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Title: Construction Plan Mina Rail Corridor

Supplier DI #: NRP-R-SYSW-CP-0010-00

Supplier Rev: 00

Supplier Date: 04/30/07

Reference#: NVT-CD-00147

NVM Nevada Transportation Manager Gene Allen
NE Nevada Engineering Scott Kelderhouse

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Nevada Rail Partners	T14/Construction Planning Support – Construction Plan, Mina Rail Corridor – NRP-R-SYSW-0010-00, (Rev. 00) Exhibit I, Item number 16m, RFP Reference Exhibit D-2.14c.2	April 30, 2007	07-00055

Section I. Submittal Information (includes above information)

Submittal Description and Revision Summary for Entire Submittal:

This is the FINAL submittal (Rev. 00) of Construction Plan, Mina Rail Corridor. Duplicate information from Construction Plan, Caliente Rail Corridor (Rev. 03) is not repeated herein; this report references the original location of the data in the Caliente report.

Construction Plan, Mina Rail Corridor is a DEIS-related report that includes descriptions of major material requirements, temporary construction facilities, environmental considerations and the program schedule. Information is intended to outline a construction approach supportive of a program schedule with a 2014 operation date.

Special Instructions:

For a complete copy of the subject report, print the following Adobe Acrobat file:
T14_MRC_Construction Plan_FINAL_Rev00_30April07.pdf

Section II. Data File Information (Add lines below if needed for additional files. Indicate "Last item" or "End of list" on last line used.)

Filename	Rev.	File Size	Description (File description and revision summary for file)	Application and Version/ Add-in or Extension and Version
T14_Cover_30April2007.ppt	00	708 KB	Report cover for *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Powerpoint 2003
T14_MRC_Construction Plan_FINAL_Rev00_30April07.doc	00	13,515 KB	Main text with all imbedded graphics – *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
T14_MRC_Construction Plan_FINAL_Rev00_30April07.pdf	00	16,891 KB	Scanned version of the complete document with all imbedded graphics and appendices - *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Adobe Acrobat 7.0 Standard Version
T14_MRC_Construction Plan_FINALreadonly_Rev00_30April07.doc	00	13,480 KB	Main text (Read Only) with all graphics - *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
T14_MRC_Construction Plan_FINALredlines_Rev00_30April07.pdf	00	14,534 KB	Scanned redline version of the complete document with all imbedded graphics and appendices NRP-R-SYSW-0010-00, (Rev. 00)	Adobe Acrobat 7.0 Standard Version
AppendixA_GarfieldHills Quarry_FINAL_Rev00.doc	00	10,656 KB	Appendix A: Shannon & Wilson, Inc.: field evaluations for Garfield Hills quarry sites – *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixA_GarfieldHills Quarry_FINALreadonly_Rev00.doc	00	10,656 KB	Appendix A (Read Only): Shannon & Wilson, Inc.: field evaluations for Garfield Hills quarry sites – *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixB_GabbsRangeQuarry_FINAL_Rev00.doc	00	15,851 KB	Appendix B: Shannon & Wilson, Inc.: field evaluations for Gabbs Range quarry sites – *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixB_GabbsRangeQuarry_FINALreadonly_Rev00.doc	00	15,851 KB	Appendix B (Read Only): Shannon & Wilson, Inc.: field evaluations for Gabbs Range quarry sites – *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003

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Nevada Rail Partners	T14/Construction Planning Support – Construction Plan, Mina Rail Corridor – NRP-R-SYSW-0010-00, (Rev. 00) Exhibit I, Item number 16m, RFP Reference Exhibit D-2.14c.2	April 30, 2007	07-00055

AppendixC_NorthClayton Quarry_FINAL_Rev00.doc	00	7,567 KB	Appendix C: Shannon & Wilson, Inc.: field evaluations for North Clayton quarry sites - *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixC_NorthClayton Quarry_FINALreadonly_Rev00.doc	00	7,567 KB	Appendix C (Read only): Shannon & Wilson, Inc.: field evaluations for North Clayton quarry sites - *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixD_WestGoldfield Quarry_FINAL_Rev00.doc	00	31 KB	Appendix D: Shannon & Wilson, Inc.: field evaluations for West Goldfield quarry sites - *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixD_WestGoldfield Quarry_FINALreadonly_Rev00.doc	00	31 KB	Appendix D (Read only): Shannon & Wilson, Inc.: field evaluations for West Goldfield quarry sites - *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixE_MalpaisMesaSouthQuarry_FINAL_Rev00.doc	00	8,190 KB	Appendix E: Shannon & Wilson, Inc.: field evaluations for Malpais Mesa South quarry sites - *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixE_MalpaisMesaSouthQuarry_FINALreadonly_Rev00.doc	00	8,190 KB	Appendix E (Read only): Shannon & Wilson, Inc.: field evaluations for Malpais Mesa South quarry sites - *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixF_ConstructionCamps_FINAL_Rev00.doc	00	9,640 KB	Appendix F: Aerial photography of construction camp locations – *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixF_ConstructionCamps_FINALreadonly_Rev00.doc	00	9,640 KB	Appendix F (Read only): Aerial photography of construction camp locations – *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixG_WaterRequirements_FINAL_Rev00.doc	00	11,424 KB	Appendix G: Detailed maps of potential well locations – *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixG_WaterRequirements_FINALreadonly_Rev00.doc	00	11,424 KB	Appendix G (Read only): Detailed maps of potential well locations – *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixH_AccessRoads_FINAL_Rev00.doc	00	5,716 KB	Appendix H: Detailed maps of potential access roads – *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
AppendixH_AccessRoads_FINALreadonly_Rev00.doc	00	5,716 KB	Appendix H (Read only): Detailed maps of potential access roads – *Construction Plan, Mina Rail Corridor* NRP-R-SYSW-0010-00, (Rev. 00)	Microsoft Word 2003
			**********Last Item**********	

Section III. Metadata

☐ **GIS Metadata** | Projection:

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Nevada Rail Partners	T14/Construction Planning Support – Construction Plan, Mina Rail Corridor – NRP-R-SYSW-0010-00, (Rev. 00) Exhibit I, Item number 16m, RFP Reference Exhibit D-2.14c.2	April 30, 2007	07-00055

All GIS data is preferred in ArcGIS9.1 UTM, NAD1983, Zone11, Feet.	Datum:
	Zone:
	Units:
☐ **CAD Metadata** CAD drawings are preferred in **Bentley MicroStation V8 and/or InRoads** and should adhere to established **CAD standards.**	Level descriptions:
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	Units of Measurement:
	Horizontal and Vertical Datum:

Section IV. Data Screening (Completed by BSC personnel)

Suitable for Review?	Screener Name:	Signature:	Date:
☒ Yes* ☐ No	Cathy Stettler	Cathy Stettler	5/1/07

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REV 00 04-30-07

Section V. STR Disposition of Submittal

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STR Name: Gene Allen		Signature:	Date: 5/1/07

5/1/07

Construction Plan
Mina Rail Corridor

Task 14: Construction Planning Support

Rev. 00

Document No. NRP-R-SYSW-CP-0010-00

prepared by:

NEVADA RAIL PARTNERS

prepared for:

BECHTEL SAIC COMPANY, LLC

Nevada Rail Line Conceptual Design

Subcontract NN-HC4-00239

April 30, 2007

Construction Plan
Mina Rail Corridor

Task 14: Construction Planning Support

Rev. 00

Document No. NRP-R-SYSW-CP-0010-00

Nevada Rail Line Conceptual Design
Subcontract NN-HC4-00239
30 April 2007

Prepared for:
Bechtel SAIC Company, LLC
1180 Town Center Drive
Las Vegas, NV 89144

Prepared by:
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List of Acronyms

AREMA	American Railway Engineering and Maintenance-of-Way Association
BC	Bonnie Claire
BLM	Bureau of Land Management
CMF	cask maintenance facility
Co.	County
CRC	Caliente Rail Corridor
CS	Common Segment
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
EOL	end-of-line
gal	gallons
GF	Goldfield Segment
HLW	high-level radioactive waste
MN	Mina Segment
MOU	Memorandum of Understanding
MOW	maintenance-of-way
MP	milepost
MRC	Mina Rail Corridor
MSC	Mina Common Segment
NDEP	Nevada Department of Environmental Protection
NDOT	Nevada Department of Transportation
no.	number
NRL	Nevada Rail Line
NRP	Nevada Rail Partners
NTTR	Nevada Test and Training Range
OV	Oasis Valley
RA EIS	Rail Alignment Environmental Impact Statement
Repository	Yucca Mountain Geologic Repository
ROW	right-of-way
S	Schurz Segment
S&W	Shannon & Wilson, Inc.
SNF	spent nuclear fuel
SR	State Route
Sta.	Station

UPRR	Union Pacific Railroad
US	U.S. Highway
WRPT	Walker River Paiute Tribe
yd^3	cubic yards

1.1 PURPOSE

The project addressed in this report is the Nevada Rail Line (NRL), a proposed nominal 254-mile railroad in central and southern Nevada. This new rail line, which has been proposed by the U.S. Department of Energy (DOE), would include a new single-track roadbed and ancillary supporting facilities. It would connect the existing national rail system with DOE's potential Yucca Mountain Geologic Repository (Repository). The site would be the nation's first geological repository designed to store and dispose of spent nuclear fuel (SNF) and high-level radioactive waste (HLW). The NRL would provide a means of transporting the waste by rail to the Repository as well as transporting construction materials by rail to support Repository operations. Two potential corridors between the existing national rail system and the Repository have been evaluated: 1) the Caliente Rail Corridor (CRC), beginning near Caliente, Nevada, and 2) the Mina Rail Corridor (MRC), beginning near Fort Churchill, Nevada (see Figure 1-A).

This report describes the construction plan for the MRC. The objective of this report is to provide the Rail Alignment Environmental Impact Statement (RA EIS) Contractor with a conceptual-level description of the construction process and technical activities needed to implement the MRC. This report outlines the construction approach to achieve a completed and operationally functioning rail line by the end of year 2014 (predicated on initial construction activities commencing by October 2009, with actual track construction beginning by July 2011). No discussion of the commercial aspects of construction, such as contractual terms and conditions, is included.

1.2 CONTENTS

This *Construction Plan* includes the following:

- MRC location map (see Figure 1-A)
- Alignment description
  - Earthwork quantities
  - Major bridge construction
  - Signal and communications facilities
  - Operations support facilities
- Significant construction material considerations
- Facilities necessary for construction
  - Construction camps
  - Water requirements
  - Access roads
  - Communications systems
- Construction protocol, including contract requirements
- Environmental considerations, including waste disposal
- Schedule

Most activities described in this report are typical in that they are common to most other Class I freight railroad construction projects executed in rural environments. Certain activities described are unique to the MRC because construction activities are required in very remote areas that lack access and services. The information is also independent of the alignment; that is, fine tuning of the alignment, which is expected as alternative routes are screened and a basis for analysis[1] is identified, will not impact the data provided.

[1] Throughout this and other Nevada Rail Partners (NRP) reports, the phrase "basis for analysis" is used to provide a frame of reference for NRP's evaluations of the alignment's construction engineering and operational characteristics. Except for *Operations and Maintenance Report, Mina Rail Corridor* (NRP 2007g), NRP reports provide data for all alignment segments so that consideration of other alternate alignment segment combinations can be accomplished.

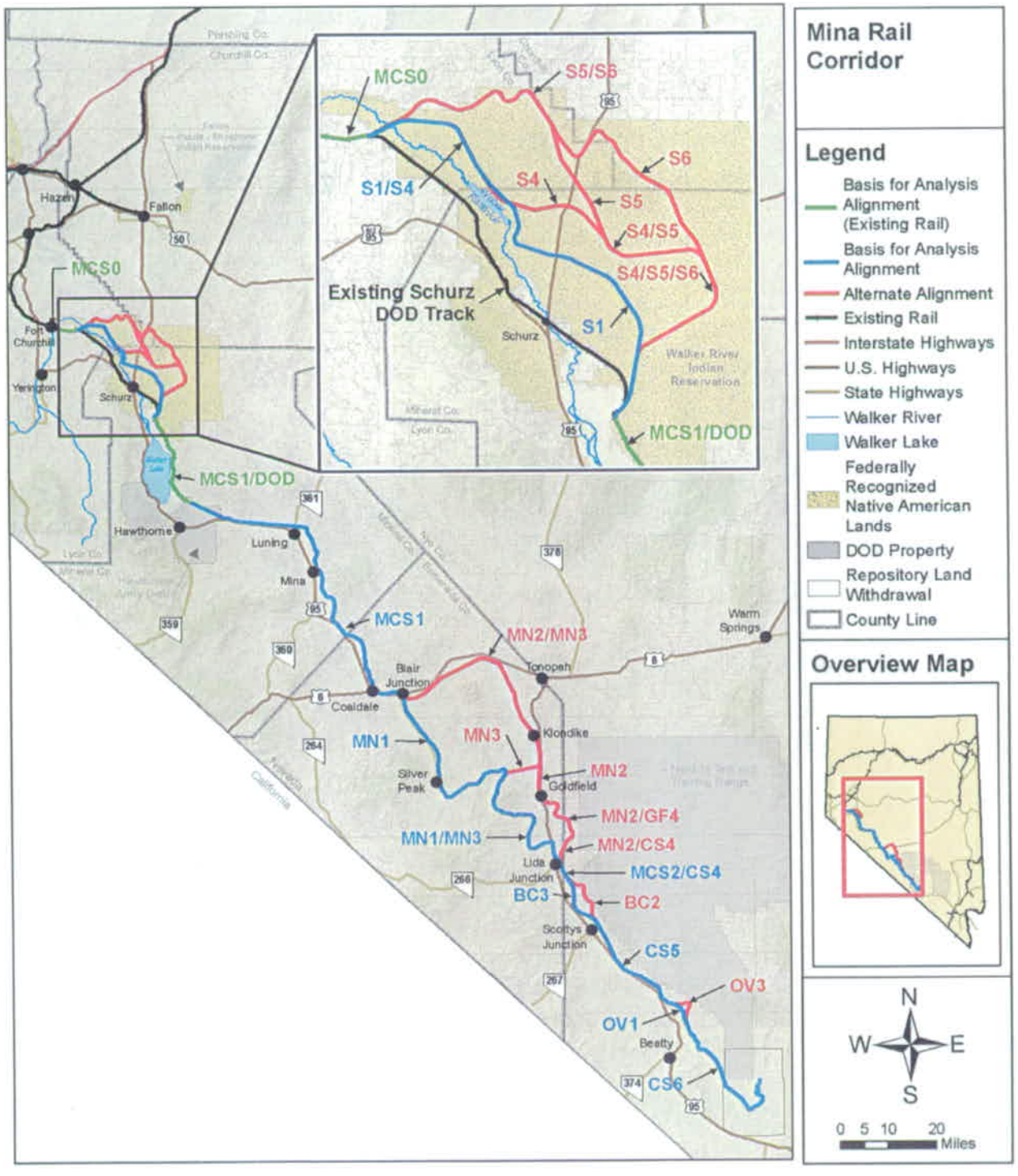

Figure 1-A. Mina Rail Corridor

Technical memoranda on various construction aspects are included as major sections. This report is not a stand-alone document. Sections that overlap or duplicate information contained in *Construction Plan, Caliente Rail Corridor* (NRP 2007d) reference the location of the data in the CRC document.

The following eight appendices to this report contain information supporting the construction plan contained herein:

- Appendix A – Field Evaluation of the Garfield Hills Quarry Site
- Appendix B – Field Evaluation of the Gabbs Range Quarry Site
- Appendix C – Field Evaluation of the North Clayton Quarry Site
- Appendix D – Field Evaluation of the West Goldfield (ES-7) Quarry Site
- Appendix E – Field Evaluation of the Malpais Mesa South Quarry Site
- Appendix F – Aerial Photography of Construction Camp Locations
- Appendix G – Well Location Detail Maps
- Appendix H – Access Road Detail Maps

This report is one of several prepared to support and provide initial input to the first draft of the *Rail Alignment Environmental Impact Statement* (RA EIS). The other reports are as follows:

- *Air Quality Emission Factors and Socioeconomic Input, Mina Rail Corridor* (NRP 2007a)
- *Alignment Development Report, Mina Rail Corridor* (NRP 2007b)
- *Comparative Cost Estimates, Mina Rail Corridor* (NRP 2007c)
- *Facilities—Design Analysis Report, Mina Rail Corridor* (NRP 2007f)
- *Operations and Maintenance Report, Mina Rail Corridor* (NRP 2007g)
- *Route Sections and Structures Report, Caliente Rail Corridor* (NRP 2007h)

Each report covers a specific topic for a specific purpose. Accordingly, each report utilizes data from various sources in varying levels of detail and precision as appropriate, as well as in different contexts. Although the reports are consistent in overall conceptual design, numerical values for certain parameters may vary from one report to another. This variation is due to the conceptual nature of the reports and their distinct areas of focus; it should not be considered an abnormal situation or an indication of error.

2.1 DESIGN CRITERIA

Refer to Section 2.1 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

The MRC basis for analysis alignment is approximately 254 miles long. However, different combinations of common segments and alternate alignment segments would produce rail lines of different lengths. The longest and shortest potential routes are outlined in *Alignment Development Report, Mina Rail Corridor* (NRP 2007b).

2.2 EARTHWORK

The 254-mile-long basis for analysis alignment has been separated into six distinct zones based on terrain. Table 2-1 lists the earthwork quantities required to construct the segments within each zone. The quantities shown are preliminary numbers subject to further engineering analysis.

Table 2-1. Earthwork Quantities for the Basis for Analysis Alignment

Zone	Length (miles)	Excavation (cubic yards [yd^3])				Fill (yd^3)	
		Common	Rippable Rock	Drill and Blast	Borrow (Mixed)	Place Embankment	Excess Excavation
Mina Common Segment (MCS) 0	-	0	0	0	74,500	56,000	0
Schurz Segment (S) 1	31.9	975,000	553,000	104,000	687,000	2,013,000	
MCS1/U.S. Department of Defense (DOD)	-	0	0	0	74,500	56,000	
MCS1	72.2	464,000	118,000	333,000	7,785,000	6,738,000	
Mina Segment (MN) 1	73.1	1,502,000	3,874,000	905,000	6,424,000	9,949,000	0
MN2/Common Segment (CS) 4, Bonnie Claire (BC) 3 and CS5	39.3	471,000	339,000	82,000	2,039,000	2,375,000	0
Oasis Valley (OV) 1 and CS6	37.96	5,563,000	612,000	1,581,000	882,000	4,567,000	3,724,000
Project Totals	**254**	**8,975,000**	**5,496,000**	**3,005,000**	**17,966,000**	**25,754,000**	**3,724,000**

2.3 BRIDGES

Bridges that would be required along the alignment would be standard railroad concrete trestle-type structures. These structures would have to be completed during earthwork activities to support follow-on trackwork activities. Similar activities for the balance of the alignment would be required during those earthwork efforts. Two major structures would be constructed regardless of the alignment chosen. The Walker River Bridge would include 26 40-foot-long spans to total 1,040 feet and would require approximately one year to construction. At Beatty Wash, a 1,027-foot-long bridge, 165 feet high, would be required, with a two-year construction duration expected.

2.4 SIGNAL SYSTEM

Refer to Section 2.4 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

2.5 COMMUNICATIONS SYSTEM

Refer to Section 2.5 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

2.6 FACILITIES

Several rail facilities would be required to support operations of the SNF and HLW trains, other commercial freight trains, and the maintenance-of-way (MOW) equipment. The Hawthorne staging yard would be located at the northern end of the alignment near Hawthorne. The interchange traffic from the Union Pacific Railroad (UPRR) would be delivered to the staging yard for preparation to transit the NRL. At the southern terminus (Yucca Mountain), an end-of-line facility (EOL) would receive trains for transfer to the Repository. Both the staging yard and the EOL facility are designed to accommodate the expected volume of general freight traffic as well and would be equipped with locomotive-servicing facilities.

At the EOL facility, right-of-way (ROW) has been identified to accommodate a cask maintenance facility (CMF). This facility would encompass a series of buildings and tracks to support the national fleet of equipment for the SNF and HLW trains.

In addition, an MOW facility would be constructed to support rail operations. MOW capabilities would include routine maintenance of NRL rolling stock and the housing of facility maintenance equipment. Locations for the MOW facility have been identified on the MN1 and MN2 alignments at Silver Peak and Klondike, respectively. The Silver Peak MOW is the basis for analysis location.

The major facilities contemplated and the total capacity for 60-foot cars that could be stored at each facility are as follows:

- Hawthorne staging yard (which would include UPRR interchange tracks), with a total capacity of 633 cars
- MOW facility, with a total capacity of 292 cars
- EOL facility at the Repository, with a total capacity of 616 cars

These facilities would include rail yards. The staging yard and EOL facility would also incorporate locomotive servicing areas in the yard layouts.

Two segments of the parallel alignment access road would be paved to provide service roads for the Hawthorne staging yard and the selected MOW facility. Approximately 7.9 miles of service roads would be paved for access to the staging yard; 1.0 mile would be paved for the Silver Peak MOW facility, and 1.8 miles would be paved for the Klondike MOW facility. Additional details on the MRC facilities are included in *Facilities–Design Analysis Report, Mina Rail Corridor* (NRP 2007f).

2.7 SIDINGS

It is expected that 12 sidings, located an average of about 25 miles apart, would be constructed along the alignment. Proposed siding locations are identified in *Operations and Maintenance Report, Mina Rail Corridor* (NRP 2007g). Each siding would be 7,000 feet long and would accommodate maintenance equipment and bad order car set-out, except for those at Montezuma Summit, the Goldfield Hills, and Bonnie Claire. These sidings would be 19,000 feet, 10,000 feet, and 10,500 feet long, respectively, because of steep grades and mountainous terrain. One other exception is the siding that would be constructed along the MCS0 segment; this siding would measure 5,000 feet long because of ROW restrictions. During construction, all of the siding locations would be used as staging areas and temporary

rail yard locations. An additional area of 8 to 16 acres would be required along the sidings for the staging areas (50 to 100 feet wide by 7,000 feet long). If commercial operations occur, then there may be a need for additional sidings to be constructed.

2.8 EXISTING DOD TRACK

Existing DOD track comprises 53.9 miles of the alignment from Fort Churchill at DOD milepost (MP) 53.9 to the Hawthorne Army Depot at DOD MP 0.0. Approximately 26.6 miles of this DOD segment would be rehabilitated, including concrete tie installation, ballast cleaning, and tamping of the existing track. In addition, signal and communications systems would be added in coordination with construction of the new MRC segments.

Two of the 12 sidings described in Section 2.7 would be constructed along existing DOD track. One 5,000-foot-long siding would be located on the MCS0 segment at approximately DOD MP 52.0. The other 7,000-foot-long siding would be located on the MSC1/DOD segment at approximately DOD MP 14.50.

The remaining 27.3 miles of DOD track that passes through the town of Schurz would be removed; this existing segment is shown in the callout box in Figure 1-A. This work would include removal of the existing rail for use elsewhere along the alignment; removal and disposal of the timber ties; grading of the ballast section; and paving of the existing road crossings once the track has been removed.

3.1 BALLAST REQUIREMENTS AND QUARRIES

3.1.1 Introduction and Data Sources

Ballast for rail construction would be obtained from new quarries developed along the NRL alignment. The quantity of ballast required is estimated to be 2,800,000 net tons. Quarry development would allow ballast requirements to be met in close proximity to the construction alignment, thereby reducing transportation costs. Dedicated quarry facilities would also help to ensure supply; acquiring ballast from outside sources could introduce uncertainty should the NRL not have primary access to ballast sources.

Data and information on quarry sites were obtained from Shannon & Wilson, Inc. (S&W 2005, 2006, 2007a). S&W conducted a series of field investigations in November 2005 and October and November 2006 to determine the topographic and geologic suitability of potential sites for quarry development. The results of the S&W field investigations are included in Appendices A through E of this *Construction Plan, Mina Rail Corridor*. Each field report provides information on site features, deposit features, and environmental features, as well as photographs of the general area.

3.1.2 Ballast Quantity Requirements

Track Ballast – Refer to Section 3.1.2 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d). A total of 2.8 million tons of ballast would be required for MRC track construction.

Subballast – Approximately 75 percent of the rock from each pit would be processed into usable ballast. The remaining 25 percent would result in fines and other waste. Some of the remaining material may be suitable for subballast or road construction.

Additionally, the remaining subballast requirements would be obtained from either cuts made for constructing the roadbed or from existing borrow pits and quarries located along the alignment. The MRC incorporates an insufficient number of cut sections to generate the required 2.4 million tons of subballast. Therefore, subballast sources located approximately 10 miles apart (no farther than 20 miles apart) along the alignment would need to be developed during construction to provide the required materials. Figure 3-A presents a typical subballast materials source layout. Figure 3-B illustrates an inventory of existing and previously developed quarries along the corridor that have generated materials similar to the subballast required for this project. Approximately 55 surplus pit locations are available adjacent to Nevada Department of Transportation (NDOT) materials sources. New quarry sites could be developed proximate to the sites shown in Figure 3-B as an alternative to using the existing sites (S&W 2007b).

Sand and Gravel – Total sand and gravel quantities have not been estimated. These materials would be derived from on-site excavation and other commercially available sources near the proposed corridor.

3.1.3 Quarry Requirements

Refer to Section 3.1.3 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

3.1.4 Recommended Quarry Sites

An initial literature search produced 28 potential candidate areas for MRC ballast material production. Of the initial 28 candidate areas, 10 sites were selected for further study because of their proximity to the MRC. All 10 sites are expected to contain ballast material of sufficient quality to meet American

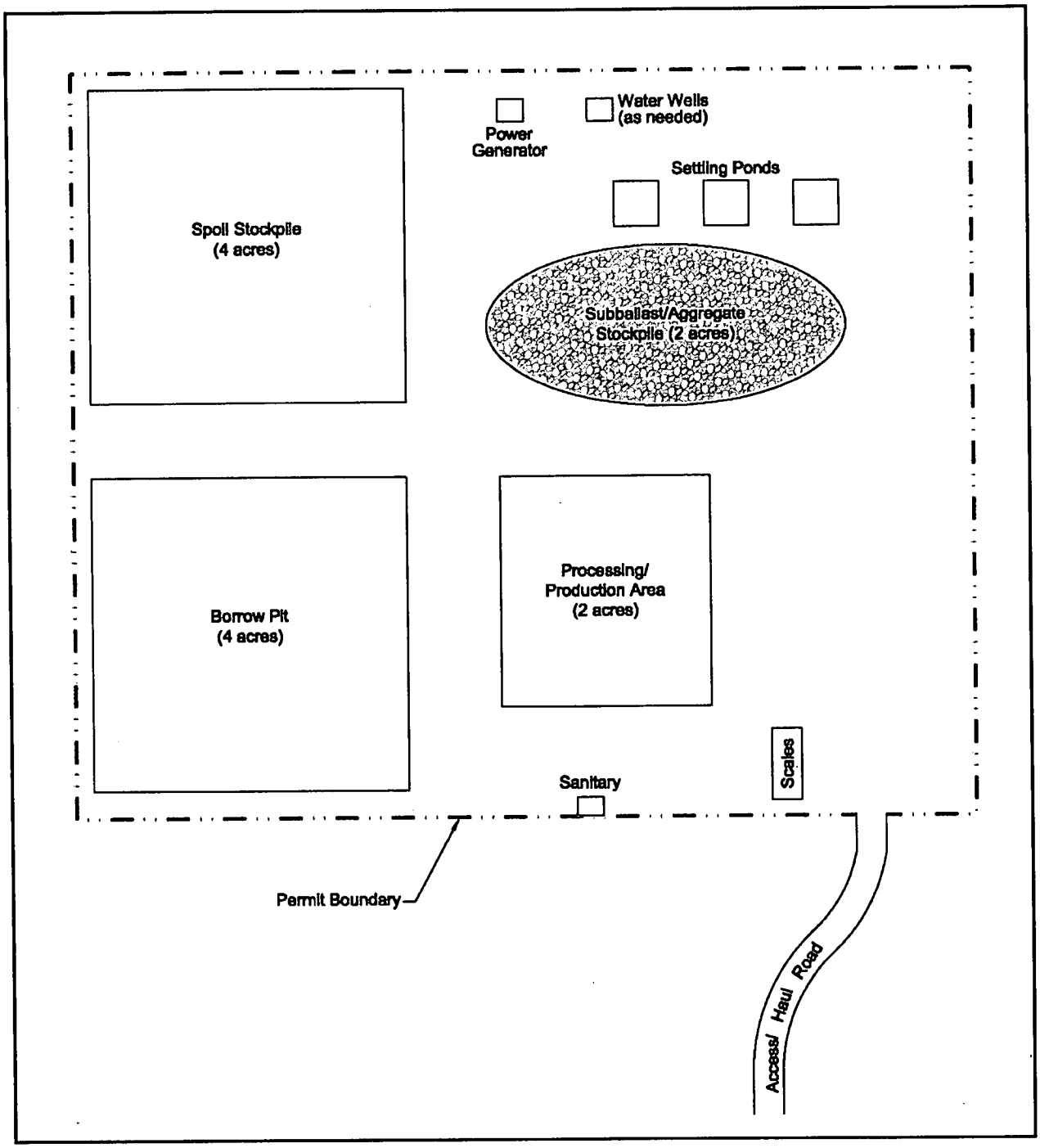

Figure 3-A. Typical Subballast Materials Source Layout

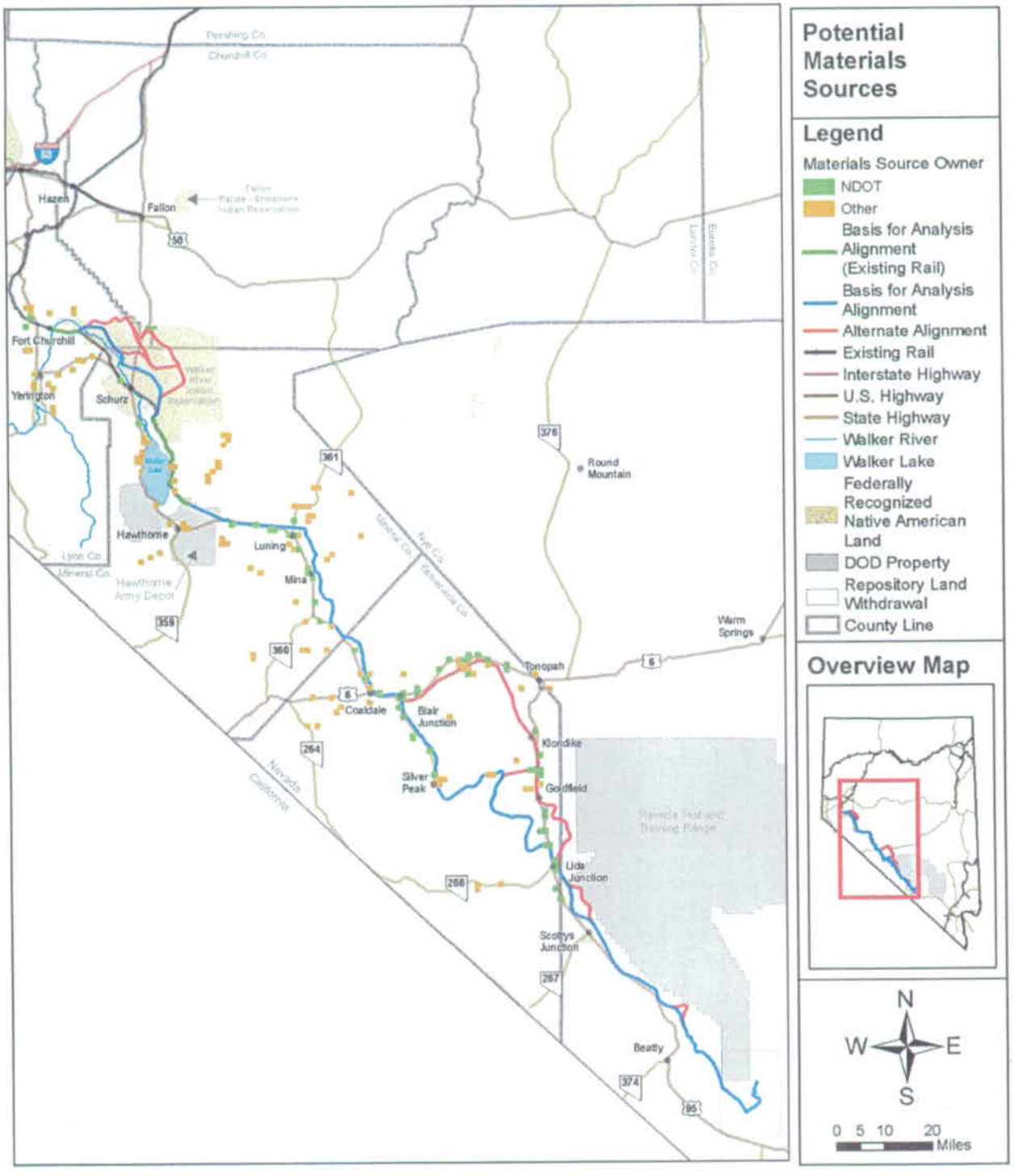

Figure 3-B. Additional Subballast Materials Sources

Railway Engineering and Maintenance-of-Way Association (AREMA) standards. The potential quarry locations were prioritized by material availability, environmental impact, and location. After completion of the field surveys, five areas were identified for further study based on factors such as proximity to the MRC, land status, strategic construction location, and sufficient ballast material quantity.

The five remaining candidate areas were determined to have sufficient topographic and geologic characteristics to accommodate quarry facilities. The five quarry sites have no significant differences in material quantity or quality, but the Weber Dam site was determined to involve a higher level of environmental impact given its location on the Walker River Indian Reservation.

Thus, four sites were selected from the MRC ballast material source analysis as potential quarry locations subject to further environmental analysis. One of the potential CRC ballast sources, the West Goldfield (ES-7) quarry site, would also be available, bringing the MRC total to five (see Figure 3-C for the MRC quarry locations).

Barring any significant environmental impacts, the criteria that will direct the selection of two quarry sites during final design are proximity to the rail alignment and site location. Proximity to the rail line improves the logistics of transporting ballast to the alignment. Locating one quarry site at the beginning of the MRC (near Hawthorne) and one quarry site midway along the MRC (near Goldfield) would help to reduce construction costs associated with transporting the finished ballast product. For information on each of the five potential sites, see the field investigations in Appendices A through E.

Two of the five quarry sites would be developed on an as-needed basis. In the northern part of the alignment, the Garfield Hills and Gabbs Range sites are available east of Hawthorne (see Figures 3-D and 3-E). In the central part of the alignment, the North Clayton, West Goldfield (ES-7) and Malpais Mesa South sites are located west or south of Goldfield (see Figures 3-F, 3-G and 3-H).

The Garfield Hills and Gabbs Range sites could be developed regardless of the chosen alignment. The North Clayton, Malpais Mesa South, and West Goldfield (ES-7) quarry sites are alignment specific. The North Clayton site would be developed if either the MN1 or MN1/MN3 alignment is selected; the Malpais Mesa South site would be developed if the MN1/MN3 alignment is selected; and the West Goldfield (ES-7) site would be developed if the MN2/Goldfield (GF) 4 alignment is selected.

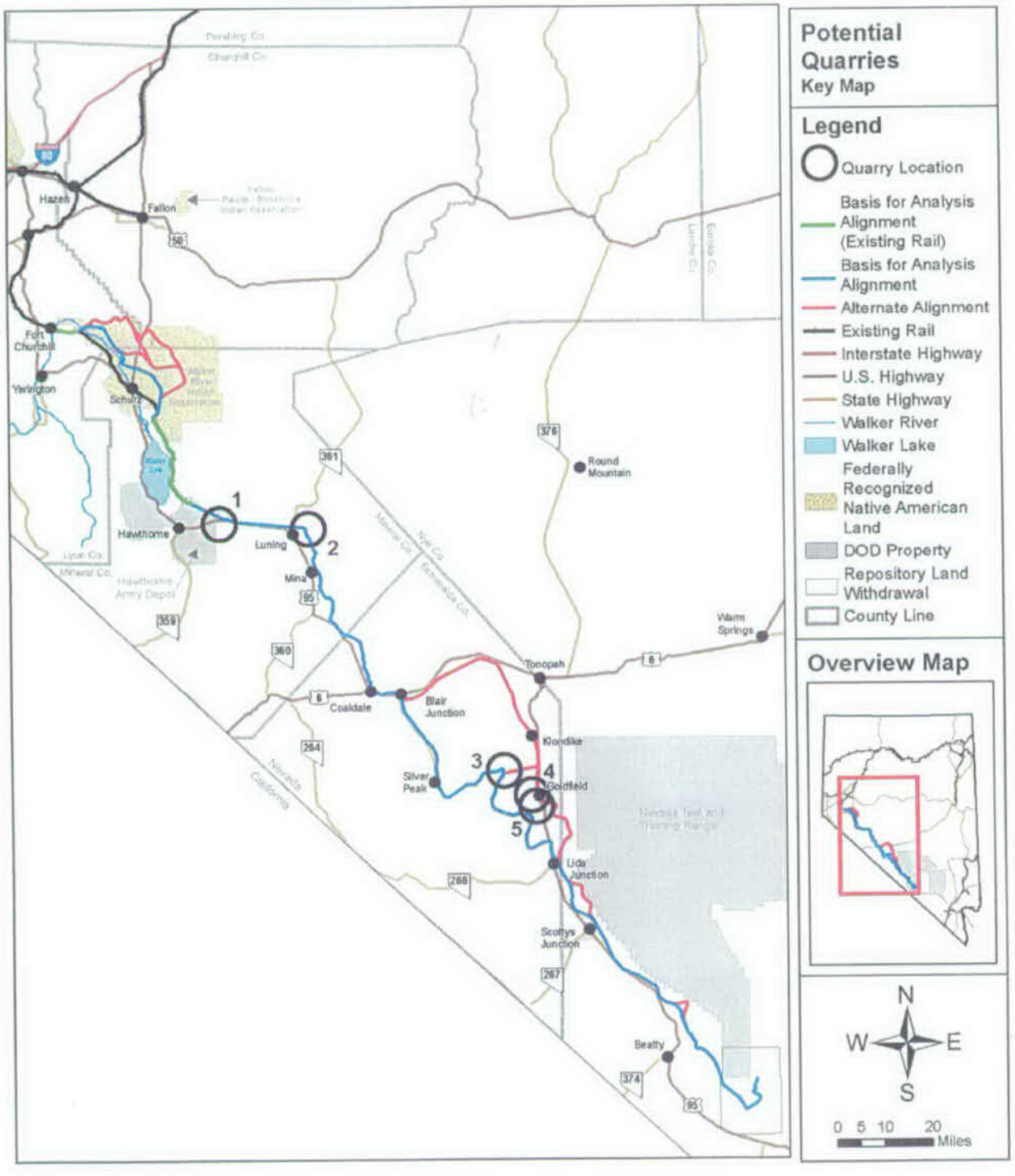

Figure 3-C. MRC Quarry Location Key Map

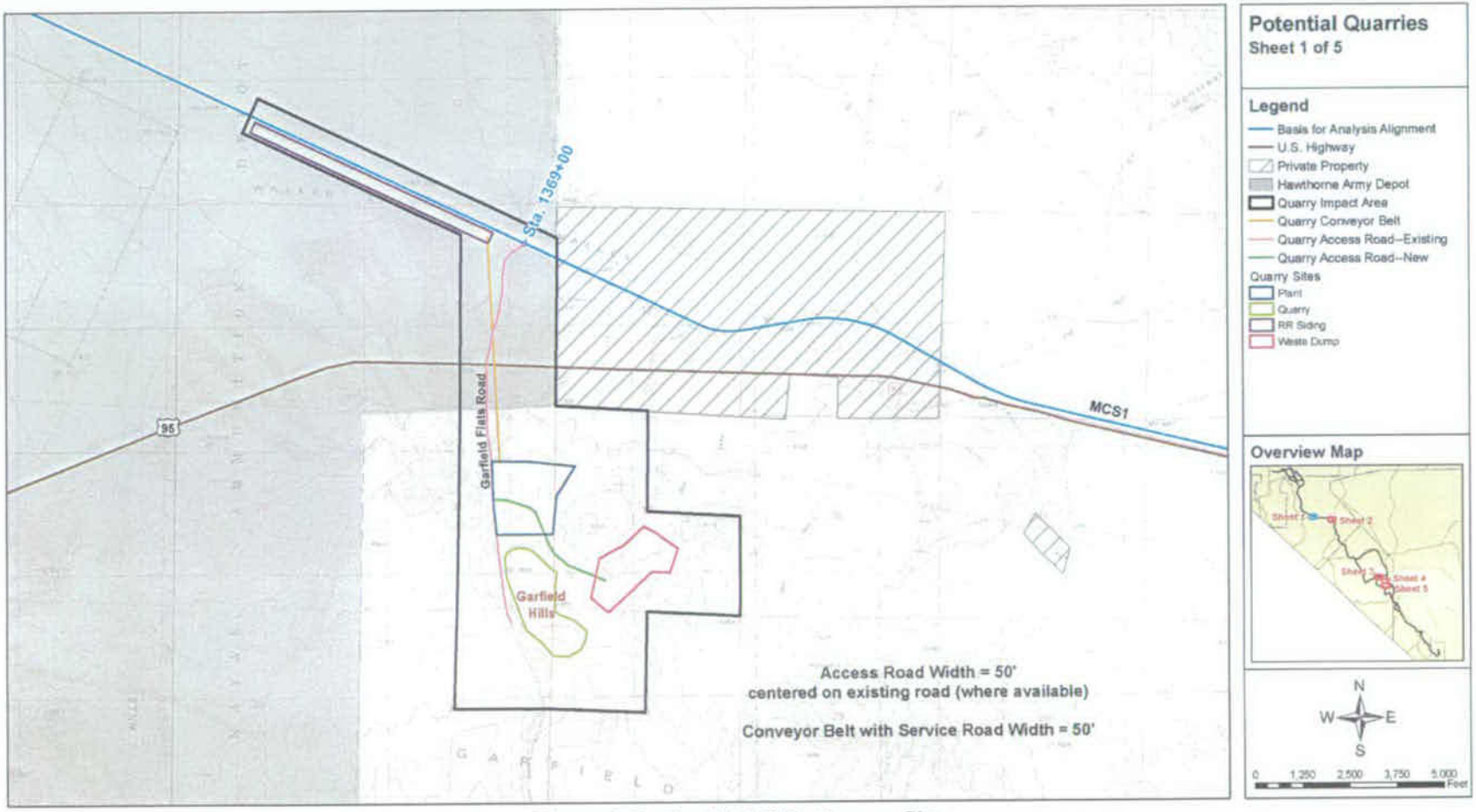

Figure 3-D. Garfield Hills Quarry Site

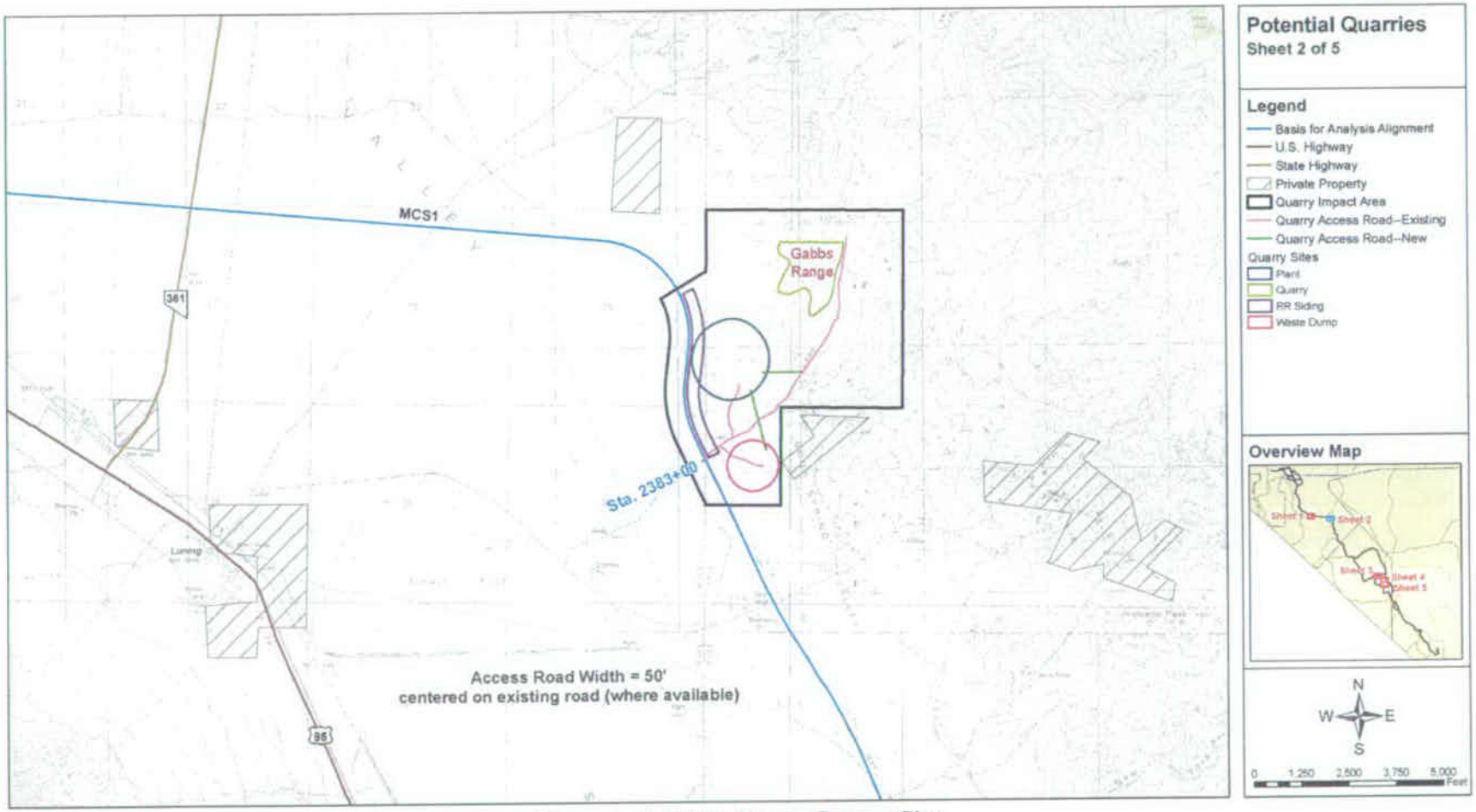

Figure 3-E. Gabbs Range Quarry Site

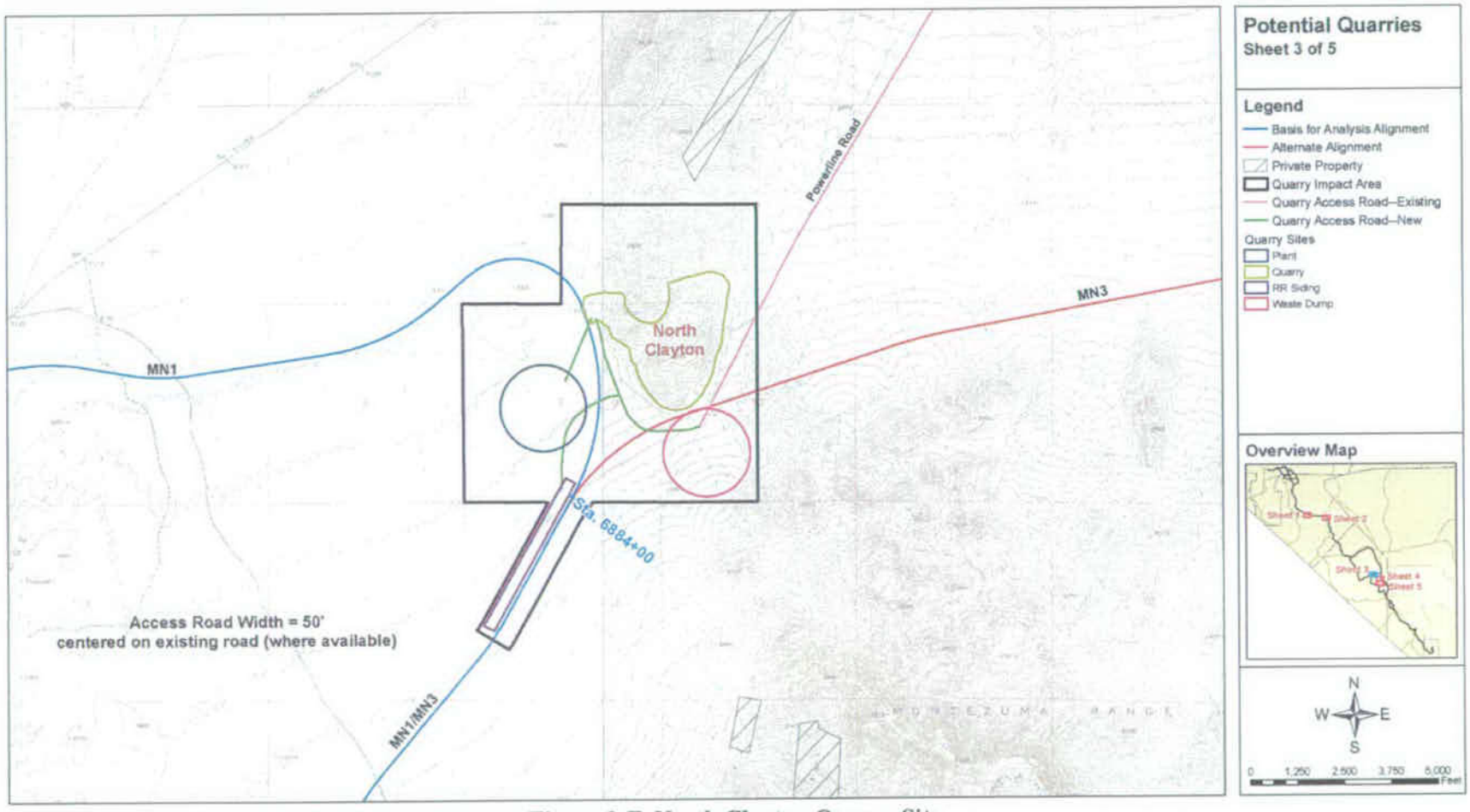

Figure 3-F. North Clayton Quarry Site

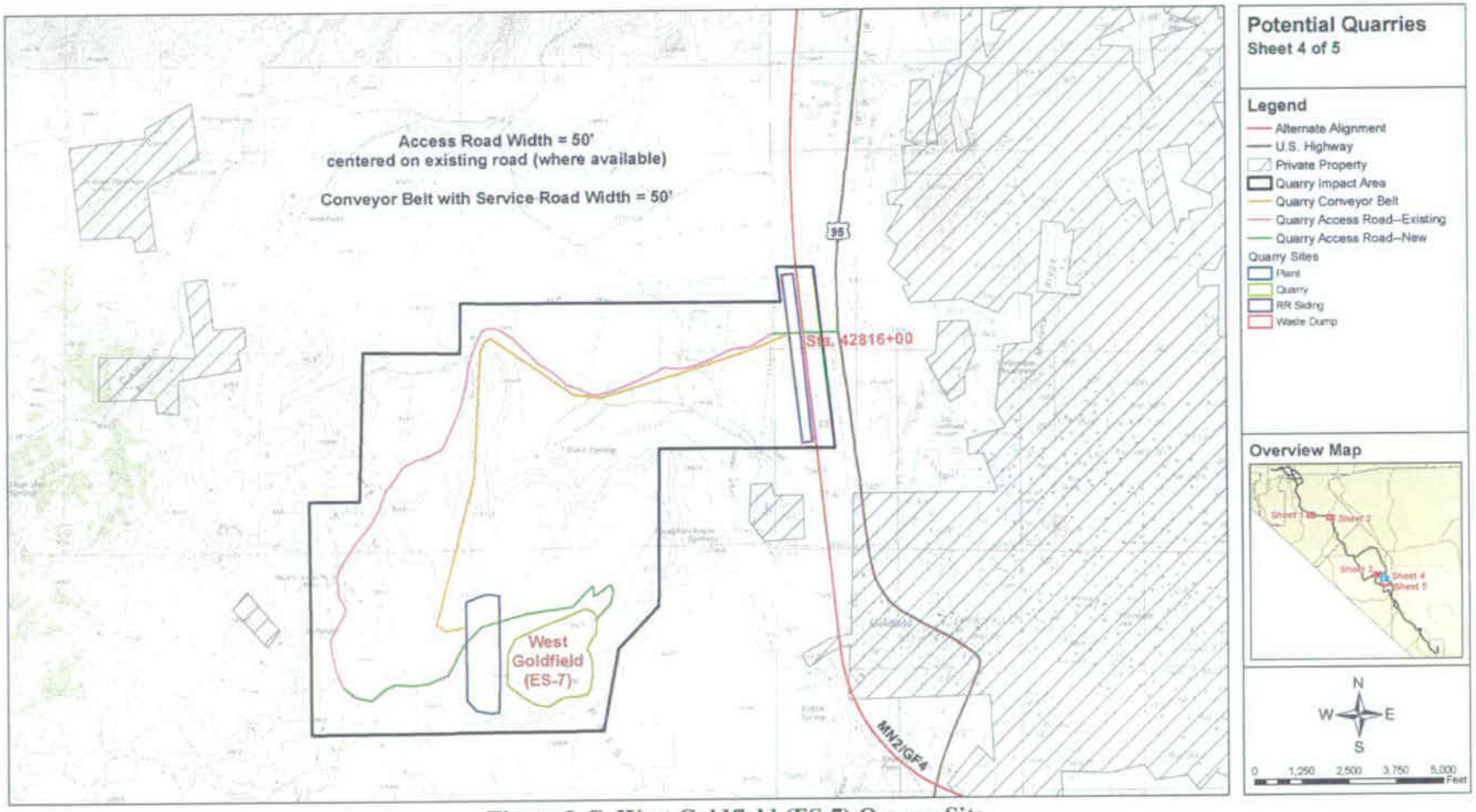

Figure 3-G. West Goldfield (ES-7) Quarry Site

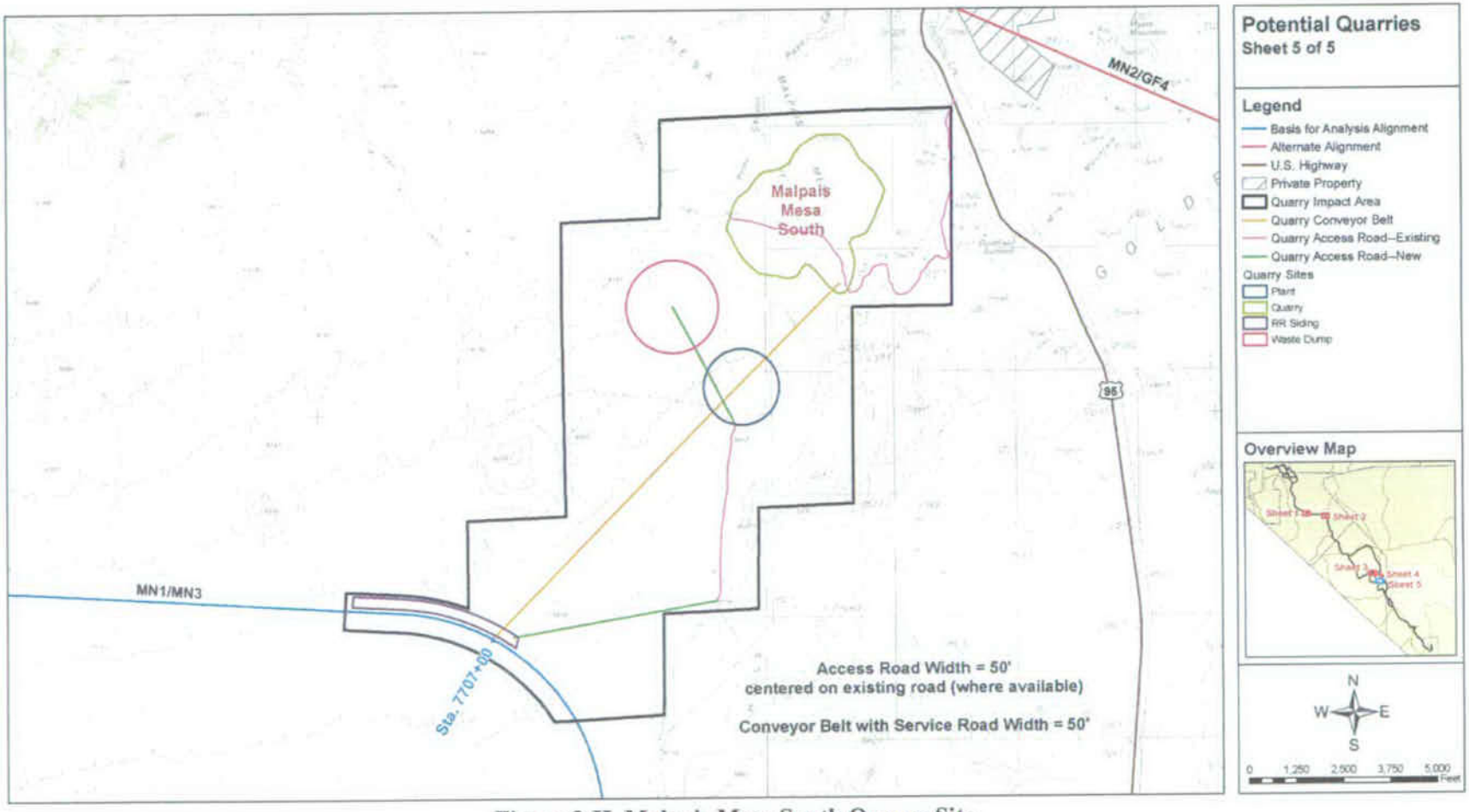

Figure 3-H. Malpais Mesa South Quarry Site

3.2 CONCRETE TIES

Concrete ties have been identified as the type of cross tie for use on the NRL based on the current best cost and life cycle value. Both standard cross ties and switch ties would be concrete. The estimated quantity required is 784,000 (24-inch center to center) concrete cross ties for standard track construction and over 100 sets of switch ties for the turnouts at sidings and yard tracks. An additional 70,000 ties would be required for DOD track rehabilitation. Commercially available manufacturers should be able to supply these quantities over the two-year delivery requirement to meet track construction production rates. These commercially produced ties would be transported by rail to Hawthorne, which would be the primary location for marshalling ties over the MRC alignment. It is also possible that a tie producer (or a contractor) would establish a dedicated tie production facility at Hawthorne (or in another area). (Note: wood cross ties and switch ties are not precluded from use on the NRL project based on assessments of cost and life cycle value at the time construction actually occurs.)

3.3 RAIL

Rail for the NRL project would be 136 RE[2] welded rail. The nominal MRC alignment of 254 miles, plus sidings and yard tracks, approximates 2,176 strings, each 1,440 feet long. It is anticipated that 80-foot-long rails would be delivered by rail from the rail manufacturing plants to Hawthorne for welding into the 1,440-foot-long strings and would be distributed along the MRC by dedicated welded rail trains. A portable welding plant would initially be set up at Hawthorne and later relocated along the alignment at 50- to 100-mile increments to weld the 80-foot-long rail into strings. Alternatively, off-line welding of the rail is possible but would require dedicated welded rail trains to support track construction activities. These trains would be subject to the same conditions outlined above for movement of ballast over the UPRR.

3.4 CONCRETE

Refer to Section 3.4 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

3.5 STEEL

Refer to Section 3.5 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

[2] RE indicates an AREMA specification.

4.1 CONSTRUCTION CAMPS

4.1.1 Camp Locations and Criteria

Refer to Section 4.1.1 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

Up to 10 camps would be constructed along the length of the MRC. Tables 4-1 and 4-2 list the selected locations of the construction camps and each primary access point, from north to south, for the basis for analysis and for the alternate alignment segments, respectively. Figure 4-A shows the construction camp locations along the MRC. Appendix F contains aerial coverage of each selected location.

Table 4-1. Construction Camp Locations on the MRC Basis for Analysis

Camp No.	Approximate Station	Primary Access Point
18A	10939+00	U.S. Highway (US) 95
17	DOD MP 0.8	Thorne Road
16	2202+00	State Route (SR) 361
15	3470+00	Unnamed road
14	4783+00	US 6
13A	5902+00	Silver Peak Road
9A	8345+00	Unnamed road
10	15176+00	Unnamed road
11	16391+00	Fleur de Lis Road to Cat Canyon Road
12	17760+00	Unnamed road

Table 4-2. Construction Camp Locations on the MRC Alternate Alignment Segments

Camp No.	Approximate Station	Primary Access Point
18D	10914+00	Unnamed road
18C	10985+00	US 95
18B	10854+00	US 95
13B	6755+00	Unnamed road
9	13809+00	Unnamed road

Cost estimates for construction of the camps are provided in *Comparative Cost Estimates, Mina Rail Corridor* (NRP 2007c).

4.1.2 Camp Components

Personnel and Housing – Refer to Section 4.1.2 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d). For an overview of MRC staffing requirements, refer to Table 1 in Appendix D of *Air Quality Emission Factors and Socioeconomic Input, Mina Rail Corridor* (NRP 2007a).

Support, Offices, and Auxiliary Components – Refer to Section 4.1.2 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

Utilities –Refer to Section 4.1.2 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

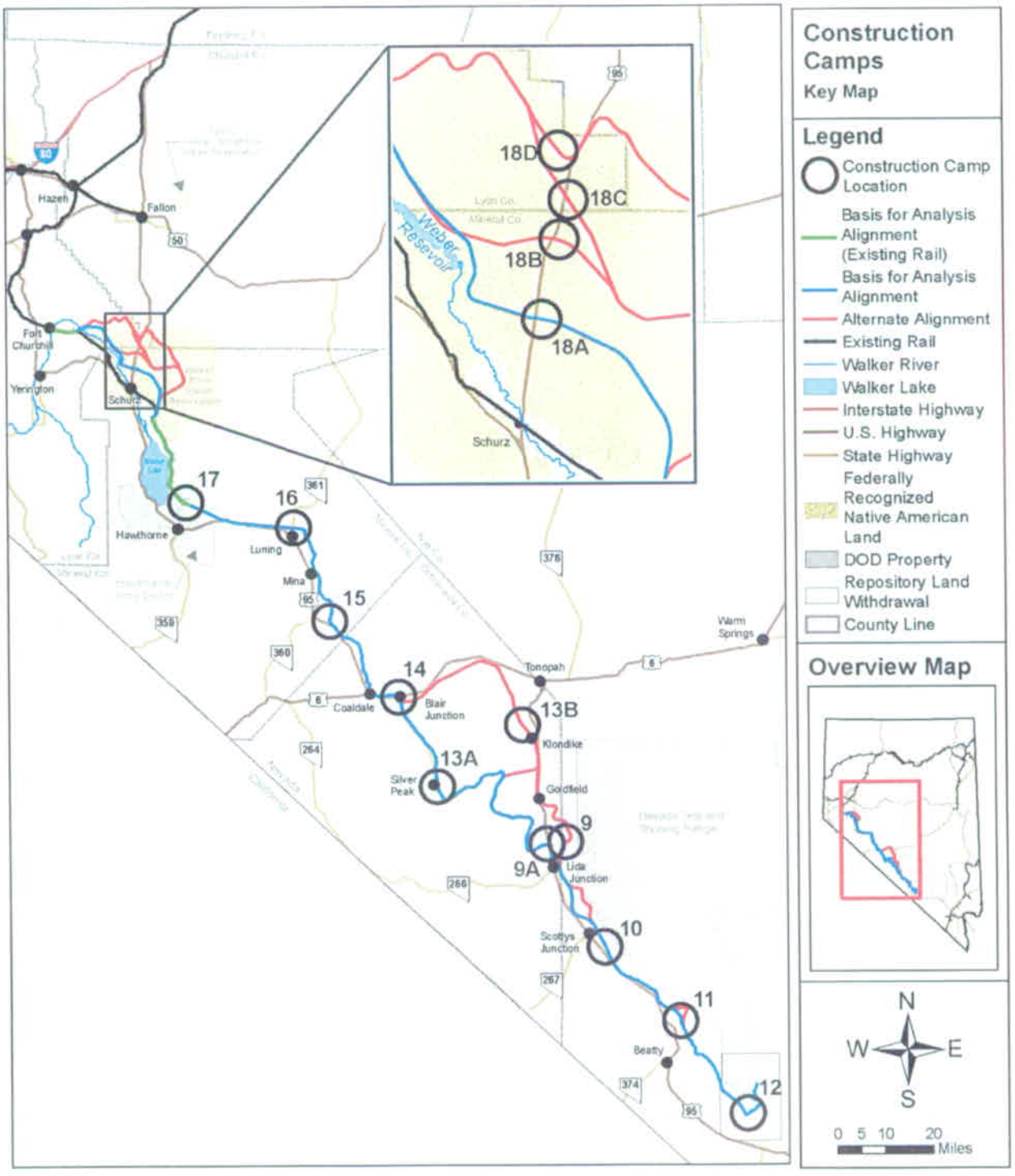

Figure 4-A. MRC Construction Camp Key Map

Contractor Work Area – Refer to Section 4.1.2 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d). Additional staging and storage/lay-down areas would be available at the Hawthorne staging yard, the MOW facility, the Repository, and the track sidings locations along the alignment.

4.1.3 Area of Disturbance Summary

Refer to Section 4.1.3 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

4.2 EQUIPMENT LAYDOWN AREAS

Refer to Section 4.2 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

4.3 TEMPORARY FACILITIES

Refer to Section 4.3 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

The siding locations would be utilized as staging areas. It is envisioned that, as work progresses to the south, the contractor would move staging areas to the next forward siding location. Consequently, the embankment areas would be widened to accommodate temporary tracks and lay-down areas. This approach will be taken into account in establishing land requirements for the ROW.

During construction of the railroad, numerous work trains would operate over the alignment. To manage the dispatching of those trains and their maintenance, an operations control center for construction would be required. For construction progressing from the Hawthorne terminus southward, the Hawthorne staging yard would be the logical location for this activity.

4.4 CONSTRUCTION WATER REQUIREMENTS

4.4.1 Introduction

Water requirements for the project during construction fall into four general categories:

- Water for earthwork compaction
- Water for construction personnel
- Water for dust control
- Water for ballast quarry operations

The total amount of water required for these activities is estimated to be 5,950 acre-feet. This estimate is based on cut and fill quantities derived from 5-foot contour mapping. The source of water is planned to be wells drilled along the alignment in proportion to the localized demand from each of the activity categories. Approximately 130 potential wells have been identified for the basis for analysis, the alternate alignment segments, the construction camps, and the quarries. For cost estimation purposes, however, it is assumed that approximately 84 wells would be drilled to support construction of the basis for analysis. Well development information was obtained from Converse Consultants (Converse Consultants 2007a). Well location data were provided electronically by Converse Consultants on 14 March 2007.

Demand quantities were developed from *Engineered Plan & Profile Drawing Set, Mina Rail Corridor* (NRP 2007e), *Facilities–Design Analysis Report, Mina Rail Corridor* (NRP 2007f), and *Comparative Cost Estimates, Mina Rail Corridor* (NRP 2007c). Ongoing engineering work utilizing 5-foot contour mapping since the development of those documents may result in changes to the final quantities used to develop the demand forecasts. The earthwork analysis is trending toward a reduced quantity demand; therefore, demand quantities used for this report are viewed as a bounding condition.

4.4.2 Quantity Requirements

Earthwork Compaction – The largest use of water for this project would be for the compaction of approximately 25,642,000 yd^3 of alluvial fill material to construct the embankment areas of the roadbed and facilities. This total is based on the basis for analysis (see Figure 4-B, MRC Hydrographic Areas). Alternate alignment segments have also been analyzed for water demand, and their individual selection and substitution would cause the total demand quantity to vary accordingly. Current compaction practices in southern Nevada require, on average, 90 gallons (gal) of water per cubic yard of alluvial fill material, including appropriate dust control during placement. Thus, this activity would require a total of 1.7 billion gal, or 5,350 acre-feet of water.

Construction Personnel – For information on the second-highest water requirement, water for construction personnel, refer to Section 4.4.2 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

Dust Control – Dust control along access roads would require the third-highest amount of water. Refer to Section 4.4.2 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

Ballast Quarry Operations – The least-demand source is water for the operation of a ballast quarry. Water would be used primarily for washing the ballast and would be recirculated through settling ponds. This activity would require a total of approximately 10,000,000 gal, or 30 acre-feet of water.

4.4.3 Water Demand by Hydrographic Area

The water sources for project construction are located in 18 hydrographic areas[3] (see Figure 4-B). Table 4-3 details the demand for water by hydrographic area for the basis for analysis. The quantities shown in Table 4-3 were used as the basis for the total project demand of approximately 5,950 acre-feet. Table 4-4 details the demand for water by hydrographic area for the alternate alignment segments. The water demand totals include the water required for construction of the Hawthorne staging yard (including UPRR interchange tracks), the MOW facility, and the EOL facility. Table notes indicate the hydrographic area in which each facility is located. For specific water requirements for facility construction and operation, refer to *Facilities–Design Analysis Report, Mina Rail Corridor* (NRP 2007f).

4.4.4 Water Source Availability

In each hydrographic area, water availability was reviewed to determine well siting to meet demand as shown in Tables 4-3 and 4-4. Well production capacities were calculated at varying flow rates; refer to *Hydrogeologic DEIS Analysis Report, Mina Rail Corridor* (Converse Consultants 2007a) for a discussion of this methodology and the existing hydrogeologic conditions. The combination of the demand locations and production parameters resulted in the need for 130 potential wells to satisfy demand. The number of new well sites by hydrographic area is listed in Table 4-5. Proposed locations of new well sites are shown in Appendix G. Of the 130 wells, approximately 100 are located within the construction ROW, 20 are located beyond the construction ROW, and 10 are located at quarry sites. The actual number of wells required for the project would vary based on the actual flow rate of successfully drilled wells. As mentioned in Section 4.4.1, approximately 84 wells are expected to be drilled to support construction of the basis for analysis.

Refer to Section 4.4.4 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

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[3] The term "hydrographic area" is sourced from *Water Resources Assessment, Mina Rail Corridor* (Converse Consultants 2007b) and is defined on page 22 of that document.

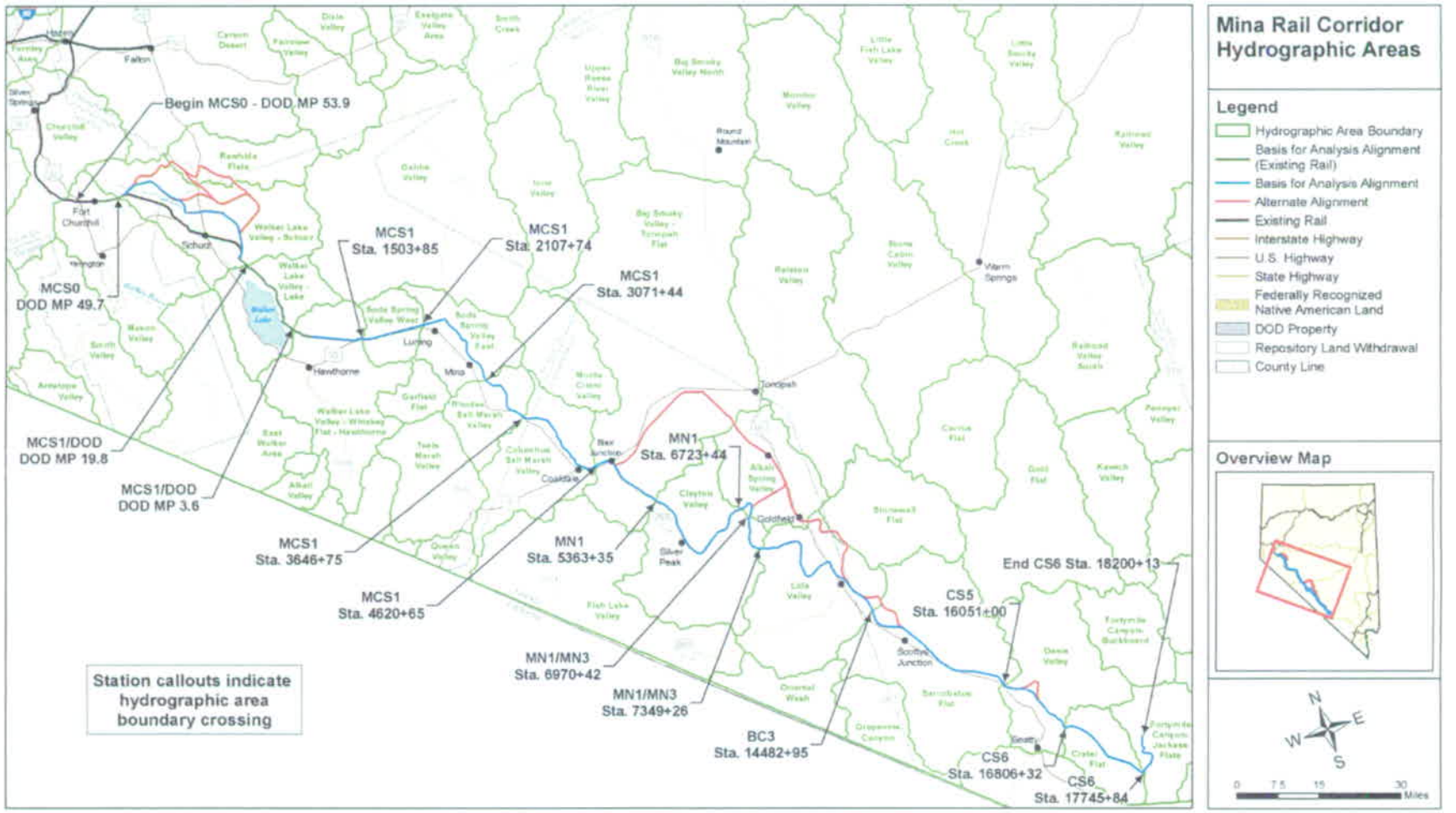

Figure 4-B. MRC Hydrographic Areas

Table 4-3. Water Requirements by Hydrographic Area for the MRC Basis for Analysis

Hydrographic Area	Segment	Beginning Station of Hydrographic Area	Ending Station of Hydrographic Area	Segment Length within Hydrographic Area (miles)	Earthwork Water Requirements (acre-feet)	Other Water Requirements (acre-feet)	Total by Hydrographic Area (acre-feet)
Mason Valley	MCS0	DOD MP 53.9	DOD MP 49.7	5.0	12.5	9.2	**21.7**
Walker Lake Valley – Schurz	S1	10000+00	11682+70	31.9	416.6	58.7	**475.3**
Walker Lake Valley – Lake	MCS1/DOD	DOD MP 19.8	DOD MP 3.6	18.0	12.5	33.1	**45.6**
Walker Lake Valley – Whiskey Flat – Hawthorne	MCS1/DOD	DOD MP 3.6	DOD MP 0.0	3.6	NA	6.6	**143.1**
	MCS1	1000+00	1503+85	9.5	119.0	17.5	
Soda Spring Valley West	MCS1	1503+85	2107+74	11.4	152.7	21.0	**173.7**
Soda Spring Valley East	MCS1	2107+74	3071+44	18.3	450.9	33.7	**484.6**
Rhodes Salt Marsh Valley	MCS1	3071+44	3646+75	10.9	255.5	20.1	**275.6**
Columbus Salt Marsh Valley	MCS1	3646+75	4620+65	18.4	311.8	33.9	**345.7**
Big Smoky Valley – Tonopah Flat	MCS1	4620+65	4812+14	3.6	71.1	6.6	**170.6**
	MN1	4809+29	5363+35	10.5	73.6	19.3	
Clayton Valley	MN1 – Segment 1	5363+35	6723+44	25.8	913.3	47.5	**960.8**
	MN1/MN3 – Segment 2	6970+42	7349+26	7.2	106.1	13.2	**119.3**
Alkali Spring Valley	MN1	6723+44	6900+00	3.4	349.8	6.3	**572.8**
	MN1/MN3	6900+00	6970+42	1.3	214.4	2.3	

Table 4-3. Water Requirements by Hydrographic Area for the MRC Basis for Analysis

Hydrographic Area	Segment	Beginning Station of Hydrographic Area	Ending Station of Hydrographic Area	Segment Length within Hydrographic Area (miles)	Earthwork Water Requirements (acre-feet)	Other Water Requirements (acre-feet)	Total by Hydrographic Area (acre-feet)
Lida Valley	MN1/MN3	7349+26	8668+10	25.0	325.4	45.8	**467.2**
	MCS2/CS4	14146+54	14259+17	2.1	39.1	3.8	
	BC3	14250+00	14482+95	4.5	44.7	8.4	
Sarcobatus Flat	BC3	14482+95	14901+92	7.8	158.1	14.4	**459.6**
	CS5	14901+92	16051+00	21.8	247.1	40.0	
Oasis Valley	CS5	16051+00	16214+16	3.1	38.3	5.7	**400.6**
	OV1	16195+95	16520+16	6.1	172.7	11.3	
	CS6	16520+16	16806+32	5.4	162.6	10.0	
Crater Flat	CS6	16806+32	17745+84	17.8	223.1	32.7	**255.8**
Forty Mile Canyon – Jackass Flats	CS6	17745+84	18200+13	8.6	556.2	15.8	**572.0**
Water Requirement Totals for the Basis for Analysis				**281**	**5,427.1**	**516.9**	**5,944.0**

Notes:
1) This analysis is based on the *Engineered Plan & Profile Drawing Set, Mina Rail Corridor* (NRP 2007e).
2) The earthwork water quantities are based on 75 gal of water per cubic yard of embankment, plus a contingency of 20 percent, for a total of 90 gal of water per cubic yard of embankment.
3) The other water quantities are based on 600,000 gal of water per mile. Water requirements for construction personnel (61 percent of water requirements other than for earthwork compaction), access road dust control (31 percent), and quarries (6 percent) have been equalized per mile.
4) The earthwork water requirements for MCS1 in the Walker Lake Valley–Whiskey Flat–Hawthorne hydrographic area include the water to construct the Hawthorne staging yard (including UPRR interchange tracks).
5) The earthwork water requirements for MN1 in the Clayton Valley hydrographic area include the water required to construct the Silver Peak MOW facility.
6) The earthwork water requirements for CS6 in the Forty Mile Canyon–Jackass Flats hydrographic area include the water required to construct the EOL facility.
7) The mileage total for this table includes approximately 27 miles of existing DOD track in the Mason Valley, Walker Lake Valley–Lake, and Walker Lake Valley–Whiskey Flat–Hawthorne hydrographic areas.

Table 4-4. Water Requirements by Hydrographic Area for the MRC Alternate Alignment Segments

Hydrographic Area	Alternate Segment	Beginning Station of Hydrographic Area	Ending Station of Hydrographic Area	Segment Length within Hydrographic Area (miles)	Earthwork Water Requirements (acre-feet)	Other Water Requirements (acre-feet)	Total by Hydrographic Area (acre-feet)
Walker Lake Valley – Schurz	S4	10000+00	12131+24	40.4	1,107.4	74.3	**1,181.70**
Walker Lake Valley – Schurz	S5 – Segment 1	10000+00	10630+04	11.9	638.7	21.9	**660.60**
Walker Lake Valley – Schurz	S6 – Segment 1	10000+00	10630+04	11.9	650.3	21.9	**672.20**
Rawhide Flats	S5	10630+04	10996+39	6.9	230.6	12.7	**243.30**
Rawhide Flats	S6	10630+04	11420+83	15.0	885.2	27.6	**912.80**
Walker Lake Valley – Schurz	S5 – Segment 2	10996+39	12324+97	25.2	370.3	46.4	**416.70**
Walker Lake Valley – Schurz	S6 – Segment 2	11420+83	12357+93	17.7	186.9	32.6	**219.50**
Big Smoky Valley – Tonopah Flat	MN2/MN3	4809+29	6507+24	32.2	275.9	59.2	**335.10**
Alkali Spring Valley	MN2/MN3	6507+24	7418+96	17.3	177.1	31.8	**208.90**
Alkali Spring Valley	MN2/GF4	42708+86	43018+38	5.9	412.0	10.8	**422.80**
Alkali Spring Valley	MN3	300+00	780+78	9.1	127.4	16.7	**144.10**
Lida Valley	MN2/GF4 – Segment 1	43018+38	43343+15	6.4	121.7	11.8	**158.00**
Lida Valley	MN2/GF4 – Segment 2	43573+65	43723+45	3.1	18.8	5.7	
Stonewall Flat	MN2/GF4	43343+15	43573+65	4.4	40.5	7.5	**48.00**
Lida Valley	MN2/CS4	13881+89	14146+54	5.0	9.4	9.2	**18.6**
Lida Valley	BC2	44000+00	44662+24	12.5	133.2	23.1	**156.3**
Sarcobatus Flat	BC2	44284+00	44662+24	7.2	77.1	13.2	**90.3**
Oasis Valley	OV3	46001+43	46520+16	9.8	339.4	18.1	**357.5**

Notes: 1) The earthwork water requirements for MN2 in the Alkali Spring Valley hydrographic area include the water required to construct the Klondike MOW facility.
2) The Walker Lake Valley–Schurz, Rawhide Flats, and Alkali Spring Valley hydrographic areas each contain more than one alternate for a given segment located within the same hydrographic area.

Table 4-5. Potential Well Sites by Hydrographic Area

Hydrographic Area	Need	Number of Sites	Number of Wells
Mason Valley	Basis for analysis	1	1
Walker Lake Valley – Schurz	Alternate alignment	6	6
	Basis for analysis	4	4
	Construction camp no. 18A	1	1
	Construction camp no. 18B	1	1
Rawhide Flats	Alternate alignment	3	3
	Construction camp nos. 18C and 18D	2	2
Walker Lake Valley – Lake	Basis for analysis	0	0
Walker Lake Valley – Whiskey Flat – Hawthorne	Basis for analysis	1	1
	Construction camp no. 17	1	1
	Facility (Hawthorne staging yard)	0	0
	Quarry (Garfield Hills)	1	1
Soda Spring Valley West	Basis for analysis	2	2
Soda Spring Valley East	Basis for analysis	2	2
	Construction camp no. 16	1	1
	Quarry (Gabbs Range)	1	1
Rhodes Salt Marsh Valley	Basis for analysis	2	2
	Construction camp no. 15	1	1
Columbus Salt Marsh Valley	Basis for analysis	3	3
Big Smoky Valley – Tonopah Flat	Alternate alignment	2	2
	Basis for analysis	2	2
	Construction camp no. 14	1	1
Clayton Valley	Basis for analysis	4	4
	Construction camp no. 13A	1	1
	Facility (Silver Peak MOW)	1	1
	Quarry (North Clayton)	1	1
Alkali Spring Valley	Alternate alignment	6	6
	Basis for analysis	2	2
	Construction camp no. 13B and Facility (Klondike MOW)	1	1
	Quarry (North Clayton)	1	1
	Quarry (West Goldfield)	2	4
Lida Valley	Alternate alignment	9	9
	Basis for analysis	5	5
	Construction camp no. 9A	4	4
	Construction camp no. 9	1	1
	Quarry (Malpais Mesa South)	2	2

Table 4-5. Potential Well Sites by Hydrographic Area

Hydrographic Area	Need	Number of Sites	Number of Wells
Stonewall Flat	Alternate alignment	1	1
Sarcobatus Flat	Alternate alignment	1	2
	Basis for analysis	6	11
	Construction camp no. 10	1	1
Oasis Valley	Alternate alignment	5	10
	Basis for analysis	12	19
	Construction camp no. 11	2	3
Crater Flat	Basis for analysis	3	7
	Construction camp no. 12	1	1
Forty Mile Canyon – Jackass Flats	Basis for analysis	0	0
Total Potential Sites and Wells		**105**	**130**
Total Basis for Analysis Sites and Wells		**67**	**84**

Notes: 1) Only the wells required for the Garfield Hills and Malpais Mesa South quarry sites are included in the basis for analysis total.
2) Well site no. 13 (three sites/three wells in the Lida Valley hydrographic area) could be used either for MN1/MN3 or for CS4, depending on the chosen alignment. These wells are counted only once in the potential well totals. These wells are included in the basis for analysis total.
3) Well site no. 17 (two sites/two wells in the Lida Valley hydrographic area) could be used either for construction camp no. 9A or for MN2/GF4, depending on the chosen alignment. These wells are counted only once in the potential well totals. These wells are included in the basis for analysis total.

4.5 ACCESS ROADS

4.5.1 Existing Road Network

Because portions of the alignment would traverse remote and often uninhabited areas, paved roads are generally limited to primary county roads or state and federal highways. The existing paved roads are connected by a web of unpaved public roads. The primary paved highways in the project vicinity are US 95, US 6, SR 361 by Luning, and SR 265 to Silver Peak. US 95 runs in close proximity to the entire MRC. One additional paved access road to the Nevada Test and Training Range (NTTR) is located off US 95 between Scottys Junction and Beatty. The roads to provide reliable access to the ancillary facilities along the MRC alignment, such as construction camps, wells, and quarries, are shown in Figures 4-C and 4-D and in Appendix H.

4.5.2 Selection Criteria

Refer to Section 4.5.2 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

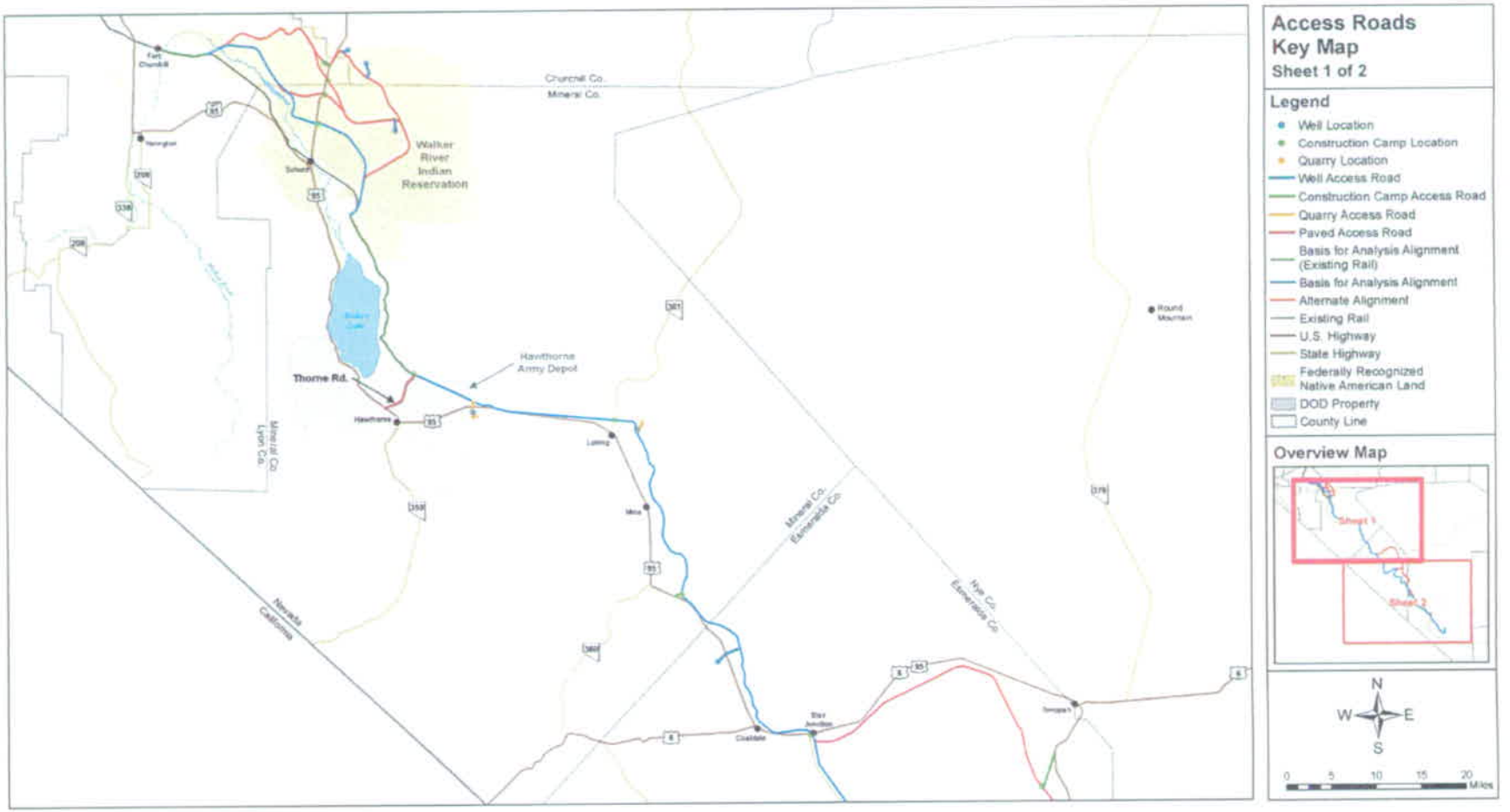

Figure 4-C. MRC Access Road Key Map–Sheet 1 of 2

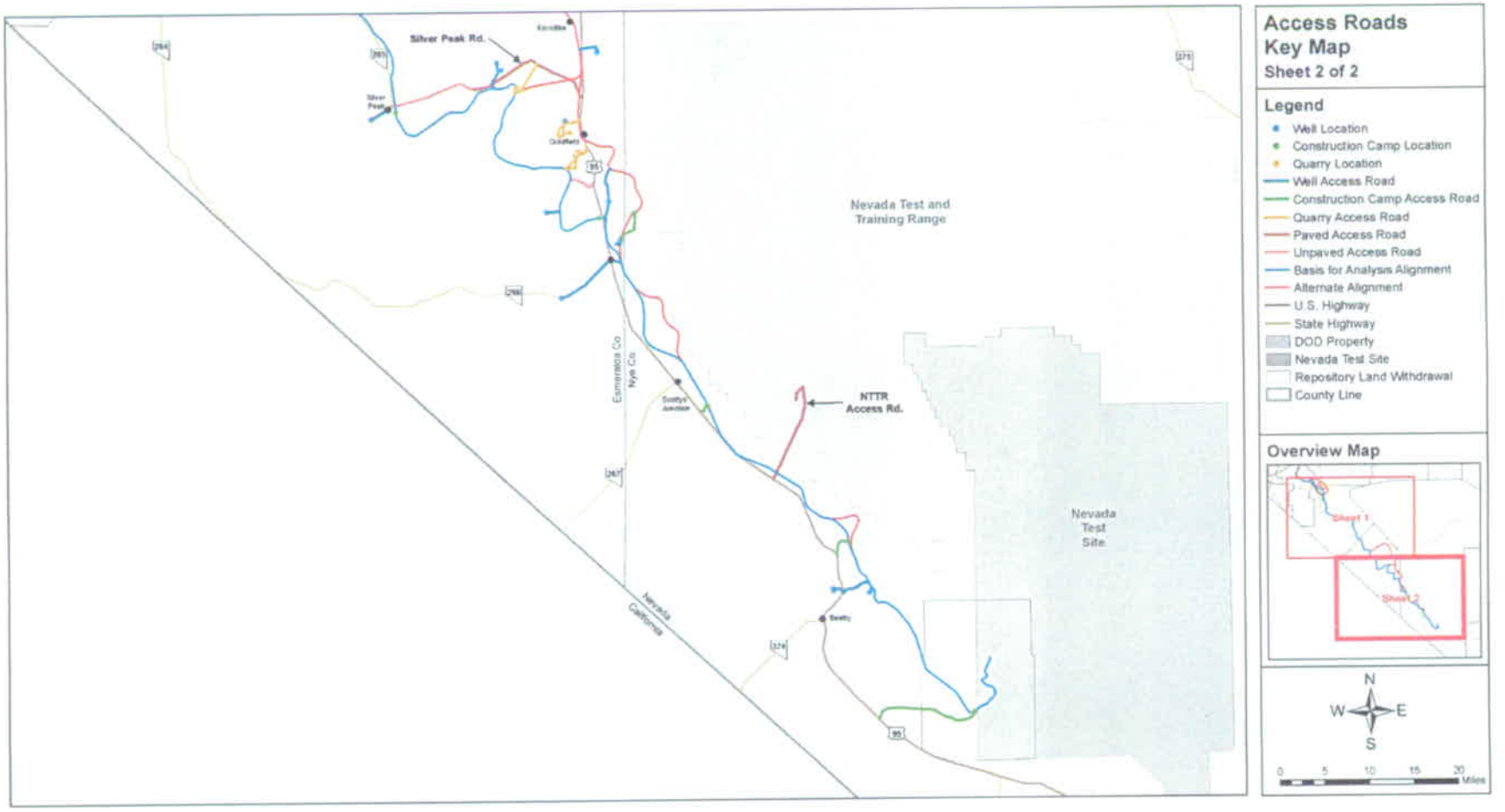

Figure 4-D. MRC Access Road Key Map–Sheet 2 of 2

4.5.3 Design Criteria

Refer to Section 4.5.3 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

4.5.4 Use

General Use – Refer to Section 4.5.4 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

Specific Use – Other access roads would be utilized to reach the ancillary facilities either from existing paved roads or from the alignment. Appendix H contains detailed maps of the access roads needed to reach each facility from an existing paved road. The majority of the specific-use access roads would be developed by improving existing unpaved public roads. No new roads would be developed for access to the alignment; however, East Railroad Springs Road at Sta. 7787+00 would be improved to provide access to MN1/MN3 from US 95. Construction camps not adjacent to existing paved roads would be reached by improving existing unpaved public roads that intersect the alignment. Any conflicts between personnel and construction traffic would be addressed during the design phase.

Each quarry facility would include an access road from the alignment to the quarry. Some new road segments would be constructed to provide access to the interior of each quarry facility. Quarry facilities utilizing conveyor belts would also include an access road adjacent to the conveyor belt. The majority of the wells would be reached via existing unpaved public roads. Only the well sites requiring the use of access roads (specifically, well sites located outside of the rail line ROW boundary) are called out in Appendix H. Well site nos. 13, 14, 18, and 24 would require the construction of new road segments to reach each well from the alignment.

4.5.5 Summary Table

Tables 4-6 and 4-7 summarize design, use, and reclamation information for each identified access road leading to the MRC alignment or to an ancillary facility. Table 4-6 lists the access roads required for the basis for analysis; Table 4-7 presents access road data for the alternate alignment segments.

Destinations that do not require construction of new roads or improvement of existing roads are not listed in the tables. Access roads to well sites within the identified quarry impact areas are considered to be included in the bounding condition and are not listed in the table. New road segments are indicated as such in the Estimated Length column. The existing roads are unpaved public roads unless otherwise noted. The overall totals do not include disturbed area, earthwork, and gravel quantities for the portions of the access roads to construction camp no. 13A and the Gabbs Range quarry site that are covered by the alignment access road. Roadway improvements would comply with Bureau of Land Management (BLM) requirements as listed in *Roads; Inventory and Maintenance* (BLM 1985). The quantities in the table are approximate, and the concepts are those that are expected to support MRC construction.

Table 4-6. Access Road Design, Use, and Reclamation Summary for the Basis for Analysis

Road Name / Station (Destination)	Currently Owned and Maintained By	ROW Requirements (feet)	Estimated Length (miles)	Improvement Concept	Gravel Volume (yd^3)	Designation	Traffic Use During Construction	Earthwork Quantities (yd^3)	Disturbed Area (acres)	Service Life	Reclamation Concept
Alignment Access Roads											
Alignment Access Road (parallel service road)	–	Within 1,000 feet of rail line	254.00	Grade existing terrain adjacent to rail line; use locally available material from drainage ditches to construct 24-foot-wide roadbed; construct new gravel surface	787,000	Permanent	General – personnel, supply and maintenance vehicles; construction equipment	9,844,000	4,926.10	Life of rail line	Permanent alignment access road; no reclamation planned
East Railroad Springs Road / MN1/MN3 7787+00 (special access from US 95)	Unknown	No new requirements; improvements would stay within existing ROW	3.40	Grade existing unpaved road; construct new gravel surface on new base layer as necessary	5,000	Semi-permanent	"	14,000	12.40	5 years	No reclamation anticipated on existing unpaved roads
Construction Camp Access Roads											
Unnamed Road / MCS1 3470+00 (Construction Camp No. 15)	Unknown	"	0.90	"	1,000	"	Specific to construction camp traffic – personnel, supply and maintenance vehicles	4,000	3.30	"	"
Silver Peak Road / MN1 5902+00 (Construction Camp No. 13A)	Esmeralda County	"	1.20 (0.40 is along the alignment access road)	"	1,000 (only on 0.80 miles of existing road)	Permanent	Open to the public	3,000 (only for 0.80 miles of existing road)	2.90 (only for 0.80 miles of existing road)	Permanent	No reclamation planned
Unnamed Road / CS5 15176+00 (Construction Camp No. 10)	Unknown (not Nye County)	"	1.40	"	2,000	Semi-permanent	Specific to construction camp traffic – personnel, supply and maintenance vehicles	6,000	5.10	5 years	No reclamation anticipated on existing unpaved roads
Fleur de Lis Road–Cat Canyon Road / OV1 16391+00 (Construction Camp No. 11)	Nye County	"	2.70	"	4,000	"	"	11,000	9.80	"	"
Unnamed Road / CS6 17760+00 (Construction Camp No. 12)	Unknown (not Nye County)	"	12.60 (0.30 is new)	"	20,000	"	"	53,000	45.80	"	"
Quarry Site Access Roads											
Garfield Flats Road / MCS1 1369+00 (Garfield Hills Quarry)	Unknown	"	2.00	"	3,000	"	Specific to quarry traffic – personnel and maintenance vehicles; construction equipment	8,000	7.30	"	"
	–	50	1.90 (new)	Grade existing terrain; use locally available material from drainage ditches to construct 24-foot-wide roadbed; construct new gravel surface	3,000	Temporary	"	16,000	11.50	"	Remove roadway materials; restore terrain to original topography; rip soil to reduce compaction; replace topsoil; seed reclaimed areas with a mix of native plants; replant cacti and yucca; apply mulch or other materials as necessary to prevent soil erosion

Table 4-6. Access Road Design, Use, and Reclamation Summary for the Basis for Analysis

Road Name / Station (Destination)	Currently Owned and Maintained By	ROW Requirements (feet)	Estimated Length (miles)	Improvement Concept	Gravel Volume (yd^3)	Designation	Traffic Use During Construction	Earthwork Quantities (yd^3)	Disturbed Area (acres)	Service Life	Reclamation Concept
Unnamed Road / MCS1 2383+00 (Gabbs Range Quarry)	Unknown	No new requirements; improvements would stay within existing ROW	5.50 (3.50 is along the alignment access road)	Grade existing unpaved road; construct new gravel surface on new base layer as necessary	3,000 (only on 2.00 miles of existing road)	Semi-permanent	Specific to quarry traffic – personnel and maintenance vehicles; construction equipment	8,000 (only for 2.00 miles of existing road)	7.30 (only for 2.00 miles of existing road)	5 years	No reclamation anticipated on existing unpaved roads
	–	50	0.50 (new)	Grade existing terrain; use locally available material from drainage ditches to construct 24-foot-wide roadbed; construct new gravel surface	1,000	Temporary	"	4,000	3.00	"	Remove roadway materials; restore terrain to original topography; rip soil to reduce compaction; replace topsoil; seed reclaimed areas with a mix of native plants; replant cacti and yucca; apply mulch or other materials as necessary to prevent soil erosion
Powerline Road / MN1/MN3 6884+00 (North Clayton Quarry)	Utility corridor	No new requirements; improvements would stay within existing ROW	3.60	Grade existing unpaved road; construct new gravel surface on new base layer as necessary	6,000	Semi-permanent	"	15,000	13.10	"	No reclamation anticipated on existing unpaved roads
	–	50	1.90 (new)	Grade existing terrain; use locally available material from drainage ditches to construct 24-foot-wide roadbed; construct new gravel surface	3,000	Temporary	"	16,000	11.50	"	Remove roadway materials; restore terrain to original topography; rip soil to reduce compaction; replace topsoil; seed reclaimed areas with a mix of native plants; replant cacti and yucca; apply mulch or other materials as necessary to prevent soil erosion
Unnamed Road / MN1/MN3 7707+00 (Malpais Mesa South Quarry)	Unknown	No new requirements; improvements would stay within existing ROW	3.30	Grade existing unpaved road, construct new gravel surface on new base layer as necessary	5,000	Semi-permanent	"	14,000	12.00	"	No reclamation anticipated on existing unpaved roads
	–	50	4.20 (new)	Grade existing terrain; use locally available material from drainage ditches to construct 24-foot-wide roadbed, construct new gravel surface	7,000	Temporary	"	35,000	25.50	"	Remove roadway materials; restore terrain to original topography; rip soil to reduce compaction; replace topsoil; seed reclaimed areas with a mix of native plants; replant cacti and yucca; apply mulch or other materials as necessary to prevent soil erosion

Table 4-6. Access Road Design, Use, and Reclamation Summary for the Basis for Analysis

Road Name / Station (Destination)	Currently Owned and Maintained By	ROW Requirements (feet)	Estimated Length (miles)	Improvement Concept	Gravel Volume (yd^3)	Designation	Traffic Use During Construction	Earthwork Quantities (yd^3)	Disturbed Area (acres)	Service Life	Reclamation Concept
Well Site Access Roads											
Unnamed Road / MCS1 3976+00 (Well Site No. 21)	Unknown	No new requirements; improvements would stay within existing ROW	3.10	Grade existing unpaved road	0	Semi-permanent	Specific to well traffic – personnel and maintenance vehicles; construction equipment	11,000	6.00	5 years	No reclamation anticipated on existing unpaved roads
Nivloc Road / MN1 5880+00 (Well Site No. 20)	Esmeralda County	"	3.20	"	0	"	"	12,000	6.20	"	"
Unnamed Road / MN1 6683+00 (Well Site No. 19)	Unknown	"	3.60	"	0	"	"	13,000	7.00	"	"
Unnamed Road / MN1/MN3 7985+00 (Well Site No. 18)	–	50	1.50 (new)	Grade existing terrain; use locally available material from drainage ditches to construct 10-foot-wide roadbed with bladed surface	0	Temporary	"	6,000	2.90	"	Remove roadway materials; restore terrain to original topography; rip soil to reduce compaction; replace topsoil; seed reclaimed areas with a mix of native plants; replant cacti and yucca; apply mulch or other materials as necessary to prevent soil erosion
Unnamed Road / MN1/MN3 8375+00 (Well Site No. 13)	Unknown	No new requirements; improvements would stay within existing ROW	2.30	Grade existing unpaved road	0	Semi-permanent	"	9,000	4.50	"	No reclamation anticipated on existing unpaved roads
Unnamed Road / MN1/MN3 8508+00 (Well Site No. 17)	Unknown	"	2.20	"	0	"	"	8,000	4.30	"	"
Unnamed Road and SR 266 MN1/MN3 8651+00 (Well Site No. 16)	Unnamed Road: unknown SR 266: NDOT	"	1.20	"	0	Unnamed Road: semi-permanent SR 266: permanent	SR 266: open to the public	4,000	2.30	Unnamed Road: 5 years SR 266: permanent	"
Unnamed Road / CS6 16685+00 (Well Site No. 14)	Unknown (not Nye County)	"	5.10 (1.00 is new)	"	0	Semi-permanent	"	19,000	9.90	5 years "	"
Beatty Wash Road / CS6 16707+00 (Well Site No. 15)	Unknown (not Nye County)	"	0.80	"	0	"	"	3,000	1.60	"	"
Total Basis for Analysis Access Road Mileage			**318**		**851,000**	**Total Basis for Analysis Access Road Quantities**		**10,136,000**	**5,141**		
Total Mileage for Construction Camps, Quarries, and Wells Access Roads			**64**		**64,000**	**Total Quantities for Construction Camps, Quarries, and Wells Access Roads**		**292,000**	**215**		

Table 4-7. Access Road Design, Use, and Reclamation Summary for Alternate Alignment Segments

Road Name / Station (Destination)	Currently Owned and Maintained By	ROW Requirements (feet)	Estimated Length (miles)	Improvement Concept	Gravel Volume (yd^3)	Designation	Traffic Use During Construction	Earthwork Quantities (yd^3)	Disturbed Area (acres)	Service Life	Reclamation Concept
Construction Camp Access Roads											
Unnamed Road / S6 10914+00 (Construction Camp No. 18D)	Walker River Paiute Tribe (WRPT)	No new requirements; improvements would stay within existing ROW	0.80	Grade existing unpaved road; construct new gravel surface on new base layer as necessary	1,000	Semi-permanent	Specific to construction camp traffic – personnel, supply and maintenance vehicles	3,000	2.90	5 years	No reclamation anticipated on existing paved or unpaved roads
Unnamed Road / MN2/MN3 6755+00 (Construction Camp No. 13B)	Unknown	"	4.10	"	6,000	"		17,000	14.90	"	"
Unnamed Road / MN2/CS4 13809+00 (Construction Camp No. 9)	Unknown (portion in Nye County is not county-maintained)	"	5.80	"	9,000	"	Specific to construction camp traffic – personnel, supply and maintenance vehicles	25,000	21.10	"	"
Quarry Site Access Roads											
Unnamed Road / MN2/GF4 42816+00 (West Goldfield Quarry)	Unknown	"	4.10	Grade existing unpaved road; construct new gravel surface on new base layer as necessary	6,000	"	Specific to quarry traffic – personnel and maintenance vehicles; construction equipment	17,000	14.90	"	"
	–	50	5.20 (new)	Grade existing terrain; use locally available material from drainage ditches to construct 24-foot-wide roadbed; construct new gravel surface	8,000	Temporary	"	44,000	31.50	"	Remove roadway materials; restore terrain to original topography; rip soil to reduce compaction; replace topsoil; seed reclaimed areas with a mix of native plants; replant cacti and yucca; apply mulch or other materials as necessary to prevent soil erosion
Well Site Access Roads											
Unnamed Road / S6 11060+00 (Well Site No. 24)	–	50	0.60 (new)	Grade existing terrain; use locally available material from drainage ditches to construct 10-foot-wide roadbed with bladed surface	0	"	Specific to well traffic – personnel and maintenance vehicles; construction equipment	2,000	1.2	"	"
Unnamed Road / S6 11275+00 (Well Site No. 23)	WRPT	No new requirements; improvements would stay within existing ROW	1.80	Grade existing unpaved road	0	Semi-permanent	"	7,000	3.50	"	No reclamation anticipated on existing unpaved roads
Unnamed Road / S4 11351+00 / S5 11544+00 (Well Site No. 22)	WRPT	"	1.30	"	0	"	"	5,000	2.50	"	"
Unnamed Road / MN2/MN3 7100+00 (Well Site No. 10)	Unknown	"	2.60	"	0	"	"	10,000	5.00	"	"
Unnamed Road / MN2/GF4 43260+00 (Well Site No. 13)	Unknown	"	4.10 (0.35 is new)	"	0	"	"	15,000	8.0	"	"

4.6 COMMUNICATIONS SYSTEMS FOR CONSTRUCTION

Refer to Section 4.6 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

Refer to Section 5.0 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

For the relevant construction stages and milestones, see Figure 7-A, MRC Construction Schedule, and Section 7.6, Operations Commissioning, in this *Construction Plan, Mina Rail Corridor*.

6.1 PERMITTING

Refer to Section 6.1 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d). Additional DOD and WRPT permitting expectations are listed in Table 6-1.

Table 6-1. Permits for Construction

Permit	Months to Acquire	Contractor Responsibility
WRPT Memorandum of Understanding (MOU)	24+	
DOD MOU	24+	
UPRR MOU	24+	
Water Appropriations Permits	24+	
Air Quality Operating Permits	24	
Permits for Highway Crossings	18	
ROW Reservations	15	
Clean Water Act Section 404 permit	15	
Free Use Permits for Gravel	15	
Cultural Resources Programmatic Agreement	15	
Federal Communications Commission License	12	
Working in Waterways Permit	9	
Endangered Species Act	9	
Water Quality Certification	9	
Public Water System Permits	6	X
Septic/Sewage System Permits	6	X
Building Permits	6	X
Stormwater Discharge Permits	3	X
Construction Camp	3	X
Hazardous Material Storage	2	X
Hazardous Waste Generation	1	X

Note: Permits for operations and maintenance are listed in *Operations and Maintenance Report, Mina Rail Corridor* (NRP 2007g). Additionally, no permits for quarry operations are included. If a quarry is pursued, a 36-month timeframe is likely in order to secure all licenses and permits.

6.2 WASTE

6.2.1 Introduction and Data Sources

Refer to Section 6.2.1 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

6.2.2 Rail Construction Waste and Hazardous Materials

Refer to Section 6.2.2 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d). The smaller counties, including Mineral, Nye, Esmeralda, and Lincoln, have fewer recycling services.

6.2.3 Construction Camp Wastes

Refer to Section 6.2.3 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d). The maximum number of construction camps is currently estimated to be 10 camps, although it is not expected that all 10 would be open and operating concurrently. A list of Carson City, Churchill, Douglas, Esmeralda, Lyon, Mineral, Nye, Storey, and Washoe County landfills is provided in Table 6-2 (Nevada Department of Environmental Protection [NDEP] 2004).

6.2.4 Facilities Waste and Hazardous Materials

Refer to Section 6.2.4 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d). The construction of the facilities[4] includes the staging yard (including UPRR interchange tracks), transportation operations center, MOW facility, and EOL facility. MRC facility construction is not expected to require the demolition or removal of existing structures.

6.2.5 Landfill Regulations

Refer to Section 6.2.5 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

Locations of available facilities and projected capacities are provided in Table 6-2. The facilities listed are within or near the counties where MRC construction would occur. Tables 6-3 and 6-4 summarize, by waste category and county, respectively, the anticipated waste levels from MRC construction and operation.

Table 6-2. Estimated Landfill Capacity in the MRC Vicinity

County	Facility Name	Landfill Class	Capacity (yd^3)	Projected Closure	Remaining Life (years)
Carson City	Ormsby	I & II	10,900,000	2016	9
Churchill	Russell Pass	I	17,552,500	2101	93
Douglas	None	-	0	0	0
Esmeralda	Goldfield	II	282,815	2023	16
Lyon	None	-	0	0	0
Mineral	Hawthorne	I	1,665,000	2041	33
Nye	Round Mountain	II	698,100	2028	22
Nye	Tonopah	II	144,504	2011	5
Storey	Lockwood	I	64,802,000	2035	28
Washoe	None	-	0	0	0
		Total	approx. 96,000,000		204

[4].No estimates of wastes arising from the CMF are presented in this *Construction Plan, Mina Rail Corridor*.

Table 6-3. Summary of Waste Created by Construction and Operation of MRC in Tons/Year

Category of Waste	Construction		Operation		
	Camp – Food Service and Domestic	Camp – Service Station	MOW Facility – (Esmeralda County)	EOL Facility (Nye County)	Staging Yard (Mineral County)
Municipal/solid waste	618	3	10	38	35
Hazardous/special wastes	Household hazardous materials not regulated	2	5	19	17
Recyclable waste	202 (25%)	2	5	19	17
Vegetation	0	0	0	0	0
Total	**820**	**7**	**20**	**76**	**69**

Table 6-4. Summary of Waste by County

County	Waste Generation Rates (tons/day)			Waste Generated over the Life of the Project	
	Existing Conditions	Construction Activities	Operational Facilities	(tons)	(yd^3)
Churchill		4		6,000	12,000
Esmeralda	4	16	0.2	24,000	48,000
Lyon		4		6,000	12,000
Mineral		16	0.2	24,000	48,000
Nye	279	10	0.2	15,000	30,000
Total	**279**	**50**	**0.4**	**75,000**	**150,000**

Figures 6-A through 6-C provide locations of existing landfills and waste bins.

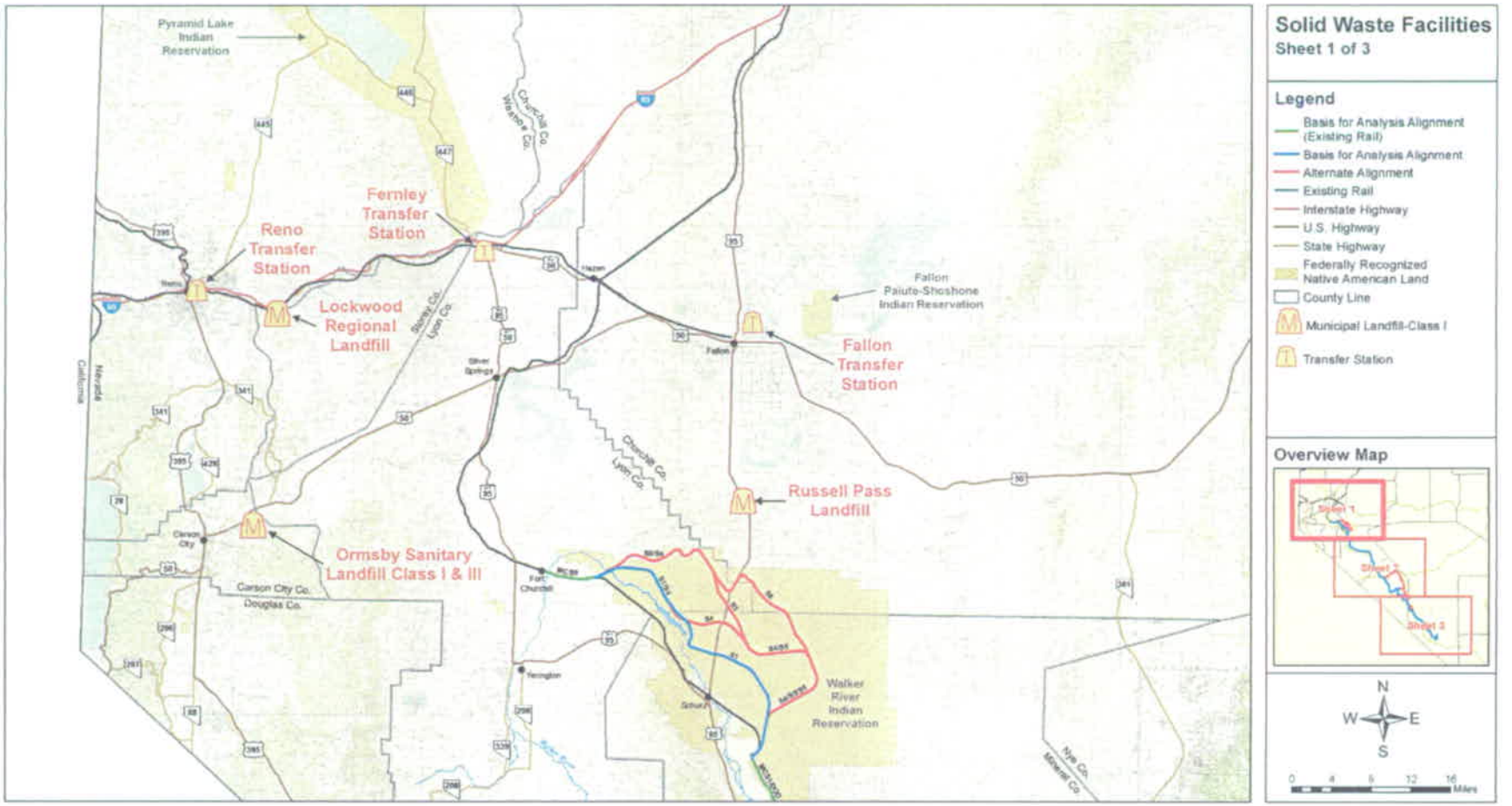

Figure 6-A. Solid Waste Facilities in the Carson City–Churchill County Area

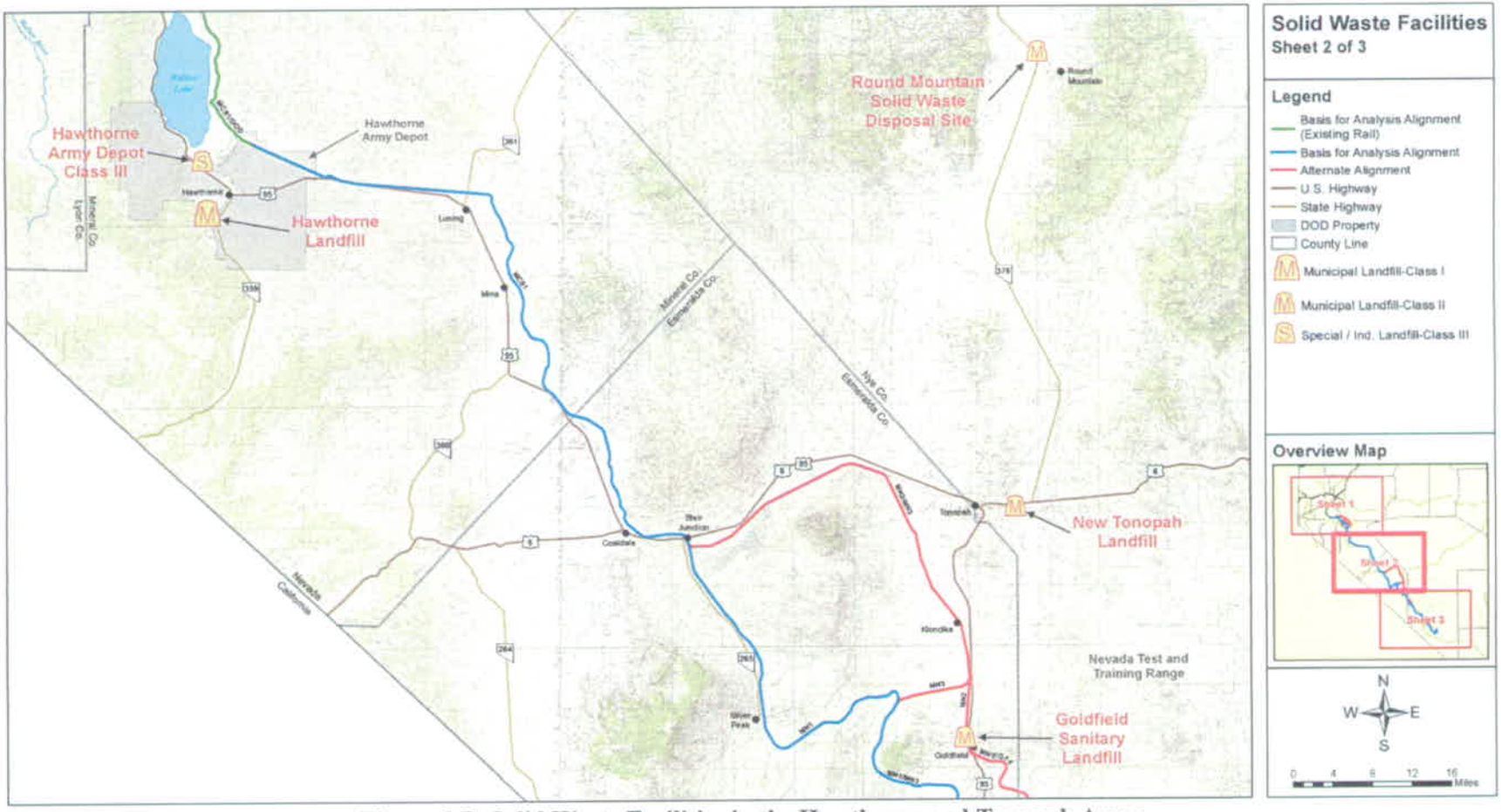

Figure 6-B. Solid Waste Facilities in the Hawthorne and Tonopah Areas

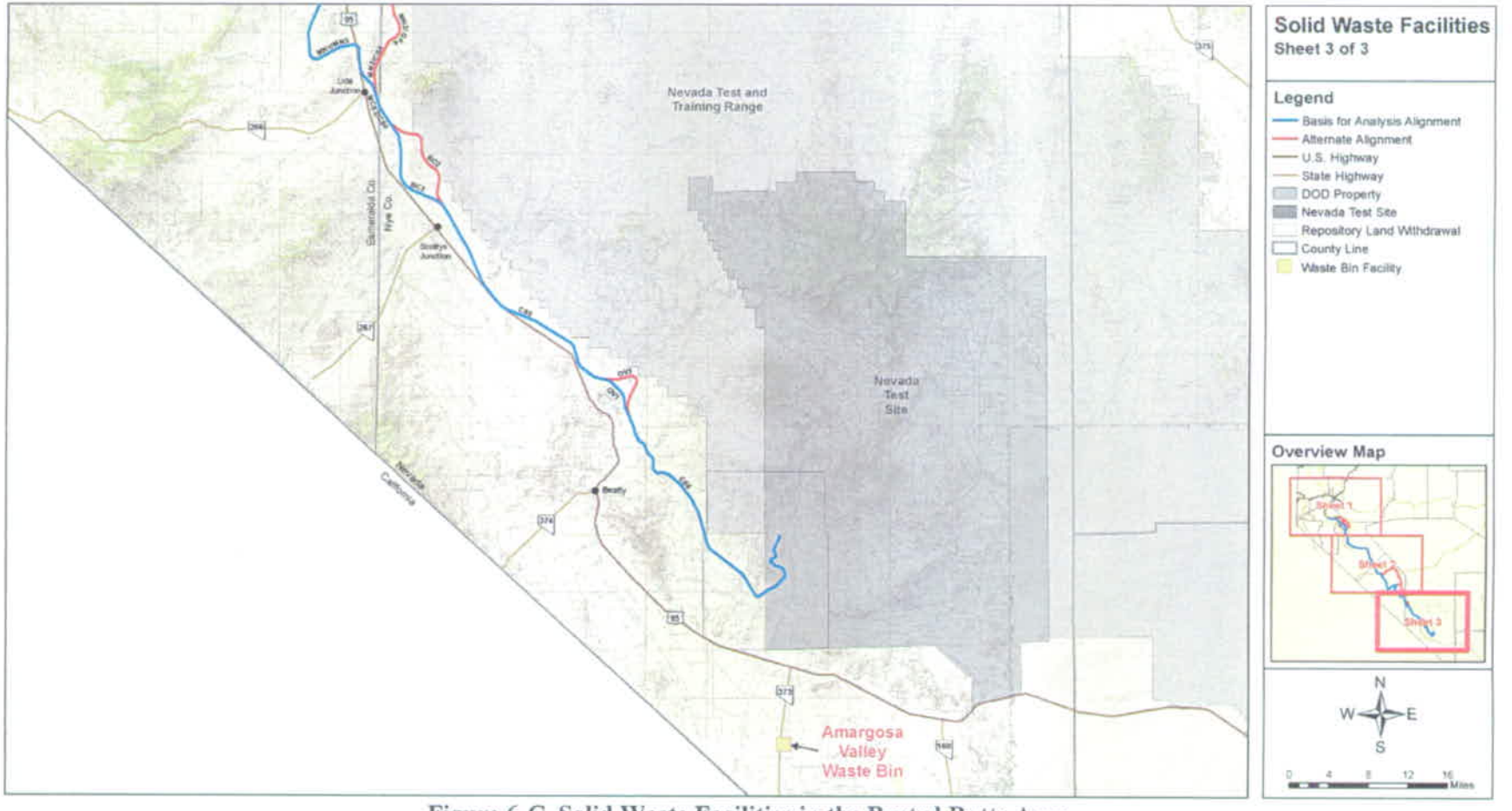

Figure 6-C. Solid Waste Facilities in the Busted Butte Area

6.2.6 Conclusion

The estimated generation rate of all wastes (municipal, hazardous, and special) would not place stress on the current landfill capacities of Carson City, Churchill, Esmeralda, Mineral, Nye, or Storey counties.

Construction activities, including the construction camps, would generate industrial and municipal wastes. The counties where rail construction activities would take place have the capacity to accept wastes generated during construction. Special wastes would require coordination with local facilities for disposal, treatment, or recycling. Municipal wastes would be collected and trucked to a local transfer station or landfill. Depending on county requirements, a recycling program may be required. The recycling may include cardboard, aluminum, steel, plastic, or other recyclable materials.

Considering the number of personnel and the potential locations, each county may establish regular pickup of recyclable materials. Otherwise, each construction camp would need to segregate recyclable materials from solid wastes and provide for transport to the county recycling locations.

Landfills could be constructed to support the rail construction activities. However, BLM may be required to take responsibility for the landfill permitting process, which includes a 30-year post-closure period. Given the numerous BLM, NDEP, and U.S. Environmental Protection Agency permitting requirements, this may be an arduous process. BLM would need to be contacted to address its willingness to allow landfills on federal lands, and to begin the siting and permitting process as soon as possible.

Based on the construction period (2009 through 2014) and operational period (2014 through 2064) for the project, several of the existing landfills listed in Table 6-2 would close prior to the end of operations. The Tonopah and Carson City landfills are scheduled to be closed in 2011 and 2016, respectively. The Goldfield landfill has a remaining lifespan of 16 years (2023). The State of Nevada may address the issue of alternative landfill locations in a forthcoming solid waste plan. Another option is to negotiate with Esmeralda or Tonopah county authorities to expand the existing landfills to provide future services for the operation of the rail facilities.

6.3 EQUIPMENT

Refer to Section 6.3 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

6.4 ACTIVITY LEVELS

Refer to Section 6.4 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

6.5 STABILIZATION AND REHABILITATION

Refer to Section 6.5 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

A conceptual schedule outlining the major decisional and construction activities is shown in Figure 7-A. This schedule shows only critical path activities and other major activities. The first set of critical path activities are those elements required to allow trackwork construction to commence. Project construction has been segmented into six zones for design efficiency, as shown in Figure 7-B, Construction Milepost Key Map.

7.1 PRE-CONSTRUCTION FIELD ACTIVITIES

Refer to Section 7.1 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

7.2 ROADBED AND STRUCTURES

Refer to Section 7.2 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

Large earthwork concentrations and major bridges largely influence the set-up of the construction schedule. In the alignment description included in Section 2.2 of this *Construction Plan, Mina Rail Corridor*, six zones of excavation and embankment activity are identified. In each of those zones, it would take approximately six months to one year to construct the roadbed prior to commencing track construction. In each case, the following sequence of activities is anticipated:

1) Permitting – Applicable per Table 6-1
2) Clearing and grubbing – Top soil windrowed along the alignment for follow-on embankment construction and, where appropriate, at select excavation sites
3) Excavation – Placement of material in embankment or spoil areas within the ROW (where excess materials are generated)
4) Embankment – Material from excavation or borrow (where insufficient material is generated by excavation activities)
5) Placement of top soil – Where applicable on embankments and select excavations

Note: Erosion monitoring and mitigation activities are included in activities two through five.

The 1,027-foot-long bridge at Beatty Wash would take two years to construct. This bridge is 165 feet in height over Beatty Wash. The Walker River Bridge is expected to require one year for construction.

In addition, construction of the roadbed and structures at the EOL facility may start early during the construction period so that earthwork compaction and associated water use can be completed before Repository construction activities requiring large amounts of water would be initiated.

7.3 TRACK

Track construction for this schedule approach is calculated at a rate of 24,000 track-feet per week (five days a week at 4,800 track-feet per day). For purposes of production calculations, 2,400 concrete cross ties would be placed on the roadbed each day (for five days of the week), with the balance of each week for addressing unforeseen conditions. Concrete cross ties would be trucked from stockpile to railhead and unloaded utilizing a jig, allowing four ties per minute (10-hour day = 600 minutes) to be placed on the roadbed. These concrete cross ties would be manufactured at a commercial tie plant and delivered to the Hawthorne terminus for distribution over the alignment. It is also possible that a tie producer (or a contractor) would establish a dedicated tie production facility in Hawthorne or another area.

Weekly production of weld rail strings would support the tie distribution rate, with the production of 34 1,440-foot-long strings each week. Welding 80-foot-long rails together at a rate of five minutes per weld

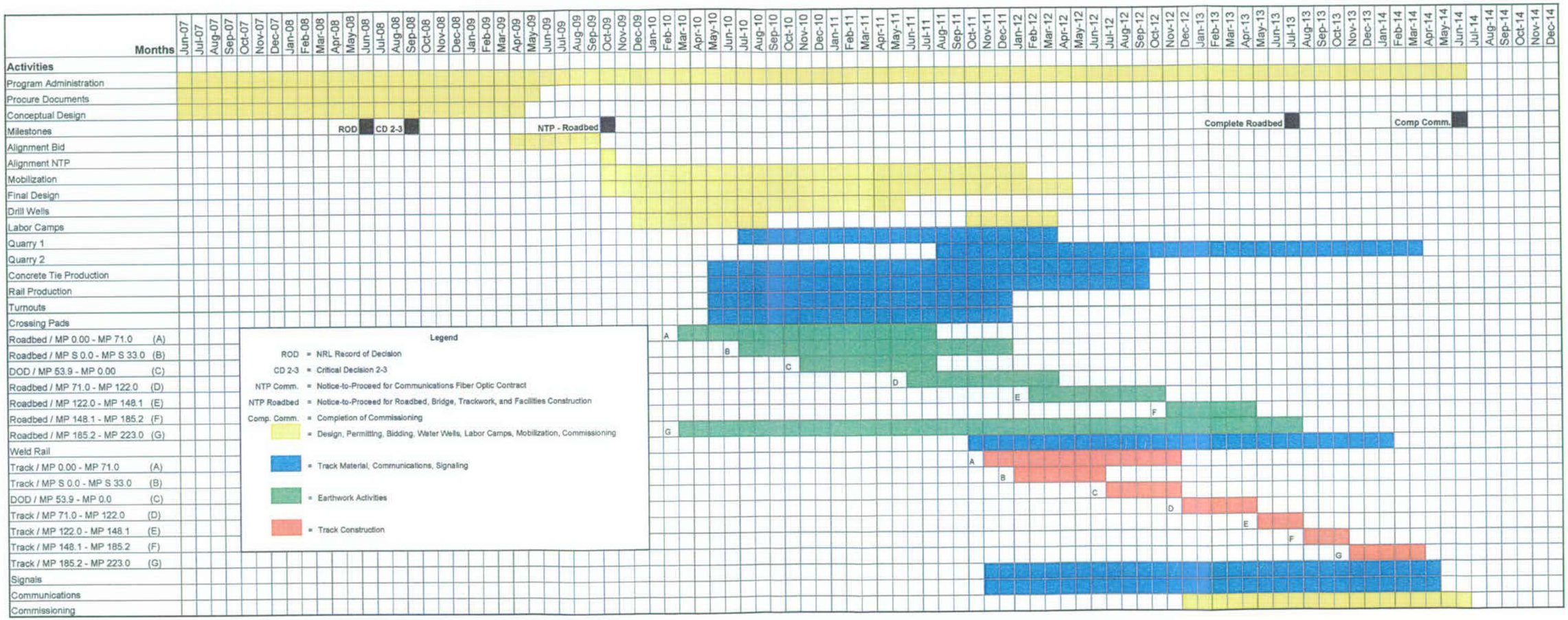

Figure 7-A. MRC Construction Schedule

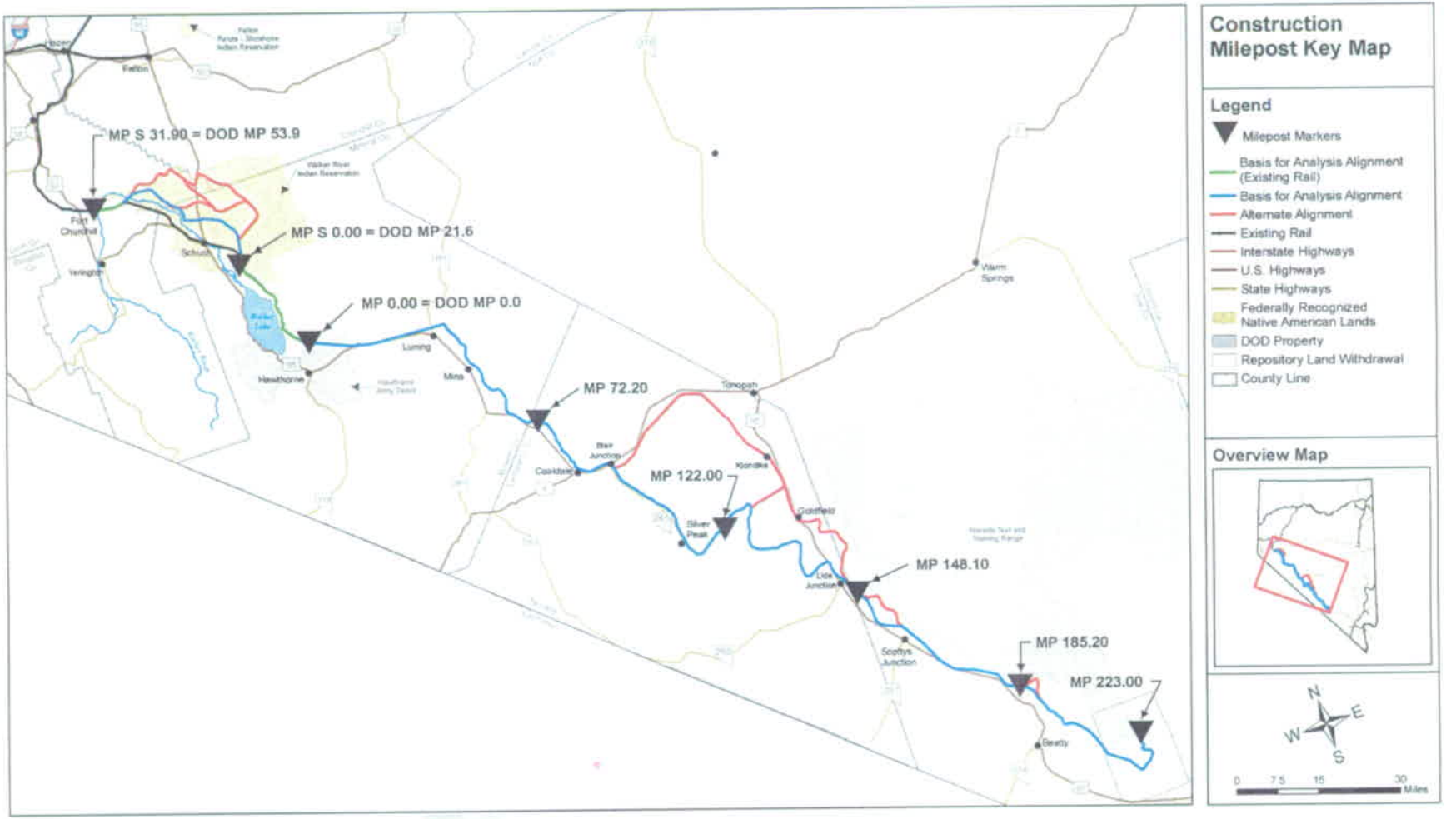

Figure 7-B. MRC Construction Milepost Key Map

would allow 120 welds per day from a portable welding plant. Considering that 17 welds are required per 1,440-foot-long string, the daily production would yield seven strings. Five days of welding activity would support 50,400 linear feet of welded rail, which is greater than the 48,000 linear feet of rail to be laid based on the concrete tie placement weekly production (24,000 track-feet requires 48,000 linear feet of rail). Rail trains loaded with up to 20 strings would be utilized on two separate days to distribute the rail.

Ballast requirements for the track are estimated at 1.70 net tons per track-foot. At that rate, ballast distribution of approximately 8,000 net tons would be required each day of track construction (4,800 track-feet x 1.70 net tons = 8,160 net tons). With the rail and concrete cross ties constructed on the finished roadbed, the first distribution of ballast would be at a rate of 1 ton per track-foot. Upon initial tamping and ballast regulating, the remaining 0.70 net tons per track-foot would be distributed to obtain the design cross section. This activity translates into the requirement of 100 cars of ballast (80 tons-per-car average) to support the daily rate of completed track construction

7.4 FACILITIES AND SIDINGS

Construction of the Hawthorne staging yard interchange track roadbed is included in the roadbed work at Hawthorne. The respective trackwork is included in the trackwork segment between MP 0.0 and MP 10.0. The MOW facility would be constructed during the roadbed work between MP 122.0 and MP 148.1. Trackwork is included in that line of the schedule. Siding work is distributed to the various zones noted in the schedule and would be accomplished during the mainline work efforts. The EOL facility work for roadbed and structures is included in the final roadbed construction timeframe.

7.5 SIGNALS AND COMMUNICATIONS

Refer to Section 7.5 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

7.6 OPERATIONS COMMISSIONING

Refer to Section 7.6 of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

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Appendix A
Field Evaluation of the Garfield Hills Quarry Site

QUARRY FIELD EVALUATION CHECKLIST

Quarry Designation: GARFIELD HILLS
Field Team: Keith Rauch, Elizabeth Karcheski
November 2, 2006

1. SITE FEATURES (show on map to the extent possible)

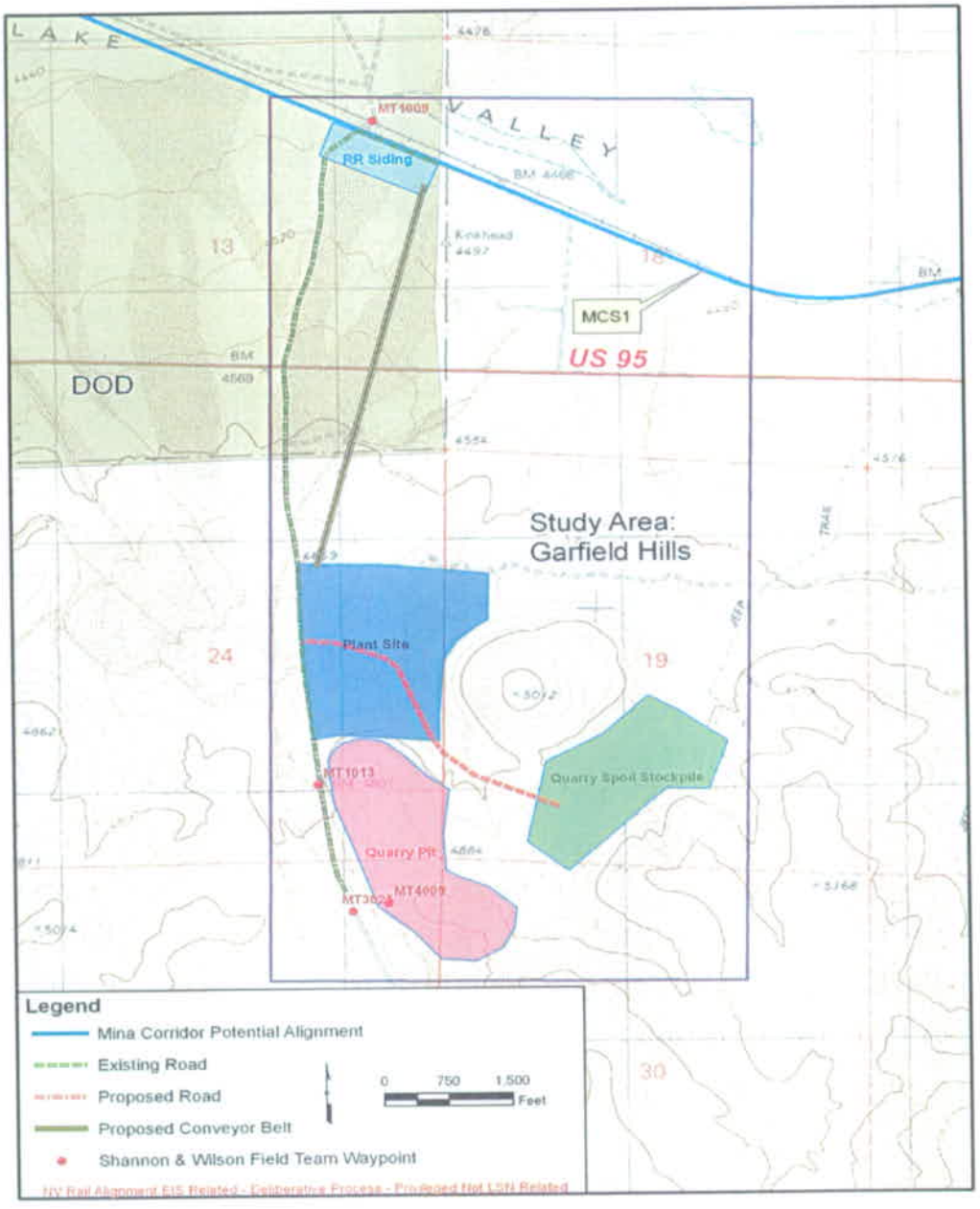


Figure A.4-1. Garfield Hills Ballast Quarry Conceptual Layout

A. Topography

The Garfield Hills study area is located about 8.8 miles east of Hawthorne, Nevada, on highway US 95. It is situated on the north slope of the Garfield Hills and in the adjacent Walker Lake Valley. Slopes across the study area range from flat to precipitous, varying greatly due to multiple hills and ridges. The topography is more moderate on the alluvial fans in the Walker Lake Valley.

B. Surface Water (near stream/river?), what flow?, intermittent)

No flowing streams were observed in the study area. Occasional dry washes cross the alluvial fan within the study area. They may carry significant water flows during major rains.

A dry wash borders the western edge of the quarry site. Scattered boulders were observed in the dry wash, and may have been deposited during times of substantial flow. Flooding potential would have to be mitigated for a quarry operation at Garfield Hills.

C. Existing Access roads (where are they?, can they be improved? show on maps)

Access to the study area is by way of Garfield Flats Road (Figure A.4-1), a gravel road that originates at highway US 95 (N38.55024°, W118.47216°) and runs along the west boundary of the study area to the quarry sample site (MT4009 at N38.53556°, W118.46973°). This road will allow good access for exploration drill rigs. It is about 40 feet wide and is graded regularly. Additional rock surfacing may have to be added for all-weather use by heavy construction equipment. About 1 mile of new roads will need to be built to provide access to the plant site, railroad siding, and spoil stockpile.

D. Room for Plant/Office Facilities (need 80 acres of flat land)

Minimizing the visual impact of this operation limits the options for locating the plant site. Adequate space is available for a 94-acre plant site on the alluvial fan along Garfield Flats Road and north of the proposed quarry (N38.54057°, W118.46851°), as shown in Figure A.4-1. The surface slopes downward to the north at moderate grades (range 1-9 percent, average 4 percent). The alluvial sandy gravel and gravelly sand can be removed by conventional methods and can be used to fill and level the site. Some preliminary site characteristics are listed in Table A.4-1.

TABLE A.4-1
GARFIELD HILLS PLANT SITE PRELIMINARY CHARACTERISTICS

Item	Value
Average site elevation (ft)	4,700
Average slope (percent)	4
Maximum slope (percent)	9

E. Room for Railroad Siding (where would siding be for loading ballast cars?)

There is adequate room for a 14-acre siding facility adjacent to the existing railroad alignment, as shown in Figure A.4-1. The proposed MCS 1 alignment lies within 1,000 feet of the highway at its closest point, so it will be visible from US 95. It will be necessary for trucks carrying ballast to cross US 95. If a conveyor is used to transport the rock to the siding, it could be routed over or under US 95. The proposed siding site is practically flat and will require little earthwork. Some preliminary characteristics are listed in Table A.4-2.

TABLE A.4-2
GARFIELD HILLS RAILROAD SIDING PRELIMINARY CHARACTERISTICS

Item	Value
Average site elevation (feet)	4,485
Average slope (percent)	1
Maximum slope (percent)	4

F. Room for Spoil Stockpile (need ~flat to ~gently sloping topo)

Figure A.4-1 shows a proposed 61-acre spoil stockpile site (N38.53559°, W118.45831°). It lies about 0.6 mile southeast of the proposed plant site. Minimizing the visual impact of this operation limits the options for its location. The surface slopes downward to the north at relative steep grades (range 1 to 40 percent, average 12 percent). Despite the steep side slopes, no earthwork should be required to prepare the site. About 0.8 mile of new road construction will be needed to access the site from the plant. Some characteristics of the site are presented in Table A.4-3.

TABLE A.4-3
GARFIELD HILLS QUARRY SPOIL STOCKPILE PRELIMINARY CHARACTERISTICS

Item	Value
Average site elevation (feet)	4,820
Average slope (percent)	12
Maximum slope (percent)	40
New road construction (mi)	0.8

G. Access Roads (to highway and RR alignment)

All-weather access to the site would require construction of roughly 1 mile of new and 2.4 miles of improved roadways. Some preliminary road construction estimates are listed in Table A.4-4.

TABLE A.4-4
GARFIELD HILLS PRELIMINARY ROAD CONSTRUCTION ESTIMATES

From	To	Improved (mi)	New (mi)	Avg. Percent Slope	Max. Percent Slope
US 95	Quarry	1.20	0.00	3	6
US 95	Siding	1.20	0.20	2	4
Plant	Spoil Pile	0.00	0.75	3	9
TOTALS		**2.40**	**0.95**		

i. Topographic conditions for new roads

The 1.2-mile section of Garfield Flats Road between US 95 and the proposed quarry is easily negotiable by 4WD vehicles during dry periods, but may require improvements to provide all-weather access. Minor fill with culverts may be required in a few locations. No road cuts or major fills are needed.

The 1.2-mile section of unimproved local road between US 95 and the siding will require improvements to provide all-weather access to trucks. It should be noted that this proposed route crosses the Hawthorne Ammunition Depot.

Trucks hauling waste rock and heavy construction equipment will use the 0.8-mile section of new road between the plant site and the spoil stockpile. It should be built to support this traffic under all weather conditions. The moderate slopes on this proposed route will require no

significant earthwork for heavy-haul trucks during construction.

ii. Cut slopes (soil/rock)

Existing topographic conditions and anticipated traffic patterns lead us to expect that no significant soil or rock cuts will be required during road construction at this site. See discussion in the previous section.

2. DEPOSIT FEATURES

A. Location (shown on 1:24,000 scale topo to the extent possible; record T, R, Sec)

The center of the 1,274-acre Study Area (Figure A.4-1) is located in the NW/4 sec 19, T 8 N, R 32 E (Mineral County, Nevada, Mt. Diablo Meridian).

B. Tonnage (provided in this deposit [W x L x H])

Outcrops in the study area indicate that the proposed quarry pit will support a multiple-bench operation covering 74 acres with a pit floor at about elevation 4,810 feet. Based on this pit floor level, the deposit thickness ranges from about 20 to 160 feet and averages about 76 feet. An estimated 42 million tons of unprocessed stone is extractable from this deposit.

C. Overburden (note thickness/type)

Surface observations indicate that the proposed quarry pit area is covered with 0 to 5 feet of sandy gravel overburden. Actual thicknesses need to be confirmed with borings. If the overburden is as thin as anticipated, it may be feasible to separate it from the stone by screening the blasted rock rather than removing it mechanically from the bench top prior to drilling.

D. Deposit Features

i. Rock Type/Description (use S&W rock descriptions)

The rock unit of interest in the proposed quarry pit is BASALT, a dark, fine-grained extrusive igneous rock that forms at, or near, the surface as volcanic lava flows and shallow intrusions. It is a low-silica rock that is rich in MgO and CaO, consisting mostly of calcic plagioclase feldspar and olivine, with augite, magnetite, iddingsite, and calcite. Basalt generally cools quickly and has a glassy to very fine-grained crystalline texture. It often contains small spherical voids (vesicles) formed by the expansion of gas or steam during cooling. The vesicles in this outcrop are most often filled with zeolite crystals and are more numerous near the top of each flow.

The outcrop in the quarry area consists of multiple basalt flows with altered scoriaceous and rubble zones between flows. Occasionally, the scoria extends vertically through the basalt flows. These scoriaceous and rubble zones are considered unsuitable for ballast material.

ii. Thickness/Depth (need minable thickness)

The maximum thickness of basalt within the quarry pit area is about 160 feet, based on mining to an elevation level with adjacent natural grades.

iii. Rock Structure (block sizes/joint or fracture spacing)

a. Joints and Fractures

The outcrop is moderately jointed and fractured. We noted three distinct joint sets in this outcrop. Average values for each joint set are presented in Table A.4-5.

TABLE A.4-5
JOINT MEASUREMENTS AT SAMPLED OUTCROP

Joint Set	Dip Angle (degrees)	Dip Direction (azimuth)	Joint Spacing (ft)	
			From	To
J1	75	118	0.1	0.5
J2	74	166	0.1	0.5
J3	75	244	0.5	2.0

b. Estimated block size distribution

Block size distribution is presented in Table A.4-6.

TABLE A.4-6
ESTIMATED BLOCK SIZE DISTRIBUTION

Block Size	Percent Distribution
>6.0 ft	5
4.0 to 6.0 ft	10
2.0 to 4.0 ft	15
0.5 to 2.0 ft	50
<0.5 ft	20

c. Deleterious Materials, including orientation and thickness (Note: Ash layers/faults/weather contacts, shear zones, fillings, scoriaceous zones, rubble zones, etc. This is internal waste that reduces deposit size.)

Based on observation of surface outcrops, about 20 percent of this stone could be weak scoria and therefore unsuitable for ballast material (internal waste).

d. Rock Quality Designation (RQD)

Our RQD estimate of the sampled outcrop is 40 to 60 percent. This reflects the closely spaced jointing of the outcrop.

e. Samples for testing (200 pounds minimum; describe sample; taken)

On 02 November 2006, roughly 260 lbs of rock samples were collected at waypoint MT4009, at various locations between 4,830 and 4,870 feet elevation. The samples filled six canvas bags.

f. Rock hammer test

The basalt rock we sampled typically fractures with 15 to 20 blows from a standard geologic rock hammer, indicating high strength.

g. Schmidt hammer tests

Ten Schmidt-hammer field tests were performed at the sample collection site. Test results are presented in Table A.4-7. The rocks tested were generally fresh; slight weathering on some test surfaces did not seem to affect the results. During all tests, the instrument was oriented perpendicular to the rock surface.

TABLE A.4-7
GARFIELD HILLS SCHMIDT-HAMMER FIELD TEST RESULTS

Test Number	Instrument Reading	Test Surface Dip/Dip Direction
1	52	90/215
2	53	71/246
3	58	63/168
4	52	88/174
5	38	81/121
6	47	30/135
7	57	63/270
8	60	71/156
9	54	80/074
10	50	68/114

iv. Groundwater — Is there evidence groundwater is near surface? Want to avoid groundwater in pit as this causes permitting problem.

No visible wells or springs were observed within the production area. We saw no evidence of groundwater in the study area. We do not anticipate any groundwater inflow into the quarry pit during mining operations. Seasonal surface water inflow should be minimal.

E. Future Explorations

Core drilling is recommended to recover subsurface samples and to characterize the quality of the basalt within the proposed quarry pit.

a. Drill rig access

The existing jeep trails are adequate for drill rig access during dry weather.

b. Type of rig

The steep slopes in the quarry pit area will require track-mounted coring rigs for access, with dozer preparation and assistance being necessary in some cases.

c. Locations and depths of borings

At least 14 proposed coring locations are recommended for a preliminary subsurface exploration program. We propose a final quarry floor elevation of 4,810 feet. Each boring should bottom 20 feet below this elevation, or 4,790 feet. These depths range from 50 feet at the north end of the quarry to about 180 feet at the highest point on the southern ridge. The estimate of total required coring is about 1,400 feet. If these cores reveal unexpected subsurface conditions (such as variable rock types or rock quality issues), additional coring may be needed to evaluate the quarry pit area.

d. Geophysics alignments

Due to good outcrop exposures and drill access, no surface geophysics are anticipated. If the core drilling indicates inconsistencies between borings, geophysics may be needed.

3. ENVIRONMENTAL FEATURES

A. Vegetation (what type/how much/where)

Vegetation consists mainly of sage, desert grasses, and sparsely scattered Joshua trees,

with about 10 to 15 percent ground cover.

B. Visibility (would quarry be visible from road?)

The quarry, plant, and siding would be visible from highway US 95, which runs through the north half of the study area.

4. OTHER FEATURES

A. Power (is power nearby or need on-site generation)

An east-trending power line lies near the center of the study area (Figure A.4-1). This power line is adjacent to the north side of the plant site.

B. Water (groundwater studies by others)

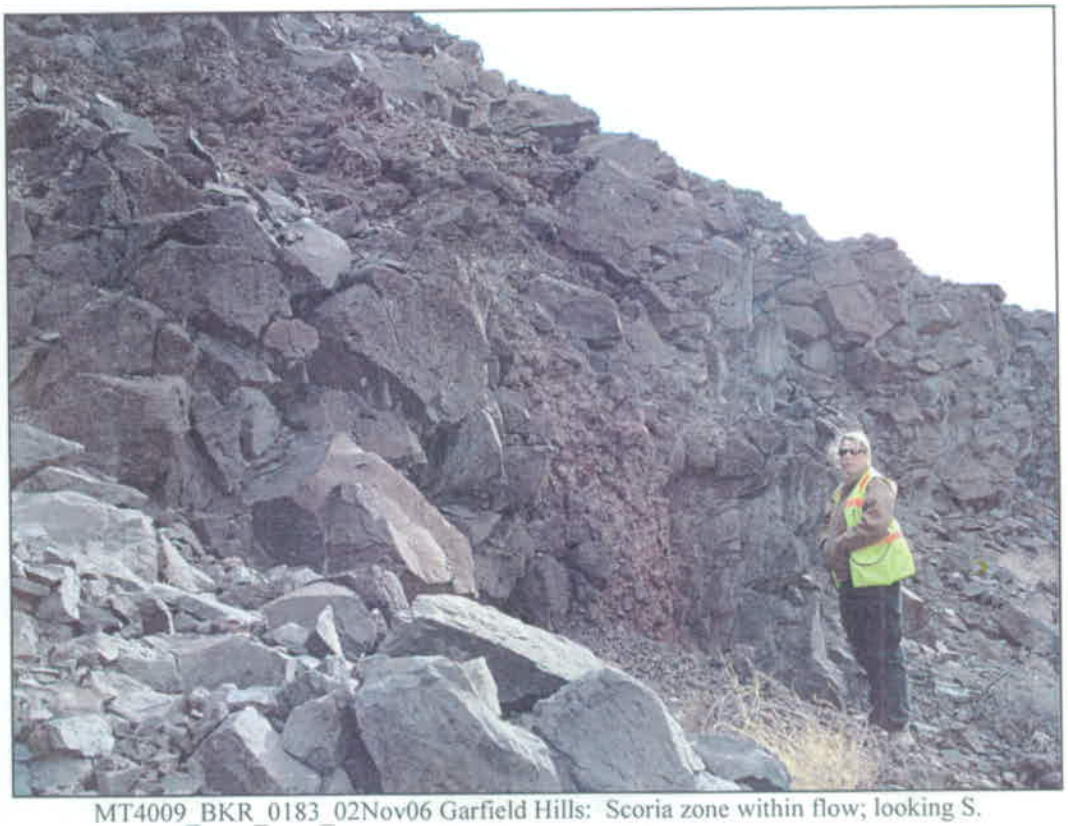
No data available on groundwater studies.

5. GARFIELD HILLS PHOTOS

MT4009_BKR_0177_02Nov06, MT4009_BKR_0178_02Nov06 and MT4009_BKR_0179_02Nov06 Garfield Hills: Panorama of sampled outcrop; looking N to E.

MT4009_BKR_0180_02Nov06 and MT4009_BKR_0181_02Nov06 Garfield Hills: Panorama of sampled outcrop; looking SE.

MT4009_BKR_0182_02Nov06 Garfield Hills: Scoria waste zone within flow; looking SE.



MT4009_BKR_0183_02Nov06 Garfield Hills: Scoria zone within flow; looking S.

Appendix B
Field Evaluation of the Gabbs Range Quarry Site

QUARRY FIELD EVALUATION CHECKLIST

Quarry Designation: GABBS RANGE
Field Team: Keith Rauch, Elizabeth Karcheski
October 31, 2006

1. SITE FEATURES (show on map to the extent possible)

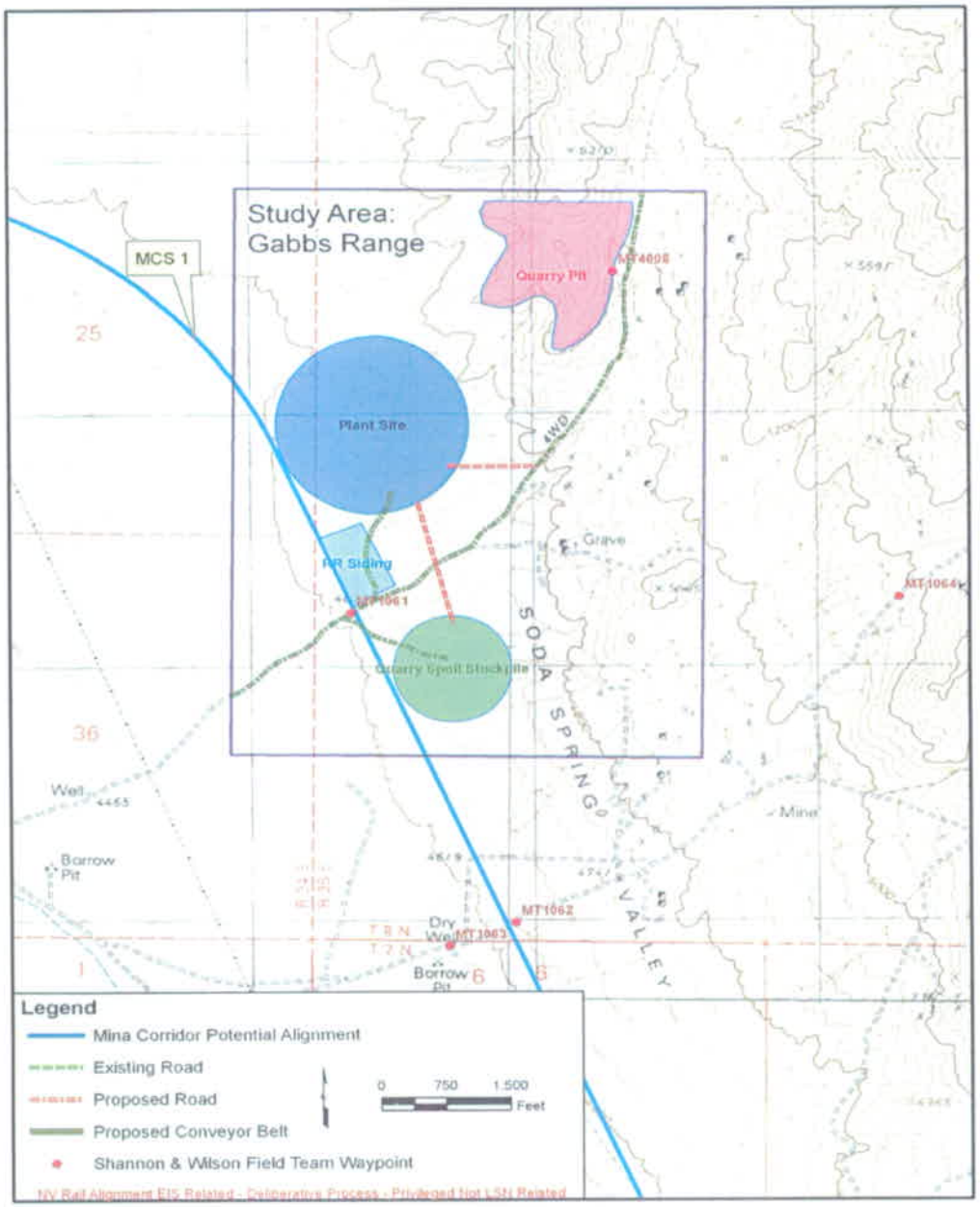


Figure A.3-1. Gabbs Range Ballast Quarry Conceptual Layout

A. Topography

The Gabbs Range study area is situated on the west slope of the Gabbs Valley Range, adjacent to Soda Spring Valley. Slopes across the study area range from moderate to steep (averaging about 40 percent), varying greatly due to multiple hills and ridges. The topography is much more gentle on the alluvial fans to the southwest of the study area in Soda Spring Valley.

B. Surface Water (near stream/river?), what flow?, intermittent)

Dry washes cross the alluvial fan in the south half of the study area. They may carry significant water flows during major rain events.

C. Existing Access roads (where are they? can they be improved? show on maps)

Access to the study area is by way of existing jeep trails that originate at highway US 95 near Luning, Nevada (N38.50598°, W118.17954°). To reach the proposed quarry site, proceed northeast on 1st Street for 0.33 mile to intersection; turn east on jeep trail and proceed 1.75 miles to intersection; turn northeast and proceed 2.2 miles to MT4008 (N38.52612°, W118.12209°). The quarry site is to the west of and adjacent to this trail. The average slope on these trails is about 2 percent with a maximum slope of 11 percent.

The existing 5 miles of jeep trails (Figure A.3-1) are adequate for exploration drill rigs during dry weather but will need improvement to serve as access roads to an active quarry site. Existing roads can be used for access to the proposed quarry facilities, but new roads could be easily established for more efficient transportation routes on the alluvial fan.

D. Room for Plant/Office Facilities (need 80 acres of flat land)

There is adequate acreage available for a 93-acre plant site on the alluvial fan southwest of the proposed quarry (Figure A.3-1). The surface slopes downward to the west and toward the alignment at a 6 percent average grade. The alluvial sandy gravel and gravelly sand can be removed by conventional methods for excavations and for structural fill. This soil can be used to improve the local jeep trails. It may also be suitable for railroad subballast material. Some preliminary site characteristics are listed in Table A.3-1.

TABLE A.3-1
GABBS RANGE PLANT SITE CHARACTERISTICS

Item	Value
Average site elevation (ft)	4,675
Average slope (percent)	6
Maximum slope (percent)	10

E. Room for Railroad Siding (where would siding be for loading ballast cars?)

There is adequate room for a 12-acre siding facility adjacent to the proposed alignment at N38.51535°, W118.13247° (Figure A.3-1). The proposed siding site lies topographically above and slopes downward toward the rail alignment. Therefore, sandy gravel and gravelly sand alluvium must be excavated to level the site. This soil can be used to improve the local jeep trails. It may also be suitable for railroad subballast material. Some preliminary site characteristics are listed in Table A.3-2.

TABLE A.3-2
GABBS RANGE RAILROAD SIDING PRELIMINARY CHARACTERISTICS

Item	Value
Average site elevation (ft)	4,650
Average slope (percent)	7
Maximum slope (percent)	10

F. Room for Spoil Stockpile (need ~flat to ~gently sloping topo)

Figure A.3-1 shows the proposed 34-acre waste dump site. It lies about 0.6 mile south of the proposed plant site. No earthwork is required to prepare the site. Existing roads will need improvement to support heavy construction equipment. Site characteristics are presented in Table A.3-3.

TABLE A.3-3
GABBS RANGE QUARRY SPOIL STOCKPILE CHARACTERISTICS

Item	Value
Average site elevation (ft)	4,718
Average slope (percent)	7
Maximum slope (percent)	10

G. Access Roads (to highway and railroad alignment)

All-weather access to the site will require construction of about 5 miles of improvements to existing jeep trails and about 0.5 mile of new road. Some preliminary road construction estimates are listed in Table A.3-4.

TABLE A.3-4
GABBS RANGE PRELIMINARY ROAD CONSTRUCTION ESTIMATES

From	To	Improved (mi)	New (mi)	Avg. percent Slope	Max percent Slope
US 95	Turn 1	0.34	0	2	7
Turn 1	Turn 2	1.75	0	0	3
Turn 2	M1 Align	1.06	0	3	8
M1 Align	MT4008	1.14	0	6	11
M1 Align	Spoil Pile	0.48	0	5	10
M1 Align	Plant	0.28	0	3	5
Quarry Turnoff	Plant	0	0.20	4	6
Plant	Spoil Pile	0	0.31	0	2
TOTAL		5.04	0.51		

i. Topographic conditions for new roads

The 3.4-mile jeep trail between US 95 and the quarry is easily negotiable by 4WD vehicles during dry periods, but will require improvements to provide all-weather access. Minor fill with culverts may be required in a few locations, but no road cuts or major fills are anticipated. New roads for efficient interior transportation can be easily established on the alluvial fan.

The 0.76-mile section between the plant site and the spoil stockpile will be used primarily by loaded dump trucks and heavy construction equipment. It will need to be built to support this traffic under all weather conditions. The gentle to moderate slopes on this proposed route will require no significant earthwork during construction.

ii. Cut slopes (soil/rock)

Existing topographic conditions and anticipated traffic patterns lead us to expect that no significant soil or rock cuts will be required during road construction at this site. See discussion in the previous section.

2. DEPOSIT FEATURES

A. Location (shown on 1:24,000 scale topo to the extent possible; record T, R, Sec)

The 915-acre study area (Figure A.3-1) is located in the SW/4 sec 30, T 8 N, R 35 E (Mineral County, Nevada, Mt. Diablo Meridian).

B. Tonnage (provided in this deposit [W x L x H])

Outcrops in the study area indicate that the proposed quarry pit will support a multiple-bench operation covering about 52 acres with a pit floor at about elevation 5,000 feet. Assuming this pit floor elevation, the minable thickness ranges from 20 to 180 feet and averages about 77 feet. An estimated 14.3 million tons of unprocessed stone is extractable from this deposit.

C. Overburden (note thickness/type)

Surface observations indicate that the proposed quarry pit area is covered with 0 to 5 feet of sandy gravel and gravelly sand overburden. Actual thicknesses need to be confirmed with borings. If the overburden is as thin as anticipated, it may be feasible to separate it from the stone by screening the blasted rock rather than removing it mechanically from the bench top prior to drilling.

D. Deposit Features

i. Rock Type/Description (use S&W rock descriptions)

The rock unit of interest in the study area is GRANITE, a high-silica plutonic igneous rock composed of quartz , and orthoclase and plagioclase feldspars. Plutonic refers to rocks that formed at considerable depths in the earth's crust from magma. Granite cools slowly and develops a coarse crystalline texture. Over time, this pluton was uplifted and/or exposed by erosion.

ii. Thickness/Depth (need minable thickness)

Based on the assumed pit floor elevation, the maximum thickness of granite within the quarry pit area is about 180 feet.

iii. Rock Structure (block sizes/joint or fracture spacing)

a. Joints and Fractures

We noted three distinct joint sets in this outcrop. Average values for each joint set are presented in Table A.3-5.

TABLE A.3-5
JOINT MEASUREMENTSE AT SAMPLED OUTCROP

Joint Set	Dip Angle° (degrees)	Dip Direction (azimuth)	Joint Spacing (feet)	
			From	To
J1	50	282	1	1
J2	58	26	0.5	3
J3	75	310	1	2

b. Estimated block size distribution

Block size distribution is presented in Table A.3-6.

TABLE A.3-6
ESTIMATED BLOCK SIZE DISTRIBUTION

Block Size	Percent Distribution
> 1.0 ft	20
0.5 to 1.0 ft	50
< 0.5 ft	30

c. Deleterious Materials, including orientation and thickness (Note: Ash layers/faults/weather contacts, shear zones, fillings, scoriaceous zones, rubble zones, etc. This is internal waste that reduces deposit size.)

Based on observation of surface outcrops, about 15 percent of the excavated stone could be highly weathered or altered and therefore unsuitable for ballast material.

d. Rock Quality Designation (RQD)

An RQD estimate of the sampled outcrop is 50 to 70 percent. This too, reflects the closely spaced jointing of the outcrop.

e. Samples for testing (200 pounds minimum; describe sample; taken)

On 31 October 2006, roughly 260 lbs of rock samples were collected at waypoint MT4008, at about elevation 5,000 feet. The samples filled six canvas bags.

f. Rock hammer test

The granite rock we sampled typically fractures with 15 to 20 blows from a standard geologic rock hammer, indicating high strength.

g. Schmidt hammer tests

Ten Schmidt-hammer field tests were performed at the sample collection site. Test results are presented in Table A.3-7. The rocks tested were generally fresh; slight weathering on some test surfaces did not seem to affect the results. During all tests, the instrument was oriented perpendicular to the rock surface.

TABLE A.3-7
GABBS RANGE SCHMIDT-HAMMER FIELD TEST RESULTS

Test Number	Instrument Reading	Test Surface Dip/ Dip Direction
1	68	50/280
2	40	50/280
3	40	60/071
4	59	58/026
5	70	75/310
6	63	80/103
7	48	64/310
8	58	73/105
9	57	44/352
10	60	46/237

iv. Groundwater — Is there evidence groundwater is near surface? Want to avoid groundwater in pit as this causes permitting problem.

No wells or springs were observed within the production area. A well casing was observed approximately 1.8 miles to the southwest along the access road. A dry well is shown in the U.S. Geological Survey (USGS) topographic map about one mile southeast of the proposed railroad siding.

We saw no evidence of groundwater in the study area. We do not anticipate any groundwater inflow into the quarry pit during mining operations. Seasonal surface water inflow should be minimal.

The nearest observed water source is at Luning, located about 2.5 miles southwest of the study area. Wells may need to be drilled at, or water transported to, the site.

E. Future Explorations

Core drilling is recommended to recover subsurface samples and to characterize the quality of the granite within the proposed quarry pit.

a. Drill rig access

The existing jeep trails are adequate for drill rig access during dry weather. Bulldozers may also be required to aid in sloping the hillside or breaking trail for the drill rig to ascend the hillsides.

b. Type of rig

The steep slopes in the quarry pit area will require track-mounted coring rigs for access.

c. Locations and depths of borings

At least ten borings are recommended for a preliminary subsurface explorations program. We propose a final average quarry floor elevation of 5,000 feet. Each boring should bottom 20 feet below this elevation, or 4,980 feet. These depths range from 60 feet at the south end of the quarry to 220 feet. The estimate of total required coring is 1,200 feet. If these cores reveal unexpected subsurface conditions (such as variable rock types or rock quality issues), additional coring may be needed to evaluate the quarry pit area.

d. Geophysics alignments

Due to good outcrop exposures and drill access, no surface geophysics are anticipated.

3. ENVIRONMENTAL FEATURES

A. Vegetation (what type/how much/where)

Vegetation consists mainly of sage, desert grasses, and sparsely scattered Joshua trees, with about 10 to 15 percent ground cover.

B. Visibility (would quarry be visible from road?)

The entire plant site, including the quarry, would be visible from the village of Luning on highway US 95, located about 2.5 miles southwest of the study area.

4. OTHER FEATURES

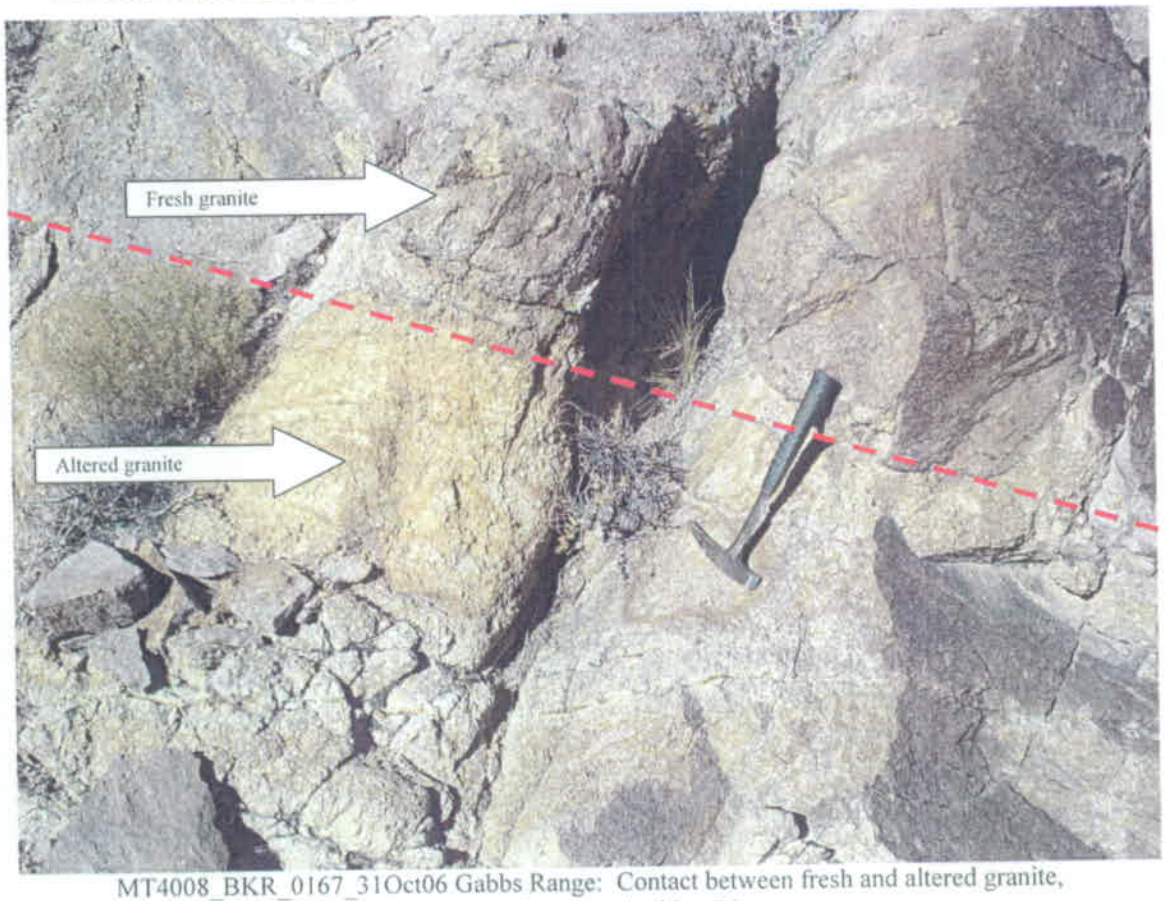
A. Power (is power nearby or need on-site generation)

A northwest-trending power line lies near the southwest corner of the study area. This power line is approximately 0.7 mile west of the plant site and is shown in Figure A.3-1.

B. Water (groundwater studies by others)

No data are available on groundwater studies.

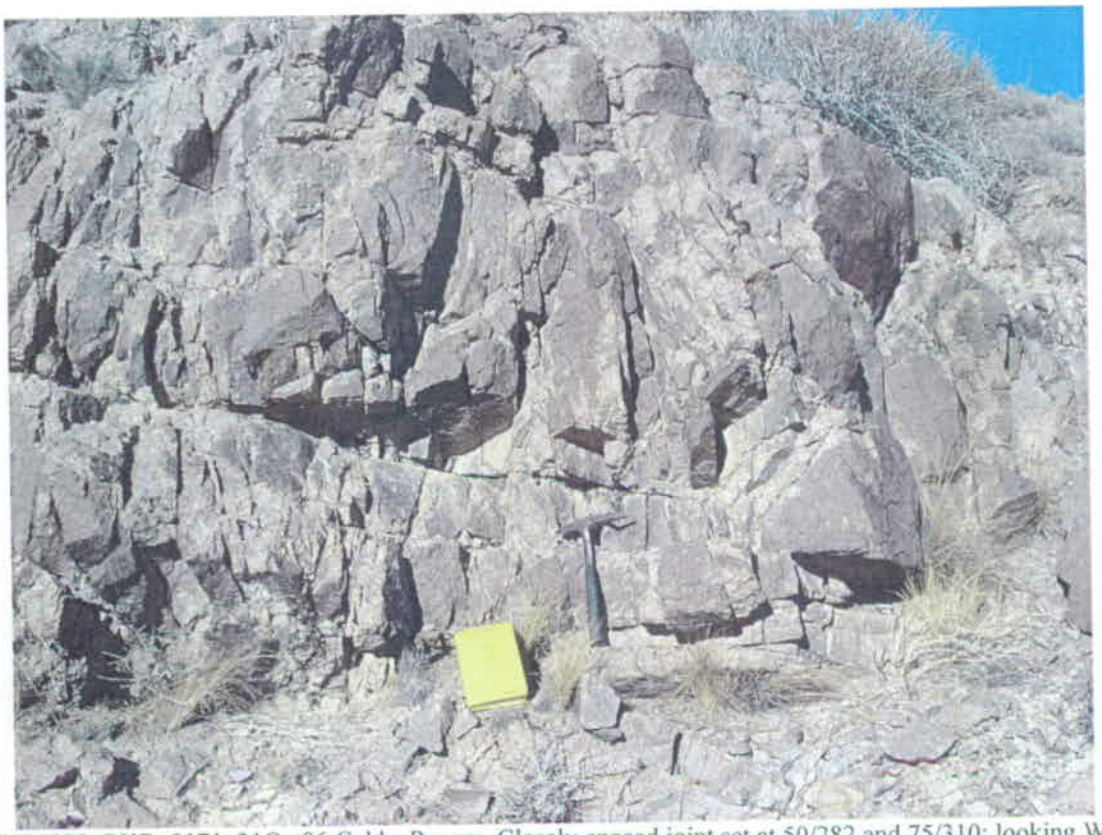
5. GABBS RANGE PHOTOS



MT4008_BKR_0167_31Oct06 Gabbs Range: Contact between fresh and altered granite, S end of outcrop; looking W.

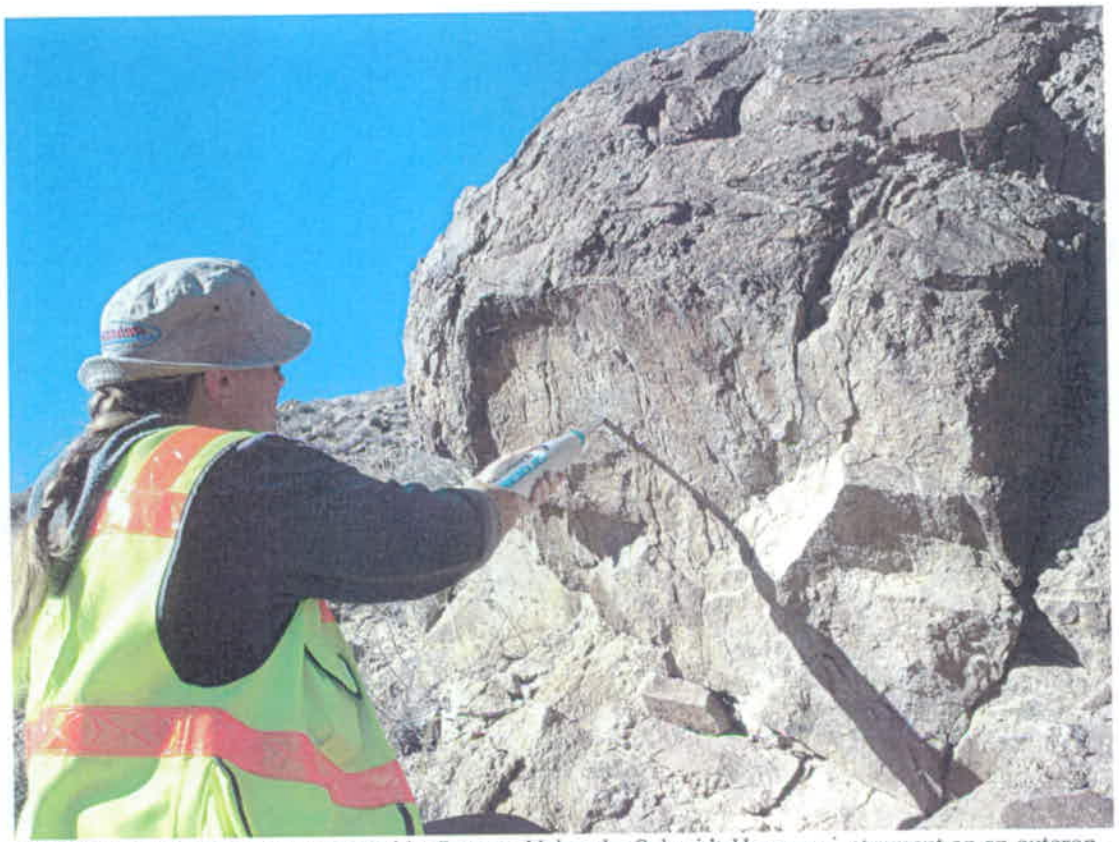
MT4008_BKR_0168_31Oct06 and MT4008_BKR_0169_31Oct06 Gabbs Range: View of outcrop along wash; looking NW.

MT4008_BKR_0170_31Oct06 Gabbs Range: Closely-spaced jointing, 50/282 and 75/310; looking W.



MT4008_BKR_0171_31Oct06 Gabbs Range: Closely-spaced joint set at 50/282 and 75/310; looking W.

MT4008_BKR_0172_31Oct06 Gabbs Range: Contact between two intrusive units, N end of outcrop; looking NW.



MT4008_BKR_0173_31Oct06 Gabbs Range: Using the Schmidt-Hammer instrument on an outcrop.

MT4008_BKR_0174_31Oct06 Gabbs Range: Panorama of sampled outcrop; looking SW to NW.

Appendix C
Field Evaluation of the North Clayton Quarry Site

QUARRY FIELD EVALUATION CHECKLIST

Quarry Designation: NORTH CLAYTON
Field Team: Keith Rauch, Elizabeth Karcheski
October 30, 2006

1. SITE FEATURES (show on map to the extent possible)

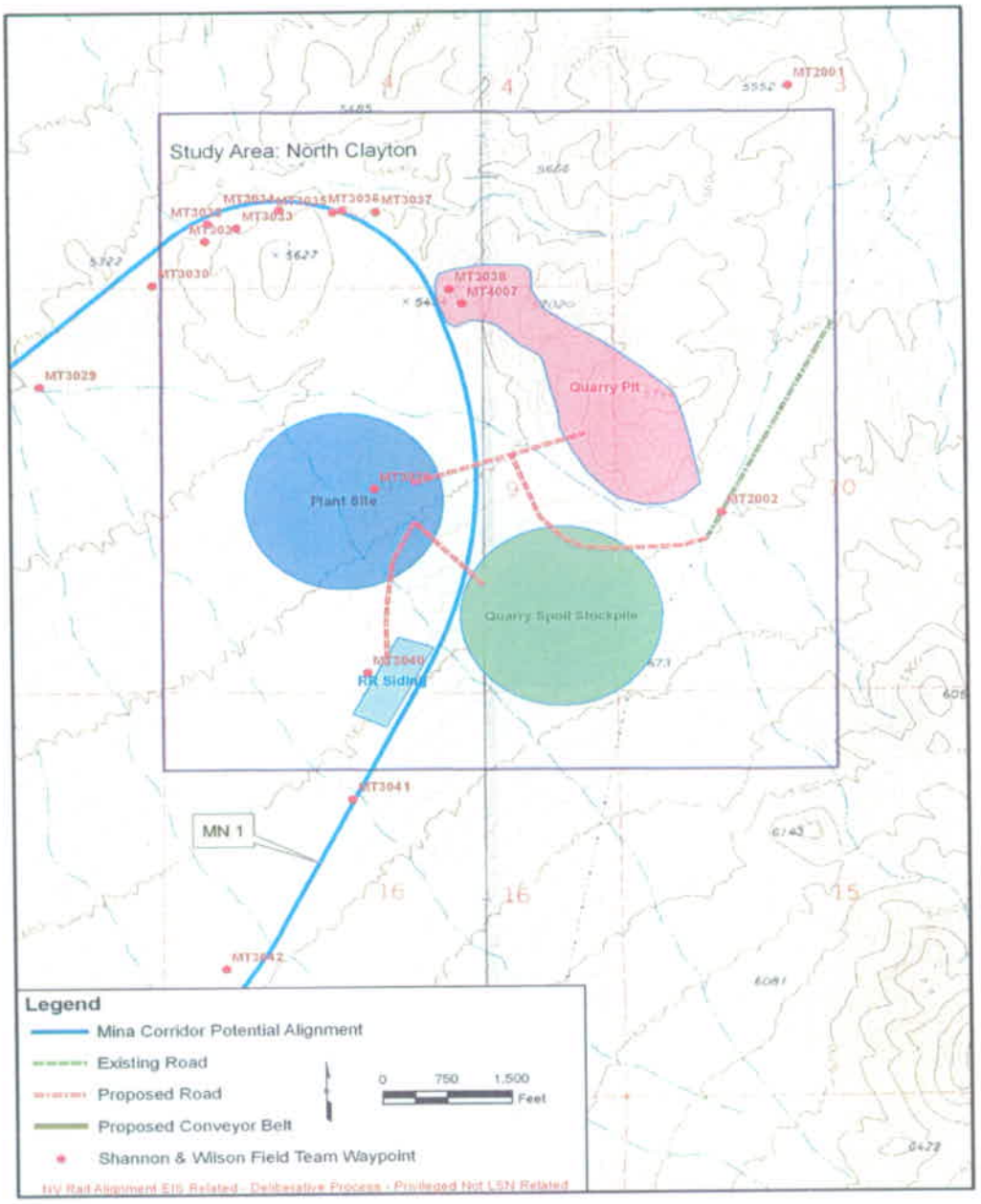


Figure A.2-1. North Clayton Ballast Quarry Conceptual Layout

A. Topography

Topography in the North Clayton study area is dominated by a northeast-trending ridge. Slopes across the study area are moderate to steep. The topography on alluvial fans to the south and east of the study area slopes northwest and north, respectively, at about 4 percent. Areas to the north and west are rougher, with hills and ridges sloping between 5 and 20 percent.

B. Surface Water (near stream/river?), what flow?, intermittent)

Several dry washes cross the alluvial fan in the south half of the study area. These washes may carry significant water flows during major rain events.

C. Room for Plant/Office Facilities (need 80 acres of flat land)

There is adequate acreage available for a plant facility on the alluvial fan southwest of the quarry site. The proposed plant site encompasses about 96 acres. The surface slopes downward away from the alignment at 3 percent average gradient. The spoil stockpile area could serve as a borrow pit for this fill during construction of the plant facilities. The sandy gravels and gravelly sand in the spoil stockpile area can be removed by conventional methods.

D. Existing Access roads (where are they?, can they be improved? show on maps)

Access to the study area is by way of an existing jeep trail adjacent to a power line that originates at Alkali (N37.82430°, W117.33540°), runs southwesterly for a distance of 6.3 miles then terminates at a rural road (N37.74033°, W117.37811°). The quarry site is west of this road and about 3.5 mi southwest of Alkali. The sample site (MT4007) is located about 1 mile northwest of the dirt road and is accessed by an unmapped jeep trail. The average slope on these trails is about 3 percent with a maximum grade of 7 percent.

These narrow dirt trails are adequate for exploration drill rigs during dry weather. They will need improvement to serve as access roads to an active quarry site. The North Clayton site map (Figure A.2-1) shows existing trails and indicates where new roads are needed to access the proposed quarry, plant site, spoil stockpile, and railroad siding.

E. Room for Railroad Siding (where would siding be for loading ballast cars?)

The proposed MN-1 alignment passes very close to the proposed quarry pit. A better location for the siding, however, is about 0.6 mile southwest of the quarry. Here, there is adequate room for an approximately 11-acre (or larger) siding facility adjacent to the tracks at approximately N37.77513°, W117.38133°. The proposed siding lies topographically below the rail alignment. Some preliminary siding characteristics are listed in Table A.2-1.

TABLE A.2-1
PROPOSED RAILROAD SIDING – CHARACTER ISTICS

Item	Value
Average site elevation (ft)	5,590
Average slope (percent)	5
New roads (mi)	1.3
Improved roads (mi)	3.6

F. Room for Spoil Stockpile (need ~flat to ~gently sloping topo)

Figure A.2-1 shows the proposed 99-acre spoil stockpile site. It is located adjacent to the proposed plant site to minimize new road construction. No earthwork is required to prepare the

site. The spoil stockpile area lies on an alluvial fan composed of gravelly, silty sand and silty, gravelly sand. This material can be removed using conventional excavation methods.

Some preliminary spoil stockpile characteristics are provided in Table A.2-2.

TABLE A.2-2
PROPOSED QUARRY SPOIL STOCKPILE

Item	Value
Average site elevation (ft)	5,997
Average slope (percent)	6
New roads (mi)	1.6
Improved roads (mi)	3.4

G. Access Roads (to highway and RR alignment)

All-weather access to the site will require construction of 3.4 miles of improvements to existing jeep trails and 1.6 miles of new roads. Some preliminary road construction estimates are listed in Table A.2-3.

TABLE A.2-3
PRELIMINARY ROAD CONSTRUCTION ESTIMATES

From	To	Improved (mi)	New (mi)	Avg. Percent Slope	Max Percent Slope
Alkali	Turnoff	3.4	0.0	3	7
Turnoff	Quarry	0.0	1.0	2	6
Quarry	Siding	0.0	0.6	2	5
TOTALS		3.4	1.6		

i. Topographic conditions for new roads

The 3.4-mile jeep trail between Alkali and the quarry turnoff is easily negotiable by 4WD vehicles during dry periods, but will require improvements to provide all-weather access. Minor fill with culverts may be required in a few locations, but no road cuts or major fills are anticipated.

The new 1-mile turnoff-to-quarry road will be used primarily by loaded dump trucks and heavy construction equipment. It will need to be built to support this traffic under all weather conditions. The gentle slopes on this proposed route will not require significant earthwork during construction.

The new 0.6-mile quarry-to-siding road also provides access to the plant site. It, too, will be used primarily by loaded dump trucks and heavy construction equipment. The gentle slopes on this proposed route will not require significant earthwork during construction.

ii. Cut slopes (soil/rock)

Existing topographic conditions and anticipated traffic patterns are such that no significant soil or rock cuts will be required during road construction at this site. See discussion in the previous section.

2. DEPOSIT FEATURES

A. Location (show on 1:24,000 scale topo to the extent possible; record T, R, Sec)

The 1550-acre study area (Figure A.2-1) is located in the NW/4 sec 10, T 2 S, R 41 E (Esmeralda County, Nevada, Mt. Diablo Meridian).

B. Tonnage (provided in this deposit [W x L x H])

Outcrops observed in the study area indicate that the proposed quarry pit will support a multiple-bench operation covering about 86 acres with a pit floor at about elevation 5,480 feet. Quarrying could commence at any number of locations near the base of the ridge and advance toward higher elevations. An estimated 13.6 million tons of unprocessed stone is extractable from this deposit.

C. Overburden (note thickness/type)

Surface observations indicate that the proposed quarry pit area is covered with 0 to 3 feet of residual sandy gravel overburden. Actual thicknesses need to be confirmed with borings. If the overburden is as thin as anticipated, it may be feasible to separate it from the stone by screening the blasted rock rather than removing it mechanically from the bench top prior to drilling.

D. Deposit Features

i. Rock Type/Description (use S&W rock descriptions)

The rock unit of interest in the study area is GRANITE, a plutonic igneous rock composed of quartz, orthoclase, plagioclase, magnetite, biotite, muscovite, and calcite. Plutonic refers to rocks that formed at considerable depths in the earth's crust from magma. Granite cools slowly and develops a coarse crystalline texture. Over time, this pluton was uplifted and exposed by erosion.

ii. Thickness/Depth (need minable thickness)

The maximum topography within the quarry pit area is about 170 feet based on a mine floor elevation of 5,480 feet.

iii. Rock Structure (block sizes/joint or fracture spacing)

a. Joints and Fractures

We noted three distinct joint sets in this outcrop. Average values for each joint set are presented in Table A.2-4.

TABLE A.2-4
JOINT MEASUREMENTS AT SAMPLED OUTCROP

Joint Set	Dip Angle° (degrees)	Dip Direction (azimuth)	Joint Spacing (feet)
J1	70	64	8 to 10
J2	19	278	5 to 6
J3	79	159	0.5 to 4

b. Estimated block size distribution

Block size distribution is presented in Table A.2-5. It reflects the joint spacing measured at various locations on the outcrop.

TABLE A.2-5
ESTIMATED BLOCK SIZE DISTRIBUTION

Block Size	Percent Distribution
> 6.0 ft	10
4.0 – 6.0 ft	50
2.0 – 4.0 ft	25
0.5 – 2.0 ft	15
< 0.5 ft	5

c. Deleterious Materials, including orientation and thickness (Note: Ash layers/faults/weather contacts, shear zones, fillings, scoriaceous zones, rubble zones, etc. This is internal waste that reduces deposit size.)

Based on observation of surface outcrops, about 25 percent of this stone could be highly weathered or altered at the ground surface and along joints, and therefore, be unsuitable for ballast material.

d. Rock Quality Designation (RQD)

RQD of the sampled outcrop is estimated at 70 to 85 percent. This reflects the vertical jointing and generally massive nature of the outcrop.

e. Samples for testing (200 pounds minimum; describe sample; taken)

On 30 October 2006, roughly 240 lbs of rock samples were collected at waypoint MT4007, at about 5,510 feet elevation. The samples filled six canvas bags.

f. Rock hammer test

The granite at the sample site fractures with 5 to 10 blows from a standard geologic rock hammer, indicating medium-high strength.

g. Schmidt hammer tests

Nine Schmidt-hammer field tests were performed at the sample collection site. Test results are presented in Table A.2-6. The rocks tested were generally fresh; slight weathering on some test surfaces did not seem to affect the results. During all tests, the instrument was oriented perpendicular to the rock surface.

TABLE A.2-6
NORTH CLAYTON SCHMIDT-HAMMER FIELD TEST RESULTS

Test Number	Instrument Reading	Test Surface Dip/ Dip Direction
1	58	59/002
2	52	90/176
3	52	19/098
4	51	68/200
5	61	60/229
6	59	69/229
7	58	80/159
8	49	80/168
9	48	70/170

iv. Groundwater — Is there evidence groundwater is near surface? Want to avoid groundwater in pit as this causes permitting problem.

We saw no evidence of groundwater in the study area. We do not anticipate groundwater inflow into the quarry pit during mining operations. Seasonal surface water inflow should be minimal.

The closest observed water source is at Alkali, located about 3.4 miles northeast of the study area. At the time of our visit, a privately owned hot spring there was producing 10 to 20 gallons per minute (gpm) of non-potable water. Wells may need to be drilled at, or water transported to, the site.

E. Future Explorations

Core drilling is recommended to recover subsurface samples and to characterize the quality of the granite within the proposed quarry pit. At least eight borings are recommended during the preliminary phase of exploration.

a. Drill rig access

The existing jeep trails are adequate for 4WD drill rig access during dry weather or road conditions.

b. Type of rig

The steep slopes in the quarry pit area will require track-mounted rock coring rigs for access and pioneer roads prepared by dozers in some places.

c. Approximate depths and total footage of borings

We propose a final quarry floor elevation of 5,480. Each boring should bottom 20 feet below this elevation, or at 5,460 feet. These depths vary from 45 feet on the western edge of the quarry to 170 feet at the highest point on the ridge. The total estimate of required coring is about 800 feet. If these cores reveal unexpected subsurface conditions (such as variable rock types or rock quality issues), additional coring may be needed to evaluate the quarry pit area.

d. Geophysics alignments

Surface geophysics may be performed if any irregularities or inconsistencies are noted in the preliminary borings.

3. ENVIRONMENTAL FEATURES

A. Vegetation (what type/how much/where)

Vegetation consists mainly of sage, desert grasses, and sparsely scattered Joshua trees, with about 10 to 15 percent ground cover.

B. Visibility (would quarry be visible from road?)

The plant site, siding, and spoil stockpile areas would be visible from Silver Peak Road—a well-traveled road between Silver Peak and Goldfield—located 1 mile northwest of the study area. The quarry pit would be visible from Montezuma Well Road, a well-maintained but infrequently traveled road, located 1 mile southwest of the study area.

4. OTHER FEATURES

A. Power (is power nearby or need on-site generation)

An existing power line runs through the southeastern quadrant of the study area. This power line is approximately 1 mile east of the plant site and is shown in Figure A.2-1.

B. Water (groundwater studies by others)

No data available on groundwater studies.

5. NORTH CLAYTON PHOTOS

MT4007_BKR_0164_28Oct06, MT4007_BKR_0165_28Oct06 and MT4007_BKR_0166_28Oct06: Panoramic view of sampled outcrop, looking W.

MT3038_WTL_0212_09Oct06: Northwest outcrop, looking NE.

MT3038_WTL_0213_09Oct06: Closeup of blocks of remnant granite from outcrop.

MT3038_WTL_0214_09Oct06: Looking N at both hills of pluton.

Appendix D

Field Evaluation of the West Goldfield (ES-7) Quarry Site

Refer to Appendix F of *Construction Plan, Caliente Rail Corridor* (NRP 2007d).

Appendix E

Field Evaluation of the Malpais Mesa South Quarry Site

QUARRY FIELD EVALUATION CHECKLIST

Quarry Designation: MALPAIS MESA SOUTH
Field Team: Keith Rauch, Elizabeth Karcheski
October 28 and 29, 2006

1. SITE FEATURES (show on map to the extent possible)

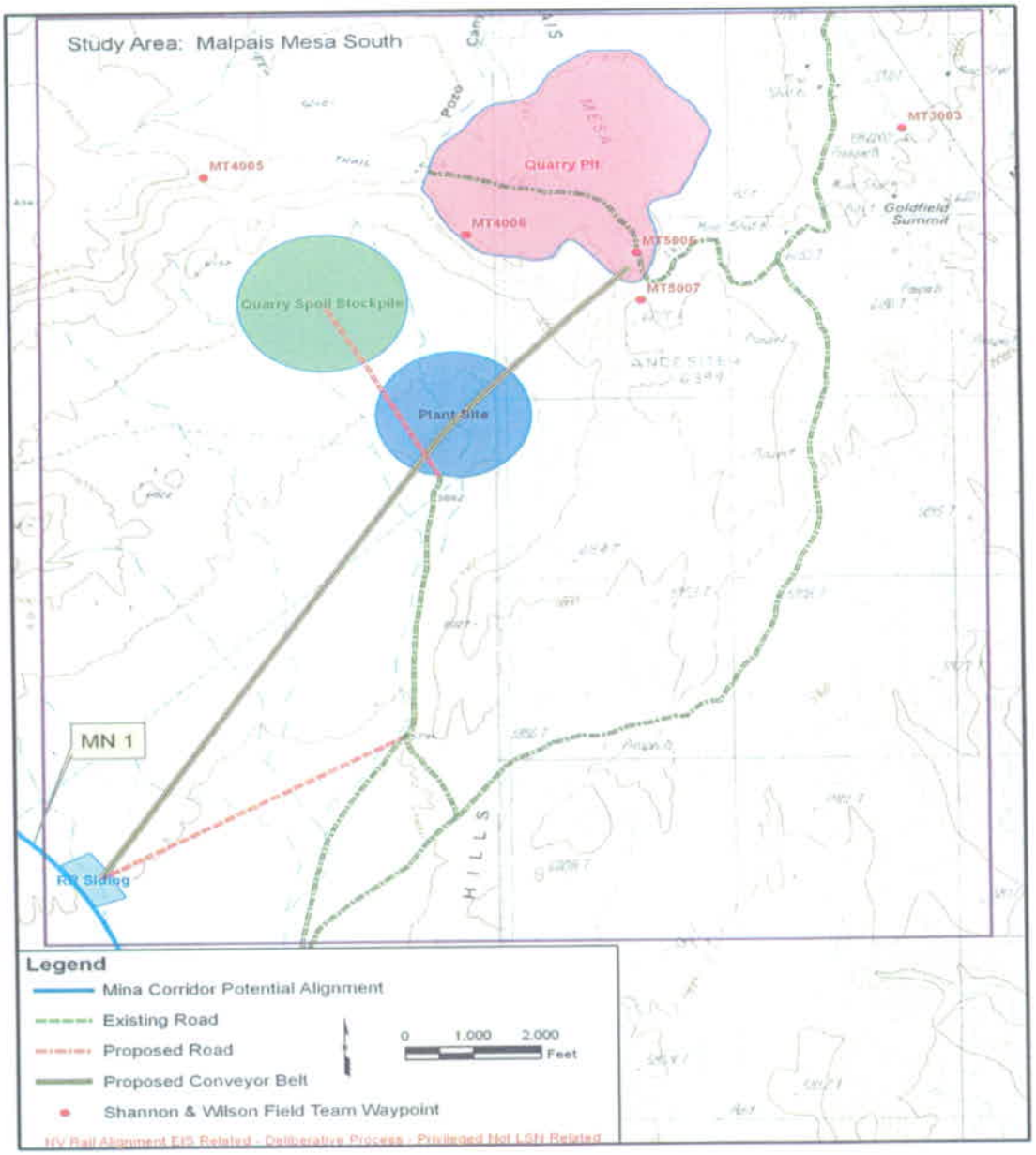


Figure A.1-1. Malpais Mesa South Ballast Quarry Conceptual Layout

A. Topography

Malpais Mesa consists of multiple basalt flows with interbedded multiple layers of ash tuff. The mesa is about 4 miles long (northwest to southeast) and 2 miles wide (southwest to northeast). The top of the mesa is generally flat with locally steep relief. The study area is at the south end of the mesa, where basalt flows with interbedded tuffs form a steep 200-foot-high, bowl-shaped cliff or steep slope (Figure A.1-1). This bowl opens to the southwest onto a broad alluvial fan that slopes gently down to the south. Slopes on the edge of the mesa average about 32 degrees. Slopes on the fan are 1 to 2 percent.

B. Surface Water (near stream/river?), what flow?, intermittent)

The alluvial fan between the quarry site and its railroad connection contains three dry washes, which may flow during major rain events. All the washes flow in a southerly direction.

C. Room for Plant/Office Facilities (need 80 acres of flat land)

There is adequate acreage available for a plant facility on the alluvial fan southwest of the quarry site. Slopes in this area average 1 to 2 percent. Only minor cuts and fills will be required. Sandy gravel and gravelly sand can be removed by conventional methods for site development.

D. Existing Access roads (where are they? can they be improved? show on maps)

We reached the site using a jeep trail that leaves highway US 95 at N37.68915°, W117.23318°. Table A.1-1 lists the approximate distances from US 95.

TABLE A.1-1
APPROXIMATE DISTANCES TO SITE LOCATIONS
BY EXISTING UNPAVED ROADS

Location	Distance (miles)
Proposed quarry site	2.3
Proposed plant site	4.8
Proposed spoil stockpile	5.5
Proposed railroad siding	4.7

These are narrow, unpaved, dirt trails that are adequate for exploration drill rigs during dry weather. They will need improvement to serve as access roads to an active quarry site. The Malpais Mesa South site map (Figure A.1-1) shows the jeep trails and where new roads are needed to access the proposed dump area and railroad siding.

An alternate access to the processing and transport facilities could be from the south via Railroad Springs Road and about 0.4 mile of new roadway. Railroad Springs Road is a well-maintained dirt road.

E. Room for Railroad Siding (where would siding be for loading ballast cars?)

The proposed MN-1 alignment lies 2.4 miles southwest of the proposed quarry pit. There is adequate room for a 10-acre (or larger) siding facility adjacent to the tracks at N37.65200°, W117.27426°. Some preliminary construction estimates are listed in Table A.1-2.

TABLE A.1-2
PROPOSED RAILROAD SIDING – SITE CHARACTERISTICS

Item	Value
Average site elevation	5,810 ft
Average slope	2 percent
New roads	1.0 mi
Improved roads	3.7 mi

Most of the cut material could be used to fill and level the lower side of the site. The site lies on an alluvial fan composed of silty, gravelly sand and silty, sandy gravel. This material can be removed using conventional excavation methods.

F. Room for Spoil Stockpile (need ~flat to ~gently sloping topo)

Figure A.1-1 shows the proposed spoil stockpile site of about 111 acres. It is located adjacent to the proposed plant site to minimize new road construction. No earthwork will be required to prepare the site. Some preliminary construction estimates are listed in Table A.1-3.

TABLE A.1-3
PROPOSED QUARRY SPOIL STOCKPILE – PRELIMINARY SITE CHARACTERISTICS

Item	Value
Average site elevation	5,970 feet
Average slope	4 percent
New roads	0.7 mile
Improved roads	None

G. Access Roads (to highway and RR alignment)

All-weather access to the site would require construction of 6 miles of improvements to existing jeep trails and 1 mile of new roads. Some preliminary road construction estimates are listed in Table A.1-4.

TABLE A.1-4
PRELIMINARY ROAD CONSTRUCTION ESTIMATES

From	To	Improved (mi)	New (mi)	Avg. Percent Slope	Max Percent Slope
US 95	Quarry	2.3	0.0	4	16
Quarry	Plant	3.7	0.0	3	14
Plant	Spoil Pile	0.0	0.7	2	4
Plant	Siding	0.0	1.0	1	3
TOTALS		6.0	1.7		

i. Topographic conditions for new roads

The 2.3-mile jeep trail between US 95 and the quarry becomes steep and winding on the side slope of the mesa (see Table A.1-4). We anticipate, however, that most of the traffic on this road will be light 4WD vehicles with only occasional trips by large, heavy construction equipment. Similar traffic patterns on the 3.7-mile quarry-to-plant road lead us to believe that the existing trail can be upgraded rather than replaced by a new road.

The new 0.7-mile plant-to-spoil stockpile road will be used primarily by loaded dump trucks and heavy construction equipment. It will need to be built to support this traffic under all weather

conditions. The gentle slopes on this proposed route will require no significant earthwork during construction.

The new 1-mile plant-to-siding road will be used primarily by light 4WD vehicles, with only occasional trips by heavy construction equipment. The gentle slopes on this proposed route will not require significant earthwork during construction.

As noted in Section 1.0 above, access roads from the south along Railroad Springs Road would be very low gradient and require minimal earthwork to the processing and loading facilities.

ii. Cut slopes (soil/rock)

Existing topographic conditions and anticipated traffic patterns lead us to expect that no significant soil or rock cuts will be required during road construction at this site. See discussion in the previous section.

2. DEPOSIT FEATURES

A. Location (show on 1:24,000 scale topo to the extent possible; record T, R, Sec)

The 258-acre quarry pit (Figure A.1-1) is located in the SW/4 sec 15, T 3 S, R 42 E (Esmeralda County, Nevada, Mt. Diablo Meridian).

Malpais Mesa was evaluated for a ballast quarry site in 2005 for the Caliente Route. A site was selected at the north end of this expansive mesa where it is in relative proximity to the Caliente Route. For the Mina Route studies, the mesa was again evaluated, but for a site closer to the MN-1 route. This potential ballast quarry site was designated Malpais Mesa South to distinguish it from the site at the north end of the mesa.

B. Tonnage (provided in this deposit [W x L x H])

Outcrops observed in the study area indicate that the proposed quarry pit will support a multiple-bench operation covering about 258 acres with a pit floor at the base of the andesite flows (estimated 6200 elevation). The thickness averages about 70 feet. Quarrying would begin along the southern cliff face and advance to the north. A quarry pit of these dimensions can produce roughly 13.1 million total tons of unprocessed stone.

C. Overburden (note thickness/type)

Surface observations suggest that the proposed quarry pit area is covered with 0 to 5 feet of residual sandy gravel overburden. Actual depths need to be confirmed with borings and/or test pits. If the overburden is as thin as anticipated, it may be feasible to separate it from the stone by screening the blasted rock rather than removing it mechanically from the bench top prior to drilling.

D. Deposit Features

i. Rock Type/Description (use S&W rock descriptions)

The rock unit of interest in the proposed quarry pit is BASALT, a dark, fine-grained extrusive igneous rock that forms at, or near, the surface as volcanic lava flows and shallow intrusions. It generally cools quickly and has a glassy to very fine-grained crystalline texture. It commonly contains small spherical voids (vesicles) formed by the expansion of gas or steam during cooling. The vesicles are normally more numerous near the top of a basalt flow.

Basalt consists mostly of plagioclase feldspar with olivine, magnetite, pyroxene, biotite and iddingsite. The vesicles observed in this outcrop are most often filled with zeolite crystals.

We observed three rock types in the sample outcrop area:

A. Basalt: moderate to medium strength, gray, fine crystalline; massive, highly vesicular with approximately 90 percent zeolite-filled vesicles, jointed; fresh to slightly weathered.

B. Basalt: moderate to medium strength, gray, fine crystalline; massive, highly vesicular with approximately 10 percent zeolite-filled vesicles, jointed; fresh to slightly weathered.

C. Tuff: low to moderate strength, red, porphyritic; massive, lineated; slightly weathered. Not suitable ballast material and not sampled for this study.

ii. Thickness/Depth (need minable thickness)

Two separate lava flows are visible in the cliff face outcrops. The lower flow is about 30 feet thick. The top of the upper flow is not fully exposed but may be as thick as 40 feet. The two flows together may have a minable thickness of about 70 feet.

iii. Rock Structure (block sizes/joint or fracture spacing)

a. Joints and Fractures

All joints are steeply dipping at 2- to 5-foot spacing. Joint faces are fairly smooth and open (not cemented). Joint measurements are presented in Table A.1-5.

TABLE A.1-5
JOINT MEASUREMENTS AT SAMPLED OUTCROP

Outcrop Number	Lithology Type	Dip Angle° (degrees)	Dip Direction (Azimuth)
2	A	75	294
2	A	80	305
2	A	75	010
3	A	79	036
3	A	85	155
4	B	82	173
4	B	69	190
5	A	87	273
5	A	90	254
6	A	83	011
6	A	73	115
7	C	67	164
7	C	82	220

b. Estimated block size distribution

Block size distribution is presented in Table A.1-6.

TABLE A.1-6
ESTIMATED BLOCK SIZE DISTRIBUTION

Block Size	Percent Distribution
> 6.0 ft	10 percent
4.0 – 6.0 ft	40 percent
2.0 – 4.0 ft	30 percent
0.5 – 2.0 ft	15 percent
< 0.5 ft	5 percent

It reflects the jointing spacing measured at various locations on the outcrop.

c. Deleterious Materials, including orientation and thickness (Note: Ash layers/faults/weather contacts, shear zones, fillings, scoriaceous zones, rubble zones, etc. This is internal waste that reduces deposit size.)

Field observations suggest that up to 25 percent of the rock in the quarry pit consists of altered or rubble/scoriaceous zones between flows. This material is not suitable for ballast but cannot be avoided during mining.

d. Rock Quality Designation (RQD)

RQD of the sampled outcrop is estimated to be 80 to 90 percent. This reflects the vertical jointing and generally massive nature of the outcrop.

e. Samples for testing (100 pounds minimum; describe sample; taken)

On 29 October 2006, roughly 200 lbs of rock samples were collected at waypoint MT4006 (Figure A.1-1), at about 6,230 feet elevation; six canvas sample bags were filled.

f. Rock hammer test

The basalt sampled for this study typically fractures with one to five blows from a standard geologic rock hammer, indicating moderate to medium strength.

g. Schmidt-hammer tests

Ten Schmidt-hammer field tests were performed at the sample collection site. Test results are presented in Table A.1-7. In all tests, the instrument was oriented perpendicular to the rock surface. Two tuff outcrops were tested (tests 9 and 10) for comparison to the andesite.

TABLE A.1-7
MALPAIS MESA SOUTH SCHMIDT-HAMMER FIELD TEST RESULTS

Test Number	Instrument Reading	Lithology	Test Surface Dip/Dip Drection
1	40	A	79/060
2	45	A	75/294
3	40	A	30/010
4	46	A	79/036
5	54	B	69/190
6	28	B	82/173
7	44	A	90/254
8	55	A	83/011
9	45	C	82/220
10	32	C	67/154

iv. Groundwater — Is there evidence of groundwater near the surface? Want to avoid groundwater in pit as this causes permitting problem.

We saw no evidence of groundwater in the study area. We do not anticipate groundwater inflow into the quarry pit during mining operations. Seasonal surface water inflow should be minimal.

E. Future Explorations

Core drilling is recommended to recover subsurface samples and to characterize the quality of the basalt within the proposed quarry pit. A minimum of 13 borings are recommended during the preliminary phase of exploration.

a. Drill rig access

The existing narrow dirt trails are adequate for exploration drill rigs during dry weather or dry road conditions.

b. Type of rig

The existing trails and gentle slopes in the quarry pit area can be negotiated using a 4WD truck-mounted rock coring rig.

c. Approximate depths and total footage of borings

We propose a final quarry floor elevation of 6,200 feet. Each boring should bottom 10 feet below this elevation, or 6,190 feet. These depths range from 27 feet at the northwestern edge of the quarry to 90 feet at the highest point on the mesa. The total estimate of required coring would be about 1,000 feet. If these cores indicate that the lower andesite flow has an irregular base, additional coring may be needed to evaluate the quarry pit area.

d. Geophysics alignments

Due to good outcrop exposures and easy drill access, no surface geophysics are anticipated at this time. This should be reevaluated after the preliminary borings are drilled.

3. ENVIRONMENTAL FEATURES

A. Vegetation (what type/how much/where)

Vegetation consists mainly of sage, desert grasses, and sparsely scattered Joshua trees, with about 10 to 15 percent ground cover.

B. Visibility (would quarry be visible from road?)

The proposed quarry site would be visible from Railroad Springs Road, an east-west dirt road that crosses the M1 alignment about 3.6 miles south of the proposed quarry site (N37.63188°, W117.27090°). The quarry would not be visible from highway US 95, located about 0.5 mile to the east.

4. OTHER FEATURES

A. Power (is power nearby or need on-site generation)

There are no existing power lines within the study area. The closest known power line is approximately 1.3 miles to the east at US 95.

B. Water (groundwater studies by others)

No visible wells or springs were observed within the study area. An abandoned aqueduct is present within the study area. It begins near the base of the mesa and trends to the southwest. The aqueduct pipe has multiple breaks and is partially filled with sand. The source of water for this aqueduct appears to have dried up long ago. Wells may need to be drilled to supply water to the site.

5. MALPAIS MESA SOUTH PHOTOS

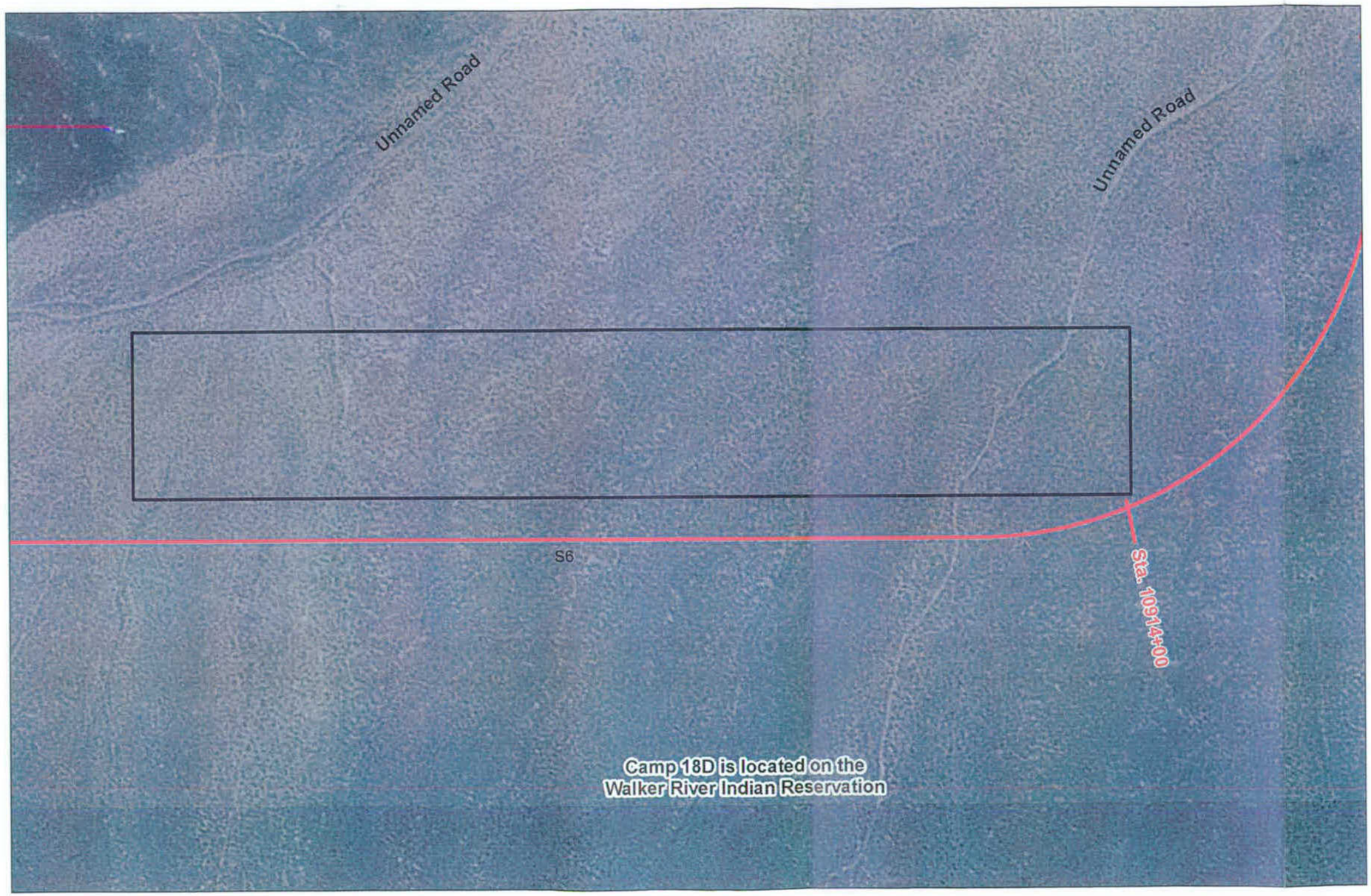
MT4006_BKR_0161_28Oct06: Malpais Mesa South. Outcropping andesite flows at sample location; looking E.

MT4006_BKR_0162_28Oct06: Malpais Mesa South. Outcropping basalt flows at sample location; looking W.

MT4006_BKR_0163_28Oct06: Malpais Mesa South. Top of Malpais Mesa, looking S toward Railroad Springs Road and alignment.

Appendix F

Aerial Photography of Construction Camp Locations



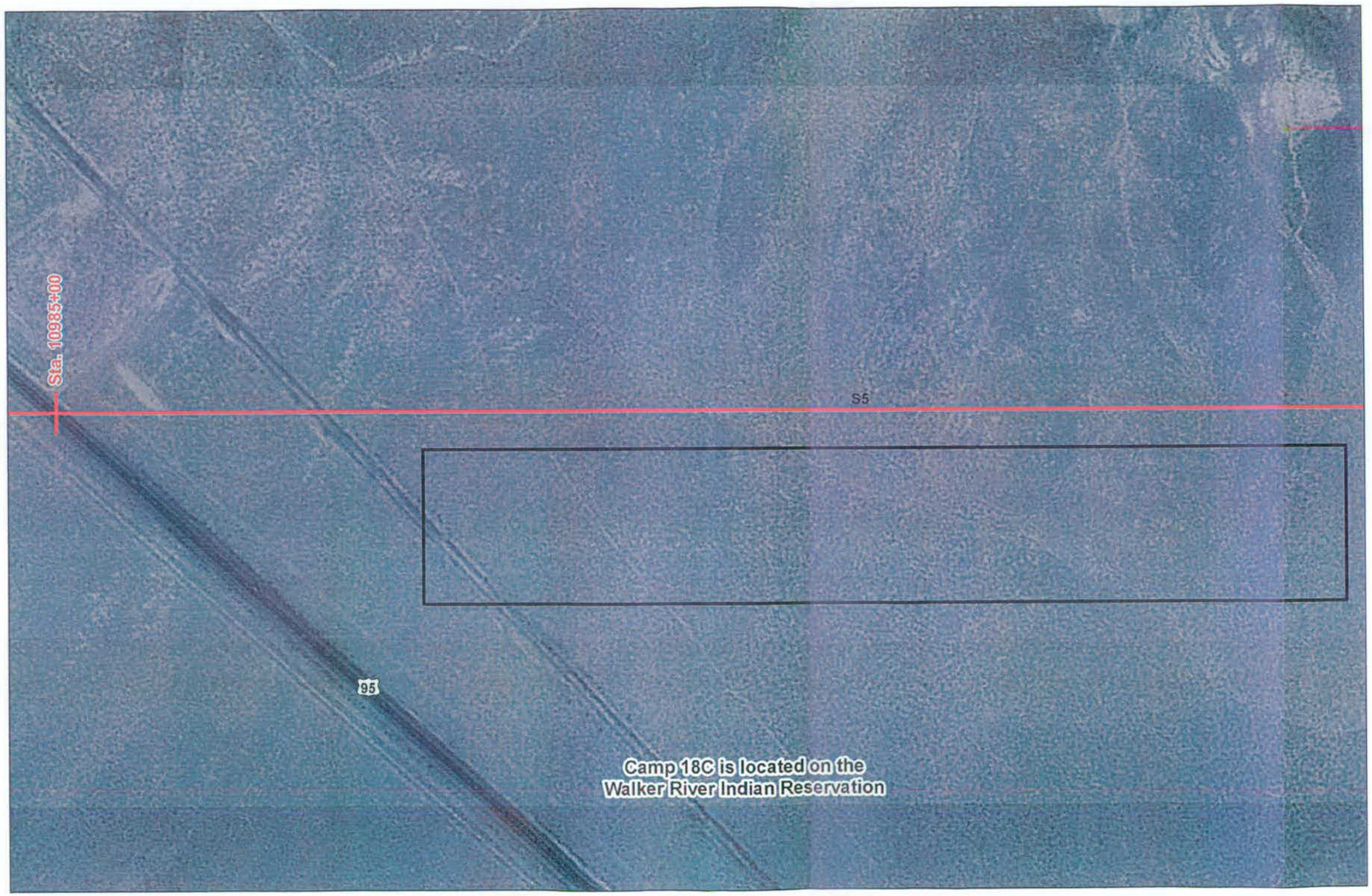
Construction Camps
Camp 18D

Legend
- Alternate Alignment
- Construction Camp Footprint

Overview Map

N E S W

0 125 250 375 500 Feet

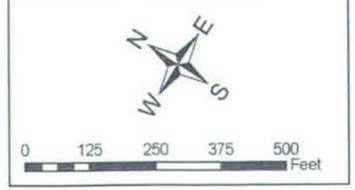


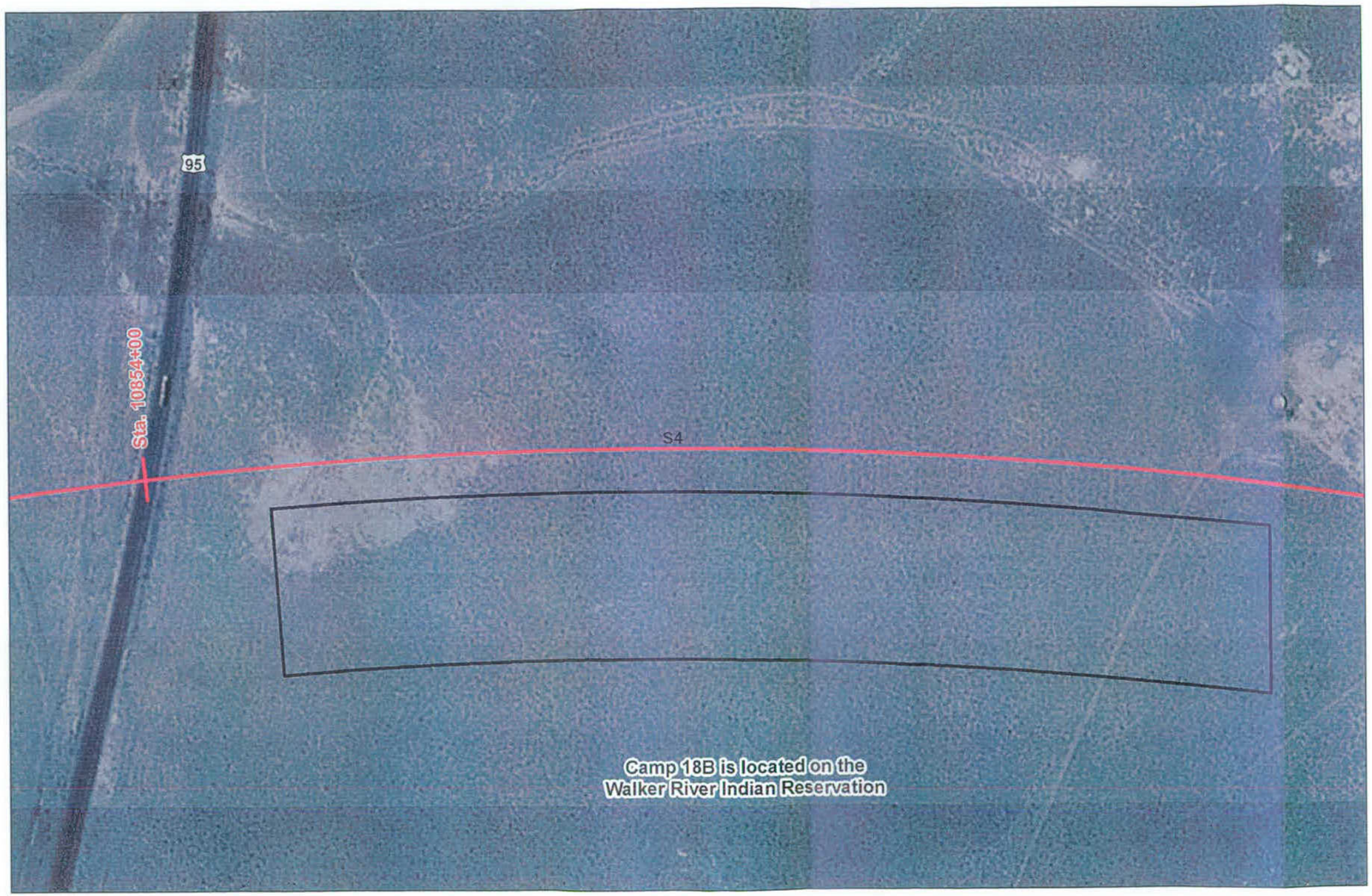
Construction Camps
Camp 18C

Legend

- Alternate Alignment
- Construction Camp Footprint

Overview Map

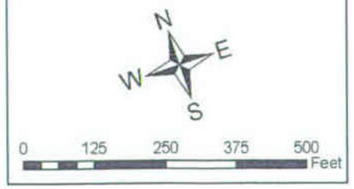


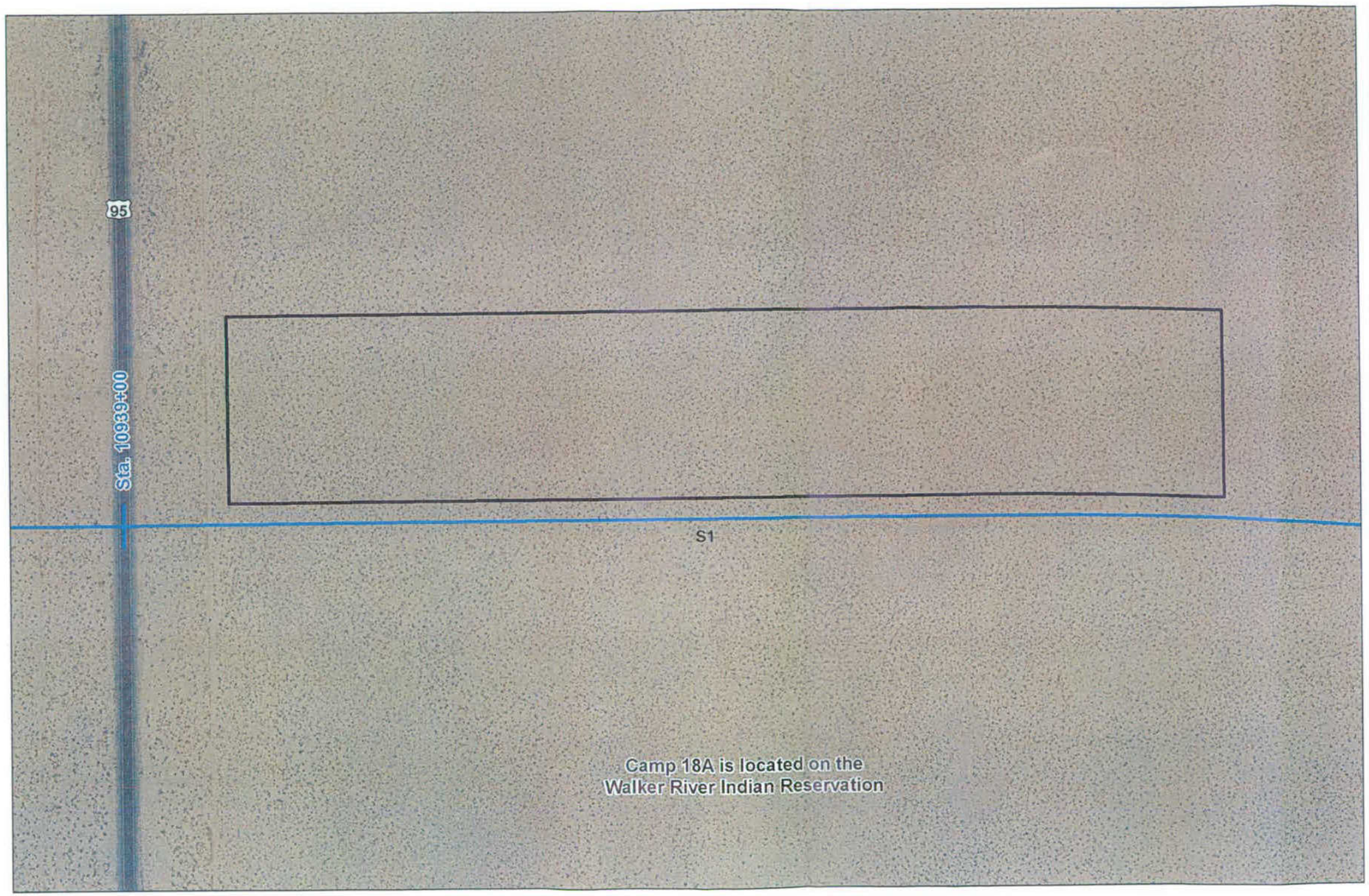


Construction Camps
Camp 18B

Legend
- Alternate Alignment
- Construction Camp Footprint

Overview Map

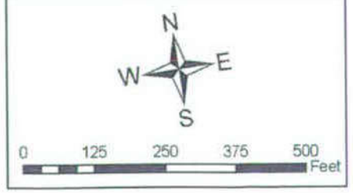


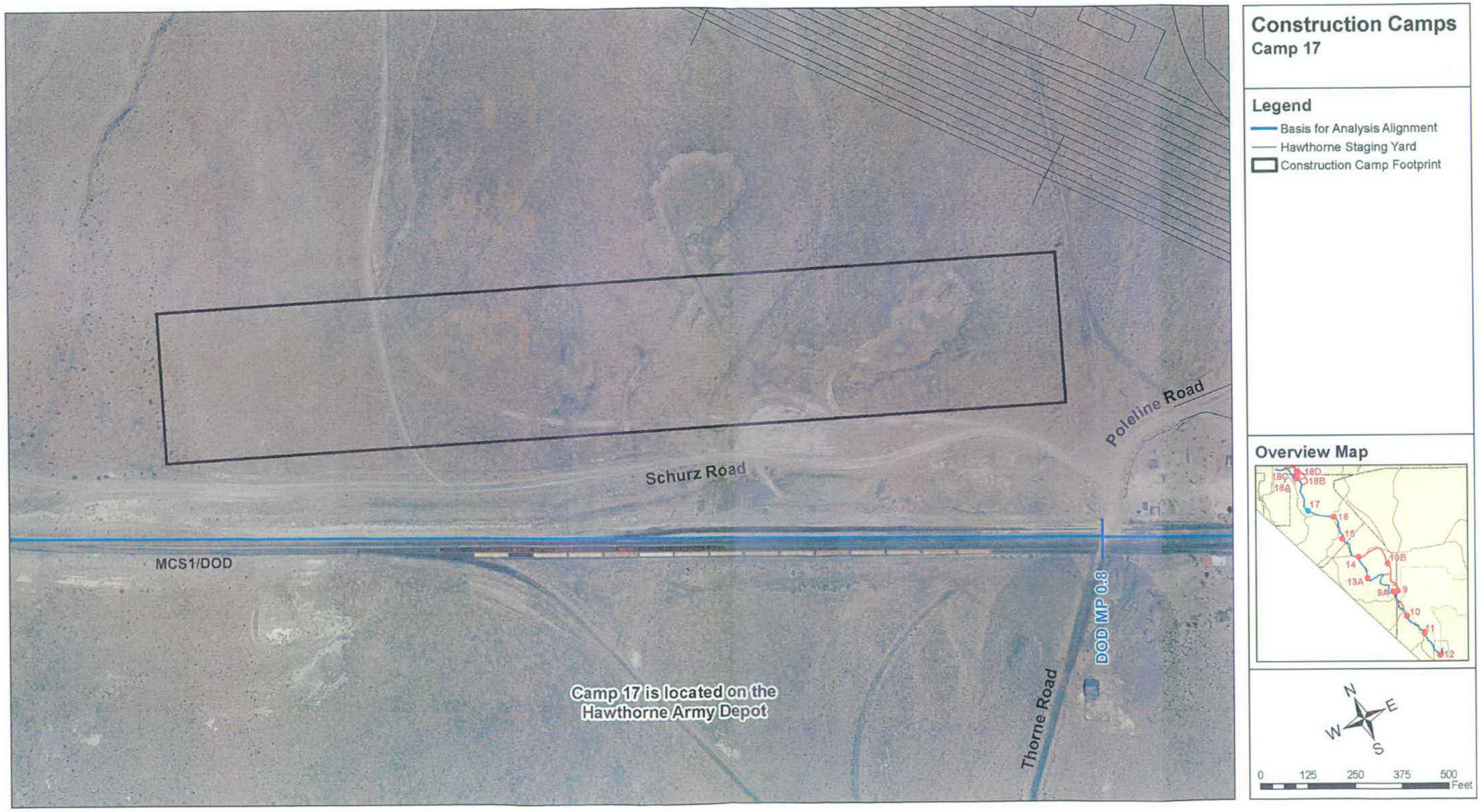


Construction Camps
Camp 18A

Legend
- Basis for Analysis Alignment
- Construction Camp Footprint

Overview Map





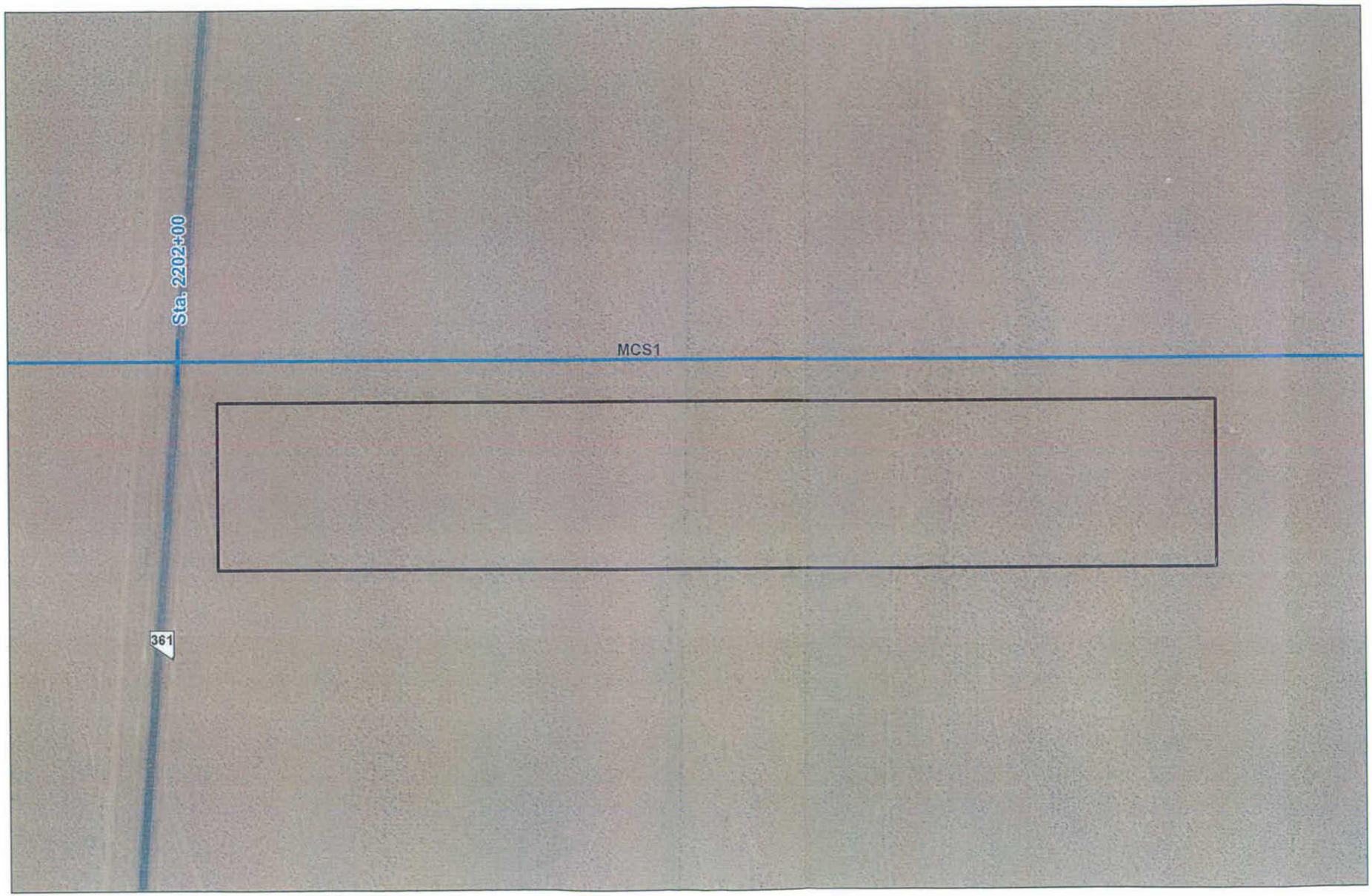
Construction Camps
Camp 17

Legend
- Basis for Analysis Alignment
- Hawthorne Staging Yard
- Construction Camp Footprint

Overview Map

N E W S

0 125 250 375 500 Feet



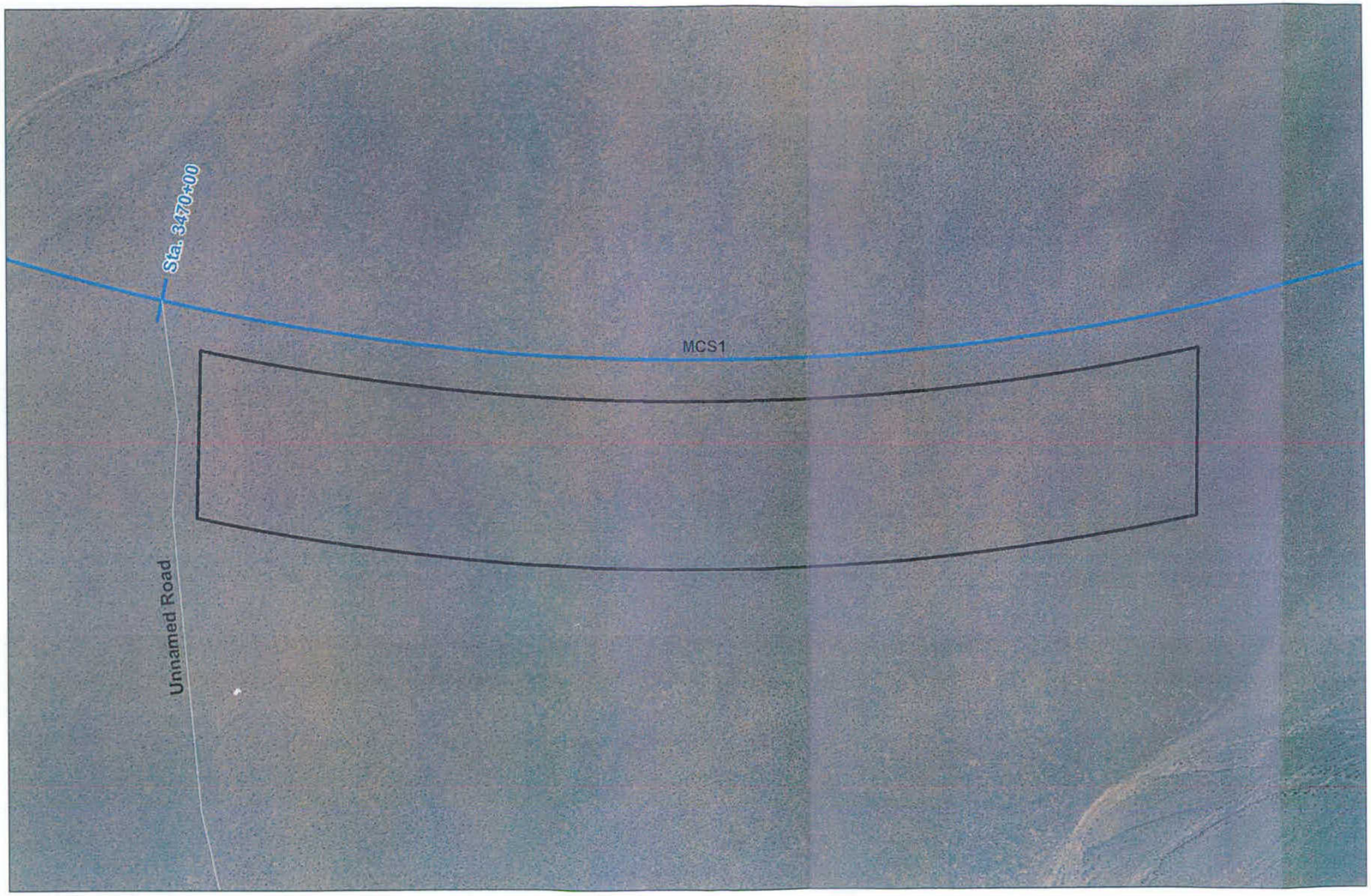
Construction Camps
Camp 16

Legend
- Basis for Analysis Alignment
- Construction Camp Footprint

Overview Map

N
W E
S

0 125 250 375 500 Feet



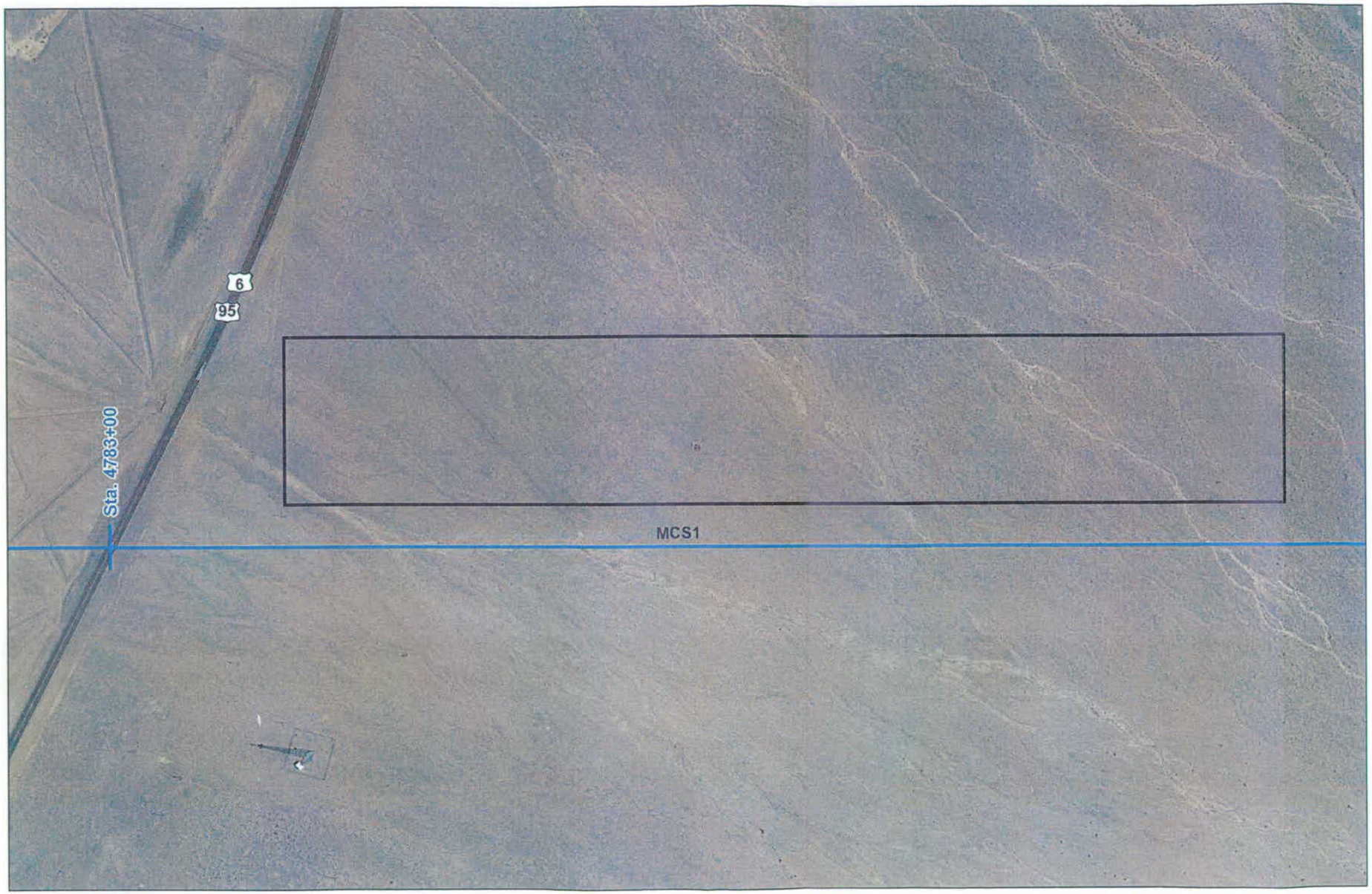
Construction Camps
Camp 15

Legend
- Basis for Analysis Alignment
- Access Road
- Construction Camp Footprint

Overview Map

N E S W

0 125 250 375 500 Feet



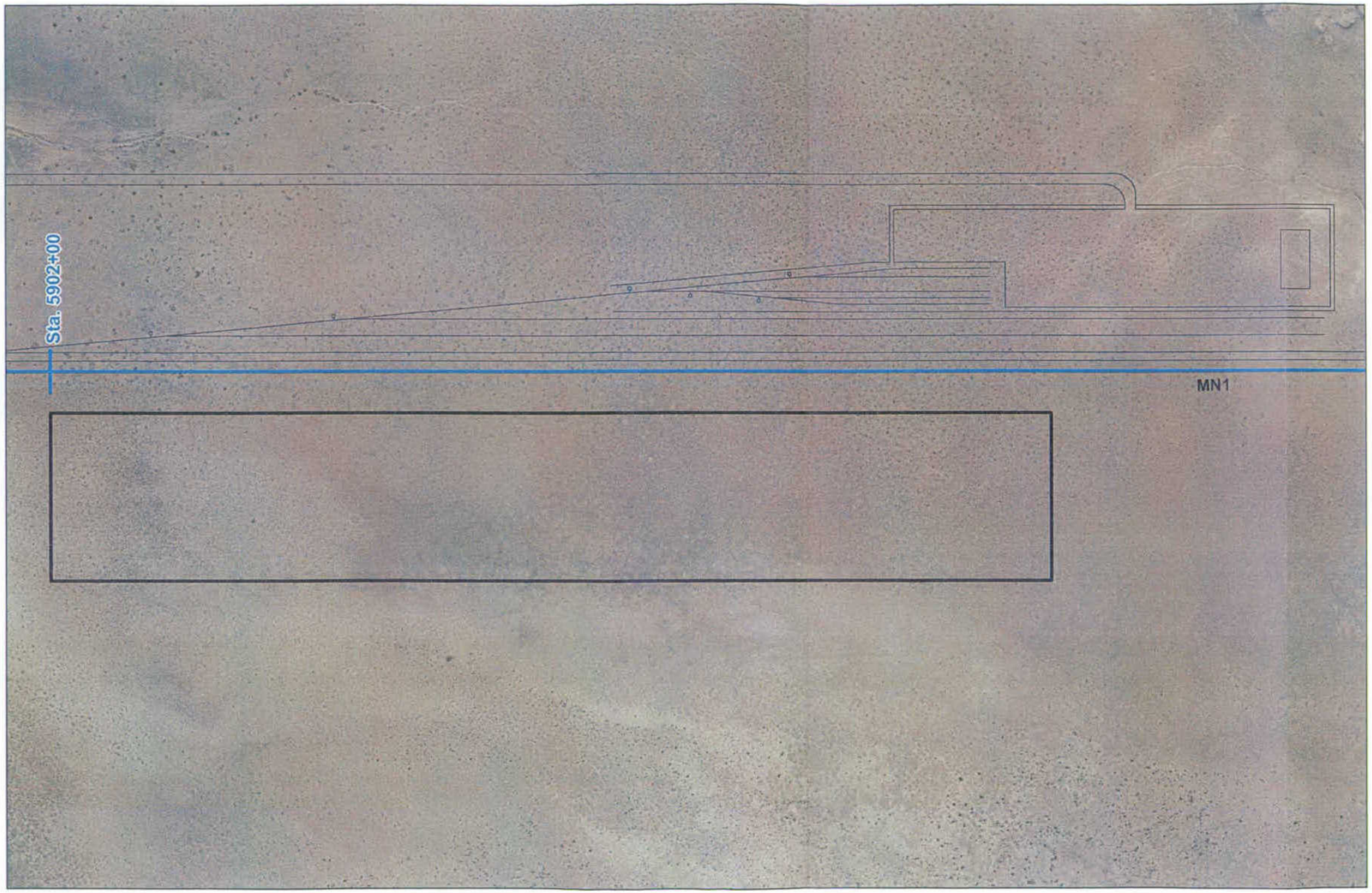
Construction Camps
Camp 14

Legend
- Basis for Analysis Alignment
- Construction Camp Footprint

Overview Map

N E S W

0 125 250 375 500 Feet



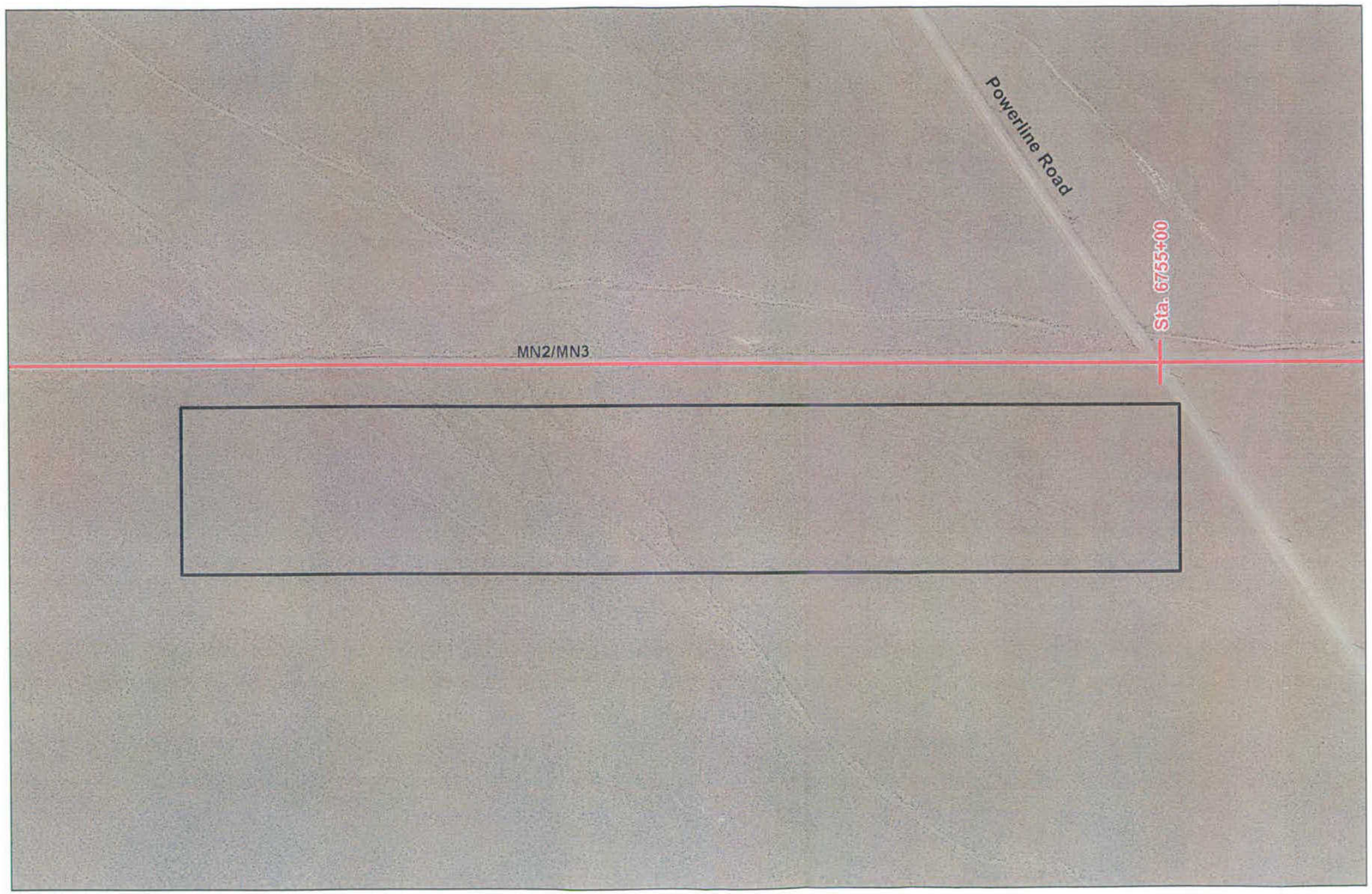
Construction Camps
Camp 13A

Legend
- Basis for Analysis Alignment
- Silver Peak MOW Facility
- Construction Camp Footprint

Overview Map

N E S W

0 125 250 375 500 Feet



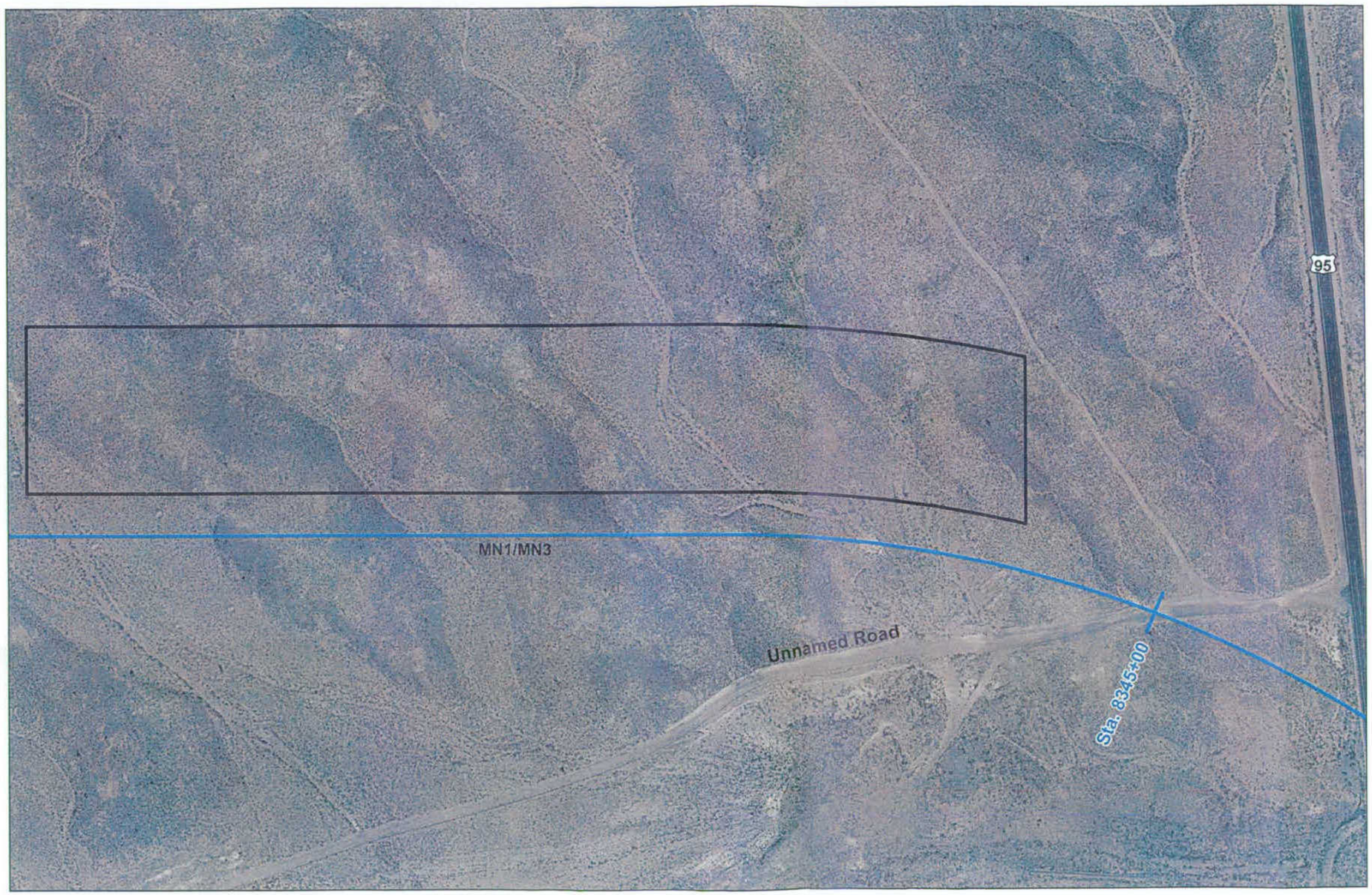
Construction Camps
Camp 13B

Legend
- Alternate Alignment
- Construction Camp Footprint

Overview Map

N E S W

0 125 250 375 500 Feet



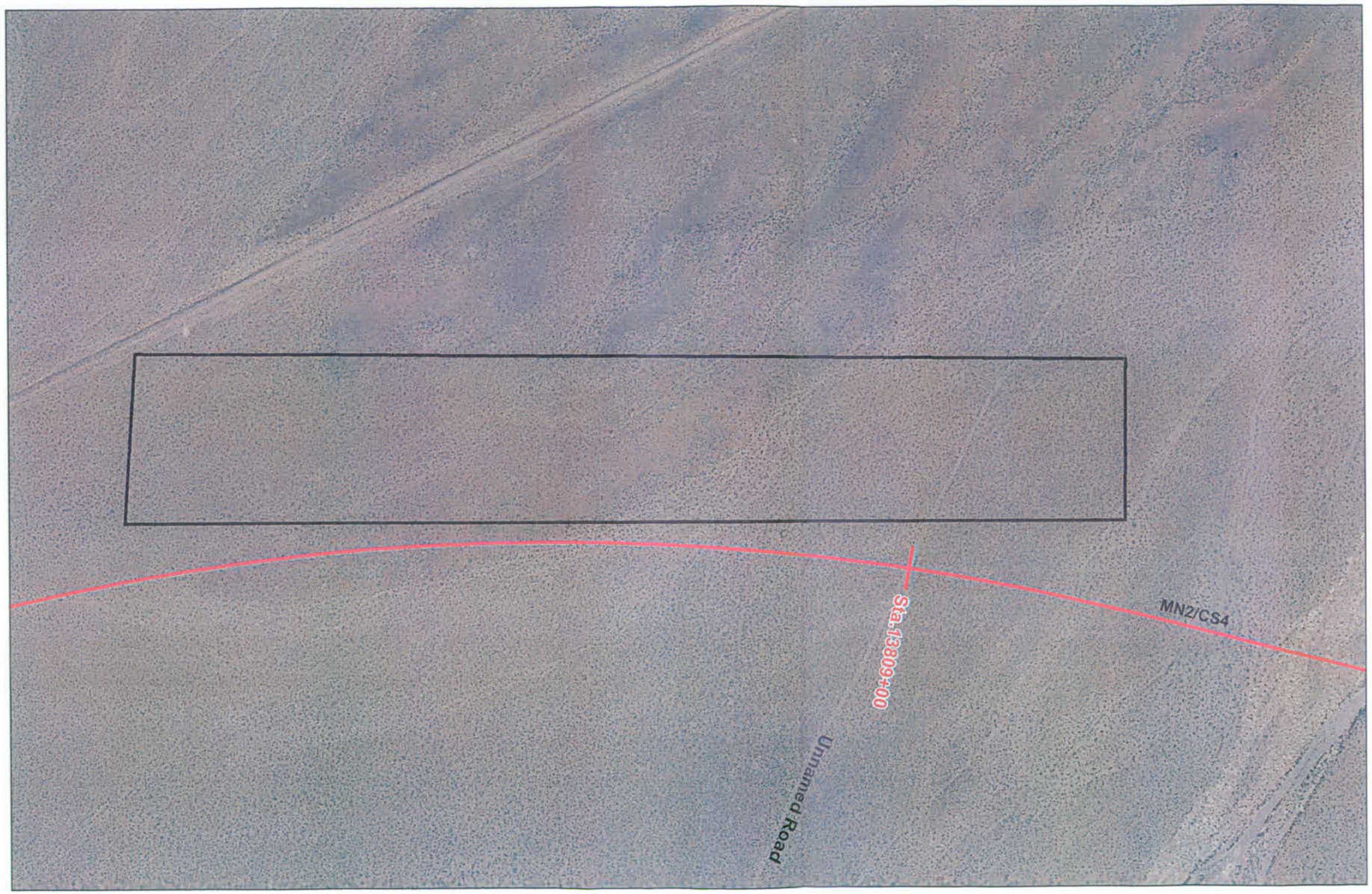
Construction Camps
Camp 9A

Legend
- Basis for Analysis Alignment
- Construction Camp Footprint

Overview Map

N
W E
S

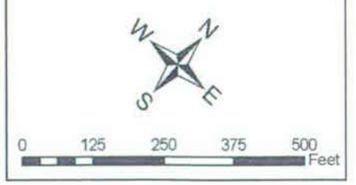
0 125 250 375 500 Feet

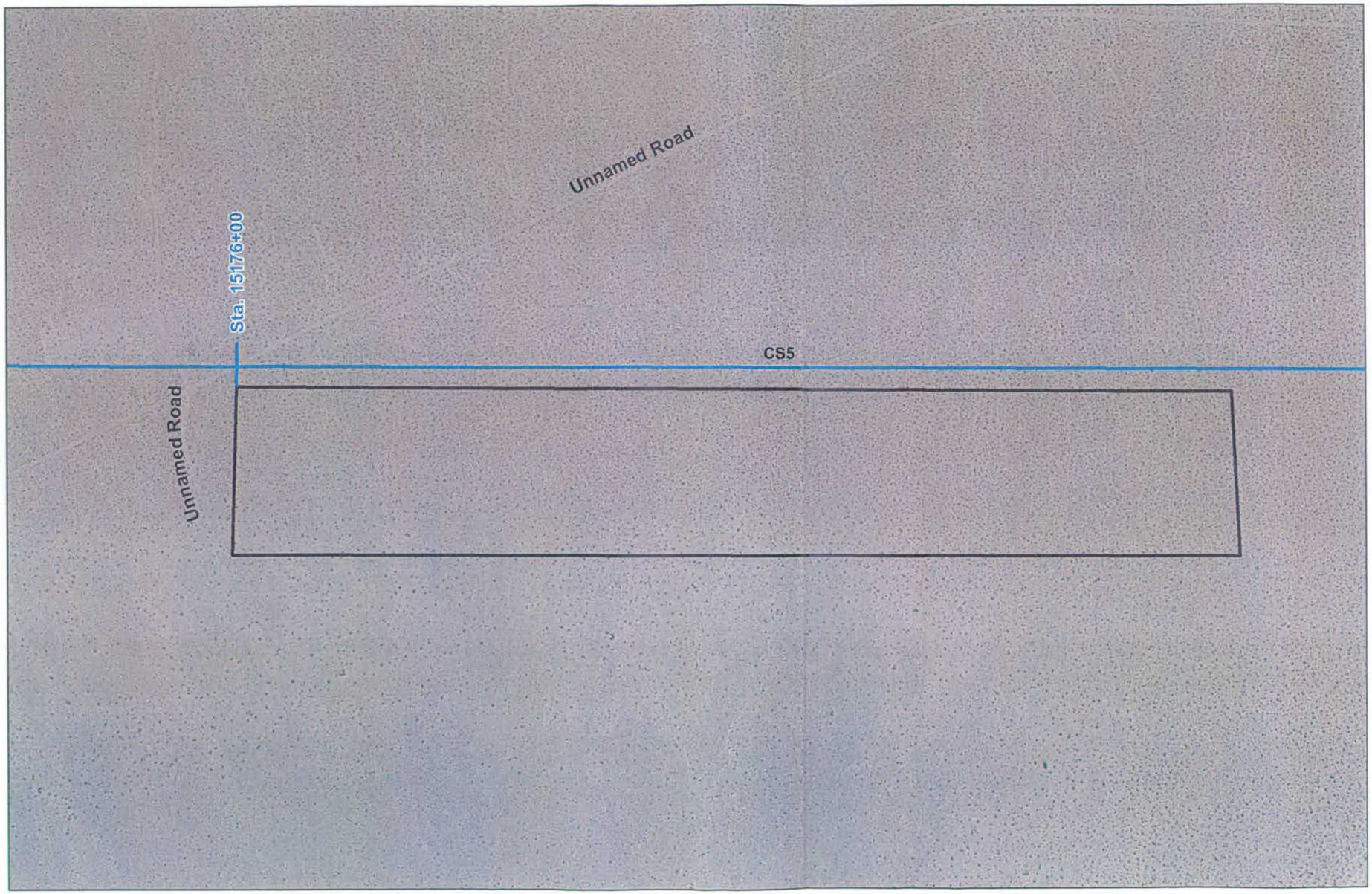


Construction Camps
Camp 9

Legend
- Alternate Alignment
- Construction Camp Footprint

Overview Map





Construction Camps
Camp 10

Legend
- Basis for Analysis Alignment
- Construction Camp Footprint

Overview Map

N E S W

0 125 250 375 500 Feet

Construction Camps
Camp 11

Legend
- Basis for Analysis Alignment
- Construction Camp Footprint
- Private Property

Overview Map

N E S W

0 125 250 375 500 Feet

Construction Camps
Camp 12

Legend

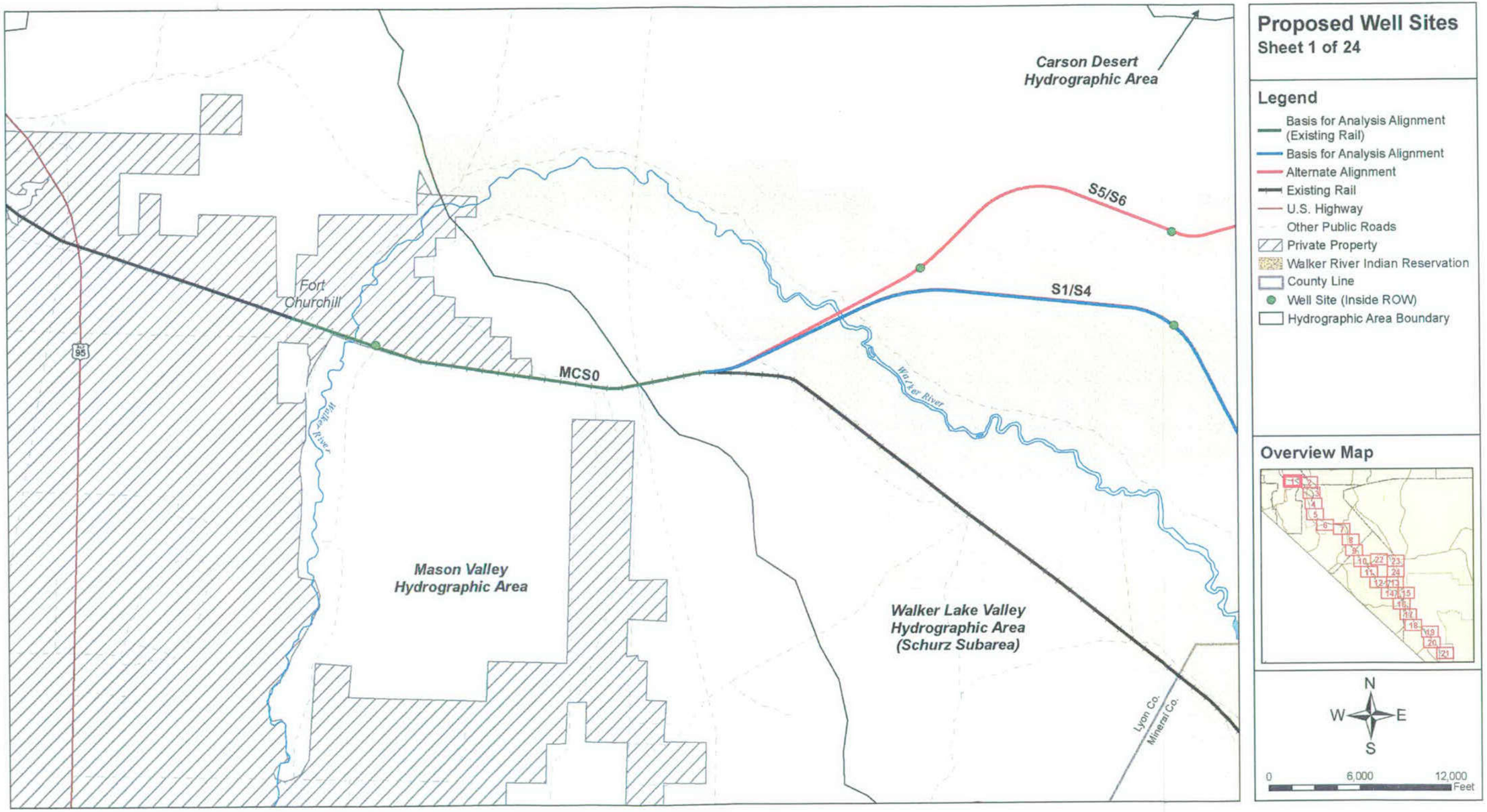
- Basis for Analysis Alignment
- Construction Camp Footprint
- Nevada Test Site

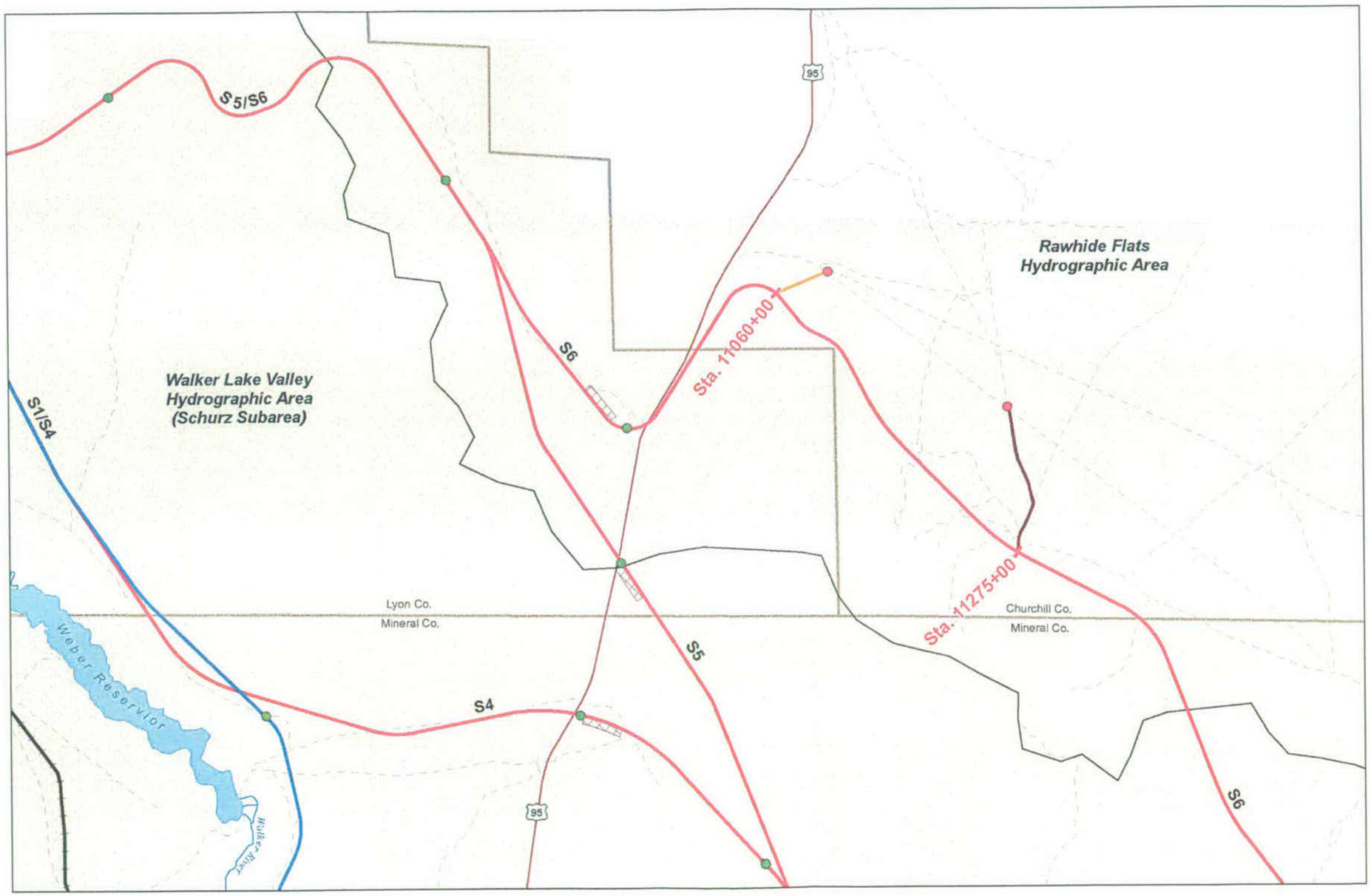
Overview Map

N
W
E
S

0 125 250 375 500 Feet

Appendix G
Well Location Detail Maps


Carson Desert
Hydrographic Area
S5/S6
S1/S4
MCS0
Fort
Churchill
Walker River
Mason Valley
Hydrographic Area
Walker Lake Valley
Hydrographic Area
(Schurz Subarea)
Lyon Co.
Mineral Co.
Proposed Well Sites
Sheet 1 of 24
Legend
Basis for Analysis Alignment (Existing Rail)
Basis for Analysis Alignment
Alternate Alignment
Existing Rail
U.S. Highway
Other Public Roads
Private Property
Walker River Indian Reservation
County Line
Well Site (Inside ROW)
Hydrographic Area Boundary
Overview Map
N
W
E
S
0
6,000
12,000
Feet



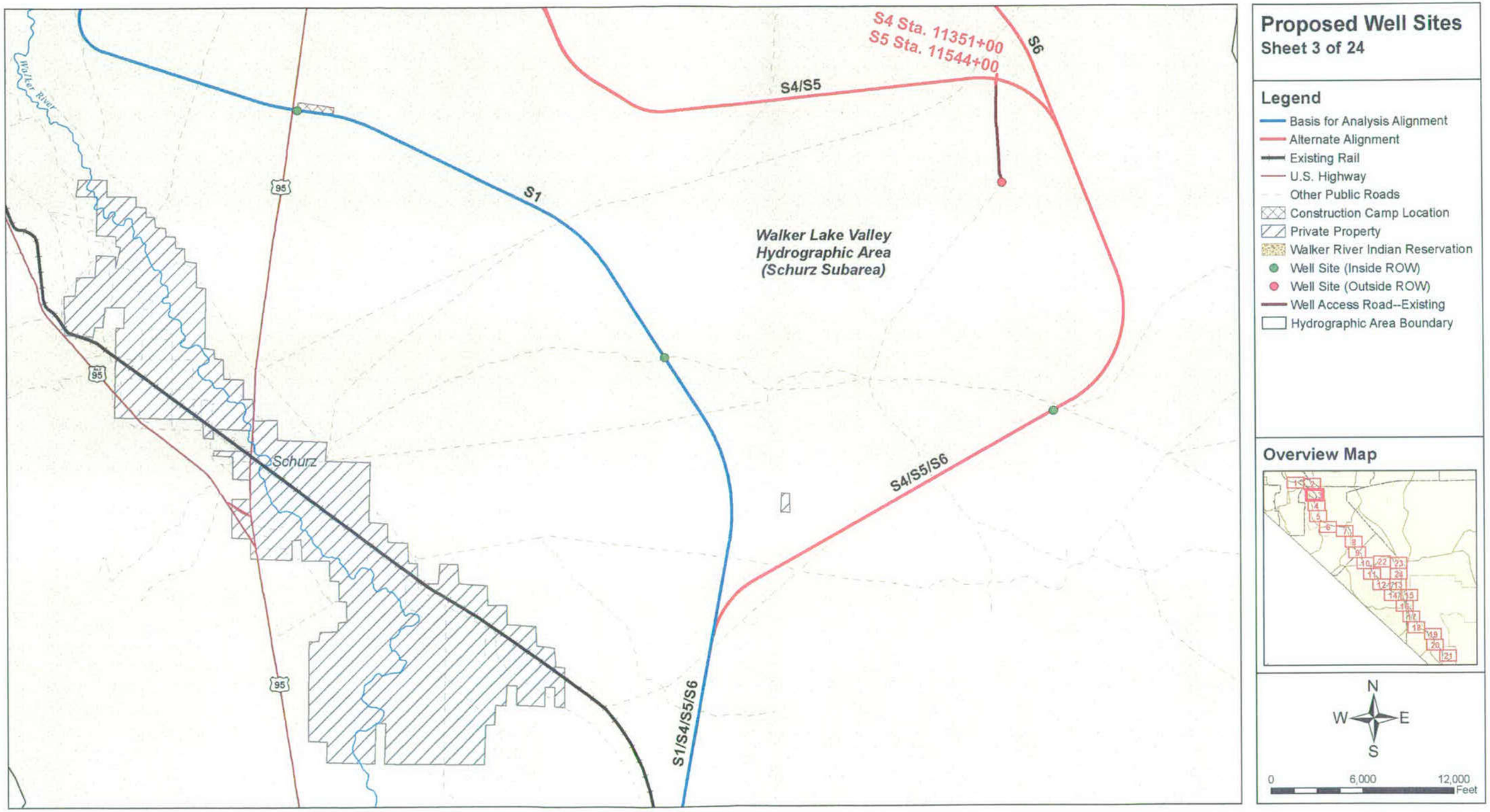
Proposed Well Sites
Sheet 2 of 24

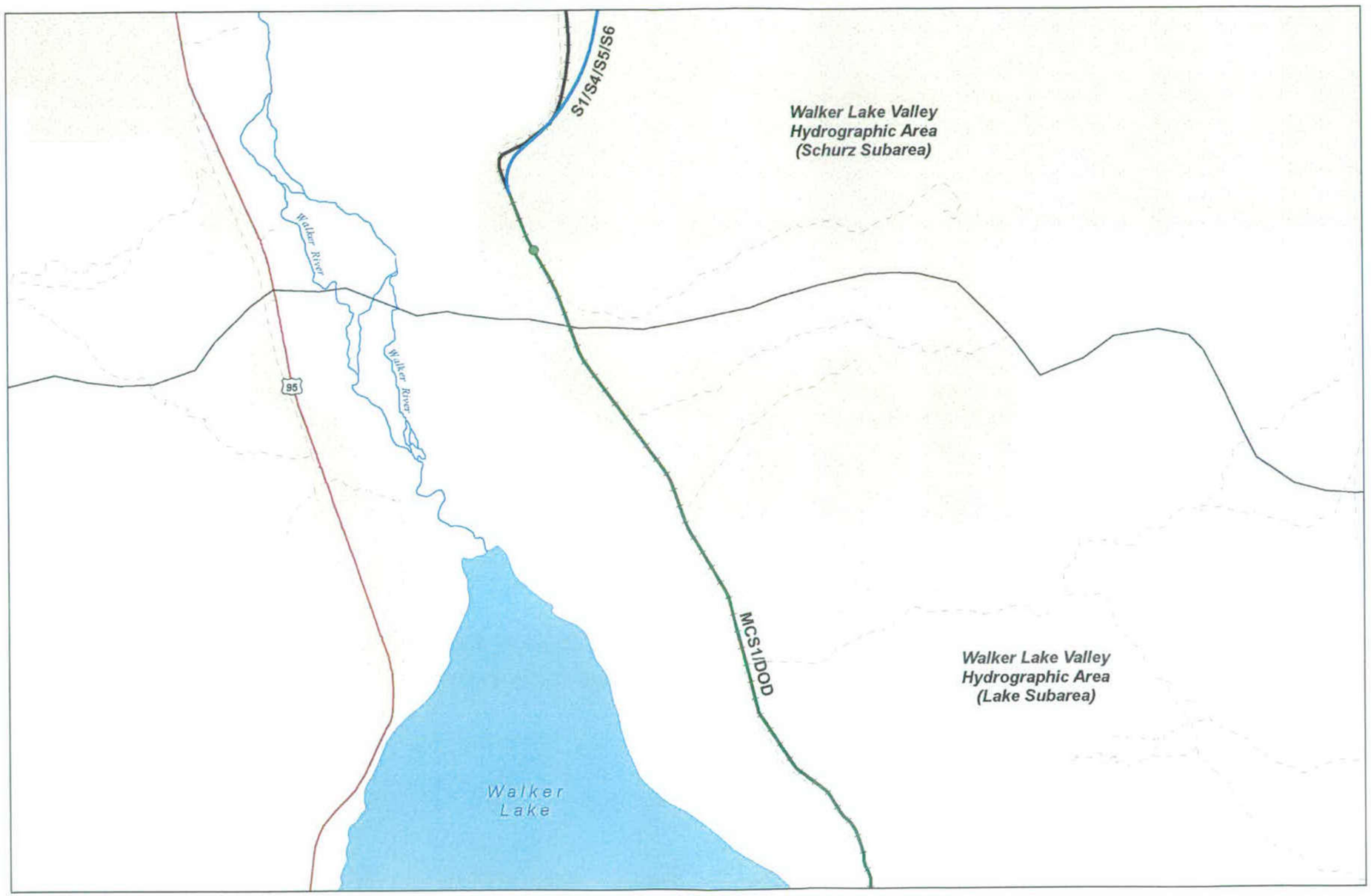
Legend
- Basis for Analysis Alignment
- Alternate Alignment
- Existing Rail
- U.S. Highway
- Other Public Roads
- Construction Camp Location
- Walker River Indian Reservation
- County Line
- Well Site (Inside ROW)
- Well Site (Outside ROW)
- Well Access Road--Existing
- Well Access Road--New
- Hydrographic Area Boundary

Overview Map

N
W E
S

0 6,000 12,000 Feet


S4 Sta. 11351+00
S5 Sta. 11544+00
S6
S4/S5
S1
Walker River
95
Walker Lake Valley
Hydrographic Area
(Schurz Subarea)
Schurz
S4/S5/S6
S1/S4/S5/S6
Proposed Well Sites
Sheet 3 of 24
Legend
Basis for Analysis Alignment
Alternate Alignment
Existing Rail
U.S. Highway
Other Public Roads
Construction Camp Location
Private Property
Walker River Indian Reservation
Well Site (Inside ROW)
Well Site (Outside ROW)
Well Access Road--Existing
Hydrographic Area Boundary
Overview Map
N
W
E
S
0
6,000
12,000
Feet

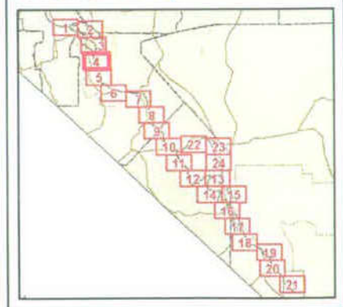


Proposed Well Sites
Sheet 4 of 24

Legend

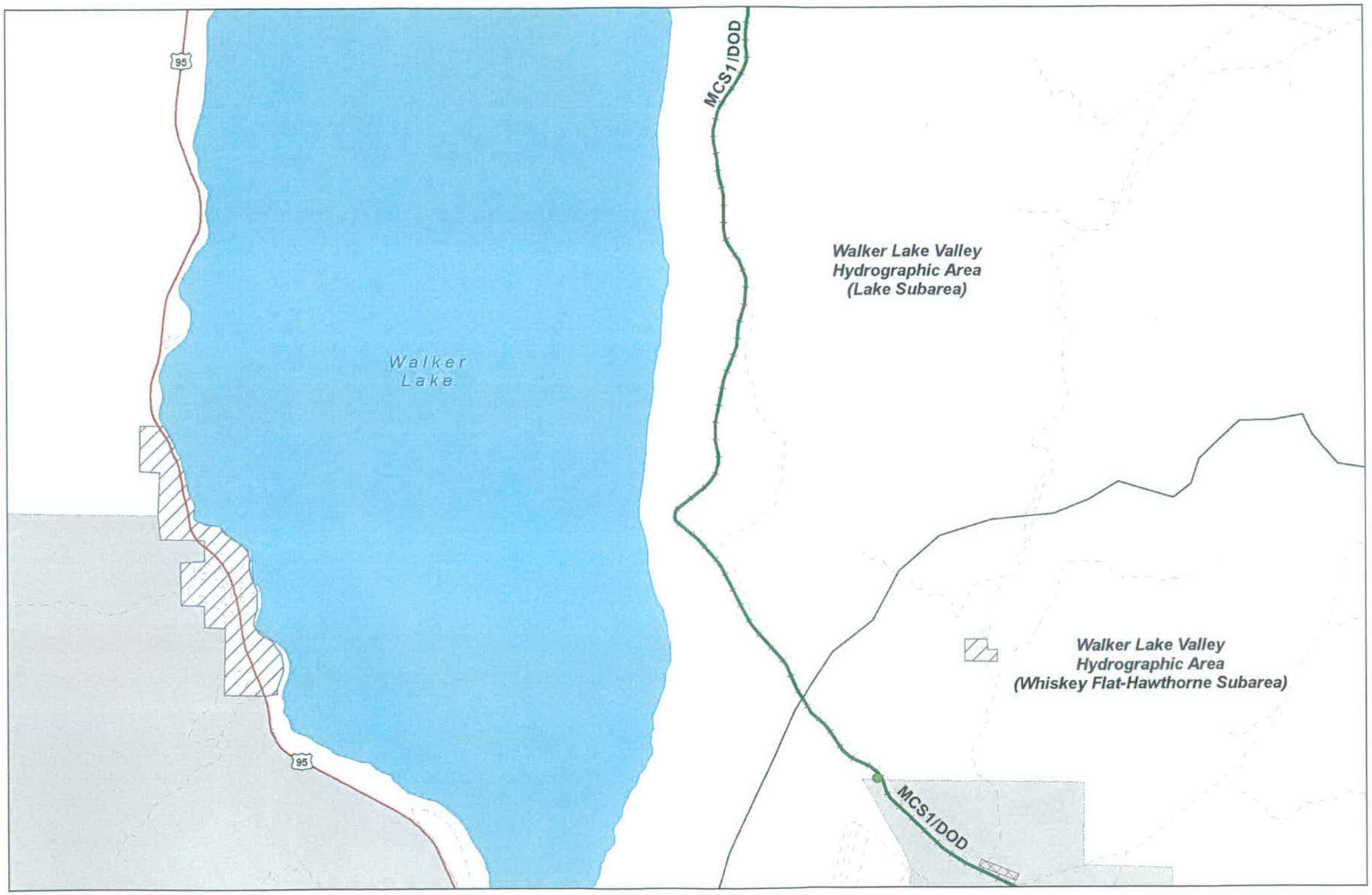
- Basis for Analysis Alignment (Existing Rail)
- Basis for Analysis Alignment
- Existing Rail
- U.S. Highway
- Other Public Roads
- Walker River Indian Reservation
- Well Site (Inside ROW)
- Hydrographic Area Boundary

Overview Map



N
W E
S

0 6,000 12,000 Feet



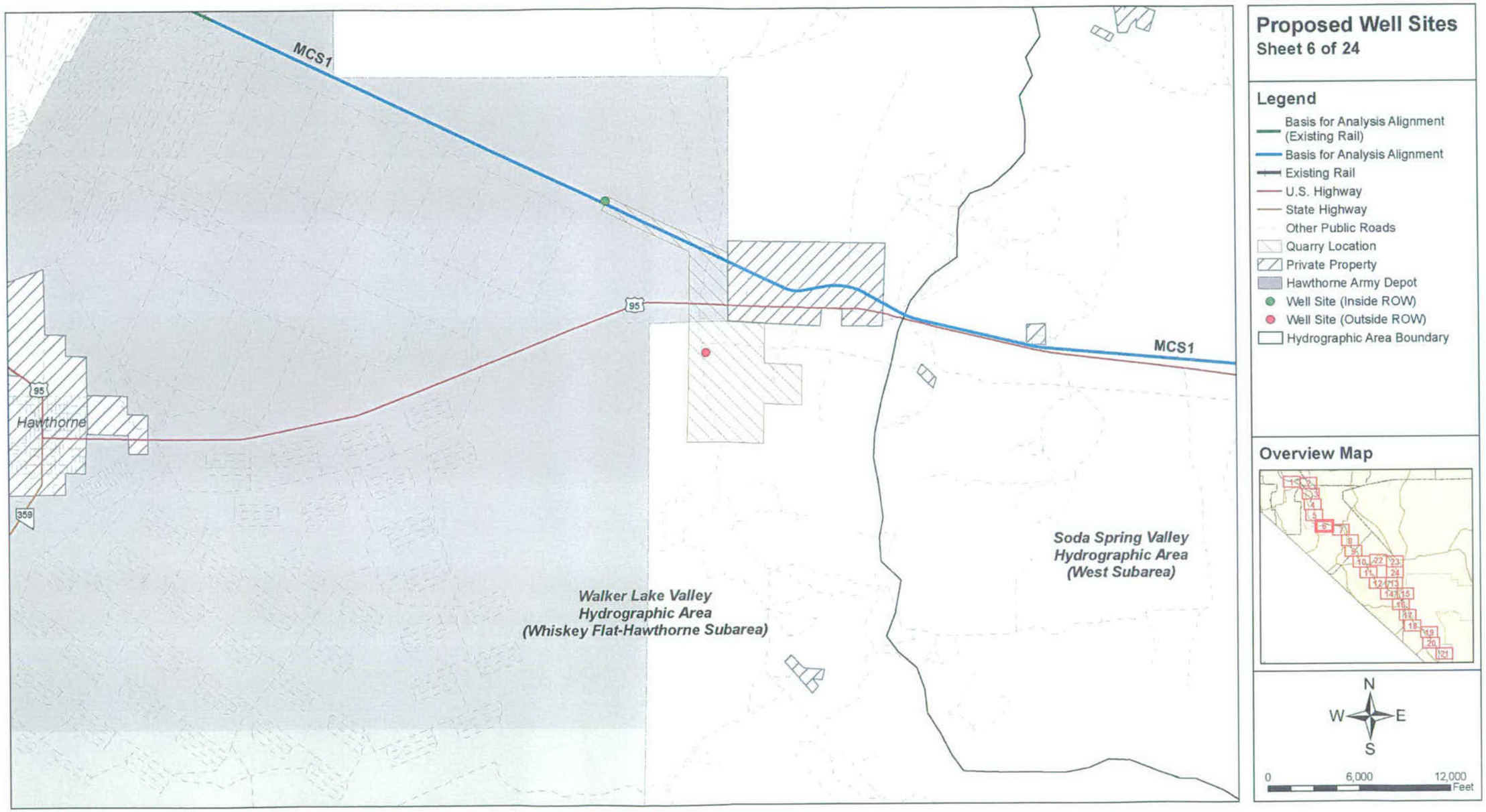
Proposed Well Sites
Sheet 5 of 24

Legend
- Basis for Analysis Alignment (Existing Rail)
- Existing Rail
- U.S. Highway
- Other Public Roads
- Construction Camp Location
- Private Property
- Hawthorne Army Depot
- Well Site (Inside ROW)
- Hydrographic Area Boundary

Overview Map

N
W E
S

0 6,000 12,000 Feet



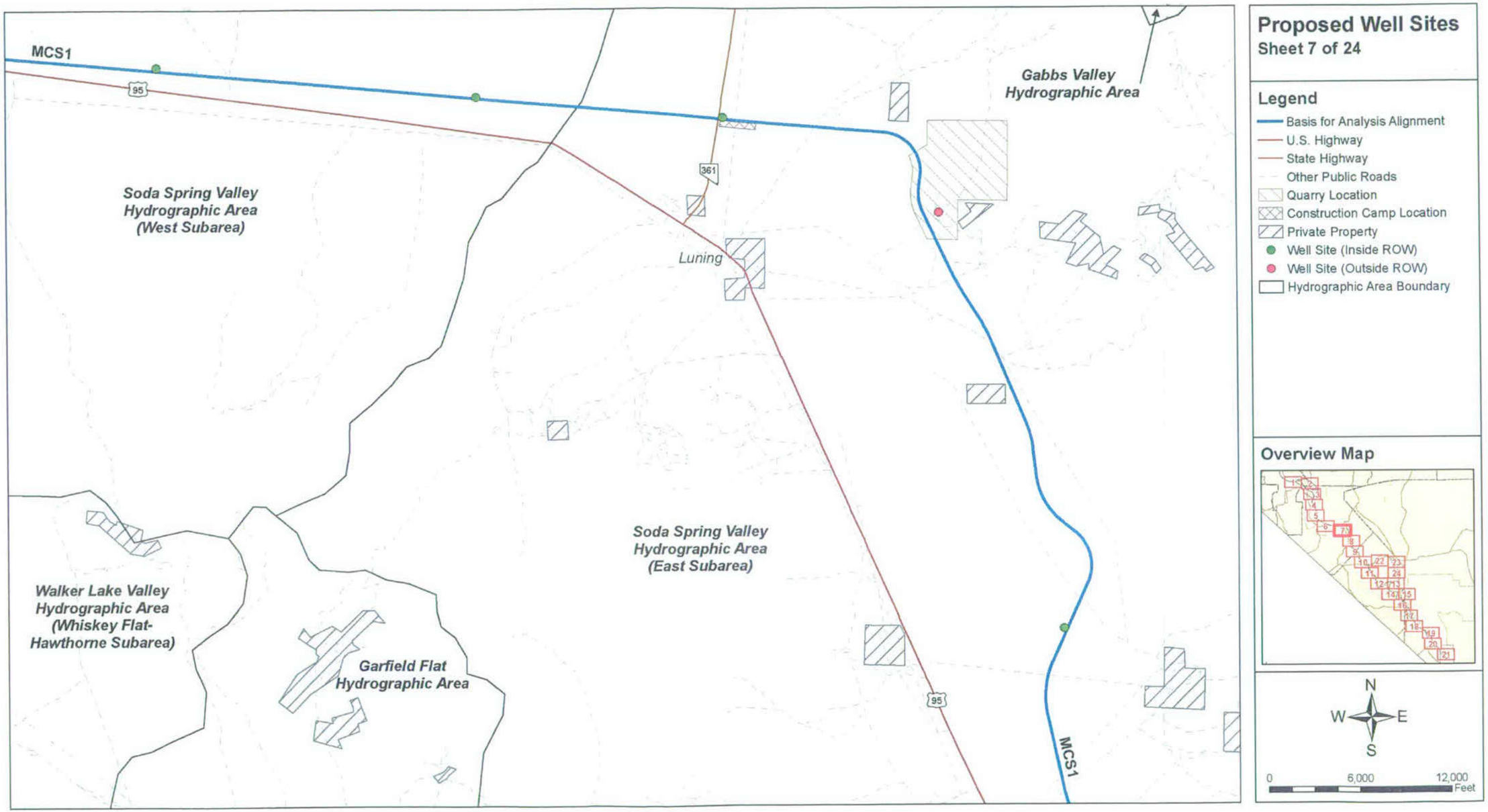
Proposed Well Sites
Sheet 6 of 24

Legend
- Basis for Analysis Alignment (Existing Rail)
- Basis for Analysis Alignment
- Existing Rail
- U.S. Highway
- State Highway
- Other Public Roads
- Quarry Location
- Private Property
- Hawthorne Army Depot
- Well Site (Inside ROW)
- Well Site (Outside ROW)
- Hydrographic Area Boundary

Overview Map

N
W E
S

0 6,000 12,000 Feet



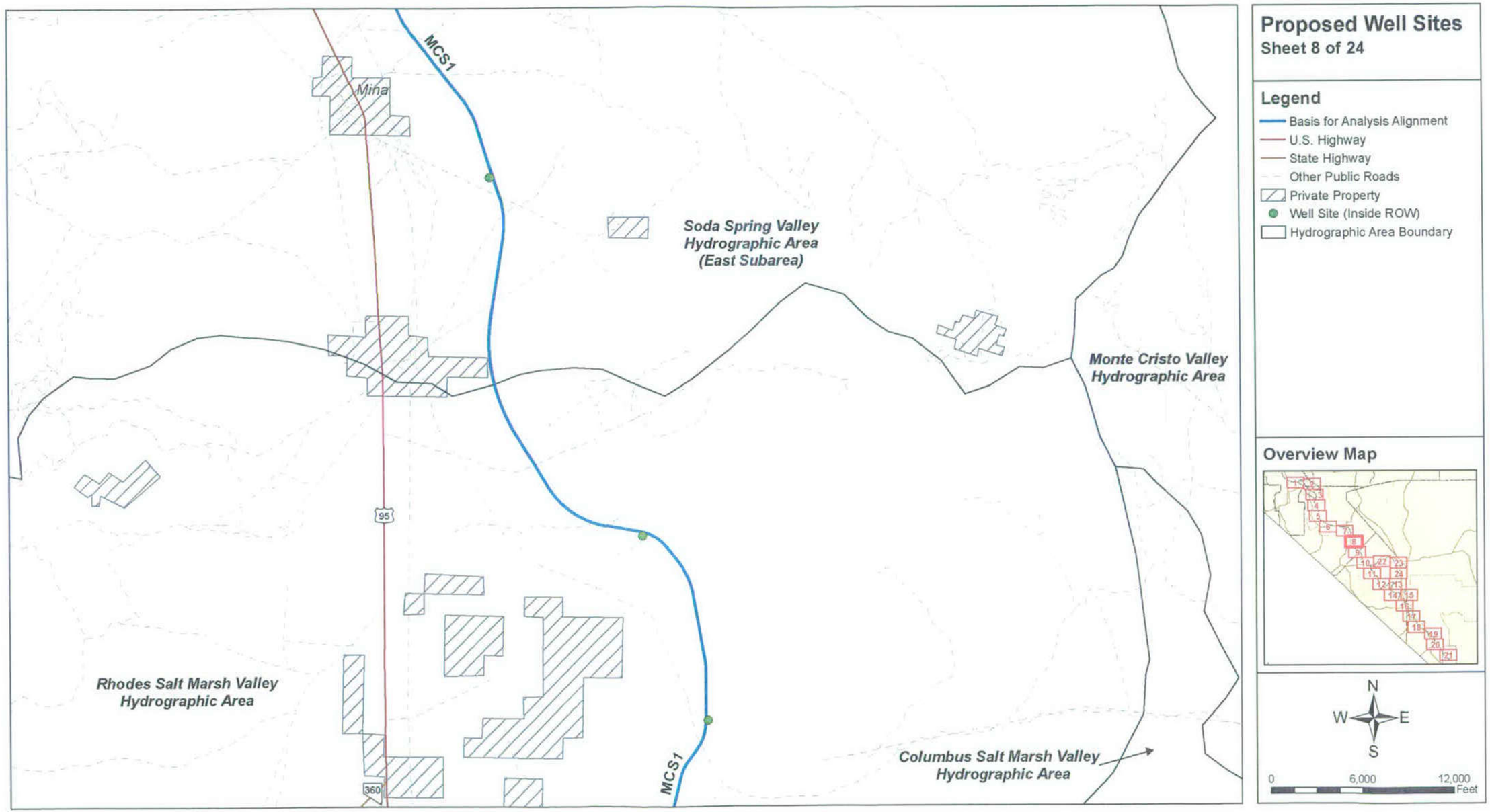
Proposed Well Sites
Sheet 7 of 24

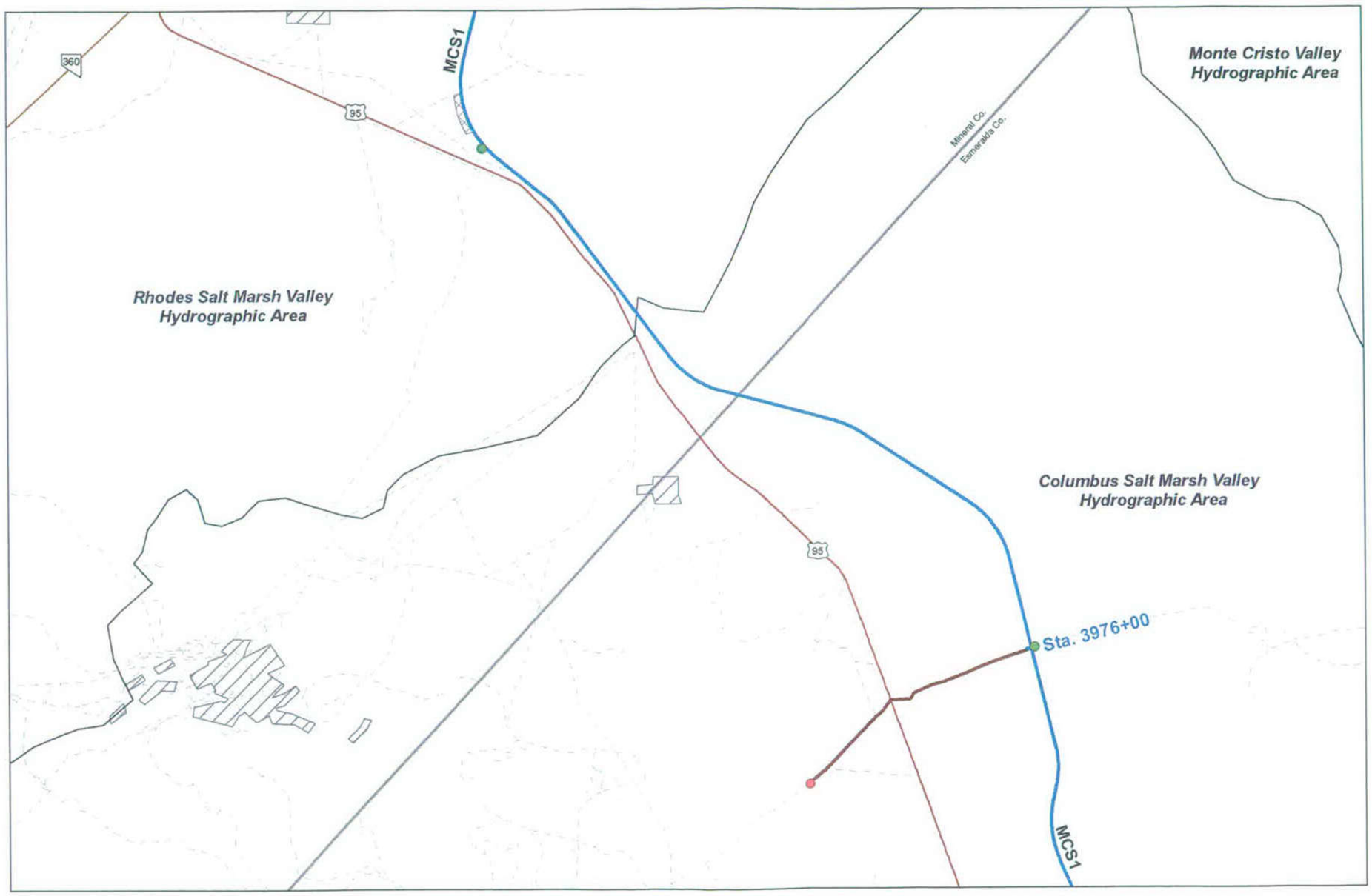
Legend
- Basis for Analysis Alignment
- U.S. Highway
- State Highway
- Other Public Roads
- Quarry Location
- Construction Camp Location
- Private Property
- Well Site (Inside ROW)
- Well Site (Outside ROW)
- Hydrographic Area Boundary

Overview Map

N
W E
S

0 6,000 12,000 Feet


MCS1
Mina
Soda Spring Valley
Hydrographic Area
(East Subarea)
Monte Cristo Valley
Hydrographic Area
95
Rhodes Salt Marsh Valley
Hydrographic Area
360
MCS1
Columbus Salt Marsh Valley
Hydrographic Area
Proposed Well Sites
Sheet 8 of 24
Legend
Basis for Analysis Alignment
U.S. Highway
State Highway
Other Public Roads
Private Property
Well Site (Inside ROW)
Hydrographic Area Boundary
Overview Map
N
W
E
S
0
6,000
12,000
Feet



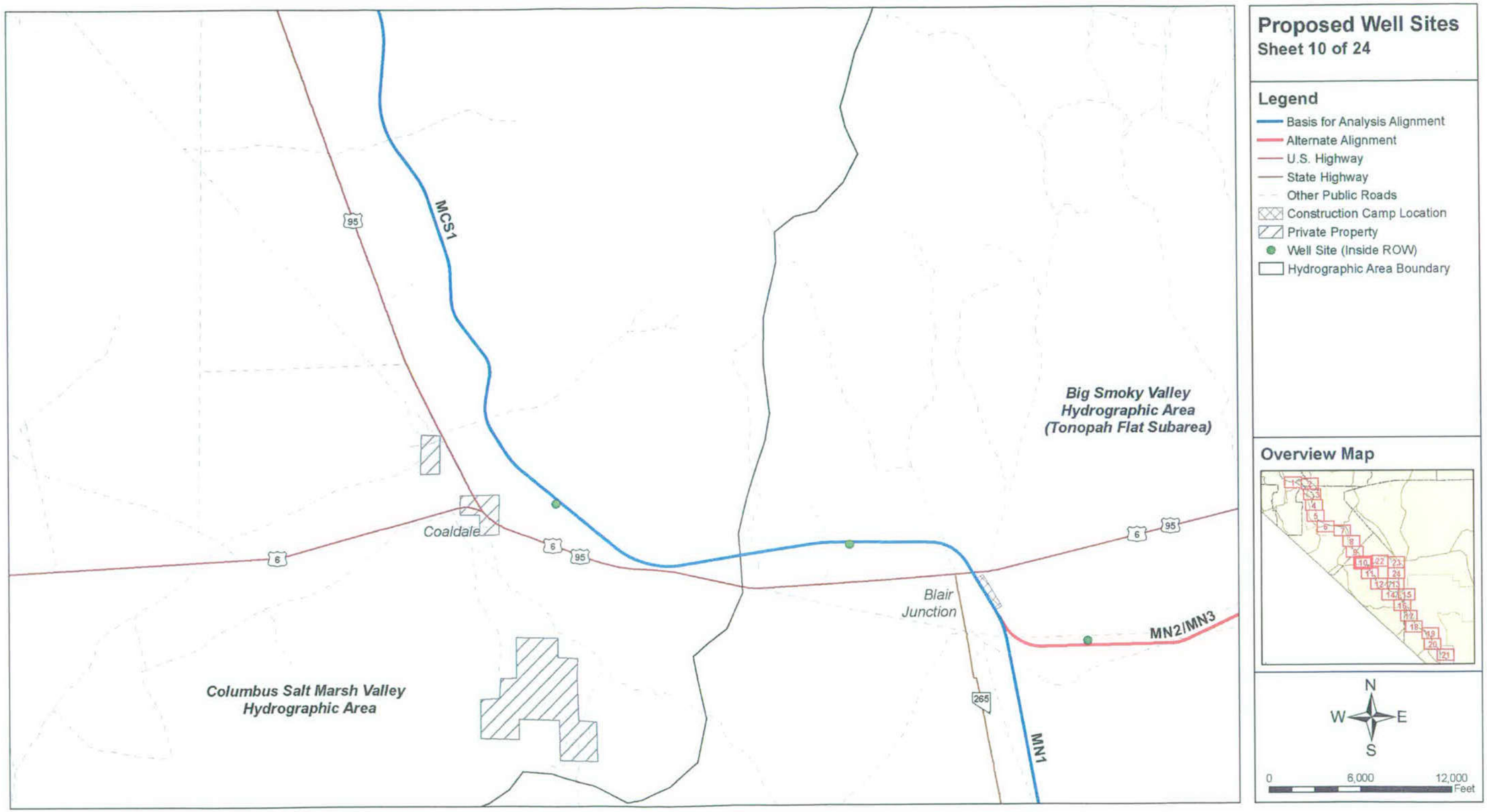
Proposed Well Sites
Sheet 9 of 24

Legend
- Basis for Analysis Alignment
- U.S. Highway
- State Highway
- Other Public Roads
- Construction Camp Location
- Private Property
- County Line
- Well Site (Inside ROW)
- Well Site (Outside ROW)
- Well Access Road--Existing
- Hydrographic Area Boundary

Overview Map

N
W E
S

0 6,000 12,000 Feet



Proposed Well Sites
Sheet 10 of 24

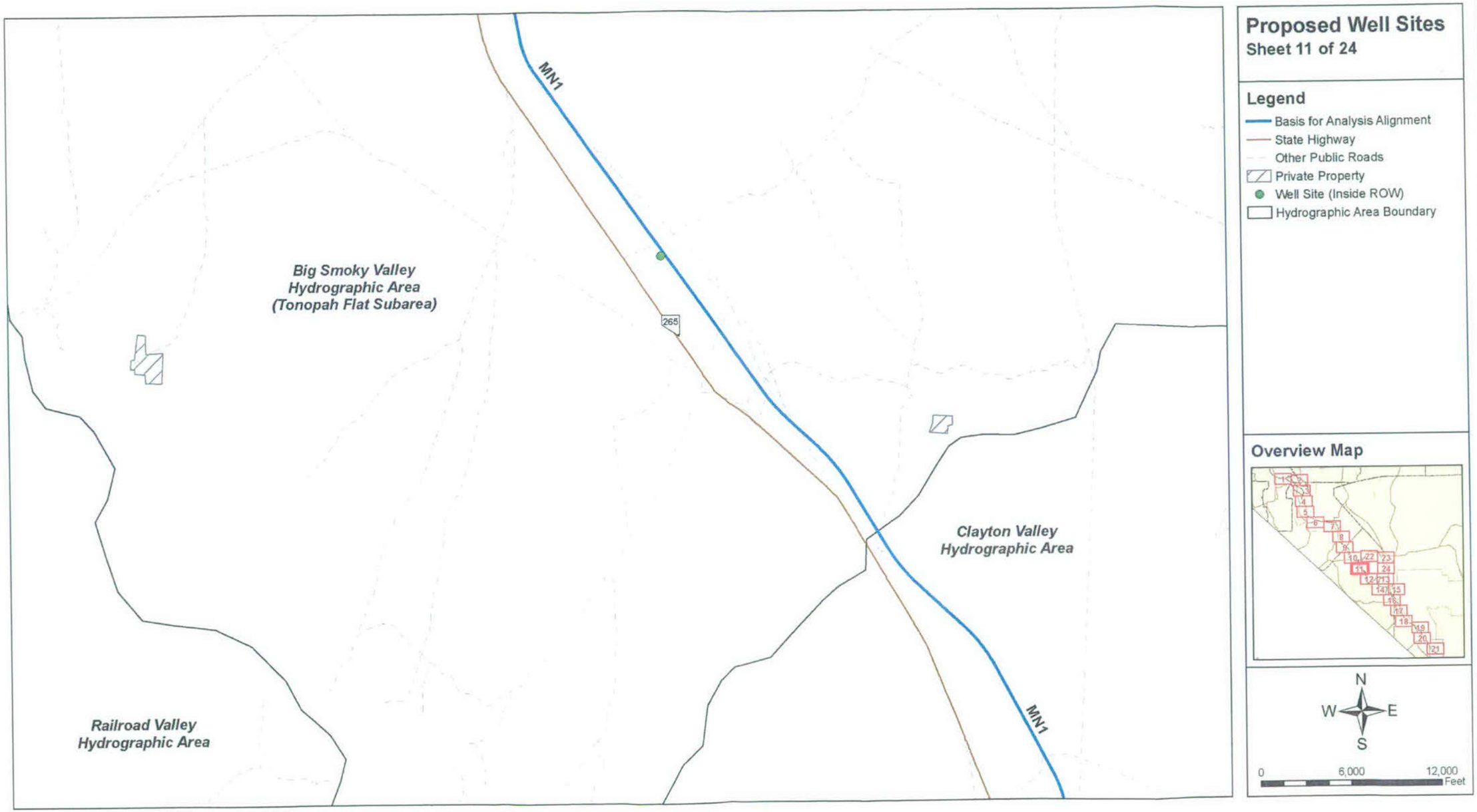
Legend

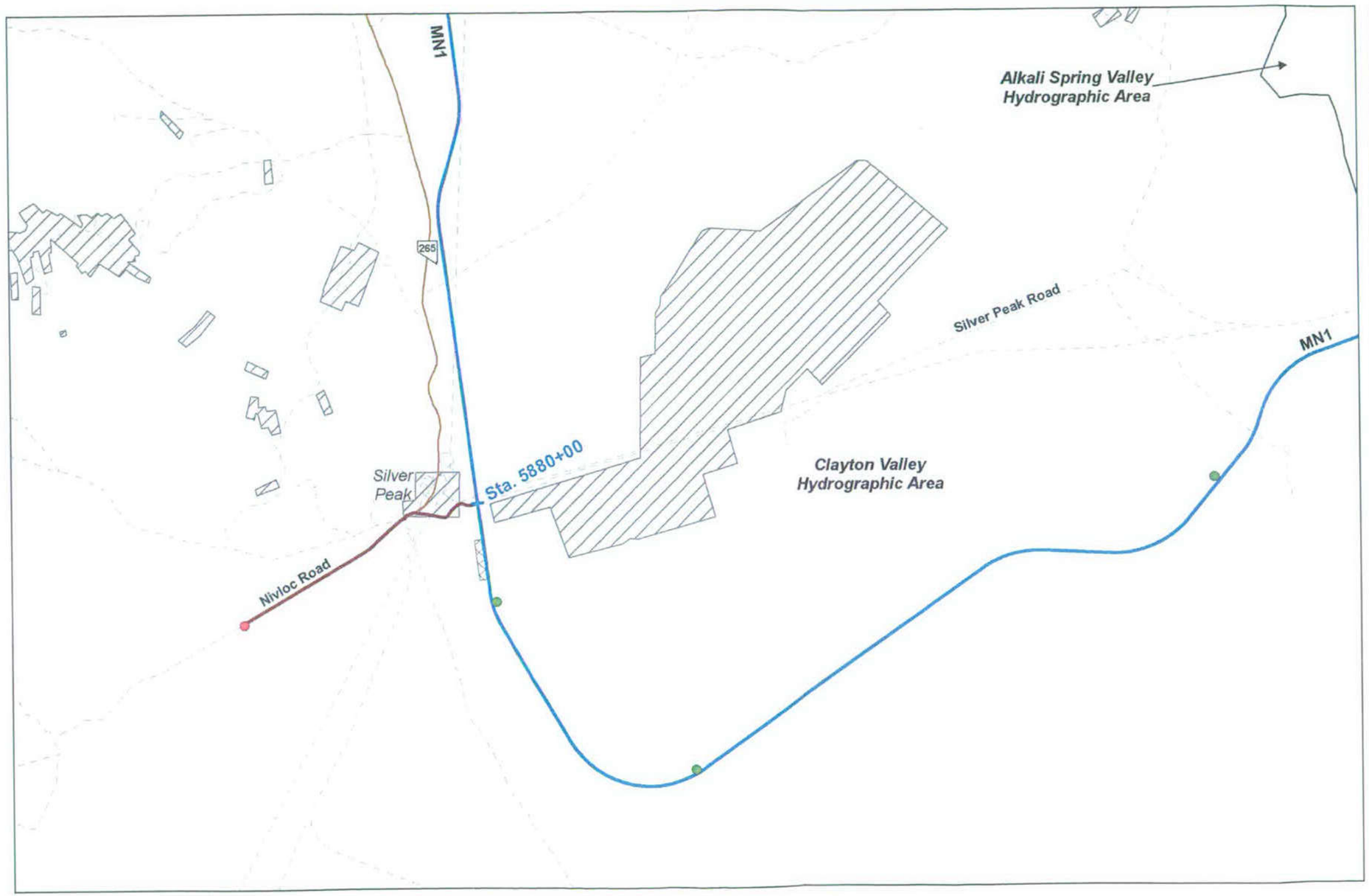
- Basis for Analysis Alignment
- Alternate Alignment
- U.S. Highway
- State Highway
- Other Public Roads
- Construction Camp Location
- Private Property
- Well Site (Inside ROW)
- Hydrographic Area Boundary

Overview Map

N
W E
S

0 6,000 12,000 Feet


MN1
265
Big Smoky Valley
Hydrographic Area
(Tonopah Flat Subarea)
Clayton Valley
Hydrographic Area
Railroad Valley
Hydrographic Area
MN1
Proposed Well Sites
Sheet 11 of 24
Legend
Basis for Analysis Alignment
State Highway
Other Public Roads
Private Property
Well Site (Inside ROW)
Hydrographic Area Boundary
Overview Map
N
W
E
S
0
6,000
12,000
Feet



Proposed Well Sites
Sheet 12 of 24

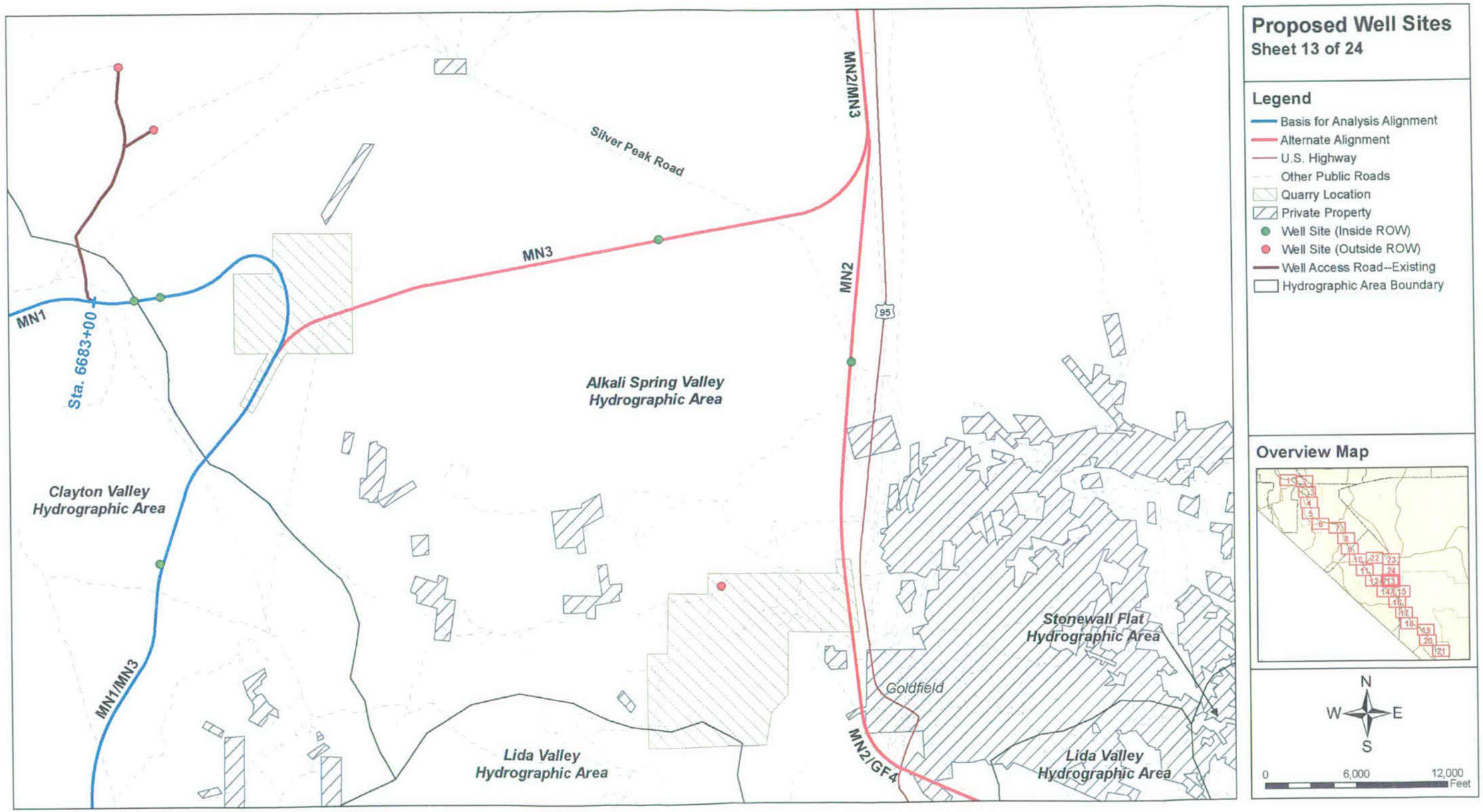
Legend

- Basis for Analysis Alignment
- State Highway
- Other Public Roads
- Construction Camp Location
- Private Property
- Well Site (Inside ROW)
- Well Site (Outside ROW)
- Well Access Road--Existing
- Hydrographic Area Boundary

Overview Map

N
W E
S

0 6,000 12,000 Feet



Proposed Well Sites
Sheet 13 of 24

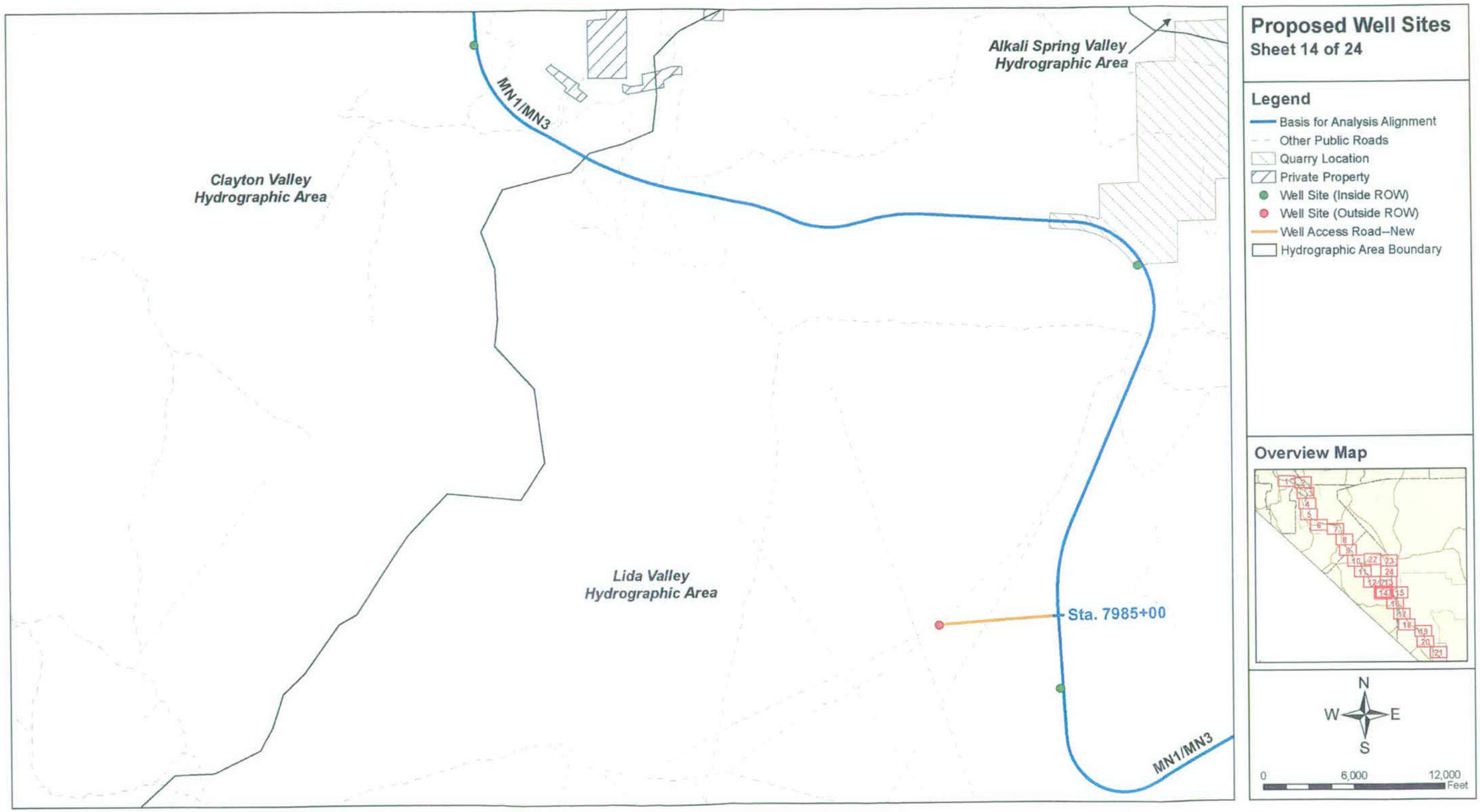
Legend

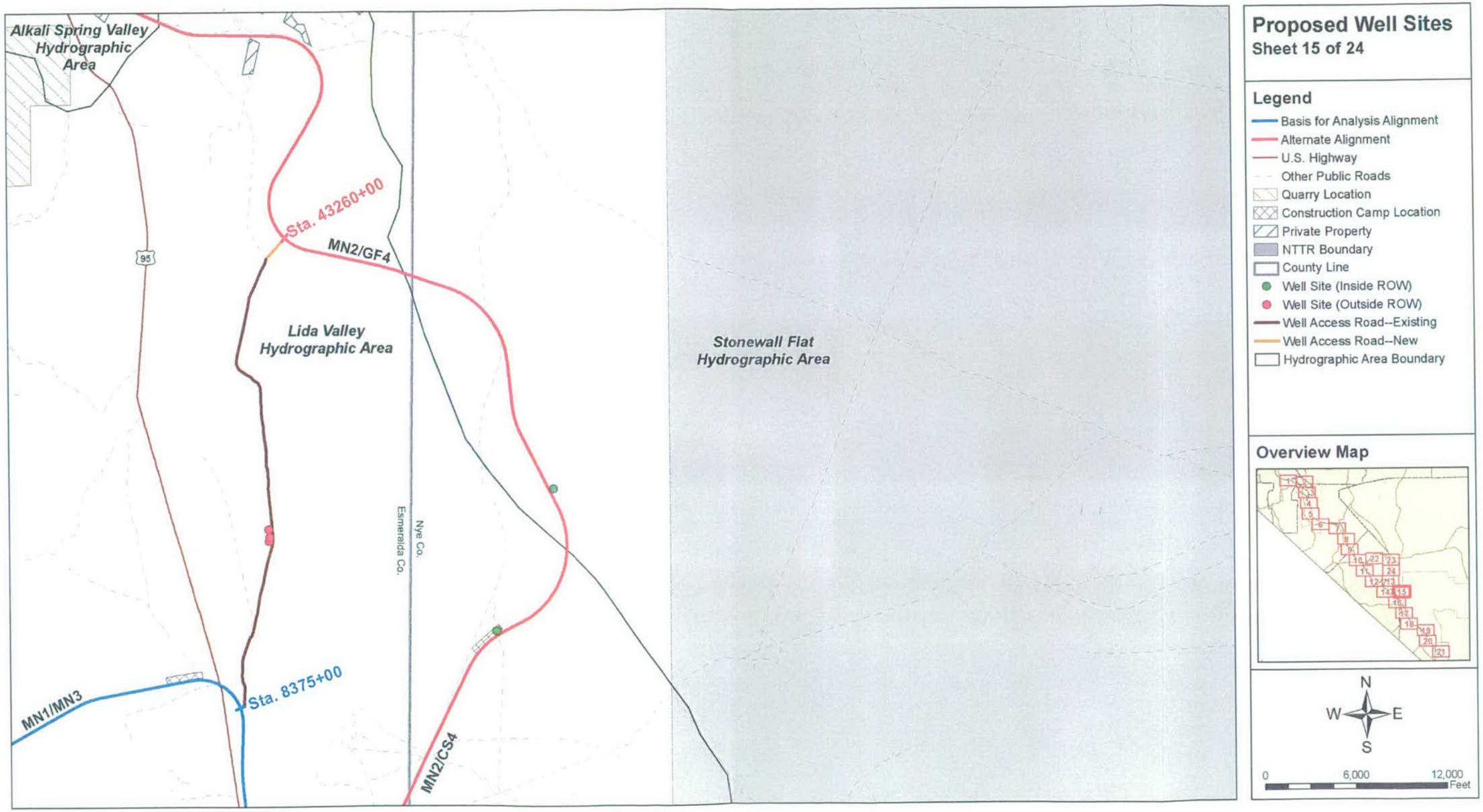
- Basis for Analysis Alignment
- Alternate Alignment
- U.S. Highway
- Other Public Roads
- Quarry Location
- Private Property
- Well Site (Inside ROW)
- Well Site (Outside ROW)
- Well Access Road--Existing
- Hydrographic Area Boundary

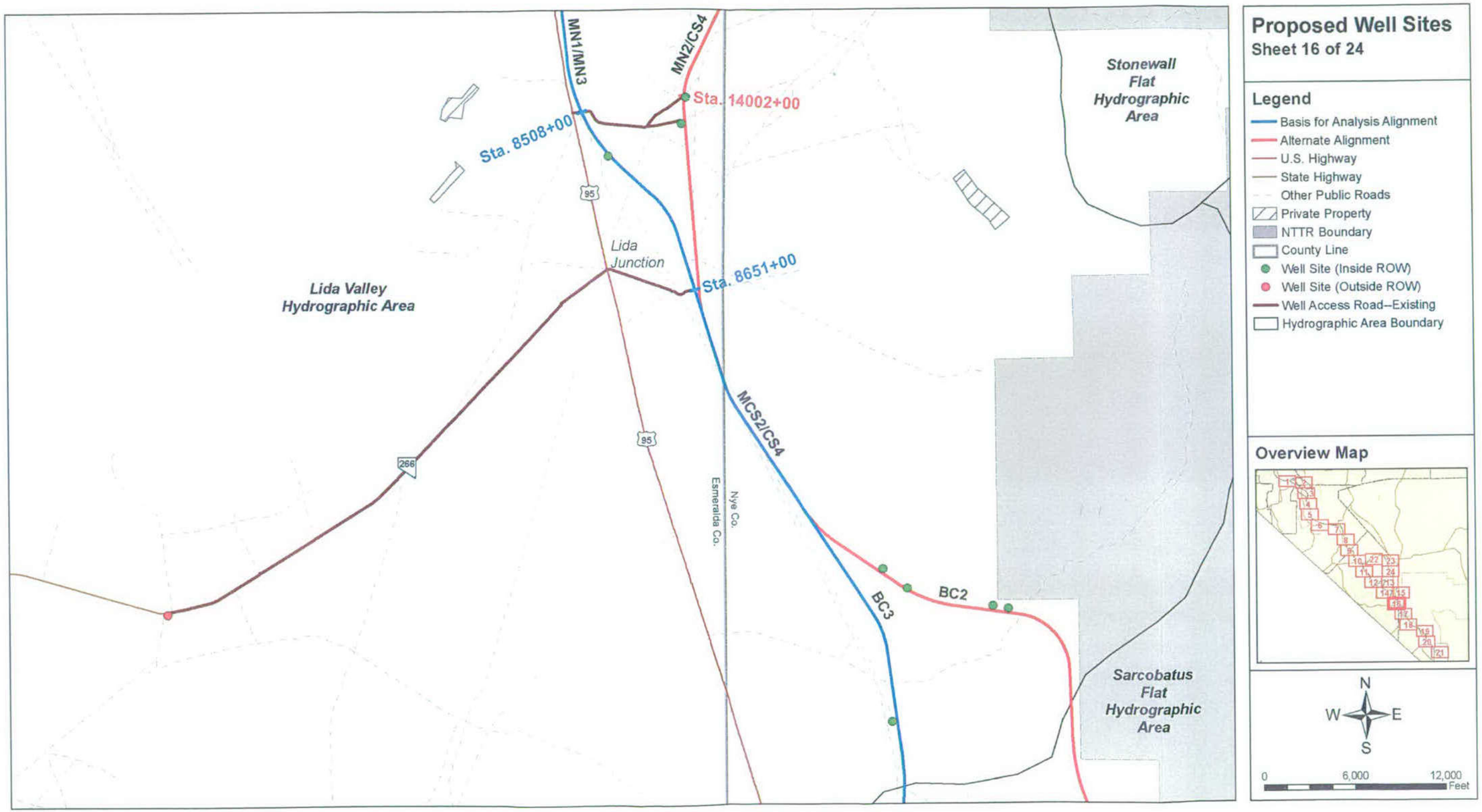
Overview Map

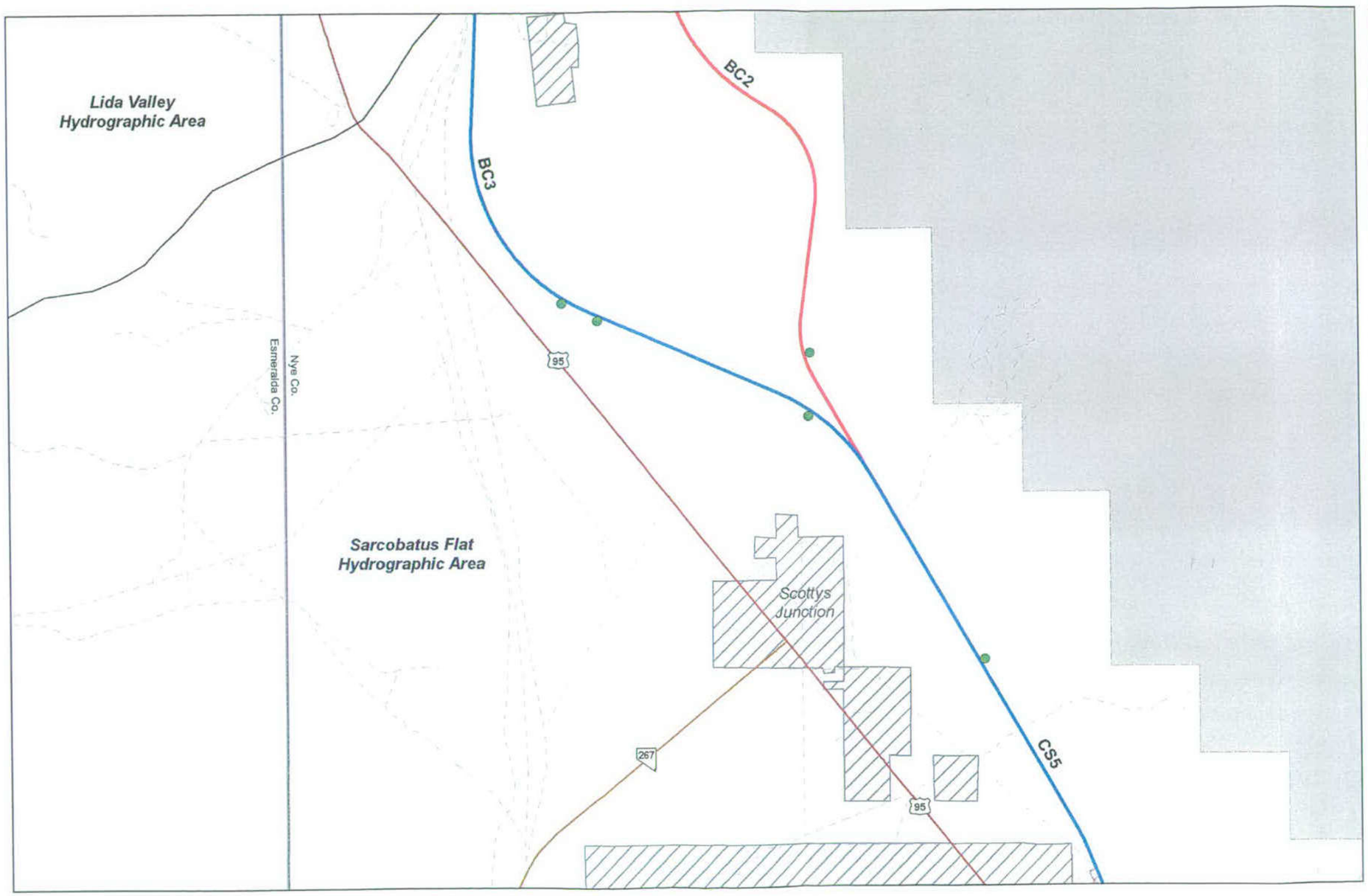
N
W E
S

0 6,000 12,000 Feet


Alkali Spring Valley
Hydrographic Area
MN1/MN3
Clayton Valley
Hydrographic Area
Lida Valley
Hydrographic Area
Sta. 7985+00
MN1/MN3
Proposed Well Sites
Sheet 14 of 24
Legend
Basis for Analysis Alignment
Other Public Roads
Quarry Location
Private Property
Well Site (Inside ROW)
Well Site (Outside ROW)
Well Access Road--New
Hydrographic Area Boundary
Overview Map
N
W
E
S
0
6,000
12,000
Feet


Alkali Spring Valley Hydrographic Area
Lida Valley Hydrographic Area
Stonewall Flat Hydrographic Area
Sta. 43260+00
MN2/GF4
Sta. 8375+00
MN1/MN3
MN2/CS4
95
Nye Co.
Esmeralda Co.
Proposed Well Sites
Sheet 15 of 24
Legend
Basis for Analysis Alignment
Alternate Alignment
U.S. Highway
Other Public Roads
Quarry Location
Construction Camp Location
Private Property
NTTR Boundary
County Line
Well Site (Inside ROW)
Well Site (Outside ROW)
Well Access Road--Existing
Well Access Road--New
Hydrographic Area Boundary
Overview Map
N
W
E
S
0
6,000
12,000
Feet


MN1/MN3
MN2/CS4
Sta. 14002+00
Sta. 8508+00
95
Lida
Junction
Sta. 8651+00
Lida Valley
Hydrographic Area
Stonewall
Flat
Hydrographic
Area
MCS2/CS4
BC3
BC2
266
95
Esmeralda Co.
Nye Co.
Sarcobatus
Flat
Hydrographic
Area
Proposed Well Sites
Sheet 16 of 24
Legend
Basis for Analysis Alignment
Alternate Alignment
U.S. Highway
State Highway
Other Public Roads
Private Property
NTTR Boundary
County Line
Well Site (Inside ROW)
Well Site (Outside ROW)
Well Access Road--Existing
Hydrographic Area Boundary
Overview Map
N
W
E
S
0
6,000
12,000
Feet



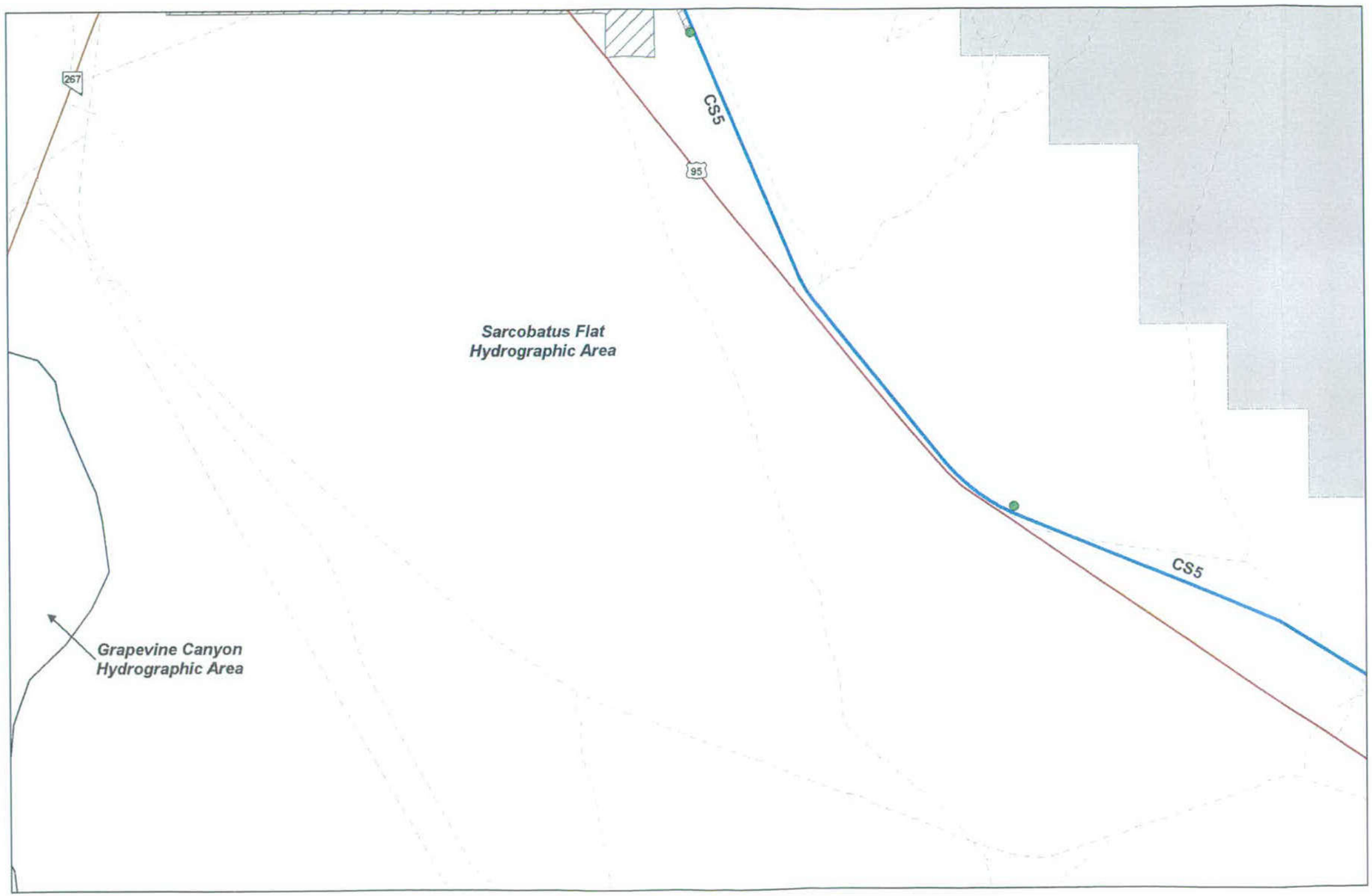
Proposed Well Sites
Sheet 17 of 24

Legend
- Basis for Analysis Alignment
- Alternate Alignment
- U.S. Highway
- State Highway
- Other Public Roads
- Construction Camp Location
- Private Property
- NTTR Boundary
- County Line
- Well Site (Inside ROW)
- Hydrographic Area Boundary

Overview Map

N
W E
S

0 6,000 12,000 Feet



Proposed Well Sites
Sheet 18 of 24

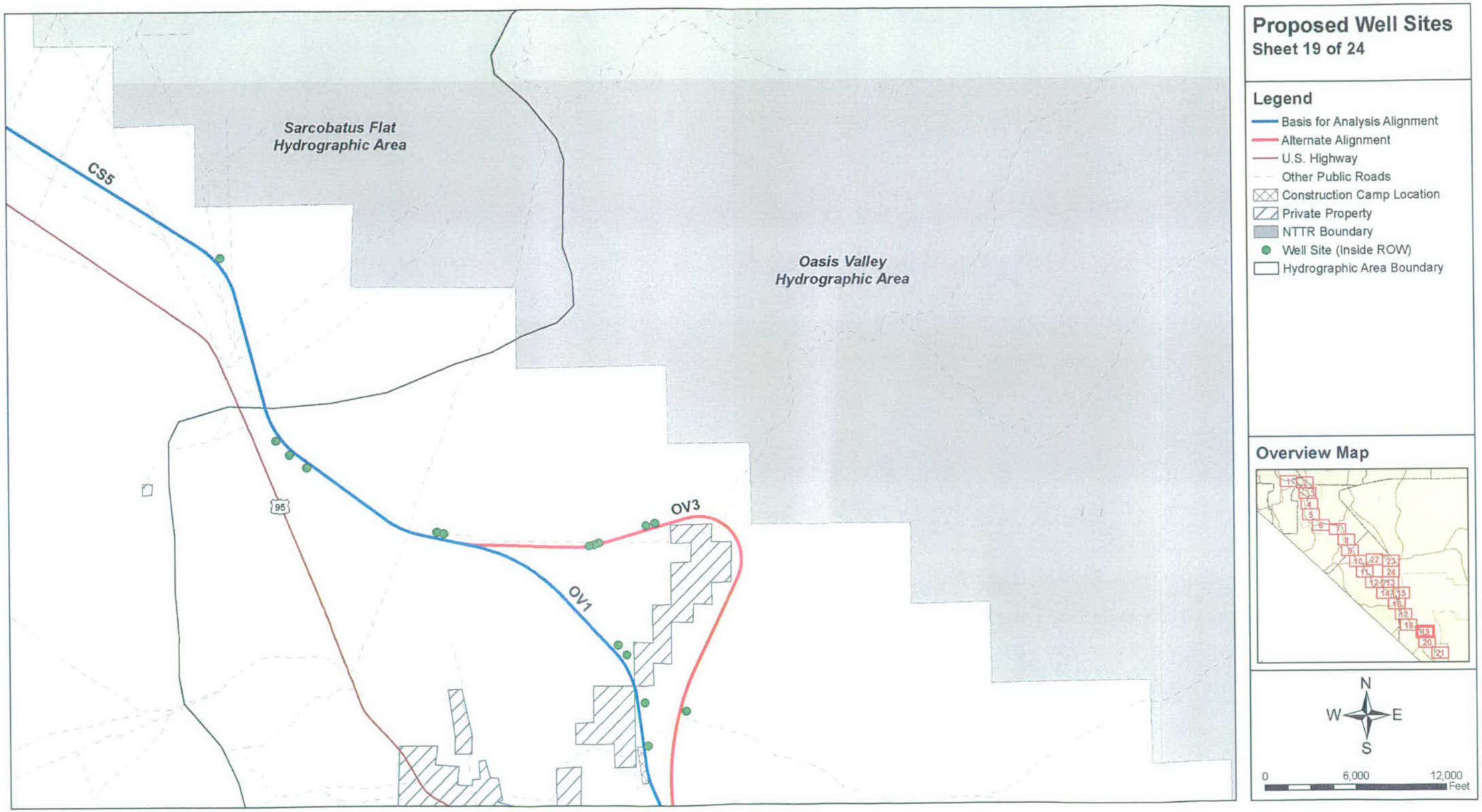
Legend

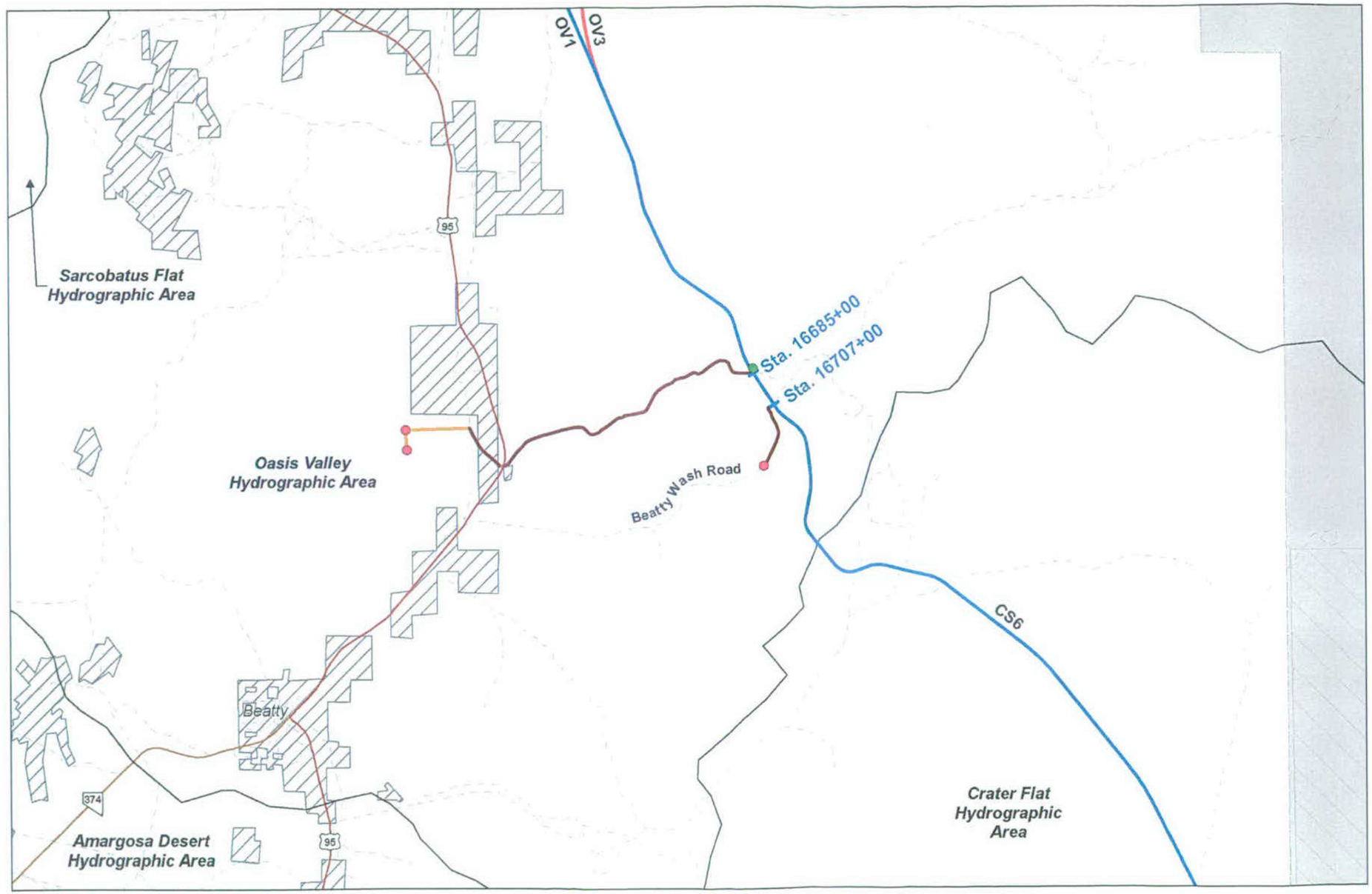
- Basis for Analysis Alignment
- U.S. Highway
- State Highway
- Other Public Roads
- Construction Camp Location
- Private Property
- NTTR Boundary
- Well Site (Inside ROW)
- Hydrographic Area Boundary

Overview Map

N
W E
S

0 6,000 12,000 Feet


Sarcobatus Flat
Hydrographic Area
Oasis Valley
Hydrographic Area
CS5
95
OV3
OV1
Proposed Well Sites
Sheet 19 of 24
Legend
Basis for Analysis Alignment
Alternate Alignment
U.S. Highway
Other Public Roads
Construction Camp Location
Private Property
NTTR Boundary
Well Site (Inside ROW)
Hydrographic Area Boundary
Overview Map
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
N
W
E
S
0
6,000
12,000
Feet



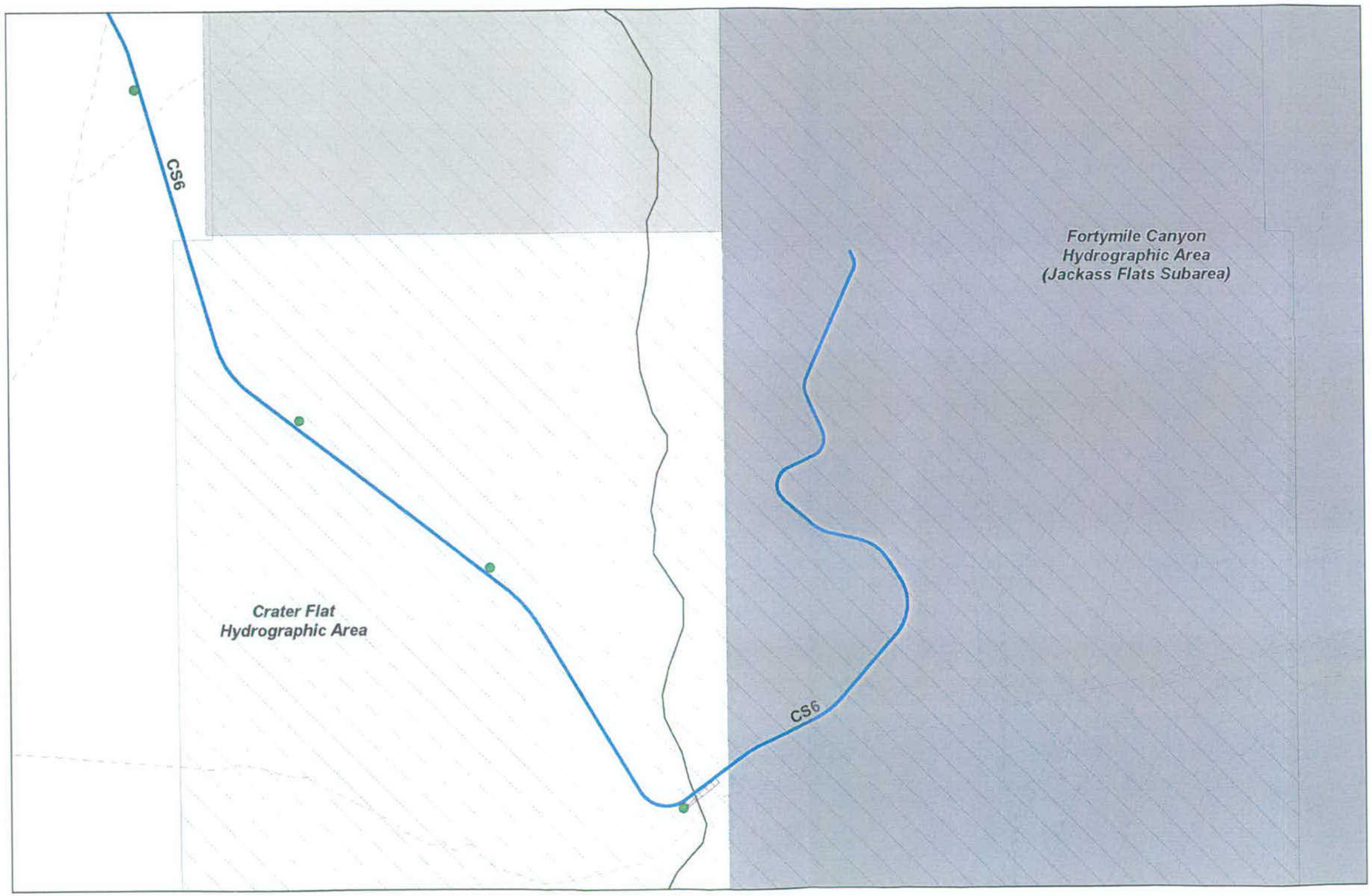
Proposed Well Sites
Sheet 20 of 24

Legend
- Basis for Analysis Alignment
- Alternate Alignment
- U.S. Highway
- State Highway
- Other Public Roads
- Private Property
- NTTR Boundary
- Repository Land Withdrawal
- Well Site (Inside ROW)
- Well Site (Outside ROW)
- Well Access Road--Existing
- Well Access Road--New
- Hydrographic Area Boundary

Overview Map

N
W E
S

0 6,000 12,000 Feet



Proposed Well Sites
Sheet 21 of 24

Legend

- Basis for Analysis Alignment
- Other Public Roads
- Construction Camp Location
- NTTR Boundary
- Nevada Test Site Boundary
- Repository Land Withdrawal
- Well Site (Inside ROW)
- Hydrographic Area Boundary

Overview Map

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W E
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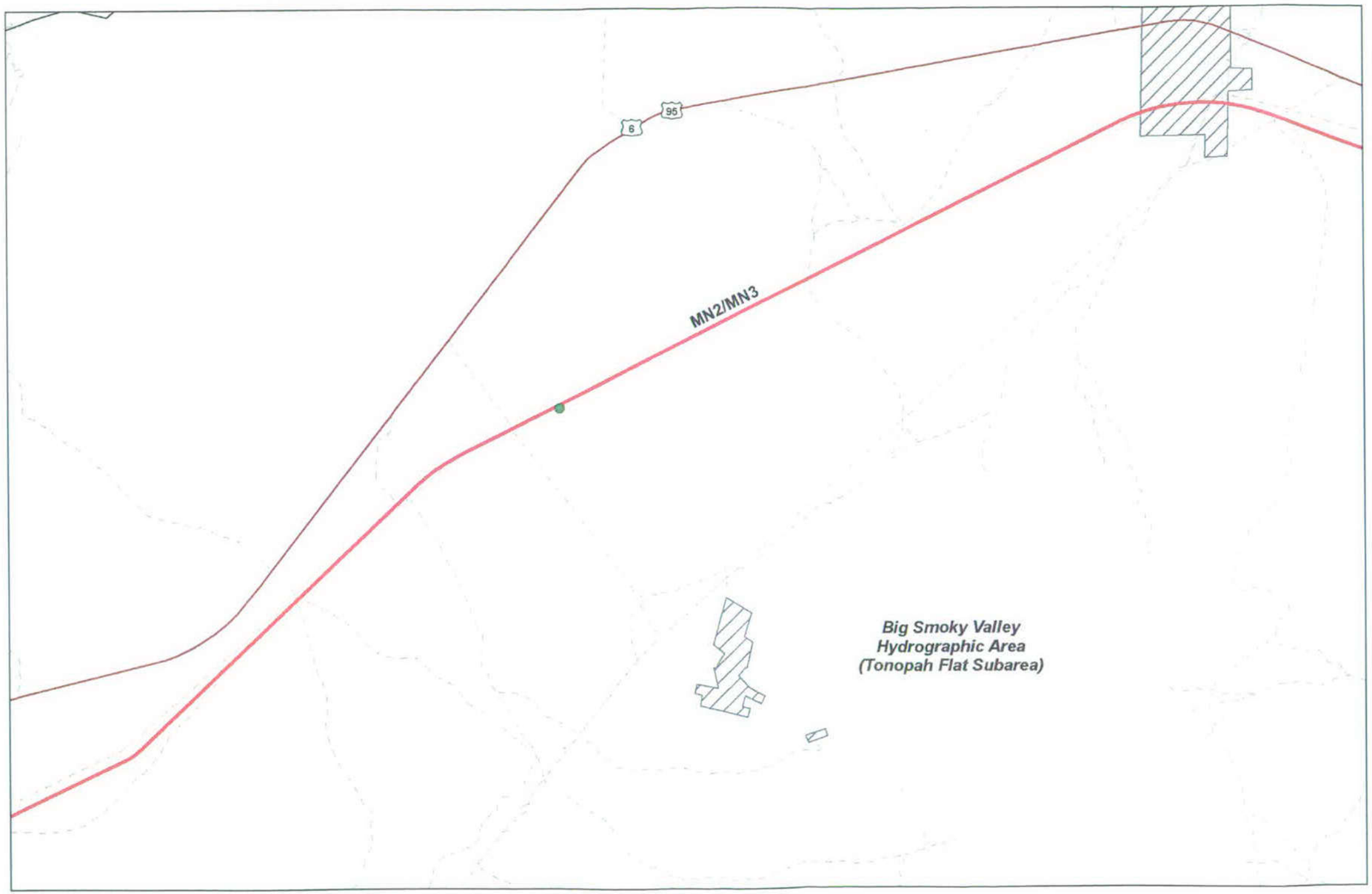
0 6,000 12,000 Feet



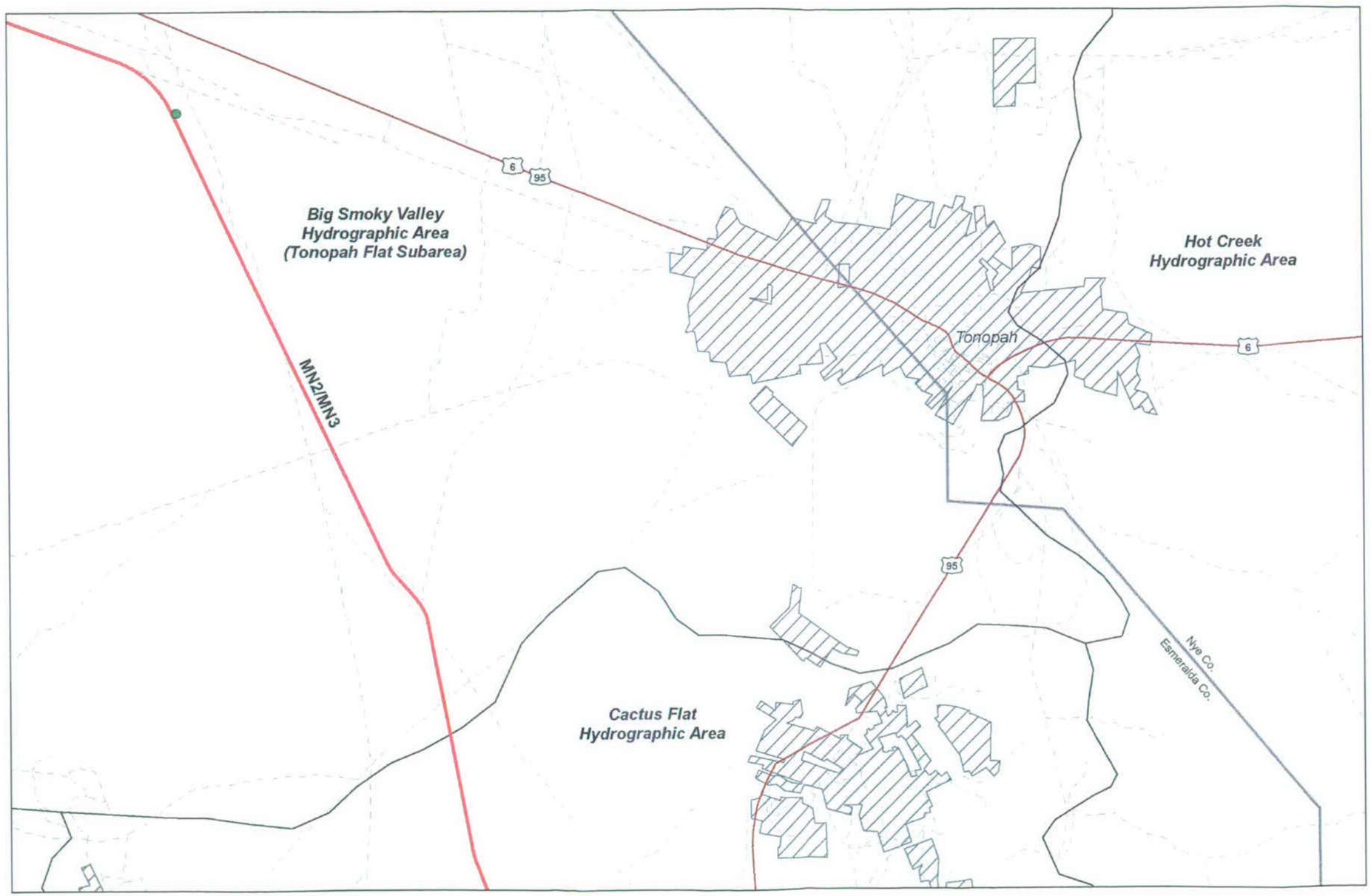
Proposed Well Sites
Sheet 22 of 24

Legend
- Alternate Alignment
- U.S. Highway
- Other Public Roads
- Private Property
- Well Site (Inside ROW)
- Hydrographic Area Boundary

Overview Map

N
W E
S

0 6,000 12,000 Feet



Proposed Well Sites
Sheet 23 of 24

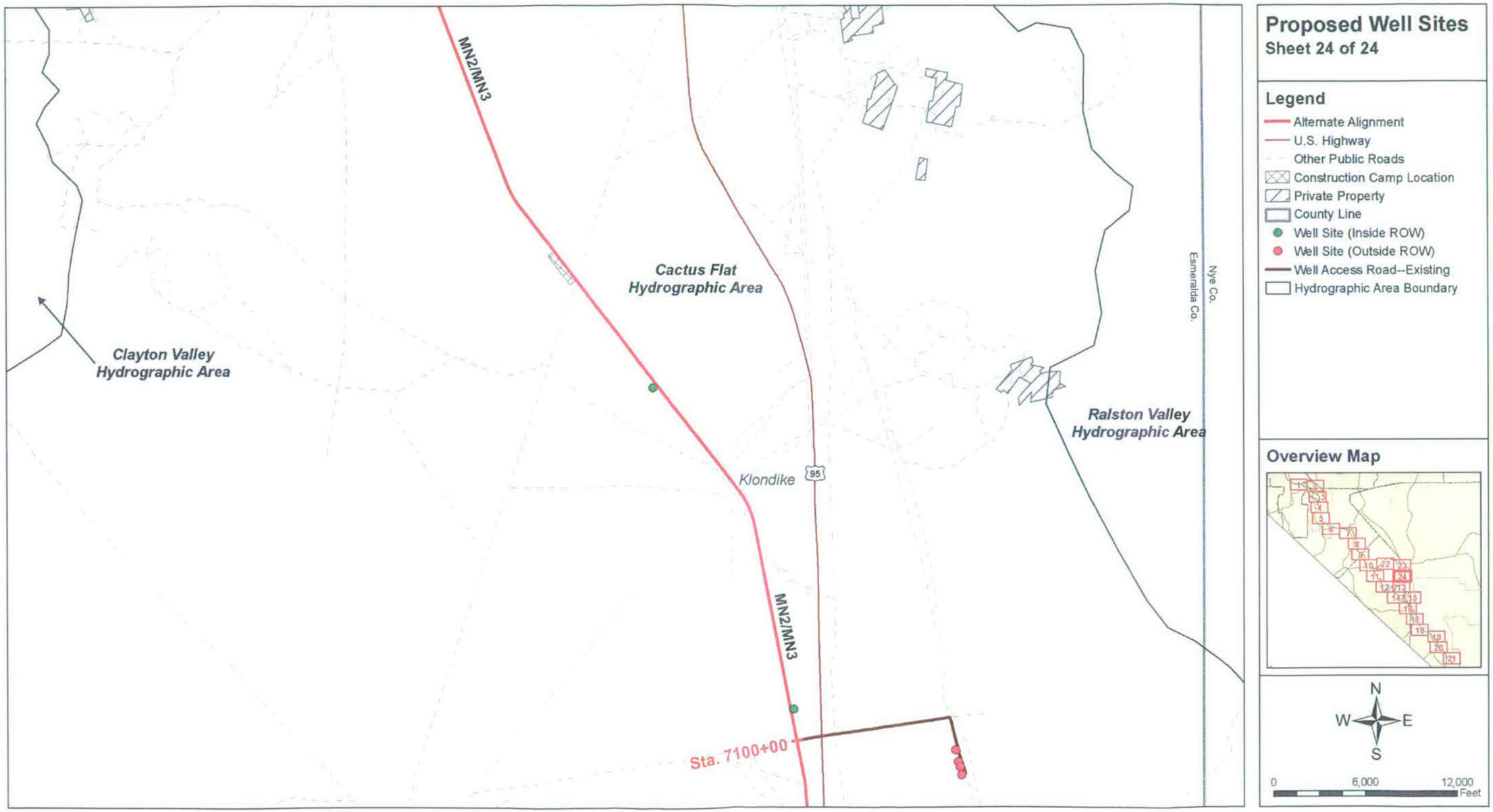
Legend

- Alternate Alignment
- U.S. Highway
- Other Public Roads
- Private Property
- County Line
- Well Site (Inside ROW)
- Hydrographic Area Boundary

Overview Map

N
W E
S

0 6,000 12,000 Feet


MN2/MN3
Cactus Flat
Hydrographic Area
Clayton Valley
Hydrographic Area
Ralston Valley
Hydrographic Area
Esmeralda Co.
Nye Co.
Klondike
95
MN2/MN3
Sta. 7100+00
Proposed Well Sites
Sheet 24 of 24
Legend
Alternate Alignment
U.S. Highway
Other Public Roads
Construction Camp Location
Private Property
County Line
Well Site (Inside ROW)
Well Site (Outside ROW)
Well Access Road--Existing
Hydrographic Area Boundary
Overview Map
N
W
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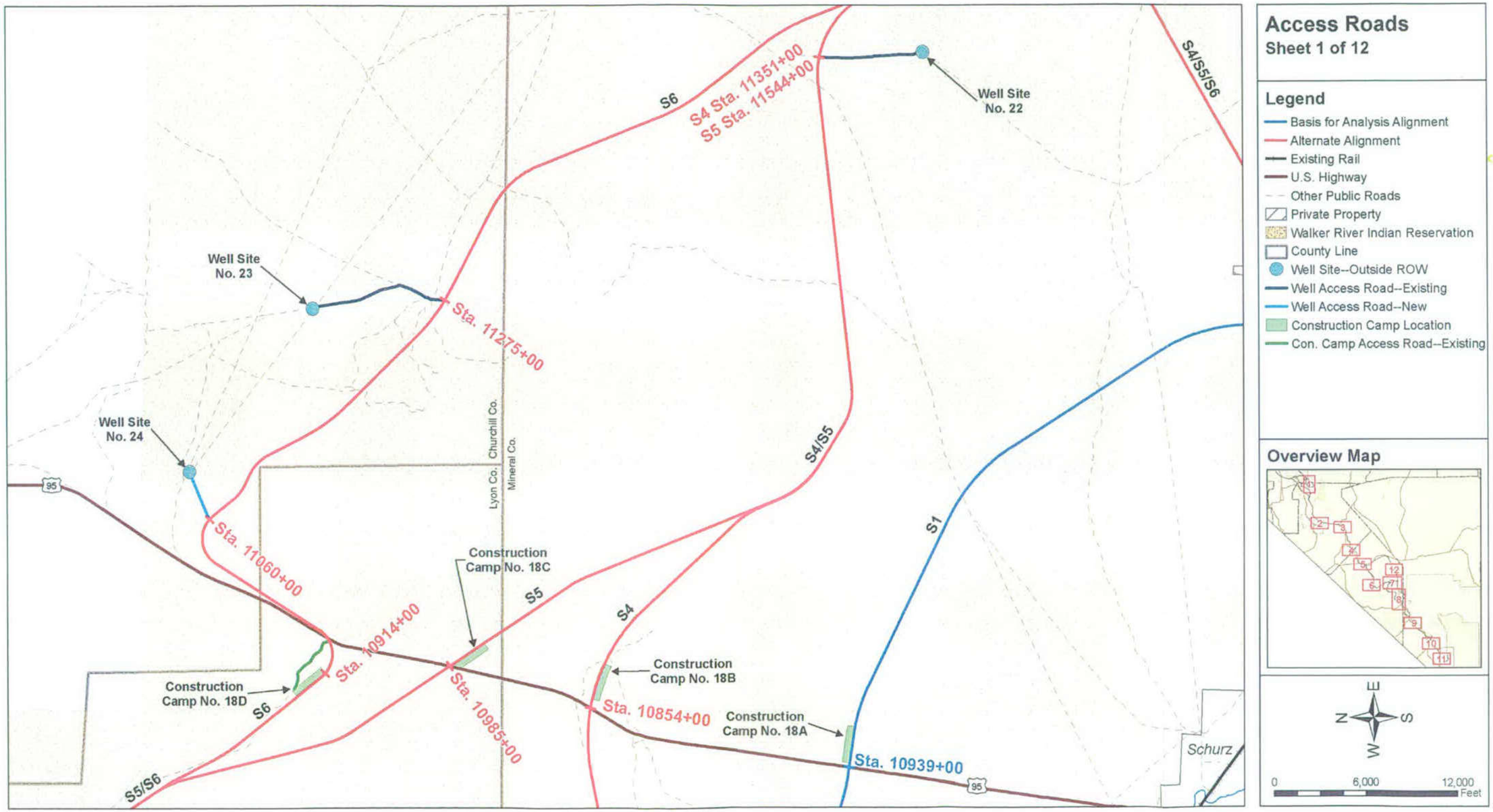
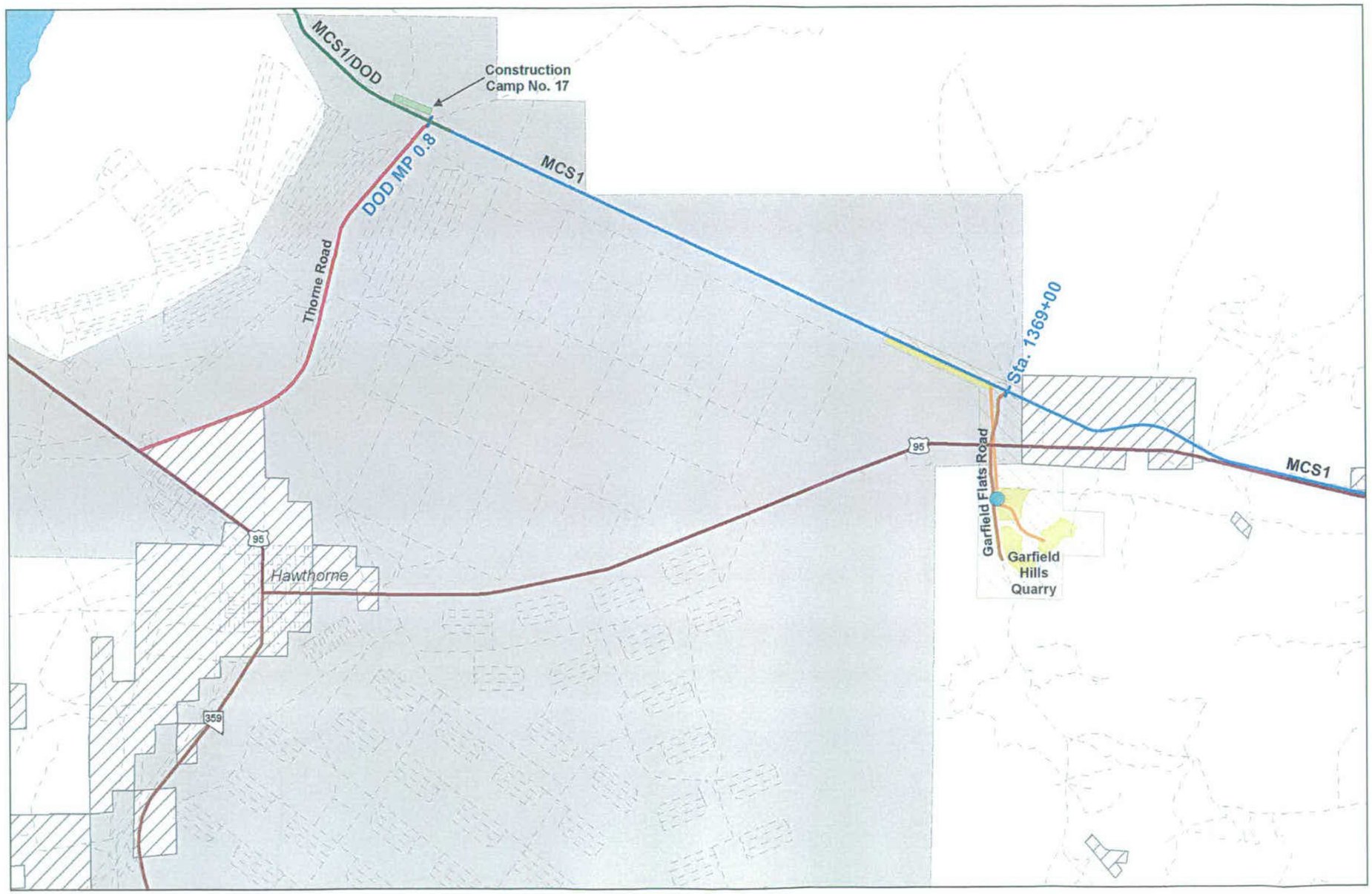
S
0
6,000
12,000
Feet

Appendix H
Access Road Detail Maps


Well Site No. 23
Well Site No. 24
Well Site No. 22
S6
S4 Sta. 11351+00
S5 Sta. 11544+00
S4/S5/S6
Sta. 11275+00
Sta. 11060+00
Sta. 10914+00
Sta. 10985+00
Sta. 10854+00
Sta. 10939+00
Construction Camp No. 18C
Construction Camp No. 18D
Construction Camp No. 18B
Construction Camp No. 18A
S5
S4
S4/S5
S1
S6
S5/S6
Churchill Co.
Lyon Co.
Mineral Co.
95
Schurz
Access Roads
Sheet 1 of 12
Legend
Basis for Analysis Alignment
Alternate Alignment
Existing Rail
U.S. Highway
Other Public Roads
Private Property
Walker River Indian Reservation
County Line
Well Site--Outside ROW
Well Access Road--Existing
Well Access Road--New
Construction Camp Location
Con. Camp Access Road--Existing
Overview Map
N
E
S
W
0
6,000
12,000
Feet



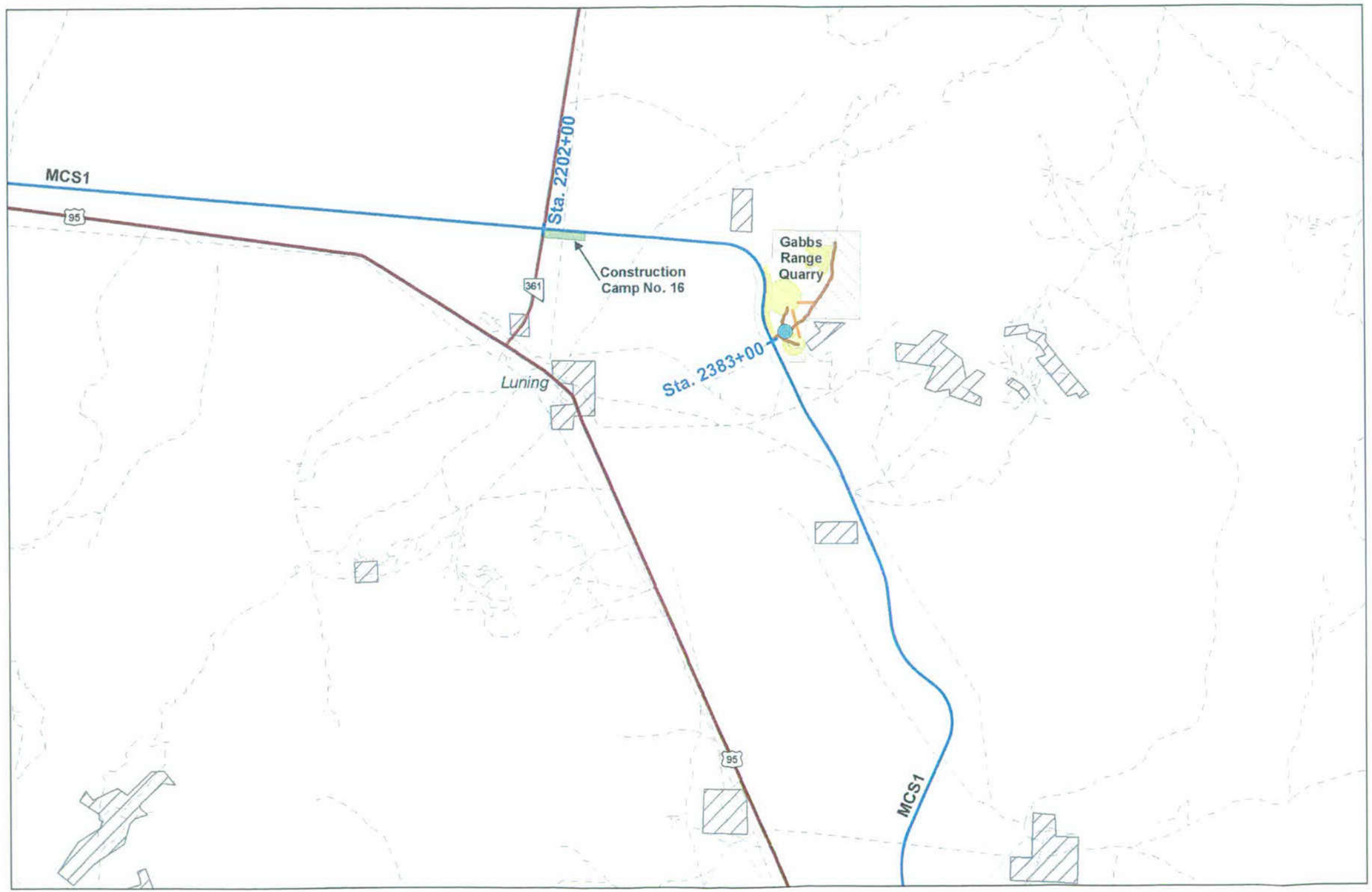
Access Roads
Sheet 2 of 12

Legend
- Basis for Analysis Alignment (Existing Rail)
- Basis for Analysis Alignment
- U.S. Highway
- State Highway
- Paved Access Road
- Other Public Roads
- Private Property
- Hawthorne Army Depot
- Well Site--Outside ROW
- Quarry Location
- Quarry Facility
- Quarry Access Road--Exisiting
- Quarry Access Road--New
- Construction Camp Location

Overview Map

N
W E
S

0 6,000 12,000 Feet



Access Roads
Sheet 3 of 12

Legend

- Basis for Analysis Alignment
- U.S. Highway
- State Highway
- Other Public Roads
- Private Property
- Well Site--Outside ROW
- Quarry Location
- Quarry Facility
- Quarry Access Road--Exisiting
- Quarry Access Road--New
- Construction Camp Location

Overview Map

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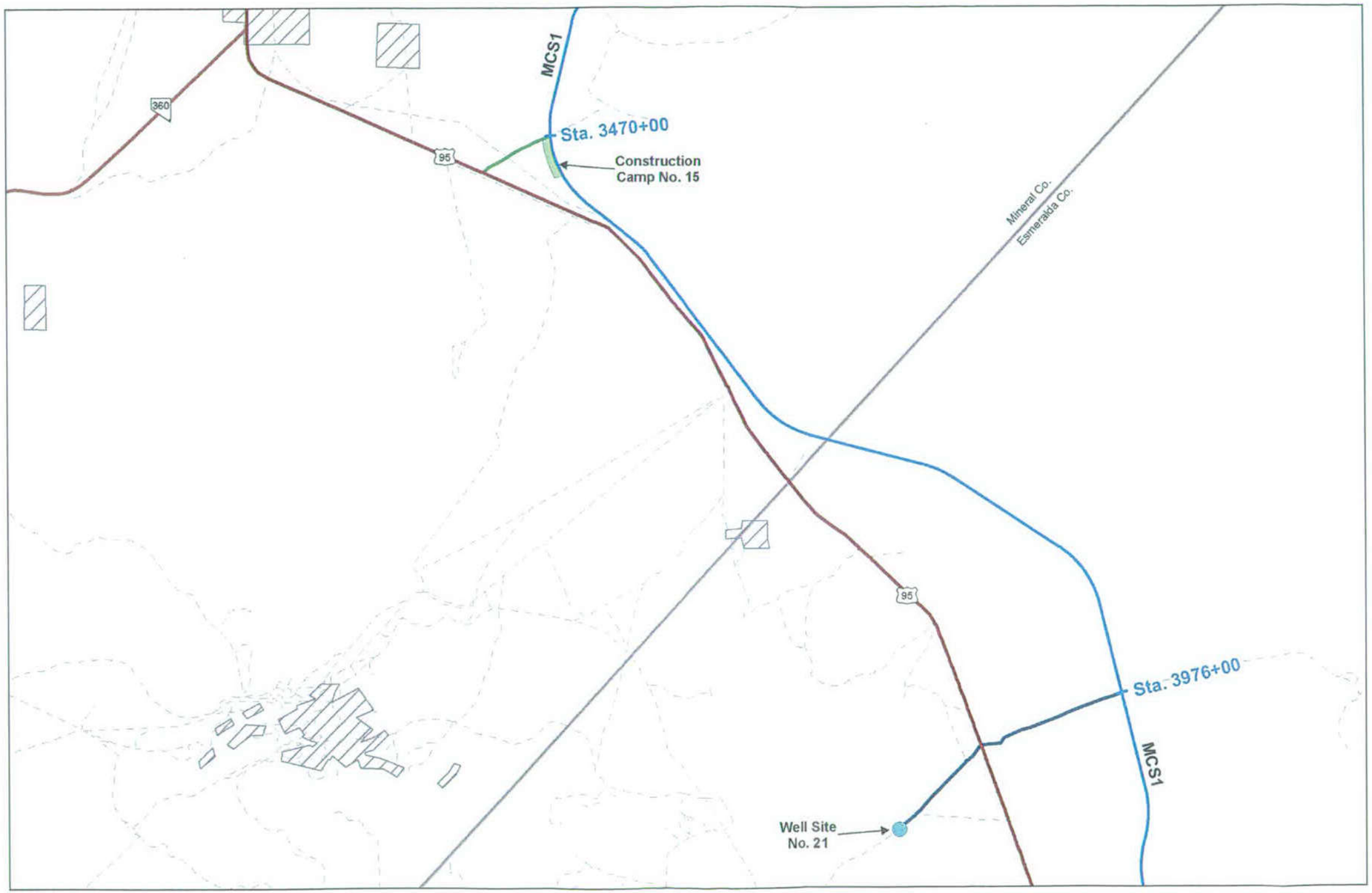
W E
S

0 6,000 12,000 Feet



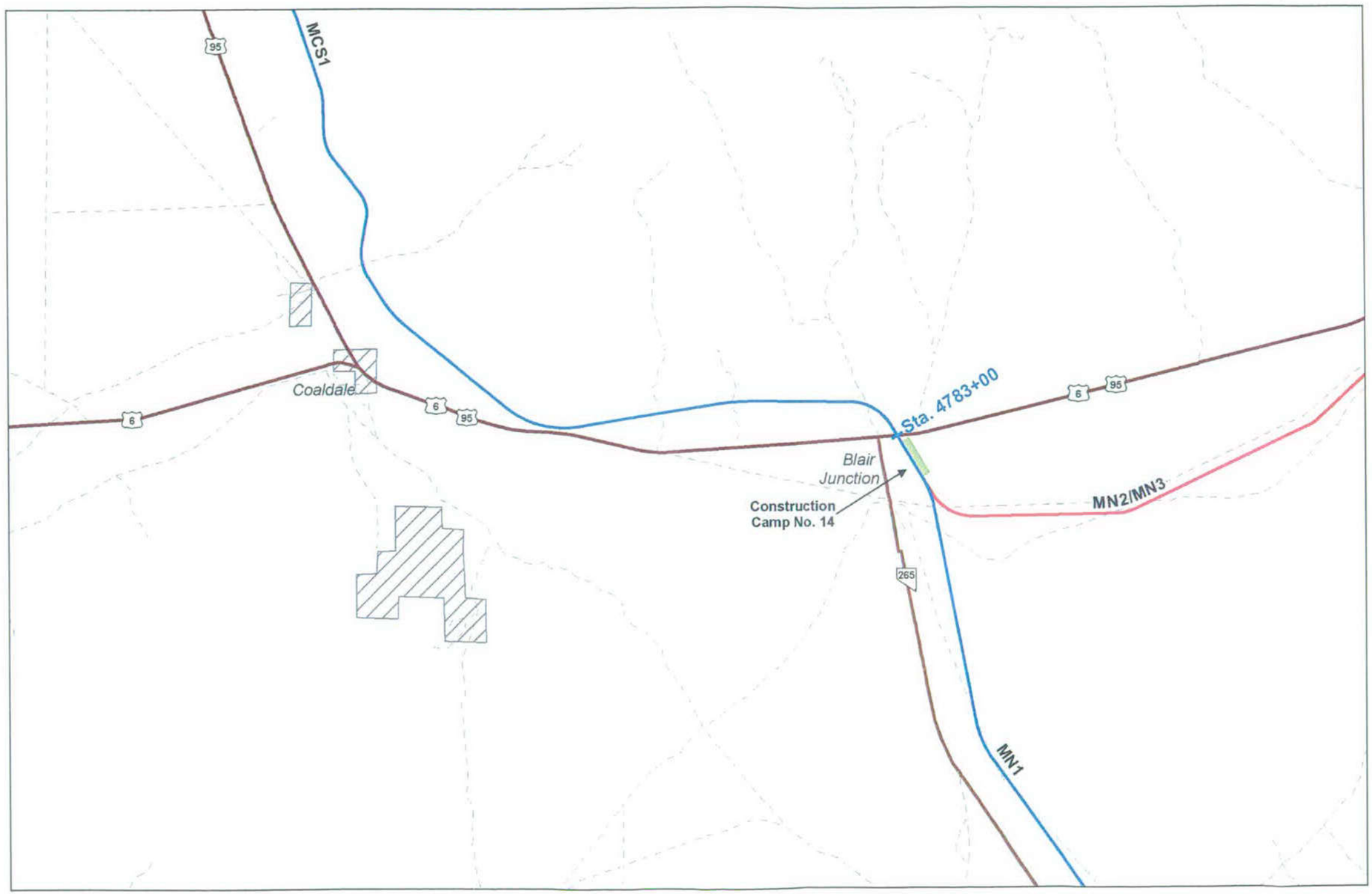
Access Roads
Sheet 4 of 12

Legend
- Basis for Analysis Alignment
- U.S. Highway
- State Highway
- Other Public Roads
- Private Property
- County Line
- Well Site--Outside ROW
- Well Access Road--Existing
- Construction Camp Location
- Con. Camp Access Road--Existing

Overview Map

N
W E
S

0 6,000 12,000 Feet



Access Roads
Sheet 5 of 12

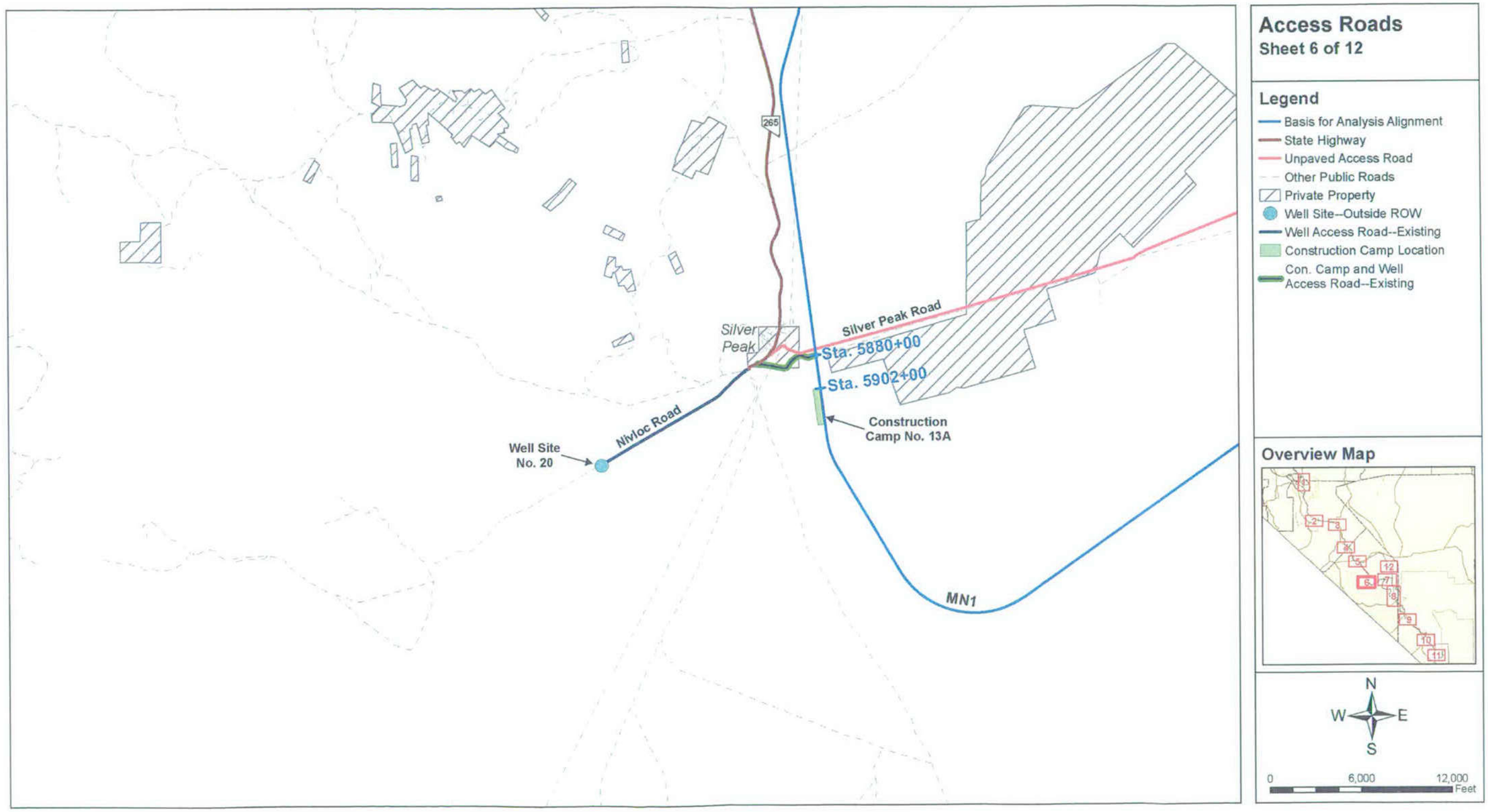
Legend

- Basis for Analysis Alignment
- Alternate Alignment
- U.S. Highway
- State Highway
- Other Public Roads
- Private Property
- Construction Camp Location

Overview Map

N
W E
S

0 6,000 12,000 Feet



Access Roads
Sheet 6 of 12

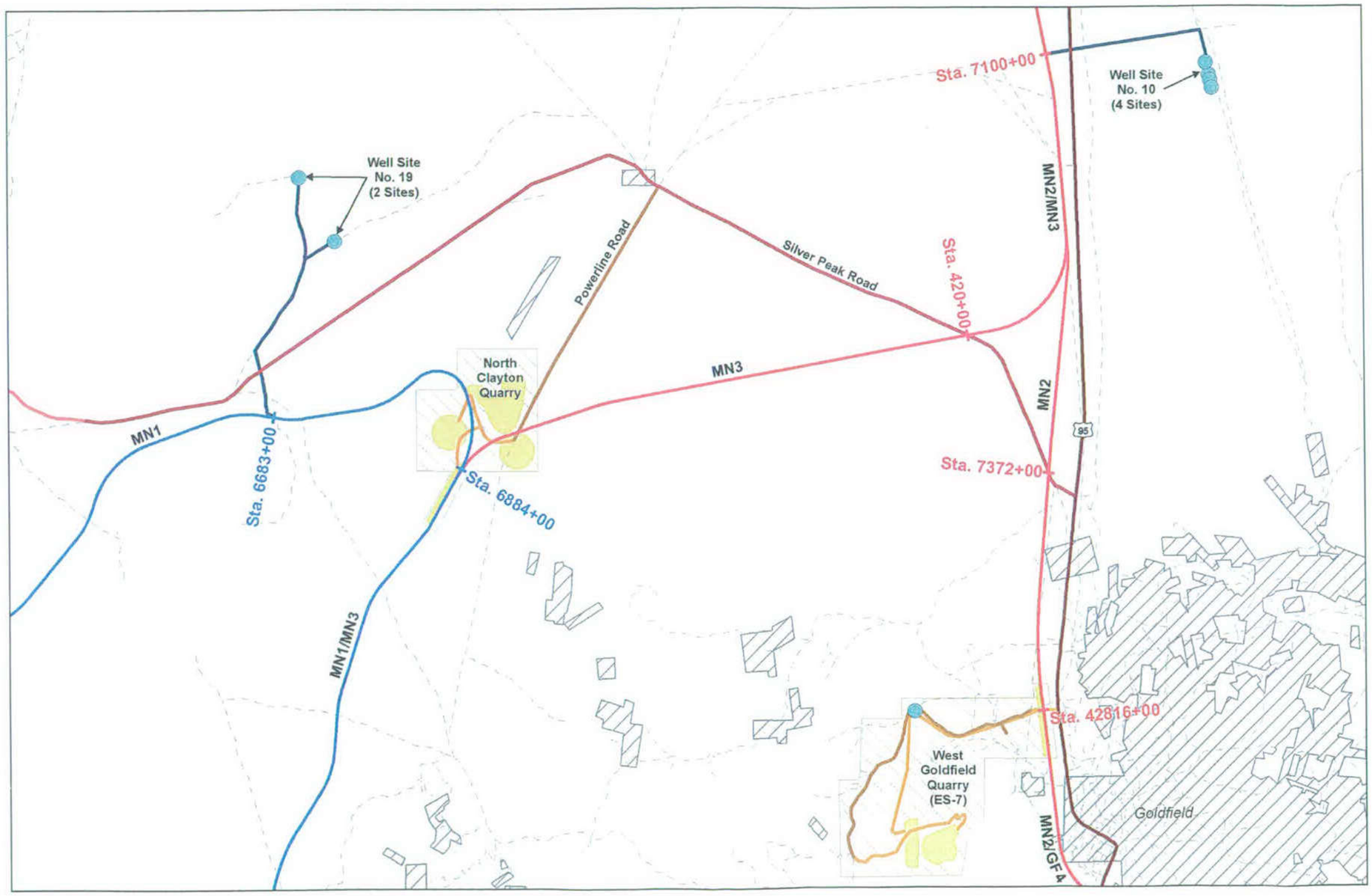
Legend

- Basis for Analysis Alignment
- State Highway
- Unpaved Access Road
- Other Public Roads
- Private Property
- Well Site--Outside ROW
- Well Access Road--Existing
- Construction Camp Location
- Con. Camp and Well Access Road--Existing

Overview Map

N
W E
S

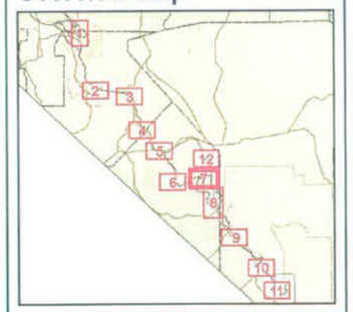
0 6,000 12,000 Feet



Access Roads
Sheet 7 of 12

Legend
- Basis for Analysis Alignment
- Alternate Alignment
- U.S. Highway
- Paved Access Road
- Unpaved Access Road
- Other Public Roads
- Private Property
- Well Site--Outside ROW
- Well Access Road--Existing
- Quarry Location
- Quarry Facility
- Quarry Access Road--Exisiting
- Quarry Access Road--New

Overview Map



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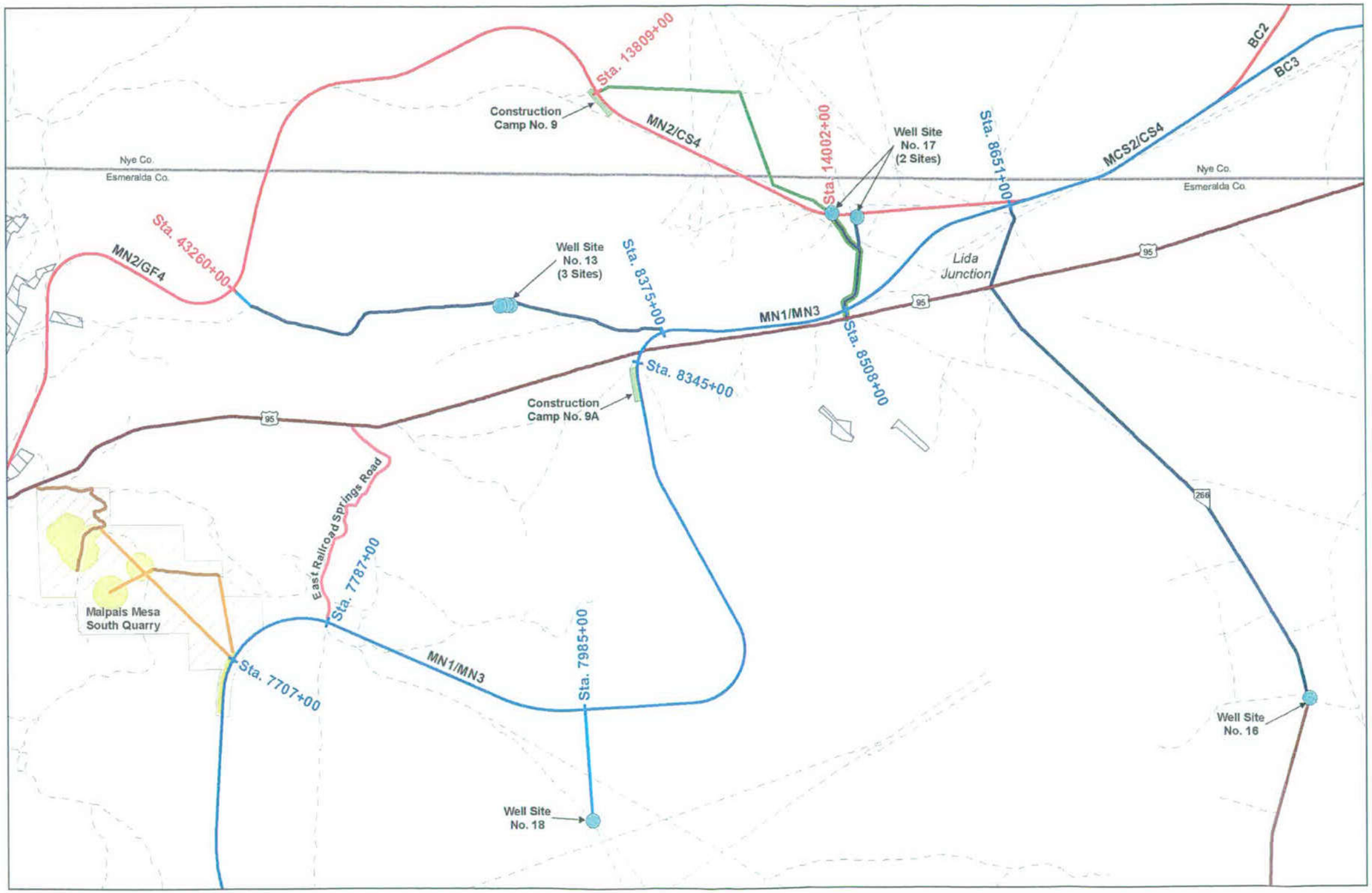
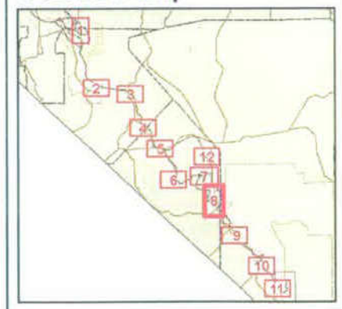


Access Roads
Sheet 8 of 12

Legend

- Basis for Analysis Alignment
- Alternate Alignment
- U.S. Highway
- State Highway
- Unpaved Access Road
- Other Public Roads
- Private Property
- County Line
- Well Site--Outside ROW
- Well Access Road--Existing
- Well Access Road--New
- Quarry Location
- Quarry Facility
- Quarry Access Road--Exisiting
- Quarry Access Road--New
- Construction Camp Location
- Con. Camp Access Road--Existing
- Con. Camp and Well Access Road--Existing

Overview Map



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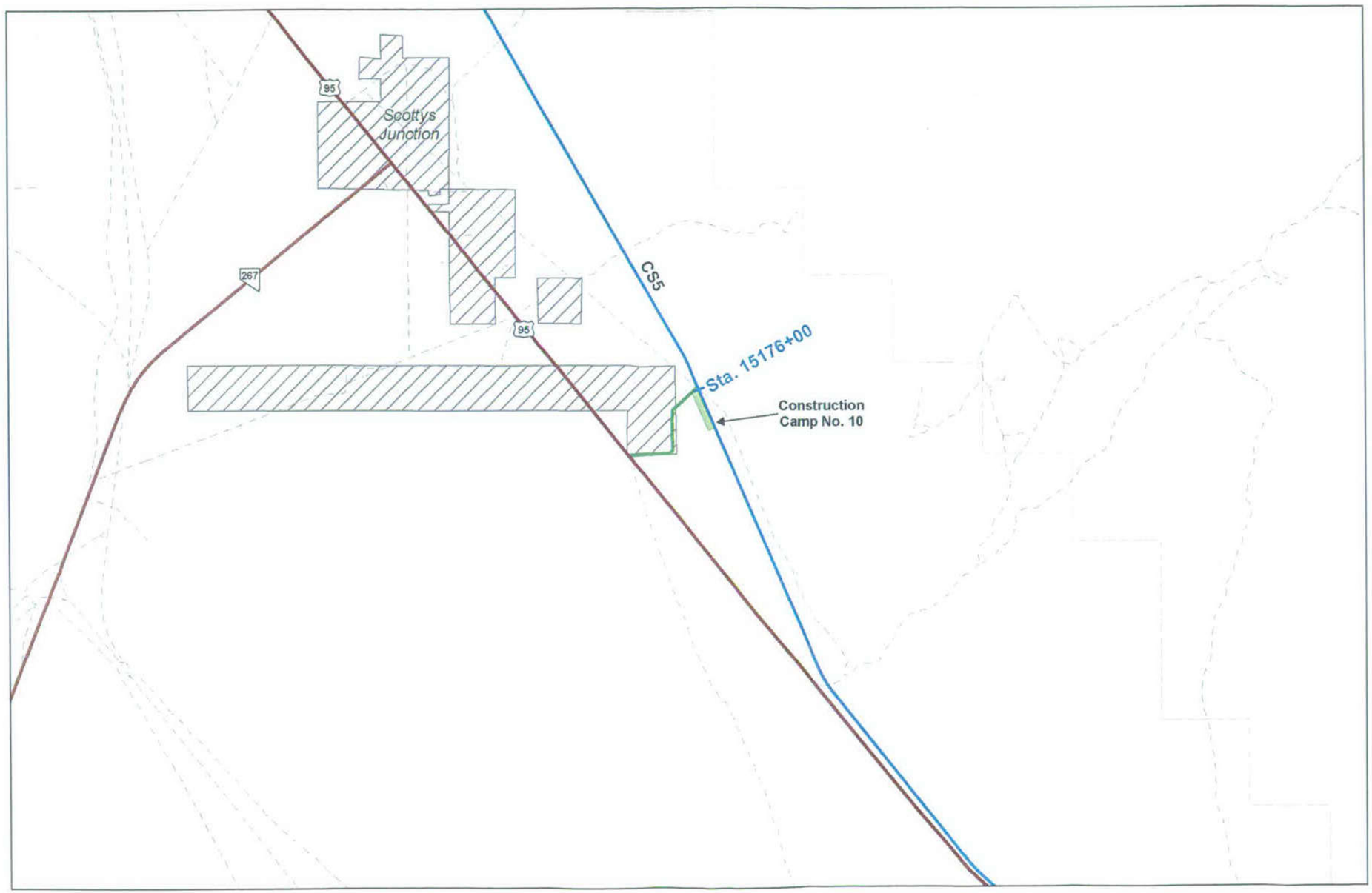


Access Roads
Sheet 9 of 12

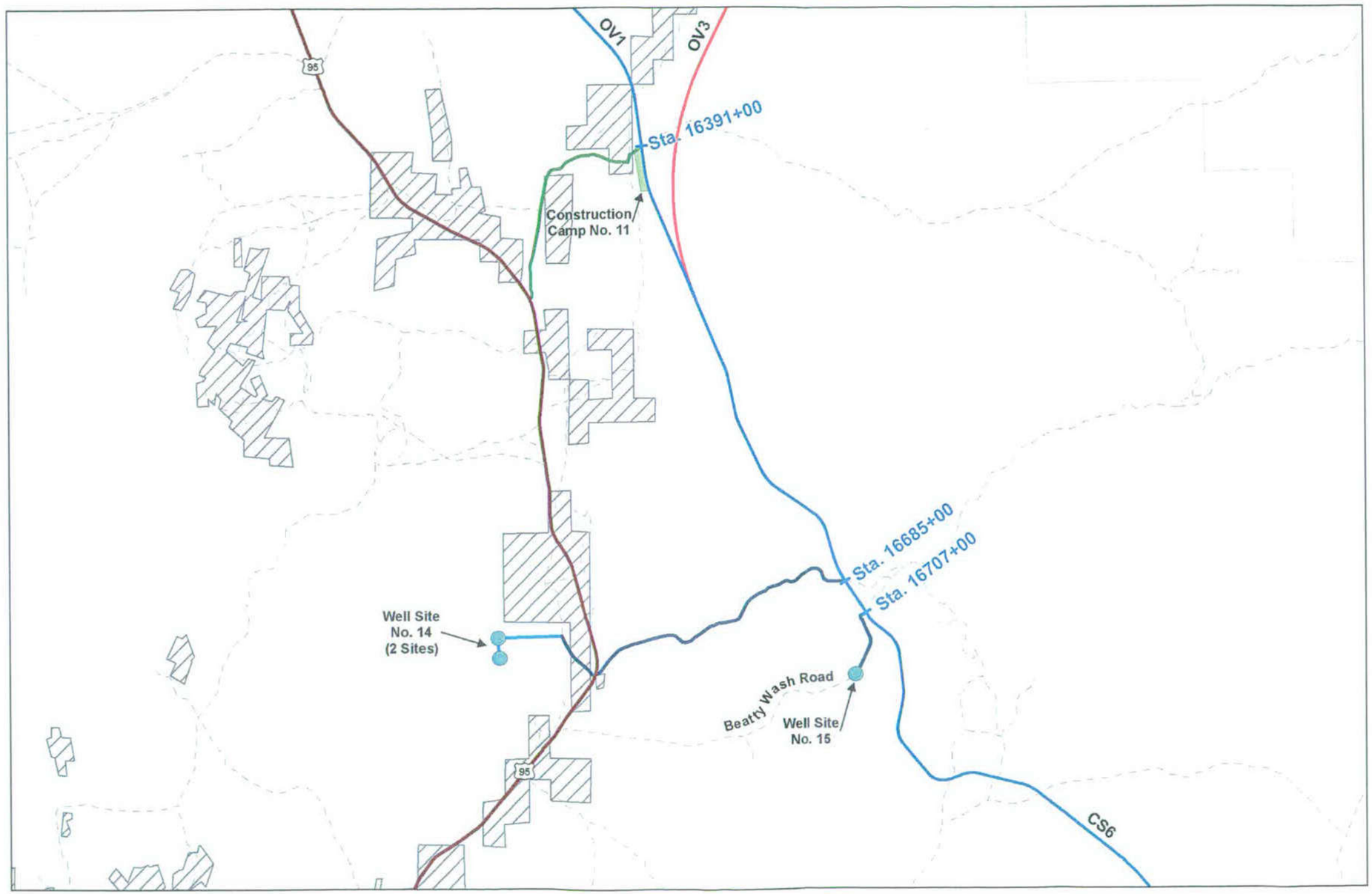
Legend

- Basis for Analysis Alignment
- U.S. Highway
- State Highway
- Other Public Roads
- Private Property
- NTTR Boundary
- Construction Camp Location
- Con. Camp Access Road--Existing

Overview Map

N
W E
S

0 6,000 12,000 Feet



Access Roads
Sheet 10 of 12

Legend

- Basis for Analysis Alignment
- Alternate Alignment
- U.S. Highway
- Other Public Roads
- Private Property
- NTTR Boundary
- Well Site--Outside ROW
- Well Access Road--Existing
- Well Access Road--New
- Construction Camp Location
- Con. Camp Access Road--Existing

Overview Map

N
W E
S

0 6,000 12,000 Feet


CS6
Construction
Camp No. 12
CS6
Sta. 17760+00
95
Access Roads
Sheet 11 of 12
Legend
Basis for Analysis Alignment
U.S. Highway
Other Public Roads
NTTR Boundary
Nevada Test Site Boundary
Repository Land Withdrawal
Construction Camp Location
Con. Camp Access Road--Existing
Con. Camp Access Road--New
Overview Map
N
W
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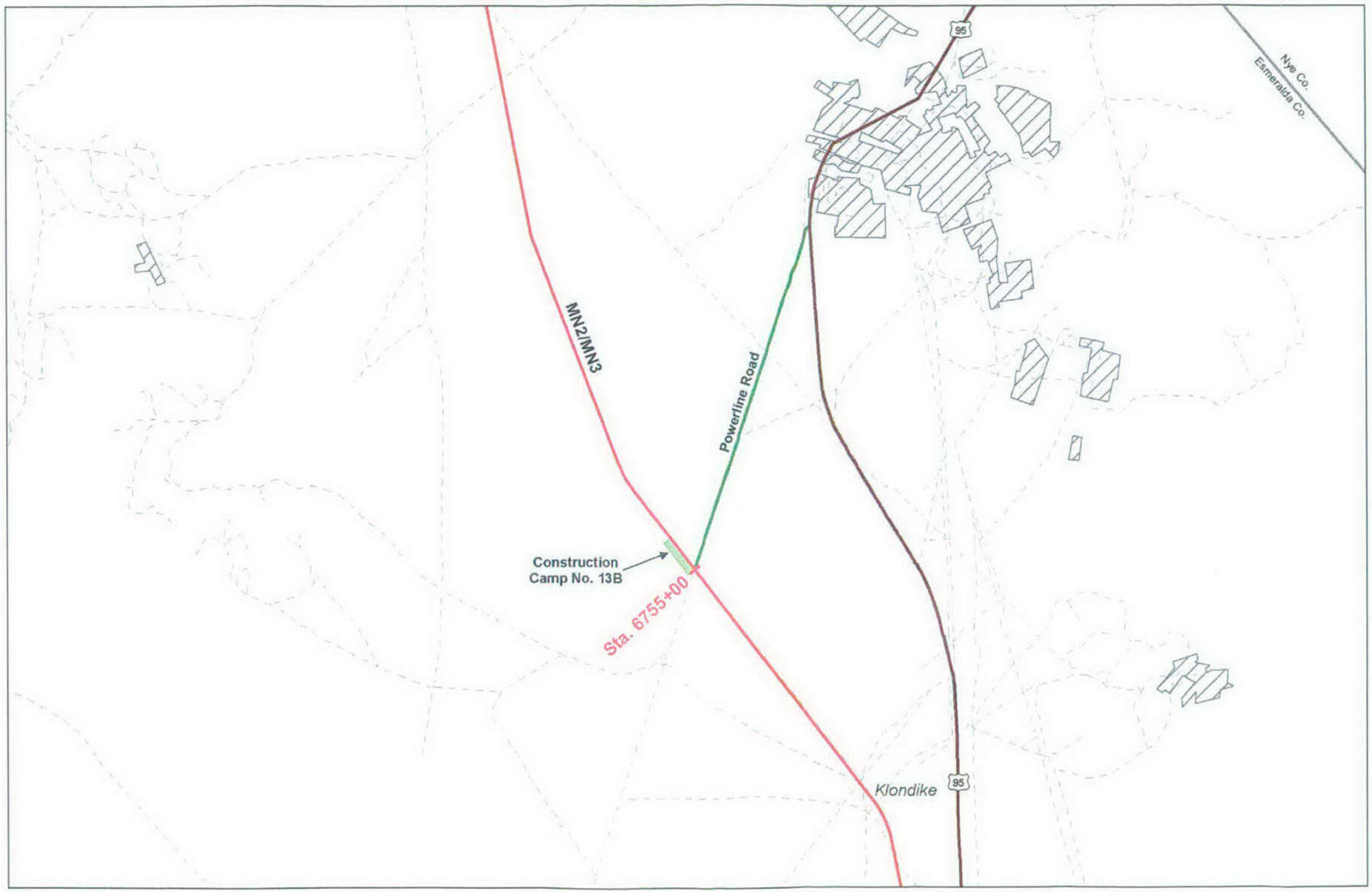
12,000
Feet



Access Roads
Sheet 12 of 12

Legend
- Alternate Alignment
- U.S. Highway
- Other Public Roads
- Private Property
- County Line
- Construction Camp Location
- Con. Camp Access Road--Existing

Overview Map

N
W E
S

0 6,000 12,000 Feet