United States Department of the Interior

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http://www.blm.gov/nv/st/en/fo/battle_mountain_field.html

TAKE PRIDE IN AMERICA

In Reply Refer To:
N-87804
N-87838
2800 (NVB0200)

NOV 1 0 2009

Dear Reader:

The Bureau of Land Management, Tonopah Field Office (TFO) and Farr West Engineering have prepared an Environmental Assessment (EA), to analyze the impacts from a proposed Right-of-Way application for the design and construction of the Beatty Water and Sanitation District (BWSD) water treatment plant which is being funded through the American Recovery and Reinvestment Act of 2009. The purpose of the proposed action is to provide a drinking water supply for Beatty, Nevada, that meets the new EPA arsenic standard by issuance of a Right-of-Way under the authority of, and in accordance with, Section 501 of the Federal Land and Policy Management Act of 1976 (FLPMA), 43 United States Code (U.S.C. 1761).

Pursuant to the National Environmental Policy Act, (NEPA), and the Council on Environmental Quality regulations on implementing NEPA, the EA identifies, describes, and evaluates resource impacts from the proposed project.

Copies of the EA may be obtained by notifying the TFO at the letterhead address above or, from the internet address below.

http://www.blm.gov/nv/st/en/fo/battle_mountain_field/blm_information/national_environmental.html

Written comments on the EA will be accepted at the above letterhead address, until 4:30 p.m., December 4, 2009. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

If you have any questions or comments regarding this proposed action, please contact Alan Buehler, Supervisory Geologist at the above address or by calling (775) 482-7800.

Sincerely,

Alan Buehler, For

Thomas J. Seley
Field Manager

Department of the Interior
Bureau of Land Management

Environmental Assessment DOI-BLM-NV-B020-2009-0121-EA

DATE: November 2009

Beatty Water and Sanitation District Water Treatment Plant Project

ENVIRONMENTAL ASSESSMENT

File Numbers: N-87804
N-87838

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BLM

Tonopah Field Office

NATIONAL SYSTEM OF PUBLIC LANDS

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ACRONYM LIST

AARA	American Recovery and Reinvestment Act
BWSD	Beatty Water and Sanitation District
CESA	Cumulative Effects Study Area
C/F	Coagulation Filtration
EPA	Environmental Protection Agency
FLPMA	Federal Land and Policy Management Act
MCL	Maximum Contaminant Levels
MOU	Memorandum of Understanding
NDEP	Nevada Division of Environmental Protection
NDOW	Nevada Division of Wildlife
NEPA	National Environmental Protection Act
NNHP	Nevada Natural Heritage Program
NRCS	Natural Resources Conservation Service
RFFA	Reasonably Foreseeable Future Action
ROW	Right-of-Way
SR	State Route
TCP	Traditional Cultural Property
TFO	Tonopah Field Office
USFW	U.S. Fish and Wildlife Service
VRM	Visual Resource Management

1 INTRODUCTION / PURPOSE OF AND NEED FOR ACTION

1.1 Introduction

The Beatty Water and Sanitation District (BWSD) water system is located in Nye County where U.S. Highway 95 continues south into Clark County and State Route (SR) 374 junctions off into Death Valley. See Figure 1.1 below.

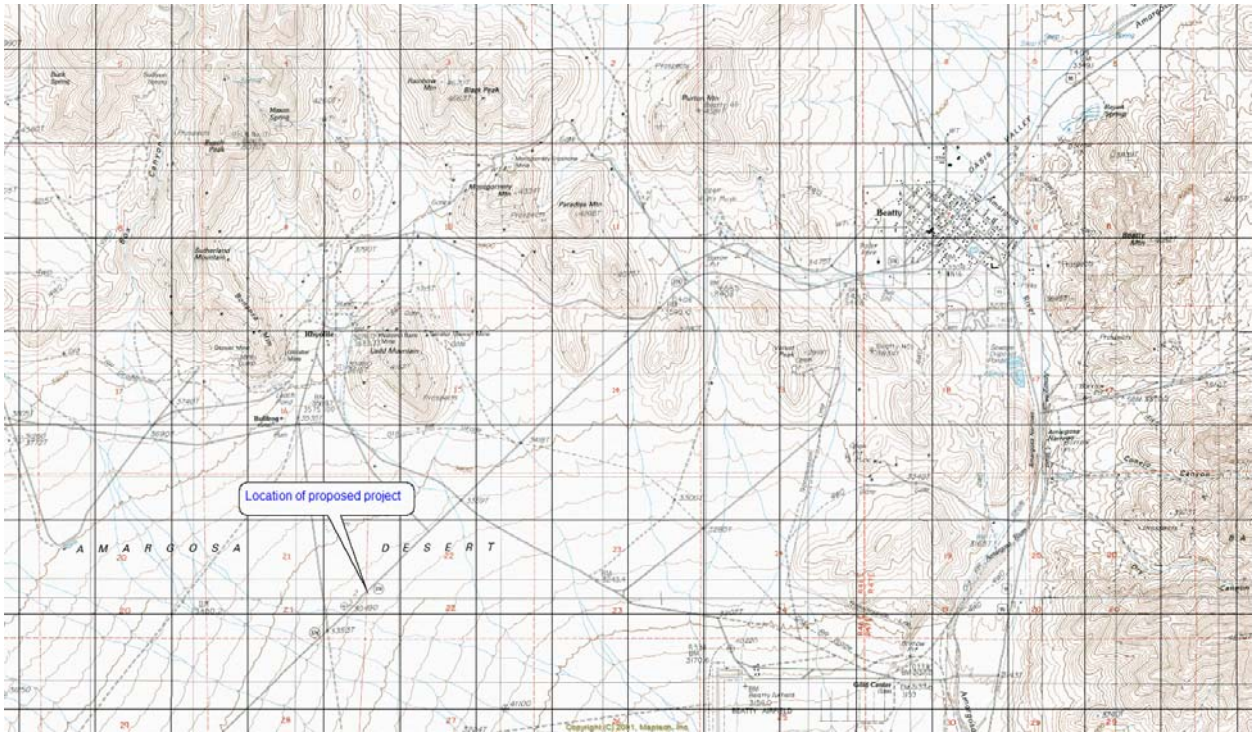


Figure 1.1 – Vicinity Map

The water system serves 444 customers, using three wells and three storage tanks. Currently, there is no water treatment necessary beyond chlorination. To comply with the primary Maximum Contaminant Levels (MCL) for arsenic and the secondary MCL for fluoride, it will be necessary to install a water treatment facility for the EW-4 well, located on land owned by the town of Beatty. The EW-4 well is the main well for the water system and contains approximately 35 ppb of arsenic (the newly established MCL by the Environmental Protection Agency (EPA) is 10 parts per billion [ppb]). A Right-of-Way (ROW) issued by the Tonopah Field Office (TFO) of the Battle Mountain District, Bureau of Land Management (BLM) would be needed for the construction of the treatment facility; as well as a land use permit (sec. 302, 2920) approval for the geotechnical study.

1.2 Purpose of and Need for Action (40 CFR 1502.13)

The design and construction of the water treatment plant are being funded through the American Recovery and Reinvestment Act of 2009 (ARRA). BWSD has selected an arsenic mitigation solution that is the most economical and simple to implement and manage. The purpose of the

proposed action is to provide a drinking water supply for Beatty, Nevada, that meets the new MCLs for arsenic established by the EPA (below 10 ppb) by issuance of a Right-of-Way under the authority of, and in accordance with, Section 501 of the Federal Land and Policy Management Act of 1976 (FLPMA), 43 United States Code (U.S.C. 1761).

The need for the proposed action is to have the Tonopah Field Office issue: 1) a land use 2920 permit for geotechnical studies to complete final engineering design for the construction of a water treatment plant and appurtenant facilities; and 2) a new ROW for construction of a water treatment plant with appurtenant facilities that would enable the BWSD to meet the requirements for MCL established by the EPA for arsenic.

BWSD is required to comply with the new arsenic rule on or before January 23, 2011 as is stated in their recent exemption extension from the Nevada Department of Environmental Protection (NDEP). According to recent and historical water quality analysis, the system is out of compliance for arsenic. The current MCL for arsenic, effective as of January 23, 2006, is now 10 ppb, down from the previous MCL of 50 ppb. Historic arsenic levels in the EW-4 well located within the service area indicates that as long as the EW-4 well is in use the water system would be out of compliance.

Although arsenic is found at levels exceeding the MCLs in the EW-4 well, the well cannot be abandoned due to the fact that it has the highest production rate in the system and typically accounts for approximately 55% or more of the total water utilized within the water system.

Various options for mitigation are available for arsenic and all mitigation would be for health purposes as required by the State and Federal EPA.

1.3 Land Use Conformance Statement

The Proposed Action is in conformance with the Tonopah Resource Management Plan (RMP) and the Record of Decision (ROD) approved on October 2, 1997 (Record of Decision, Lands and Rights-of-Way page 18, and page A-47, Appendix 14 of the RMP). The Tonopah RMP and ROD is the Tonopah Field Office's planning document required by the Federal Land Policy and Management Act of 1976, as amended. A copy of the RMP is available for review at the BLM Tonopah Field Office, 1553 S. Main Street, Tonopah, NV.

1.4 Relationship to Other Statues, Regulations, and Plans

The Federal Land Policy and Management Act of 1976 (FLPMA), (43 U.S.C. 1761), was passed to authorize BLM's management of public lands. The applicant requested a right-of-way under the authority of FLPMA. The subject property is also governed under:

- FLPMA Section 501(a)(1) gives the Bureau of Land Management the authority to grant, issue or renew rights-of-way over, upon, under, or through public lands for:

  "Reservoirs, canals, ditches, flumes laterals, pipes, pipelines, tunnels, and other facilities and systems for the impoundment, storage, transportation, or distribution of water…."

On April 3, 1985, the Nye County Board of Commissioners adopted a county policy plan for Public lands under the Nevada Statewide Policy Plan for Public Lands authorized by Senate Bill 40. Senate Bill 40 directs the State Land Use Planning Agency to work together with local planning entities to actually prepare local plans and policy statements regarding the use of Federal lands in Nevada.

Title 43 CFR 2800 allows for issuing, amending or renewing right-of-way grants for necessary transportation or other systems or facilities which are in the public interest and which require rights-of-way over, upon, under or through public lands, including but not limited to:

(1) Reservoirs, canals, ditches, flumes, laterals, pipes, pipelines, tunnels and other facilities and systems for the impoundment, storage, transportation or distribution of water; and

(2) 43 CFR 2800.0-3 is the authority for issuing regulations providing for the use, occupancy, and development of the public lands through permits, easements, and rights-of-way.

Relationships to other statutes, regulations, and plans are:

- Archaeological Resources Protection Act of 1979, 16 U.S.C. 470aa to 47011
- National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et. seq.
- National Environmental Policy Act of 1969, 42 U.S.C. 4321 et. seq.
- Clean Air Act of 1970, as amended, 42 U.S.C. 7401 et. seq.
- Clean Water Act of 1972, as amended, 33 U.S.C. 1251 et. seq.
- Council on Environmental Quality, Title 40 Code of Federal Regulations, part 1500

All waters of the State belong to the public and may be appropriated for beneficial use pursuant to the provisions of Chapters 533 and 534 of the Nevada Revised Statutes. Any water used on the described lands should be provided by an established utility or under permit issued by the Nevada Division of Water Resources, State Engineer's Office.

2 THE PROPOSED ACTION AND ALTERNATIVES

2.1 Location of the Proposed Action

The BLM proposes to issue a right-of-way for the area described below and shown in Figure 1.2:

Mount Diablo Meridian, Nevada
T. 12 S., R. 46 E.,
Sec. 22, lots 9 and 10.

Containing 20.85 acres more or less.

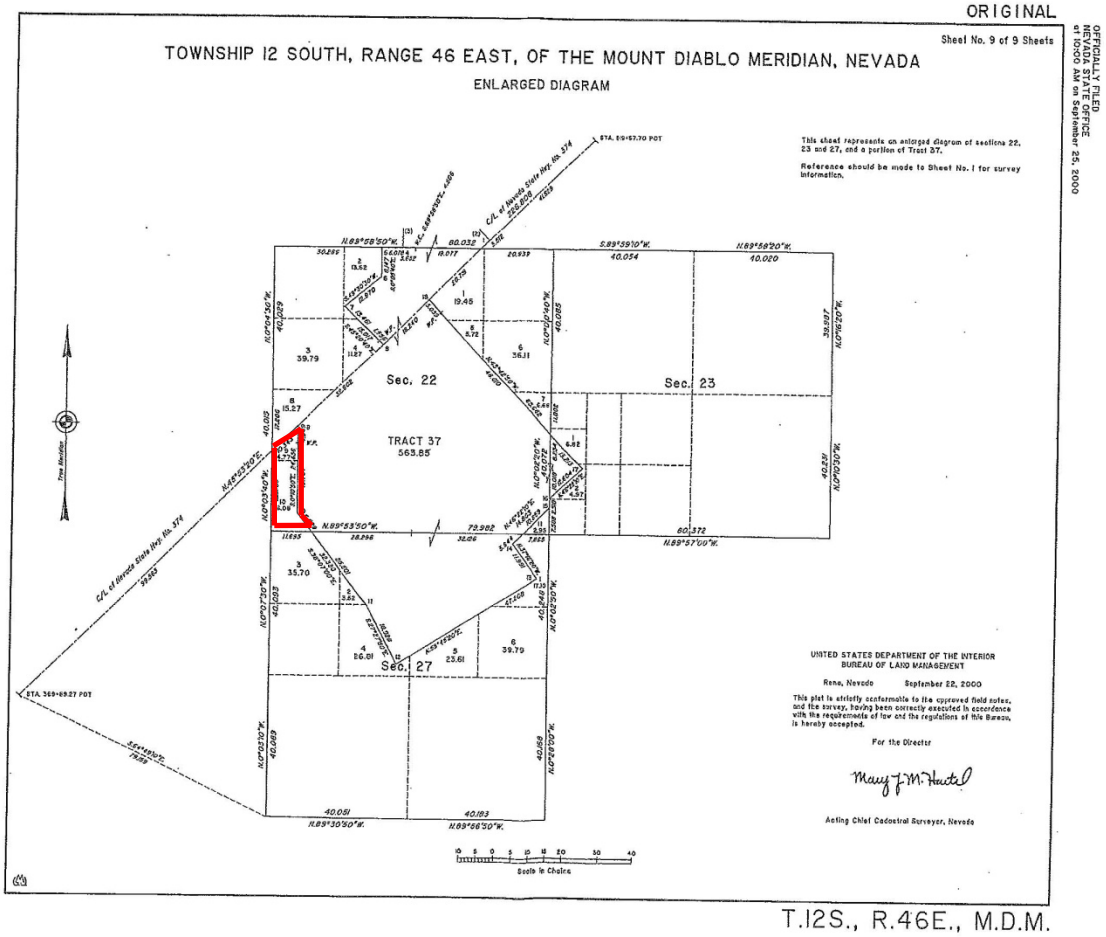


Figure 2.1 – Total proposed right-of-way boundary (red)

The location of the proposed treatment plant would be at the booster pump site within lots 9 and 10 located in Section 22 as shown in Figure 1.3.

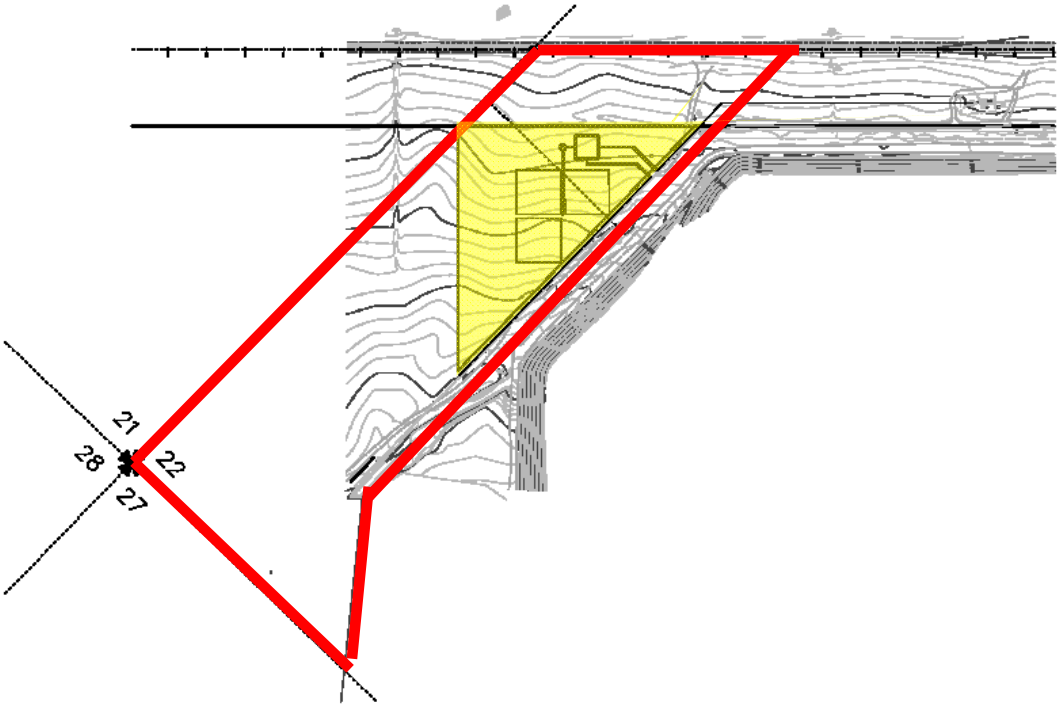


Figure 2.2 – Proposed construction area (yellow) with estimated total boundary (red)

2.2 Description of Proposed Action and Alternatives (40 CFR 1502.12)

2.2.1 Proposed Action

The proposed action consists of two phases:

- Phase I of the Proposed Action consists of an approval from the TFO for a geotechnical study. The study is needed in order to ascertain the soil properties, percolation rates and other engineering needs to design the proposed water treatment plant, septic tank leach field for the building, and appurtenant water infiltration/evaporation basins;

- Phase II of the Proposed Action would consist of the issuance of a ROW under Title 43 CFR 2800 regulations by the TFO to the BWSD for construction of the proposed water treatment facility and all appurtenant facilities, including one or more evaporation basins; leach fields; power lines; roadways; and appropriate pipelines to run the facility.

- Total disturbance for both Phases is estimated to be eight and one-half (8.5) acres.

  Access to the proposed action would be from SR 374 (NVCC 020258) and from either the access road authorized by the BWSD's right-of-way for a water tank and pump station (N-60568) or Valley Electric Association's power line right-of-way and access road (N-74034).

Phase I of the Proposed Action

Farr West Engineering of Reno, Nevada is the BWSD's engineering consultants that intend to conduct the geotechnical studies and design the proposed water treatment facilities.

The geotechnical studies would consist of the following:

- Construct no more than four (4) and no fewer than two (2) test pits; not to exceed 10Wx15Lx13D feet; all depending on the soils encountered during the pits' construction.

  The test pits are required to obtain the percolation rate at that depth. The percolation rate would be used to verify the size of the infiltration/evaporation ponds as well as the design of the necessary septic tank leach field.

  Potable water would be used to conduct the percolation tests. All of the test pits would be filled in upon completion of the tests; and re-contouring of the pits would occur so as to match the existing ground elevations of the surrounding areas and to prevent the ponding of water.

  The percolation test pit would remain open for the 24-hour test period. Tortoise fencing around the test pit would be required per the U.S. Fish and Wildlife Service's (Service) Biological Assessment. The tortoise netting would consist of orange "construction" netting approximately six (6) feet high; of which two feet would be buried to prevent tortoises from burrowing into the pit during the test cycle.

  The fence would be placed approximately 20 feet beyond the perimeter of the pit to warn and exclude pedestrians and OHV users of the danger of the open test pit.

  Upon completion of the percolation tests the temporary construction fencing would be removed.

  Ultimately, construction would require a permanent fence be constructed to exclude both tortoises and humans from the new evaporation/infiltration ponds and the new facilities.

  It is likely the geotechnical studies/investigations would take only a single day to complete; though the percolation test would take a full 24 hours; as required for completing the tests per Nevada Administrative Code (NAC).

  All pits would be constructed using a back hoe.

Phase II of the Proposed Action

Phase II of the Proposed Action consists of the following:

- The BWSD has filed an application for a ROW. The ROW application proposes a water treatment plant to treat the Beatty Community's water supply to remove arsenic in order to meet current EPA safe drinking water standards.

A total of eight and one-half (8.5) acres of disturbance on BLM managed Public Lands is proposed. BWSD's proposed facility would consist of: an 6-foot high cyclone type fence, constructing a building approximately 35W x 65Lx18H feet; a septic tank leach field; appurtenant pipelines and power lines to run the plant; a 25,000 gallon backwash water holding tank (approximate dimensions = 18 ft diameter x 13 ft high), roadways; and finally, three (3) combined 25 x 25 ft evaporation/infiltration basins to de-water the sludge resulting from the treatment process. The areas around the building, holding tank and ponds will be graveled. Approximately 225 yards of gravel would be needed. The gravel will come from a source selected by the contractor.

The following description provides specific details of the actual water treatment facility and process:

Water Treatment Facility

The proposed project is to install a water treatment facility to remove arsenic. The proposed technology is coagulation/filtration (C/F). This means that the water will pass through a ferric chloride media and the arsenic will bind to the media. After the arsenic is removed, the water is then filtered through pressurized sand filters to complete the process.

Based on pilot study results, the proposed treatment facility would consist of:

1. Three pressure filters (including one redundant), each with 8-ft diameters would be installed:

    a. Design hydraulic loading rate: 5 gpm/ft2
    b. Vessel dimensions: 8-ft diameter by 84 inches in height

2. A ratio of 1.5 is assumed for design to average flow. An annual well utilization rate of 30 percent is assumed.

3. Chlorine feed facilities to feed up to 3 mg/L of free chlorine would be included.

4. A spent backwash equalization tank is provided. Spent backwash water would be treated with an onsite recovery system and recycled back to the head of the plant.

5. An industrial type building painted a VRM standard environmental color, is included to house the chemical storage and feed equipment and filters.

The proposed evaporation/infiltration ponds are currently projected (subject to re-design based on the geotechnical study/percolation results) to be 25L x 25W x a depth to be determined; but would allow a two (2) foot free board at all times; including meteoric events.

The dewatered sludge from the ponds would be cleaned out as needed or a minimum of once every eight (8) months to maintain a minimum free board of two (2) feet. Up to three (3) ponds of similar size may be constructed. The use of the ponds would be rotated periodically for cleaning.

Assuming a 3,000 gallon backwash discharge into a pond there would be approximately 8 inches of water in a 25'x25' pond. The percolation rate is estimated to be about 2 min/inch based on the type of soils in the area (this would be verified when the geotechnical investigation is completed); therefore the water that is discharged to the ponds would take an estimated 16 minutes to infiltrate after each backwash. That rate of infiltration doesn't allow for much evaporation to occur, however, the pan evaporation rate in the area is approximately 3 inches/month in the winter and over 14 inches/month in the summer. Between the infiltration and evaporation the ponds should dry out fairly quickly after each discharge of backwash water. The end result would be little or no free standing water approximately 16 minutes after a discharge from the treatment plant. The estimated rate of infiltration will be verified during geotechnical testing.

Access to the ponds by humans or wildlife would be excluded by a fence. The fence would be buried up to two (2) feet below the surface so as to prohibit desert tortoises from burrowing onto the site.

BWSD would be required to report any bird or wildlife mortality to the Nevada Division of Wildlife (NDOW), the Service (for desert tortoises or migratory bird fatalities), and the TFO.

It has been determined that the optimum location for the water treatment facility is near the booster station. The reasons for this include accessibility for deliveries and rapid emergency response times by BWSD staff.

Monitoring reports required by NDEP Bureau of Water Pollution Control would be courtesy copied to the TFO.

The NDEP Bureau of Water Pollution Control monitoring requires BWSD boring a ten (10) foot bore hole on a semi-annual basis in the bottoms of the evaporation/infiltration ponds. These bore holes would be properly backfilled and compacted so as to not provide a preferential pathway into the soil.

2.2.2 Alternatives to the Proposed Action (40 CFR 1502.14)

2.2.2.1 No Action Alternative

Selection of the No Action Alternative would deny the applicant permission to construct the proposed water treatment facility on public land at its current site and would require use of lower producing wells that would not provide adequate water for current demand. A new location would need to be found for construction of the water treatment facility. In the absence of the treatment facility, water supplied to the Town of Beatty would continue to exceed the Federally mandated MCL for arsenic. Currently there are no predetermined penalties for non-compliance with the arsenic rule. However, funding currently provided under the American Recovery and Reinvestment Act of 2009 (ARRA) would no longer be available.

2.2.2.2 Alternatives considered, but not analyzed in detail

The following is a brief discussion of various water treatment alternatives that were considered by Farr West Engineering and BWSD before submitting their preferred alternative, the coagulation/filtration (C/F) system.

Non-Treatment and Treatment Alternatives

A review of historical arsenic levels for the BWSD production wells to determine if arsenic levels are increasing, decreasing or remaining constant was conducted.

Arsenic mitigation may be adversely affected depending upon how much the arsenic levels are fluctuating. The State provided Farr West Engineering and BDSW with historical water quality data for BWSD from the EPA's Safe Drinking Water Information System (SDWIS) database. More detailed information may be found in Appendix A.

The District typically monitors arsenic concentrations in the blended source. The arsenic concentration in the blended source fluctuates continually which is to be expected as the use of each of the wells varies from month to month. Prior to the EPA's new arsenic rule, BWSD was in compliance with the existing EPA standards; as long as the District's water supply met the 0.050 mg/L MCL. Due to infrequent monitoring and/or insufficient historical data for the District's other sources of supply, it is not possible to determine whether arsenic concentrations fluctuate significantly at each source.

The arsenic concentration at the blended source is largely dependent on the percentage of water that is provided by the EW-4 well.

Various factors considered by Farr West Engineering to develop their recommendation to BWSD for their use of the C/F system, included:

- Costs;
- Water Chemistry;
- The amount of arsenic over time;
- Generation and disposal of potential hazardous waste materials created by other treatment methods.

The following non-treatment and treatment options were considered and eventually ruled out as an option or recommendation by Farr West Engineering to the BWSD:

Non-Treatment Alternatives:

- Abandonment: Abandonment was not considered since the EW-4 well supplies 55% or more of the Town's water supply;
- Seasonal Use: Seasonal use requires that BWSD switch a high arsenic source from full-time production to seasonal or peaking use only. When reducing production from the

EW-4 well to meet seasonal demands AND reduce arsenic levels to meet the new MCLs, the remaining production wells could not meet the Town's water supply demands;

- Blending: Blending was not considered because the EW-4 well has the highest arsenic concentrations and also supplies 55%+ of the Town's water supply; the other primary wells could not make up the production of EW-4.

Treatment Alternatives:

Treatment alternatives are those that involve a chemical or mechanical means for removing arsenic in drinking water. The following types of treatment alternatives were considered by Farr West Engineering for possible recommendation to the BWSD. They were dropped from consideration because of high capital investment costs and high operation and maintenance costs.

- Reverse Osmosis (RO);
- Activated Alumina (AA);
- Ion Exchange (IE);
- Iron Based Sorbents (IBS);
- Lime Softening (LS);
- Oxidation Filtration with or without pH adjustment and iron coagulant.

For a detailed description of these options and why they were ultimately not recommended to the BWSD by Farr West Engineering, is found in Appendix A:

3 AFFECTED ENVIRONMENT (40 CFR 1502.15), ENVIRONMENTAL CONSEQUENCES (40 CFR 1502.16) AND PROPOSED MITIGATION OR AVOIDANCE MEASURES

3.1 Critical Elements of the Human Environment

To comply with the National Environmental Policy Act (NEPA), the Bureau of Land Management is required to address specific elements of the environment that are subject to requirements specified in statute or regulation or by executive order (BLM 1988, BLM 1997, BLM 2008). The following table outlines the elements that must be addressed in all environmental analyses, as well as other resources deemed appropriate for evaluation by the BLM, and denotes if the Proposed Action or No Action Alternative affects those elements.

Supplemental Authority0F[1]	**Not Present**1F[2]	**Present/Not Affected**	**Present/May be Affected**2F[3]	**Rationale**
Air Quality			X	Carried forward for analysis

[1] See H-1790-1 (January 2008) Appendix 1 Supplemental Authorities to be Considered.
[2] Supplemental Authorities determined to be Not Present or Present/Not Affected need not be carried forward for analysis or discussed further in the document.
[3] Supplemental Authorities determined to be present/May be Affected *must* be carried forward for analysis in the document.

Supplemental Authority0F[1]	**Not Present**1F[2]	**Present/Not Affected**	**Present/May be Affected**2F[3]	**Rationale**
Area of Critical Environmental Concern (ACEC)	X			There are no ACEC's in the area of the proposed project.
Cultural/Historical	X			An archeological survey was performed in the proposed project area. There would be no adverse impacts to National Register Eligible sites.
Environmental Justice	X			No minority or low-income population would be affected by the proposed project.
Farmlands Prime or Unique	X			There are no prime or unique farmlands in the proposed project area.
Noxious Weeds/Invasive Non-native Species	X			There are no noxious weeds present or adjacent to the site.
Native American Religious Concerns			X	Carried forward for analysis
Floodplains	X			The area of the proposed project is in Federal Emergency Management Agency (FEMA) Zone X and is outside the 1% annual chance floodplain.
Riparian/Wetlands	X			The USFW Wetlands Mapper did not indicate wetlands in the proposed project area.
Threatened, Endangered Species.			X	Carried forward for analysis
Migratory Birds			X	Carried forward for analysis
Waste –Hazardous/ Solid	X			There would be no hazardous wastes generated. The BWSD has agreed to send copies of all quarterly monitoring reports as a courtesy copy to the BLM, Tonopah Field office. The toxicity of solid residuals is assessed by the Toxicity Characteristic Leaching Procedure (TCLP), which is a soil sample extraction method for chemical analysis. If contaminant concentrations in the TCLP leachate are in excess of those listed in the Land Disposal Restrictions of RCRA, the solid residual is classified as hazardous and must be disposed in a RCRA Subtitle C class landfill. If classified as nonhazardous, the solid residuals can be sent to municipal solid waste landfills.
Water Quality			X	The intent of the project is to improve drinking water quality at the point of use by removing arsenic.
Wild & Scenic Rivers	X			There are no wild & scenic rivers in the Tonopah Filed Office's jurisdiction.

Supplemental Authority0F[1]	**Not Present**1F[2]	**Present/Not Affected**	**Present/May be Affected**2F[3]	**Rationale**
Wilderness	X			There is no designated wilderness or wilderness study areas located within the project area.
Forests and Rangelands (HFRA only)	X			There are no forests or healthy rangelands identified in the project area that meet the HFRA criteria.
Human Health and Safety.			X	Carried forward for analysis

Other resources of the human environment that have been considered for this environmental assessment (EA) are listed in the table below. Elements that may be affected are further described in the EA. Rationale for those elements that would not substantially or adversely be affected by the proposed action and alternative is listed in the table below.

Other Resources	**Not Present**3F[4]	**Present/ Not Affected**	**Present/ May be Affected**	**Rationale**
Grazing Management	X			Not present.
Land Use Authorization			X	Carried forward for analysis
Minerals		X		Mineral exploration has already taken place near the proposed project area. There are no known mineral resources within the proposed project area.
Paleontological Resources	X			There are no known paleontological resources in the proposed project area.
Recreation	X			Access to established recreation areas would not be impacted.
Soils			X	Carried forward for analysis
Special Status Species	X			There are no known SSS present in the proposed project area.
Vegetation			X	Carried forward for analysis
Visual Resources			X	Carried forward for analysis
Wild Horses and Burros		X		Although within the Bullfrog Herd Management Area, the proposed project area is heavily disturbed by other ROW actions and is not suitable for grazing. Wild burros have not been found within the vicinity of the project area.
Wildlife			X	Carried forward for analysis
Socio-Economic Values			X	Carried forward for analysis

[4] Other Resources determined to be Not Present or Present/Not Affected need not be carried forward for analysis or discussed further in the document based on the rational provided.

3.2 Air Quality

Affected Environment

Ambient air quality and the emission of air pollutants are regulated under both Federal and State of Nevada laws and regulations. The Bureau of Air Pollution Control (BAPC) issues permits for emission units, surface area disturbance permits, fossil-fuel fired steam electric plants, and emissions auditing. The BAPC is responsible for permit and enforcement activities throughout the State of Nevada.

Air quality in the project area is governed by pollutant emissions and meteorological conditions. Wind speeds, mixing heights, and stability all affect the circulation and dilution of emissions in the area. The proposed action is located within an air basin which is currently unclassified for all pollutants having an air quality standard (40 CFR 81.329).

Current emissions within the project area include vehicle combustion emissions, fugitive dust from travel on unimproved roads, industrial and commercial activities, and wildland fires.

Environmental Consequences of the Proposed Action

The estimated amount of soil that would be disturbed during the construction of the Beatty water treatment plant is approximately 8.5 acres. Fugitive dust during construction would be controlled by watering of the area as needed. It is anticipated the site would be graveled upon completion of construction.

Activities associated with the water treatment plant that would affect air quality are expected to be minimal. Post-construction O&M activities in and around the completed plant would include an occasional maintenance visit to the plant by BWSD personnel.

Environmental Consequences of the No Action Alternative

In the absence of the proposed project, there would be no changes in the air quality in the area.

3.3 Cultural/Historical

Affected Environment

Historic properties that are significant in history and culture are recognized by both the state and the federal governments as resources to be preserved and interpreted for the benefit of all citizens. They are non-renewable resources that are important to our individual and collective identity, and they are worthy of protection, investigation, interpretation, and conservation.

All federally funded, permitted, or assisted projects in Nevada must be in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470), and its implementing regulations in (36 CFR Part 800.4). This act ensures that historic resources are identified and evaluated. The effects of a project on cultural resources can then be determined and appropriate mitigative measures implemented.

A class III cultural resource survey was performed by the Harry Reid Center for Archeological Studies (HRC) in the area where the proposed water treatment plant would be constructed. A non-eligible historic trash dump was found during the survey. There would be no effect to cultural or historical properties.

Environmental Consequences of the Proposed Action

The proposed action would require that approximately 8.5 acres at the site be disturbed. This disturbance would not affect any significant cultural or historical sites.

Environmental Consequences of the No Action Alternative

There are no environmental consequences associated with the No Action alternative.

3.4 Native American Religious Concerns

Affected Environment

In accordance with the NHPA (P.L. 89-665), NEPA (P.L. 91-190), the Federal Land Policy and Management Act (P. L.94-579), the American Indian Religious Freedom Act (P.L. 95-341), the Native American Graves Protection and Repatriation Act (P.L. 101-601), and Executive Order 13007, the BLM must provide affected tribes an opportunity to comment and consult on the proposed project. BLM must attempt to identify locations having traditional/cultural importance and reduce or possibly eliminate any negative impacts to identified traditional, cultural, spiritual sites, activities, and/or resources.

Tonopah Field Office management and staff conducted a field visit (October 8, 2009) and a meeting (October 23, 2009) with Timbisha Shoshone Tribal representatives with no significant tribal concerns/resources having been identified within or near the project area. The Timbisha Shoshone traditional territory includes the Beatty area.

Environmental Consequences of the Proposed Action

Various tribes and bands of the Western Shoshone have stated that federal projects and land actions can have widespread effects to their culture and traditional practices as they consider the landscape as sacred and as a provider. Various locations throughout the BLM Tonopah Field Office administrative area continue to host traditional/spiritual/cultural use activities. Sites and resources considered sacred or detrimental to the continuation of tribal traditions include, but are not limited to: prehistoric and historic village sites, sources of water (hot and cold springs), pine nut gathering locations, sites of ceremony and prayer, prehistoric and ethno-historic archaeological sites, burial locations, “rock art” sites, medicinal/edible plant gathering locations, areas associated with creation stories, or any other tribally designated Traditional Cultural Property (TCP).

Considering the location of the proposed activities, the limited amount of surface disturbance (minimal acreage), input from tribal representatives, and the finding of only a historic trash dump during the archaeological inventory, it has been determined by Tonopah Field Office and Tribal

cultural resource specialists that no impacts to tribal resources or traditional/cultural properties would occur.

However, during the project activities, if any surface or subsurface artifacts (stone tools, projectile points, etc…) are encountered, it must be stressed to those involved in the proposed project activities that such items are not to be collected. Cultural and Archaeological resources are protected under the Archaeological Resources Protection Act (16 U.S.C 470ii) and the Federal Land Management Policy Act (43 U.S.C. 1701).

Also, though the possibility of disturbing Native American gravesites within most project areas is extremely low, inadvertent discovery procedures must be noted. Under the Native American Graves Protection and Repatriation Act, section (3)(d)(1), it states that the discovering individual must notify the land manager in writing of such a discovery. If the discovery occurs in connection with an authorized use, the activity, which caused the discovery, is to cease and the materials are to be protected until the land manager can respond to the situation.

3.5 Special Status Species

Special status species are those species for which state or Federal agencies afford an additional level of protection by law, regulation, or policy. For the purpose of this EA, special status species meet one or more of the following criteria:

- Listed as rare, threatened, or endangered by a state or Federal agency;
- Proposed to be listed as rare, threatened, or endangered by a state or federal agency;
- NDOW protected species, species of special concern, or a harvest species;
- Tracked by the Nevada Natural Heritage Program (NNHP); or
- Included in the BLM Nevada Sensitive Species List.

There are no listed sensitive or special status plants within the proposed project area.

3.5.1 Threatened, Endangered Species (T&E Species)

Affected Environment

A biological survey (Appendix B) was performed in the project area by Alex L. Heindl of Desert WalkAbouts, Inc. The survey resulted in the discovery of one *probable* and one *possible* desert tortoise *Gopherus agassizii* burrow.

No other signs of the threatened or endangered species were encountered.

Environmental Consequences of the Proposed Action

Other than the probable and possible tortoise burrows discovered during the survey, there is no other evidence that the site is or has been occupied or used by tortoises. The biological report by DesertWalkabouts concludes the following:

"It does not appear that the proposed project site offers much, if any, habitat useful to desert tortoises. The nearly complete dearth of tortoise sign in the actual project area, coupled with complete absence of any tortoise sign along the outlying transects leaves considerable question as to this area's utility so far as tortoises are concerned. The two burrows I did locate and mark may indicate occasional tortoise entry and use, but this area, at best, seems to provide just marginal values to the species."

According to the biological evaluation, the project would have little, if any, environmental effect on threatened and endangered species.

Environmental Consequences of the No Action Alternative

There are no adverse consequences associated with the No Action alternative. Wildlife in the area would continue to exist as it does currently.

There are no other identified T&E species or Special Status Species observed or recorded in the proposed project area.

3.6 Migratory Birds

Affected Environment

The BLM has a Memorandum of Understanding (MOU) addressing BLM projects and the affects those projects may have on any Migratory Birds. In essence, BLM approved projects may not affect populations of migratory birds. In addition, certain mitigation measures must be required of the BLM or a proponent before construction may take place in any potential or known nesting habitat.

For the area of the BWSD proposal, monitoring/surveys of nests must occur if construction is proposed between March 1st through July 31st of each year; prior to any construction activities. If no nests of any migratory birds are found, the project construction may continue. If nests are found, the proponent and the construction company must work with the BLM to avoid destruction of any migratory bird nests or its inhabitants.

The biotic survey performed by DesertWalkabouts included the sighting of a single red-tailed hawk (*Buteo jamaicensis*) one raven (*Corvus corax*), and multiple Black-throated sparrows (*Amphispiza bilineata*). It must be noted that the survey occurred in August of 2009. If construction of the geotechnical study pits or the water treatment plant is proposed from March 1st until July 31st, a new survey for migratory bird nests must be completed prior to initiation of construction.

The evaporation/infiltration ponds' standing water, however limited, may be a temporary draw for migratory birds and wildlife. A recent letter issued by the Nevada Department of Wildlife (NDOW) dated November 13, 2009, addressed concerns regarding the overall risk to wildlife from the concentrations of arsenic. Based on information provided in the letter, it was concluded that the overall risk to wildlife from a toxic exposure perspective appeared to be limited. The

exposure, due to the infiltration rates, infrequent use of the ponds after start-up combined with the evaporation rates of the area, would likely limit exposure to wildlife and migratory birds.

Monitoring for avian (migratory birds) and wildlife mortalities would be required of the BWSD for up to one year after plant start-up and the first backwash. This monitoring would ensure the effluent does not harm migratory bird life or other wildlife. Any mortality would be reported to the NDOW; the Service (for migratory bird mortalities and Special Status Species mortalities), and the TFO.

Environmental Consequences of the Proposed Action

The BWSD and its construction company would be required to follow the above prescriptive criteria prior to and during construction. Therefore, there would be no impact to migratory bird populations.

Environmental Consequences of the No Action Alternative

There are no adverse consequences associated with the No Action alternative. Existing migratory bird activity in the area, if any, would be unaffected. However a different project location would need to be found for the construction of the proposed water treatment facility.

3.7 Water Quality

Affected Environment

The current water quality of the EW-4 well that supplies 55+% of the BWSD's community water currently exceed the EPA's MCLs by several ppb. The current average concentration of arsenic in the EW-4 well is approximately 35 ppb and has ranged from 32 to 37 ppb historically. The well is nearly 1,500 feet deep and the static water level is approximately 615 feet below the surface.

Environmental Consequences

The proposed action would improve the drinking water quality from the EW-4 well to less than the 10 ppb of arsenic; bringing the town of Beatty's water supply into compliance with EPA regulations.

Meeting the EPA's regulatory requirements would improve the drinking water quality for the town's water supply; and likely protect the health of the town's water users by reducing arsenic levels. The Nevada Division of water pollution control will grant BWSD a Groundwater Discharge Permit for unlined sludge dewatering ponds. The Permit requires that monitoring of the discharge take place on an annual basis and a re-evaluation of the Permit will be conducted in 5 years. Due to the depth of the groundwater in the area it has be determined that there will be no impact to the ground water (approximately 600 feet deep) from the infiltration/evaporation ponds.

Environmental Consequences of the No Action Alternative

Failure to implement the proposed action would prevent the BWSD from meeting the new arsenic MCLs established by the EPA.

3.8 Human Health and Safety

Affected Environment

The project would consist of a 60w x 60 l x 13h building/treatment facility, a 25,000 gallon backwash water holding tank, and three 25 x 25 ft combination evaporation/infiltration ponds.

The facility would be located adjacent to SR 374, approximately 3.5 miles southwest of Beatty. The building would house chemical storage and feed equipment and filters.

Environmental Consequences of the Proposed Action

The purpose of the project is to improve human health by removing arsenic in excess of the MCL from the drinking water. The facility would be fenced and secured in order to prevent access by unauthorized personnel. Improved drinking water quality, i.e. the reduction of the amount of arsenic in the Beatty's water supply would be a positive impact on human health and safety.

No negative impacts to human health and/or safety are anticipated.

Environmental Consequences of the No Action Alternative

There are possible adverse consequences associated with the No Action alternative.

3.9 Land Use Authorizations

Affected Environment

Entities with an interest in the location or general vicinity of the proposed project include the BLM, Nevada Department of Transportation, Barrick Gold of North America, Inc., Valley Electric and BWSD. Additionally, BWSD currently holds a right-of-way for the maintenance of existing facilities in the area. The table below lists ROW holders adjacent or within the proposed project area which have been notified by certified letter on September 23, 2009 of the proposed project (43 CFR 2807.14).

Right-of-Way Holder	Case File	Type	Width from centerline
Beatty Water and Sanitation District	N-60568	Water Well and Pipeline, access road	50 ft.
Valley Electric Association	N-74034	25 kV Power line and access road	20 ft.

Barrick Bullfrog	N-77252	Water Facility – pipeline	20 ft
Nevada Dept of Transportation	NVCC 020258	State Route 374	400 ft

Environmental Consequences of the Proposed Action

The proposed action includes securing a right-of-way for a water treatment facility. Currently the property to be used for the facility is not being occupied for purposes other than possibly wildlife habitat and forage. No consequences regarding authorization are anticipated. Proposed power lines, pipelines and other potential access roadways, would require a separate use authorization.

Environmental Consequences of the No Action Alternative

There are no adverse consequences associated with the No Action alternative. In the absence of the project, no authorization(s) would be needed.

3.10 Soils

Affected Environment`

A Natural Resources Conservation Service (NRCS) soil resource report for the proposed project area is included in Appendix D. According to the report, the soil in the project area includes a complex (two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps) consisting of yermo, skelon, and pinez soils. The Yermo-Skelon-Pinez complex is not considered to be prime farmland. The specific details of the different soil types are included in the NRCS report.

Environmental Consequences of the Proposed Action

The proposed project would disturb a total of approximately 8.5 acres. The largest disturbance would be for the approximately 0.04 acres of Combination evaporation/infiltration ponds. A preliminary review indicates that local soil conditions may be ideal for infiltration. The site of the proposed action has existing human intrusion and part of the area has been disturbed. The soil order is classified as an Aridisol and erosion would be within the normal tolerance of the soil order.

Additional soil disturbances would include 3,600 ft^2 for the equipment/storage building and an approximately 2,000 ft^2 concrete platform for a 25,000 gallon tank. The balance of soil disturbance would be for finish grading of the site.

Environmental Consequences of the No Action Alternative

There are no adverse consequences associated with the No Action alternative. In the absence of the project, the existing soils would remain undisturbed and the project site would remain as it is.

3.11 Vegetation

Affected Environment

Generally speaking, Mojave Desert vegetation dominates the southern part of Nevada. Much of the Mojave is covered in creosote bush (*Larrea tridentata*), a widely distributed shrub with olive-colored foliage. Creosote bush occurs with white burrobush (*Ambrosia dumosa*) on deep, sandy soils and with shadscale (*Atriplex confertifolia*) on shallower soils.

Mojave vegetation is composed mostly desert shrubs, of short to medium height and somewhat evenly spaced.

Non-native plant species such as Red Brome (*Bromus Rubeius*) occurs on the site. It is only prevelant and prolific during favorable precipitation events. Cheatgrass may occur on the site but only during very favorable moisture conditions. It would only occur if a cheatgrass seed reserve is present. These two plants are short lived annual grasses and respond quickly to weather conditions.

The DesertWalkabouts, Inc. biological survey verified the presence of the following plants:

- Creosote bush (*Larrea tridentata*)
- Four-wing saltbush (*Atriplex canescens*)
- Spiny hopsage (*Grayia spinosa*)
- White bursage (*Ambrosia dumosa*)
- Cheese bush (*Hymenoclea salsola*)
- Cheese bush (*Hymenoclea salsola*)
- California buckwheat (*Eriogonum fasciculatum*)
- Wolfberry (*Lycium andersonii*)
- Joint-fir (*Ephedra nevadensis*)
- Coyote melon (*Cucurbita palmata*)
- Little trumpet (*Eriogonum inflatum*)
- Silver cholla (*Opuntia echinocarpa*)
- Beaver-tail cactus (*O. basilaris*)
- Indian rice grass (*Oryzopsis hymenoides*)
- Big galleta (*Pleuraphis rigida*)
- Halogeton (*Halogeton glomeratus*)
- Russian thistle (*Salsola kali*)

Environmental Consequences of the No Action Alternative

There are no adverse consequences associated with the No Action alternative. In the absence of the project, the existing plants on the proposed project site would be unaffected.

3.12 Visual Resources

Affected Environment

The proposed project area is located within the Basin and Range physiographic province. The province is characterized by numerous small, roughly parallel mountain ranges (trending north-south) separated by nearly flat desert plains, or basins. The basins are generally 4,000–5,000 feet (1,200–1,500 m) above sea level, and the mountain ranges rise 3,000–5,000 feet above the level of the basins

The Basin and Range climate is semi-arid and deserts form in the rain shadows of linear mountain ranges. The region is sparsely populated and economically dependent on mining, ranching, tourism, and manufacturing.

The VRM Classification for the proposed project falls into Class III. The level of change to the characteristic of the landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer.

Figures 3.1 through 3.4 show the northern, southern, eastern, and western views as seen from the proposed project site.

Figure 3.1 - Looking north from the project area.

Figure 3.2 – Looking south from the project area

Figure 3.3 – Looking east from the project area

Figure 3.4 – Looking west from the project area

Environmental Consequences of the Proposed Action

Elements of the proposed project that could have an effect on visual resources include the equipment/storage building, 25,000 gallon backwash water holding tank, facility fencing and other appurtenant equipment. The most prominent features would be the water holding tank and building. The holding tank would be approximately 13 ft high and the building would be 35 feet x 65 feet x approximately 18 feet high.

To meet the requirements for VRM Class III, use of the BLM Standard Environmental Color Chart would be used for painting of the building and water holding tank.

Environmental Consequences of the No Action Alternative

There are no adverse consequences associated with the No Action alternative.

3.13 Wildlife

Affected Environment

There is a wide variety of taxa that occurs presently, historically, or temporarily, within the State of Nevada. The Nevada Natural Heritage Program has developed lists of taxa that include special status (Section 3.2.1.11), migratory (Section 3.2.1.6), and threatened and endangered (3.2.1.5)

species as well as those classified as unprotected. Estimates of the number of each taxa included on the 2002 Natural Heritage lists are as follows:

- 128 Mammals
- 283 Birds
- 91 Fishes
- 54 Reptiles
- 16 Amphibians

Environmental Consequences of the Proposed Action

The proposed project would affect approximately 8.5 acres of potential wildlife habitat. However, past disturbance has trashed the area so there would be little impact.

Environmental Consequences of the No Action Alternative

There are no adverse consequences associated with the No Action alternative. In the absence of the project, any existing habitat would remain undisturbed.

3.14 Socio-Economic Values

Affected Environment

The Town of Beatty consists of approximately 440 residents and commercial users of the water supply. The local economy consists primarily of recreational based services such as restaurants; hotels; hotel/casinos; commercial and non-commercial filming, service to mining and ranching communities; RV parks; and government services, including local, state and Federal.

The primary tourist draws include: the ghost Town of Rhyolite; Death Valley National Park; the scenery and mild winter; numerous hot springs in the area; and surrounding desert countryside.

Environmental Consequences of the Proposed Action

The design and construction of the water treatment plant are being funded through the American Recovery and Reinvestment Act of 2009 (ARRA). While Beatty is fortunate to have received this ARRA funding, it is contingent upon being able to open the project to bid for general contractors by late December 2009 (a 21 day bidding period I required prior to award of the project to a general contractor. Approval of the project would see potentially two positive economic impacts to Beatty: 1) the addition of ten (10) to fifteen (15) construction workers for up to seven (7) months, and; 2) the improved drinking water quality may make it a more desirable for people to re-locate either seasonally or permanently to the Community.

The construction work force would either rent RV spaces at local RV parks or rent motel rooms for the duration of the construction period. In addition, it is likely that these 10-15 construction workers would either buy groceries or eat at the established restaurants in the community. It is likely these same construction workers would do some kind of recreational activities both after work and possibly during some of their weekends.

It is not possible to quantify the likelihood of additional seasonal or permanent people moving to Beatty solely as a result of the improved water quality. While improved drinking water quality may be one incentive, other qualities, such as climate, location, etc. would equally influence a decision to re-locate to the area.

Environmental Consequences of the No Action Alternative

There would be no economic impact from the short term construction workers.

4 CUMULATIVE EFFECTS ANALYSIS

4.1 Cumulative Impacts

For the purposes of this EA, the cumulative impacts are the sum of all past and present actions, the Proposed Action, and reasonably foreseeable future actions (RFFAs). The purpose of the cumulative analysis in the EA is to evaluate the significance of the Proposed Action and the Subsequent Land Use's contributions to cumulative impacts. A cumulative impact is defined under federal regulations as follows:

> "...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 regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

As required under the NEPA and the regulations implementing NEPA, this chapter addresses those cumulative effects on the environmental resources in the Cumulative Effects Study Areas (CESAs) which could result from the implementation of the Proposed Action and the No Action; past actions; present actions; and reasonably foreseeable future actions (RFFA). The extent of the CESA may vary with each resource, based on the geographic or biologic limits of that resource. As a result, any projects considered under the cumulative analysis may vary according to the resource being considered. In addition, the length of time for cumulative effects analysis may vary according to the duration of impacts from the Proposed Action on the particular resource.

Environmental consequences of the Proposed Action and the No Action were evaluated previously in Chapter three. Based upon the analysis of the environmental resources, the following resources would be impacted by the Proposed Action and No Action:

Air Quality	Visual Resources
Noxious Weeds/Invasive Non-Native Species	Migratory Birds
Special Status Species/Threatened/Endangered Species	Wildlife
Water Quality	Socio-Economic Values
Human Health and Safety	Land Use Authorizations
Soils	Vegetation

The above resources are considered to have the potential to be cumulatively impacted by actions within the identified CESA for that resource.

Based on the preceding analysis, the Proposed Action and No Action would not impact the following resources or they are not present and thus do not have cumulative impacts:

ACECs	Wild and Scenic Rivers
Cultural/Historical	Wilderness/WSAs
Prime Farmlands	Forests and Rangelands
Native American Religious Concerns	Grazing Management
Floodplains	Minerals
Riparian/Wetlands	Paleontological Resources
Special Status Species - Plants	Recreation
Waste-Hazardous/Solid	

4.1.1 Past Actions

Past actions by the BWSD in the project area include an existing booster station with storage tank and access roads. Other past actions adjacent to the project area but not associated with BWSD include a closed mining and milling area, evaporation pond, and SR 374.

Less permanent past actions include recreational use, wild burros and wildlife foraging, and road maintenance.

4.1.2 Present Actions, Including Proposed Actions

Present actions include the proposed project and continued use of the area for mineral exploration, wildlife, maintenance of the existing access road, and recreation.

4.1.3 Reasonably Foreseeable Future Actions (RFFA's)

Reasonably foreseeable actions include the maintenance of the proposed facility. Projected maintenance activities would include site visits at least every other day. for general maintenance. The main O&M tasks would be for the ponds. They would require periodic cleaning in order to comply with groundwater discharge permit requirements. The ponds must be cleaned at least once every 8 months. Aside from that task, very little maintenance would be required at the site.

It is likely that the proposed Right-of-Way area, approximately 20.85 acres, would be sold to the BWSD through either a direct sale under FLPMA, Section 203 and Section 209 or under the provisions of the Recreation and Public Purposes Act (R&PP) through an R&PP patent. When compatible with local government plans, Federal lands should be made available for state, local government, and private uses. This sale would provide ownership of the BWSD's investment in the water treatment plant and appurtenant facilities.

4.1.4 Evaluation of the Potential Proposed Action Cumulative Impacts and Mitigation

There are approximately 440 acres that have been previously disturbed adjacent to and in the vicinity of the proposed project. The amount of land that would be disturbed as a result of the proposed project is approximately 2% of that amount. Land on the northwest side of SR 374 has been previously disturbed by mining activity as well. Taking into account all of the land in the immediate vicinity that has been disturbed, the proposed project would affect less than 1% of that total.

Table 4.1 shows past, present, proposed, and future effects on the proposed project site. Because there has been very little construction activity on the site, most of the disturbances in the past and present relate to mining activities and occasional recreational vehicles (dirt bikes, ATVs, etc…).

Table 4.1 – Effects of Actions on Resources

Resource	Past Actions	Present Actions	Proposed Actions	Future Actions	Cumulative Effect
Air Quality	Temporary impacts resulting from ATV use, mining and current BWSD procedures	Potential for temporary impact due to recreation	Implemented mitigation measures would meet or exceed Nevada Air Quality guidelines; therefore the proposal would not contribute significantly to the cumulative impacts.	Occasional dust and vehicle emissions from vehicles entering site for O&M activities; the sale of the ROW to BWSD would continue these impacts.	No measurable change in existing environment
Noxious Weeds/Invasive Non-Native Species	Impact unknown	No Impact	Impact mitigated through construction BMPs.	No future soil disturbance planned, no impact anticipated. The sale of the ROW area to BWSD would not contribute to further soil disturbance.	Potential initial impact due to construction soil disturbance
Native American Concerns	There are no known identified impacts to Native American religious concerns in the area.	Archeological survey suggests limited or no impact	Archeological survey suggests limited or no impact. The proposed mitigation would eliminate any potential impacts to NAC or properties of potential religious significance, including grave sites.	No future soil disturbance planned, no impact anticipated. The sale of the ROW area to BWSD would not impact any NAC, grave sites or other properties of potential religious significance.	No impact anticipated

Special Status Species/Threatened/ Endangered Species	Assume impact mitigated	Potential disruption of desert tortoise habitat due to recreational and/or mining activities	Potential permanent disruption of low density Class III desert tortoise habitat	O&M activities only, no impact anticipated. The sale of the ROW area to the BWSD would require U.S. FWS consultation and potential mitigation of any impacts to desert tortoises or their habitat before the sale is complete. Up to 20.85 acres of low grade, low density Class III desert tortoise habitat may ultimately be lost.	Removal of 8.5 acres as potential desert tortoise habitat. The sale of the ROW area to BWSD could remove up to 20.85 acres of low density/Class III desert tortoise habitat.
Migratory Birds	Assume impacts from previous approved activities have been mitigated.	No impact anticipated	Impact to habitat unlikely with the required mitigation.	Upon the sale of the 20.85 acre ROW to the BWSD, the BLM would not have any control over the site. It is possible the BWSD could clear the entire site; causing a loss of migratory bird nesting habitat. It is unlikely this would affect any bird populations.	The proposed action with the mitigation implemented would not cause an incremental impact to migratory birds or their nesting habitat.
Land Use Authorization	Assume impact mitigated	Possible trespass resulting from recreational use	Land use authorization would be provided through BLM right-of-way	The future sale of the 20.85 acre ROW to the BWSD would remove 20.85 acres from the Public lands into County ownership. This was analyzed and	The proposed action would not cause any significant incremental impacts to the public Lands managed by the TFO.

				approved for disposal in the 1997 Tonopah RMP.	
Soils	Minor loss to wind and water erosion has occurred to the area from past actions.	Minor loss to wind and water erosion has occurred to the area from current actions.	Minor loss of soils would occur during construction due to wind and soil erosion; as well as some soil removal.	The sale of the 20.85 acres of the ROW to BWSD may have a small impact to soils should the Town opt to expand the water treatment plant or remove/disturb additional soils when it obtains ownership.	The proposed action would not cause significant incremental impacts to soils when the proposed mitigation is in place.
Vegetation	Assume impact mitigated	Potential impact from recreational and/or mining activity	Potential impact on common vegetation (no special status species present)	No impact	Removal of approximately 8.5 acres of native vegetation
Visual Resources	Assume impact mitigated	No impact	Potential impact from structures	No impact	Potential impact from structures
Wild Horses and Burros	Assume impact mitigated	Potential impact from recreational and/or mining activity	Potential impact to forage	No impact	Removal of 8.5 acres of potential forage
Wildlife	Assume impact mitigated	Potential impact from recreational and/or mining activity	Potential impact to forage and habitat	No impact	Removal of 8.5 acres as potential habitat and forage
Socio-economic Values	There have been 350+ water users, including businesses, residents, RV parks, and government. Beatty's economic base was based on mining, supporting the local ranching community, tourism and	The Town of Beatty consists of approximately 440 residents and commercial users of the water supply. The Town economy consists primarily of tourism based services such as restaurants; motels/hotels; casinos;	Between 10-15 construction workers would move to Beatty for construction of the water treatment plant. A positive economic impact would occur to the Town.	The sale of the 20.85 acres ROW to the BWSD would likely have a positive un-quantified economic impact on the Town.	The proposed action would not have a significant incremental impact to the socio-economic values of the Town of Beatty.

	Government.	service to mining and ranching communities; RV parks; and government services, including Local, State and Federal. The primary tourist draws include: the ghost Town of Rhyolite; Death Valley National Park; the scenery and mild winter; numerous hot springs in the area; and surrounding desert countryside.			

4.1.5 Proposed Mitigation Measures For the Proposed Action By Resource

Table 5.1 shows recommended mitigation for each of the resources present at or near the proposed project site for the proposed action.

Table 4.2 – Mitigation Measures

Resource	Mitigation Measure
Air Quality	Measures would include dust suppression methods to minimize airborne particulate matter created during construction activities. Standard construction BMPs, including watering of the construction site and access roads, would be used to control fugitive dust during the construction phases of the Project. Additionally, all construction equipment and vehicles would be kept in good operating condition in order to minimize exhaust emissions. Post construction activities for the site include re-vegetation with native species and graveling surface areas where needed to limit blowing dust impacts to SR 374.
Weeds	All weed BMPs should be used during construction. Most importantly, seed sources should be removed by washing the undercarriage in advance of vehicles entering the project site to limit seed transport. Native vegetation should be reestablished on bare ground where possible after construction. **Prior to any construction disturbance, the contractor would comply with the following BMPs.** • Identify and map all noxious and invasive weed populations present in the project area • Treat or contain any weed populations that may be impacted or disturbed by construction activity; • Flag all weed populations to be avoided; • Provide training to construction workers and equipment operators on the identification of weeds to be avoided; • Certify that all construction material sources used for supplies of sand, gravel, rock and mulch are weed-free prior to obtaining or transporting any material from them; • Obtain and use only certified weed-free straw or use fiber roll logs for sediment containment; • Wash and inspect all vehicles for weed seeds and plant parts prior to bringing them onto the job site; • Install storm water Best Management Practices to prevent erosion of the job site and the potential transport of weedy material onto or off of the job site. **During construction the contractor would:** • Minimize ground disturbance and vegetation removal as much as possible and practical; • Wash, or using an air compressor, blow clean all vehicles (including tires and undercarriage) that may have entered weed-infested areas prior to entering uninfested areas of the job site; • Restrict vehicles or other traffic that may transport weed seeds or plant material from entering the job site unless they are first washed and inspected. **After construction is complete the proponent/applicant would:** • Revegetate or otherwise prevent the establishment of weeds in all areas of the job site through a program of monitoring and post-construction weed treatment for the life of the project; • Revegetate using soil components and mulches obtained from non-weed infested sources; • Utilize seed and other plant materials that has been checked and certified as noxious weed-free and that has a weed content of 0.05 percent or less; • Revegetate using plant materials that have a high likelihood of survival; • Maintain all planted material and native vegetation located on the project site for the life of

	the project.
Native American Concerns	In the event of the discovery of human remains during construction, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains. The Nye County Coroner shall be notified and shall make a determination as to whether the remains are Native American. If the Coroner determines that the remains are not subject to his authority, he shall notify the Native American Heritage Commission. During the project activities, if any surface or subsurface artifacts (stone tools, projectile points, etc…) are encountered, it must be stressed to those involved in the proposed project activities that such items are not to be collected. Cultural and Archaeological resources are protected under the Archaeological Resources Protection Act (16 U.S.C 470ii) and the Federal Land Management Policy Act (43 U.S.C. 1701). Also, though the possibility of disturbing Native American gravesites within most project areas is extremely low, inadvertent discovery procedures must be noted. Under the Native American Graves Protection and Repatriation Act, section (3)(d)(1), it states that the discovering individual must notify the land manager in writing of such a discovery. If the discovery occurs in connection with an authorized use, the activity, which caused the discovery, is to cease and the materials are to be protected until the land manager can respond to the situation.
Special Status Species/ Threatened/ Endangered Species	The only threatened or endangered species that may inhabit the proposed project site is the desert tortoise. In the event that one is found during implementation of the project, construction would cease and the local office of the U.S. Fish and Wildlife Service (USFWS) and the Tonopah Field Office of the BLM would be notified. Construction would not continue until authorized by USFWS/BLM officials.
Migratory Birds	Although migratory birds are present in Nye County, no bird habitat was discovered during the biological survey. The survey occurred in August, 2009 after the bird nesting season for the area. A new survey would be required and avoidance of occupied nests would be required if construction of either the geotechnical study pits or the water treatrment plant is to occur between March 1st and July 31st.
Waste-Hazardous/Solid	There is no hazardous and/or solid waste at the project site therefore no mitigation is necessary. The Town of Beatty and the BWSD would be required to provide a copy of the NDWR quarterly monitoring reports to the TFO until that time the land is conveyed to Beatty.
Land Use Authorization	All necessary permits and right-of-ways would be acquired prior to construction. Stipulations would include BMPs, Notice to Proceed; and a stipulation to require an on-site third party contractor to monitor construction of the project.
Soils	Dust control mitigation would be sufficient for soil maintenance during construction. Because the local climate is arid, erosion is unlikely during construction. The BWSD commits to the best management Practices noted in the above analysis.
Vegetation	The project is expected to result in both temporary and permanent disturbance to native vegetation. Permanent disturbance would occur in the footprint of the building, evaporation ponds, and water holding tank. This disturbance would occupy approximately 5,700 square feet. Much of the remaining disturbed area would be reseeded in order to restore native plants. Re-vegetation would be implemented for plants included in the biological survey report for the area. In addition, gravel would be placed on roadways to limit blowing dust impacting SR 374.
Visual Resources	Since the topography in the area is flat, the only reasonable mitigation is to use colors on the structures that blend well with the surrounding environment. The proposal includes using an approved BLM environmental color for the new treatment plant and water holding tank.
Wild Horses and	Traffic would be limited to a top speed of 25 mph on dirt access roads. If burros are

Burros	encountered during travel to and from the project area, project traffic would be required to slow down, so as not to frighten or injure the animals
Wildlife	General wildlife mitigation measures would include minimizing the area of disturbance, reclaiming the project disturbance after completion of the project, and collecting and disposing of project related trash daily. Monitoring as described in the above analysis for effects tied to water exposure would also be required; including notification to the appropriate agencies should any migratory bird or wildlife mortality occur as a result of exposure to the effluent in the ponds.

5 PERSONS OR AGENCIES CONSULTED

Table 5.1 Persons or Agencies Consulted Regarding the Project

Name	Purpose and Authority	Date
U.S. Fish and Wildlife Service	Wildlife Clearance	September 2009
Nevada State Historic Preservation	Cultural Resources Clearance	September 2009
Nye County	County approval of project	August 2009
Jim Balderson	NDEP Bureau of Safe Drinking Water	August 2009
Adele Malone	NDEP Bureau of Air Quality	August 2009
Albert Verrilli	BWSD	November 2009
Nevada Department of Fish and Wildlife	Informal Consultation and response	August and November 2009
Joseph Maez	NDEP, Bureau of Water Pollution Control	November 2009
Barrick Bullfrog	Adjacent Landowner and ROW holder	September, November 2009
NDOT	ROW holder	September 2009
Valley Electric	ROW holder	September 2009
Timbisha Shoshone Tribe	Information sharing	October 2009

6 LIST OF PREPARERS

Name	Title
	TONOPAH FIELD OFFICE - BLM
Jeff Brown	Lands and Realty Specialist
Devin Englestead	Wildlife Biologist
Marc Pointel	Acting Supervisory Rangeland Management Specialist
Sheryl Post	Rangeland Management Specialist; Weeds
Adam Stephens	Rangeland Management Specialist
Stacy Antilla	Visual Resource Specialist
Ken Depaoli	Geology and Minerals
Alan Buehler	Supervisory Geologist
Susan Rigby	Archaeologist
William Coyle	GIS Specialist
Eric Williams	Planning and Environmental Coordinator
	BATTLE MOUNTAIN DISTRICT OFFICE - BLM
Wendy Seley	District Lands and Realty Specialist; Project Lead
Dave Davis	District Planning/Environmental Coordinator
Dan Tecca	District HazMat Coordinator
Gerald Dixon	District Native American Coordinator

FARR WEST ENGINEERING

Susan Jorgensen	Engineer; Project Manager
Danny Sommers	Engineer; EA Preparer

7 REFERENCES

1. University of Nevada Cooperative Extension, Fact Sheet 03-59, “Measures to Prevent the Spread of Noxious and Invasive Weeds During Construction Activities.

2. “American Indian Religious Traditions, an Encyclopedia”, Suzanne J. Crawford and Dennis F. Kelley.

3. Native American Religious and Cultural Freedom: an Introductory Essay (2005), *Native Peoples’ Traditions,* Michael D. McNally
4. US Environmental Protection Agency (EPA) Website

5. “Federal Land Policy and Management Act of 1976”

6. Western Regional Air Partnership’s (WRAP) Fugitive Dust Handbook Countess Environmental, September 2006

7. Nevada Natural Heritage Program Website

APPENDIX A

Discussion of Possible Alternatives to the Proposed Action; Alternatives Considered But Not Analyzed In Detail

Non-Treatment and Treatment Alternatives

It is important to review historical arsenic levels produced by the BWSD production wells to determine if arsenic levels are increasing, decreasing or remaining constant. Arsenic mitigation may be adversely affected depending upon how much the arsenic levels are fluctuating. The State provided Farr West Engineering and BDSW with historical water quality data for BWSD from the EPA's Safe Drinking Water Information System (SDWIS) database. The following table summarizes historical arsenic levels for the Beatty water system production wells.

Table A.1- Historical Arsenic Levels for BWSD Production Wells

Arsenic Concentrations are in mg/L					
Date	**Blending Vault**	**Well 1**	**Indian Springs Well**	**Summit Well**	**EW-4**
9/3/08	**0.023**	**-**	**-**	**-**	**0.033***
6/27/08	**0.011**	**0.013**	**-**	**-**	**-**
6/30/06	**0.012**	**0.024**	**-**	**-**	**-**
3/1/06	**0.020**	**0.014**	**-**	**-**	**-**
12/6/05	**0.021**	**0.013**	**-**	**-**	**-**
9/7/05	**0.035**	**0.016**	**-**	**-**	**-**
2/1/05	**-**	**0.013**	**0.009**	**0.011**	**0.030**
6/17/02		**0.012**	**0.009**	**0.008**	**0.024**
12/15/99	**0.017**	**-**	**-**	**-**	**-**
6/9/99	**0.03**	**-**	**-**	**-**	**-**
5/18/92	**0.008**	**-**	**-**	**-**	**-**
5/18/92	**0.010**	**-**	**-**	**-**	**-**
2/9/90	**0.008**	**-**	**-**	**-**	**-**

- Arsenic was not tested at this source for the specified date.
* Result from pilot study, August 2008

The District typically monitors arsenic concentrations in the blended source. The arsenic concentration in the blended source fluctuates continually which is to be expected as the use of each of the wells varies from month to month and prior to the New Arsenic Rule, as long as the District's water supply met the 0.050 mg/L MCL, they were in compliance. Due to infrequent monitoring and/or insufficient historical data for the District's other sources of supply, it is not possible to determine whether arsenic concentrations fluctuate significantly at each source. The arsenic concentration at the blended source is largely dependent on the percentage of water that is provided by the EW-4 well.

BWSD has chosen an arsenic mitigation solution that is the most economical and simple to implement and manage. There are two types of options from which to choose in order to comply with the new arsenic standard, non-treatment and treatment options.

Non-Treatment Alternatives

Non-treatment options consist of using high arsenic sources seasonally, blending treated water, consolidating water sources, replacing water sources with new sources, or becoming consecutive to another water system. For the most part, non-treatment options tend to be more economical and easier to implement and manage than treatment options. There is a onetime capital cost and minimal maintenance cost associated with the non-treatment options.

Abandonment

Abandonment of a high arsenic source is the simplest non-treatment approach for remedy, especially for water systems with multiple sources that can rely on at least one source for producing water with arsenic below the MCL. Annual pumping totals from 2008 were used to determine whether high arsenic sources could be abandoned without negatively affecting consumer demand. The table below summarizes each source's annual water production and its annual contribution (percentage) in meeting demands for that year.

Table A.2 - Annual Pumping Totals and Contribution (%) to Demand for 2006 & 2007

Well	2007		2008	
	Gallons	% of Total	Gallons	% of Total
#1	12,672,972	15.46%	8,024,915	9.52%
#2 (inactive well)	13,375,050	16.32%	0	0.00%
#3 (backup well)	2,239,315	2.73%	0	0.00%
Indian Springs	12,810,230	15.63%	14,105,440	16.74%
Summit	19,914,360	24.29%	16,250,630	19.28%
EW-4	20,963,000	25.57%	45,887,000	54.45%
Total	81,974,927	100%	84,267,985	100%

The EW-4 well, which also produces water with the highest concentration of arsenic (33 ppb), is the District's main production well and contributed 55% of the District's water during the year 2008. During 2007, the production of the EW-4 well was much lower because it was out of service for 6 months. Based on the data, abandoning this well is not a feasible option. Well 1, the District's other high arsenic source (12 ppb) has not been used since August 2008. The District plans to utilize this well as a monitoring well in the future and would no longer be using it for distribution. The Indian Springs and Summit wells are both in compliance with the Arsenic Rule. Abandoning these wells would not be useful for arsenic mitigation purposes.

Seasonal Use

Seasonal use requires that BWSD switch a high arsenic source from full-time production to seasonal or peaking use only. When used, it would be blended with low arsenic water sources before entry to the distribution system. This is allowed, as long as the running annual average at the entry point to the distribution system does not exceed the MCL. Unfortunately, this option would not work for the Beatty water system. The District relies on its main production well EW-4 for over 50% of its water demand. Seasonal use would require the District to no longer use this

well and rely mainly on the Indian Springs and Summit wells to supply the communities which is not a feasible option.

Blending

Blending requires the utility meet the revised arsenic MCL at all entry points to the distribution system. Blending involves mixing waters from two or more sources prior to entering the distribution system and eliminates the need for treatment. Beatty is already blending water from the Indian Springs Well, the Summit Well and EW-4. Each source that would be blended should have a flow measurement device installed to ensure that the blended ratio would meet the arsenic MCL.

For Beatty, blending options are for treating arsenic are limited. The main production well (EW-4) with the highest capacity for blending (500gpm) also contains the highest arsenic concentration (0.024 mg/L). The Indian Springs Well can produce 250gpm and contains 0.009 mg/L of arsenic. This is just below the MCL and does not provide much room for blending. Also, the Summit Well can produce 100 gpm, but also contains 0.008 mg/L of arsenic. Again, this does not leave many blending options that would meet demands.

If the Summit Well and Indian Springs Well were to pump at full capacity, he EW-4 Well could never produce more than 64gpm without risking exceeding the arsenic MCL. EW-4 could never produce more than 13% of its total capacity without risking compliance with the arsenic MCL.

Also, blending the Indian Springs Well and Summit Well with EW-4 would require that the two lower producers become the main producers for the water service area and that EW-4 only be used minimally. Limiting production to the Indian Springs and Summit Wells may not provide enough water to service the community. If one well pump was to malfunction or need repairs, the system would not have adequate redundancy to supply customer demand. This would require the system to use EW-4 or Well 1 for backup rendering the system non-compliant with the New Arsenic Rule.

Treatment Alternatives

Treatment alternatives are those that involve a chemical or mechanical means for removing arsenic in drinking water. Some of the treatment options include reverse osmosis (RO), Activated Alumina (AA), Ion Exchange (IE), Iron Based Sorbents (IBS), Lime Softening (LS), and Oxidation Filtration with or without pH adjustment and iron coagulant. For small water systems Point-Of-Use or Point-Of-Entry treatment systems are sometimes options for treatment, however the BWSD system is too large for POU or POE to be considered. POU and POE treatment systems utilize the same treatment technology as wellhead or centralized treatment systems, but on a much smaller scale.

Treatment options have the tendency to be more expensive to implement and more complicated to manage than non-treatment options. Both the capital cost and related operation and maintenance of the treatment options are expensive. However, due to the fact that the non-treatment options may not be reliable for this system on a long term basis, treatment options must be considered.

Water Quality Parameters for Selecting a Treatment Method
Some constituents present in drinking water affect arsenic removal, and an understanding of the presence and concentration of these parameters is needed to evaluate arsenic treatment options and costs. Parameters considered for determining effective arsenic treatment technologies are:

- Arsenic, Total
- Arsenite [As(III)]
- Fluoride
- Manganese
- Nitrite
- Orthophosphate
- Silica
- Total Dissolved Solids (TDS)
- Arsenate [As(V)]
- Chloride
- Iron
- Nitrate
- Nitrite
- pH
- Sulfate
- Total Organic Carbon (TOC)

Treatment Technologies
The District initially considered treatment technologies capable of removing both fluoride and arsenic. However the final decision was to remove arsenic only.

Based on the available water quality data, the District considered the following arsenic and fluoride removal treatment options:

- Activated Alumina (single stage treatment)
- Coagulation/Filtration (C/F) with alum or electro-flocculation with aluminum plates as the coagulant (dual state treatment)
- Traditional C/F (using ferric chloride) for arsenic removal followed by partial stream RO or AA for fluoride removal (dual stage treatment)

1. Activated Alumina: The AA process is best under acidic conditions. The pH of the water needs to be decreased for effective removal of arsenic and then increased for supply. There are a number of parameters that interfere with the performance of AA adsorption. The parameters that can affect AA treatment are outlined in the table.

Table 21 – AA Interference

Analyte	Concentration May Cause Interference
Chloride	250 mg/L
Fluoride	2 mg/L
Silica	30 mg/L
Iron	0.5 mg/L
Manganese	0.05 mg/L
Sulfate	720 mg/L
Dissolved Org Carbon	4 mg/L
TDS	1000 mg/L

Small utilities opt to operate the system under natural pH conditions. In such cases, the savings in capital and chemical costs required for pH adjustment and media regeneration offset the costs associated with decreased run length. AA is capable of removing both arsenic and fluoride and is typically the type of treatment that is pursued in cases where both constituents are present. However, a challenge for larger systems with AA media is onsite regeneration of media which typically produces 37 to 47 bed volumes of caustic soda waste. The waste solution typically consists of high levels of TDS, aluminum, and soluble arsenic and the waste stream would be classified as a hazardous waste stream. AA with regeneration is not a feasible solution for small water systems.

Therefore, small systems can utilize AA as a single use, throw away media. However, due to the increased levels of both arsenic and fluoride at the EW-4 well, the frequency of media replacement would likely be excessive. This would greatly increase the O&M costs associated with using AA as a single use media. This is therefore not a recommended solution for BWSD.

Coagulation/Filtration utilizing electro-flocculation technology: This process utilizes electrically charged aluminum plates to create an alum coagulant. This is a technology new to the potable water treatment industry to be used for arsenic treatment. Through the completion of a pilot study it has been found that the process would also simultaneously remove fluoride from the water. Once a floc is formed, the water is run through a filter, removing the floc holding the contaminants. The results of the pilot study and a cost comparison of this treatment technology are outlined in Sections 5.3 and 5.4 to determine the viability of C/F utilizing electro-flocculation for the BWSD system.

Coagulation/Filtration for Arsenic Removal followed by Partial Stream RO or AA for Fluoride Reduction: This dual stage treatment option would employ the use of traditional coagulation/filtration for the removal of arsenic utilizing ferric chloride as the coagulant, followed by the use of Reverse Osmosis (RO) or AA for partial stream treatment for the reduction of fluoride. By utilizing the RO or AA treatment on a partial stream basis, the amount of waste created would be limited while the overall concentration of fluoride would be brought below the secondary standard of 2 mg/L. A cost estimate and analysis of these options are included in Section 5.4.

PILOT STUDY AND RESULTS

A pilot study at the EW-4 well began with bench scale testing in March of 2007. The goal of the pilot study was to determine if a single step treatment technology other than activated alumina would be possible for the removal of both arsenic and fluoride from the EW-4 water. The bench scale tests were performed by NCS and indicated that a coagulation filtration process using alum as the coagulant would remove adequate amounts of both the arsenic and fluoride. The arsenic concentration goal was 5 ppb, while the fluoride concentration goal was 1.8 ppm.

Based on the results of the bench scale tests, two phases of pilot studies were completed on site. The pilot study was conducted at the EW-4 booster station. This location ensured a constant supply of water to the pilot study made up solely of water from the EW-4 well.

Pilot Study Conclusions
The third phase of the pilot study was the most successful. The reduction of both the arsenic and the fluoride met the necessary goals. However, it was also discovered during this phase of the pilot study that the dual media filter that was utilized during the pilot study was not adequate for removing the alum floc because of the higher aluminum doses that were necessary to remove the arsenic and fluoride. Due to this, there were higher than anticipated aluminum residuals in the filter effluent. Optimization of the filter bed would be required during the design process to reduce the aluminum residuals in the filter effluent.

The recommended treatment technology based on the pilot study results is an ARS/filtration system. Utilizing the information gathered during the pilot study, the treatment system would include the following;

Alternative 1 – Activated Alumina

Description
The use of activated alumina (AA) is common for systems that require removal of both arsenic and fluoride. AA is an adsorptive media that can be either disposed of or regenerated upon exhaustion (regeneration is more complex and creates a substantial waste stream). The life of the media is dependent upon the levels of arsenic and fluoride that need to be removed.

Design Criteria
The facility would likely consist of 2 pressure filters operated in series. The AA media would be used on a throw-away basis due to the complexity of regenerating the media and disposing of the waste. Each filter would be capable of treating 500 gpm. The filters would require infrequent backwashing, and the majority of the backwash water can be recycled back through the treatment facility. The limited amount of backwash water that cannot be recycled would be disposed of in a lined evaporation pond or rapid infiltration basin (RIB).

Environmental Impacts
There are no anticipated environmental impacts beyond those normal to construction and the disposal of the exhausted media on a regular basis.

Land Requirements
The purchase of land would not be necessary. BWSD would be required to work with BLM to redefine their right-of-way lease. The booster station and pipeline from the well to town are located on current ROW that is leased from BLM. There are no anticipated problems related to redefining the current ROW to include space for the building and evaporation ponds or Combination evaporation/infiltration ponds.

Advantages/Disadvantages
The main advantage of the AA facility is the lower capital cost (based on the information available as no pilot study was run with AA). The other advantage is that the AA media would successfully remove both the arsenic and fluoride to acceptable levels.

The disadvantages of this technology are mainly found in the O&M costs. Due to the fact that it is not desirable to regenerate the AA media, it must be used on a throw away basis. This greatly increases the annual O&M costs (calculated based on a 30% utilization rate), however the alternative – regenerating the media – has its own associated problems (waste stream and overall complexity as well and the necessity of other chemicals). Therefore it would not be recommended for BWSD to regenerate the AA media, resulting in high O&M costs for media replacement. The safety factor of 25% is utilized due to the fact that the O&M costs are calculated assuming that there is no significant interference to arsenic reduction. Fluoride would affect the AA ability to remove arsenic as the fluoride would also take up space on the media. Without running a pilot study it is not possible to say to what extent this interference would take place, therefore a conservative safety factor of 25% is utilized. (This interference would not affect the capital cost, only the O&M costs.)

Option 2 – ARS/Filtration

Description

Option 1 consists of a wellhead treatment facility to be installed for the EW-4 well. The treatment system would consist of ARS/filtration and would treat the full flow of water from the EW-4 well. The arsenic would be reduced to lower than 10 ppb at all times and the fluoride would be reduced to 1.80 mg/L or less at all times. This treatment system would bring BWSD into compliance with both the primary MCL for arsenic and the secondary MCL for fluoride.

Design Criteria

The treatment system would be designed as outlined in the recommended option of the pilot study. A total of 4 ARS reactors, each capable of treating 180 gpm, would be installed, as well as 3 pressure vessels for filtration. The filter bed media would be optimized during design to ensure the aluminum floc is properly removed during filtration – thereby reducing aluminum residuals in the filter effluent that were discovered during the pilot study.

In addition, pH adjustment and addition of chlorine for full oxidation of the arsenic would be required. The optimum pH for this process is 6.0 and a free chlorine residual of 2 mg/L is necessary.

The backwash water from the treatment system would be decanted, and the majority of it would be recycled back through the treatment system – reducing waste. The sludge from the backwash water would sent either to lined evaporation pond or RIB and would ultimately be disposed of in a landfill if necessary. The sludge from this type of treatment is non-hazardous and has past TCLP tests at other sites.

Environmental Impacts

The environmental impacts would be limited to the construction of the treatment building and the lined evaporation ponds or Combination evaporation/infiltration ponds.

Land Requirements

The purchase of land would not be necessary. BWSD would be required to work with BLM to redefine their right-of-way lease. The booster station and pipeline from the well to town are located on current ROW that is leased from BLM. There are no anticipated problems related to redefining the current ROW to include space for the building and evaporation ponds or Combination evaporation/infiltration ponds.

Advantages/Disadvantages
The advantage of this treatment option is that it is a single process treatment system with limited O&M required. The waste is non-hazardous and can be disposed of in a landfill. All of the water from the EW-4 can be treated, and BWSD would be brought into compliance with the arsenic and fluoride MCLs. Another distinct advantage to the use of electro-flocculation treatment is the use of fewer chemicals (i.e. no ferric chloride).

The main disadvantage of this treatment system is the initial capital cost for the electro-flocculation reactors. In comparison to conventional C/F, the capital cost is higher. However, the O&M costs are lower due the fact that the chemical alum does not need to be added for coagulation. The cost to run the reactors is lower than the cost of purchasing alum, therefore the O&M costs over the long run are lower than conventional C/F with alum as the coagulant.

Option 3 – Dual Stage Treatment with C/F and Reverse Osmosis or AA
Description
This option would involve the installation of two types of treatment, one to reduce the arsenic levels in the water, and the other to reduce the fluoride levels. Conventional coagulation/filtration would be used to treat the full flow of water to successfully remove the arsenic to below 10 ppb. Following removal of the arsenic, partial stream treatment would be used to reduce the fluoride levels in the water. Due to the fact that not all of the fluoride needs to be removed it would not be necessary to treat the full 500 gpm. Either RO or AA would adequately remove sufficient levels of fluoride.

Design Criteria
The C/F process would treat 500 gpm with the use of ferric chloride as the coagulant. Three pressure filters would be used, each capable of treating 180 to 250 gpm. Regular backwashing of the filters would be required and the backwash water would be sent to a backwash water tank. The majority of the backwash water would be recycled back through the treatment system, with no more than 5% of the backwash water being sent to an evaporation pond. An evaporation pond would allow for drying of the sludge for eventual disposal in a landfill.

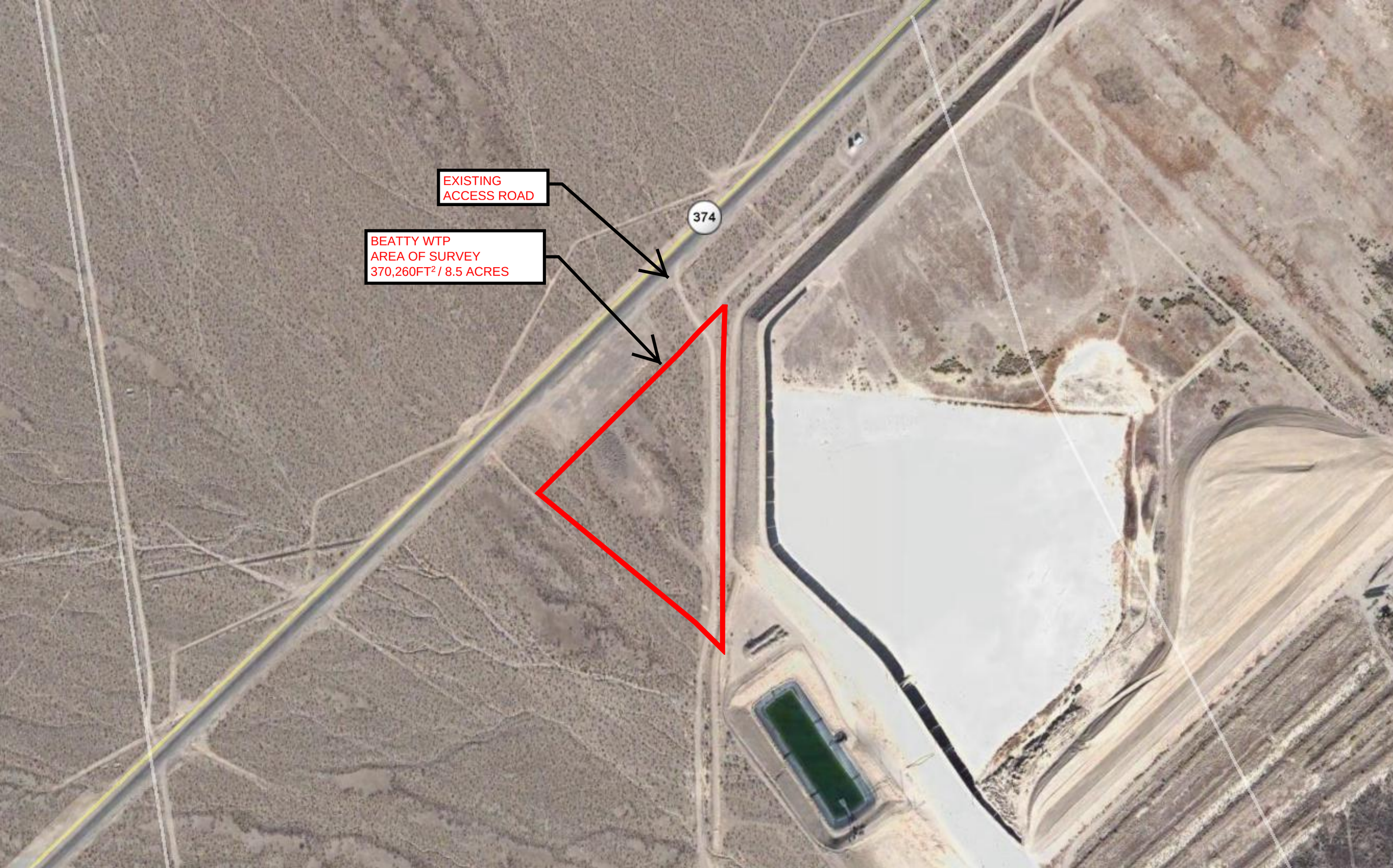
Following the C/F treatment to remove arsenic, a small AA or RO system would be utilized to treat approximately 200 to 250 gpm to remove fluoride. This partial stream that is treated would then be blended back with the untreated stream for distribution. The resulting concentration of fluoride would be less than the secondary MCL of 2 mg/L. Due to the amount of reject water that would be created with an RO system, it is recommended that if this option is chosen a small AA system be utilized.

Environmental Impacts
There are no anticipated environmental impacts beyond those normal to construction and the disposal of the exhausted media and dewatered sludge on a regular basis.

Land Requirements
The purchase of land would not be necessary. BWSD would be required to work with BLM to redefine their right-of-way lease. The booster station and pipeline from the well to town are located on current ROW that is leased from BLM. There are no anticipated problems related to redefining the current ROW to include space for the building and evaporation ponds.

APPENDIX B

Maps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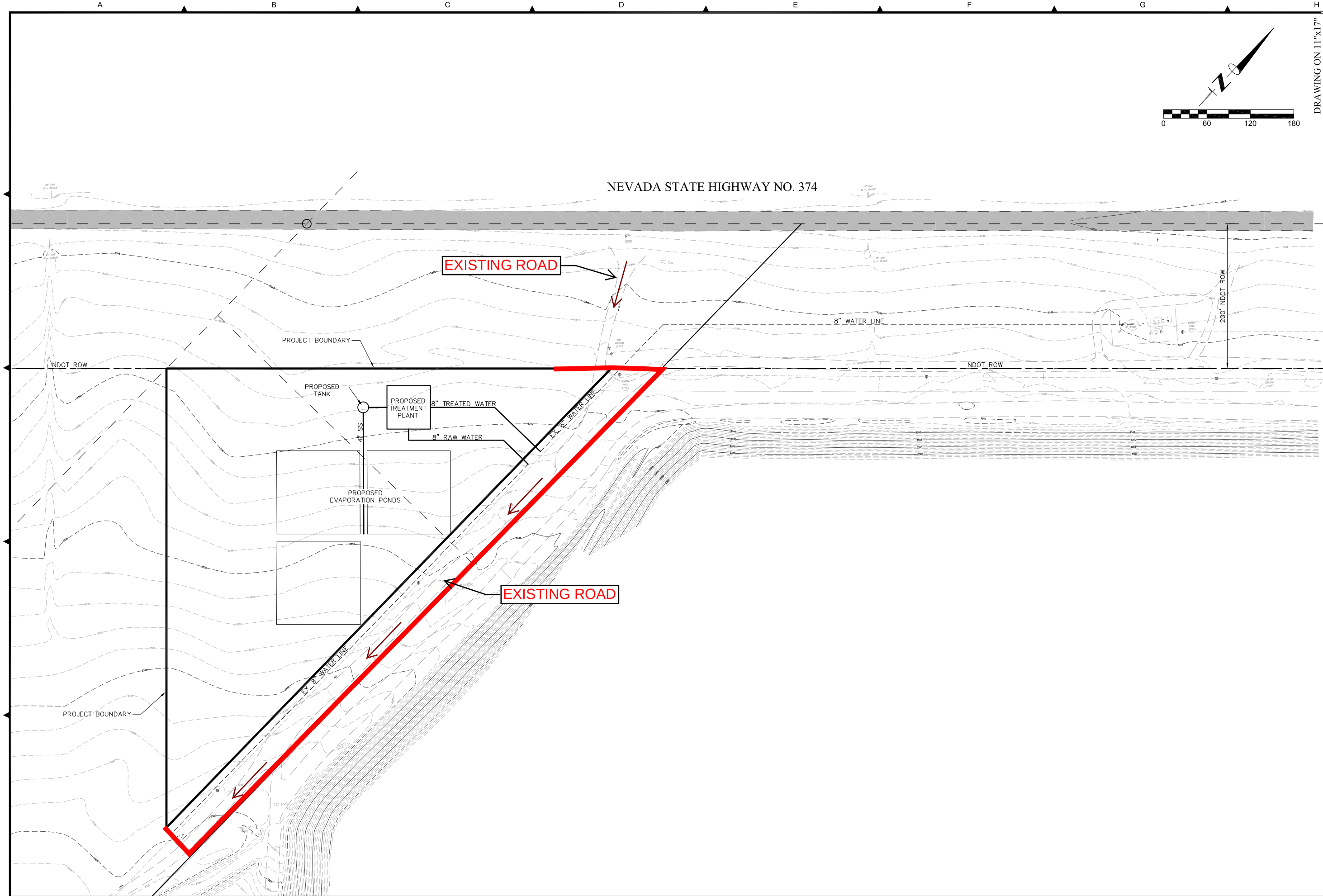
ACCESS ROAD
BEATTY WTP
AREA OF SURVEY
370,260FT² / 8.5 ACRES
374



DRAWING ON 11"x17" IS HALF SCALE

REVISION	DESCRIPTION	BY	APP	DATE

JOB NO.: 0254 BEATTY WTP
DATE: JUNE, 2009
SCALE: AS SHOWN
DESIGNED: XXX
DRAWN: VJW
CHECKED: BBE

FARR WEST ENGINEERING
5442 LONGLEY LANE, SUITE B
RENO, NEVADA 89511
PHONE: (775) 851-4788
FAX: (775) 851-0766

WATER TREATMENT PLANT PROJECT
BEATTY WATER AND SANITATION DISTRICT
OVERALL SITE PLAN
NYE COUNTY NEVADA

SHEET NUMBER
EXHIBIT
A
1 OF 1

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APPENDIX C

Correspondence

ndep
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Jim Gibbons, Governor
Allen Biaggi, Director
Leo M. Drozdoff, P.E., Administrator

August 27, 2009

Mr. Dan Sommers
Farr West Engineering
5442 Longley Lane, Suite B
Reno, NV 89511

RE: Environmental Review: Beatty Water Treatment Plant Project

Dear Mr. Sommers:

Enclosed you will find the signed environmental review form for the (BWSD) Water Treatment Plant Project proposed by the Beatty Water and Sanitation District. The Nevada Division of Environmental Protection, Bureau of Air Quality Planning has reviewed this project for conformance with federal air quality standards, and it will conform to Nevada's Applicable State Implementation Plan. Please note the following requirements that must be complied with during the planning and implementation phases of this project:

1. If during the course of a project an area in excess of five (5) acres is disturbed, a surface area disturbance permit is required from the Bureau of Air Pollution Control. For assistance contact Francisco Vega, Supervisor, BAPC Permitting Branch at (775) 687-9343 to apply for a permit.

2. Regardless of the size of the disturbed area, fugitive dust emitted from the project must be controlled at all times through the use of best practical methods. These methods can include, but are not limited to, paving, chemical stabilization, watering, phased construction, and revegetation. For assistance with controlling fugitive dust, contact Larry Kennedy at (775) 687-9495.

If you have any questions on this review you may call me at (775) 687-9356, or e-mail at amalone@ndep.nv.gov.

Sincerely,

Adele K. Malone, Supervisor
Planning and Modeling Branch

ENVIRONMENTAL REVIEW: AIR QUALITY ACT

Grantee: Beatty Water and Sanitation District Project Name: Water Treatment Plant Project

Pursuant to U.S Department of Housing and Urban Development, U.S. Department of Commerce, Economic Development Administration or other federal department or agency requirements, as applicable, the grant recipient assumes the responsibility for environmental review, decision making and actions required by local, state, and federal environmental laws or authorities. In order to complete the environmental review requirements, we are requesting the Nevada Division of Environmental Protection's (NDEP) review of the project with respect to the threshold for Air Quality. The pertinent standards for Air Quality include the following criteria, standards, policies and/or regulations:

1. The Clean Air Act (42 U.S.C. 7401 et seq.) as amended; particularly Section 176 (c) and (d) (42 U.S.C. 7506 (c) and (d)).

Please check either line A or B below and add any applicable comments in the space provided. Please feel free to attach any additional comments.

_X_ A. The project conforms to the EPA-approved State Implementation Plan (SIP), per contract with the State Air Quality Management District or Board.

____ B. The environmental threshold for Air Quality is exceeded. The project is not in conformance with the Clean Air Act. Negotiate suitable mitigation measures with the Air Quality Management District or Board.

NDEP Comments:

This project not is expected to disturb an area in excess of five (5) acres, therefore, a surface area disturbance permit is not required before the project is started.

In the event a surface area disturbance permit is required, contact Francisco Vega at (775) 687-9343.

In accordance with NAC 445B.22037, fugitive dust must be controlled at all times during the implementation of this project.

/ Supervisor August 25, 2009

Signature/Title Date

Nevada Division of Environmental Protection

Rev. 8/08

ndep
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Jim Gibbons, Governor
Allen Biaggi, Director
Leo M. Drozdoff, P.E., Administrator

August 14, 2009

Dan Sommers
Farr West Engineering
5442 Longley Lane, Suite B
Reno, Nevada 89511

RE: Environmental Review: Beatty Water & Sanitation District Water Treatment Plant Project
In reply, please refer to plan review number (LY-3590-09)

Dear Mr. Sommers:

The Bureau of Safe Drinking Water (BSDW) has performed the above-referenced environmental review. Based on the information provided by Farr West Engineering, the BSDW offers the following comments:

The construction of the water system treatment facility should have minimal or no impact to the existing groundwater quality. The construction of the water treatment facility is necessary to bring the water system into compliance with arsenic drinking water standard of 0.010 milligrams per liter. Please contact Joe Maez (Bureau of Water Pollution Control) at 687-9431 regarding requirements for the disposal any reject or backwash water generated from the treatment facility.

Please be advised that engineered plans and specifications will need to be provided to BSDW for review and approval prior to construction.

Please feel free to contact me at (775) 687-9517, if you have any questions or comments.

Sincerely,

Jim Balderson

Jim Balderson, P.E., Engineering Supervisor
Bureau of Safe Drinking Water
Nevada Division of Environmental Protection

cc: Jennifer Carr, P.E., Chief, Bureau of Safe Drinking Water
Joe Maez, P.E., Bureau of Water Pollution Control

P:/PHE/WORD/JRB/Environmental Review – Beatty Water Treatment Plant

FARR WEST
ENGINEERING

July 22, 2009

Ms. Melissa Brito
Closure Manager
Barrick Gold of North America, Inc.
Salt Lake City, UT

Re: Beatty Water & Sanitation District
Environmental Assessment and Cultural Resources Survey

Dear Ms. Brito,

Beatty Water & Sanitation District (BWSD) is currently in the design phase for a water treatment plant (WTP). The WTP is necessary for BWSD to achieve compliance with the new arsenic rule which came into effect in January of 2006. The new arsenic rule states that the Maximum Contaminant Level (MCL) for arsenic in drinking water is 10 parts per billion (ppb), while the previous MCL was 50 ppb. The EW-4 well owned by BWSD is the primary well for the water system and it exceeds the MCL for arsenic. Additionally, the water from the EW-4 well also exceeds the State enforced secondary standard for fluoride. The chosen method to achieve compliance is to design and construct a water treatment facility.

BWSD has received funding from the Drinking Water State Revolving Fund (SRF) through the American Recovery and Reinvestment Act of 2009 for design and construction. The proposed site for the WTP is government lots 9 & 10, Section 22, T. 12 S., R. 46 E., Mount Diablo Meridian, Nevada. The two lots are currently owned by the Bureau of Land Management and BWSD is in the process of applying for a permit to construct the facilities. A requirement of any permits from BLM for the area is the completion of an environmental assessment and a cultural resources survey.

Due to the fact that BWSD has an existing booster station and water line that are located approximately 1,800 feet from the proposed WTP, it is proposed that the environmental assessment and cultural resources survey include the area between the proposed site and the existing booster station (the area which is owned by Barrick). At this time it is ***not*** anticipated that any work will be necessary in this area, however, in the event that an additional valve, connection, or other underground work may be required around the existing booster station for a fully functional WTP, it is in BWSD's best interest to have the environmental assessment and cultural resources survey completed now, instead of having to address it as a later date. The requirement of any work in the area owned by Barrick will **immediately** be brought to Barrick's attention for review, comment and approval/disapproval.

5442 LONGLEY LANE, SUITE B • RENO NV 89511 • (775) 851-4788 • FAX (775) 851-0766

The environmental assessment and cultural resources survey should not take more than one day each. The two items are observational only and no disturbance of the area will take place. Due to the time constraints on the project because of receiving funds from the American Recovery and Reinvestment Act, BWSD proposes to have the surveys completed the week of July 27, 2009. This will assist them in receiving the necessary permits from BLM for obtaining access to the proposed site and the eventual ROW permit itself.

If you have any questions, or require additional information regarding the proposed activities, please contact me.

Sincerely,
Farr West Engineering

Susan Jorgensen
Project Manager

Cc: Ray H. Williams, III, General Manager, BWSD

Danny Sommers

From: Susan Jorgensen
Sent: Thursday, July 23, 2009 8:15 AM
To: Danny Sommers
Cc: Ray H. Williams III
Subject: FW: Proposed EA and cultural resources survey for Beatty
Attachments: image002.jpg; image001.jpg

See Melissa's comments below, we are ok to proceed with the EA and cultural survey.

Susan Jorgensen
FARR WEST
ENGINEERING

From: Brito, Melissa (Salt Lake City) [mailto:MBrito@barrick.com]
Sent: Thursday, July 23, 2009 8:11 AM
To: Susan Jorgensen
Cc: Chase, Rocky (Salt Lake City); Wilsey, Cy (Salt Lake City)
Subject: RE: Proposed EA and cultural resources survey for Beatty

Thank you, Susan. You may proceed with the EA work on Barrick property.

Melissa Ann Brito ~ Closure Manager ~ Barrick Gold of North America, Inc. ~ 801.419.3115 mobile ~ 801.606.7340 fax

---

From: Susan Jorgensen [mailto:susan@fweng.com]
Sent: Wednesday, July 22, 2009 4:07 PM
To: Brito, Melissa (Salt Lake City)
Cc: Ray H. Williams III; Danny Sommers
Subject: Proposed EA and cultural resources survey for Beatty

Melissa,

Attached is a letter with a brief introduction to the project and also a description of what the proposed environmental assessment and cultural survey will involve. If you need any additional information, please let me know.

Thanks, and have a good afternoon.

FARR WEST
ENGINEERING
Susan Jorgensen
5442 Longley Lane, Suite B
Reno, Nevada 89511
(775) 851-4788 Main
(775) 225-5841 Cell
(775) 851-0766 Fax

APPENDIX D

NRCS Soils Report

United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Nye County, Nevada, Southwest Part

Beatty WTP

August 6, 2009

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

- Gully
- Short Steep Slope
- Other

Political Features

- Cities
- PLSS Township and Range
- PLSS Section

Water Features

- Oceans
- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:11,700 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Nye County, Nevada, Southwest Part
Survey Area Data: Version 3, Oct 5, 2006

Date(s) aerial images were photographed: 9/22/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Nye County, Nevada, Southwest Part (NV785)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
2054	Yermo, hot-Yermo-Arizo association	104.4	18.9%
2181	Skelon-Yermo-Pinez complex, 0 to 4 percent slopes	0.1	0.0%
2186	Yermo-Skelon-Pinez complex, 4 to 15 percent slopes	448.3	81.1%
Totals for Area of Interest		**552.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If

intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Nye County, Nevada, Southwest Part

2054—Yermo, hot-Yermo-Arizo association

Map Unit Setting

Elevation: 3,000 to 4,000 feet
Mean annual precipitation: 4 to 6 inches
Mean annual air temperature: 57 to 66 degrees F
Frost-free period: 210 to 250 days

Map Unit Composition

Yermo, hot, and similar soils: 40 percent
Yermo and similar soils: 30 percent
Arizo and similar soils: 15 percent

Description of Yermo, Hot

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from mixed rock sources

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability (nonirrigated): 7s
Other vegetative classification: LIMY 3-5 P.Z. (030XA073NV_1)

Typical profile

0 to 6 inches: Very gravelly sandy loam
6 to 60 inches: Stratified extremely gravelly sandy loam to gravelly loam

Description of Yermo

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed rock sources

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 7s
Other vegetative classification: LIMY 5-8 P.Z. (030XA058NV_2)

Typical profile

0 to 6 inches: Very gravelly sandy loam
6 to 60 inches: Stratified extremely gravelly sandy loam to gravelly loam

Description of Arizo

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed rock sources

Properties and qualities

Slope: 2 to 4 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability (nonirrigated): 7s
Ecological site: DRY WASH (R030XA065NV)

Typical profile

0 to 8 inches: Very gravelly sandy loam
8 to 60 inches: Stratified cobbly coarse sand to extremely gravelly sand

2181—Skelon-Yermo-Pinez complex, 0 to 4 percent slopes

Map Unit Setting

Elevation: 2,300 to 3,000 feet
Mean annual precipitation: 3 to 7 inches
Mean annual air temperature: 61 to 66 degrees F
Frost-free period: 190 to 230 days

Map Unit Composition

Yermo and similar soils: 30 percent
Skelon and similar soils: 30 percent
Pinez and similar soils: 25 percent

Description of Skelon

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from mixed rock sources

Properties and qualities

Slope: 2 to 4 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Very low (about 1.8 inches)

Interpretive groups

Land capability (nonirrigated): 7s
Other vegetative classification: CALCAREOUS LOAM 3-5 P.Z. (030XA053NV_1)

Typical profile

0 to 4 inches: Gravelly sandy loam
4 to 28 inches: Stratified very gravelly coarse sandy loam to very gravelly fine sandy loam
28 to 44 inches: Indurated
44 to 52 inches: Very gravelly sandy loam
52 to 60 inches: Extremely gravelly coarse sand

Description of Yermo

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed rock sources

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 7s
Other vegetative classification: CALCAREOUS LOAM 3-5 P.Z. (030XA053NV_1)

Typical profile

0 to 6 inches: Very gravelly sandy loam
6 to 60 inches: Stratified extremely gravelly sandy loam to gravelly loam

Description of Pinez

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from mixed rock sources

Properties and qualities

Slope: 2 to 4 percent
Surface area covered with cobbles, stones or boulders: 5.0 percent
Depth to restrictive feature: 40 to 60 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Land capability (nonirrigated): 7s
Other vegetative classification: CALCAREOUS LOAM 3-5 P.Z. (030XA053NV_1)

Typical profile

0 to 4 inches: Very gravelly loamy sand
4 to 10 inches: Very gravelly sandy loam
10 to 29 inches: Very gravelly sandy clay loam
29 to 41 inches: Extremely gravelly loamy sand
41 to 51 inches: Indurated

2186—Yermo-Skelon-Pinez complex, 4 to 15 percent slopes

Map Unit Setting

Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 3 to 7 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 190 to 230 days

Map Unit Composition

Skelon and similar soils: 35 percent
Yermo and similar soils: 35 percent
Pinez and similar soils: 15 percent

Description of Yermo

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed rock sources

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 7s
Other vegetative classification: LIMY 5-8 P.Z. (030XA058NV_2)

Typical profile

0 to 6 inches: Very gravelly sandy loam
6 to 60 inches: Stratified extremely gravelly sandy loam to gravelly loam

Description of Skelon

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from mixed rock sources

Properties and qualities

Slope: 2 to 4 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Very low (about 1.8 inches)

Interpretive groups

Land capability (nonirrigated): 7s
Other vegetative classification: LOAMY 5-8 P.Z. (030XA061NV_2)

Typical profile

0 to 4 inches: Gravelly sandy loam
4 to 28 inches: Stratified very gravelly coarse sandy loam to very gravelly fine sandy loam
28 to 44 inches: Indurated
44 to 52 inches: Very gravelly sandy loam
52 to 60 inches: Extremely gravelly coarse sand

Description of Pinez

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from mixed rock sources

Properties and qualities

Slope: 2 to 4 percent
Surface area covered with cobbles, stones or boulders: 5.0 percent
Depth to restrictive feature: 40 to 60 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0

Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Land capability (nonirrigated): 7s

Other vegetative classification: CALCAREOUS LOAM 5-8 P.Z. (030XA066NV_2)

Typical profile

0 to 4 inches: Very gravelly loamy sand

4 to 10 inches: Very gravelly sandy loam

10 to 29 inches: Very gravelly sandy clay loam

29 to 41 inches: Extremely gravelly loamy sand

41 to 51 inches: Indurated

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Classifications

This folder contains a collection of tabular reports that present a variety of soil groupings. The reports (tables) include all selected map units and components for each map unit. Land classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Prime and other Important Farmlands (Beatty WTP)

This table lists the map units in the survey area that are considered important farmlands. Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

For some of the soils identified in the table as prime farmland, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these crops when properly managed. The water supply is dependable and of adequate quality. Nearness to markets is an additional consideration. Unique farmland is not based on national criteria. It commonly is in areas where there is a special microclimate, such as the wine country in California.

In some areas, land that does not meet the criteria for prime or unique farmland is considered to be *farmland of statewide importance* for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In some areas that are not identified as having national or statewide importance, land is considered to be *farmland of local importance* for the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Report—Prime and other Important Farmlands (Beatty WTP)

Prime and other Important Farmlands– Nye County, Nevada, Southwest Part		
Map Symbol	**Map Unit Name**	**Farmland Classification**
2054	Yermo, hot-Yermo-Arizo association	Not prime farmland
2181	Skelon-Yermo-Pinez complex, 0 to 4 percent slopes	Not prime farmland
2186	Yermo-Skelon-Pinez complex, 4 to 15 percent slopes	Not prime farmland

Recreational Development

This folder contains a collection of tabular reports that present soil interpretations related to recreation facility development. The reports (tables) include all selected map units and components for each map unit, limiting features and interpretive ratings. Recreational development interpretations are tools designed to guide the user in identifying and evaluating the suitability of the soil for specific recreational uses. Example interpretations include camp areas, picnic areas, playgrounds, paths and trails, and off-road motorcycle trails.

Camp Areas, Picnic Areas, and Playgrounds (Beatty WTP)

The soils of the survey area are rated in this table according to limitations that affect their suitability for camp areas, picnic areas, and playgrounds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in this table can be supplemented by other information, for example, interpretations for dwellings without basements, for local roads and streets, and for septic tank absorption fields.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, saturated hydraulic conductivity (Ksat), and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, Ksat, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, Ksat, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, Ksat, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, Ksat, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, Ksat, and toxic substances in the soil.

Report—Camp Areas, Picnic Areas, and Playgrounds (Beatty WTP)

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Camp Areas, Picnic Areas, and Playgrounds– Nye County, Nevada, Southwest Part							
Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2054—Yermo, hot-Yermo-Arizo association							
Yermo, hot	40	Very limited		Very limited		Very limited	
		Gravel content	1.00	Gravel content	1.00	Gravel content	1.00
						Slope	0.13
Yermo	30	Very limited		Very limited		Very limited	
		Gravel content	1.00	Gravel content	1.00	Gravel content	1.00
						Slope	0.13
Arizo	15	Very limited		Very limited		Very limited	
		Flooding	1.00	Gravel content	1.00	Gravel content	1.00
		Gravel content	1.00			Slope	0.13
2181—Skelon-Yermo-Pinez complex, 0 to 4 percent slopes							
Skelon	30	Somewhat limited		Somewhat limited		Very limited	
		Depth to cemented pan	0.65	Depth to cemented pan	0.65	Gravel content	1.00
		Gravel content	0.41	Gravel content	0.41	Depth to cemented pan	0.64
						Slope	0.13
Yermo	30	Very limited		Very limited		Very limited	
		Gravel content	1.00	Gravel content	1.00	Gravel content	1.00
Pinez	25	Very limited		Very limited		Very limited	
		Gravel content	1.00	Gravel content	1.00	Gravel content	1.00
		Large stones content	1.00	Large stones content	1.00	Large stones content	1.00
		Too sandy	0.79	Too sandy	0.79	Too sandy	0.79
		Slow water movement	0.26	Slow water movement	0.26	Slow water movement	0.26
						Slope	0.13

Camp Areas, Picnic Areas, and Playgrounds– Nye County, Nevada, Southwest Part							
Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2186—Yermo-Skelon-Pinez complex, 4 to 15 percent slopes							
Skelon	35	Somewhat limited		Somewhat limited		Very limited	
		Depth to cemented pan	0.65	Depth to cemented pan	0.65	Gravel content	1.00
		Gravel content	0.41	Gravel content	0.41	Depth to cemented pan	0.64
						Slope	0.13
Yermo	35	Very limited		Very limited		Very limited	
		Gravel content	1.00	Gravel content	1.00	Gravel content	1.00
Pinez	15	Very limited		Very limited		Very limited	
		Gravel content	1.00	Gravel content	1.00	Gravel content	1.00
		Large stones content	1.00	Large stones content	1.00	Large stones content	1.00
		Too sandy	0.79	Too sandy	0.79	Too sandy	0.79
		Slow water movement	0.26	Slow water movement	0.26	Slow water movement	0.26
						Slope	0.13

Soil Qualities and Features

This folder contains tabular reports that present various soil qualities and features. The reports (tables) include all selected map units and components for each map unit. Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Soil Features (Beatty WTP)

This table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage, or

oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Soil Features– Nye County, Nevada, Southwest Part									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
2054—Yermo, hot-Yermo-Arizo association									
Yermo, hot		—	—		0	—	Low	High	Low
Yermo		—	—		0	—	Low	High	Low
Arizo		—	—		0	—	Low	High	Low
2181—Skelon-Yermo-Pinez complex, 0 to 4 percent slopes									
Skelon	Duripan	20-40	4-17		0	—	Low	High	Low
Yermo		—	—		0	—	Low	High	Low
Pinez	Duripan	40-60	4-17		0	—	None	High	Low
2186—Yermo-Skelon-Pinez complex, 4 to 15 percent slopes									
Skelon	Duripan	20-40	4-17		0	—	Low	High	Low
Yermo		—	—		0	—	Low	High	Low
Pinez	Duripan	40-60	4-17		0	—	None	High	Low

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