads by Hermosa Drilling Project vehicles and conflicts with other uses such as bicycling or hiking along those roads. The limited amount of additional traffic on the public roads would not be expected to be great enough to create a conflict with other users (see **Table 19**). In addition, project traffic would follow speed limits and safety requirements.

The 10 overland vehicle paths identified would be used one time to get equipment to and from 14 characterization sites. Crews are to walk into or use all-terrain vehicles to reach these sites. Daily crew trips into and out of each site would be made for up to two weeks each. This level of use would produce less ground disturbance than constructing temporary roads. As these access routes would be decompacted and seeded where appropriate, long-term impacts would be minimal. Once reclaimed, these paths would be difficult to see with the implementation of Forest Service Required Design Features VIS-4, VIS-5, and VEG-6. It is unlikely that they would encourage future illegal, unapproved use by all-terrain or off-road vehicles.

Temporary access routes, except TARs 6 and 8 would be decommissioned, which would include recontouring portions of the roads to make this less visible and difficult for motor vehicles to access. Effective decommissioning, including the implementation of design feature VIS-1, VIS-5, and VEG-6, would discourage future unapproved use by motorized vehicles.

Overland footpaths would be used to access four characterization sites. These sites will be accessed by foot only, with crews carrying portable equipment to conduct drilling activities. Crews may walk

to and from these sites as many as 10 times. This is not likely to cause significant disturbance that would encourage future unapproved motorized use or require reclamation.

Based on the above discussion, the effects on transportation are expected to be minor and short-term, with the exception of the beneficial effect from decommissioning of existing user-created and unauthorized roads.

3.13.4 Compliance with Forest Plan and Other Regulations

The Hermosa Drilling Project is consistent with the Forest Plan Standards related to travel and transportation. No temporary roads would be constructed in Management Area 7, consistent with the management direction to avoid constructing roads in this management area.

The project is also consistent with 36 CFR 212.51, Forest Plan Forest-wide and management area direction, and the Patagonia Town Code of Ordinances related to the designated truck route.

3.14 Public Safety

Public comment related to public safety expressed concerns about other uses of roads and highways (recreation, hiking, biking, industrial), chemical spills, use of chemicals, impacts on groundwater, potentially hazardous minerals in the core samples, and air pollution. Mixed use of roads are discussed in the Access and Transportation section, the potential for contamination of groundwater is discussed in the Water Resources section, and air pollution is discussed in the Air Quality section.

The impacts and risks of spills and the use of chemicals and potentially hazardous minerals will be discussed in this section.

3.14.1 Regulatory Framework

3.14.1.1 Coronado Forest Plan

Forest-wide Standards for Chemical Management (page 46 of the Forest Plan) applicable to the Hermosa Drilling Project includes:

1. Safeguard water, people, animals, pets, and property in connection with use of pesticides and fire retardants.
2. Conform to Department of Agriculture standards in the use of all pesticides and promote development of acceptable alternatives for the use of pesticides.
3. Chemicals may be used within guidelines approved by other agencies for the following purposes:
 - h. Herbicides to control invading plants that reduce herbaceous forage production on rangelands. Not all of the control would be done by use of herbicides. Depending on individual site circumstances, the control might be by mechanical means, prescribed fire, fuelwood harvest, herbicides, or some combination.

3.14.2 Existing Conditions

The analysis area for public safety is the project area. There are no known hazardous materials or safety concerns in the project area. Abandoned mines within the project area have been, however, they have not been inventoried or evaluated for public safety or hazardous materials.

3.14.3 Environmental Consequences

3.14.3.1 Direct and Indirect Effects from No Action

Under the No Action alternative, mineral exploration activities would not occur. No drilling, road maintenance or reconstruction, or overland access routes would occur. Therefore, there would be no direct or indirect effects on Safety and hazardous materials.

3.14.3.2 Direct and Indirect Effects from the Proposed Action

AMI lists materials that may be used in the characterization project in Appendix E of their Plan of Operations (AMI, 2013b).

A concern was raised during scoping as to whether core samples removed during exploration would be radioactive. AMI has completed exploration drilling of the mineral resource on AMI's property and studied the geology in the analysis area. Based on the geology in the area and samples collected from these exploration efforts, radioactive minerals are not present in core samples at above average concentrations (AMI, 2013d). The average abundance (background level) of uranium in crustal rocks ranges from 0.5 parts per million to 5.0 parts per million, depending on the type of rock (EPA, 1999). Core samples removed from exploration drilling would be stored on AMI's property.

Implementation of AMI's proposed EPMs in Section 2.3.3.9 and the Forest Service Required Design Features in Section 2.3.5.6 (HAZ-1 through HAZ-6) will help to ensure public safety. These include but are not limited to speed limits of 15 miles per hour unless otherwise posted, dust control, lighting during operations, controlling access into work areas during operations, and fire prevention. The Plan of Operations also contains a plan for spill response (Appendix F). Measures taken to prevent, contain, and cleanup spills would minimize the potential for spills to occur and provide measures to deal with them effectively should they occur. Spill cleanup of any contaminated soils includes the removal and off-site disposal at an approved facility. Additionally, materials used for drilling, are low toxicity and are easily handled and do not pose hazards to human health or the environment (see Appendix E of the Plan of Operations with the MSDS for all proposed materials). Consequently, the risk to public safety human health, wildlife, or the environment from proposed drilling activities, including spills is minimized. The project as described in the proposed action is not expected to pose a hazard to the public or result in hazardous materials entering the environment.

Herbicide use for invasive plants would be targeted at individual plants and species per the Invasive Exotic Plant Management Program, and a safety and spill prevention plan would be required (USFS, 2004). Because herbicide use will follow the requirements of the Invasive Exotic Plant Management Program, effects on public health and safety would be unlikely.

3.14.4 Compliance with Forest Plan and Other Regulations

The Hermosa Drilling Project is consistent with current Forest Plan standards for safety and hazardous materials. The project will pose little risk to groundwater, humans, wildlife, and property. In addition, the use of pesticides during this project is consistent with the Forest Plan and is safe for the environment.

3.15 Recreation

3.15.1 Regulatory Framework

3.15.1.1 Coronado Forest Plan

The Forest Plan established management standards for recreation. To guide recreation management and development, the Forest established recreation opportunity classes (USFS, 1982) based on existing and desired conditions. The Recreation Opportunity Spectrum (ROS) classes are, from least developed to most developed; Primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Modified, Roaded Natural, Rural, and Urban. The project area is classified as:

Semi-primitive motorized: Characterized by a predominantly natural or natural appearing environment. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum onsite controls and restrictions may be present, but are subtle. Motorized use is generally permitted; roads are usually unpaved and often primitive. Moderate probability of experiencing solitude, closeness to nature, tranquility, self-reliance, and risk.

Roaded modified: Characterized by a predominately natural or natural appearing environment. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum onsite controls and restrictions may be present, but are subtle. Roads are well maintained and provide easy access. Moderate probability of experiencing solitude, closeness to nature, self-reliance, and risk.

Management Area 1 (page 47 of the Forest Plan)

Management Emphasis and Intensity: Manage for visual resources and semi-primitive dispersed recreation opportunities including those related to wildlife.

Standards and Guidelines for Dispersed Recreation

1. Use of motorized vehicles is restricted to existing trails and roads. Some trails may be closed to motorized vehicles for safety, resource protection, and user conflict reasons.
2. Emphasize semi-primitive motorized and semi-primitive nonmotorized recreation opportunities. When roads are no longer needed, close them in order to create more opportunities for semi-primitive nonmotorized or primitive experiences.

Management Area 4 (page 62 of the Forest Plan)

Management Emphasis and Intensity: Dispersed recreation activities may occur except for those that adversely affect the productivity of the land or resource.

Standards and Guidelines for Dispersed Recreation

3. Use of motorized vehicles is restricted to existing trails and roads. Some trails may be closed to motorized vehicles for safety, resource protection, and user conflict reasons. All trails on the Santa Catalina Ranger District are closed to motorized vehicles.
4. Maintain existing ROS class composition, except if any existing roads are determined to be unneeded, close them to create more opportunities for semi-primitive non-motorized or primitive experiences.

Management Area 7A and 7B (page 67 and 71 of the Forest Plan)

Management Emphasis and Intensity: (7A) Dispersed recreation activities and other uses may be allowed to the extent they do not degrade the unique values, (7B) Recreation activities and other uses may occur to the extent they do not degrade the unique values.

Standards and Guidelines for Dispersed Recreation

1. Use of motorized vehicles is restricted to existing trails and roads. Some trails may be closed to motorized vehicles for safety, resource protection, and user conflict reasons.
2. Maintain current Roaded Natural recreation opportunities while creating increased Semi-primitive non-motorized opportunities when possible by closing roads which are determined to be unneeded, and creating temporary roads only for resource utilization projects.

Off highway vehicle use is prohibited by the Coronado Forest. Forest Plan Amendment No. 12 (August 2010) prohibits motor vehicle use off the designated system of roads, trails, and areas, except as identified on a Motor-Vehicle Use Map (MVUM)". The motor vehicle use map is described in more detail in Section 3.12.1 of the EA.

3.15.2 Existing Conditions

The analysis area for recreation is the project area. There are no developed recreation sites within the project area. Dispersed recreation, including off-highway vehicle use, camping, hunting, mountain biking, hiking, and sightseeing, occur in the project area. Information is currently unavailable on the amount of use. The Harshaw Creek Road (NFS Road-49) is frequently used for sightseeing (see Section 3.11.2 for a discussion on visual resources). Within a half mile of Harshaw Road, Harshaw Creek Road, and NFS Road 214, the ROS is Roaded Modified. This creates a ring that coincides closely with the project area boundary. The interior of the project area is designated as semi-primitive motorized. Existing NFS roads within the Semi-Primitive Motorized ROS are primitive, unpaved roads.

3.15.3 Environmental Consequences

3.15.3.1 Direct and Indirect Effects from No Action

As there would be no development of drilling sites and access, control of access, or changes in the visual quality under no action, there would be no effects on recreation.

3.15.3.2 Direct and Indirect Effects of the Proposed Action

The area where recreational users are most likely to encounter impacts from this project is along NFS Road 49 within the Roaded Modified ROS. Three characterization sites (CS-33, CS-34, and CS-38) would be located along this road. Visitors to the area may encounter workers, security staff, or work activity during the two weeks at each site when drilling is occurring. All three of these sites will be maintained as monitoring well sites (**Table 2**), so visitors also may encounter workers during the two to three-hour monitoring events conducted quarterly (**Table 4**). These activities may be perceived as industrial by recreational users. Overall, project activities would be short-term in any one location and temporary. Implementation of all of AMI's proposed EPMs (Section 2.3.3) and the Forest Services Required Design Features (Section 2.3.5) will ensure that negative impacts to recreational use are minimized. The activities and impacts are consistent with the Roaded Modified ROS.

Most of the characterization sites and new TARs would occur in the Semi-Primitive Motorized ROS. Use of the roads and activities at characterization sites would occur for up to two weeks each. As the sites are frequently clustered, activities along access roads and in nearby areas would sometimes cause recreationists to feel that the use is more concentrated. While road maintenance may be improved, opportunities for recreationists to feel solitude and tranquility will be temporarily reduced. These temporary impacts may be considered inconsistent with the Semi-Primitive Motorized ROS.

During construction of roads and drilling pads, AMI's EPMs would control dust and require speed limits of 15 mph or as otherwise posted. These measures would prevent dust or speeding vehicles from detracting from the recreational experience. Activities in any one drilling location would occur for two weeks or less, except the quarterly well monitoring.

Existing user-created roads may be used by hikers and mountain bikers in the area. Several of these would be upgraded to allow equipment and vehicle access for drilling and monitoring. Bikers and hikers may avoid the area during construction activities, and may not like the upgraded condition of some of these roads. During reclamation, these roads would be obliterated and decommissioned. Following reclamation, they would no longer be available for motorized use.

Once wells are installed and concurrent reclamation completed, the recreational visitor would likely not notice the wells as the well head lock boxes will be painted to blend with the landscape (VIS-6 in section 2.3.5.5). AMI intends to manage access to their private lands (see Section 2.3.3.8), however, this would not affect access to any currently open NFS roads that the public may be using.

TARs constructed for the project, except TAR 6 and 8, and overland vehicle paths would be reclaimed (Sections 2.3.4, 2.3.5.5, VIS-5, and 2.3.5.9, VEG-6) when the project is completed (within 2 years unless the site would be used for monitoring). This reclamation should deter unauthorized off-highway vehicle use.

Impacts on recreation are expected to be short-term with the exception of the long-term loss of access to user-created and unauthorized roads once they are decommissioned.

3.15.4 Compliance with Forest Plan and Other Regulations

Activities within the Semi-Primitive Motorized ROS may be temporarily inconsistent with the ROS due to the feeling of concentrated activities and loss of solitude.

Once activities are completed and reclamation removes TARs (except TARs 6 and 8) and drill pads, the project would be consistent with the Semi-Primitive Motorized ROS. Removing unauthorized, user created roads, as would occur with decommissioning of TARs, complies with the Forest Plan Standard and Guideline of "when roads are no longer needed, close them in order to create more opportunities for semi-primitive non-motorized or primitive experiences" (Section 3.15.2).

Chapter 4

Cumulative Effects

Cumulative effects are defined as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). Reasonably foreseeable actions are “those Federal or non-Federal activities not yet undertaken, for which there are existing decisions, funding, or identified proposals” (36 CFR 220.3). The proposed exploration activity is part of a data collection operation, considered temporary in nature, and would determine the feasibility of future mining activities. AMI has not submitted a proposal to the Forest Service for the development of a mine in the project area, even though they published a pre-feasibility study. Therefore, the effects of development of a mine cannot be adequately quantified or analyzed. Because there is no identified proposal, the development and operation of a mine is not considered reasonably foreseeable, and is thus not considered in the cumulative effects analysis. Any future mine proposal for Hermosa or any other proposal in the area will be analyzed in detail in a future NEPA environmental review and a separate decision made as to whether or not to approve it.

Because the direct effects of the Hermosa Drilling Project will affect 13.90 acres and the project area includes 7,350 acres, for most resources, the project area is considered large enough to adequately to encompass an area where past, present and reasonably foreseeable actions may have cumulative effects. The cumulative effects analysis area is described for each resource analyzed.

The temporal scope of the cumulative impacts analysis assumes that Hermosa Drilling Project activities will occur within a two-year period (including reclamation) with the exception of the monitoring wells and their reclamation, and that all monitoring well activities will be completed within 15 years.

The no action would have no direct or indirect effects on any resource and therefore assessment of cumulative impacts is not applicable. Cumulative impacts from the No Action alternative are not addressed further.

4.1 Past, Present, and Reasonably Foreseeable Activities and Descriptions

This section identified the past, present, and reasonably foreseeable future activities considered in the cumulative impacts (depending on the cumulative impacts analysis area). These activities are listed in **Table 20** and shown on **Figure 12**. Past activities (such as road development, mining, mineral exploration, special uses, and recreational activities) are reflected in the description of existing conditions because their impacts have already occurred.

4.1.1 Activities on Private Lands

Activities that have occurred on private lands in and around the project area include development of several houses and outbuildings, ranches, roads, and mineral exploration. Locations of private lands are shown on **Figure 3**. These activities have disturbed soil and vegetation. Some areas disturbed by mineral exploration have been reclaimed. Motorized equipment has been used for construction, drilling, and property maintenance.

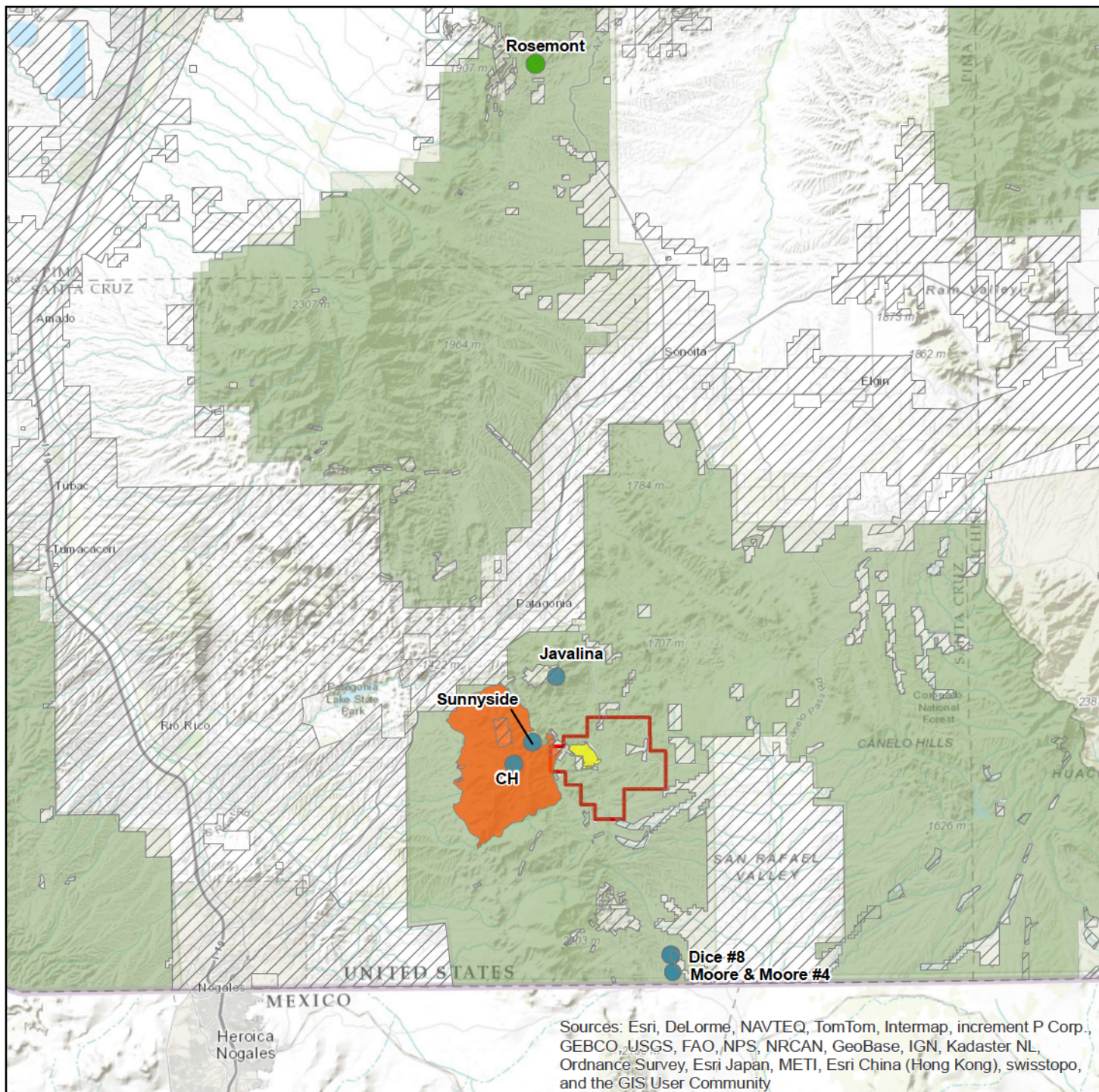
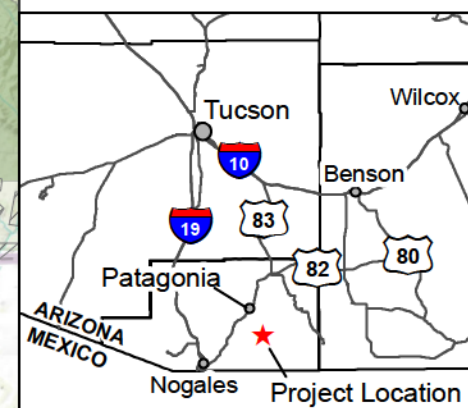
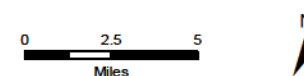
Table 20. Past, Present, and Reasonably Foreseeable Actions Considered

Activity	Approximate Date	Area Affected/Location Relative to Hermosa Project Area
Activities on private lands near the project area	2011 and ongoing	Unknown level of disturbance, some areas within the project area, exploration drilling (including pad construction and access, and reclamation), houses.
Grazing management, including water development	Ongoing	Grazing allotments within the Hermosa project area
Recreational activities, motorized and non-motorized	Ongoing	Recreation-related activities occurring in the Hermosa project area
Groundwater use for communities and irrigation	Ongoing	Cienega Creek Basin
Wildland fire and Fire Suppression: Soldier Basin fire	2013	10,775 acres total, 146 acres of NFS land within the Hermosa project area
Wildland fire and Fire Suppression: Wildcat fire	2011	All of Wildcat Fire's 398 acres occurred on NFS lands within the Hermosa project area
Mining: Rosemont Copper Mine	Anticipated start date: Approximately 2014 + 25 years for mine operations	5,400 acres in the area to be disturbed; located 25 miles from Hermosa project area
Mineral Exploration: Sunnyside mineral exploration drilling project: Sections 5 and 6 T23S R16E.	Anticipated start date: within 2 years; Duration: less than 1 year	0.6 acres of disturbance, adjacent to the Hermosa project area. Closest drilling location is 0.5 miles from Hermosa project area
Mineral Exploration: Dice #8 – Proposed placer mineral exploration project Sec 18, T 24 S, R 17 E	Anticipated start date: within 2 years; Duration: less than 1 year	1.5 acres of disturbance, 5.5 miles outside the Hermosa Project Area
Mineral Exploration: Javelina – Proposed mineral exploration drilling project including access. Sec. 17, 21, 29, T 22 S, R 16 E	Anticipated start date: within 3 years; Duration: less than 1 year	Less than 2 acres of disturbance, approximately 2 miles outside the Hermosa Project Area
Mineral Exploration: CH – Proposed mineral exploration drilling project. Township 23 South, Range 16 East	Anticipated start date: within 3 years; Duration: less than 1 year	Less than 1 acre, approximately 1.5 miles outside the Hermosa project area.
Mineral Exploration: Moore and Moore #4 – Proposed placer mineral exploration project Sec 19, T 24 S, R 17 E	Anticipated start date: within 3 years; Duration: less than 1 year	6 acres, approximately 6.1 miles outside the Hermosa project area.
Fuels Reduction: Huachuca FireScope – Fire and fuel reduction projects	Ongoing	Multiple types of treatment allowed within the Hermosa project area, none currently planned.
Transportation: Sierra Vista Travel Management Planning	Under NEPA review	Within Hermosa project area

Figure 12
Past, Present, and
Reasonably
Foreseeable Actions

Hermosa Exploration
 Drilling Project
 Arizona Minerals, Inc.

- Project Area
- Private Land
- Coronado N.F.
- Area Activities**
- Proposed Mining Projects
- Proposed Exploration Projects
- Soldier Basin Fire
- Wildcat Fire



Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

4.1.2 Grazing management, including water development

Grazing allotments are described in the Range section of the EA (3.8.2). Grazing in the past may have caused minor vegetation disturbance, soil compaction, or erosion. Allotment Management Plans call for maintenance or replacement of range improvements and list new improvements to be implemented in the future. Allotment Management Plans for the Farrell and Duquesne Allotments include implementation of planned improvements and ongoing maintenance or replacement of range improvements.

Livestock use in range allotments tends to reduce understory herbaceous vegetation and may enhance the establishment of shrubs and trees. However, the impacts of managed grazing are generally considered to be minor, except in localized areas where livestock congregate (USFS, 2009a).

4.1.3 Recreational Activities, motorized and non-motorized

Dispersed recreation, including off-highway vehicle use, camping, hunting, mountain biking, hiking, and sightseeing, occur in the project area (described in Section 3.2.3.3). The Harshaw Creek Road (NFS Road-49) is frequently used for sightseeing. Impacts such as soil compaction from foot traffic, presence of motorized and non-motorized vehicles, noise from vehicles, and spread of invasive plants have occurred and will continue.

4.1.4 Groundwater Use for Communities and Irrigation

The average annual water demand for the Cienega Creek Basin was 1,250 acre-feet between 2001 and 2006 (ADWR, 2009b). The amount of water used by the town of Patagonia for 2012 was approximately 130 acre feet (ADWR, 2013c) for 391 residential connections. That equates to approximately 0.33 acre feet of water used annually per residential connection.

4.1.5 Mineral Exploration

Sunnyside Mineral Exploration

This proposed mineral exploration drilling project includes six exploration drill holes, one temp access road, one monitoring well, and 0.2 miles of non-system (temporary) road access. The NEPA environmental review has been initiated, and the project scoping/comment period was completed in July 2013. The proposed project would be located in Humboldt Canyon, six miles due south of Patagonia, in Sections 5 and 6 T23S R16E, which is adjacent to the Hermosa project area. The Sunnyside project would include 0.6 acres of disturbance. The closest drilling location is within 0.5 mile of the Hermosa project activities and within the western edge of the Hermosa Drilling Project area. The anticipated start date is within two years; with duration of less than one year. The Sunnyside project would result in impacts similar to the proposed Hermosa Drilling Project, but it is much smaller in scale and shorter in duration.

Dice # 8 Mineral Exploration

This proposed placer mineral exploration project includes gravel excavation, hydraulic processing (screening, trommel, and sluice work), and temporary access. The NEPA environmental review has not been initiated, and the project is currently in the planning phase. The project would likely result in 1.5 acres of disturbance. It would be located 5.5 miles from the Hermosa project area. The anticipated start date is within two years; with a duration of less than one year.

Javelina Mineral Exploration

This is a proposed mineral exploration drilling project, including access. A NEPA environmental review has not been initiated, and the project is currently in the planning phase. The anticipated start date is within three years; with a duration of less than one year.

CH Mineral Exploration

This is a proposed mineral exploration project including drilling and access. A NEPA environmental review has not been initiated, and it is currently in the planning phase. The anticipated start date is within three years; with a duration of less than one year.

Moore and Moore #4 Mineral Exploration

This proposed placer mineral exploration project includes placer/pit/trommel/slucce operations and access. The NEPA environmental review has not been initiated and is currently in the planning phase. The anticipated start date is within three years; with a duration of less than one year.

4.1.6 Wildland Fire and Fire Suppression

Wildcat fire

The 2011 Wildcat wildland fire burned approximately 398 acres of NFS land within the Hermosa project area. The Wildcat fire was located entirely within the Hermosa project area. Of the 398 acres of NFS lands within the Wildcat fire perimeter, no acres were burned at high severity (indicating severe soil impacts), about 35 acres burned at moderate severity (indicating moderate soil impacts), 289 burned at low severity (indicating minimal soil impacts), and 75 acres were unburned (USFS, 2011c).

Soldier Basin Fire

The Soldier Basin fire (2013) burned an estimated 10,775 acres total, and of those, 6,223 acres burned at low severity, 1,784 burned at moderate severity, and 9 acres burned at high severity. Approximately 15 percent of the area within the Soldier Fire boundary did not burn or burned at very low severity. None of the high severity burn area occurred in the Hermosa project area (USFS, 2013d). Most of the Soldier fire within the Hermosa project area (146 acres total) was unburned or very low severity. The easternmost fire boundary was the Harshaw Road and none of the characterization sites or new access is within the Soldier Basin burned area.

4.1.7 Rosemont Copper Mine

The Rosemont Copper Mine proposal was analyzed and a final environmental impact statement and draft record of decision were published by the Coronado National Forest in December 2013. The project is currently undergoing public review as part of the objection process. The objection period ended February 14, 2014. The Forest Service has 45 to 75 days to resolve objections.

The proposed Rosemont Copper Mine project includes construction, operation, reclamation, and closure of an open pit mine on and adjacent to NFS lands. This project area is located about 30 miles south of Tucson, Arizona. It is on approximately 995 acres of private land owned by Rosemont Copper Company, 3,670 acres of NFS lands, and 75 acres of Arizona State Land Department lands. The Rosemont Copper Project consists of the development of an open pit mine, ore processing plant, tailings and waste rock disposal facilities, access roads and utility corridors. The operation would produce concentrates of copper, molybdenum, and silver. The life of the operation, including construction, operation, reclamation and closure, is approximately 24.5 to 30 years (USFS, 2013e).

Because the Rosemont Copper Mine project is 25 miles from the Hermosa Drilling Project, there is limited potential for cumulative impacts. Part of the proposed Rosemont Mine area is within the Cienega Creek groundwater basin, as is the Hermosa Drilling Project. The Rosemont Mine pit development would require pit dewatering, which may affect groundwater quantity in the Cienega Creek Basin. During Rosemont's operation, dewatering would create a cone of depression beneath the pit (the drawdown cone). At the end of Rosemont mining operations (approximately 25 years), the 5-foot drawdown cone would extend outward from the pit for up to five miles (USFS, 2013e). Once mining has ceased (after approximately 25 years) and dewatering pumps would no longer be active, water will re-fill the pit to create equilibrium within the aquifer. At equilibrium after mine closure, the loss of water from the groundwater basin as a result of the pit lake would be approximately 170 to 370 acre-feet per year (USFS, 2013e).

Rosemont Mine would also have air quality impacts. These include the potential to exceed PM₁₀ and ozone in some areas, and produce emissions and dust. Rosemont Mine is also expected to increase traffic coming in from the south of the Rosemont Mine. Cultural resources would be affected by Rosemont Mine at the mine site through removal. The Rosemont Mine analysis did not identify any cumulative impacts on wildlife from the Hermosa Drilling Project.

4.1.8 Huachuca FireScape Project

The Huachuca FireScape Project decision notice (USFS, 2009b) approved prescribed fire and mechanical treatments conducted by the Forest Service to reduce fuels over 10 years (beginning 2009) of up to 270,000 acres (184,000 of NFS lands), depending on funding. Activities that may be proposed within the Hermosa Drilling Project Area include thinning by hand, handpiling and burning, prescribed burn, burn/chip, thin by hand/masticate/handpile. No site specific activities have been identified within the Hermosa Project Area.

4.1.9 Travel Management Planning

The Coronado National Forest is in the midst of travel management planning and a proposed action for managing roads in the area has been open to public scoping. The proposed action for travel management includes decommissioning NFS road 5522 and changing the status of NFS road 4687 to "Restricted" and adding TAR 6 as NFS road 58-9.85R-1 as an open road. A map of the proposed action is available online at

http://a123.g.akamai.net/7/123/11558/abc123/forestservic.download.akamai.com/11558/www/nepa/80593_FSPLT2_291751.pdf.

The overall effect on transportation and access of travel management planning, if the proposed action is selected, would be to slightly reduce public access in the Hermosa Drilling Project area.

4.2 Air Quality

The direct impacts from the proposed action, in the form of exhaust emissions and dust, would not likely extend beyond the project area boundary (Section 3.2.3). The cumulative impacts analysis area for air quality is the project area. Past, present, and reasonably foreseeable activities that have affected or may affect air quality within the cumulative impacts analysis area include ongoing motorized recreation activities, Soldier Basin and Wildcat wildland fires and suppression activities, Rosemont Mine and the Huachuca FireScape Project.

Exhaust and dust emissions from motorized recreation are considered low level and are not expected to increase in the future. The exhaust and dust emissions would not combine with the short-term and negligible levels of emissions from the Hermosa Drilling Project to result in cumulative effects because it is unlikely that motorized recreation will occur where drilling is occurring.

The Wildcat and Soldier Basin wildland fires had impacts on air quality at the time of the fires, but these impacts stopped when the fires were extinguished or burned themselves out. Therefore these impacts do not coincide with the air quality impacts from the Hermosa Drilling Project. Other past wildfire events impacted air qualities at one time, but these effects similarly do not continue to affect air quality in the project area. Wildland fire and fire suppression activities will likely occur in the future, but the time and extent of impact cannot be predicted. The direct impacts from the proposed action, in the form of exhaust emissions and dust, are short-term (six months to two years) (see Section 3.3.3.2). Cumulative effects are not anticipated to occur because the impacts from the past action are no longer occurring.

The Huachuca FireScape decision notice (USFS, 2009b) approved prescribed fire and mechanical treatments to reduce fuels over 10 years (beginning 2009), depending on funding. Burning activities within the Hermosa Drilling Project Area from the Huachuca FireScape Project would affect air quality through particulate emissions. However, burning would not occur unless air quality standards could be met (USFS, 2009b) and impacts would be short term. The improvements in vegetation conditions from the Huachuca FireScape treatments would reduce the potential for wildland fire, which would be a beneficial effect on air quality in the long term. It is also likely that treatments from the Huachuca FireScape project will not coincide with the Hermosa Drilling Project with the exception of monitoring well activities.

The cumulative impacts analysis area for the Rosemont Mine considered the Hermosa Drilling Project. Cumulative impacts were considered *“short term, use motorized equipment, and disturb small amounts of ground. While they would contribute greenhouse gases and dust, overall emissions would be relatively small, compared with other development activities.”* Rosemont Mine cumulative impact analysis identified cumulative impacts on levels of PM₁₀ and ozone in Tucson and Saguaro National Park East. Neither of these locations is within the cumulative impacts analysis area for Hermosa Drilling Project air quality impacts.

4.3 Noise

The noise-related direct impacts from the proposed action are short-term (six months to two years) (see Section 3.2.3). The cumulative impacts analysis area for noise is a half-mile buffer around the project area. Past, present, and reasonably foreseeable activities that may affect noise levels within the cumulative impacts analysis area include the private land activities, Soldier Basin and Wildcat wildland fires and fire suppression activities, the Huachuca FireScape Project, Sunnyside Exploration Project, and ongoing recreation activities.

Past activities including private land activities, wildland fire and fire suppression, and motorized recreational activities have affected noise levels in the project area, but these effects ended when the associated activity ended. Ongoing motorized recreational activities will continue to create intermittent, low-level noise, but the level is considered minor and would not combine with noise generated from the Hermosa Drilling Project above a negligible level.

If Huachuca FireScape projects are identified and funded for implementation within the Hermosa cumulative impacts analysis area for noise, motorized equipment such as chainsaws, vehicles, and

heavy equipment operation would generate noise. It is likely that treatments from the Huachuca FireScape project will not coincide with the Hermosa Drilling Project with the exception of monitoring well activities. These noise levels are anticipated to be low level, short-term, and would occur in discreet locations at a small scale. They would not combine incrementally to result in levels that would produce a negligible effect.

The Sunnyside Exploration Project is partially within the west boundary of the Hermosa project area. Drilling on that project is proposed to occur within two years. If the Sunnyside Project occurs at the same time as the Hermosa Drilling Project, noise generated from the two projects may occur simultaneously. The scope of the Sunnyside project is smaller and the project area is further removed from sensitive receptors, and is on the other side of a small terrain divide than the Hermosa Drilling Project. The project's direct impacts from noise are considered low. Individually, noise from both projects would produce short-term, minor effects.

Current and future noise levels created by motorized recreation may combine with motorized activities from exploration projects. Noise from current and future levels of motorized use is low-level, short-term, and intermittent. Noise from the Hermosa Drilling Project would be temporary (two weeks per site).

4.4 Vegetation

Impacts on vegetation from the Hermosa Drilling Project (see Section 3.4.3) would not extend beyond the project area boundary. The cumulative impacts analysis area for vegetation is the project area. Past, present, and reasonably foreseeable activities that may affect vegetation and occur within the cumulative impacts analysis area include private land activities, the Soldier Basin and Wildcat wildland fires and fire suppression activities, the Huachuca FireScape Project, and grazing and recreation activities. While it is likely that wildland fire and fire suppression would occur in the future, the extent, timeframe in relation to the Hermosa Drilling Project and effects are not predictable. Other mineral exploration projects are proposed outside the project area; however, they are included in the discussion due to similarities in effects.

Cumulative impacts considered from the Wildcat and Soldier Basin wildland fires and fire suppression activities include 544 acres of burned vegetation. Most of the 146 acres within the Hermosa Project Area affected by the Soldier Fire was unburned or burned at a very low severity, and none of the burned areas in the Hermosa project area burned at severe intensity, indicating soils are expected to stabilize and recover to support re-establishment of vegetation. The acres of vegetation disturbance is unknown, however, it is visible from aerial photos, indicating that reclamation is recent.

Outside the project area, future foreseeable exploration projects may occur and would be similar to those of the proposed action, but smaller in scale and shorter in duration. General proposed project locations and total disturbance acreages of other exploration projects are considered in this analysis, but the exact disturbance and vegetation types affected by these projects are unknown because they are still in the planning phase. Effects of surface disturbance would remain until reclamation is successful.

The Huachuca FireScape Project, if implemented would reduce fire hazard and fuels resulting in beneficial effects to the vegetation condition. Should FireScape treatment projects and Hermosa Drilling Project activities co-occur, implementation of concurrent reclamation would minimize the effects.

Grazing and recreational activities in the past have caused vegetation disturbance. Effects have been minor, except in a few areas of concentrated activity. Ongoing grazing and recreational activities will likely not increase in intensity to contribute additional effects, as levels are expected to remain the same because there has been no proposal to increase the level of grazing activities and the project area is managed for non-developed recreation. Implementation of planned range improvement projects may have a minor, short-term negative effect on vegetation, but reclamation and the long-term benefits would minimize the effects.

Because the Hermosa Drilling Project includes reclamation of all disturbed areas, the effect on vegetation from the Hermosa Drilling Project would not incrementally add to past effects from wildland fire and fire suppression, recreation or grazing, or the potential future Huachuca FireScope treatments.

4.5 Invasive Plants

The Hermosa Drilling Project effects on invasive plants would not extend beyond the project area boundary. Therefore, the cumulative impacts analysis area for invasive plants is the project area. Past, present, and reasonably foreseeable activities that may result in effects related to invasive plants and that occur within the cumulative impacts analysis area include private land activities the Soldier Basin and Wildcat wildland fires and fire suppression activities, the Huachuca FireScope Project, and grazing and recreation activities. Other mineral exploration projects are proposed outside the project area, however, they are included in the discussion due to similarities in effects.

Past, present, and future grazing and recreation has resulted in and will likely continue to result in the introduction and/or spread of invasive species. Private land activities may have introduced invasive species, however, state law requires landowners control weeds. It is unknown whether the wildland fires and suppression resulted in invasive plant spreading or infestation, but there is a high likelihood that areas became susceptible. These effects have been or will be controlled on NFS lands by management decisions and actions. Future levels of grazing and recreation activities are not expected to increase and would continue to be managed to minimize impacts.

Outside the project area, future foreseeable exploration projects may occur and would be similar to those of the proposed action, but smaller in scale and shorter in duration. General proposed project locations and total disturbance acreages of other exploration projects are considered in this analysis, but the exact disturbance and potential impacts on invasive plant species from these projects are unknown because they are still in the planning phase. Effects of surface disturbance would remain until reclamation is successful.

The Huachuca FireScope Project, if implemented, could create opportunities for invasive plant spread. These activities would also be subject to weed control management and oversight by the Forest Service and therefore would result in only minor effects. As discussed in Section 3.5.3.2, impacts from the Hermosa Drilling Project would be minimized through EPMs, monitoring, and control treatments.

The effects of the Hermosa Drilling Project would be minor and would not incrementally combine with the minor effects from past, present, and foreseeable activities to result in cumulative impacts.

4.6 Special Status Wildlife and Plants

The cumulative impacts analysis area for special status wildlife and plants is the project area, plus exploration projects occurring in the vicinity of the project. Past, present, and reasonably foreseeable activities that may affect special status wildlife and plants and occur within the cumulative impacts analysis area include private land activities, the Soldier Basin and Wildcat wildland fires and fire suppression activities, the Huachuca FireScape Project, travel management, mineral exploration, and ongoing grazing and recreation activities.

For species where the direct and indirect impacts determinations were “no impact”, there would be no cumulative impacts from past, present, and reasonably foreseeable actions.

For species where the Hermosa Drilling Project may impact individuals, past and present actions that have affected or will continue to affect wildlife include private land activities, livestock grazing, wildfire suppression, and recreation. Reasonably foreseeable actions included in the cumulative impact analysis include, wildland fire suppression, Huachuca FireScape Project, travel management, mineral exploration, grazing and recreation. While it is likely that wildland fire suppression would occur in the future, the extent and effects are not predictable.

Past actions have contributed beneficial effects on some species, such as grazing improvements that provide aquatic habitat. However, stock ponds and troughs also provide habitat for invasive species, like bullfrogs, which would not be considered beneficial.

Wildland fire and fire suppression likely modified some species habitat, but because the fire severity was generally low, their effects are no longer occurring. Past and ongoing recreation and grazing have likely caused and will continue to cause minor soil and vegetation disturbance, including invasive plant establishment and spread, resulting in minor adverse impacts on special status species.

Cumulative effects on special status species and habitat from other future foreseeable exploration projects may occur and would be similar to those of the proposed action, but smaller in scale and shorter in duration. General proposed project locations and total disturbance acreages of other exploration projects are considered in this analysis, but the exact disturbance and habitats affected by these projects are unknown because they are still in the planning phase. Effects of surface disturbance would remain until reclamation is successful. Cumulative effects from noise, light, and increased human presence would occur if other exploration projects co-occurred with the Hermosa project. This effect would be short-term, lasting only for the project duration. Cumulative effects from future grazing, recreation, and exploration activities would not result in population-level impacts, and are not likely to cause a trend toward federal listing.

The Huachuca FireScape Project treatment analysis indicated that implementation may affect, but is not likely to adversely affect threatened and endangered species analyzed in the Draft Hermosa Drilling Project Biological Assessment (Tetra Tech, 2014c) (jaguar, lesser long-nosed bat, Chiricahua leopard frog, Gila chub, Gila topminnow, Huachuca water umbel). The Huachuca FireScape analysis also found that the project was likely to adversely affect the Mexican spotted owl and the designated critical habitat of the Sonoran tiger salamander. However, the USFWS concluded that the Huachuca FireScape Project would not likely jeopardize the continued existing of the Mexican spotted owl or destroy or modify its designated critical habitat, and that it is not likely to jeopardize the continued existence of the endangered Sonoran tiger salamander (USFS, 2009b).

The analysis for the Huachuca FireScape project also determined that “out of 71 sensitive species analyzed, it was determined that there would be no effect on 31 of them. For the remaining sensitive

and management indicator species, modification of habitat and short-term effects may affect individuals but are not likely to cause a trend towards federal listing or contribute to significant population changes” (USFS, 2009c).

4.7 Heritage and Native American Interests

The cumulative impacts analysis area for Heritage and Native American Interests is the project area. Past, present, and reasonably foreseeable activities that may affect heritage or Native American interests and that occur within the cumulative impacts analysis area include private land activities, ongoing grazing management, recreation activities, Soldier Basin and Wildcat wildland fires and suppression activities, Rosemont Mine, and the Huachuca FireScape Project.

Recreational activity, grazing management, private land activities, and wildland fire and fire suppression may have adversely affected heritage resources in the past and may in the future, but the extent is unknown.

Rosemont Mine would not affect cultural resources within the Hermosa Drilling Project cultural resource cumulative impacts analysis area.

Some tribal representatives and members of the public have expressed concern to the Coronado National Forest that mining projects, including projects smaller in scale than Hermosa Drilling Project, are having a cumulative effect on both the overall assemblage of historic properties and changing the cultural landscape.

Human activities in the area do pose some risk of damaging cultural resources (See section 3.7.3). This risk, added to the impacts from past, present, and reasonably foreseeable actions would increase the likelihood of adverse effects and the potential for affecting current tribal uses of the area. Because there would be no adverse effects to historic properties from the Hermosa Drilling Project, cumulative effects are not anticipated on historic properties.

4.8 Range

Impacts on range from the Hermosa Drilling Project would not extend beyond the project area boundary; therefore, the cumulative impacts analysis area for range is the project area. Past, present, and reasonably foreseeable activities that may affect range and that occur within the cumulative impacts analysis area include private land activities, the Soldier Basin and Wildcat wildland fires and fire suppression activities, the Huachuca FireScape Project, and ongoing grazing activities.

No change in the level of grazing is anticipated in the foreseeable future. Ongoing grazing management in the form of Allotment Management Plans would most likely lead to minor ground disturbance, although the exact location or extent is unknown. Impacts from planned new range improvements or maintenance and replacement of existing improvements would result in additional short-term and minor ground disturbance. These activities would have minor, beneficial effects on range.

The past wildland fires have burned vegetation, temporarily removing available forage. These areas within the cumulative assessment area did not experience severe burns and are recovering or have recovered and will be available for future grazing. Huachuca FireScape actions may result in a temporary loss of grazing capacity, but would likely improve range conditions in the long term.

As the Hermosa Drilling Project will disturb 13.90 acres and remove them from grazing for at least two years, there is a minor effect on available forage until reclamation is complete. However, the area impacted is relatively small compared to the surrounding available rangeland.

Direct and indirect effects of the Hermosa Drilling Project on range are minimal and short term. The Hermosa Project includes concurrent reclamation and weed control to minimize the minor, short-term impacts to range. When combined with the other reasonably foreseeable actions, it is unlikely that there would be a reduction in the level of grazing allowed due to effects of present and reasonably foreseeable actions and the Hermosa Drilling Project because of the low number of acres disturbed in comparison to the available rangeland.

4.9 Woodlands

Impacts on woodlands from the Hermosa Drilling Project would not extend beyond the project area, therefore, the cumulative impacts analysis area for woodlands is the project area. Past, present, and reasonably foreseeable activities that may affect woodlands and that occur within the cumulative impacts analysis area include the Soldier Basin and Wildcat wildland fires and fire suppression activities, the Huachuca FireScape Project, and ongoing grazing activities.

The Wildcat and Soldier Creek fires burned woodland at low and moderate severity within the project area. While severity is a measure of soil impacts, the low severity burn areas likely did not kill many trees. The acres of woodland that burned at moderate severity likely suffered more tree mortality, but not all of the trees were killed. These areas will recover naturally over time.

The management activities authorized under the Huachuca FireScape Project would affect woodlands in the short-term, but fuels reduction projects would ultimately improve the condition of woodlands.

The Hermosa Drilling Project would have minimal effects on woodlands relative to the total acreage of woodland in the project area; removing approximately 8.52 acres compared to 5,370 acres in the project area. This impact, when added to the past and reasonably foreseeable actions, cumulative effects will be minor.

4.10 Soils

Impacts on soils from the Hermosa Drilling Project would not extend beyond the project area boundary; therefore, the cumulative effects analysis area for soils is the project area. Past, present, and reasonably foreseeable activities that may affect soils and that occur within the cumulative impacts analysis area include private land activities, the Soldier Basin and Wildcat wildland fires and fire suppression activities, travel management planning, the Huachuca FireScape Project, and ongoing grazing and recreation activities. These other activities may also result in compaction and soil loss from erosion.

The Wildcat and Soldier Basin wildland fires, which occurred in 2012 and 2013, respectively, burned 544 acres of the project area. Soil impacts from the fire within the project area were minimal, as the burn severity was not high.

Reclaimed roads from the Hermosa Drilling Project, private land activities, and those identified for decommissioning under travel management planning would be temporarily impacted due to reduced productivity and an increased chance of soil loss. However, the soils would improve over time as vegetation reestablishes.

Impacts on soils from grazing and recreation have not been quantified, but are considered minor and localized. Past actions contributed to the conditions of the soils found in the project area. Effects from future grazing and recreation would not be greater than past effects.

The purpose of the Huachuca FireScape treatments would be to improve vegetation conditions. Treatments, if funded, would be conducted in a manner so as to not have long-term adverse impacts on soils, and minimize the short-term impacts. The long-term effects of the Huachuca FireScape treatments were anticipated to be beneficial by reducing the risk of severe wildland fire in the future.

Under the proposed action alternative, the total disturbance from the project is a maximum of 13.90 acres, which is 0.19 percent of the project area. Impacts would be minimized through implementation of EPMs and Forest Service Required Design Features, including reclamation of all disturbed areas. The impact on soils would add a minor level of effects of other past, present, and foreseeable projects to result in cumulative impacts.

4.11 Water

4.11.1 Surface Water

Impacts on surface water from the Hermosa Drilling Project would not extent beyond the project area boundary; therefore, the cumulative impacts analysis area for surface water is the Harshaw watershed within the project area. Past, present, and reasonably foreseeable activities that may affect surface water and that occur within the cumulative impacts analysis area include private land activities, the Soldier Basin and Wildcat wildland fires and fire suppression activities, the Huachuca FireScape Project, and ongoing grazing and recreation activities.

Stormwater runoff following the wildland fires may have caused temporary stream sedimentation, however these effects are no longer occurring. Measures to avoid water impacts from the Huachuca FireScape Project, if implemented, would avoid long-term surface water quality problems. None of these activities have or will have impacts on surface water availability.

Decommissioning roads under travel management planning would be implemented with erosion and sediment controls to avoid adverse effects on water quality and could improve surface water quality if the two roads identified are currently contributing sediment to surface water.

Ongoing grazing and recreation and private land activities have had impacts on water quality in the past, but additional effects are not expected because use is not anticipated to increase. Much of the surface water found in the project area was developed to supply stock water.

No reasonably foreseeable action in the cumulative impacts analysis area would add additional effects. Therefore, the cumulative effects of Hermosa Drilling Project on surface water quantity are the same as the direct and indirect effects.

4.11.2 Groundwater

The cumulative effects analysis area for groundwater is the Cienega Creek Basin (see **Figure 9**). Activities within the Cienega Creek watershed that may affect groundwater include private land activities, present community water use and irrigation, the proposed Rosemont Mine, and mineral exploration activities.

For ongoing groundwater use for communities and irrigation, an overall annual average of 1,250 acre-feet was pumped from the Cienega Creek Basin between 2001 and 2006 (ADWR, 2009a). The

annual pumping value included activities conducted during those years, for residential (including those within the project area), agricultural, and industrial uses (including past drilling on private lands). In 2005, ADWR cited 600 acre-feet per year for municipal water sources, less than 300 acre-feet/year for industrial use, and 500 acre-feet per year for agricultural use for the cultural water demand in the Cienega Creek Basin (ADEQ, 2005). The cultural water demand includes tribal, municipal, agricultural, and industrial uses.

The groundwater usage is roughly equal to recharge for the 606-square mile Cienega Creek groundwater basin (ADEQ, 2012b). The total amount of recoverable groundwater in storage is estimated to be 5.1 million acre-feet (ADEQ, 2012b).

The community water systems in the Cienega Creek Basin include the following: Casa Arroyo Association Incorporated, Empirita Water System, Patagonia Water Department, Red Rock Acres Home Owners Association, Rolling Wheels Mobile Home Owners, Sonoita Valley Water Company, Sonoita Water Utility, and Southern Water Company (ADWR, 2009a). Data from the ADWR water report from 2008, showed the total annual water demand from the above community water systems was 169 acre-feet. This value included water pumped from wells or diverted from streams and did not include effluent reuse (ADWR, 2009a). The annual gallons per capita per day for the water systems were 749 gallons per capita per day (ADWR, 2009a). The gallons per capita per day were calculated by dividing the annual demand (in gallons) by 365 and by the population served by the system. All of the community water systems, combined, within the Cienega Creek Basin used approximately 169 acre-feet per year (ADWR, 2009a).

The Hermosa Drilling Project would use approximately 10.82 acre-feet total during the six-month to two-year project timeframe. In comparison to the overall annual average use recorded by ADWR of 1,250 acre feet for the Cienega Creek Basin (ADWR, 2009a), the project use is 0.87 percent of the overall Cienega Creek Basin. The total use for the project is considered a temporary activity and when compared to the residential, agricultural, and industrial uses presents a minor use of the overall groundwater contained within the Cienega Creek Basin.

The Rosemont Mine Final Environmental Impact Statement (USFS, 2013e) presented a hydrologic analysis of the proposed activities predicted a five mile radius groundwater drawdown cone occurring during mining operations from open pit dewatering. This drawdown cone does not extend to the Hermosa project area. The Rosemont Mine Final EIS predicted that pit lake formation would occur approximately 20 years after mining operations cease. The timeframe of AMI's exploration project is proposed for up to a two-year period. Therefore, the potential combined activities between Rosemont and AMI would be in the early development of the Rosemont mine, and early dewatering phase of activities, which do not extend to the Hermosa project area. The Hermosa Drilling Project impacts combined with the predicted drawdown cone associated with Rosemont's mining activities are not anticipated to have a cumulative impact because they would not occur at the same time or place.

Rosemont Copper Mine is located along the central western edge of the Cienega Creek Basin approximately 25 miles northwest of the project area. According to the Final EIS, modeling did not predict any impacts on the Cienega Creek Basin groundwater during the period when Hermosa would be operating.

The amount of groundwater usage from other mineral exploration projects in the cumulative impacts analysis area (Sunnyside, Dice #8, Javelina, CH, and Moore and Moore#4) is unknown. However, these projects are all smaller in scale and shorter in duration than the Hermosa Drilling Project and

therefore impacts on groundwater are anticipated to be much less than Hermosa. These mineral exploration projects are anticipated to contribute localized and short term groundwater impacts to the Cienega Creek Basin.

The estimated amount of groundwater to be used for the Hermosa Drilling Project (10.82 acre-feet) is considered minor (0.87 percent of the total used annually) when compared to other authorized uses within the Cienega Creek Basin, as outlined above.

4.12 Visual Resources

Past, present, and reasonably foreseeable activities that may affect visual resources and occur within the cumulative impacts analysis area include private land activities, the Soldier Basin and Wildcat wildland fires and fire suppression activities, the Huachuca FireScape Project, travel management planning, and the Sunnyside Exploration Project.

Effects on visual resources from past and present private land activities, grazing, and recreational use contributed to the existing visual resource condition. The wildland fires that have occurred in the cumulative analysis area did have an impact on visual resources, but the burned areas are returning to previous conditions (Section 3.12.2). Travel management planning would have a beneficial effect in the long-term by reducing road density.

Although smaller in scale and amount of surface disturbance, the Sunnyside Exploration project is located in the same general area (5 miles south of Patagonia) as the Hermosa Drilling Project, and there would be minor cumulative impacts to visual resources for up to 1 year if the timing of these projects overlaps. However, both projects would result in a relatively small amount of visible disturbance, and disturbed areas would be reclaimed.

Implementation of Huachuca FireScape Project activities would provide long-term benefits to scenery by improving forest health and reducing risks of catastrophic wildfire. The Huachuca FireScape project included an amendment to the Forest Plan because retention and partial retention VQOs could not be met and were temporarily changed to modification. The analysis indicated that within three years of treatment, the original VQOs will be met.

Because past, present, and future actions combined with the proposed action would not substantially alter scenic resources (and some would provide benefits), no adverse, long-term cumulative effects from the Hermosa Drilling Project are expected.

4.13 Transportation, Traffic, and Access

The assessment area for cumulative effects on transportation, traffic, and access is the project area and the route to Patagonia (NFS Road 49 and NFS Road 58, Harshaw Road, Taylor Avenue, to SR 82). Past, present, and reasonably foreseeable activities that may affect transportation, traffic, and access and that occur within the cumulative impacts analysis area include travel management planning, Rosemont Mine, proposed mineral exploration projects, and the ongoing grazing and recreation activities.

The overall effect on transportation and access proposed in travel management planning would be to slightly reduce public access in this area. It is likely that the Hermosa Drilling Project would be complete before a decision on the travel management plan would be completely implemented and before roads are decommissioned. Additionally, effects are uncertain as it is unknown at this time what decision will result from travel management planning.

Rosemont Mine would increase traffic in Patagonia, which is within the cumulative impacts analysis area for the Hermosa Drilling Project. The Rosemont Mine EIS predicted overall increases of traffic (not specific to Patagonia) of two additional bus trips per day (USFS, 2013e) originating south of the Rosemont Mine.

Proposed mineral explorations projects would contribute use to some of the same main roads that would be used by Hermosa. These projects are smaller in scale and shorter in duration than Hermosa and effects would be similar, but reduced from those anticipated from the Hermosa Drilling Project.

Past and present grazing and recreation activities use existing roads and contribute to traffic. These ongoing activities are not expected to increase and will not contribute additional effects in the future. Impacts from the Hermosa Drilling Project would temporarily cause an increase in traffic, resulting in a minor effect on transportation and access. However, the effects would be short term and localized. There could be additive cumulative impacts on transportation, traffic, and access from the proposed action and future traffic, but the effects are expected to be minor.

4.14 Public Safety

The Hermosa Drilling Project is not expected to pose a hazard to the public or result in hazardous materials entering the environment; therefore, there would be no cumulative impacts on public safety or hazardous materials.

4.15 Recreation

Impacts on recreation and the designated ROS from the Hermosa Drilling Project would not extend beyond the project area boundary; therefore, the cumulative impacts analysis area for recreation is the project area. Past, present, and reasonably foreseeable activities that may affect recreation and occur within the cumulative impacts analysis area include the Soldier Basin and Wildcat wildland fires and fire suppression activities, the Huachuca FireScape Project, travel management planning, and ongoing grazing activities.

Soldier Basin and Wildcat wildland fire direct effects on recreation are no longer occurring. Implementation of Huachuca FireScape activities would provide long-term benefits to recreation settings by improving forest health and reducing risks of catastrophic wildfire. Therefore, this activity would have no effect on ROS.

The overall effect on recreation that would likely occur from travel management planning would be to slightly reduce public access in this area, which would also meet the Semi-Primitive Motorized ROS in the interior of the project area. The Hermosa Drilling Project would reduce access and the attractiveness of the area for recreational opportunities in the short-term. However, it is likely that the Hermosa Drilling Project would be complete before a decision on the travel management plan is made and roads are decommissioned. Additionally, effects are uncertain, as it is unknown at this time what decision will result from travel management planning.

Ongoing grazing would have the same effect as in the past and would not contribute additional cumulative effects.

The effects of the Hermosa Drilling Project, when added to past, present, and reasonably foreseeable future actions, would have temporary effects that may be inconsistent with the Semi-Primitive Motorized ROS in a portion of the project area while activities occur, and long-term beneficial effects by removing unnecessary or unapproved roads.

Chapter 5

Consultations and Coordination

5.1 List of Preparers

5.1.1 Forest Service Authors and Reviewers

Mark Ruggiero, Responsible Official.

Margie DeRose, Project Manager.

Eli Curiel, Public Safety/Hazardous Materials.

Walter Keyes, Transportation.

John Kraft, Wildlife and Vegetation, Including Threatened and Endangered Species.

James Heitholt, Grazing and Vegetation.

Debby Kriegel, Visual Resources, Recreation.

Bill Gillespie, Cultural Resources, Heritage/Tribal.

David Mehalic, Cultural Resources, Heritage/Tribal.

Tami Emmett, Lands.

Michele Girard, Watershed and Air Resources.

Salek Shafiqullah, Soil and Water Resources.

Gregory Olsen, Soil and Water Resources.

Sharon Biedenbender, Invasive Plants.

Robert Walter, Recreation.

Duane Bennett, Special Uses.

Joel Chandler, Noise Resources.

Andrea Campbell, NEPA Review.

Rachael Hohl, NEPA Review.

Marc Stamer, Special Status Species.

5.1.2 Tetra Tech, Inc. 3rd Party EA Preparer Roles and Responsibilities

Cameo Flood, Project Manager/NEPA Specialist - air, noise, vegetation, heritage/tribal, range, woodland, transportation, public safety, recreation.

Kim Hould, Assistant Project Manager/Biologist/GIS - biological assessment, biological evaluation, Management Indicator Species, special status species.

Wendy Reith, Biologist - biological assessment, biological evaluation.

Michele Weidner, Vegetation Ecologist - invasive plants, biological evaluation.

Stephanie Hallinan, Geologist - soils, surface and groundwater.

Jill Reid, Biologist - biological assessment, biological evaluation.

Patty McGrath, Senior NEPA review.

5.2 Persons, Groups, and Agencies Consulted

5.2.1 Coronado National Forest Mining NEPA Mailing List

The original project mailing list was taken from AMI's previously proposed Hardshell project. It was updated in 2013 and continuously with public meeting participants, interested parties, scoping commenters, stakeholders, tribes, and state and federal agencies, tribes. There are 506 contacts on the list. Of these, there are 421 email addresses, and 202 physical addresses.

5.2.1.1 Agencies

Arizona Department of Water Resources

US Customs and Border Protection

Arizona Game and Fish Department

US Department of Environmental Quality

Arizona State Parks

US Fish and Wildlife Service

US Bureau of Reclamation

5.2.1.2 Associations

Sky Island Alliance

Arizona Trail Association

Friends of Sonoita Creek

Patagonia Area Resource Alliance

5.2.1.3 Tribes

Ak-Chin Indian Community

Salt River Pima-Maricopa Indian Community

Ft. Sill Apache Tribe

San Carlos Apache Tribe

Gila River Indian Community

Tohono O'odham Nation

The Hopi Tribe

White Mountain Apache Tribe

Mescalero Apache Tribe

Yavapai-Apache Nation

Pascua Yaqui Tribe

Pueblo of Zuni

5.2.2 Submitted Scoping Comments

Scoping was initiated August 6, 2013 with a news releases and legal notices in local newspapers, letters mailed to interested parties and email addresses. The Forest Service held an informational meeting in Patagonia on August 20, 2013. Approximately 65 people attended the meeting. Approximately 200 comment letters or emails were received.

Chapter 6

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