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J. Eugene C. Allen EC Allen 5/15/07
RESPONSIBLE ENGINEER/ANALYST (Printed Name and Signature) DATE

Title: Hydrogeologic DEIS Analysis Report Mina Rail Corridor

Supplier Document #: N/A

Supplier Rev.: 0

Supplier Date: 04/27/07

Reference # NVT-CD-00149

NVM Nevada Transportation Manager Gene Allen
NE Nevada Engineering Kathy Mrotek

BSC

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1. Supplier/Subcontractor Name:	Purchase Order/Subcontract No. and Title:	
Parsons Brinkerhoff Converse Consultants	NN-HC4-00207/ Mina Hydrologic	
2. BSC Submittal No.:	Revision:	Title:
V0-A000-NHC4-00207-00028-001	003	Hydrogeologic DEIS Analysis Report Mina Rail Corridor

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4/5-14-07

Subcontractor:	Item Number/Title/Revision:	Submittal Date:	SRCT No.:
PB/Converse Consultants	Task 3.6a/Identification of Water Resources – Hydrogeologic DEIS Analysis Report – Mina Rail Corridor Rev 0	April 27th, 2007	07-00024

Section I. Submittal Information (includes above information)

Submittal Description and Revision Summary for Entire Submittal:

Report:

This Hydrogeologic DEIS Analysis Report, per task 3.6a of contract NN-HC4-00207, describes the well siting process and proposed new well sites for supplying water for each hydrographic basin included within the Mina Rail Corridor (MRC). The report includes a summary of relevant data and processes related to the development of new water resources for construction and operation of the proposed MRC. This information can be used for planning purposes by the EIS Contractor to aid in the evaluation of potential impacts to existing resources resulting from development of new groundwater sources along the MRC. The report includes Appendix data summaries for the proposed new wells along the MRC (as summarized below). The report also includes Plates depicting the proposed well sites and relevant hydrogeologic information along the MRC. This report is the Rev.0 submission, which incorporated comments and revisions on the Rev.0b submission.

GIS Data:

This data delivery contains data gathered as part of the Mina Rail Corridor water resources assessment. All maps, pdfs, and data have been organized as described here. All data is in UTM zone 11N NAD 83 Ft.

1. A single geodatabase name "WR_YMP_DIES_20070430.mdb" is being delivered, which contains the (3) feature classes created during this analysis and described below.
    - DevelopmentZones - Abstract: A polygon feature class representing feasibility rankings. A feasibility rating scheme was developed to provide an overview of the conditions that affect groundwater development (in relative terms) within the MRC basins. The criteria incorporated into this scheme include; (1) evidence of high production wells; (2) presence of favorable hydrogeologic conditions; and (3) estimates of depth to groundwater. This rating system was devised to delineate areas with a higher probability of meeting the specific well site criteria. Development zone ratings range from numbers 7 to 19. The lower ratings represent areas with the least favorable conditions while the higher ratings generally represent areas with the more favorable conditions for groundwater development within each basin.
    - Wells_Mina20070425 - Abstract: A point feature class representing potential well sites and attribution as identified and calculated by this analysis.
    - Wells_ReusedCRC20070426 - Abstract: A point feature class representing potential well sites and attribution as identified and calculated by the previous Caliente analysis, which are common and re-used with this alignment and analysis.
2. A second geodatabase named "MapRefBaseData.mdb" is being delivered, which contains the (7) feature classes described below.
    - Align_Mina_20070423withExisting -Abstract: A line coverage identifying the location of the current Mina alignment. The data is provided by BSC (Bechtel SAIC Company, LLC). Portions of the US Rail were an existing rail exists were added to this file. Both data sets were provided by BSC.
    - caliente_mina_common - Abstract: A line coverage identifying the location of the old Caliente alignment. The data is provided by BSC.
    - CityAndTown - Abstract: A point coverage that identifies high population areas such as cities and towns in the state of Nevada. This data is provided by BSC.
    - construction_camps_rev0 - Abstract: A point coverage that identifies the location of potential construction camps for the construction of the alignment. This data is provided by BSC.
    - FAC_MRC_Hawthorne_Staging_Yard_REV_0A - Abstract: A line coverage identifying the location of a potential staging yard. The data is provided by BSC.
    - FAC_MRC_Klondike_MOW_MN2_REV_0A - Abstract: A line coverage identifying the location of a potential MOW facility. The data is provided by BSC.
    - FAC_MRC_Silver_Peak_MOW_MN1_REV_0A - Abstract: A line coverage identifying the location of a potential

5/16/07

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MOW facility. The data is provided by BSC

- Gnis_Springs - Abstract: This Geographic Names Information System (GNIS) contains physical and cultural feature names and location information for the State of Nevada. This point overage was created by the U.S.Geological Survey (USGS).
- hydro_geology - Abstract: A polygon coverage that identifies the hydrogeology of the area. The hydrogeology polygons contain information of the area covered, operimeter, geologic formation, and hydrogeologic description. This data set was created as part of a USGS study (Scientific Investigations Report 2004-5131, Maurer, et al., 2004).
- MajorRoad - Abstract: A line coverage that identifies the major roads and highways for the state of Nevada. Data provided by BSC.
- Mina_sidings - Abstract: A line coverage representing the location of potential rail road sidings. Data provided by BSC.
- MinorRoads - Abstract: A line coverage that identifies the minor roads and jeeptrails for the state of Nevada. Data provided by BSC.
- nv_basins_1 and MinaRailCorridorBasinsP1 - Abstract: Polygon coverage of a natural region of land that contain a hydrologic unit. These boundaries were originally delineated in 1968 in collaboration with the USGS (Rush, 1968a). The updated basin coverage in 1999 by BLM (U.S. Bureau of Land Management) based on data originating from NDWR (Nevada Division of Water Resources) - State Engineering Office. The MinaRailCorridorBasinsP1 is just a smaller selected set.
- MRC_Quarry_Sites_REV_0A - Abstract: A polygon coverage that identifies, among other things, potential quarry sites. This data was originally provided by BSC.
- NEDmask - - Abstract: A polygon that covers the extent of all the maps. This data set was used to mask the NED and make it less pronounced. This polygon does not represent a feature.
- nv_basins_1 - Abstract: Polygon coverage of a natural region of land that contain a hydrologic unit. These boundaries were originally delineated in 1968 in collaboration with the USGS (Rush, 1968a). The updated basin coverage in 1999 by BLM (U.S. Bureau of Land Management) based on data originating from NDWR (Nevada Division of Water Resources) - State Engineering Office.
- nv_counties - Abstract: A polygon coverage that identifies the county boundaries within the state of Nevada. Data provided by Nevada BLM.

3. ArcMap - A directory containing maps supporting the analysis. Plate 1_1 provides an overview, and the other plates show potential well locations by basin. Finally, the figures show the development zone analysis by basin. The files are:
   - site_ymp_mrc_Plate1_1_20070430.mxd (898 kb)
   - ymp_deis_analysis_Plate4_1_20070430.mxd (1,125 kb)
   - ymp_deis_analysis_Plate4_2_20070430.mxd (1,027 kb)
   - ymp_deis_analysis_Plate4_3_20070430.mxd (1,003 kb)
   - ymp_deis_analysis_Plate4_4_20070430.mxd (1,008 kb)
   - ymp_deis_analysis_Plate4_5_20070430.mxd (1,007 kb)
   - ymp_deis_analysis_Plate4_6_20070430.mxd (992 kb)
   - ymp_deis_analysis_Plate4_7_20070430.mxd (1,035 kb)
   - ymp_deis_analysis_Plate4_8_20070430.mxd (991 kb)
   - ymp_deis_analysis_Plate4_9_20070530.mxd (998 kb)

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- ymp_deis_analysis_Plate4_10_20070430.mxd (1,049 kb)
- ymp_deis_analysis_Plate4_11_20070430.mxd (1,040 kb)
- ymp_deis_analysis_Plate4_12_20070430.mxd (1,012 kb)
- Groundwater_Development_Zones_3_1_2007040.mxd (959 kb)
- Groundwater_Development_Zones_3_2_2007040.mxd (893 kb)
- Groundwater_Development_Zones_3_3_2007040.mxd (695 kb)
- Groundwater_Development_Zones_3_4_2007040.mxd (700 kb)
- Groundwater_Development_Zones_3_5_2007040.mxd (696 kb)
- Groundwater_Development_Zones_3_6_2007040.mxd (889 kb)
- Groundwater_Development_Zones_3_7_2007040.mxd (696 kb)
- Groundwater_Development_Zones_3_8_2007040.mxd (889 kb)
- Groundwater_Development_Zones_3_9_2007040.mxd (696 kb)
- Groundwater_Development_Zones_3_10_2007030.mxd (889 kb)
- Groundwater_Development_Zones_3_11_2007030.mxd (890 kb)
- Groundwater_Development_Zones_3_12_2007030.mxd (891 kb)

4. PDFs – A directory called 'PDFs' contains published versions of the maps listed above. These files are:
   - site_ymp_mrc_Plate1_120070430.pdf (2,271)
   - ymp_deis_analysis_Plate4_1_20070430.pdf (2,523 kb)
   - ymp_deis_analysis_Plate4_2_20070430.pdf (2,477 kb)
   - ymp_deis_analysis_Plate4_3_20070430.pdf (2,635 kb)
   - ymp_deis_analysis_Plate4_4_20070430.pdf (3,073 kb)
   - ymp_deis_analysis_Plate4_5_20070430.pdf (2,536 kb)
   - ymp_deis_analysis_Plate4_6_20070430.pdf (2,490 kb)
   - ymp_deis_analysis_Plate4_7_20070430.pdf (2,656 kb)
   - ymp_deis_analysis_Plate4_8_20070430.pdf (2,190 kb)
   - ymp_deis_analysis_Plate4_9_20070430.pdf (2,731 kb)
   - ymp_deis_analysis_Plate4_10_20070430.pdf (2,667 kb)
   - ymp_deis_analysis_Plate4_11_20070430.pdf (2,082 kb)
   - ymp_deis_analysis_Plate4_12_20070430.pdf (2,719 kb)
   - Groundwater_Development_Zones_3_10_20070430.pdf (2,367 kb)
   - Groundwater_Development_Zones_3_11_20070430.pdf (2,086 kb)
   - Groundwater_Development_Zones_3_12_20070430.pdf (2,384 kb)

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PB/Converse Consultants	Task 3.6a/Identification of Water Resources – Hydrogeologic DEIS Analysis Report – Mina Rail Corridor Rev 0	April 27th, 2007	07-00024

- Groundwater_Development_Zones_3_1_20070430.pdf (2,369 kb)
- Groundwater_Development_Zones_3_2_20070430.pdf (2,522 kb)
- Groundwater_Development_Zones_3_3_20070430.pdf (2,391 kb)
- Groundwater_Development_Zones_3_4_20070430.pdf (2,615 kb)
- Groundwater_Development_Zones_3_5_20070430.pdf (2,335 kb)
- Groundwater_Development_Zones_3_6_20070430.pdf (2,556 kb)
- Groundwater_Development_Zones_3_7_20070430.pdf (2,502 kb)
- Groundwater_Development_Zones_3_8_20070430.pdf (2,240 kb)
- Groundwater_Development_Zones_3_9_20070430.pdf (2,353 kb)

Special Instructions

This data delivery contains project data and Arc Maps pointing to that data. For these files to work correctly the folder structure on this disk must be maintained.

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

Filename	Rev.	File Size	Description (File description and revision summary for file)	Application and Version/ Add-in or Extension and Version
WR_YMP_DIES_20070430.mdb	0	1,032 KB	ESRI Geodatabase created containing spatial data sets listed in Section 1.	ArcGIS 9.2
MapRefBaseData.mdb	0	162,840 KB	ESRI Geodatabase created containing spatial data sets listed in Section 1.	ArcGIS 9.2
*.mxd	0	22,937 KB	ESRI ArcMap maps described in Section 1	ArcGIS 9.2
*.pdf	0	61,747 KB	Adobe PDFs described in Section 1	Adobe Acrobat 7.0
043110 04 Converse Mina Rail Rev0 DEIS Analysis 4-27-07.pdf	0	2,461 KB	Hydrogeologic DEIS Analysis Report Mina Rail Corridor, Draft Rev 0	Adobe Acrobat 7.0
Rev0_DEIS Analysis_Appendix 4-27-07.pdf	0	191 KB	Report Appendix data (A – D), Rev 0	Adobe Acrobat 7.0
DEIS MRC Report_FiguresRev0.pdf	0	28,827 KB	Report Figures depicting basin development zones.	Adobe Acrobat 7.0
DEIS MRC Report_PlatesRev 0.pdf	0	32,960 KB	Report plates depicting alignment features, basin boundaries and proposed new well sites.	Adobe Acrobat 7.0

**********Last Item**********

Section III. Metadata

☐ GIS Metadata	Projection: NAD 1983 UTM Zone 11N
All GIS data is preferred in ArcGIS9.1 UTM, NAD1983,	Datum: D_North_American_1983, Semimajor Axis: 6378137.00 Semiminor Axis: 6356752.3141403561 Inverse Flattening: 298.257222101000002

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Zone11, Feet.	Zone: 11N
	Units: Feet
☐ **CAD Metadata** CAD drawings are preferred in **Bentley MicroStation V8 and/or InRoads** and should adhere to established **CAD standards**.	Level descriptions:
	Scale:
	Units of Measurement:
	Horizontal and Vertical Datum:

Section IV. Data Screening (Completed by BSC personnel)

Acceptable for Review?	Screener Name:	Signature:	Date:
☒ Yes* ☐ No	Cathy Stettler	Cathy Stettler	5/3/07

*If "Yes", Data Storage Location: nvtdata\PB\Phase1\07-00024 Hydro DEIS Anal Rpt Mina Rev 0 04-27-07

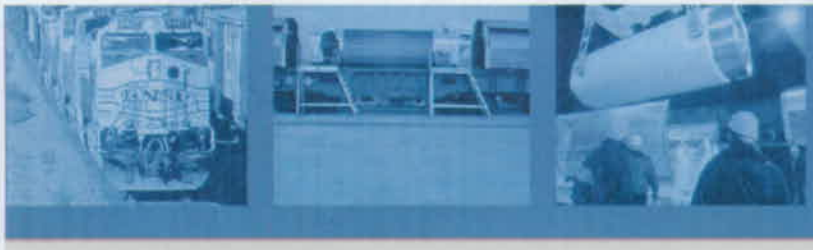
Comments: *(Justification for returning submittal is **required**; other comments are optional.)*

Section V. STR/STR Support Disposition of Submittal

Process for Review?	** If "No", date returned:	Comments:	
☒ Yes ☐ No**			
STR/STR Support Name: Gene Allen		Signature: EC Allen 5/2/07	Date: 5/3/07

NV Rail Alignment EIS Related – Deliberative Process – Privileged Not LSN Relevant

CS 5-16-07



Hydrogeologic DEIS Analysis Report
Mina Rail Corridor

Task 3.6a: Identification of Water Resources
REV. 0
04-33110-04

Prepared by:

Converse Consultants

Prepared for:

BECHTEL SAIC COMPANY, LLC

Nevada Rail Project Hydrologic Analysis

NN-HC4-00207

April 27, 2007

Hydrogeologic DEIS Analysis Report

Mina Rail Corridor

REV. 0

Nevada Rail Project Hydrologic Analysis

Subcontract No. NN-HC4-00207

April 27, 2007

Converse Consultants Project No. 04-33110-04

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Appendix

Well Sites Plates

Abbreviations and Acronyms

AFA	acre-feet per year (ac-ft/yr)
AMSL	Above Mean Sea Level
bgs	below ground surface
BLM	Bureau of Land Management (USDI)
BSC	Bechtel SAIC Company, LLC
CAD	Computer-Aided Design
CRC	Caliente Railroad Corridor
DOE	Department of Energy (U.S.)
EIS	Environmental Impact Statement (NEPA/EPA)
EOL	End of Line
ft	foot (feet)
gal/yr	gallons per year
gal/mi	gallons per mile
GIS	Geographical Information System
gpm	gallons per minute
ID	Identification
mg/l	milligrams per liter
mo/yr	months per year
MOW	Maintenance of Way
MRC	Mina Railroad Corridor
N/A	Not applicable
NDWR	Nevada Division of Water Resources
NRL	Nevada Rail Line
NRP	Nevada Rail Partners
NWIS	National Water Information System (USGS)
ROW	Right-of-Way
TBD	To Be Determined
TDS	Total Dissolved Solids
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator

1.0 Introduction

1.1 Background

Construction of the proposed rail line, referred to in this report as the Mina Rail Corridor (MRC), would require the use of water during construction activities, which is expected to come from groundwater resources. The water used during construction would primarily support construction activities, which include embankment compaction, dust control, and field operations. Potable water would also have to be supplied for workers during rail construction and at various facilities during operation of the rail.

The Department of Energy (DOE) is currently examining the MRC in an Environmental Impact Statement (EIS) for possible construction of a railroad to Yucca Mountain. The MRC is a 0.25 mile-wide corridor that includes common segments and segments with alternative alignments. A 1,000-ft construction Right-of-Way (ROW) is planned within the 0.25-mile wide corridor on US Bureau of Land Management (BLM) lands. Where the corridor crosses the Walker River Paiute Reservation the operational ROW will be approximately 100 to 200 feet in width. The corridor will also narrow where it crosses private lands or other ROWs that conflict with the 1,000-foot width criteria. The current analysis is based on the MRC alignment that was developed from 5-ft topographic contour information, referenced as '5-ft Design Alignment', with the exception of S4, S5 and S6 (Schurz) alignment segments on the Walker River Paiute Reservation. The analysis for these Schurz segments was based on U.S. Geological Survey (USGS) topographic information, which was used to produce these USGS design alignments.

This report references geographical areas and hydrographic basins, or basins, along the MRC according to the following convention:

1. The MRC consists of (1) a 100 to 1,000-foot construction ROW and (2) several identified alternative alignments of the MRC that are included for evaluation.

2. Basins through which any part of the MRC passes are referenced as MRC Basins. There are 12 basins that meet this geographic criterion. The alignment used for this analysis and the associated basins are shown in Plate 1-1.

1.2 Purpose and Scope

This report describes the processes used to determine locations for construction of new groundwater wells to provide water resources in the twelve (12) basins through which the proposed MRC passes. The current analysis for development of water resources along the MRC includes only the northern portion of the proposed railroad to Yucca Mountain. The southern portion of the Mina corridor, which is common with the Caliente Rail Corridor (CRC), is addressed in an earlier report for the CRC (Converse, 2006).

The objective of this hydrogeologic analysis is to provide information that can be used to support the evaluation of the water resource development strategy described herein as part of the impact analysis of the EIS for the project. The information presented in this document was developed within a Geographical Information System (GIS) specifically for the MRC project. The supporting information and data layers related to water resources within this GIS system have previously been described in the *Water Resources Assessment Report* (Converse, 2007).

2.0 Approach

The approach for specifying locations for, or siting, groundwater wells along the MRC was based on input provided by the project design team, which consists of Bechtel SAIC (BSC) and Nevada Rail Partners (NRP). The information was generally provided in GIS and Computer-Aided Design (CAD) format, which included the following:

1. **MRC Alignment-** The alignment used for siting wells was based on GIS data corresponding to *Alignment Development Report- Mina Rail Corridor, 2007* (NRP, 2007a), which included common and

alternate MRC segments being considered at that time by the MRC design team. This alignment uses the latest available data from the USGS based on 20-foot contour topographic information, but is superseded by an alignment using 5-foot contour data.

2. **Water Requirements** - The location and volumetric estimates for water requirements were determined by the design team. A description of the estimated water requirements incorporated in the recommendations for groundwater wells is provided in the Sections that follow.

3. **MRC Facility Features** - These features were specified by the design team and are described in detail in the Sections that follow.

4. **Existing Information** - Existing hydrogeologic information from the Nevada Division of Water Resources (NDWR), the USGS and numerous public reports was used along with GIS coverage files for various geologic and topographic features. This information was utilized as part of the hydrogeologic analysis to estimate potential depths of wells and anticipated production rates for sited wells along the corridor. Hydrogeology coverage adapted from Maurer and Others (2004) is displayed on the Well Sites Plates included within this report.

2.1 MRC Construction and Facility Water Requirements

The MRC would include construction activities and facility features that require water during both construction and following the completion of construction for operations activities. Based on information provided by the design team, water requirements determined for the MRC would consist of multiple demands, which generally include:

1. Compaction of material placed in embankments
2. Dust control during excavation, embankment construction and other construction related uses including access roads

3. Ballast quarry operations
4. Temporary construction camps
5. Permanent operational facilities such as the Nevada Rail Line (NRL) Yard, the NRL Maintenance of Way (MOW) Facility and rail sidings.

All water requirements discussed herein are based on the documents produced for or by the MRC design team, which include the following:

1. **Alignment Development Report, Dated April 20, 2007**
   Nevada Rail Partners 2007a. *Alignment Development Report Mina Rail Corridor.* Document No. NRP-R-SYSW-DA-0003-00. Las Vegas, Nevada: Nevada Rail Partners.

2. **Facilities Design Analysis Report, Dated April 17, 2007**
   Nevada Rail Partners 2007b. *Facilities-Design Analysis Report Mina Rail Corridor,* Task 10: Facilities. Document No. Document No. NRP-R-SYSW-FA-0002-00. Las Vegas, Nevada: Nevada Rail Partners.

3. **Construction Implementation Planning Report, Dated April 30, 2007**
   Nevada Rail Partners 2007c. *Construction Plan- Mina Rail Corridor.* Document No. NRP-R-SYSW-CP-0010-00. Las Vegas, Nevada: Nevada Rail Partners.

4. **Operations and Maintenance Report, Dated April 30, 2007**
   Nevada Rail Partners 2007d. *Operations and Maintenance Report Mina Rail Corridor.* Document No. NRP-R-SYSW-OM-0003-00. Las Vegas, Nevada: Nevada Rail Partners.

The alignments and earthwork quantities described in these documents provided the basis for the estimated water demand to support the construction-related activities. The types of fill material, alluvial or rock, were also considered. The rock material was considered to require little or no water for compaction as compared to alluvial, which would require fairly substantial amounts. The demand for construction water would vary over the length of the

rail line. Areas with the greatest amounts of fill would require the greatest quantity of water, while areas of cut or rock fill would require relatively little water for embankment construction.

Water required for dust control and other construction-related uses was estimated based on an allowance per mile of line constructed. Water for temporary construction camps was based upon the number of personnel, holding tank capacities and forecasted activity levels. Temporary water would also be required to support start-up at rock quarry sites with an estimated 2-year construction period, which would include dust control and washing at each quarry site. These requirements would be temporary and would end when construction activities in that area are completed. Similarly, water requirements for permanent facilities such as the NRL Yard, the NRL MOW Facility, and sidings were also determined. These water requirements would be considered permanent and on-going throughout the operational life of the rail line. A summary of estimated unit water demand requirements for various facilities is provided in Table 2-1.

Table 2-1 – Estimated Facility Water Demand[1]

Facility Type	Estimated Annual Demand Per Site		Remarks
Temporary Water	**[millions of gallons]**	**[gpm][2]**	
Construction Camps	7.7	20	Domestic use based on (350 people per camp) x (80-gal/person/day) at 9 mo/yr per site
Quarries	12.5	24	Required to support quarry start-up and 2-year rail line construction (each site)
Permanent Water			
Siding	0.06	<1	Assumed 10,000 gals for fire control and 50,000 gals for maintenance (per year)
Permanent Facilities[2]	1.5 to 3.3	2.8 to 6.2	Includes total estimated demand for domestic and maintenance/operational use per year for NRL Yard and NRL MOW facilities

Notes:

[1] Demand estimates based on NRP (2007b) and NRP (2007c).

[2] Water demand shown in units of [gpm] is based on the annualized amount and not adjusted for peak (9-month) demand.

All estimated water requirements determined by the design team according to the general criteria described above were segregated by basin and alignment segment, as appropriate.

The following scheme was used to convert the proposed water demand at a site to gallons per minute yield needed for each well site:

1. Construction water demand represents the number of gallons required for a twelve-month construction period within each basin. It includes water for soil compaction, dust control and certain miscellaneous uses. Dividing this figure by 525,600 yields the equivalent amount in gallons per minute for 1 year. Since the actual demand usage would likely be for only nine months the peak requirement in gallons per minute becomes 1.33 times the annualized gallons per minute.

2. For other non-embankment construction uses, the gallons per year estimates were converted to gallons per minute by dividing by 525,600.

2.2 Water Demand Classification

Water requirements to support the MRC project were divided into two categories based on duration of use, which included (1) temporary demand, and (2) permanent demand. Within each of these divisions the type of demand was classified as either (1) potable water, or (2) non-potable water. The determination of how water demand was specified as temporary or permanent was based on whether that water would be intended to support construction or facilities demand, respectively. Table 2-2 provides a summary of water demand classifications based on whether the water demand was intended for construction or a MRC facility (listed by types).

Table 2-2 – Water Demand Classification

Water Demand Identifications (with all required combinations)	Water Demand Type (by Duration)	Water Demand Type (by Use)[1]
Construction	Temporary	Non-Potable
Quarry	Temporary	Non-Potable
Construction / Quarry	Temporary	Non-Potable
Permanent Facility - NRL Yard - NRL MOW	Permanent	Potable
Siding	Permanent	Non-Potable
Construction / Siding	Permanent	Non-Potable
Construction / Permanent Facility	Permanent	Potable
Construction / Permanent Facility/Camp	Permanent	Potable
Camp	Temporary	Potable
Construction / Camp	Temporary	Potable
Construction / Camp /MOW	Permanent	Potable

Notes:

[1] All wells with a 'potable' use designation were sited at or as close as reasonably possible to the facilities in which the water would be used.

The classification combinations in Table 2-2 result from well sites with the potential to serve multiple purposes. For example, wells at a particular site may be used for construction (a temporary use) but also may be needed for a construction camp (a temporary use) or an operational facility in which case the well would be considered permanent. The particular application of the water from each well will dictate the specific construction details for the well. It should be noted that more stringent well design criteria must be met to provide potable water than for non-potable uses.

The construction water demand for of each basin segment in Table 2-3 is equal to the earthwork water requirements reported in NRP (2007c). The total demand, or 'All Demand' per basin segment in Table 2-3 was calculated by adding the water requirements for each quarry, siding, and all other rail

facilities along a basin segment to the earthwork construction demand. Water requirements for facilities are reported in NRP (2007b).

A summary of construction water demand by basin and route segment is provided in Table 2-3. Data for constructing this table are based on information provided by Nevada Rail Partners (2007c). A complete description of each well site is included in Appendices A, B, C, and D.

Table 2-3 -MRC Water Demand by Route and Basin

Basin	Demand Area (Routes)	Construction		All Demand		Wells	Basis of Analysis Wells	Basis of Analysis Demand
		Route Total [1] (ac-ft)	Peak Route, gpm (9-month)	Route Total[2] (ac-ft)	Peak Route gpm (9-month)			
Fortymile Canyon[3]	*CS6*	*555.6*	*459.2*	*572.0*	*472.7*	*0*	*0*	*572.0*
Crater Flat[3]	*CS6*	*223.1*	*184.4*	*255.8*	*211.4*	*8*	*8*	*255.8*
Oasis Valley[3]	*CS5/OV1/CS6*	*373.6*	*308.8*	*400.6*	*331.1*	*21*	*21*	*400.6*
Oasis Valley[3]	CS5/OV3/CS6	540.3	446.5	574.1	474.5	25	*N/A*	*N/A*
Sarcobatus Flat[3]	BC2/CS5	324.2	267.9	377.4	311.9	8	*N/A*	*N/A*
Sarcobatus Flat[3]	*BC3/CS5*	*405.2*	*334.9*	*459.6*	*379.8*	*12*	*12*	*459.6*
Stonewall Flat[3]	MN-2/GF4	40.5	33.5	48.0	39.7	2	*N/A*	*N/A*
Lida Valley[3]	MN1/MCS2/BC2	497.7	411.3	570.4	471.4	8	*N/A*	*N/A*
Lida Valley[3]	MN2/GF4/CS4/MCS 2/BC2	322.2	266.3	375.8	310.6	20	*N/A*	*N/A*
Lida Valley[3]	MN2/GF4/CS4/MCS 2/BC3	233.7	193.1	272.6	225.3	14	*N/A*	*N/A*
Lida Valley[3]	*MN1/MCS2/BC3*	*409.2*	*338.2*	*467.2*	*386.1*	*7*	*7*	*467.2*
Alkali Spring Valley[3]	*MN-1*	*564.2*	*466.3*	*572.8*	*473.4*	*3*	*3*	*572.8*
Alkali Spring Valley[3]	MN1/MN3/MN2	307.3	254.0	355.8	294.0	3	*N/A*	*N/A*
Alkali Spring Valley[3]	MN-2/GF4	589.1	486.9	631.7	522.1	14	*N/A*	*N/A*
Clayton Valley	*MN-1*	*1019.4*	*842.5*	*1080.1*	*892.6*	*7*	*7*	*1080.1*
Big Smoky Valley	*MCS1/MN1*	*144.7*	*119.6*	*170.6*	*141.0*	*3*	*3*	*170.6*
Big Smoky Valley	MCS1/MN2/MN3	347.0	286.8	412.8	341.2	4	*N/A*	*N/A*
Columbus Salt Marsh Valley	*MCS1*	*311.8*	*257.7*	*345.7*	*285.7*	*3*	*3*	*345.7*
Rhodes Salt Marsh Valley	*MCS1*	*255.5*	*211.2*	*275.6*	*227.8*	*3*	*3*	*275.6*
Soda Springs Valley East	*MCS1*	*450.9*	*372.6*	*484.6*	*400.5*	*4*	*4*	*484.6*
Soda Springs Valley West	*MCS1*	*152.7*	*126.2*	*173.7*	*143.6*	*2*	*2*	*173.7*
Walker Lake Valley - Whiskey Flat Hawthorne [6]	*MCS0 South / MCS1*	*119.0*	*98.3*	*143.1*	*118.3*	*3*	*3*	*143.1*
Rawhide Flats	S5	230.6	190.6	243.3	201.1	1	*N/A*	*N/A*
Rawhide Flats	S6	885.2	731.6	912.8	754.4	4	*N/A*	*N/A*
Walker Lake Valley - Schurz [5]	*S1 / MCS0 South*	*429.1*	*354.6*	*520.9*	*430.5*	*5*	*5*	*520.9*
Walker Lake Valley - Schurz [5]	S4 / MCS0 South	1119.9	925.5	1227.3	1014.3	7	*N/A*	*N/A*
Walker Lake Valley - Schurz [5]	S5 / MCS0 South	651.2	538.2	706.2	583.6	7	*N/A*	*N/A*
Walker Lake Valley - Schurz [5]	S6 / MCS0 South	662.8	547.8	717.8	593.2	5	*N/A*	*N/A*
Mason Valley	*MCS0 North*	*12.5*	*10.3*	*21.7*	*17.9*	*1*	*1*	*21.7*
Basis of Analysis Wells							*82*	
Basis of Analysis Water Demand Total [4] (ac-ft)								5,944

Notes:

[1] Route total 'construction demand' is based on 75 gal/cy plus a 20% contingency for earthwork (compaction), and includes 186,000 gal/mi demand for dust control, based on NRP (2007c).

[2] Route total 'all demand' is a total of 'construction demand' plus site-specific facility demand estimates within each basin: 20-gpm for construction camps, 24-gpm for 5 quarries, 1-gpm for sidings and permanent facilities (i.e. yards, MOWs).

[3] 'Common Basins' are those Basins that were analyzed previously as part of the CRC alignment. As noted in Appendix C, some well sites in the 'Common Basins' from the CRC include 2 wells per site as specified. Also note that portions of Lida Valley and Alkali Spring Valley were analyzed independently for both MRC and CRC studies.

[4] Includes data from the MRC and CRC.

[5] Bolded and italicized basin and route segments represent the 'Basis of Analysis' for the MRC alignment (including basins in common with CRC).

3.0 Siting Approach - New Wells

The approach for determining the appropriate number and location of groundwater wells for the MRC project was based on estimated water requirements for construction activities and operation facilities, as well as, available hydrogeologic information. It was assumed that no existing appropriated water resources (from wells) would be used and that all water would come from newly constructed wells. The extent to which DOE may negotiate access to existing water rights is unknown at this time. As a result, the approach for siting new wells represents a potential upper range, or bounding condition, for development of new water resources.

As described above in *2.0 Approach*, estimates for required construction and facilities water demand were provided by the design team. In order to provide an estimate of the potential number and location of new groundwater wells a comparison was made between the required water demand and the estimated amount of water potentially available at, or as close as possible to those areas where demand was highest. Determinations of where and how much groundwater might be available were based on a comprehensive review of existing geographic and hydrogeologic information, as documented by Converse (2007).

Existing information was used to prepare a series of development zones for each MRC hydrographic basin in which the areas of relative favorability for groundwater development are indicated. Use of the development zone concept, as explained in *3.2 Development Zone Delineation Process,* allows for re-siting wells that prove to be infeasible by virtue of their location relative to places of use, impacts on other wells or political reasons. The approach used for well siting was the same used for previous related work for the CRC (Converse,

2006), with the only exception being that more details are presented with each MRC well site as described herein and presented in Appendix A and B.

3.1 Well Siting Objectives

Three main objectives were considered during siting of the new wells for the MRC project: (1) wells were sited as close as possible to portions of the proposed rail alignment requiring the highest projected construction water demand and within the MRC construction ROW if possible; (2) wells were sited in areas where groundwater production would most likely (based on existing groundwater conditions) meet the required water demand with a minimum number of wells; and (3) wells were sited in areas where potential impacts to existing sources of water (underground and surface) were minimized.

3.2 Development Zone Delineation Process

In order to meet the well siting objectives, as described above, a feasibility rating scheme was developed to provide an overview of the conditions that affect groundwater development (in relative terms) within the MRC basins. The criteria incorporated into this scheme include; (1) evidence of high production wells; (2) presence of favorable hydrogeologic conditions; and (3) estimates of depth to groundwater. This rating system was devised to delineate areas with a higher probability of meeting the specific well site criteria. It should be noted however, that the feasibility criteria does not include distance from the MRC ROW or water quality, since these factors are assessed on an individual basis. Table 3-1 outlines the rating system which was developed and applied to identify development zones within the MRC basins.

Table 3-1 – Development Zone Rating Criteria

Criteria	Relative Weighting Factor (by importance)	Status Rating and Description for Development Zones
Evidence of High Production Wells	3	3 – NDWR well logs indicate the presence of wells with high production capacity (i.e. greater than 100 gpm) 2 – Limited presence of wells producing more than 100 gpm or several wells yielding less than 50 gpm 1 – No information on groundwater production
Key Hydrogeologic Information	2	3 – Presence of unconsolidated material with favorable soils. Favorable location relative to springs, streams, lakes, phreatophytes or other features indicative of shallow and potentially favorable conditions for groundwater development 2 – Areas of predominantly consolidated formations with presence of favorable geologic structure (faults, springs in rock formations) 1 – Locations in rock formations with low permeability, limited structure, no evidence of springs, no existing water resource development in the area (based on topography, water rights, USGS data, NDWR wells) and any other referenced condition that indicates unfavorable conditions for groundwater development
Depth to Groundwater	1	4 – Depth to groundwater is less than 100 feet (bgs) 3 – Depth to groundwater is between 100 and 500 feet (bgs) 2 – Depth to groundwater is greater than 500 feet (bgs) 1 – Depth to groundwater is unknown

The procedure for rating each development zone (independent of distance from the centerline ROW or water quality) consisted of the following steps:

1. Determining the appropriate number of development zones.

2. Multiplying each zone's *Status Rating* by the *Relative Weighting Factor* (Table 3-1) for each criteria listed above to arrive at a rating.

3. Each criteria rating was summed to arrive at a total score for each development zone.

4. Finally, adjustment of the development zones and recalculation of representative ratings as necessary.

Development zone ratings range from numbers 7 to 19. The lower ratings represent areas with the least favorable conditions while the higher ratings generally represent areas with the more favorable conditions for groundwater development within each basin. In many cases zones 12 and 13 are favorable (though not the highest numerically in the basin) in that they are generally located on alluvial fans, which generally have potential to yield high production rate wells with good water quality. The delineated zones are represented by color shading and rating scores as depicted in Figures 3-1 thru 3-12. Although the development zones are not based on potential impacts to existing water resources or water quality Figures 3-1 thru 3-12 include generalized areas with reported high total dissolved solids (TDS) on the order of 10,000 milligrams/liter (mg/l). Basins that include high TDS are in Clayton Valley (Basin 143), Big Smoky Valley (Basin 137A) and Columbus Salt Marsh Valley (Basin 118). The following Sections summarize the MRC basin development zone areas based on the rating criteria described in Table 3-1.

3.2.1 Lida Valley (144)

Development zones in Lida Valley were identified by applying the development rating criteria as described in *3.2 Development Zone Delineation Process.* Overall, the basin contains development zone ratings of 7, 11, 12, 13, and 15 (Figure 3-1). The presence of shallow groundwater in the alluvial aquifer possibly related to bedrock obstructions could result in favorable groundwater conditions for new development in isolated areas. An overview of basin development zone delineations and details regarding the primary criteria that influenced the rating scores are summarized below:

1. The development zone area rated as 7 met the least amount of feasibility criteria and generally spans the basin margins which consist of consolidated geologic formations.

2. Located approximately 8 miles east-northeast of Lida townsite and north of Highway 266 is an area rated as 11. North of a bedrock constriction a potential reservoir may be present; however recharge is limited to the Montezuma Range, which is lower in elevation and

covers less area than the adjacent Mount Magruder. Other zones rated as 11 include similar conditions.

3. The eastern part of the basin rated as 12 contains groundwater at depths of more than 300 feet, and information pertaining to expected production rates is unknown.

4. The small valley fill (sub) basin near Lida town site yielded a rating of 13 as a result of shallow groundwater conditions and numerous springs, as well as, the presence of a municipal well. It is located upgradient from bedrock, which may be acting as a potential groundwater barrier.

5. West of a potential bedrock constriction located approximately 5 miles southwest of Lida Junction on Nevada State Highway 266 is an area rated as 15. Currently, wells do not exist in this area nor are there any existing water rights; however groundwater for this area is supplied mostly by the relatively high recharge area that lies in the Mount Magruder area west of Lida townsite. The potential reservoir and rate of recharge may be the most desirable in this area.

3.2.2 Alkali Spring Valley (142)

Development zones in Alkali Spring Valley were identified by applying the development rating criteria as described in *3.2 Development Zone Delineation Process*. Overall, the basin contains development zone ratings of 7, 11, 12, 13, 18, and 19 (Figure 3-2). An overview of basin development zone delineations and details regarding the primary criteria that influenced the rating scores is summarized below:

1. The development zone area rated as 7 met the least amount of feasibility criteria and generally spans the basin margins which consist of consolidated geologic formations.

2. Areas rated as 11 may have the potential for high production rate wells; however, depth to groundwater is unknown. The area rated as 12 also appears to be a relatively favorable location for wells.

3. The area rated as 13, located near NDWR Well Log No. 22771 appears to be a favorable area, as the driller's log reported a pumping rate of 900 gpm however; no drawdown was recorded so it is not possible to estimate a specific yield for the well.

4. The areas that were rated 18 and 19 are located near a municipal well field with several reported production rates of more than 100 gpm at pumping groundwater depths near 200 feet. In addition, historically two wells (the Neptune wells) located on the south side of the playa had reported sustained production rates of more than 100 gpm. Therefore, this area may provide favorable conditions for additional water development. Water quality would probably be less than ideal (for potable uses) near the Neptune wells than in the area near the municipal well field to the east.

3.2.3 Clayton Valley (143)

Development zones in Clayton Valley were identified by applying the development rating criteria as described in *3.2 Development Zone Delineation Process*. Overall, the basin contains development zone ratings of 7, 8, 11, 12, 18, and 19 (Figure 3-3). An overview of basin development zone delineations and details regarding the primary criteria that influenced the rating scores is summarized below:

1. The development zone area rated as 7 met the least amount of feasibility criteria and generally spans the basin margins which consist of consolidated geologic formations.

2. The development zone area rated as 8 is based upon several dry holes that were reportedly completed in this area within valley fill.

3. Zones 11 and 12 lie on the alluvial slope and alluvial fans in the southern and eastern parts of the basin. These areas are geologically favorable for development of high capacity wells but there is little well data to determine likely groundwater depths or production rates.

4. The areas having the highest probability for developing new high capacity water supply wells, with a rating of 19, are located within the valley fill unconfined aquifer with anticipated production rates exceeding several hundreds of gallons per minute at depths of 100 feet or less.

5. The area north of the development zone 19 contains very saline groundwater (poor water quality) and should be avoided for siting any new wells.

6. The area designated as 18 represents the most attractive area for new high capacity wells. Water quality here should be better than in zone 19, but well depths will be greater.

3.2.4 Big Smoky Valley – Tonopah Flat Basin (137A)

Development zones in Big Smoky Valley – Tonopah Flat Basin were identified by applying the development rating criteria as described in *3.2 Development Zone Delineation Process.* Overall, the basin contains development zone ratings of 7, 12, 16, and 18 (Figure 3-4). An overview of basin development zone delineations and details regarding the primary criteria that influenced the rating scores is summarized below:

1. The development zone area rated as 7 met the least amount of feasibility criteria and generally spans the basin margins which consist of consolidated geologic formations.

2. A few high capacity wells have been developed in zone 16. This area should be suitable for new production wells except for the area in the southwest part of the valley that contains very saline

groundwater (poor water quality) and should be avoided for siting any new wells.

3. Much of the very broad valley floor has a high probability for developing new high capacity water supply wells although the best opportunities are located within the valley fill aquifer in the area between the mountain fronts and the playa. Water quality and well yield are anticipated to improve toward the middle sections of the alluvial fans in areas rated as 12 and 18.

3.2.5 Columbus Salt Marsh Valley (118)

Development zones in Columbus Salt Marsh Valley were identified by applying the development rating criteria as described in *3.2 Development Zone Delineation Process*. Overall, the basin contains development zone ratings of 7, 12, and 13 (Figure 3-5). An overview of basin development zone delineations and details regarding the primary criteria that influenced the rating scores is summarized below:

1. The development zone area rated as 7 met the least amount of feasibility criteria and generally spans the basin margins which consist of consolidated geologic formations.

2. Much of the very broad valley floor has a high probability for developing new high capacity water supply wells although the best opportunities are located within the valley fill aquifer in the area between the mountain fronts and the playa. Water quality and well yields are anticipated to improve towards the middle sections of the alluvial fans in areas rated 12 and 13.

3. Water quality in much of the area rated as 13 may not be suitable for potable water without treatment; specifically the area located in the south central portion of development zone containing saline groundwater (poor water quality).

3.2.6 Rhodes Salt Marsh Valley (119)

Development zones in Rhodes Salt Marsh Valley were identified by applying the development rating criteria as described in *3.2 Development Zone Delineation Process*. Overall, the basin contains development zone ratings of 7, 12, and 13 (Figure 3-6). An overview of basin development zone delineations and details regarding the primary criteria that influenced the rating scores is summarized below:

1. The development zone area rated as 7 met the least amount of feasibility criteria and generally spans the basin margins which consist of consolidated geologic formations.

2. Much of the very broad valley floor has a high probability for developing new high capacity water supply wells although the best opportunities are located within the valley fill aquifer in the area between the mountain fronts and the playa. Water quality and well yield is anticipated to improve toward the middle sections of the alluvial fans in the area rated as 12.

3. Although groundwater depths may be shallow, water quality in much of area rated as 13 may not be suitable for potable water without treatment.

3.2.7 Soda Spring Valley - East Subarea (121A)

Development zones in Soda Spring Valley – East Subarea were identified by applying the development rating criteria as described in *3.2 Development Zone Delineation Process*. Overall, the basin contains development zone ratings of 7, 12, 13, and 16 (Figure 3-7). An overview of basin development zone delineations and details regarding the primary criteria that influenced the rating scores is summarized below:

1. The development zone area rated as 7 met the least amount of feasibility criteria and generally spans the basin margins which consist of consolidated geologic formations.

2. Much of the very broad valley floor has a high probability for developing new high capacity water supply wells although the best opportunities are located within the valley fill aquifer in the area between the mountain fronts and the playa. Several wells with greater than 100 gpm production rates have been developed near Luning and on the east side of the valley, east of Mina. Water quality and well yield should increase toward the middle sections of the alluvial fans at the northern and southern sections of the basin rated as 12, 13, and 16.

3.2.8 Soda Spring Valley – West Subarea (121B)

Development zones in Soda Spring Valley – West Subarea were identified by applying the development rating criteria as described in *3.2 Development Zone Delineation Process*. Overall, the basin contains development zone ratings of 7, 12, and 13 (Figure 3-8). An overview of basin development zone delineations and details regarding the primary criteria that influenced the rating scores is summarized below:

1. The development zone area rated as 7 met the least amount of feasibility criteria and generally spans the basin margins which consist of consolidated geologic formations.

2. Zone 12 is rated as favorable geologically for well development as zone 13 but generally lacks wells with groundwater production data.

3. Much of the very broad valley floor has a high probability for developing new high capacity water supply wells although the best opportunities are located within the valley fill aquifer in the area between the mountain fronts and the playa. Very few wells have been developed in this basin. Water quality and well yield should improve toward the middle areas of the alluvial fans at the western end of the basin rated as 13.

3.2.9 Walker Lake Valley – Hawthorne Subarea (110C)

Development zones in Walker Lake Valley – Hawthorne Subarea were identified by applying the development rating criteria as described in *3.2 Development Zone Delineation Process*. Overall, the basin contains development zone ratings of 7, 12, 18, and 19 (Figure 3-9). An overview of basin development zone delineations and details regarding the primary criteria that influenced the rating scores is summarized below:

1. The development zone area rated as 7 met the least amount of feasibility criteria and generally spans the basin margins which consist of consolidated geologic formations.

2. The area rated as 12 is potentially a feasible development zone for new high capacity wells based on the geologic setting; however, little or no well production data are available for this area.

3. Anticipated production rates exceeding several hundreds of gallons per minute at depths of 100 feet or less are most likely in the areas rated 18 and 19. These areas contain a high probability for developing new high capacity water supply wells within the valley fill aquifer. These zones are located along the east front of the Wassuk Range in the central part of Whiskey Flat approximately 13 miles southeast of Hawthorne, as well as an area 7 miles northwest of Hawthorne, designated with a rating of 19.

3.2.10 Walker Lake Valley – Schurz Subarea (110A)

Development zones in Walker Lake Valley – Schurz Subarea were identified by applying the development rating criteria as described in *3.2 Development Zone Delineation Process*. Overall, the basin contains development zone ratings of 7, 12, 16, and 19 (Figure 3-10). An overview of basin development zone delineations and details regarding the primary criteria that influenced the rating scores is summarized below:

1. The development zone area rated as 7 met the least amount of feasibility criteria and generally spans the basin margins which consist of consolidated geologic formations.

2. The area rated as 12 is potentially a feasible development zone for new high capacity wells based on the geologic setting; however, little or no well production data are available for this area.

3. A few high capacity wells have been developed within the zone rated as 16; therefore, this area should be suitable for new production wells.

4. The areas having the highest probability for developing new high capacity water supply wells are located within the valley fill aquifer near the Walker River. Anticipated production rates exceeding several hundreds of gallons per minute at depths of 100 feet or less are most likely in the areas rated as 19.

3.2.11 Rawhide Flat (123)

Development zones in Rawhide Flat were identified by applying the development rating criteria as described in *3.2 Development Zone Delineation Process*. Overall, the basin contains development zone ratings of 7, 10, 12, and 13 (Figure 3-11). An overview of basin development zone delineation and details regarding the primary criteria that influenced the rating scores is summarized below:

1. The development zone area rated as 7 met the least amount of feasibility criteria and generally spans the basin margins which consist of consolidated geologic formations.

2. The area represented by zone 10 includes one well where water is very deep.

3. Areas having the highest potential for new groundwater development are shown as zones 12 and 13, which were delineated on the valley floor where groundwater is shallow.

Overall there has been very little development of groundwater in this basin and sources of groundwater recharge appear to be limited.

3.2.12 Mason Valley (108)

Development zones in Mason Valley were identified by applying the development rating criteria as described in *3.2 Development Zone Delineation Process*. Overall, the basin contains development zone ratings of 7 and 19 (Figure 3-12). An overview of basin development zone delineation and details regarding the primary criteria that influenced the rating scores is summarized below:

1. The development zone area rated as 7 met the least amount of feasibility criteria and generally spans the basin margins which consist of consolidated geologic formations.

2. Development zone 19 covers the valley floor and presents favorable conditions for high capacity shallow well development. Shallow groundwater in this area is in hydraulic communication with the Walker River.

3.3 Well Sites Summary

Generally, preferred locations for the proposed well sites are within the 1,000-foot construction ROW for the MRC alignment and are as close as possible to those areas with the highest concentration of water demand. The construction ROW of 1,000 ft applies to all of the alignment segments except areas with land ownership under the jurisdiction of the Bureau of Indian Affairs, which occurs only in the Walker Lake Schurz and Lake Sub-basins, 110A and 110B, respectively. Whenever the available information used for determining water availability indicated that groundwater pumping did not appear to be feasible from a particular area within the construction ROW, the

proposed well sites were relocated as near as reasonably possible to the ROW. Specifically, when well sites were moved off the construction ROW, they were placed adjacent to documented land disturbances that represented roadway features (improved and unimproved). Proposed well sites were not located on documented private land.

The actual number of wells and well sites that may be required depends upon the combination of alternative route segments comprising the final selected MRC route. Included in Appendices A and B is the Proposed MRC Well Table, which includes data related to each recommended well site. The table is divided into MRC segments by basin. Table 3-2 below includes a description of table headings in the Proposed MRC Well Sites tables provided in Appendix A and B. Each proposed new well site is shown on the *Proposed Well Sites Plates* 4-1 thru 4-12 included with this report.

Table 3-2 – Descriptions of Appendix Well Table Headings

Column Heading	Description
Basin	Title of the defined Hydrographic Basin in which a portion of the MRC alignment passes.
Segment / Route	Each entry in this column corresponds to a segment or a route (i.e., group of segments) of the MRC alignment.
Required Demand	This field lists the total basin water demand for each segment. As explained in *2.1 MRC Construction and Facilities Water Requirements*, these values were determined by the design team and were based on the estimated amount of water required in each basin and MRC route segment. All construction water demand estimates (as a total volume) were converted to an annualized pumping rate and expressed as gallons per minute. This conversion included the assumption that water demand for construction activities would occur continuously over 9 months. Non-construction (facilities) water demand was assumed to occur continuously over an annualized basis and added to construction demand for wells that would service both construction and non-construction demand; see Table 2-1.
County	Nevada County in which the proposed well site is located. Transportation of water across county lines potentially complicates water rights permitting.

Column Heading	Description
Approximate Station	This field provides the approximate construction station (based on the '5-ft Design Alignment' relative to the location of the proposed well site.
Demand Type	Information in this field is based on whether the demand is for construction or a facility. This field matches the identifications for water demand in Table 2-2.
Depth to Water	Depth to water in feet below ground surface (ft-bgs) based on published data sources. A summary of ranges of estimated depths to groundwater used for this analysis is provided in Table 3-3.
Site ID	A unique identifier (ID) assigned to each well site that is comprised of the basin abbreviation in which the site is located, a sequential site number (basin-specific), and segment (letter) indicator.
UTM East (feet)	Grid projection representing the center point of a well site location.
UTM North (feet)	Grid projection representing the center point of a well site location.
Well Depth	Estimated depth in feet based on available hydrogeologic information in the basin and near the proposed well sites when available. The estimate is given as a range of anticipated depths (ft-bgs) for completion of wells in order meet the required water demand. It should be noted that these projected ranges are highly subjective and should be used for planning purposes only. It is recommended that actual well depths be based on subsurface conditions encountered during drilling. A summary of ranges of estimated well depths used for this analysis is provided in Table 3-4.

Column Heading	Description
Production Rate (gpm)	These values are estimated based on available hydrogeologic information in the basin and near the proposed well site when available. These estimates are provided based primarily on reported production rates from NDWR Well Driller's Log data in close proximity and similar geologic settings (Converse, 2006 and project GIS data included with this analysis). A comparison between 'Production Rate' and 'Required Demand' is made and used to determine the number of wells that would be needed in each basin in order to meet required total water demand. It should be noted that the projected pumping rates, or yields, are highly subjective and should be used for planning purposes only. It is recommended that actual well yield, pump equipping, and operational parameters be determined during pump tests performed as part of the well construction program.
On ROW	This field includes a 'yes' or 'no' answer. The MRC construction ROW is based on well site placement on one side of the centerline. If the result is 'no,' then the proposed well site is located somewhere outside of the construction ROW. It should be noted that much of the MRC ROW in Basin 110A has a total width of 100 feet due to land access restrictions.
Aquifer Type	This is a generalization of the type of aquifer to be expected at each proposed well site.
Mapped Geology	General geologic setting of the proposed well site.
Structure	Nearby geologic structure, primarily faults, that could influence groundwater flow near the proposed well site.
Nearby Well Description	Description of nearby wells based upon NDWR and USGS data sources.
Nearby Surface Water	Nearby springs, streams and lakes.
Nearby Active Water Rights	Description of nearby active underground and surface water rights based upon data queried from NDWR databases between August and October 2006.
Environmental Issues	Description of any known environment issues that could affect groundwater quality at the proposed well site.
Site Access Terrain	A general description of the road access and terrain for the proposed site. This field also includes approximate distances from nearby major roadways, where applicable.

Column Heading	Description
County Boundary	Notes whether the well site will supply a place of use in the same county as the well.
Discussion	General notes that provide a summary explanation of a particular well site and an overview of some of the more relevant issues that affect the parameters used to site and describe the well at its specified location.

Tables 3-3 and 3-4 include anticipated ranges for depth to groundwater and well depths (in feet-bgs), respectively, which are included in well site data provided in Appendix A.

Table 3-3 – Ranges of Depth to Groundwater (ft-bgs)

Depth to Water
0 to 10
10 to 50
50 to 100
100 to 200
200 to 500
500 to 1,000
> 1,000

Table 3-4 – Ranges for Well Depths (ft-bgs)

Total Well Depth
25 to 50
50 to 100
100 to 200
200 to 500
500 to 750
750 to 1,000
1,000 to 1,500
1,500 to 2,000

3.3.1 Well Sites for Schurz Rail Segment Alternatives

Siting of wells in Walker Lake Basin Schurz Subarea (110A) is complicated by the need to evaluate four possible rail routes through this basin and the adjoining Rawhide Flats Basin (123). Proposed well sites were identified for a particular alternative and in many cases the same well site is proposed for other alternatives. Estimated production rates (site specific) are based upon a reasonable expectation of the well capability as determined by local geologic conditions. In some cases the full productive capacity of a well will not be needed; in others, the risk for obtaining the estimated well productive capacities is considered high because of unfavorable geologic conditions. Table 3-5 provides a summary of the proposed well sites in the Schurz area.

Table 3-5 - Schurz Area, Alternative Rail Segment Wells

Segment	Basin	Required Basin Demand (gpm)	Well No.	Estimated Production (gpm)	Use
S1	Walker Lake Schurz	430.5	WLa-1a	150	Construction
			WLa-3a	150	Construction
			WLa-4a	200	Construction/Camp
			WLa-5a	200	Construction/siding
			WLa-6a	100	Construction
			Total	800	
S4	Walker Lake Schurz	1014.3	WLa-6a	125	Construction
			WLa-1b	150	Construction/Camp
			WLa-2b	125	Construction
			WLa-3b	225	Construction
			WLa-4b	200	Construction
			WLa-5a	200	Construction/siding
			Total	1,025	
S5	Walker Lake Schurz	583.6	WLa-1c	225	Construction
			WLa-2c	100	Construction
			WLa-3c	100	Construction
			WLa-4c	50	Construction/Camp
			WLa-3b	225	Construction
			WLa-4b	200	Construction
			WLa-5a	200	Construction/siding
	Rawhide Flats	201.1	RF-1a	100	Construction
			Total	1,200	
S6	Walker Lake Schurz	593.2	WLa-1c	225	Construction
			WLa-2c	100	Construction
			WLa-3b	225	Construction
			WLa-3c	100	Construction
			WLa-4b	200	Construction
			WLa-5a	200	Construction/siding
	Rawhide Flats	754.4	RF-1a	100	Construction
			RF-1b	100	Construction/Camp
			RF-2b	150	Construction
			RF-4b	200	Construction
			Total	1,600	

3.3.2 Basin 227A Discussion

Fortymile Canyon – Jackass Flats (Basin 227A) covers the portion of the rail line on the Nevada Test Site. An analysis of this basin was conducted separately because water use in that area must be coordinated with potential needs for repository construction. The following summarizes information water demand and well locations in that basin. Appendix C does not include information on wells in Basin 227A.

The total water demand for basin 227A is 572 acre-feet. This includes 556.2 acre-feet for earthwork and 15.8 acre-feet for other needs. This estimate was calculated using the same methods as was used for the rest of the rail line. The proposed points of diversion for this water are existing Well J-12 and the C-Well complex. Approximately equal amounts would be pumped from each location. It is planned that water required for construction of the rail line within basin 227A would be part of the water DOE would appropriate for construction and operation of the repository (430 acre-feet per year). If it is determined that the amount required for construction of the rail line and repository could temporarily exceed the amount appropriated, the methods and schedule for constructing the rail line or repository could be modified to reduce peak water demands or DOE could seek an additional temporary appropriation for rail construction.

3.4 Well Sites Presentation / GIS

The information for all new well sites based on the MRC is included in Appendices A and B. Well sites previously proposed for the common portion of the CRC that are used in conjunction with the MRC corridor are included in Appendices C and D. The well site information in Appendices A and C correspond to data included in the GIS database. The well sites were added to a pre-existing GIS database as a new feature class. This feature class contains the point representation of proposed well sites for the MRC project. Each point represents the center of a 250-foot by 250-foot well site. Each record contains attributes about each of the proposed well sites. Comprehensive explanations for the well sites provide details about various site-specific features as explained in Table 3-2. Well site explanations are included in Appendices B and D. Well site locations are also shown on the attached Plates 4-1 thru 4-12.

4.0 References

Converse Consultants, 2007, Water Resources Assessment Report Mina Rail Corridor Yucca Mountain Project, Nevada, Prepared For Parsons Brinckerhoff Quade & Douglas, Inc., Subcontract # (NN-HC4-00207), April 5, 2007.

Converse Consultants, 2006, Hydrogeologic DEIS Analysis Report Caliente Rail Corridor Yucca Mountain Project, Nevada, Prepared for Parsons Brinckerhoff & Douglas, Inc., subcontract # (NN-HC4-00207), April 10, 2006.

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Nevada Rail Partners 2007a. *Alignment Development Report Mina Rail Corridor.* Document No. NRP-R-SYSW-DA-0003-00. Las Vegas, Nevada: Nevada Rail Partners.

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Nevada Rail Partners 2007c. *Construction Plan- Mina Rail Corridor.* Document No. NRP-R-SYSW-CP-0010-00. Las Vegas, Nevada: Nevada Rail Partners.

Nevada Rail Partners 2007d. *Operations and Maintenance Report Mina Rail Corridor.* Document No. NRP-R-SYSW-OM-0003-00. Las Vegas, Nevada: Nevada Rail Partners.

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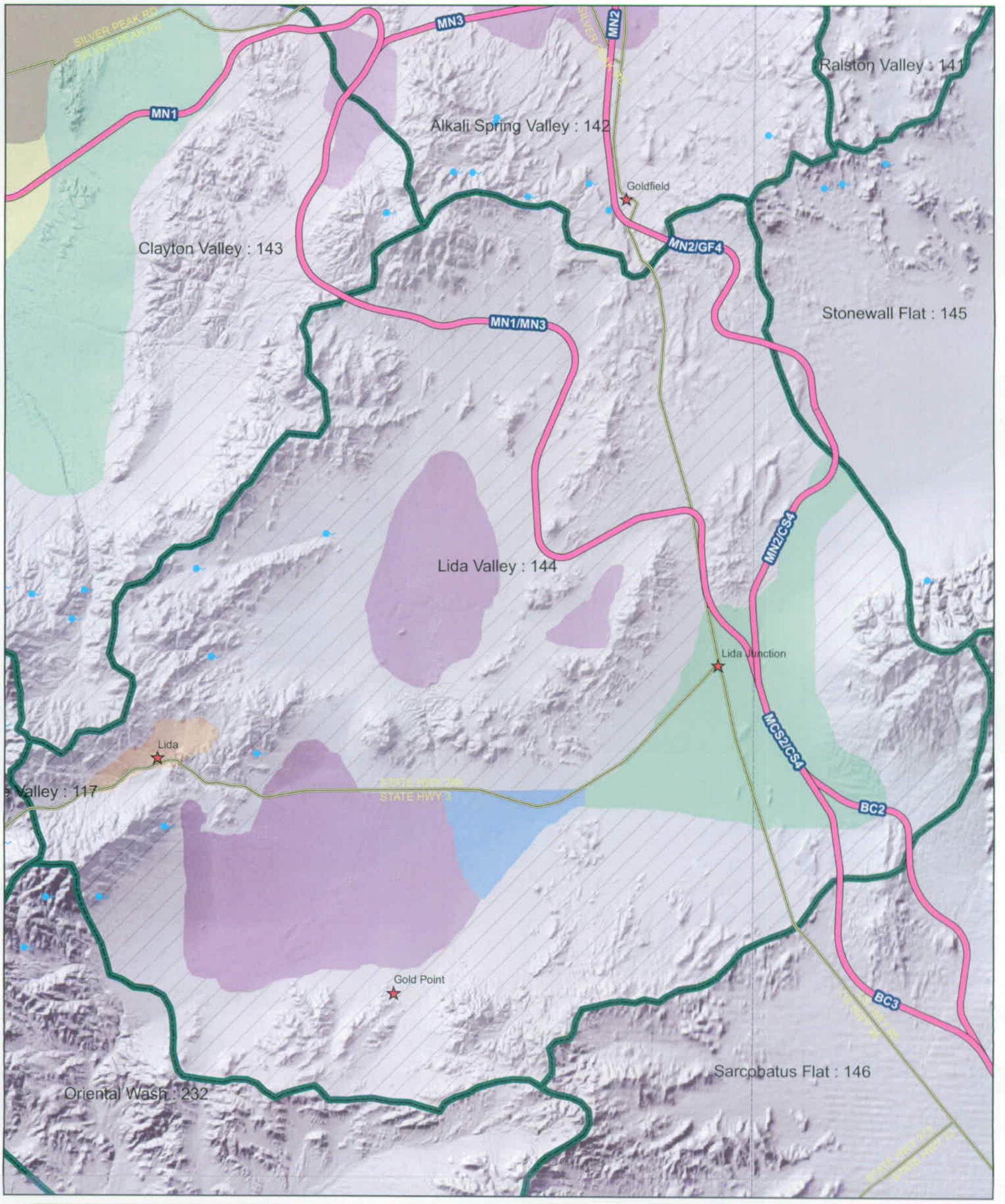


Legend

- Towns
- GNIS Springs
- Major Roads
- Mina Rail Alignment
- Basin Boundary
- Counties

Development Zones

7, 8, 10, 11, 12, 13, 15, 16, 18, 19, Brine

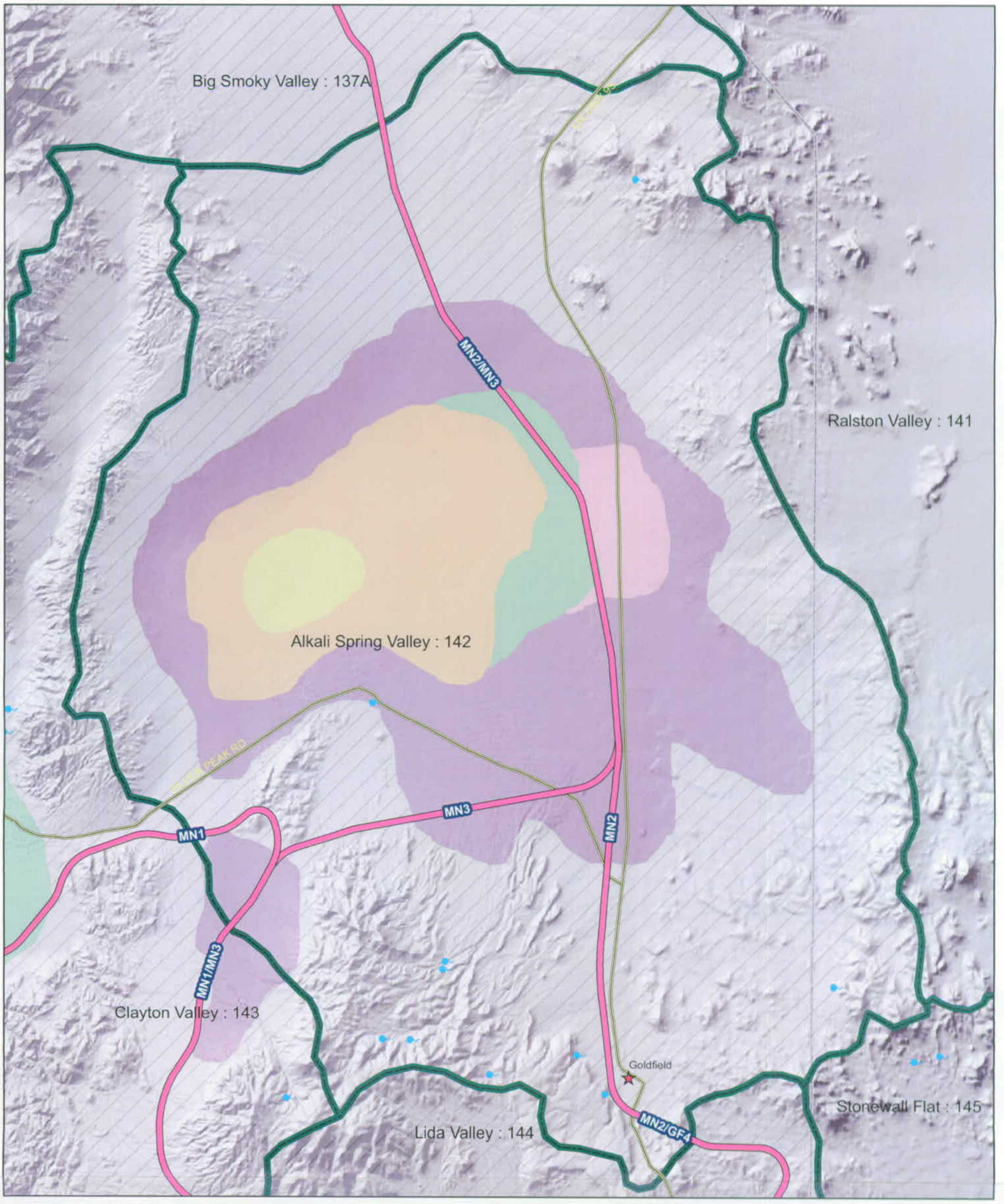
N W E S

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

Miles
0 1 2 4

Figure 3-1: Lida Valley (144)

Groundwater_Development_Zones.mxd



Legend

- Towns
- GNIS Springs
- Major Roads
- Mina Rail Alignment
- Basin Boundary
- Counties

Development Zones

7, 8, 10, 11, 12, 13, 15, 16, 18, 19, Brine

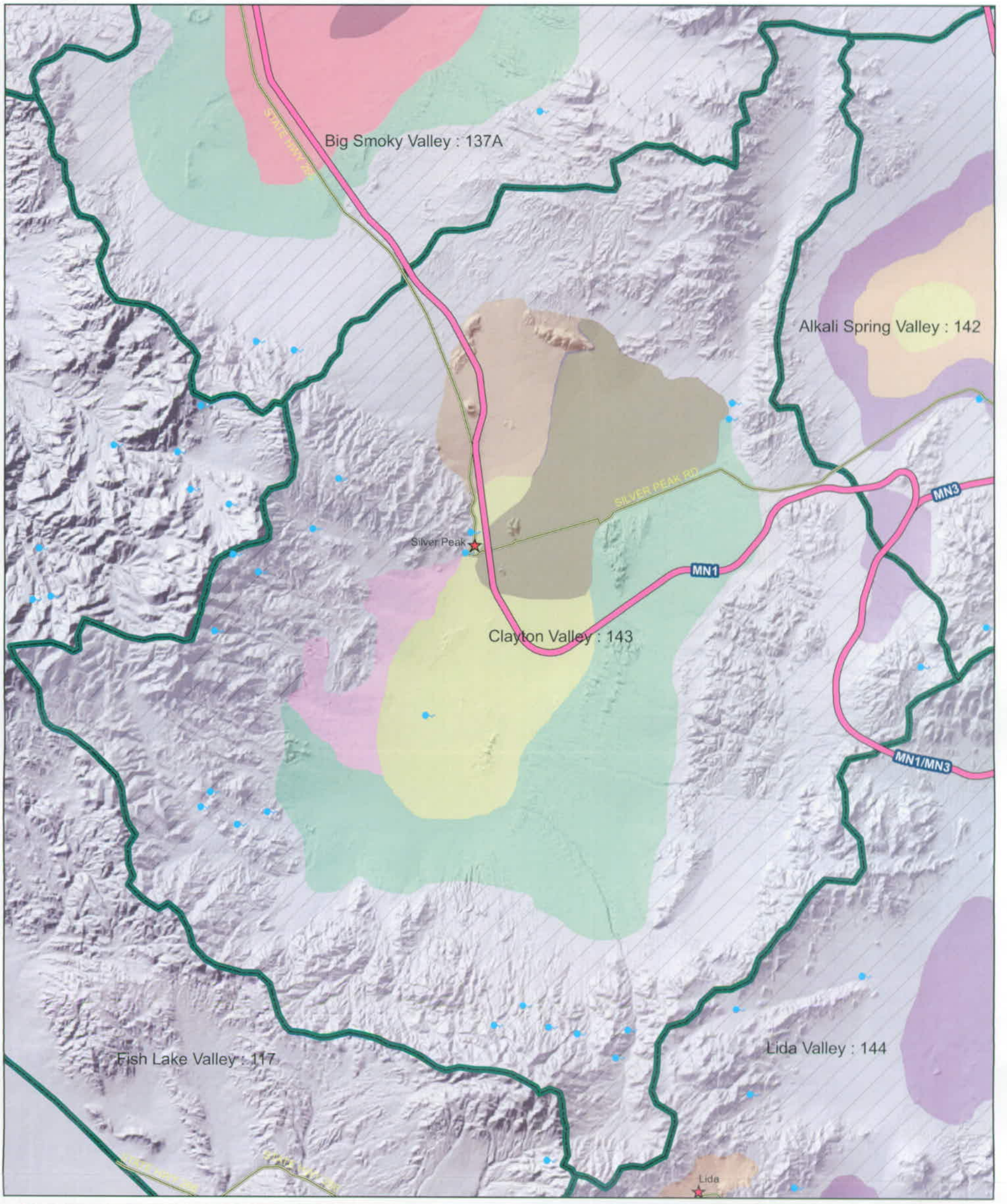
N W E S

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

Miles
0 1 2 4

Figure 3-2: Alkali Spring Valley (143)

Groundwater_Development_Zones.mxd



Legend

Towns
GNIS Springs
Major Roads
Mina Rail Alignment
Basin Boundary
Counties

Development Zones

7 11 15 19
8 12 16 Brine
10 13 18

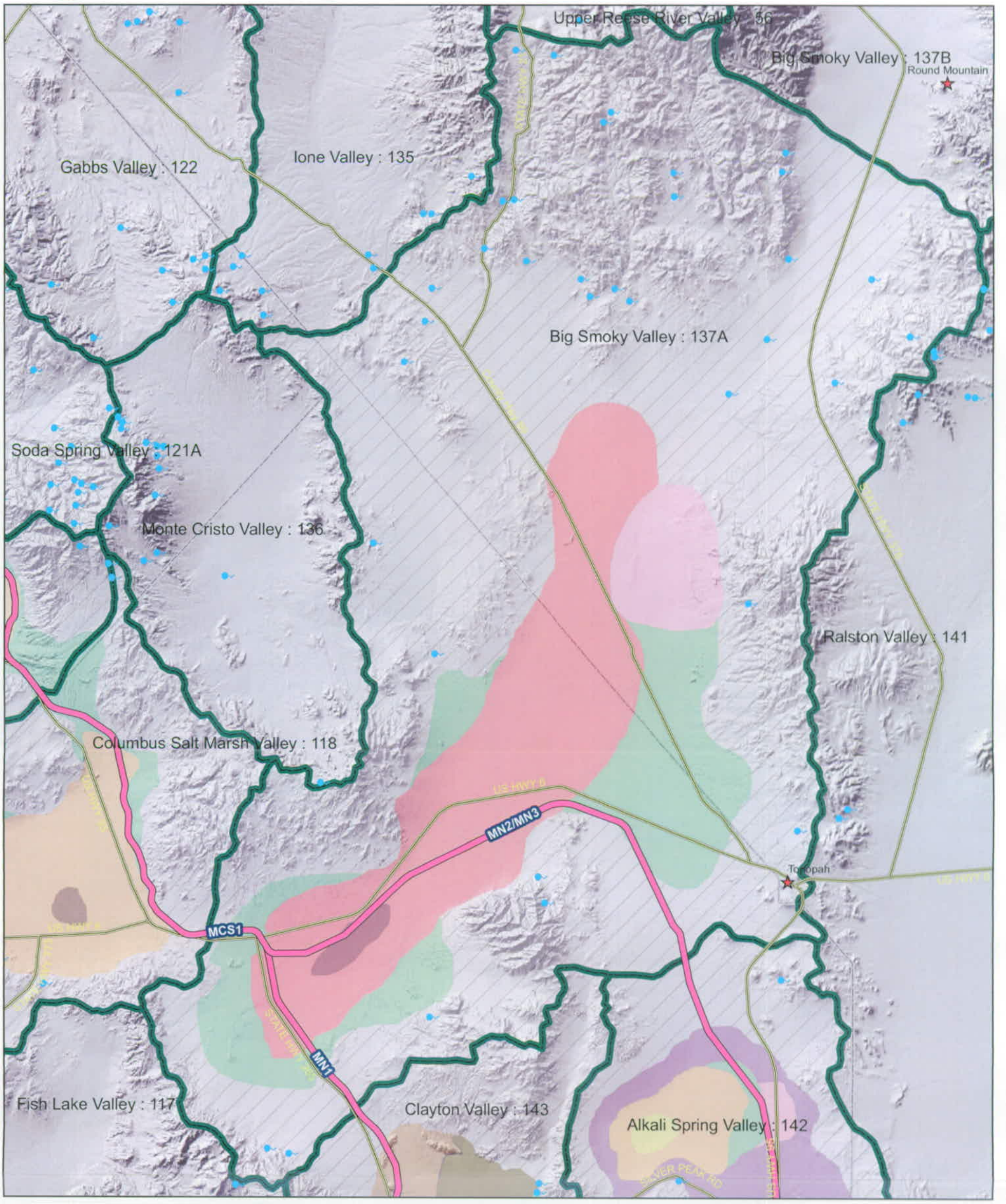
N W E S

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

Miles
0 1.5 3 6

Figure 3-3: Clayton Valley (143)

Groundwater_Development_Zones.mxd



Legend

- Towns
- GNIS Springs
- Major Roads
- Mina Rail Alignment
- Basin Boundary
- Counties

Development Zones

7, 8, 10, 11, 12, 13, 15, 16, 18, 19, Brine

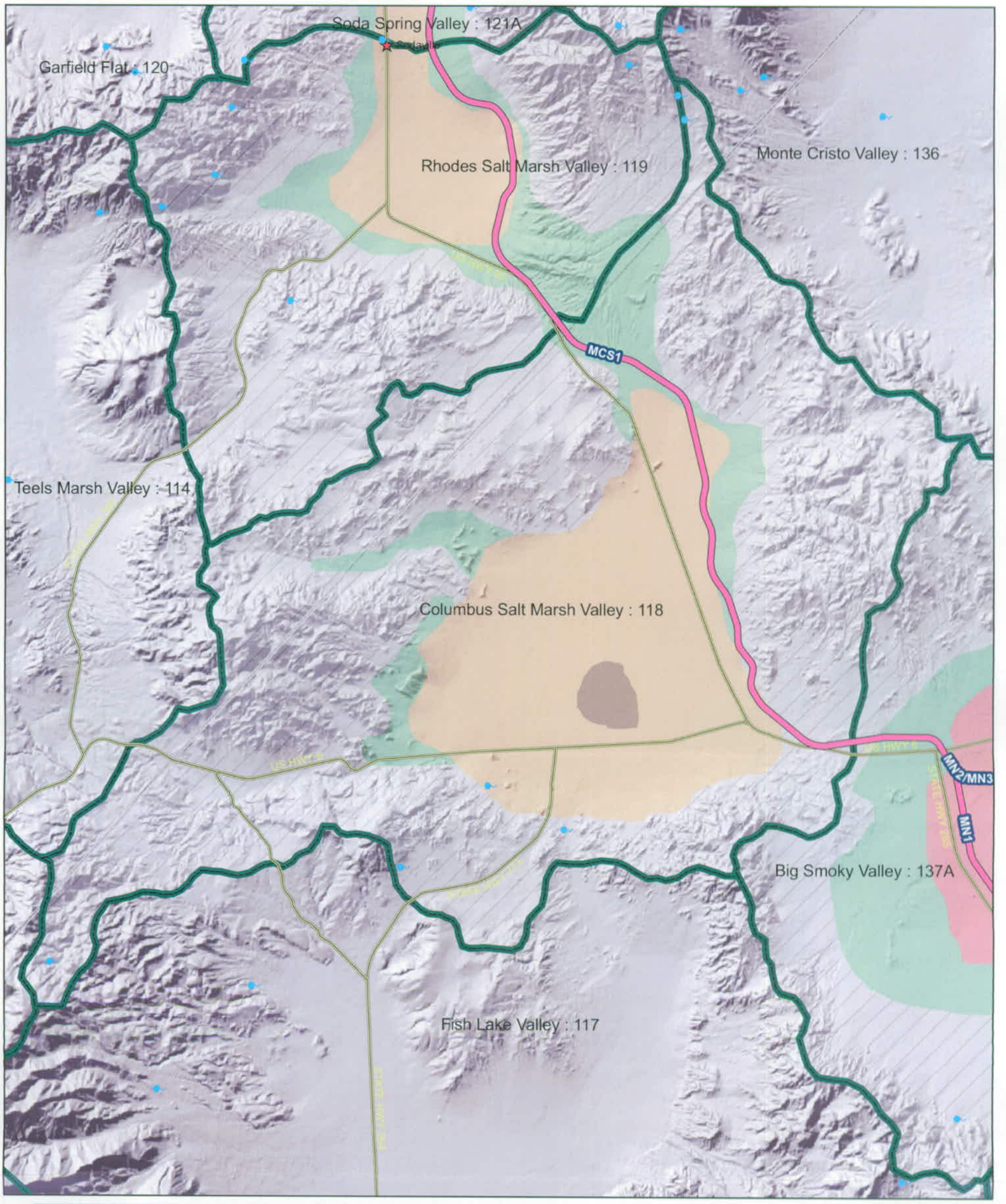
N W E S

Figure 3-4:
Big Smoky Valley - Tonopah Flat (137A)

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

0 2.5 5 10 Miles

Groundwater_Development_Zones.mxd



Legend

- Towns
- GNIS Springs
- Major Roads
- Mina Rail Alignment
- Basin Boundary
- Counties

Development Zones

7	11	15	19
8	12	16	Brine
10	13	18	

N W E S

Figure 3-5:
Columbus Salt Marsh Valley (118)

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

0 1.5 3 6 Miles

Groundwater_Development_Zones.mxd

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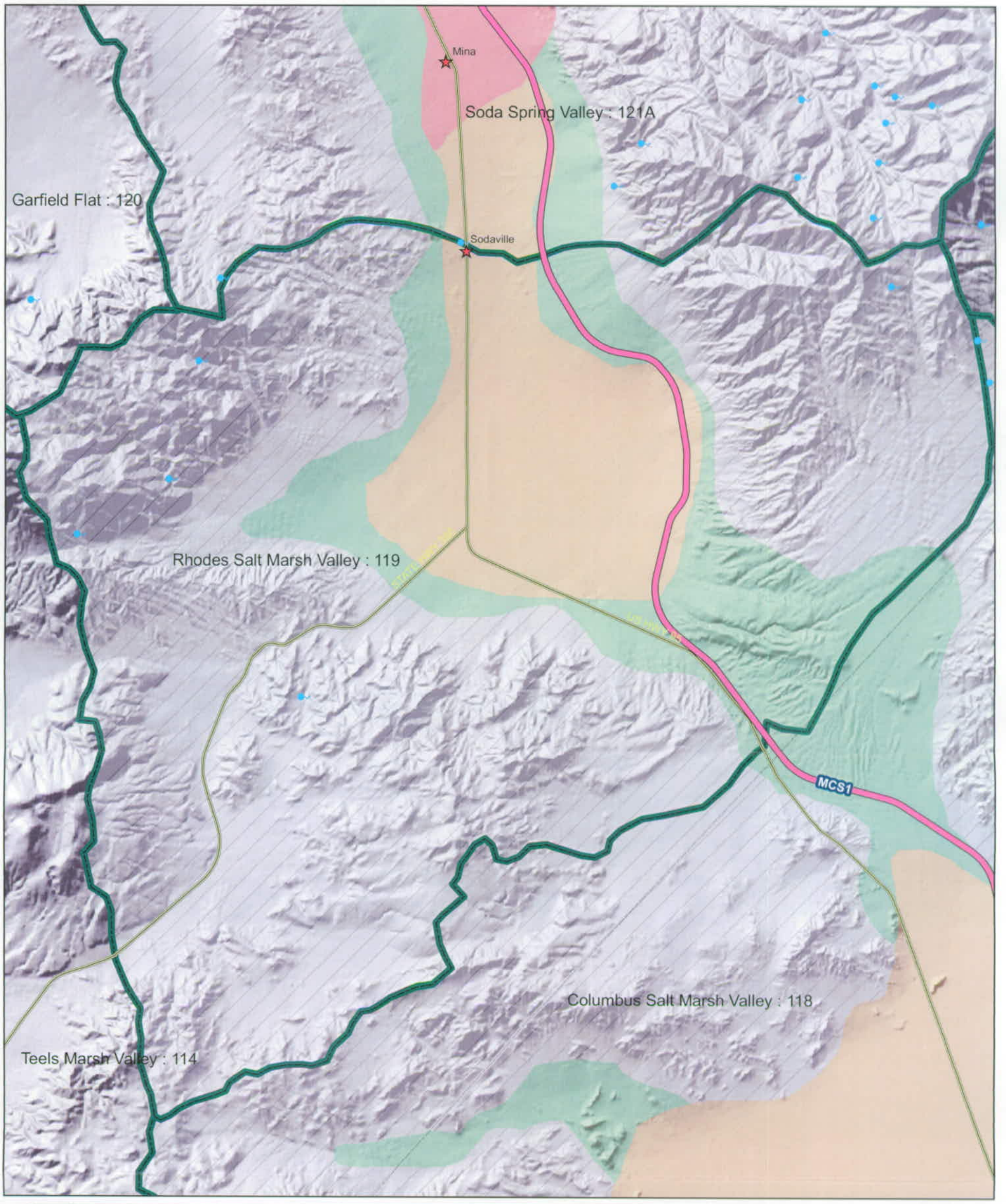


Legend

- Towns
- GNIS Springs
- Major Roads
- Mina Rail Alignment
- Basin Boundary
- Counties

Development Zones

7, 8, 10, 11, 12, 13, 15, 16, 18, 19, Brine

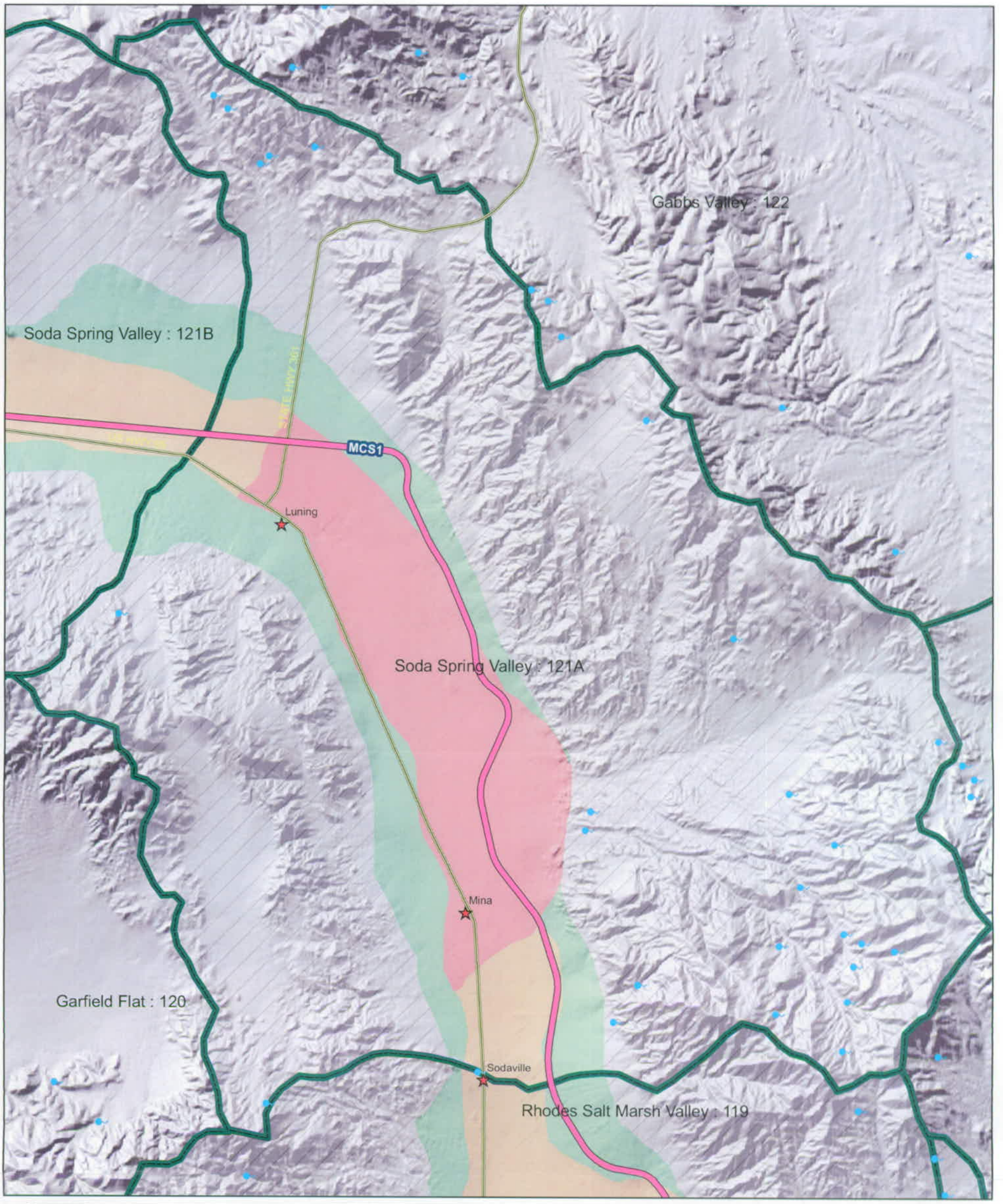
N W E S

Figure 3-6:
Rhodes Salt Marsh Valley (119)

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

Miles
0 1 2 4

Groundwater_Development_Zones.mxd



Legend

- Towns
- GNIS Springs
- Major Roads
- Mina Rail Alignment
- Basin Boundary
- Counties

Development Zones

7, 8, 10, 11, 12, 13, 15, 16, 18, 19, Brine

N W E S

Figure 3-7:
Soda Springs Valley - East (121A)

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

Miles
0 1 2 4

Groundwater_Development_Zones.mxd

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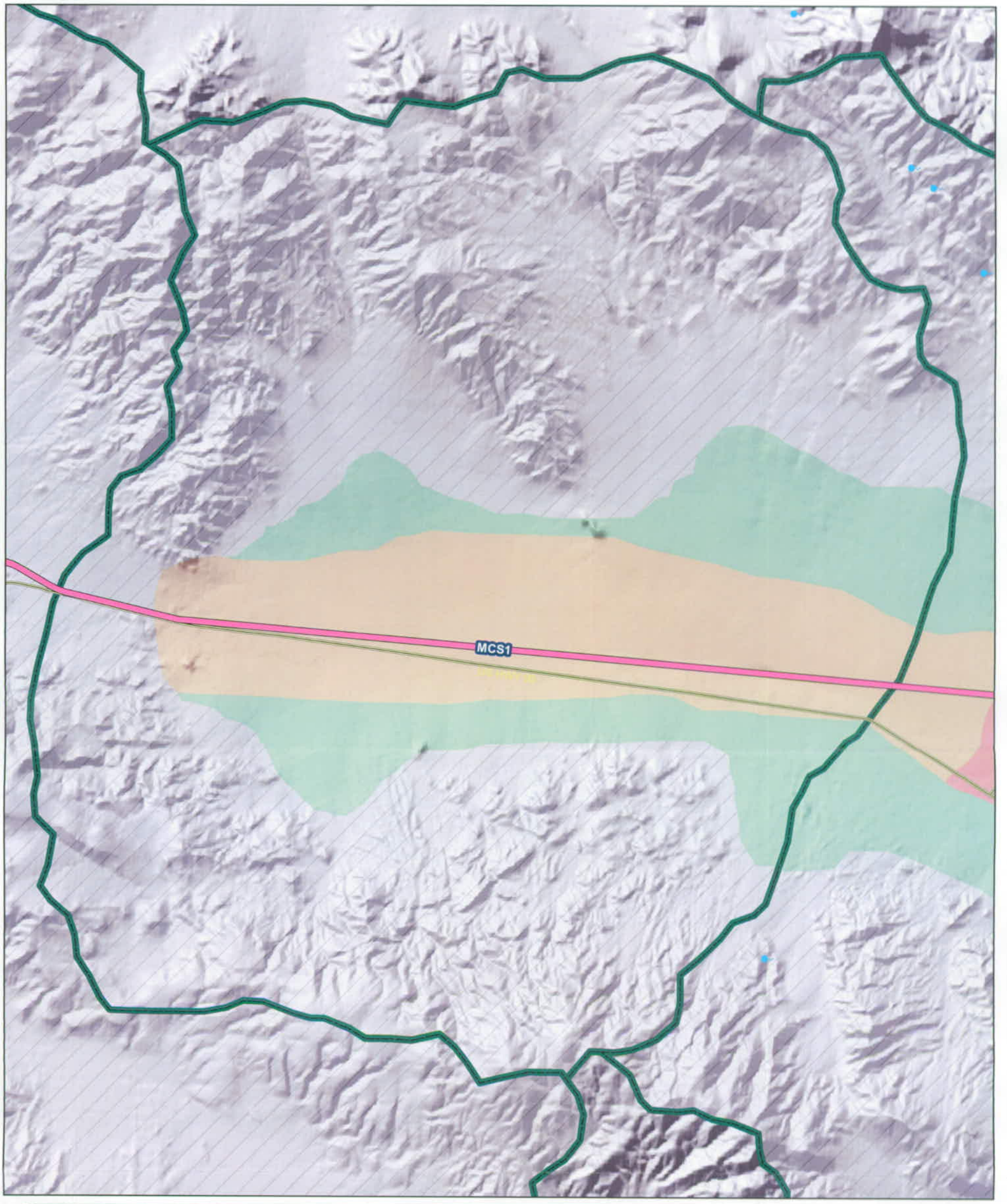


Legend

- Towns
- GNIS Springs
- Major Roads
- Mina Rail Alignment
- Basin Boundary
- Counties

Development Zones

7, 8, 10, 11, 12, 13, 15, 16, 18, 19, Brine

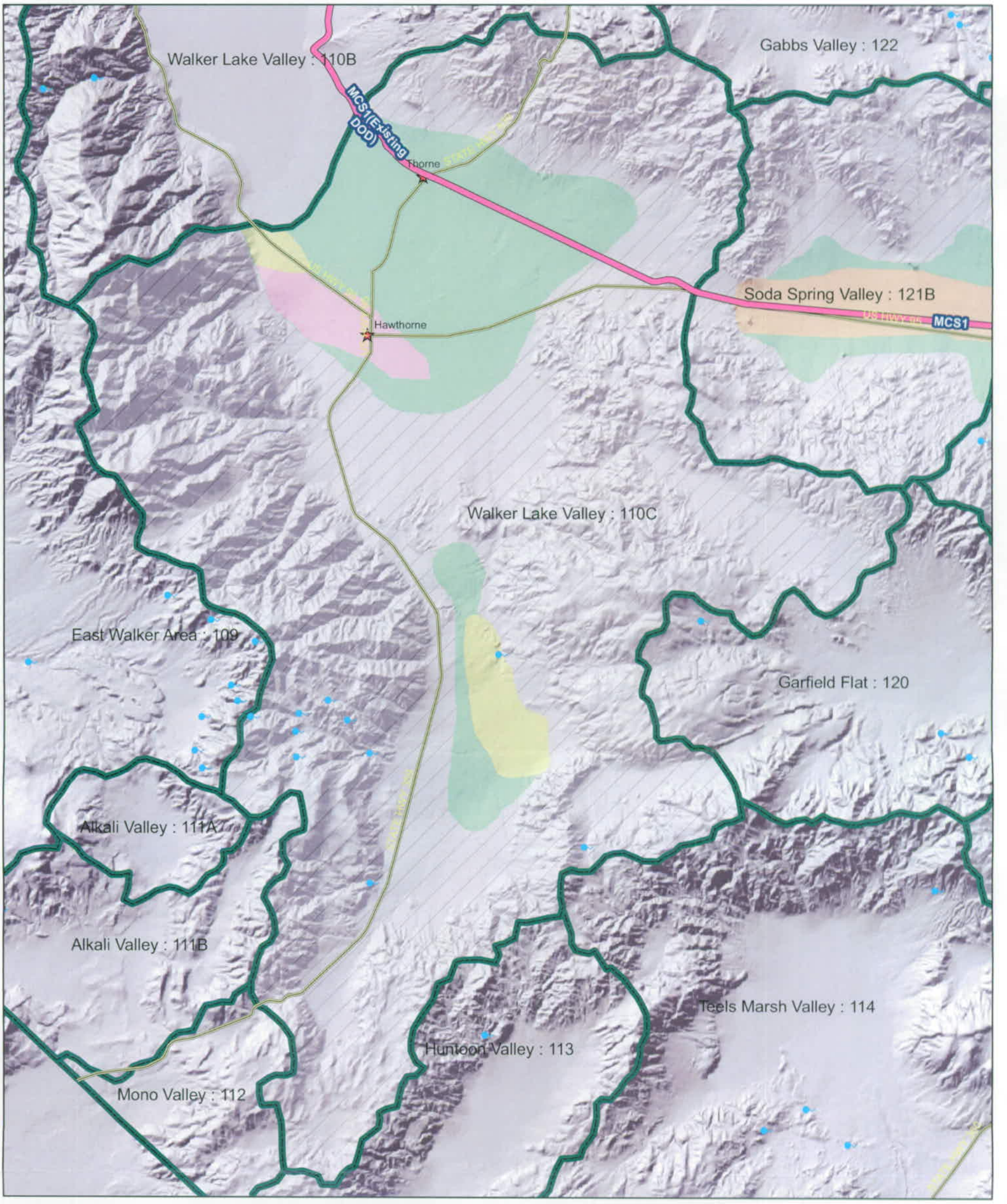
N W E S

Figure 3-8:
Soda Springs Valley - West (121B)

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

Miles
0 0.5 1 2

Groundwater_Development_Zones.mxd



Legend

- Towns
- GNIS Springs
- Major Roads
- Mina Rail Alignment
- Basin Boundary
- Counties

Development Zones

7, 8, 10, 11, 12, 13, 15, 16, 18, 19, Brine

N W E S

Figure 3-9:
Walker Lake Valley - Hawthorne (110C)

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

0 1.5 3 6 Miles

Groundwater_Development_Zones.mxd

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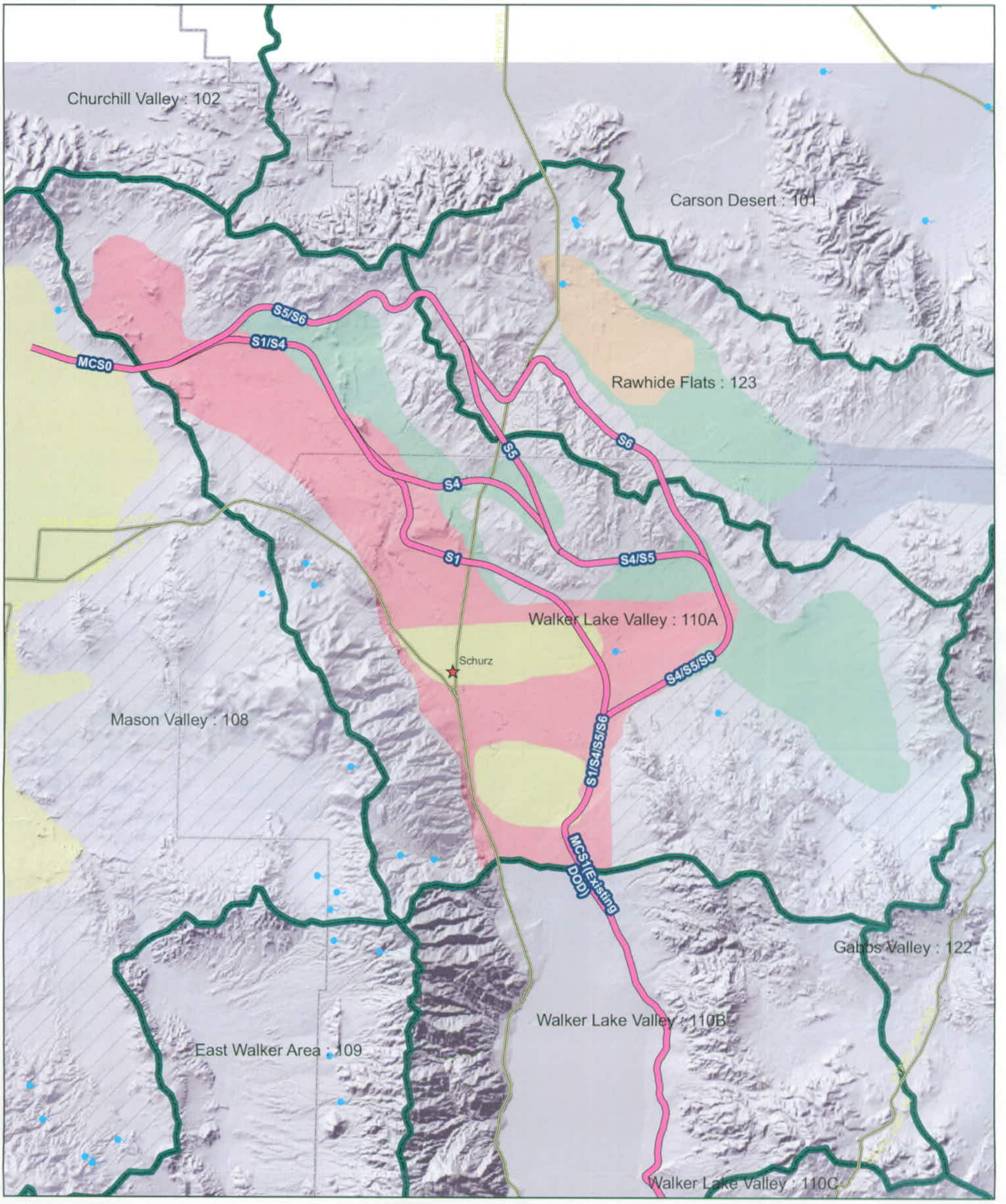


Legend

- Towns
- GNIS Springs
- Major Roads
- Mina Rail Alignment
- Basin Boundary
- Counties

Development Zones

7, 8, 10, 11, 12, 13, 15, 16, 18, 19, Brine

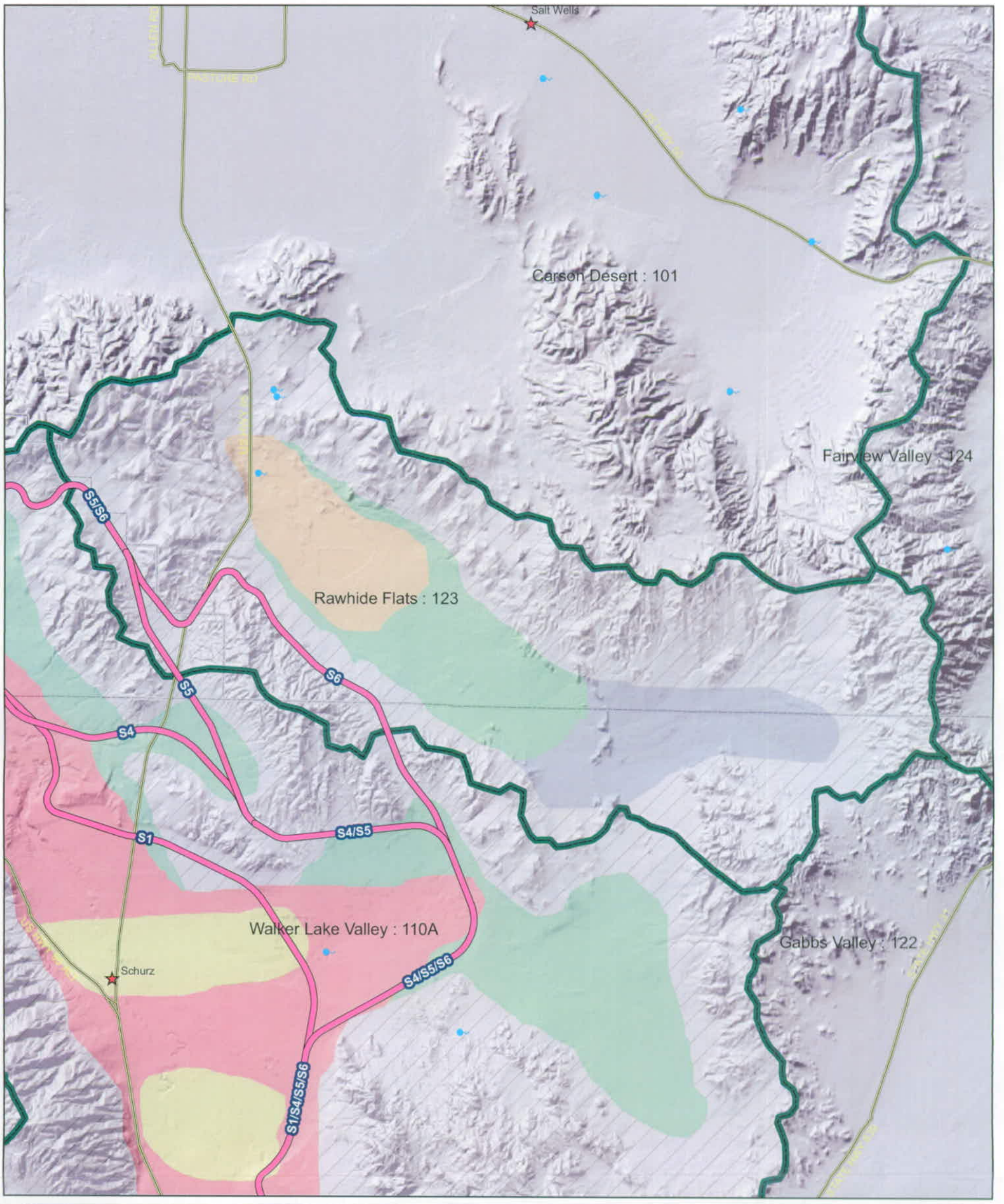
N W E S

Figure 3-10:
Walker Lake Valley - Schurz (110A)

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

Miles
0 1.5 3 6

Groundwater_Development_Zones.mxd



Legend

- Towns
- GNIS Springs
- Major Roads
- Mina Rail Alignment
- Basin Boundary
- Counties

Development Zones

7, 8, 10, 11, 12, 13, 15, 16, 18, 19, Brine

N W E S

Figure 3-11:
Rawhide Flat Valley (123)

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

0 1.25 2.5 5 Miles

Groundwater_Development_Zones.mxd

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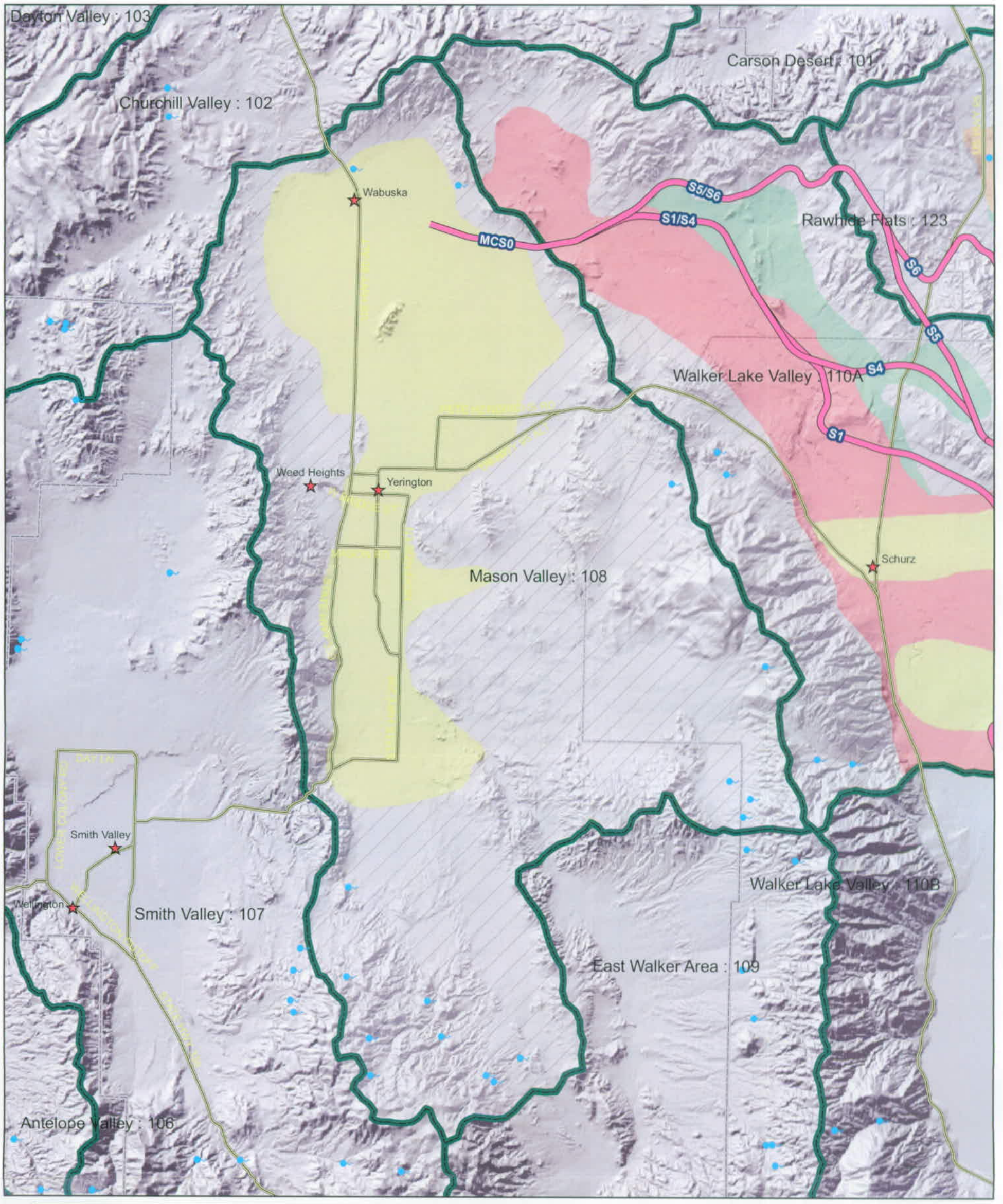

Legend

- Towns
- GNIS Springs
- Major Roads
- Mina Rail Alignment
- Basin Boundary
- Counties

Development Zones

7, 8, 10, 11, 12, 13, 15, 16, 18, 19, Brine

N, W, E, S

Figure 3-12:
Mason Valley (108)

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

0 1.5 3 6 Miles

Groundwater_Development_Zones.mxd

Appendix A

APPENDIX A.
PROPOSED MINA RAIL CORRIDOR WELL SITES [1]

Basin[2]	Segment / Route	Required Demand (gpm)	County	Approximate Station	Demand Type	Depth to Water (ft-bgs)	SiteID	UTM East (feet)	UTM North (feet)	Well Depth (ft-bgs)	Production Rate (gpm)	On ROW	Aquifer Type
144 - Lida Valley Basin	MN1/MCS2/BC3***	256.0	Esmeralda	7747+00	Construction/Quarry	100 to 200	Li-1a	1562292.89	13669123.26	200 to 500	100	Yes	Alluvial/confined bedrock
			Esmeralda	NA	Construction	100 to 200	Li-2a	1557493.03	13593887.24	100 to 200	150	No	Alluvial
			Esmeralda	8542+00	Construction /Camp	200 to 500	Li-3a	1587134.79	13624103.32	500 to 750	150	Yes	Alluvial
			Esmeralda	8034+00	Construction/Siding	200 to 500	Li-4a	1556914.23	13641154.87	200 to 500	50	Yes	Alluvial/confined bedrock
			Esmeralda	7980+00	Construction/Quarry	200 to 500	Li-5a	1548922.34	13645390.91	200 to 500	25	No	Alluvial
144 - Lida Valley Basin	MN1/MCS2/BC2***	310.6	Esmeralda	7747+00	Construction/Quarry	100 to 200	Li-1a	1562292.89	13669123.26	200 to 500	100	Yes	Alluvial/confined bedrock
			Esmeralda	NA	Construction	100 to 200	Li-2a	1557493.03	13593887.24	100 to 200	150	No	Alluvial
			Esmeralda	8542+00	Construction /Camp	200 to 500	Li-3a	1587134.79	13624103.32	500 to 750	150	Yes	Alluvial
			Esmeralda	8034+00	Construction/Siding	200 to 500	Li-4a	1556914.23	13641154.87	200 to 500	50	Yes	Alluvial/confined bedrock
			Esmeralda	7980+00	Construction/Quarry	200 to 500	Li-5a	1548922.34	13645390.91	200 to 500	25	No	Alluvial
142 - Alkali Spring Valley	MN1	473.4	Esmeralda	6795+00	Construction	100 to 200	AS-1a	1520468.04	13735264.74	100 to 200	200	No	Unconfined alluvial
			Esmeralda	6730+00	Construction/Quarry	200 to 500	AS-2a	1523130.52	13720025.99	500 to 750	50	Yes	Confined bedrock
			Esmeralda	6750+00	Construction	200 to 500	AS-3a	1522797.09	13731115.06	500 to 750	200	No	Fractured rock
142 - Alkali Spring Valley	MN1 / MN3 / MN2	294	Esmeralda	6893+00	Construction /Camp/MOW	100 to 200	AS-1b	1559754.4	13766164.91	200 to 500	225	Yes	Confined alluvial
			Esmeralda	496+00	Construction	200 to 500	AS-1c	1556498.59	13723576.48	500 to 750	100	Yes	Unconfined alluvial/confined bedrock
			Esmeralda	7128+00	Construction	100 to 200	AS-2b	1568978.45	13745105	200 to 500	225	Yes	Alluvial
142 - Alkali Spring Valley	MN2/GF4**	522.1	Esmeralda	6893+00	Construction /Camp/MOW	100 to 200	AS-1b	1559754.4	13766164.91	200 to 500	225	Yes	Confined alluvial
			Esmeralda	7128+00	Construction	100 to 200	AS-2b	1568978.45	13745105	200 to 500	225	Yes	Alluvial
143 - Clayton Valley	MN1	892.6	Esmeralda	5930+00	Construction /Camp	200 to 500	CL-1a	1445525.35	13702056.04	200 to 500	350	No	Alluvial
			Esmeralda	6497+00	Construction	100 to 200	Cl-3a	1504172.92	13710538.68	200 to 500	225	Yes	Unconfined alluvial
			Esmeralda	7059+00	Construction	200 to 500	Cl-4a	1522931.6	13702332.08	500 to 750	50	Yes	Unconfined alluvial
			Esmeralda	7047+00	Construction/Quarry	200 to 500	Cl-5a	1521374.73	13719793.8	500 to 750	50	Yes	Unconfined alluvial
			Esmeralda	7240+00	Siding	200 to 500	Cl-7a	1518242.34	13683992.93	200 to 500	50	Yes	Alluvial

APPENDIX A.
PROPOSED MINA RAIL CORRIDOR WELL SITES [1]

Basin[2]	Segment / Route	Required Demand (gpm)	County	Approximate Station	Demand Type	Depth to Water (ft-bgs)	SiteID	UTM East (feet)	UTM North (feet)	Well Depth (ft-bgs)	Production Rate (gpm)	On ROW	Aquifer Type
143 - Clayton Valley	MN1	892.6	Esmeralda	5940+00	Construction/MOW	50 to 100	Cl-8a	1460816.99	13703381.82	100 to 200	150	Yes	Confined alluvial
			Esmeralda	6125+00	Construction	50 to 100	CL-9a	1472879.51	13693252.22	100 to 200	225	Yes	Confined alluvial
137A - Big Smoky Valley - Tonopah Flat	MCS1 / MN1	141	Esmeralda	4855+00	Construction /Camp	50 to 100	BSa-1a	1422990.64	13801771.83	200 to 500	200	Yes	Unconfined alluvial
			Esmeralda	5130+00	Construction	100 to 200	BSa-2b	1431775.13	13774989.88	200 to 500	75	Yes	Unconfined alluvial
			Esmeralda	4690+00	Construction/Siding	100 to 200	BSa-4a	1409818.73	13808338.42	100 to 200	125	Yes	Alluvial
137A - Big Smoky Valley - Tonopah Flat	MCS1/MN2/MN3	342.1	Esmeralda	4855+00	Construction /Camp	50 to 100	BSa-1a	1422990.64	13801771.83	200 to 500	200	Yes	Unconfined alluvial
			Esmeralda	5359+00	Construction	10 to 50	BSa-2a	1468691.08	13827892.27	100 to 200	225	Yes	Unconfined alluvial
			Esmeralda	6097+00	Construction	50 to 100	BSa-3a	1527174.28	13837708.66	200 to 500	225	Yes	Unconfined alluvial
			Esmeralda	4690+00	Construction/Siding	100 to 200	BSa-4a	1409818.73	13808338.42	100 to 200	125	Yes	Alluvial
118 - Columbus Salt Marsh	MCS1	285.7	Esmeralda	3973+00	Construction	200 to 500	CSM-1a	1376645.85	13858041.08	200 to 500	50	Yes	Alluvial
			Esmeralda	4480+00	Construction	50 to 100	CSM-2a	1390385.43	13811099.75	200 to 500	100	Yes	Alluvial
			Esmeralda	4050+00	Construction	50 to 100	CSM-3a	1363178.48	13849900.28	100 to 200	225	No	Alluvial
119 - Rhodes Salt Marsh	MCS1	227.8	Mineral	3225+00	Construction	100 to 200	RSM-1a	1341306.58	13913944.43	200 to 500	100	Yes	Alluvial
			Mineral	3360+00	Construction/Siding	50 to 100	RSM-2a	1345548.3	13901826.51	100 to 200	100	Yes	Alluvial
			Mineral	3510+00	Construction /Camp	100 to 200	RSM-3a	1343600.18	13887960.07	200 to 500	100	Yes	Unconfined alluvial/confined bedrock
121A - Soda Springs Valley East	MCS1	400.5	Mineral	2375+00	Construction/Quarry	100 to 200	SSa-1	1316832.41	13987728.28	100 to 200	50	Yes	Alluvial/confined bedrock
			Mineral	2680+00	Construction	100 to 200	SSa-2	1324935.56	13960242.13	200 to 500	150	yes	Unconfined alluvial
			Mineral	2930+00	Construction	100 to 200	SSa-3	1331270.38	13937593.42	200 to 500	200	yes	Unconfined alluvial
			Mineral	2204+00	Construction /Camp	100 to 200	SSa-4	1302618.27	13994050.83	200 to 500	100	Yes	Unconfined alluvial
121B - Soda Springs Valley West	MCS1	143.6	Mineral	2040+00	Construction/Siding	200 to 500	SSb-1	1286238.29	13995482.39	200 to 500	100	yes	Alluvial
			Mineral	1850+00	Construction	50 to 100	SSb-2	1265002.48	13997474.39	100 to 200	150	Yes	Alluvial
110C - Walker Lake Valley - Whiskey Flat Hawthorne	MCS0South / MCS1	118.3	Mineral	1290+00	Construction/Siding	100 to 200	WLc-1a	1213333.5	14009079.49	100 to 200	125	Yes	Alluvial
			Mineral	1380+00	Quarry	200 to 500	WLc-2a	1219952.21	13999011.58	200 to 500	24	No	Confined bedrock

APPENDIX A.
PROPOSED MINA RAIL CORRIDOR WELL SITES [1]

Basin[2]	Segment / Route	Required Demand (gpm)	County	Approximate Station	Demand Type	Depth to Water (ft-bgs)	SiteID	UTM East (feet)	UTM North (feet)	Well Depth (ft-bgs)	Production Rate (gpm)	On ROW	Aquifer Type
110C - Walker Lake Valley - Whiskey Flat Hawthorne	**MCS0South / MCS1**	**118.3**	Mineral	DOD MP 1.7	Construction/Permanent Facility /Camp	50 to 100	WLc-3a	1177759.49	14028205.7	100 to 200	150	Yes	Alluvial
123 - Rawhide Flats	S5	201.1	Lyon	10738+47	Construction	100 to 200	RF-1a	1124945.81	14221615.37	100 to 200	100	Yes	Alluvial
123 - Rawhide Flats	S6	754.4	Lyon	10900+00	Construction /Camp	200 to 500	RF-1b	1135780.26	14206722.14	200 to 500	100	Yes	Alluvial
			Churchill	11075+00	Construction	200 to 500	RF-2b	1147978.18	14216012.94	200 to 500	150	No	Alluvial
			Churchill	11210+00	Construction	100 to 200	RF-4b	1158650.05	14207873.18	500 to 750	200	No	Alluvial
110A - Walker Lake Valley - Schurz	**MCS0 North / S1 / MCS0South**	**430.5**	Lyon	10660+00	Construction	100 to 200	WLa-1a	1113848.31	14189608.39	200 to 500	150	Yes	Alluvial
			Mineral	11246+00	Construction	10 to 50	WLa-3a	1153114.76	14156183.15	50 to 100	150	Yes	Alluvial
			Mineral	10943+00	Construction /Camp	100 to 200	WLa-4a	1128830.08	14172502.77	200 to 500	100	Yes	Alluvial
			Mineral	DOD MP 19.6	Construction/Siding	10 to 50	WLa-5a	1150222.32	14112412.67	100 to 200	200	Yes	Alluvial
			Lyon	10325+00	Construction	100 to 200	WLa-6a	1094357.01	14216850.08	200 to 500	100	Yes	Alluvial
110A - Walker Lake Valley - Schurz	MCS0 North / S4 / MCS0South	1014.3	Mineral	10855+00	Construction /Camp	200 to 500	WLa-1b	1132834.41	14189515.05	200 to 500	150	Yes	Alluvial
			Mineral	11000+00	Construction	200 to 500	WLa-2b	1143971.86	14180653.56	500 to 750	125	Yes	Alluvial
			Mineral	11350+00	Construction	100 to 200	WLa-3b	1175381.83	14167612.99	200 to 500	225	No	Alluvial/confined bedrock
			Mineral	11617+17	Construction	100 to 200	WLa-4b	1178680.19	14152596.27	100 to 200	200	Yes	Alluvial
			Mineral	DOD MP 19.6	Construction/Siding	10 to 50	WLa-5a	1150222.32	14112412.67	100 to 200	200	Yes	Alluvial
			Lyon	10325+00	Construction	100 to 200	WLa-6a	1094357.01	14216850.08	200 to 500	125	Yes	Alluvial
110A - Walker Lake Valley - Schurz	MSC0 North / S5 / MCS0 South	583.6	Lyon	10158+95	Construction	50 to 100	WLa-1c	1077607.27	14220709.99	200 to 500	225	Yes	Alluvial/confined bedrock

APPENDIX A.
PROPOSED MINA RAIL CORRIDOR WELL SITES [1]

Basin[2]	Segment / Route	Required Demand (gpm)	County	Approximate Station	Demand Type	Depth to Water (ft-bgs)	SiteID	UTM East (feet)	UTM North (feet)	Well Depth (ft-bgs)	Production Rate (gpm)	On ROW	Aquifer Type
110A - Walker Lake Valley - Schurz	MSC0 North / S5 / MCS0 South	583.6	Lyon	10350+00	Construction	100 to 200	WLa-2c	1094260.05	14223032.9	100 to 200	100	Yes	Alluvial
			Mineral	11350+00	Construction	100 to 200	WLa-3b	1175381.83	14167612.99	200 to 500	225	No	Alluvial/confined bedrock
			Lyon	10464+25	Construction	200 to 500	WLa-3c	1104641.99	14226689.15	200 to 500	100	Yes	Alluvial
			Mineral	11617+17	Construction	100 to 200	WLa-4b	1178680.19	14152596.27	100 to 200	200	Yes	Alluvial
			Lyon	10996+00	Construction /Camp	200 to 500	WLa-4c	1,135,455.05	14,198,487.98	200 to 500	50	Yes	Alluvial
			Mineral	DOD MP 19.6	Construction/Siding	10 to 50	WLa-5a	1150222.32	14112412.67	100 to 200	200	Yes	Alluvial
110A - Walker Lake Valley - Schurz	MCS0 North / S6 / MCS0 South	593.2	Lyon	10738+47	Construction	100 to 200	RF-1a	1124945.81	14221615.37	100 to 200	100	Yes	Alluvial
			Lyon	10158+95	Construction	50 to 100	WLa-1c	1077607.27	14220709.99	200 to 500	225	Yes	Alluvial/confined bedrock
			Lyon	10350+00	Construction	100 to 200	WLa-2c	1094260.05	14223032.9	100 to 200	100	Yes	Alluvial
			Mineral	11350+00	Construction	100 to 200	WLa-3b	1175381.83	14167612.99	200 to 500	225	No	Alluvial/confined bedrock
			Lyon	10464+25	Construction	200 to 500	WLa-3c	1104641.99	14226689.15	200 to 500	100	Yes	Alluvial
			Mineral	11617+17	Construction	100 to 200	WLa-4b	1178680.19	14152596.27	100 to 200	200	Yes	Alluvial
			Mineral	DOD MP 19.6	Construction/Siding	10 to 50	WLa-5a	1150222.32	14112412.67	100 to 200	200	Yes	Alluvial
108 - Mason Valley	**MCS0North**	**17.9**	Lyon	DOD MP 50.9	Siding	0 to 10	Mn-2a	1041482.27	14215828.91	25 to 50	50	Yes	Alluvial

Notes:

[1]All well sites consist of 1 well per site.

[2]**Basis of Analysis** segments are in **bold print**.

*Miscellaneous Notes:

*Well site information for Crater Flat (229), Oasis Valley (228), Sarcobatus Flat (146), Stonewall Flat (145) and portions of Lida Valley (144) and Alkali Spring Valley (142) is included in Appendices C and D.

** See Appendix C for wells on MN2/GF4 segment needed to complete the route through Alkali Spring Valley; and for MN2/GF4/CS4/BC2 and MN2/GF4/CS4/BC3 segments needed to complete the route through Lida Valley.

*** See Appendix C for wells on MN1/MCS2/BC2 or MN1/MCS2/BC3 segment needed to complete the route through Lida Valley.

Proposed MRC Well Sites- Explanations

Appendix B

Basin	SiteID	Mapped Geology	Structure	Nearby Well Descpt	Nearby Surface Water	Nearby Active Water Rights	Environmental Issues	Site Access Terrain	County Boundary	Discussion
144 - Lida Valley Basin	Li-1a	The site lies in an area of valley fill that overlies Tertiary limestone and volcanic tuff deposits, which are mapped in the nearby adjacent Goldfield Hills to the east of the site. Thickness of valley fill is unknown at this location but could be on the order of a few hundred feet or less.	No mapped faults nearby.	The nearest well (NDWR Well Log 6817) lies 3 1/2 miles to the northeast. It is completed to a depth of 440 feet in interbedded gravel, boulders and clay. The SWL is 35 feet bgs with water bearing zones at 36 to 40 feet, 65 to 78 feet and 344 to 352 feet. It is perforated from 70 to 440 feet and was bail tested at 50 gpm.	None.	No. 48262 (1-MGA, Stock water) lies 3.5 miles to the northeast. No. 21162 (3-MGA, Municipal, Goldfield)	None known.	The site lies on a gently inclined alluvial fan that extends southwestward from Malpais Mesa.	The well site and place of use are both within Esmeralda County.	There are no data on depth to groundwater or even the thickness of valley fill data at the proposed well site; however, gravity data suggest the site may be situated near a bedrock high underlying the valley fill. Well yield will depend highly upon saturated thickness in the valley fill and the extent of fractures in the underlying limestone rocks. Generally this site should be expected to produce no more than 75 gpm, which is sufficient supply for the quarry and potentially supplement construction operations. Site Li-5a is suggested as an alternative well site in case this is a dry hole. The site is based upon 5-ft. Design Alignment.
144 - Lida Valley Basin	Li-2a	The site lies in an area of valley fill in the central part of the valley. Tertiary volcanic rocks are exposed in the hills to the north and south of the site and form a partial obstruction for eastward groundwater flow in the valley. The proposed site lies to the west of this obstruction.	Gravity data suggest that the depth of valley fill decreases in the area of the partial obstruction which should force groundwater to a higher level.	The nearest well in valley fill lies east of the partial bedrock obstruction more than 7 miles to the east.	The nearest surface water consists of small springs more than 9 miles to the west.	The nearest active water right is for a well approximately 5 miles to the east of the proposed site.	None known.	The site lies in the central part of an alluvium filled valley on gently sloping terrain.	The proposed site is in Esmeralda County. The Esmeralda - Nye County boundary lies at the southern end of the MN-1 segment. The segment lies entirely within Esmeralda County. The proposed site and place of use are entirely within Esmeralda County.	The proposed well site lies in valley fill west of a partial bedrock obstruction to eastward groundwater flow. Although depth to groundwater is unknown here it is likely considerably shallower than the 300 to 400 foot depths along the MN-1 segment. This area receives groundwater recharge from higher mountains to the west. Although located off the alignment this site is perceived as being a lower risk for developing adequate water than those located on the alignment. The site is based upon 5-ft. Design Alignment.
144 - Lida Valley Basin	Li-3a	The site is situated within the valley fill alluvium of a topographic depression (Stonewall Flats) between the Cuprite Hills (west) consisting of the Mule Spring limestone and siltstone of the Harkless formation, and Stonewall Mountains (east) consisting of welded tuff.	Gravity data suggest a depression feature in the basin basement, or an increase in alluvial fill toward the center of the Stonewall Flats area.	Nearby wells (Logs 61854 and 4270) indicated depth to water of approx. 350 ft and completed to the top of limestone / siltstone bedrock between 500 and 600 ft.	None	Active underground rights; No. 15885 (domestic) located 1 mile south, No. 48008 (Stock) located 1. 5 miles south	None known.	Located adjacent to old railroad bed, approx. 0.5 miles south of Cuprite, within relatively flat area in the Stonewall Flat topographic depression.	The proposed site is in Esmeralda County, and approx. 1 mile west of Nye County boundary. The proposed site and place of use are entirely within Esmeralda County.	This site is situated within an area that may receive limited groundwater underflow from the adjacent Stonewall Flat basin via the Stonewall Mountain fault system to the northeast. This site will serve camp 9A as well as construction. The site is based upon 5-ft. Design Alignment.
144 - Lida Valley Basin	Li-4a	The site lies on an alluvial fan that extends southwestward from the Goldfield Hills. Nearby bedrock consists of Tertiary volcanics of low hydraulic conductivity.	There are no nearby mapped faults.	There are no nearby wells.	There is no nearby surface water.	No. 3566 (2-MGA Stock) lies 7 miles to the east.	None known.	The site lies on a gently sloping alluvial fan.	The proposed well and place of use lie in Esmeralda County.	There are no data on depths to groundwater or even the thickness of valley fill at the proposed well site. This is considered a high risk location for developing groundwater although it should be possible to develop the small quantity needed for the proposed siding and possibly a small additional amount to supplement construction operations. It is likely that water will be encountered in alluvium although this small amount could likely be developed in the underlying volcanic rocks as well. The site will serve the Goldfield Hills siding. The site is based upon 5-ft. Design Alignment.
144 - Lida Valley Basin	Li-5a	This site lies in valley fill on the central part of an alluvial fan. The thickness of valley fill is unknown, but likely greater than at proposed site Li-4a.	No nearby faults are mapped.	There are no nearby wells.	There is no nearby surface water.	The nearest underground water right lies more than 8 miles to the northeast.	None known.	The site lies on a gently sloping alluvial fan.	Both the proposed well site and the place of use lie within Esmeralda County.	This is an alternate well site to Li-1a. This is a more favorable location for having sufficient thickness of alluvial valley fill and a greater saturated thickness than at the site of Li-1a. The site is based upon 5-ft. Design Alignment..
142 - Alkali Spring Valley	AS-1a	The proposed well site lies in valley fill on the southwestern part of the Alkali Spring basin. Cambrian clastic rocks crop out 1/2 miles west of the site and 1 1/2 miles southeast of the site. To the south the valley fill becomes fairly shallow on a small saddle, based on gravity data, before passing southward into a small unnamed alluvium-filled basin.	Several north-northeast striking faults in bedrock to the southwest of the site project into the area of the proposed well site.	The nearest well is a former MX well site that lies approximately 1 mile south of the proposed site. This well was dry to its maximum depth of 200 feet. Site U567L lies approximately 2 miles north of the proposed site on the playa. It is 73 feet deep and all in valley fill. Water depth is 48 feet. Several other wells lie in the playa area (to the north) with similar depths to water. Generally, the further up the fan the greater the depth to water, which corresponds to a decrease in saturated thickness as the mountain blocks are approached.	The nearest surface water is at Alkali Spring approximately 3 miles to the east. This spring has a perennial flow of approximately 50 gpm of thermal water. Most of the flow recharges to the alluvial aquifer.	The nearest active water right is a surface right at Alkali Spring approximately 3 miles to the east. The nearest active underground right is three miles to the west in the adjoining Clayton Valley Basin. The proposed well site lies in an area of inactive water rights.	None known.	The proposed site lies adjacent to an unimproved road on an alluvial slope in the southwestern part of Alkali Spring Basin approximately 3 miles north of the rail corridor.	The proposed site and place of use are entirely within Esmeralda County.	Rail segment MN-1 lies in an area of outcropping low permeability rocks and in the upland part of Alkali Spring Basin where valley fill may be very thin overlying bedrock, both of which are not preferred scenarios for development of the required amounts of groundwater for the short segment of MN-1 in this area. The proposed well site lies in an area of valley fill without a history of significant groundwater production. Based on other wells in the basin 100 to 200 gpm should be a reasonable production rate to expect per well. The site is based upon 5-ft. Design Alignment.
142 - Alkali Spring Valley	AS-1b	The proposed well site lies in an area of valley fill on the northeast side of the Alkali Spring Valley. The nearest bedrock exposures are more than 2 miles to the northeast and consist of Tertiary volcanic rocks.	The proposed site lies several miles away from any major bedrock faults that could influence groundwater flow.	The nearest well NDWR Log No. 22771 lies approximately 1 mile west-northwest of the proposed site. This extends to a depth of 500 feet in alluvium (gravel with clay streaks). The log indicates a 72 hour pumping test with a production rate of 900 gpm. No drawdown value was recorded. SWL was 122 feet and the well was screened from 160 to 500 feet. Its likely the aquifer is confined at this location since the SWL is considerably above the original screened zone and the reference to gravels with clay streaks in the log.	The nearest surface water is Alkali Hot Spring more than 7 miles to the southwest.	The nearest active underground water right is one mile west of the proposed site (Application No. 42606 - 13 MGA -Mining). Others lie 2 1/2 miles southeast and 3 miles west.	None known.	The site is on the lower part of an alluvial fan with gently sloping topography, approximately 2 miles east of US 95 along an old railroad grade.	The proposed site and place of use are entirely within Esmeralda County.	The site lies 2/1/2 miles northwest of Goldfield municipal well field where several wells have been developed with production rates in excess of 300 gpm. The logs mention sandstone and cemented gravel within the screened aquifer. These materials may be sandstone beds within the Tertiary Siebert Formation instead of alluvium. This site will provide water for Construction Camp 13b as well as for construction. The site is based upon 5-ft. Design Alignment.
142 - Alkali Spring Valley	AS-1c	The proposed site lies in an alluvium covered area overlying Tertiary semiconsolidated sediments high on the south side of Alkali Spring Basin. The Tertiary sediments in turn overlie Tertiary volcanic breccia both of which are considered to be of high permeability. The Tertiary sediments farther north may be the aquifer for Goldfield wells.	There are no nearby faults mapped.	There are no nearby wells.	The closest surface water is Alkali Hot Spring located 3 1/2 miles to the northwest.	The nearest active underground water right lies 2 1/2 miles to the south, No. 10049 (mining).	None known.	The site lies in a moderately incised upper portion of an alluvial slope. The nearest road, Silver Peak Road, lies 4,500 feet north.	The site and proposed place of use are both in Esmeralda County.	This is a high risk site for developing the specified 100 gpm. It may be necessary to supply this area from wells sited on MN2 segment that are located in more productive parts of the basin. Required basin demand assumes route MN1-MN3-MN2 for a total basin demand of 304 gpm including 1 siding and camp. The site is based upon 5-ft. Design Alignment.
142 - Alkali Spring Valley	AS-2a	The proposed well site lies in narrow valley fill on the southwestern part of the Alkali Spring basin situated between consolidated material less than 2 miles away on either side. Outcrops of Cambrian clastic and siltstone rocks are present to the west while the consolidated rocks east of the site are mapped as Harkness formation siltstone and dioritic to andesite rocks. Based on gravity data, the alluvium may be fairly shallow in this area (less than 200 ft deep). Of particular interest for groundwater production is an outcrop of carbonate clastic rocks less than 1.5 miles southwest, which project through the proposed well site.	Several north-northeast striking faults in bedrock to the southwest of the site project into the area of the proposed well site.	The nearest well is a former MX well site that lies approximately 1.5 miles north of the proposed site. This well was dry to its maximum depth of 200 feet. Site U567L lies approximately 2 miles north of the proposed site on the playa. It is 73 feet deep and all in valley fill. Water depth is 48 feet. Several other wells lie in the area with similar depths to water.	The nearest surface water is at Alkali Spring approximately 3 miles to the east. This spring has a perennial flow of approximately 50 gpm of thermal water. Most of the flow recharges to the alluvial aquifer.	The nearest active water right is a surface right at Alkali Spring approximately 4.5 miles to the east-northeast. The nearest active underground right is three miles to the west in the adjoining Clayton Valley Basin.	None known.	The proposed site lies within a gently sloping alluvial fan. Site is located within the ROW approx. 1 mile south of Silver Peak Road.	The proposed site and place of use are entirely within Esmeralda County.	Rail segment MN-1 lies in an area of outcropping low permeability rocks and in the upland part of Alkali Spring Basin where valley fill may be very thin overlying bedrock, both of which are not preferred scenarios for development of the required amounts of groundwater for the short segment of MN-1 in this area. The proposed well site lies in an area of valley fill without a history of much groundwater production. The only chance of encountering any groundwater at this location is the carbonate rocks. They are present with sufficient fracturing to provide adequate groundwater yield at depths that may exceed 500 ft below surface. The site is based upon 5-ft. Design Alignment.
142 - Alkali Spring Valley	AS-2b	The proposed well site lies in an area of valley fill on the northeast side of the Alkali Spring Valley. The nearest bedrock exposures are approximately 2 miles to the east and consist of Tertiary volcanic rocks.	The proposed site lies several miles away from any major bedrock faults that could influence groundwater flow.	The nearest wells NDWR Log Nos. 1345, 11027, 23148 and 40163 lie approximately 1.2 miles north and north-northwest of the proposed site. Yield from these nearby wells appears to be in the range of 100 to 350 gpm from alluvium or possibly conglomerate/sandstone within the Tertiary Siebert Formation. Three of the wells are screened at depths between 250 and 400 feet, and the fourth from 120 to 400 feet. Reported static water levels are at depths between 120 to 200 feet.	The nearest surface water is Alkali Hot Spring more than 5 miles to the southwest.	The nearest active underground water rights lie 1/2 mile north of the proposed site. The following Application Nos. and annual duties are in this section 17450 - 1 MGA, 36897, 41961 - 44 MGA,, 55627 - 49 MGA and 60963 - 300 AFA. The uses are stock, municipal and quazi-municipal, respectively.	None known.	The site is on the middle part of an alluvial fan with gently sloping topography, approximately 1,700 ft east of US 95 along an old railroad grade.	The proposed site and place of use are entirely within Esmeralda County	The site lies 1.2 miles south of Goldfield municipal well field where a few wells have been developed with production rates in excess of 300 gpm. The logs mention sandstone and cemented gravel within the screened aquifer, which may actually be a conglomerate. These materials may be sandstone beds within the Tertiary Siebert Formation instead of alluvium. The site is based upon 5-ft. Design Alignment.

Basin	SiteID	Mapped Geology	Structure	Nearby Well Descpt	Nearby Surface Water	Nearby Active Water Rights	Environmental Issues	Site Access Terrain	County Boundary	Discussion
142 - Alkali Spring Valley	AS-3a	The proposed well site lies in valley fill on the southwestern part of the Alkali Spring basin. Cambrian clastic rocks crop out 1/2 miles west of the site and 1 1/2 miles southeast of the site. To the south the valley fill becomes fairly shallow on a small saddle, based on gravity data, before passing southward into a small unnamed alluvium-filled basin.	Several north-northeast striking faults in bedrock to the southwest of the site project into the area of the proposed well site.	The nearest well is a former MX well site that lies approximately 0.5 mile southwest of the proposed site. This well was dry to its maximum depth of 200 feet. Site U567L lies approximately 2 miles north of the proposed site on the playa. It is 73 feet deep all in valley fill. Water depth is 48 feet. Several other wells lie in the area with similar depths to water.	The nearest surface water is at Alkali Spring approximately 2.5 miles to the east. This spring has a perennial flow of approximately 50 gpm of thermal water. Most of the flow recharges to the alluvial aquifer.	The nearest active water right is a surface right at Alkali Spring approximately 3 miles to the east. The nearest active underground right is three miles to the west in the adjoining Clayton Valley Basin.	None known.	The proposed site lies adjacent to an unimproved road on an alluvial slope in the southwestern part of Alkali Spring Basin approximately 2.3 miles north of the rail corridor.	The proposed site and place of use are entirely within Esmeralda County.	Rail segment MN-1 lies in an area of outcropping low permeability rocks and in the upland part of Alkali Spring Basin where valley fill may be very thin overlying bedrock, both of which are not preferred scenarios for development of the required amounts of groundwater for the short segment of MN-1 in this area. The proposed well site lies in an area of valley fill without a history of much groundwater production. The only chance of encountering any groundwater at this location is the carbonate rocks are present with sufficient fracturing to provide adequate groundwater yield at depths that may exceed 500 ft below surface. The site is based upon 5-ft. Design Alignment.
143 - Clayton Valley	CL-1a	The proposed site lies in the middle part of a large alluvial fan that extends eastwards from the Silver Peak Range. Existing well logs show sand, gravel and fractured bedrock with only minor clay.	Site is located in Quaternary valley fill although limestone and rhyolite fragment conglomerate may be present at depths near 400 feet. Inferred extension of Clayton Valley fault traces are mapped less than 2 miles south of the site, which may act as a local barrier to groundwater flow.	The most productive wells in the valley are in the Silver Peak municipal well field situated 1/2 to 1 mile east of the proposed site. These wells have sustained production rates of from 80 to 600 gpm, with several more than 300 gpm. Transmissivities are mostly in the range of 13,000 to 60,000 gpd/ft. Water quality is presumed to be good for these wells, as most are used for quasi and municipal purposes. The closest well 1/2 mile away is NDWR well log 14950 – SWL 280 ft. Other wells farther away and lower on the alluvial fan are NDWR well log No. 88447- SWL 237 ft. Other wells approximately 1 mile away and 200 feet lower in collar elevation are NDWR well log Nos. 10541, 26756 and 29411 with SWL values of 150 ft, 165 ft and 169 ft, respectively.	The nearest surface water is Silver Peak spring 2 1/2 miles to the northeast.	The nearest active water rights are less than 1 mile east of the site, which are part of the Silver Peak municipal well field.	None known.	The proposed well site lies approximately 3 1/2 miles by road southwest of the rail alignment or 15,600 feet due west from Station 5930+00. It lies on the north side of an existing road on an alluvial fan.	The proposed site and place of use are entirely within Esmeralda County.	This well is designed to serve the construction requirements for the northern part of the MN-1 alignment within Clayton Valley. Existing wells in the northwestern part of the basin are generally low yield and have poor water quality. The proposed off-ROW site lies adjacent to the municipal well field for Silver Peak and near the highest yield wells in the valley. Water quality should be good here (less than 1,000 mg/l TDS). This site would also be used to supply Construction Camp 13a and construction water if needed. Production rates in excess of 300 gpm are highly probable for this site. The site is based upon 5-ft. Design Alignment.
143 - Clayton Valley	Cl-3a	The proposed site is on the upper part of an alluvial fan formed from debris of Lower Paleozoic clastic and carbonate rocks derived from the Clayton Range 4,000 feet to the southeast. Tertiary Siebert lake beds are exposed approximately 1 1/2 miles northwest of the proposed site. This unit would be less favorable for development of high capacity wells than the alluvium if it underlies the alluvium at the proposed site.	The north-northeast striking Clayton Ridge fault lies approximately 4,000 feet southeast of the proposed site. This is a range front fault apparently downthrown on the northwest side. For this reason alluvium may be at least several hundreds of feet thick even close to the bedrock outcrop. Siting a well at the proposed location will likely be in an area of at least several hundred feet of alluvial fan material. This should be mostly gravels and sands and a good host for high groundwater production.	NDWR well log 8732 developed in alluvium lies about 4,000 feet south of the ROW at station 6230+00 and shows groundwater at a depth of 9 feet and a tested pumping rate of 3,000 gpm, although no drawdown amount was reported. A detailed log of this well is not available. NDWR Well 9161 lies about 7,200 feet north of the proposed ROW at Station 6340+00. This had a water depth of 8 feet but the main water bearing zone is a sand between 125 and 127 feet. Most of the drilled 380 feet consisted of blue clay, salt and gypsum. NDWR well 8717 lies 4,100 feet south of the alignment at station 6070+00. This is a stock well developed in alluvium. The static water level was at 8 feet but the best water bearing zone in the 90 foot well is in a sand from 41 to 90 feet. NDWR Well 8529 lies 9,100 feet southwest of the alignment at stration 6030+00. The log shows a static water level at 4 feet with the best water bearing level is in a sand and gravel layer at 210 to 220 feet. The log shows interbedded sand silt an clay. Water was noted to be brackish.	There is no nearby surface water or springs.	The nearest active underground water rights lie approximately 3.5 miles to the northwest of the proposed site.	Groundwater may be high in TDS with nearby levels exceeding 2,500 mg/l, particular toward the Clayton Valley Depression along the Silver Peak Road.	The site is on the gently sloping surface of an alluvial fan and lies within approximately 1 mile of an existing dirt road and 2 miles south of Silver Peak Road.	The proposed site and place of use are entirely within Esmeralda County.	Several wells have been developed in the lower part of the valley with sustainable production rates up to 600 gpm. No high production rate wells exist near the proposed site, but material type and geologic setting suggest that yields of 200 gpm or more would be possible here. Two wells in this general area are recommended to achieve the required 400 gpm of demand. Water quality should be good with TDS of 1,000 mg/l or less. The site is based upon 5-ft. Design Alignment.
143 - Clayton Valley	Cl-4a	The site lies in a small alluvial basin that is bounded by low permeability bedrock (mostly Lower Paleozoic clastic rocks with some Tertiary volcanics) on the west, south and east. The alluvium is open to the north into Alkali Spring Basin. Gravity data suggest that the deepest part of this small basin is in the area of the proposed well sites and that a partial bedrock obstruction lies beneath alluvium on the north and an apparent bedrock constriction to the south, conditions which may provide for reasonable development opportunity. Depth to groundwater is unknown but likely to be more than 200 feet.	North-northeast striking faults are mapped in bedrock at the south end of this basin. These project into the proposed well area and may serve as conduits to convey recharge water from the higher mountains to the south.	There are no nearby wells. The USGS shows one 200 foot well (Project ID U553L) five miles north of the proposed site. This appears to be dry for the 200 feet of depth drilled. The nearest known groundwater production is in the central part of the Alkali Spring Valley approximately 8 to 10 miles north-northeast of the proposed site.	Several small springs lie in the Montezuma Range at distances of 2.5 to 5 miles. Some of these may be localized by north-northeast striking faults in the Lower Paleozoic clastic rocks.	There are no active or inactive water rights in the immediate location of the proposed site. The nearest active underground rights are 1 1/2 miles to the southeast in the Montezuma Range. There are also several active surface water(spring) rights in the Montezuma Range.	None known.	Site access should be good. It lies approximately 4 1/2 miles south of the paved Silver Peak Road in an alluvial valley in which drainage is only slightly incised.	The proposed site and usage area are entirely within Esmeralda County.	A conservative estimate of 150 gpm is the estimated production rate for this well based on the assumption of that recharge originating from the Montezuma Range to the east can be captured within the alluvial sediments; however there are no data on groundwater occurrence in this small basin. A lower risk alternative to drilling new wells here would be to obtain water from new wells located off the ROW in the lower part of Alkali Spring Valley approximately 8 to 10 miles north-northeast of the proposed site. The site is based upon 5-ft. Design Alignment.
143 - Clayton Valley	Cl-5a	The site lies in a small alluvial basin that is bounded by low permeability bedrock (mostly Lower Paleozoic clastic rocks with some Tertiary volcanics) on the west, south and east. The alluvium is open to the north into Alkali Spring Basin and more restricted toward the south of this site. Gravity data suggest that site may be situated in an area where basement depth may be minimal compared to areas just a few miles north and south of the site. Depth to groundwater is unknown but likely to be more than 250 feet.	North-northeast striking faults are mapped in bedrock at the south end of this basin. However, there appears to limited structure mapped in this area.	There are no nearby wells. The USGS shows one 200 foot well (Project ID U553L) 1.5 miles north of the proposed site. This well appears to be dry for the 200 feet of depth drilled. The nearest known groundwater measurements are in the central part of the Alkali Spring Valley approximately 5 miles north-northeast of the proposed site where groundwater depths are on the order of 100 ft or less below ground surface.	Several small springs lie in the Montezuma Range approx. 5 miles southeast and Alkali Hot Springs approx. 5 miles northeast of the site. Some of these may be localized by north-northeast striking faults in the Lower Paleozoic clastic rocks.	There are no active or inactive water rights in the immediate location of the proposed site. The nearest active underground rights are 1 1/2 miles to the southeast in the Montezuma Range. There are also several active surface water(spring) rights in the Montezuma Range.	None known.	Site access should be very good. It lies less than 1 mile south of the paved Silver Peak Road in a relatively flat alluvial valley.	The proposed site and place of use are entirely within Esmeralda County.	A conservative estimate of 50 gpm was used for wells since there are no data on groundwater occurrence in this area. The potential for a dry well is relatively high in this area if the alluvium is not saturated and the underlying bedrock is not fractured. A well at this location would be ideally located to service the nearby quarry at a minimum (if groundwater is encountered). A lower risk alternative to drilling a well here would be to obtain water from new wells located off the ROW in the lower part of Alkali Spring Valley approximately 3 miles north of the proposed site. This site will also supply water for the North Clayton Quarry. The site is based upon 5-ft. Design Alignment.
143 - Clayton Valley	Cl-7a	The site lies at the head of a small alluvial basin that is bounded by low permeability bedrock (mostly Lower Paleozoic clastic rocks with some Tertiary volcanics) on the west, south and east. The alluvium is open to the north into Alkali Spring Basin. Depth to groundwater is unknown but likely to be more than 200 feet.	North-northeast striking faults are mapped in bedrock at the south end of this basin near the proposed site. These may serve as conduits to convey recharge water from the higher mountains to the south and the Montezuma Range from the east into the alluvial channel.	There are no nearby wells.	The nearest surface water is Montezuma Spring 3 miles to the northeast.	The closest active water right lies 2 miles to the northeast (No. 29176 8 MGA stock).	None known.	The site is situated in a gently sloping and narrow incised alluvial canyon-like setting, accessible via dirt roads leading to Silver Peak Rd. approx. 9 miles to the north and Goldfield approximately 15 miles to the east.	The proposed well and place of use lie in Esmeralda County.	There are no data on depths to groundwater or even the thickness of valley fill at the proposed well site. This is considered a high risk location for developing groundwater although it should be possible to develop the small quantity needed for the proposed siding and potentially a small additional volume to supplement construction operations. It is likely that water will be encountered in alluvium although this small amount could likely be developed in the underlying volcanic rocks as well. The site lies adjacent to a northeast striking fault zone that could influence groundwater flow. The site will serve the Montezuma Summit siding. The site is based upon 5-ft. Design Alignment.
143 - Clayton Valley	Cl-8a	The site lies in a playa on the west side of Clayton Valley.	No obvious structural influence at this site.	The closest well NDWR 9000 lies 4,100 feet east. The main aquifer here was intersected at 60 feet and the SWL was 2 feet.	The nearest surface water consists of lithium evaporation ponds located 1 mile to the northeast. Three springs lie to the northwest at distances of 6,600 feet, 7,000 feet and 7,150 feet.	The closest active undergrounnd water right lies 3,100 feet to the northwest (No. 30399, municipal Silver Peak City, 14-MGA). Active surface water (spring) rights lie 6,850 feet to the northwest (APP 10036 - .334 CFS - mining), 6,200 feet northwest (App 13027 - .013 cfs - mining) and 6,850 feet northwest (App 15847 - .53 cfs - mining).	Groundwater in this area has a high salinity and is likely very corrosive.	The site is located on the edge of a playa, 1.5 miles south of Silver Peak. Access may be difficult in wet weather.	The place of use and well are both in Esmeralda County.	The well will service the Silver Peak MOW with potential to supplement construction operations. The site is based upon 5-ft. Design Alignment.

Basin	SiteID	Mapped Geology	Structure	Nearby Well Descpt	Nearby Surface Water	Nearby Active Water Rights	Environmental Issues	Site Access Terrain	County Boundary	Discussion
143 - Clayton Valley	CL-9a	The proposed alternate site lies on the east side of the valley floor in an area underlain by interbedded sand, gravel and clay. Alluvium depth likely to be at least several hundreds of feet.	Mapped north-northeast striking Clayton Valley faults lie about 1 mile to the east of the proposed site. Their influence on groundwater at the proposed site is unknown.	The nearest well, NDWR log 8717, located 1-mile southwest of the proposed site, is a 90 foot stock well with a water bearing sand from 41 to 90 feet that is overlain by 4 feet of clay (probable confined water condition). NDWR Well 8529 lies 2 miles southwest of the alignment at station 6030+00. The log shows a static water level at 4 feet with the best water bearing level in a sand and gravel layer at 210 to 220 feet. The log shows interbedded sand silt an clay. Water was noted to be brackish.	The nearest surface water are hot springs on the west side of the valley near Silver Peak town site 5 miles northwest and Soda Springs five 1/2 miles southwest.	The nearest active underground water right is 0.5 to 1 mile northeast of the site.	Groundwater may be high in TDS with nearby levels exceeding 2,500 mg/l, particular toward the Clayton Valley Depression along the Silver Peak Road.	The site lies on the valley floor in alluvium, 4 miles south of Silver Peak Road.	The proposed site and place of use are entirely within Esmeralda County.	Compared to other proposed well sites in the basin this site has a higher probability for obtaining the necessary quantity of water, requires less drilling, but may not provide water of sufficiently good quality for the intended use. TDS is likely in the range of 3,000 to 10,000 mg/l but could be higher. The site is based upon 5-ft. Design Alignment.
137A - Big Smoky Valley - Tonopah Flat	BSa-1a	Bedrock outcrop to the north is andesite; to the west is tuffaceous shale and sandstone. This site is located near the toe of slope of unconsolidated colluvium/alluvium. The Permeability Group for this setting is "Very High". Gravity contours suggest that this site is located over a deep colluvium/alluvium deposit in the Tonopah Flats region of the lower Big Smoky Basin. Information from proximate wells suggests good yield and relatively shallow depth to water.	Interpreted gravity contours suggest a relatively deep basement or bottom trough-like structure that may convey recharge within the narrow alluvium restriction from the Monte Cristo Range to the north and to a lesser extent the Weepah Hills to the south.	Closest well is NDWR16826, located approximately 6,500 feet southeast of BSa-1a. Total depth of NDWR 16826 is 220 feet, reported yield is 200 gpm. Other wells in similar setting on north alluvial apron have depth to water < 100 feet.	NWIS site S10015 is located ~ 2.5 miles to the northeast. Peak stream flow at this wash reported from 50 to 450 cfs suggests a significant amount of runoff from the Monte Cristo Range is conveyed to the valley alluvium on a seasonal basis during periodic storm events.	The points of diversion for the closest active underground water rights are located 1 and 1.2 miles to the west at Blair Junction (App No. 33058 -1 MGA - Quazi-municipal) and (App No. 17559 - 1 MGA - stock).	TDS for groundwater in this part of the Big Smoky (137A) basin have been estimated to be on the order of 3,000 to 10,000 mg/l. Groundwater used of potable purposes at the construction camp would require treatment.	Access is anticipated to be very good. Near-level ground surface along old railroad bed and approximately 1.25 miles south of US 95. The site is located within the 1,000 ROW.	The proposed site and place of use are entirely within Esmeralda County.	Production of 225 gpm or more should be attainable from a properly designed well at this location, based upon nearby well NDWR 16826. Close attention should be paid to strata and water-bearing zones encountered during drilling. Well construction should be tailored to subsurface conditions. This location is near the intersection of MCS1/MN1/MN2 and should easily serve a proposed construction camp (at or near the Blair Junction intersection) and construction demand for either route alternative in the area. The site is based upon 5-ft. Design Alignment.
137A - Big Smoky Valley - Tonopah Flat	BSa-2a	Bedrock outcrop ~10,000 to the north is andesite. This site is located near the toe of slope of unconsolidated colluvium/alluvium. The Permeability Group for this setting is "Very High". Gravity contours suggest that this site is located over a deep colluvium/alluvium deposit in the Tonopah Flats region of the lower Big Smoky Basin. Information from proximate wells suggests good yield and relatively shallow depth to water.	Situated within an alluvial restriction between the Monte Cristo Range to the North and Lone Mountain to the south, mapped fault zone (less than 3 miles to the south) between the alluvial and mountain block contact, Lone Mountain thrust faults may act as a conduit for a significant amount of groundwater flow originating from the Lone Mountains and several springs to the south-southeast.	Closest well is NDWR Log No. 23321, located ~1.8 miles west of the proposed new well site. Total depth of NDWR Log 23321 is 105 feet deep, reported yield is 250 gpm.	Although no springs have been mapped by the USGS near the proposed well sites, according to permit Nos. 6670 and 6671, there are 2 active seasonal surface water permits on spring sources each between 1 and 1.5 miles to the east and west of the proposed new well site.	The nearest active underground water right is 4,580 feet to the east is App. No. 12870, small stock water right.	None known	Access anticipated to be very good, although near the Big Smoky sand dunes. Near-level ground surface along old railroad bed and approx. 1.25 miles southeast of US 95. The site is located within 1,000 ROW.	The proposed site and place of use are entirely within Esmeralda County.	An estimated yield of 250 gpm or more should be attainable from this well, based upon nearby and similar wells. Close attention should be paid to strata and water-bearing zones encountered during drilling. Care should be taken to minimize potential impacts to nearby permitted spring sources in the area. Well construction should be tailored to subsurface conditions. The site is based upon 5-ft. Design Alignment.
137A - Big Smoky Valley - Tonopah Flat	BSa-2b	This site is located along an alluvial slope mapped as older alluvium. Gravity data suggest the site is situated in an area that may have sufficiently deep basement thickness. The Permeability Group for the alluvium in this area is identified as "Very High". Groundwater development potential drops significantly to the south and east of the site where alluvial thickness appears to decrease toward consolidated rocks of the Esmeralda group consisting of low permeability sandstone and siltstone in the Weepah Hills.	The northeast-southwest-trending Lone Mountain thrust faults project through site from less than 4 miles to the northeast where alluvial slope of the Weepah Hills meets the valley fill.	The closest well is Log No. 65464 located approximately 2 miles to the southwest was drilled to 351 feet (bgs) with a static water level of 265. Another well Log No. 16826, located ~6 miles north of the site with a drilled depth of 220 feet and reported yield is 200 gpm (40 ft of drawdown for an estimated transmissivity of 8,750 gpd/ft). Other wells in similar setting on north alluvial apron have depth to water < 100 feet.	Closest surface water occurs as a spring (Barrel Spring) located ~7 miles to the east in the Weepah Hills	The nearest active underground water rights lie ~2 miles northeast (App No. 29233, STK, 4 MGA)	None known	Access anticipated to be good, along a gently sloping alluvial apron, only 2,200 ft east of State HWY 265.	The proposed site and place of use are entirely within Esmeralda County.	The prospects for small (100 gpm or less) supply at this location seem reasonable based on other small development in similar areas along the alluvial apron in the area. However, development potential drops dramatically to the south along the ROW where a dry hole was encountered (log No. 4362 to depth of 520 feet) ~5 miles to the south. Close attention should be paid to strata and water-bearing zones encountered during drilling. Well construction should be tailored to subsurface conditions. The site is based upon 5-ft. Design Alignment.
137A - Big Smoky Valley - Tonopah Flat	BSa-3a	Bedrock outcrop to the southwest is rhyolite. This site is located near the toe of slope of unconsolidated colluvium/alluvium. The Permeability Group for this setting is "Very High". Gravity contours suggest that this site is located near a deep colluvium/alluvium deposit (bedrock depression) in the Tonopah Flats region of the lower Big Smoky Basin. Information from proximate wells suggests good yield and relatively shallow depth to water.	The site is situated between prominent fault zones, Lone Mountain extension to the northwest and the Crescent Dunes fault zone to the northeast. As mapped, both north-south fault zones appear to promote circulation (groundwater conduits) within stratified colluvium/alluvium. A well in Lone Mountain fault zone (NDWR Log No. 23307, ~4.3 miles northwest) was tested at 1,000 gpm with a transmissivity of 24,000 gpd/ft. Evidence of the Crescent Dunes acting as a prolific groundwater conduit is supported by several mining wells located ~14 miles north (in the same fault zone) with reported pumping rates exceeding 2,000 gpm.	Closest wells are NDWR Log No. 23307 (4.3 miles northwest, depth = 350 feet, yield = 1,000 gpm) and NDWR Log No. 7499 (1.5 miles southeast, cased depth = 150, low demand QM well with a reported static water level of only 9 ft)	None	The nearest active underground water rights are ~1.5 miles southeast of the site (App No. 40075 - 1 MGA, stock) and (App. No. 13191 - 1 MGS, stock).	None known	Access anticipated to be very good on near-level ground surface adjacent to Slime Wash and ~3,000 feet south of old railroad bed and 1 mile south of US 95. The site is located within 1,000 ROW.	The proposed site and place of use are entirely within Esmeralda County, although the Nye County line is located only 6 miles to the east.	This well site appears to be ideally situated in an area where significant structure has been mapped. The Quaternary alluvium in the area appears to be (based on nearby well logs and local topography) conveying groundwater originating from recharge in the San Antonio Mountains to the northeast (via the Crescent Dunes fault zone), Monte Cristo Range to the northwest (via Lone Mtn. fault zone) and to a lesser extent the Lone Mountains to the southwest. The site is based upon 5-ft. Design Alignment.
137A - Big Smoky Valley - Tonopah Flat	BSa-4a	Bedrock outcrop to the north is andesite (Gilbert Formation); site is situated near a mapped alluvial contact with tuffaceous shale and sandstone to the west. This site is located near the toe of slope of unconsolidated colluvium/alluvium. Depth to consolidated rock may be relatively shallow (based on gravity contours) compared to nearby wells further down the alluvial slope. The Permeability Group for this setting is "Very High". Information from proximate wells suggests good yield and relatively shallow depth to water, although the depth to groundwater may be on the order of 150 feet at this location.	No proximate mapping of structure that would influence the well at this location.	Closest well is NDWR Log No. 16826, located approximately 12,000 feet east-southeast of BSa-1a. Total depth of NDWR Log No. 16826 is 220 feet, reported yield is 200 gpm. A well (NDWR Log No. 7483) located ~4 miles west of this site in a similar geologic setting on the other side of the basin boundary (in Columbus Salt Marsh Valley) was screened in a conglomerate consisting of shale, and bedrock was encountered at approx. 300 feet (20 gpm with bailer).	USGS S10015 is located ~5 miles to the east. Peak stream flow at this wash reported from 50 to 450 cfs.	The closest active water right is located 8,200 feet ESE (App No. 33058 - 1 MGA - Quazi municipal) and 9,200 feet to the southeast (App No. 17559 - 1 MGA - stock).	None known.	Access anticipated to be very good (only 2,400 ft north of US 95) on a ~3% slope. The site is located within 1,000 ROW, ~1.3 miles northwest of Blair Junction.	The proposed site and place of use are entirely within Esmeralda County.	Geologic conditions in this area may vary significantly over short distances along the alluvial apron in this area. This well should provide enough yield to serve the Blair Junction siding and potentially a small amount of supplemental construction water in western Big Smoky (137A) basin and Columbus Salt Marsh basin to the west and north if necessary. The site is based upon 5-ft. Design Alignment.
118 - Columbus Salt Marsh	CSM-3a	The proposed site is situated in the lower part of an alluvial fan emanating from a draw between carbonate rocks of the Palmetto Formation (Op) outcrops of the Candelaria Hills to the north and northwest.	There is little structure in the area other than contacts between alluvial fill and mountain front.	The nearest wells include NDWR Log No. 3660 ~1.1 miles northeast (187 ft deep, yielded 200 gpm), Log Nos. 1507 & 88516 ~2.1 miles southwest (50 to 85 ft deep, depth to groundwater less than 10 ft, yielded between 200 and 440 gpm with a transmissivity of ~17,000 gpd/ft). All wells are completed in alluvial sediments.	There is no nearby surface water.	The closest active underground water rights are App. No. 17560 (stock water) ~ 1.1 miles northeast and 500 AFA of mining water rights located ~ 2.2 miles southwest.	TDS in this part of the basin may exceed 1,000 mg/l but should be well below 10,000 mg/l.	The proposed site is located along an existing dirt road off the ROW in a gently sloping area at the bottom of an alluvial fan. US 95 and the ROW are located 1.3 miles and 3 miles, respectively to the northeast along the dirt road.	Approximately 2,000 feet of the ROW in Columbus Salt Marsh Basin lies in Mineral County whereas the proposed well site and remainder of the ROW is in Esmeralda County. The portion of the ROW lying in Mineral County will require only about 5 ac-ft of water for soil compaction, but worth noting is the fact that if any water from Basin 118 is used in Basin 119, it will have to be diverted and used in 2 different counties.	This well site is proposed as an alternative to the site east of this location along within the ROW. Little is known about groundwater conditions anywhere near the ROW well site, while this location (based on nearby well logs, geology and existing water rights) should safely yield in excess of 200 gpm. The site is based upon 5-ft. Design Alignment.

Basin	SiteID	Mapped Geology	Structure	Nearby Well Descpt	Nearby Surface Water	Nearby Active Water Rights	Environmental Issues	Site Access Terrain	County Boundary	Discussion
118 - Columbus Salt Marsh	CSM-1a	The proposed site is in an area of valley fill on the an alluvial fan. A nearby test hole indicates the area is underlain by sand and gravel to depths of at least 500 feet. Tertiary volcanic rocks and lake beds crop out approximately 2 miles east of the proposed site.	Several north trending faults lie along the western front of the Monte Cristo Range but do not separate bedrock from valley fill. There is no obvious correlation between fault and spring locations, except for a small spring located 1 mile north of Coaldale Junction.	The nearest well lies 1/4 mile to the northeast of the proposed site. This is a thermal gradient test hole that penetrated sand and gravel for it full 500 feet of depth. The water level was not determined. The closest production well (NDWR Log No. 3680) lies 2 miles to the southwest. This has been developed in interbedded gravel, clay and sand. The static water level is 44 feet and the total depth of the well is 187 feet. The log indicates a production rate of 200 gpm.	There is no nearby surface water.	The closest active underground water right lies 9,400 feet to the southwest (APP No. 17560 - 1 MGA- stock).	None known.	The site lies on an alluvial slope on the lower part of an alluvial fan. The terrain is generally flat to gently sloping. Location is ~1.7 east of US 95.	Approximately 2,000 feet of the ROW in Columbus Salt Marsh Basin lies Mineral County whereas the proposed well site and remainder of the ROW is in Esmeralda County. The portion of the ROW lying in Mineral County will require only about 5 ac-ft of water for soil compaction, but worth noting is the fact that if any water from Basin 118 is used in Basin 119, it will have to be diverted and used in 2 different counties.	From a water quality perspective well sites along the alluvial slope on the east side of the basin in the area of the Mina alignment ROW is preferred in Columbus Salt Marsh Basin. However, little is know about groundwater conditions in this area along the alluvial slope area and no wells have been drilled east of the ROW on the fan. This area should contain coarser alluvial materials more conductive to higher production rate wells than the interbedded clays and sands in the playa area. Although there are several thermal gradient test holes none of these logs recorded the depth to water. Based on existing wells in the basin, higher production can be relatively assured west of the ROW as long as the playa area can be avoided. The site is based upon 5-ft. Design Alignment.
118 - Columbus Salt Marsh	CSM-2a	The proposed site is in the upper part of an alluvial apron a few miles west of bedrock contact with Tertiary volcanic outcrops of andesite (Gilbert Formation) and rhyolite rocks.	North trending faults lie along the western front of the Monte Cristo Range, do not separate bedrock from valley fill, but do project directly through the proposed new well site. The presence of a nearby small spring (1.3 miles north) appears to be related to the Eastern Columbus fault zone. Several East-northeast striking faults have been mapped that traverse the are 1 mile to nearly 3 miles southeast of the proposed site. Their influence on groundwater is unknown.	The nearest wells include NDWR Log No. 6031 located 1 mile to the west (246 ft deep, encountered a lot of 'blue shale' during drilling, no pumping data), NDWR Log No. 7483 located 1.6 miles to the south (292 ft deep, test pumped at 20 gpm with 205 ft of drawdown, encountered a lot of 'blue clay' and some 'shale' during drilling).	The closest surface water is a small spring (Tim's Spring) with a vested stock water right (No. V05505) located 1.3 miles to the north-northwest. The spring is situated with a mapped fault zone in andesitic rocks, upgradient from the proposed well site at an elevation of 4780, which is ~30 ft higher elevation than the new well site. Van Denburgh and Glancy(1970), Plate 1 indicate a low discharge spring lying 1,200 feet from the proposed site, but this does not appear in more current spring databases for this area.	The closest underground (active) water right is App. No. 14828 (QM, 10 MGA) located ~1.5 miles to the west.	Groundwater at the proposed well site may exceed 1,000 mg/l in TDS. Also note that the Columbus Salt Marsh playa (less than 4 miles to the west contains high salt levels with shallow groundwater exhibiting TDS that exceeds 10,000 mg/l.)	The site lies on an alluvial slope on the upper part of an alluvial fan. The terrain is generally flat to gently sloping at ~2.4% to the west. The site is also located 2,100 ft north of the old railroad bed and 2,700 ft north of US 95.	The proposed site and place of use are entirely in Esmeralda County.	The site is situated in an area where favorable groundwater conditions may exist if the structure to the north and enough saturated alluvium (with gravel) are encountered during drilling. Higher production is probably likely at great depths (below the fine grained soils/clays in the playa area) off the ROW to the west in the playa area, but groundwater quality degrades significantly to the west. This area should contain coarser alluvial materials more conductive to higher production rate wells than the interbedded clays and sands in the playa area although geologic conditions from other well logs in the are highly variable and few production wells exist in the alluvial slope area. The site is based upon 5-ft. Design Alignment.
119 - Rhodes Salt Marsh	RSM-1a	The site lies on the lower 1/3 of a large alluvial fan that extends westwards from the Pilot Mountains. Low permeability Mesozoic sandstone and siltstone are exposed east of the Benton Spring Fault zone in the Pilot Mountains 1 mile east of the proposed site.	The Benton Spring normal fault zone separates the alluvium from the consolidated rocks of the Pilot Mountains. No springs are evident along the fault trace so its influence on groundwater is unknown.	NDWR Well log 24109 lies 3-1/2 miles west-southwest of the proposed site. This reaches a depth of 68 feet in sand and gravel. SWL was 32 feet bgs.	The nearest surface water is in Rhodes Salt Marsh 2 1/2 miles to the southwest.	The nearest active water underground right is approximately 2 1/2 miles to the southwest of the proposed site (App No. 16420- 41 AFS - irrigation).	None known.	The site lies on the lower part of an alluvial fan, approx. 3.2 miles east of US 95. The terrain slopes gently to the southwest.	The proposed site and place of use are entirely in Mineral County.	Although there are no nearby wells on this side of the basin the proposed site in on the lower part of a large alluvial fan extending from the Pilot Mountains. This area should receive considerable groundwater recharge from the higher parts of the range. Water quality should be good and the coarse alluvium in this area should support high groundwater production rates. A production rate of at least 100 gpm is anticipated from a well in this area. The site is based upon 5-ft. Design Alignment.
119 - Rhodes Salt Marsh	RSM-2a	The site lies on alluvial slope that extends westwards from the Pilot Mountains. Low permeability Mesozoic sandstone and siltstone are exposed northeast of the Benton Spring Fault zone in the Pilot Mountains 1 mile east of the proposed site.	The Benton Spring normal fault zone separates the alluvium from the consolidated rocks of the Pilot Mountains. No springs are evident along the fault trace so its influence on groundwater is unknown.	NDWR Well log 1426 lies ~2.3 miles southwest of the proposed site (depth = 650 feet, completed in interbedded sand and clay for irrigation use, depth to water reported as 32 feet bgs). At least three wells located between 2 and 2.5 miles to the west (NWIS U10750L, U10754L, U10752L) were completed at depths between 400 and 450 ft with artesian (flowing) conditions at the surface.	The nearest surface water is in Rhodes Salt Marsh 2 miles to the west-northwest.	The nearest active water underground right is for a well approximately 2.3 miles to the southwest (App No. 16420- 41 AFS - irrigation).	None known.	The site lies on gently sloping alluvium on the east edge of Rhodes Salt Marsh, approx. 4 miles east of US 95. The terrain slopes gently to the southwest.	The proposed site and place of use are entirely in Mineral County.	This area should receive considerable groundwater recharge from the higher elevations of the Pilot Mountains to the east. Water quality should be better than in the salt marsh and adequate for construction purposes. The site is based upon 5-ft. Design Alignment.
119 - Rhodes Salt Marsh	RSM-3a	The site lies on alluvial slope that extends northwards from the divide separating Rhodes Salt Marsh Basin from Columbus Salt Marsh Basin. Moderate permeability semi-consolidated Tertiary sediments crop out south of the proposed site and would be the likely host for groundwater in this area.	There are no nearby mapped faults that would influence groundwater in this area.	NDWR Well log 1426 lies 9,600 feet northwest of the proposed site. This reaches a depth of 650 feet in in interbedded sand and clay. SWL was 32 feet bgs. This well is clearly in valley fill whereas at the proposed site it is likely in Tertiary sediments.	The nearest surface water is in Rhodes Salt Marsh 4 miles to the north.	The nearest active underground water right is approximately 10,800 feet to the northwest (App No. 16420 - 41 AFS - irrigation).	None known.	The site lies on gently sloping alluvium on the south edge of Rhodes Salt Marsh, approximately 1,000 ft north of US 95. The terrain slopes gently to the north.	The proposed site is in Mineral County and water usage will be entirely within Mineral County.	Water quality should be better than in the salt marsh and adequate for camp purposes. This site should also provide enough water to meet anticipated construction demand, which is the highest, in this portion of the basin. The site is based upon 5-ft. Design Alignment.
121A - Soda Springs Valley East	SSa-1	This location is at the top of the alluvial apron, down slope from exposed contact between carbonate bedrock (favorable for groundwater production) and granitic (unfavorable) section of the Pilot Mountains. No nearby wells in this area, but gravity data suggest alluvium may be fairly shallow at this location.	The only mapped faults are the nearby projected Benton system at bedrock contacts, influence on groundwater flow in this area cannot be determined.	The closest well with any useful information is NDWR Log No. 2028 (located ~ 2.8 miles west) in Luning (depth=229, yield=70 gpm, owned by Mineral County Power Company).	Closest known surface water is located approx. 1.5 miles southwest of the proposed well site.	Closest known surface water is a vested right (V06208, source listed as 'other surface water'), located approx. 1.5 miles southeast of the proposed well site.	None known	Located adjacent to proposed quarry site within ROW.	The proposed site and place of use are entirely within Mineral County.	Anticipated yield at this location is relatively unknown due to lack of available wells nearby and the presence of both carbonate and non-carbonate rocks in the vicinity. The site is based upon 5-ft. Design Alignment.
121A - Soda Springs Valley East	SSa-2	This location is at the toe of the alluvial apron down slope from the exposed Tertiary volcanic bedrock section of the Pilot Mountains.	Local mapped faults parallel the axis of the Valley near the bedrock contacts with valley fill. Based on spring presence along these faults, it is apparent that the faults do have a local influence on groundwater flow.	Closest well is NDWR Log No. 4513 (depth =108 feet, yield = 60 gpm during testing but the well casing 10 inches and it's a MUN well that probably yields much more than 60 gpm) located ~1.5 miles east at the base of Pilot Mountains in the Benton Spring fault system.	Closest surface water occurs as springs in the Pilot Mountains to the east, ~1.5 miles east, several springs that supply Mina.	Several municipal water rights (surface and underground) are located within 1.5 miles east of the proposed well site.	None known	Access anticipated to be very good, ~2.1 miles east of US 95. Near-level ground surface, site is located within 1,000 ROW.	The proposed site and place of use are entirely within Mineral County.	New development at the proposed well site should safely yield 150 gpm, based upon wells in similar settings. The site is based upon 5-ft. Design Alignment.
121A - Soda Springs Valley East	SSa-3	The site lies in the central part of Soda Springs Valley in an area of thick valley fill. Carbonate rocks of the Pilot Mountains are exposed to the east, which likely provide most of the groundwater recharge in this area via seepage loss from streams on the alluvial apron and underflow from the consolidated rocks (especially carbonate).	The Benton Spring fault system is mapped in the alluvial fill to the south, which projects through the proposed well site. The same fault system is also identified along the alluvial apron at the bedrock contact to the east (~1 mile to the east). The faults influence groundwater movement is unknown.	Closest wells are NDWR Log No. 2170, ~1.5 miles northwest in Mina (depth = 303 feet, water level = 120 feet, yield = 103 gpm) and NDWR Log No. 58766, ~1.8 miles north near bedrock contact (depth = 300 feet, water level=84, yield = 200 gpm with est. transmissivity over 100,000 gpd/ft)	Closest surface water occurs as springs in the Pilot Mountains to the east; Martin Springs (9,000 feet to east-southeast) and Sulphur Spring (10,000 feet to southeast).	The nearest active underground water rights lie 7,100 feet to the northwest (APP 14573 - 35 MGA - mining) and 9,400 feet to the northwest (APP No. 11119 - 7 MGA - domestic).	None known	Access anticipated to be very good, approximately 1.5 miles east of Mina/US 95 on near-level ground surface. Site is located within 1,000 ROW.	The proposed site and place of use are entirely within Mineral County.	An estimated 200 gpm should be safely developed from this well site, based upon wells in similar settings (i.e., alluvial apron near carbonate bedrock). This location is near a prominent gap in the Pilot Mountains, and high-yield wells are located in this setting. The site is based upon 5-ft. Design Alignment.
121A - Soda Springs Valley East	SSa-4	The site lies in the central part of Soda Springs Valley in an area of thick valley fill.	There are no nearby mapped faults to influence groundwater movement.	The nearest well is NDWR Log 2028 located 8,600 feet south of the proposed site. This penetrates to a depth of 229 feet in sand and gravel with interbedded clay zones. The main water bearing zone is from 162 feet to 229 feet with first water encountered at 91 feet. The log indicates a production rate of 70 gpm. NDWR well 8595 lies 9,300 feet south of the proposed site. This penetrates to a depth of 264 feet in clay, sand and gravel with the main water zone from 140 to 264 feet. The well was pump tested at 60 gpm with a 66 foot drawdown.	Closest known surface water is a vested right (V06208, source listed as 'other surface water'), located approx. 1.8 miles southeast of the proposed well site.	The nearby active underground water rights lie 5,780 feet south (App No. 11114 - 0.5 MGA -mining), 6,823 feet south (App No. 10562 -0.5 MGA - mining), 9,000 feet to the south (App No. 22074 - 32 MGA - municipal), 8,200 feet south (APP No. 61281E - 6 AFA - environmental), 9,000 feet south (App No. 7295 - 0 MGA - domestic) and 7,000 feet south (APP No. 14755 - 63 MGA - municipal).	Potential high TDS (for drinking water supply)	The site on the valley floor and is nearly level, immediately adjacent to SR 361.	The proposed site and place of use are both in Mineral County.	This site is designed to serve construction camp 16 and provide supplemental construction water, if needed. Groundwater at this site likely has TDS levels that exceed the 1,000 mg/l drinking water standard so treatment will be necessary for use a drinking water. The site is based upon 5-ft. Design Alignment.
121B - Soda Springs ValleyWest	SSb-1	This location is at the toe of slope at a prominent, alluvium-filled gap in the Garfield Hills at a region of carbonate bedrock.	No proximate mapping of structure.	Closest wells are NDWR Log No. 40600 (depth = 120 feet, yield not reported) and NDWR Log No. 31975 (depth = 1950 feet, yield not reported) which are at least 16,000 feet from this proposed well location.	There is no nearby surface water. Closest surface water occurs as springs in the Garfield Hills and Black Dyke Mountains to the south.	There are no nearby active underground water rights.	None known	Access is anticipated to be very good, ~2,200 feet north of US 95 on near-level ground surface. Site is located within 1,000 foot ROW.	The proposed site and place of use are entirely within Mineral County.	Little is known about groundwater conditions in this area, which is located at the edge of the valley floor setting. The site is based upon 5-ft. Design Alignment.

Basin	SiteID	Mapped Geology	Structure	Nearby Well Descpt	Nearby Surface Water	Nearby Active Water Rights	Environmental Issues	Site Access Terrain	County Boundary	Discussion
121B - Soda Springs Valley West	SSb-2	This location is at the toe of an alluvial slope emanating from volcanic rock exposure within the Garfield Hills to the south.	No proximate mapping of structure.	The closest well is NDWR Log No. 31975, which was an NDOT well (depth=195 ft, 9 inch casing, logged as sandy gravel to total depth) located ~1.1 miles southwest of the site.	The only documented surface water is a vested water right (V06216, Duty=8 AFA, listed as OSW (other surface water), described as 'midway catchment'), located just over 2,600 ft. to the north.	The only documented surface water is a vested water right (V06216, Duty=8 AFA, listed as OSW (other surface water), described as 'midway catchment' for stock watering), located 2,600 feet north.	None known	Site should be relatively flat with good access located approximately 1,100 feet north of US 95 along the railroad bed.	The proposed site and place of use are entirely within Mineral County.	This site should provide more than enough water to meet construction demand in this basin. Groundwater should be shallow as indicated by nearby well logged as sandy gravel. The site is based upon 5-ft. Design Alignment.
110C - Walker Lake Valley - Whiskey Flat Hawthorne	WLc-1a	The proposed site lies near the toe of an alluvial fan that extends 2 miles northeast to the bedrock outcrops of the Gillis Range. Bedrock in the Gillis Range in this area consists of Mesozoic metamorphic rocks and granitic rocks.	There is no obvious structural control for groundwater in the alluvium at the proposed site.	One nearby NDWR Well Log provides an indication of subsurface conditions at the proposed site, Log 31738 located 1-1/2 miles to the south. This well penetrated interbedded sand and clay to a depth of 156 feet. SWL is at 142 feet.	The nearest surface water is Walker Lake located 9 miles northwest of the proposed site.	The nearest active underground water rights lie two miles to the west and 2.5 miles to the east-southeast of the proposed site (environmental water rights).	The proposed site lies in the northeastern part of the Hawthorne Army Deport. An extensive investigation of groundwater contamination by explosives and solvents has been conducted in the area cross-gradient and downgradient 3 to 6 miles west and northwest from the proposed site. Although its unlikely groundwater has been affected at the proposed site, sampling for contamination by solvents and explosives should be conducted before any water is put to use from this site.	The site lies on gently sloping terrain on the lower part of an alluvial fan adjacent to an existing service road, and railroad bed.	The proposed site and place of use are entirely in Mineral County.	This site would be used for construction water and for the Hawthorne siding. The site is based upon 5-ft. Design Alignment.
110C - Walker Lake Valley - Whiskey Flat Hawthorne	WLc-2a	The proposed site lies in an alluvium covered embayment into the north side of the Garfield Hills. Rocks underlying the alluvium are Triassic Excelsior formation volcanic rocks. This is considered a fairly high risk location for finding groundwater. If fractured, the shallow underlying volcanic rocks may yield adequate water to supply the quarry.	There are no nearby mapped faults to influence groundwater occurrence.	The closest well NDWR Log No. 22511 lies 2 miles east of the proposed site. This well is in a similar geologic setting as the proposed site. It penetrated alluvium from 0 to 80 feet then broken volcanic rock for the remainder of its length to 337 feet. Static water level is 270 feet bgs. The well (domestic] was pump tested at 40 gpm.	There is no nearby surface water.	The nearest active underground water rights lie 3,700 feet to the northeast (APP No. 70523 - 41 AFA - commercial), and 8,500 feet to the east northeast (APP No. 70524 - 41 AFA - Commercial).	None known.	This well site will be at the proposed Garfield Hills quarry plant site and located on the central part of a northward sloping alluvial fan.	The proposed site and place of use are entirely in Mineral County.	The proposed site lies in an alluvium covered embayment into the north side of the Garfield Hills. Rocks underlying the alluvium are Triassic Excelsior formation volcanic rocks. This is considered a fairly high risk location for finding groundwater. If fractured, the shallow underlying volcanic rocks may yield adequate water to supply the quarry. The site is based upon 5-ft. Design Alignment.
110C - Walker Lake Valley - Whiskey Flat Hawthorne	WLc-3a	The site lies at the toe of an alluvial fan that extends westward from the Gillis Range.	No mapped faults in this area.	The closest production wells are 7 miles to the west on the other side of Walker Lake.	Walker Lake lies 3 miles to the west of the proposed site.	The nearest active underground water rights are five miles to the southeast (APP No. 71730E Environmental and 70992E, Environmental).	The proposed site lies north of the Hawthorne Army Deport. An extensive investigation of groundwater contamination by explosives and solvents has been conducted in the area cross-gradient from the proposed site. Although its unlikely groundwater has been affected at the proposed site, sampling for contamination by solvents and explosives should be conducted before any water is put to use from this site.	The site lies along the existing rail line in level terrain.	The proposed well site and place of use are both in Mineral County.	TDS levels greater than 1,000 mg/l at this site will likely require water treatment for drinking water use. This site will serve for construction, construction camp # 17 and permanent rail facilities. The site is based upon 5-ft. Design Alignment.
123 - Rawhide Flats	RF-1a	The site lies in the narrow alluvium filled Long Valley between a ridge of basalt flows on the east and Tertiary andesite on the west. The depth of the alluvium is unknown but may be only a few feet so the target for groundwater could be in either alluvium or fractured rock along faults buried in this valley.	Several northwest striking unnamed faults pass through the alluvial filled part of the valley. Their influence on groundwater is unknown.	There are no nearby wells.	The nearest surface water is Stinking Springs located 5 miles to the northeast.	The nearest active underground water right is located 5 miles to the northeast. However, this area is within Walker River Paiute Reservation so it is possible that not all water being placed to beneficial use is actually permitted through the State Engineer's office.	None known.	The site lies on a flat portion of the valley 700 feet west of an existing unimproved road.	The site lies in Lyon County but the place of use would be within both Lyon County and Churchill County.	There is no information about groundwater occurrence in this part of Long Valley. Limited opportunities exist for groundwater recharge so this valley presents a high risk target area for developing adequate groundwater. The site is based upon USGS. Design Alignment.
123 - Rawhide Flats	RF-1b	The site lies in a narrow alluvium filled valley between a ridge of basalt flows on the east and Tertiary andesite on the west. The depth of the alluvium is unknown but may be only a few feet so the target for groundwater could be in either alluvium or fractured rock along faults buried in this valley. The site lies near the point where surface water flowing out of Long Valley crosses Tertiary volcanic rocks. This situation may trap groundwater that would otherwise exit the valley.	Several northwest striking unnamed faults pass through the alluvial filled part of the valley. Their influence on groundwater is unknown.	There are no nearby wells.	The nearest surface water is Stinking Springs located 5 miles to the northeast.	The nearest active underground water right is located 5 miles to the northeast. However, this area is within Walker River Paiute Reservation so it is possible that not all water being placed to beneficial use is actually permitted through the State Engineer's office.	None known.	The site is in an area of moderately incised alluvium approximately 1,200 feet west of US Highway 95.	The site lies in Lyon County but the place of use would be within both Lyon County and Churchill County.	There is no information about groundwater occurrence in this portion of Long Valley. Limited opportunities exist for groundwater recharge so this presents a high risk target area for developing adequate groundwater. The site is based upon USGS. Design Alignment.
123 - Rawhide Flats	RF-2b	The site lies on the lower part of an alluvial fan extending east from the Terrill Mountains that are composed of low permeability Tertiary volcanic breccia and tuff. Gravity data suggest that the alluvial fill in Rawhide Flat Basin is very deep.	Several northwest striking unnamed faults define the eastern range front of the Terrill Mountains Their influence on groundwater is unknown.	The nearest well is USGS well U11538 located 6 miles to the east. This well (according to Everett and Rush,1967) reaches a depth of 162 feet in alluvium. Static water level was 145 feet bgs.	The nearest surface water is Stinking Springs located 3 miles to the north.	The nearest active underground water right is located 3 miles to the north. However, this area is within Walker River Paiute Reservation so it is possible that not all water being placed to beneficial use is actually permitted through the State Engineer's office.	None known.	The site is on a gently northeast sloping alluvial fan adjacent to two existing unpaved roadways.	The site lies in Churchill County but the place of use would be within both Lyon County and Churchill County.	Groundwater information within Rawhide Flat Basin is very sparse. Although the basin receives very little recharge, the deep alluvium, presence of several springs in the lower part suggest that there could be considerable amounts of groundwater in storage here. The site is based upon USGS. Design Alignment.
123 - Rawhide Flats	RF-4b	The site lies on the lower part of an alluvial fan extending east from the Terrill Mountains that are composed of low permeability Tertiary volcanic breccia and tuff. Gravity data suggest that the alluvial fill in Rawhide Flat Basin is very deep.	Several northwest striking unnamed faults define the eastern range front of the Terrill Mountains Their influence on groundwater is unknown.	The nearest well is USGS well U11538 located 3 miles to the east. This well (according to Everett and Rush,1967) reaches a depth of 162 feet in alluvium. Static water level was 145 feet bgs.	The nearest surface water is Stinking Springs located 5 miles to the north.	The nearest active underground water right is located 5 miles to the north. However, this area is within Walker River Paiute Reservation so it is possible that not all water being placed to beneficial use is actually permitted through the State Engineer's office.	None known.	The site is on a gently northeast sloping alluvial fan adjacent to two existing unpaved roadways.	The site lies in Churchill County but the place of use would be within both Lyon County and Churchill County.	Groundwater information within Rawhide Flat Basin is very sparse. Although the basin receives very little recharge, the deep alluvium, presence of several springs in the lower part suggest that there could be considerable amounts of groundwater in storage here. The site is based upon USGS. Design Alignment.
110A - Walker Lake Valley - Schurz	WLa-1a	The proposed site lies at the edge of the valley floor near the fluvial plain and approximately 1 mile northeast of the Walker River. The nearest outcrop is a hill composed of Tertiary volcanics that lies 2.5 miles to the northeast.	No major faults are indicated in this area on the published geologic maps.	The closest well to this site is USGS U11454L located approx. 0.7 miles south. Reported depth to water in this well was 60 feet, but the well is located in an area that is approximately 138 feet lower elevation than the proposed well site.	The nearest surface water is the Walker River 1 mile to the southwest of the site.	The nearest active underground water right lies 4 miles to the southwest of the proposed site.	None known.	The site lies on the generally flat valley floor in alluvium.	Well is sited in Mineral County to provide construction water for the S1 segment in both Mineral and Lyon Counties and within (but not limited to) the Walker River Paiute Reservation.	Groundwater conditions are relatively unknown. However, based on similar geologic settings elsewhere in the basin, the well should provide enough water for the required demand in this area.The site is based upon 5-ft. Design Alignment.

Basin	SiteID	Mapped Geology	Structure	Nearby Well Descpt	Nearby Surface Water	Nearby Active Water Rights	Environmental Issues	Site Access Terrain	County Boundary	Discussion
110A - Walker Lake Valley - Schurz	WLa-1b	The proposed site is in alluvium on the northern part of the basin. Mesozoic intrusive and metamorphic rocks crop out 1 mile to the north, and Tertiary volcanics 1 mile south and 2 miles east.	There are no mapped faults near the proposed site.	The nearest well is USGS well U11475QL (NDWR Log No. 17698) located 3,000 to the east of the proposed site. The 2007 static water level of 275 feet bgs. The well penetrated to a depth of 464 feet in alluvium and cemented alluvium. Static water level was 320 feet bgs at time of construction. It was bail tested at 50 gpm with a drawdown of 5 feet.	The nearest surface water is the Walker River 4 miles to the southwest.	The nearest active water rights lie approximately 8 miles to the south of the proposed site. However, this area is within Walker River Paiute Reservation so it is possible that not all water being placed to beneficial use is actually permitted through the State Engineer's office.	None known.	The site lies in a flat alluvium covered area adjacent to US Highway 95.	The site and place of use are both within Mineral County.	The site is based upon USGS. Design Alignment.
110A - Walker Lake Valley - Schurz	WLa-1c	The site lies on the basin floor 1/4 mile south of outcropping Tertiary andesite flows in the Desert Mountains.	Several northeast striking faults are mapped on the south edge of the Desert Mountains and may separate bedrock from alluvium that has been dropped on the south side. Effects of the faults on groundwater flow are unknown.	Two nearby wells are situated in a similar geologic setting as the proposed site, Project ID No. U11589L, located 6,400 feet northeast and having a static water level of 146 feet bgs; and Project ID No. U11601L located 9,100 feet northeast and having a static water level of 159 feet bgs. No logs are available for these wells. Another well, NDWR No. 27328 located 2 miles to the northwest penetrates alluvium consisting of mostly clay to 210 feet then enters broken volcanic rock and sand to 257 feet. Water is produced from the broken rock zone and is confined with a static water level at 140 feet bgs.	The only surface water is Walker River 1 mile to the southwest.	The nearest active underground water right lies 3 miles to the northwest. However, this area is within Walker River Paiute Reservation so it is possible that not all water being placed to beneficial use is actually permitted through the State Engineer's office.	None known.	The site lies on a nearly flat area of alluvium. The nearest existing road is 1 mile to the south.	The site and place of use are both within Lyon County.	The site lies on the north edge of the alluvial plain that includes the Walker River and should be a moderately attractive location to develop significant groundwater. The aquifer at this location is broken volcanic rock located just below the alluvium as suggested by NDWR well Log 27328. The site is based upon USGS Design Alignment.
110A - Walker Lake Valley - Schurz	WLa-2b	The proposed site is in alluvium on the northern part of the basin. Tertiary volcanics crop out 1 mile south, 1 mile north and 1 mile east.	Several unnamed northwest striking faults project into the area of this well site. Their affects on groundwater are unknown.	The nearest well is USGS well U11475QL (NDWR Log No. 17698) located 2 miles to the northwest of the proposed site . The 2007 static water level of 275 feet bgs. The well penetrated to a depth of 464 feet in alluvium and cemented alluvium. Static water level was 320 feet bgs at time of construction. It was bail tested at 50 gpm with a drawdown of 5 feet.	The nearest surface water is the Walker River 4 miles to the southwest.	The nearest active water rights lie approximately 6 miles to the south of the proposed site. However, this area is within Walker River Paiute Reservation so it is possible that not all water being placed to beneficial use is actually permitted through the State Engineer's office.	None known.	The site lies in a flat alluvium covered area. There are no roads in this area.	The site and place of use are both within Mineral County.	The site is based upon USGS Design Alignment.
110A - Walker Lake Valley - Schurz	WLa-2c	The site lies on middle part of a small alluvial fan that extends south from the Desert Mountains. Tertiary andesite flows crop out 1/4 mile to the north.	Several northwest striking faults are mapped to the southeast of this site and project through the area of the site. Their affect of groundwater is unknown.	Two nearby wells are situated in a similar geologic setting as the proposed site, Project ID No. U11589L, located 11,000 feet west and having a static water level of 146 feet bgs; and Project ID No. U11601L located 9,000 feet westt and having a static water level of 159 feet bgs. No logs are available for these wells. Another well, NDWR No. 27328 located 6 miles to the west penetrates alluvium consisting of mostly clay to 210 feet then enters broken volcanic rock and sand to 257 feet. Water is produced from the broken rock zone and is confined with a static water level at 140 feet bgs. Additional wells lie along the Walker River 3 to 3 1/2 miles south and southwest of the site but these are shallow monitoring wells whose static water level is controlled by the Walker River.	The Walker River lies 3 miles to the south and is the only surface water in the area.	The nearest active underground water right lies 5 miles to the northwest.	None known.	The site lies on the middle part of a gently south sloping alluvial fan. There are no roads near the site.	The site and place of use are both within Lyon County.	The proposed site lies on BLM land near the Walker River Paiute Reservation boundary. The site is based upon USGS Design Alignment.
110A - Walker Lake Valley - Schurz	WLa-3a	The proposed site lies in the central part of the valley floor in alluvium. The nearest outcrops located 1 1/2 miles to the north are composed of Tertiary volcanics. Groundwater is shallow here (less than 50 feet).	No major faults are indicated in this area on the published geologic maps.	Two production wells lie near the proposed site. NDWR Log No. 17700 lies 1/2 mile south of the proposed site and penetrates to a depth of 124 feet in sand, clay and gravel. The main water producing zone is a gravel from 104 to 124 feet that produces 40 gpm from a bailing test. SWL is 55 feet bgs. The third well lies 1 1/2 miles east, NDWR well log no. 637. This reaches a depth of 102 feet and produces from a gravel zone at 76 to 102 feet. No production rate was indicated for this well. NDWR Well Log No. 9714 is located 1 mile northwest and was completed to a depth of only 60 feet with a yield of 60 gpm with only 9 ft of drawdown. Wells (USGS U11291L) located less than 1.5 miles east are reported as flowing.	The nearest surface water is Double Spring located approximately 7,000 feet southeast of the proposed site.	The nearest active underground water right lies 4.3 miles to the southwest of the proposed site. However, this area is within Walker River Paiute Reservation so it is possible that not all water being placed to beneficial use is actually permitted through the State Engineer's office.	None known.	The site lies on the generally flat valley floor in alluvium, approx. 5 miles east of US 95.	Well site lies in Mineral County and will provide water for parts of S1 segment lying in Mineral County on the Walker River Paiute Reservation.	The shallow alluvial aquifer should present ideal conditions for groundwater production in a well completed to shallow depths.The site is based upon 5-ft. Design Alignment.
110A - Walker Lake Valley - Schurz	WLa-3b	The proposed site lies on the central part of an alluvial slope that extends southwards from the Terrill Mountains. Bedrock exposed 1 mile to the west is Tertiary basalt flows, and 1 mile to the north and east it consists of various other Tertiary volcanic rock types. Gravity data suggest that alluvium depths in this area are at least several hundreds of feet.	Several northwest striking faults that mark the east side of the Terrill Mountains project a short distance to the east of the proposed site. What affect these have on groundwater flow is unknown.	The nearest well is USGS well site U1133L located 2 miles to the south. This reaches a depth of 84 feet in alluvium. Static water level is 34 feet bgs. Three stock wells lie 5 to 6 miles to the southwest.	The nearest surface water is Double Spring located 5 miles to the southwest.	The nearest active underground water rights lie 10 miles to the southwest. However, this area is within Walker River Paiute Reservation so it is possible that not all water being placed to beneficial use is actually permitted through the State Engineer's office.	None known.	The site is on a gently southward sloping alluvium covered area adjacent to an existing unpaved roadway.	The site and place of use are both within Mineral County.	The site is based upon USGS Design Alignment.
110A - Walker Lake Valley - Schurz	WLa-3c	The site lies on middle part of an alluvial fan that extends south from the Desert Mountains. Tertiary volcanic breccia and welded tuff crop out 1/4 mile to the north.	Several northwest striking faults are mapped to the southeast of this site and project through the area of the site. Their affect of groundwater is unknown.	There are no nearby wells.	The Walker River lies 4 1/2 miles to the southwest.	The nearest active underground water right lies 7 miles to the northwest. However, this area is within Walker River Paiute Reservation so it is possible that not all water being placed to beneficial use is actually permitted through the State Engineer's office.	None known.	The site lies on the middle part of a gently south sloping alluvial fan. There are no roads near the site.	The site and place of use are both within Lyon County.	The risk of not obtaining sufficient water at this site is fairly high. The Desert Mountains to the north provide very little groundwater recharge so the existance of saturated conditions in this part of the alluvial fan are in doubt. The site is based upon USGS Design Alignment.
110A - Walker Lake Valley - Schurz	WLa-4a	The proposed site lies in the central part of the valley floor in alluvium. The nearest outcrops located 1 1/2 miles to the north are composed of Tertiary volcanics.	No major faults are indicated in this area on the published geologic maps.	One production well lies near the proposed site. NDWR well log no. 8891 lies 1 mile to the east. This is a stock well that penetrates to a depth of 212 feet in interbedded clay and sand. Water was first encountered at 160 feet but the main producing zone is 205 to 212 feet. This was bail tested at 15 gpm. Another well (NDWR Log No. 10315) located 1.4 miles southeast of the site was completed to only 28 feet with a reported static water level of 7 feet (yield=15 gpm with 4 ft of drawdown).	The closest surface water is the Walker River 2 1/2 miles to the southwest.	The closest active underground water right lies 4 miles to the south.	None known.	The site lies on the generally flat valley floor in alluvium, immediately adjacent to US 95.	The site and place of use are both within Mineral County.	This site will supply water for Camp 18a and construction water, if needed in this area. The site is based upon 5-ft. Design Alignment.
110A - Walker Lake Valley - Schurz	WLa-4b	The proposed site lies on the lower part of an alluvial slope that extends from the northend of the Gillis Range. Rock outcrops 1/2 mile to the south consist of Mesozoic metamorphic rocks and Tertiary volcanics.	There are no nearby mapped faults.	The nearest well, NDWR No. 10113 lies 2 miles to the northwest. This is a domestic well that penetrates alluvium to it full depth of 67 feet. Static water level is 5 feet bgs.	The nearest surface water is Double Spring located 4 miles to the west.	The nearest active underground water rights are more than 9 miles to the west. However, this area is within Walker River Paiute Reservation so it is possible that not all water being placed to beneficial use is actually permitted through the State Engineer's office.	None known.	The site lies in a flat alluvium covered area adjacent to an existing unpaved road.	The site and place of use are both within Mineral County.	The site is based upon USGS Design Alignment.
110A - Walker Lake Valley - Schurz	WLa-4c	The site lies in the narrow alluvium filled Long Valley between a ridge of basalt flows on the east and Tertiary andesite on the west. The depth of the alluvium is unknown but may be only a few feet so the target for groundwater could be in either alluvium or fractured rock along faults buried in this valley.	Several northwest striking unnamed faults pass through the alluvial filled part of the valley. Their influence on groundwater is unknown.	The nearest well is USGS well U11475QL (NDWR Log No. 17698) located 2 miles south of the proposed site. The 2007 static water level of 275 feet bgs. The well penetrated to a depth of 464 feet in alluvium and cemented alluvium. Static water level was 320 feet bgs at time of construction. It was bail tested at 50 gpm with a drawdown of 5 feet.	The nearest surface water is the Walker River located 5 miles to the southwest.	The nearest active underground water right is located 6 miles to the northeast. However, this area is within Walker River Paiute Reservation so it is possible that not all water being placed to beneficial use is actually permitted through the State Engineer's office.	None known.	The site lies on a flat portion of the valley at the divide between basins adjacent to US Highway 95.	The site lies in Lyon County but the place of use would be within both Lyon County and Churchill County.	There is no information about groundwater occurrence in this portion of Long Valley. Limited opportunities exist for groundwater recharge so this presents a high risk target area for developing adequate groundwater. The site is based upon USGS. Design Alignment.

Basin	SiteID	Mapped Geology	Structure	Nearby Well Descpt	Nearby Surface Water	Nearby Active Water Rights	Environmental Issues	Site Access Terrain	County Boundary	Discussion
110A - Walker Lake Valley - Schurz	WLa-5a	The site lies at the toe of an alluvial fan that extends westward from the Gillis Range where rock outcrops consist of Mesozoic granitic rocks and Tertiary volcanic rocks.	There are no significant mapped faults in the area of the proposed well site. Gravity contours suggest the proposed site is situated near the deepest part of the alluvial basin where saturated thickness of the shallow alluvial aquifer is at a maximum.	The closest wells are USGS site (U11130L) located ~2.2 miles northwest (depth=52 ft, depth to water=4 ft), NDWR Log No. 39050 located ~3.4 miles north (depth=500, depth to water = 27 ft, yield = 3,000 gpm with 159 ft of drawdown (est. transmissivity of 33,000 gpd/ft) and NDWR Log No. 16898 located 3.5 miles northwest (depth = 460 ft, water level = 33 ft, yield = 2,500 gpm with 113 ft of drawdown. Both NDWR wells described here are used for irrigation and were completed in alluvial sediments consisting of clay with interbedded layers or sand and gravel. Depths to water at the proposed site based on generalized depths to groundwater in the region.	The closest surface water is the Walker River located 1 1/2 miles to the west.	There are no active underground water rights near the proposed well site, but there is an active surface water diversion (App No. 25792, recreational) on the Walker River approximately 2.5 miles to the south in basin 110B.	None known.	The site lies on the DOD railroad ROW in an area of gently west-sloping terrain, approx. 3 miles east of US 95.	The proposed site and place of use are entirely in Mineral County and parts of S1 segment lying in Mineral County on the Walker River Paiute Reservation.	This site lies within the Walker River Paiute Reservation. Based on wells less than 4 miles away completed in similar settings, a well at this location should safely produce the required amount of groundwater necessary to serve the siding and meet construction demand in the southern portion of the basin. The site is based upon 5-ft. Design Alignment.
110A - Walker Lake Valley - Schurz	WLa-6a	The site lies within an area consisting of alluvial fan gravel in the high permeability group. The site is surrounded by andesitic rock outcrops to the east and north. Saturated alluvial thickness may be limited.	The Wassuk Range fault system is mapped a few miles to the south, which projects approximately through the proposed well site, but the influence on groundwater flow in area is unknown.	The closest wells are USGS sites (U11589L and U11601L) located ~2.5 miles northwest (depth=unknown, depth to water ~155 ft). The wells are located in an area mapped as Quaternary fill (the same as the proposed new well site) and immediately adjacent to andesitic rock outcrops in the Desert Mountains to the north.	The closest surface water is the Walker River located 2.1 miles to the south.	The nearest active underground water right lies 4.3 miles to the southwest of the proposed site. However, this area is within Walker River Paiute Reservation so it is possible that not all water being placed to beneficial use is actually permitted through the State Engineer's office.	None known.	The site lies on the S1 ROW in an area of gently west-sloping terrain within the upper portion of the Sunshine Flat area.	The proposed site is within Lyon County on the Walker River Paiute Reservation. The place of use may include areas within Mineral County (boundary located ~4 miles to the south of this site).	This site lies within the Walker River Paiute Reservation. Based on wells less than 4 miles away completed in similar settings, a well at this location should safely produce the required amount of groundwater necessary if enough saturated high permeability alluvial gravel layers are encountered. The site is based upon 5-ft. Design Alignment.
108 - Mason Valley	Mn-2a	The site lies within valley fill of Mason Valley.	No known nearby faults that would influence groundwater.	The nearest production well lies 1.1 miles to the northeast, NDWR Log No. 46261. This domestic well penetrated to a depth of 222 feet; in alluvium to 110 feet then fractured basalt to 222 feet. It was pump tested at 30 gpm. SWL was 11 feet bgs.	The Walker River lies 1/4 mile to the west and Joggles Slough lies 1/4 mile to the east.	The nearest active underground water right lies 1.1 miles north(APP No. 54631-irrigation).	None known.	The proposed well site lies on the railroad ROW on level ground.	The proposed site and place of use are entirely within Lyon County.	This site has been placed within 30 feet of the rail siding tracks since all surrounding land is privately owned. The site is based upon 5-ft. Design Alignment.

*Miscellaneous Notes:

*Well site information for Crater Flat (229), Oasis Valley (228), Sarcobatus Flat (146), Stonewall Flat (145) and portions of Lida Valley (144) and Alkali Spring Valley (142) is included in Appendices C and D.

** See Appendix C for wells on MN2/GF4 segment needed to complete the route through Alkali Spring Basin; and for MN2/GF4/CS4/BC2 and MN2/GF4/CS4/BC3 segments needed to complete the route through Lida Valley.

*** See Appendix C for wells on MN1/MCS2/BC2 or MN1/MCS2/BC3 segment needed to complete the route through Lida Valley.

Appendix C

APPENDIX C.
PROPOSED WELL SITES COMMON PORTION
BY BASIN AND ROUTE

Basin	Route (Mina Name)	Route	Demand Point Station	Required Demand Point Production Rate (gpm)	Site ID	UTM East (feet)	UTM North (feet)	Number of Wells per Site	Well Type	Potable	Permanent	Proposed Well Depth (feet-bgs)	Estimated Available Production Rate per Well (gpm)	Within 1000 ft CRC ROW
Crater Flat 229														
Crater Flat														
Crater Flat	*CS6*	*CS6*	17054+00	61	CF1	1766639.30	13386596.21	2	Construction/Siding	No	Yes	1500 - 2000	50	Yes
			17404+00	36	CF2	1776441.22	13366744.48	2	Construction	No	No	1500 - 2000	50	Yes
			17554+00	56	CF3	1787878.67	13357931.98	2	Construction	No	No	1500 - 2000	50	Yes
			17744+00	60	CF4	1799460.11	13343515.19	2	Construction/Camp	Yes	No	1200 - 1500	50	Yes
				Well Sites	4		**Wells Total**	8						
Oasis Valley 228														
Oasis Valley														
Oasis Valley	CS5/OV3/CS6	CS5/OV3/CS6	16200+00	55	OV10	1712983.19	13461777.05	2	Construction	No	No	150 - 300	20	Yes
					OV11	1713417.21	13461681.55	1	Construction	No	No	150 - 300	20	Yes
			16718+00	136	OV14	1717901.40	13417366.99	2	Construction - alt	No	No	100 - 150	50	No
					OV15	1738784.14	13422159.07	2	Construction	No	No	1000 - 2000	50	Yes
					OV23	1739402.24	13416340.59	1	Construction	No	No	500 - 2,000?	50	No
					OV16	1717814.58	13418582.28	2	Construction - alt	No	No	100 - 150	50	No
			46200+00	174	OV12	1723781.91	13461031.94	2	Construction	No	No	150 - 300	20	Yes
					OV18	1723480.07	13460890.86	2	Construction	No	No	150 - 300	20	Yes
					OV19	1723125.74	13460808.83	2	Construction	No	No	150 - 300	20	Yes
					OV20	1726916.74	13462154.68	2	Construction	No	No	100 - 200	20	Yes
					OV21	1727520.90	13462300.53	2	Construction	No	No	100 - 200	20	Yes
			46315+00	20	OV17	1729511.09	13449891.42	1	Camp	Yes	No	50 - 150	20 - 30	Yes
			46450+00	89	OV13	1726771.65	13450468.94	2	Construction	No	No	50 - 100	50	Yes
					OV24	1702299.71	13467871.44	2	Construction - alt	No	No	100-150	50	Yes
				Well Sites	14		**Wells Total**	25						
Oasis Valley														
Oasis Valley	*CS5/OV1/CS6*	*CS5/OV1/CS6*	16200+00	34	OV1	1712983.19	13461777.05	2	Construction	No	No	150 - 300	20	Yes
					OV2	1713417.21	13461681.55	1	Construction	No	No	150 - 300	20	Yes
			16344+00	109	OV3	1725562.64	13453614.74	2	Construction	No	No	50 - 100	50	Yes
					OV4	1725000.14	13454260.56	1	Construction	No	No	50 - 100	50	Yes
					OV24	1702299.71	13467871.44	2	Construction - alt	No	No	100-150	50	Yes
					OV25	1703195.53	13466933.95	1	Construction - alt	No	No	100-150	50	Yes
			16410+00	20	OV9	1726968.88	13447655.30	2	Camp	Yes	No	50 - 150	20	Yes
			16494+00	40	OV5	1726771.65	13450468.94	2	Construction	No	No	50 - 100	50	Yes
					OV26	1704341.36	13466079.81	1	Construction - alt	No	No	100-150	50	Yes

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BY BASIN AND ROUTE

Basin	Route (Mina Name)	Route	Demand Point Station	Required Demand Point Production Rate (gpm)	Site ID	UTM East (feet)	UTM North (feet)	Number of Wells per Site	Well Type	Potable	Permanent	Proposed Well Depth (feet-bgs)	Estimated Available Production Rate per Well (gpm)	Within 1000 ft CRC ROW
Oasis Valley	*CS5/OV1/CS6*	*CS5/OV1/CS6*	16718+00	132	OV6	1717901.40	13417366.99	2	Construction - alt	No	No	100 - 150	50	No
					OV7	1738784.14	13422159.07	2	Construction	No	No	1000 - 2000	50	Yes
					OV22	1739402.24	13416340.59	1	Construction	No	No	500 - 2,000?	50	No
					OV8	1717814.58	13418582.28	2	Construction - alt	No	No	100 - 150	50	No
				Well Sites	**13**		**Wells Total**	**21**						
Sarcobatus Flat 146														
Sarcobatus Flat														
Sarcobatus Flat	BC2/CS5	BC2/CS5	15200+00	81	SaF9	1644204.11	13527332.84	2	Construction/Camp	Yes	No	200 - 300	50	Yes
			15550+00	66	SaF10	1663434.41	13498950.45	2	Construction	No	No	200 - 300	50	Yes
			15950+00	78	SaF11	1698684.14	13479982.32	2	Construction/Siding	No	Yes	200 - 300	50	Yes
			44582+00	77	SaF8	1626511.28	13560725.19	2	Construction	No	No	150 - 300	50	Yes
				Well Sites	**4**		**Wells Total**	**8**						
Sarcobatus Flat														
Sarcobatus Flat	*BC3/CS5*	*BC3/CS5*	14688+00	92	SaF1	1611494.02	13563780.81	2	Construction	No	No	200 - 300	50	Yes
					SaF2	1613660.70	13562697.45	1	Construction	No	No	200 - 300	50	Yes
			14888+00	52	SaF3	1626389.77	13556886.85	2	Construction/Siding	No	Yes	200 - 300	50	Yes
			15100+00	59	SaF4	1636910.35	13542238.55	2	Construction	No	No	200 - 500	50	Yes
			15176+00	20	SaF5	1644204.11	13527332.84	1	Camp	Yes	No	200 - 300	20	Yes
			15550+00	70	SaF6	1663434.41	13498950.45	2	Construction	No	No	200 - 300	50	Yes
			15950+00	78	SaF7	1698684.14	13479982.32	2	Construction/Siding	No	Yes	200 - 300	50	Yes
				Well Sites	**7**		**Wells Total**	**12**						
Lida Valley 144														
Lida Valley														
Lida Valley	MN2/GF4/CS4/MCS2/BC2	GF4/CS4/BC2	13775+00	20	LV19	1600930.92	13645216.77	1	Camp	Yes	No	400 - 500	20	Yes
			14028+00	48	LV13	1592323.36	13627932.76	2	Construction	No	No	250 - 400	20	Yes
					LV14	1592025.55	13625161.30	2	Construction	No	No	250 - 400	20	Yes
			43102+00	49	LV9	1585840.44	13651506.17	2	Construction	No	No	400 - 500	20	No
					LV10	1585788.54	13651220.40	1	Construction	No	No	400 - 500	20	No
			43302+00	69	LV11	1585840.44	13651506.17	2	Construction	No	No	400 - 500	20	No
					LV12	1585767.71	13651991.25	2	Construction	No	No	400 - 500	20	No
			44098+00	64	LV15	1606768.75	13595392.42	2	Construction	No	No	250 - 400	20	Yes
					Lv16	1605171.29	13596702.07	2	Construction	No	No	250 - 400	20	Yes
			44282+00	62	LV17	1612449.02	13594188.09	2	Construction	No	No	250 - 400	20	Yes
					LV18	1613469.85	13594021.41	2	Construction	No	No	250 - 400	20	Yes

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BY BASIN AND ROUTE

Basin	Route (Mina Name)	Route	Demand Point Station	Required Demand Point Production Rate (gpm)	Site ID	UTM East (feet)	UTM North (feet)	Number of Wells per Site	Well Type	Potable	Permanent	Proposed Well Depth (feet-bgs)	Estimated Available Production Rate per Well (gpm)	Within 1000 ft CRC ROW
				Well Sites	**11**		**Wells Total**	**20**						
Lida Valley														
Lida Valley	MN1/MCS2 /BC2 **	CS4 /BC2 **	44098+00	34	LV15	1606768.75	13595392.42	2	Construction	No	No	250 - 400	20	Yes
					Lv16	1605171.29	13596702.07	2	Construction	No	No	250 - 400	20	Yes
			44282+00	62	LV17	1612449.02	13594188.08	2	Construction	No	No	250 - 400	20	Yes
					LV18	1613469.85	13594021.41	2	Construction	No	No	250 - 400	20	Yes
				Well Sites	**4**		**Wells Total**	**8**						
Lida Valley														
Lida Valley	MN2/GF4/CS4/MCS2/BC3	GF4/CS4/BC3	13775+00	20	LV8	1600930.92	13645216.77	1	Camp	Yes	No	400 - 500	20	Yes
			14028+00	57	LV5	1592323.36	13627932.76	2	Construction	No	No	250 - 400	20	Yes
					LV6	1592025.55	13625161.30	2	Construction	No	No	250 - 400	20	Yes
			14448+00	47	LV7	1605733.76	13586597.54	2	Construction	No	No	250 - 400	30	Yes
			43102+00	48	LV1	1585840.44	13651506.17	2	Construction	No	No	400 - 500	20	No
					LV2	1585788.54	13651220.40	1	Construction	No	No	400 - 500	20	No
			43302+00	67	LV3	1585840.44	13651506.17	2	Construction	No	No	400 - 500	20	No
					LV4	1585767.71	13651991.25	2	Construction	No	No	400 - 500	20	No
				Well Sites	**8**		**Wells Total**	**14**						
Lida Valley														
Lida Valley	***MN1/MCS2/BC3 ****	***CS4/BC3 ****	14448+00	50	LV7	1605733.76	13586597.54	2	Construction	No	No	250 - 400	30	Yes
				Well Sites	**1**		**Wells Total**	**2**						
Stonewall Flat 145														
Stonewall Flat														
Stonewall Flat	MN2/GF4	GF4	43542+00	35	StF11	1604765.29	13654622.22	2	Construction	No	No	400 - 500	20	Yes
				Well Sites	**1**		**Wells Total**	**2**						
Alkali Spring Valley 142														
Alkali Spring Valley														
Alkali Spring Valley	MN2/GF4 ***	GF4***	42778+00	55	ASV4	1579707.41	13741653.48	2	Construction	No	No	200 - 300	50	No
					ASV5	1579811.57	13741320.14	2	Construction	No	No	200 - 300	50	No
			42978+00	165	ASV8	1579915.74	13740799.29	2	Construction	No	No	200 - 300	50	No
					ASV9	1579519.91	13742424.33	2	Construction	No	No	200 - 300	50	No
				Well Sites	**4**		**Wells Total**	**8**						

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PROPOSED WELL SITES COMMON PORTION
BY BASIN AND ROUTE

Basin	Route (Mina Name)	Route	Demand Point Station	Required Demand Point Production Rate (gpm)	Site ID	UTM East (feet)	UTM North (feet)	Number of Wells per Site	Well Type	Potable	Permanent	Proposed Well Depth (feet-bgs)	Estimated Available Production Rate per Well (gpm)	Within 1000 ft CRC ROW
Alkali Spring Valley														
Alkali Spring Valley			Quarry ES-7	24	ASV6	1560427.12	13700545.69	2	Quarry	No	Yes	100 - 200	10 - 30	No
Alkali Spring Valley			Quarry ES-7	24	ASV7	1569206.51	13715359.34	2	Quarry - alt	No	Yes	200 - 300	10 - 30	No
				Well Sites	2		**Wells Total**	4						

Notes:

* Includes water demands and wells for CS4/BC3 portion only. See Appendix A for additional wells on MN1 segment needed to complete the route through Lida Valley.

** Includes water demands and wells for CS4/BC2 portion only. See Appendix A for additional wells on MN1 segment needed to complete the route through Lida Valley.

*** Includes water demands and wells for GF4 portion only. See Appendix A for additional wells on MN2/GF4 segment needed to complete the route through Alkali Spring Valley.

Proposed Well Sites Common Portion - Comments

Appendix D

APPENDIX D.
PROPOSED WELL SITES COMMON PORTION
BY BASIN AND ROUTE (Comments)

Basin	Route (Mina Name)	Route	Demand Point Station	Required Demand Point Production Rate (gpm)	Site ID	Comments
Crater Flat 229						
Crater Flat						
Crater Flat	*CS6*	*CS6*	17054+00	61	CF1	Based on other wells in the basin the static water level at this site should be between 900 and 1,000 below surface with actual depths to water producing zones even greater. The nearest two production wells (Crater Flat 1 and PW-2) located 3 miles to the northwest extend to depths of 1,600 to 2,100 feet. Assuming that specific capacities of new wells are similar to well PW-2 then at least 200 feet of water column would be needed to supply a 50 gpm production rate.
			17404+00	36	CF2	Based on other wells in the basin the static water level at these sites should be between 800 and 1,000 feet below surface with actual depths to water producing zones even greater. The nearest two wells are located 2.2 miles west (well VH-2) and 1.4 miles southwest (well VH-1). The most productive water zone in VH-1 was at a depth of approximately 1,900 feet so well depths of 2,000 feet are suggested for this location. Pump test results on well VH-1 suggest that a production rate of 50 gpm is a reasonable expectation for wells at this site.
			17554+00	56	CF3	Based on other wells in the basin the static water level at these sites should be between 800 and 1,000 feet below surface with actual depths to water producing zones even greater. The nearest two wells are located 1.5 miles northeast (well WT-10) and 3 miles west (well VH-1). The most productive water zone in VH-1 was at a depth of approximately 1,900 feet so well depths of 2,000 feet are suggested for this location. Pump test results on well VH-1 suggest that a production rate of 50 gpm is a reasonable expectation for wells at this site.
			17744+00	60	CF4	Based on other wells in the basin the static water level at these sites should be between 800 and 1,000 feet below surface with actual depths to water producing zones even greater. The nearest two wells are located 2.1 miles north (well WT-11) and 1-mile northeast (well VH-10). Water levels in these wells and a monitoring well EWDP-18P 0.4 miles east, suggest that the static water level at this site will be in the range of 900 to 1,100 feet. A minimum depth for these wells is 1,100 to 1,300 feet although it may be necessary to drill significant deeper to intersect a sufficiently productive fractured rock aquifer. Insufficient data is available to further define this depth. Wells sited near fault zone.
Oasis Valley 228						
Oasis Valley						
Oasis Valley	*CS5/OV1/CS6*	*CS5/OV1/CS6*	16200+00	34	OV1	Likely low yielding wells in volcanics.
					OV2	Likely low yielding wells in volcanics.
			16344+00	109	OV3	The proposed site should be placed near the eastern edge of the CRC in order to avoid a large wetland area caused by springs. Groundwater should be encountered at this location in valley fill between 10 and 50 feet based on three existing wells, 1,200 feet to the south-southwest, 1,900 feet to the south-southeast, and 1,900 feet to the east of the proposed site. Groundwater is very shallow here caused by a fault zone that dams southwestward flowing groundwater in underlying volcanic rocks from Pahute Mesa area. Drilling depths to ensure intersection of reliable production should be 50 to 100 feet. Production capacity in excess of 50 gpm per well is highly probable based on typical characteristics of valley fill alluvial aquifers in the area. Typically water in this area contains elevated levels of fluoride making it unsuitable for potable water use.
					OV4	The proposed site should be placed near the eastern edge of the CRC in order to avoid a large wetland area caused by springs. Groundwater should be encountered at this location in valley fill between 10 and 50 feet based on three existing wells, 1,200 feet to the south-southwest, 1,900 feet to the south-southeast, and 1,900 feet to the east of the proposed site. Groundwater is very shallow here caused by a fault zone that dams southwestward flowing groundwater in underlying volcanic rocks from Pahute Mesa area. Drilling depths to ensure intersection of reliable production should be 50 to 100 feet. Production capacity in excess of 50 gpm per well is highly probable based on typical characteristics of valley fill alluvial aquifers in the area. Typically water in this area contains elevated levels of fluoride making it unsuitable for potable water use.
					OV24	Well site in alluvial aquifer. Alternate well site location for OV3 and OV4.
					OV25	Well site in alluvial aquifer. Alternate well site location for OV3 and OV4.
			16410+00	20	OV9	Construction camp. Typically water in this area contains elevated levels of fluoride making it unsuitable for potable water use. High potential for conflict with existing water users.
			16494+00	40	OV5	Groundwater should be encountered at this location in valley fill between 10 and 50 feet based on three existing wells in the area. Groundwater is very shallow here caused by a fault zone that dams southwestward flowing groundwater in underlying volcanic rocks from Pahute Mesa area. Drilling depths to ensure intersection of reliable production should be 50 to 100 feet. Production capacity in excess of 50 gpm per well is highly probable based on typical characteristics of valley fill alluvial aquifers in the area. Typically water in this area contains elevated levels of fluoride making it unsuitable for potable water use.
					OV26	Well site in alluvial aquifer. Alternate well site location for OV5.
			16718+00	132	OV6	Well site in in Soberup Gulch in alluvium. No existing road access. This site is an alternative to probable low yielding well sites located on the CRC. Use only if water can't be ontained along the CRC.
					OV7	No aquifer test data has been found for existing wells in volcanic rocks near the CRC. Wells in the area are monitoring wells to the north and east of the CRC and only shallow alluvial wells lie to the west of the CRC. Historically much of the groundwater used in the Oasis Valley basin has come from springs and shallow dug wells in the alluvium. The largest production wells in the basin are a part of the Beatty Water and Sanitation system where individual wells yield from 80 to 275 gpm from alluvium in the Bullfrog Hills. - This demand location is situated in an area underlain by Tertiary volcanic rocks. The area surrounding these locations is devoid of any wells so that there is no specific data to evaluate the potential for viable wells in this area on the CRC. 2 wells in volcanics no data to specify wells. Possible water production from intersecting faulted areas in the volcanics. It is designed to intersect a low angle west-dipping detachment fault (possibly water-bearing) whose trace passes through station 16755. High risk to produce significant water.
					OV22	No data near this site to specify wells. This site is in volcanic rocks approximately ½ mile west of the CRC at station 16755. It is designed to intersect a low angle west-dipping detachment fault (possibly water-bearing) whose trace passes through station 16755. High risk to produce significant water.
					OV8	Well site in in Soberup Gulch in alluvium. No existing road access. This site is an alternative to probable low yielding well sites located on the CRC. Use only if water can't be ontained along the CRC.

APPENDIX D.
PROPOSED WELL SITES COMMON PORTION
BY BASIN AND ROUTE (Comments)

Basin	Route (Mina Name)	Route	Demand Point Station	Required Demand Point Production Rate (gpm)	Site ID	Comments
Oasis Valley						
Oasis Valley	CS5/OV3/CS6	CS5/OV3/CS6	16200+00	55	OV10	Likely low yielding wells in volcanics.
					OV11	Likely low yielding wells in volcanics.
			16718+00	136	OV14	Well site in in Soberup Gulch in alluvium. No existing road access. This site is an alternative to probable low yielding well sites located on the CRC. Use only if water can't be ontained along the CRC.
					OV15	No aquifer test data has been found for existing wells in volcanic rocks near the CRC. Wells in the area are monitoring wells to the north and east of the CRC and only shallow alluvial wells lie to the west of the CRC. Historically much of the groundwater used in the Oasis Valley basin has come from springs and shallow dug wells in the alluvium. The largest production wells in the basin are a part of the Beatty Water and Sanitation system where individual wells yield from 80 to 275 gpm from alluvium in the Bullfrog Hills. - This demand location is situated in an area undertain by Tertiary volcanic rocks. The area surrounding these locations is devoid of any wells so that there is no specific data to evaluate the potential for viable wells in this area on the CRC. 2 wells in volcanics no data to specify wells. Possible water production from intersecting faulted areas in the volcanics. It is designed to intersect a low angle west-dipping detachment fault (possibly water-bearing) whose trace passes through station 16755. High risk to produce significant water.
					OV23	No data near this site to specify wells. This site is in volcanic rocks approximately ⅛ mile west of the CRC at station 16755. It is designed to intersect a low angle west-dipping detachment fault (possibly water-bearing) whose trace passes through station 16755. High risk to produce significant water.
					OV16	Well site in in Soberup Gulch in alluvium. No existing road access. This site is an alternative to probable low yielding well sites located on the CRC. Use only if water can't be ontained along the CRC.
Oasis Valley	CS5/OV3/CS6	CS5/OV3/CS6	46200+00	174	OV12	Wells sites in Tertiary sediments. Likely low yielding wells.
					OV18	Wells sites in Tertiary sediments. Likely low yielding wells.
					OV19	Wells sites in Tertiary sediments. Likely low yielding wells.
					OV20	Wells sites in Tertiary sediments. Likely low yielding wells.
					OV21	Wells sites in Tertiary sediments. Likely low yielding wells.
			46315+00	20	OV17	Site well in alluvial channel along existing road near margin of CRC in Tertiary sediments.
			46450+00	89	OV13	Groundwater should be encountered at this location in valley fill between 10 and 50 feet based on three existing wells in the area. Groundwater is very shallow here caused by a fault zone that dams southwestward flowing groundwater in underlying volcanic rocks from Pahute Mesa area. Drilling depths to ensure intersection of reliable production should be 50 to 100 feet. Production capacity in excess of 50 gpm per well is highly probable based on typical characteristics of valley fill alluvial aquifers in the area. Typically water in this area contains elevated levels of fluoride making it unsuitable for potable water use.
					OV24	Well site in alluvial aquifer. Alternate well site location for OV13.
Sarcobatus Flat 146						
Sarcobatus Flat						
Sarcobatus Flat	BC2/CS5	BC2/CS5	15200+00	81	SaF9	Supply construction camp as well as demand point.
			15550+00	66	SaF10	The proposed site should be placed near the southwestern edge of the CRC adjacent to US 95 . Groundwater should be encountered at this location in valley fill between 40 and 100 feet based the nearest 2 wells that are 4 miles south and4 miles to the southeast of the proposed site and at a similar elevation. Drilling depths to ensure intersection of reliable production should be 200 to 300 feet. Production capacity in excess of 200 gpm per well is possible.
			15950+00	78	SaF11	'Groundwater should be encountered at this location in valley fill between 50 and 150 feet based the nearest well which lies 3,000 feet to the southeast of the proposed site and at a similar elevation. Drilling depths to ensure intersection of reliable production should be 200 to 300 feet. Production capacity in excess of 200 gpm per well is possible.
			44582+00	77	SaF8	Proposed site in valley fill. Nearest well is 2 miles south with water depth of 135 feet.

APPENDIX D.
PROPOSED WELL SITES COMMON PORTION
BY BASIN AND ROUTE (Comments)

Basin	Route (Mina Name)	Route	Demand Point Station	Required Demand Point Production Rate (gpm)	Site ID	Comments
Sarcobatus Flat						
Sarcobatus Flat	*BC3/CS5*	*BC3/CS5*	14688+00	92	SaF1	Generally in the Sarcobatus Flat Basin groundwater will be encountered at one or more zones within the alluvial materials. Partial confinement of water-bearing zones is common in alluvial basins in Nevada so that actual depths to producing zones may be more than this. In addition, it is advisable to intersect multiple water producing zones so that a large thickness of aquifer is exposed to the well screen. This increases the probability that wells will have a higher productive capacity. In general useable quantities of water may be expected in the valley fill along much of the CRC within Sarcobatus Flat basin as long as its not in an area close to bedrock exposures where the alluvium is too thin to permit a reasonable saturated thickness above bedrock. The proposed site should be placed near the southern edge of the CRC in order to ensure an adequate thickness of saturated valley fill for productive wells. Groundwater should be encountered at this location in valley fill between 100 and 200 feet based on wells near Scotty's Junction, the nearest of which is 4.4 miles to the southeast of the proposed site. Production capacity in excess of 200 gpm per well is possible.
					SaF2	Generally in the Sarcobatus Flat Basin groundwater will be encountered at one or more zones within the alluvial materials. Partial confinement of water-bearing zones is common in alluvial basins in Nevada so that actual depths to producing zones may be more than this. In addition, it is advisable to intersect multiple water producing zones so that a large thickness of aquifer is exposed to the well screen. This increases the probability that wells will have a higher productive capacity. In general useable quantities of water may be expected in the valley fill along much of the CRC within Sarcobatus Flat basin as long as its not in an area close to bedrock exposures where the alluvium is too thin to permit a reasonable saturated thickness above bedrock. The proposed site should be placed near the southern edge of the CRC in order to ensure an adequate thickness of saturated valley fill for productive wells. Groundwater should be encountered at this location in valley fill between 100 and 200 feet based on wells near Scotty's Junction, the nearest of which is 4.4 miles to the southeast of the proposed site. Production capacity in excess of 200 gpm per well is possible.
Sarcobatus Flat	*BC3/CS5*	*BC3/CS5*	14888+00	52	SaF3	Generally in the Sarcobatus Flat Basin groundwater will be encountered at one or more zones within the alluvial materials. Partial confinement of water-bearing zones is common in alluvial basins in Nevada so that actual depths to producing zones may be more than this. In addition, it is advisable to intersect multiple water producing zones so that a large thickness of aquifer is exposed to the well screen. This increases the probability that wells will have a higher productive capacity. In general useable quantities of water may be expected in the valley fill along much of the CRC within Sarcobatus Flat basin as long as its not in an area close to bedrock exposures where the alluvium is too thin to permit a reasonable saturated thickness above bedrock. The proposed site should be placed near the southern edge of the CRC in order to ensure an adequate thickness of saturated valley fill for productive wells. Groundwater should be encountered at this location in valley fill between 100 and 200 feet based on wells near Scotty's Junction, the nearest of which is 4.4 miles to the southeast of the proposed site. Production capacity in excess of 200 gpm per well is possible.
			15100+00	59	SaF4	No data on groundwater depth.
			15176+00	20	SaF5	Supply construction camp only
			15550+00	70	SaF6	The proposed site should be placed near the southwestern edge of the CRC adjacent to US 95 . Groundwater should be encountered at this location in valley fill between 40 and 100 feet based the nearest 2 wells that are 4 miles south and4 miles to the southeast of the proposed site and at a similar elevation. Drilling depths to ensure intersection of reliable production should be 200 to 300 feet. Production capacity in excess of 200 gpm per well is possible.
			15950+00	78	SaF7	'Groundwater should be encountered at this location in valley fill between 50 and 150 feet based the nearest well which lies 3,000 feet to the southeast of the proposed site and at a similar elevation. Drilling depths to ensure intersection of reliable production should be 200 to 300 feet. Production capacity in excess of 200 gpm per well is possible.
Lida Valley 144						
Lida Valley						
Lida Valley	MN2/GF4/CS4/MCS2/BC2	GF4/CS4/BC2	13775+00	20	LV8	Construction camp well. Site is in valley fill adjacent to volcanic rock outcrop. Numerous north-northeast striking bedrock faults are in this area.
			14028+00	48	LV13	Site is in valley fill adjacent to volcanic rock outcrop. Numerous north-northeast striking bedrock faults are in this area.
					LV14	Site is in valley fill.
			43102+00	49	LV9	Demand point is poor site for wells. Locate off CRC in valley fill to south. No data on water depth.
					LV10	Demand point is poor site for wells. Locate off CRC in valley fill to south. No data on water depth.
			43302+00	69	LV11	Demand point is poor site for wells. Locate off CRC in valley fill to south. No data on water depth.
					LV12	Demand point is poor site for wells. Locate off CRC in valley fill to south. No data on water depth.
			44098+00	64	LV15	Well site in valley fill.
					Lv16	Well site in valley fill.
			44282+00	62	LV17	Well site in valley fill.
					LV18	Well site in valley fill.

APPENDIX D.
PROPOSED WELL SITES COMMON PORTION
BY BASIN AND ROUTE (Comments)

Basin	Route (Mina Name)	Route	Demand Point Station	Required Demand Point Production Rate (gpm)	Site ID	Comments
Lida Valley						
Lida Valley	MN1/MCS2 /BC2 **	CS4 /BC2 **	44098+00	34	LV15	Well site in valley fill.
					Lv16	Well site in valley fill.
			44282+00	62	LV17	Well site in valley fill.
					LV18	Well site in valley fill.
Lida Valley						
Lida Valley	MN2/GF4/CS4/MCS2/BC3	GF4/CS4/BC3	13775+00	20	LV8	Construction camp well. Site is in valley fill adjacent to volcanic rock outcrop. Numerous north-northeast striking bedrock faults are in this area.
			14028+00	57	LV5	Site is in valley fill adjacent to volcanic rock outcrop. Numerous north-northeast striking bedrock faults are in this area.
					LV6	Site is in valley fill.
			14448+00	47	LV7	A few small stock wells lie near the CRC in the Lida Valley Basin but no aquifer test data is available. All of these produce water from valley fill.
			43102+00	48	LV1	Demand point is poor site for wells. Locate off CRC in valley fill to south. No data on water depth.
					LV2	Demand point is poor site for wells. Locate off CRC in valley fill to south. No data on water depth.
			43302+00	67	LV3	Demand point is poor site for wells. Locate off CRC in valley fill to south. No data on water depth.
					LV4	Demand point is poor site for wells. Locate off CRC in valley fill to south. No data on water depth.
Lida Valley						
Lida Valley	***MN1/MCS2/BC3 ****	***CS4/BC3 ****	14448+00	50	LV7	A few small stock wells lie near the CRC in the Lida Valley Basin but no aquifer test data is available. All of these produce water from valley fill.
Stonewall Flat 145						
Stonewall Flat						
Stonewall Flat	MN2/GF4	GF4	43542+00	35	StF11	Well site in alluvium. No nearby wells.
Alkali Spring Valley 142						
Alkali Spring Valley						
Alkali Spring Valley	MN2/GF4 ***	GF4 ***	42778+00	55	ASV4	Well site located in valley fill on an alluvial fan. Wells may be capable of significantly higher production than estimated 50 gpm.
					ASV5	Well site located in valley fill on an alluvial fan. Wells may be capable of significantly higher production than estimated 50 gpm.
			42978+00	165	ASV8	Well site located in valley fill on an alluvial fan. Wells may be capable of significantly higher production than estimated 50 gpm.
					ASV9	Well site located in valley fill on an alluvial fan. Wells may be capable of significantly higher production than estimated 50 gpm.
Alkali Spring Valley						
Alkali Spring Valley			Quarry ES-7	24	ASV6	Site located along NE striking fault zone in upper part of alluvial fan. Target is water in underlying fractured volcanics.
Alkali Spring Valley			Quarry ES-7	24	ASV7	Alternate well location located on alluvial fan adjacent to US 95. Save one well for siding.

Notes:

* Includes water demands and wells for CS4/BC3 portion only. See Appendix A for additional wells on MN1 segment needed to complete the route through Lida Valley.

** Includes water demands and wells for CS4/BC2 portion only. See Appendix A for additional wells on MN1 segment needed to complete the route through Lida Valley.

*** Includes water demands and wells for GF4 portion only. See Appendix A for additional wells on MN2/GF4 segment needed to complete the route through Alkali Spring Valley.

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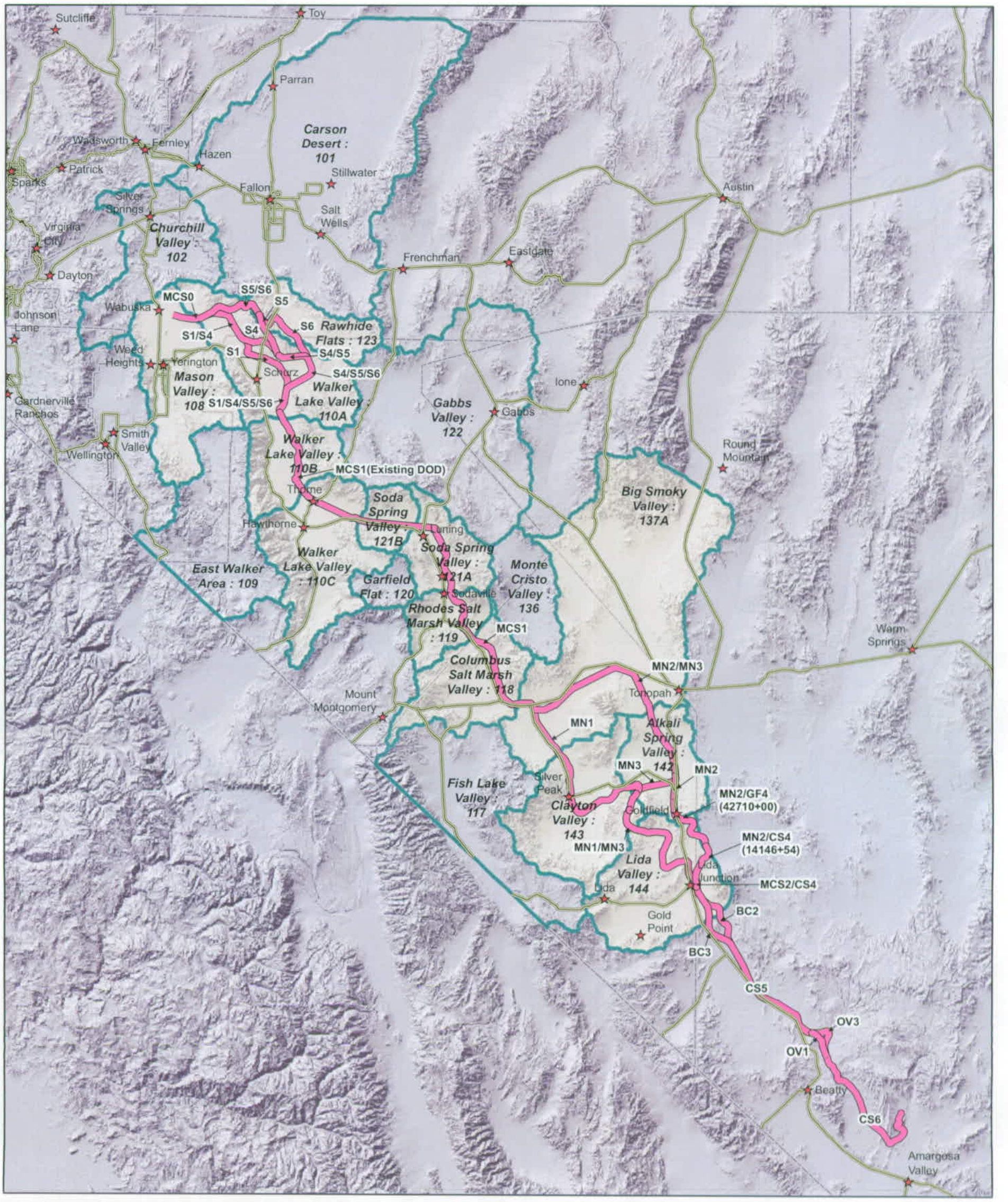
PB 100 YEARS



Legend

- Towns
- Major Roads
- Mina Alignment
- County Boundary
- USGS National Elevation Dataset
- Mina Rail Corridor Basins
- Study Corridor Basins

N W E S

Plate 1-1:
Basin Boundaries & Proposed Rail Corridor

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

0 10 20 40 Miles

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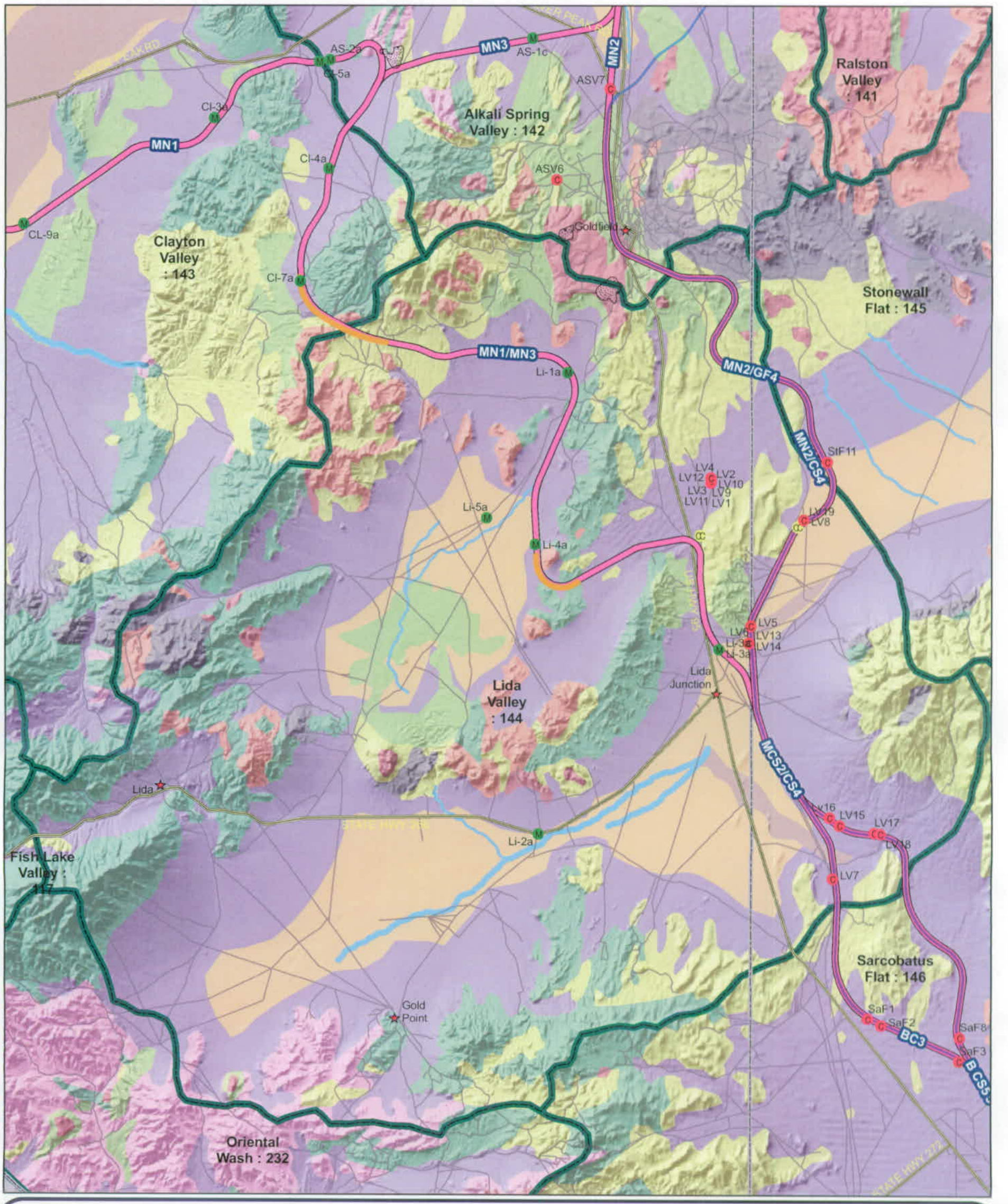
PB



Legend

Proposed Well Sites

- Mina Well Site
- Caliente Well Site

Camps and Facilities

- Construction Camps
- Mina Sidings
- Quarry Location
- Facility

Hydrogeology

- Alluvial Slope
- Andesitic Volcanic Flows
- Basaltic Volcanic Flows
- Clastic/Carbonate
- Clastic Sandstones and Siltstones
- Fluvial Deposits
- Intrusive and Metamorphic Rocks
- Playa
- Rhyolitic Volcanic Flows
- Tertiary Fine-Grained Semiconsolidated Sediments
- Valley Floor
- Volcanic Breccias/Welded Tuffs/Old Volcanics
- Water

Map Reference

- Towns
- Major Roads
- Minor Roads
- Mina Rail Alignment
- Caliente Rail Alignment
- Basin Boundary
- County Boundary
- USGS National Elevation Dataset

N W E S

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

0 1.5 3 6 Miles

Plate 4-1: Lida Valley (144)

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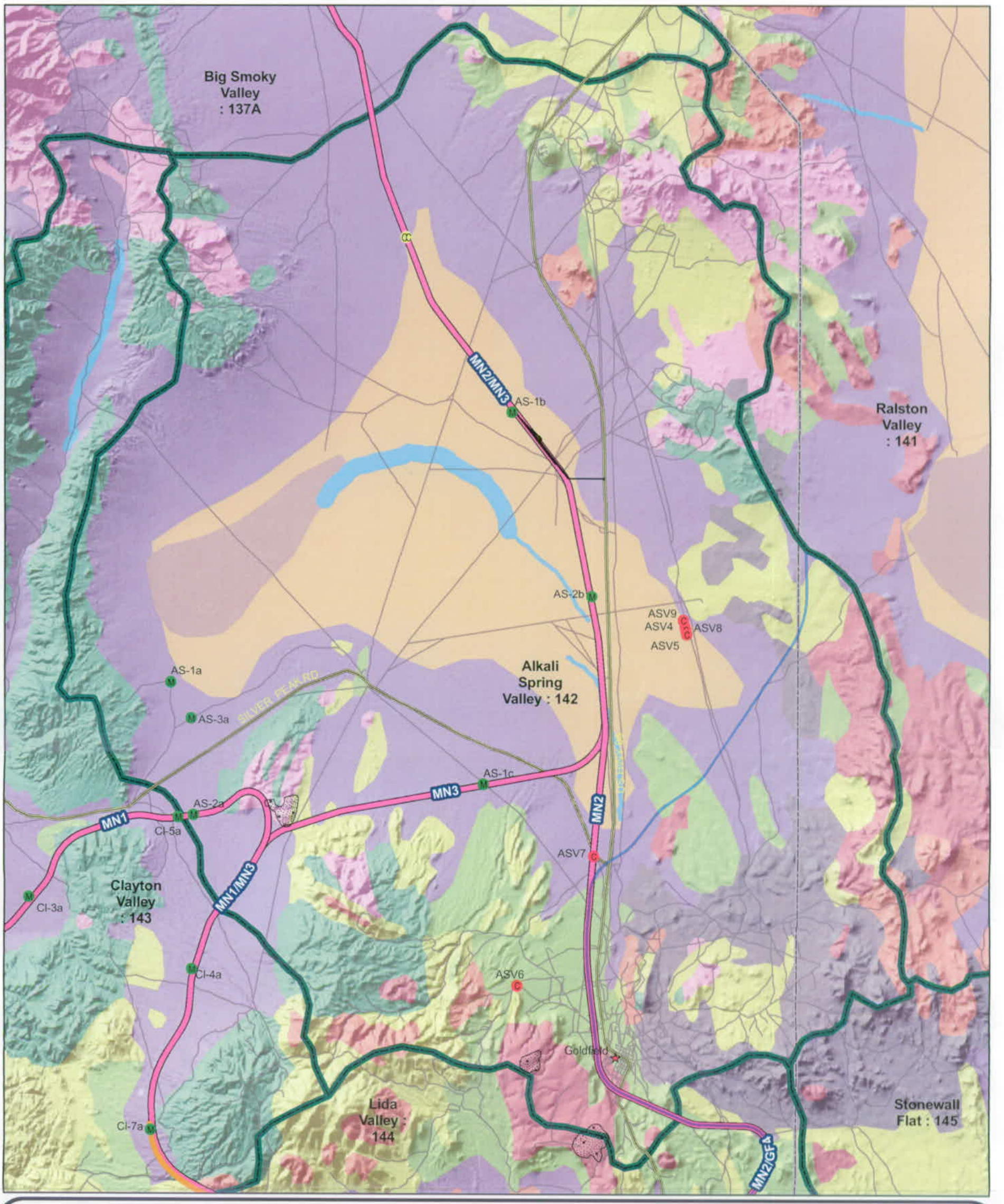

Legend

Proposed Well Sites
- Mina Well Site
- Caliente Well Site

Camps and Facilities
- Construction Camps
- Mina Sidings
- Quarry Location
- Facility

Hydrogeology
- Alluvial Slope
- Andesitic Volcanic Flows
- Basaltic Volcanic Flows
- Clastic/Carbonate
- Clastic Sandstones and Siltstones
- Fluvial Deposits
- Intrusive and Metamorphic Rocks
- Playa
- Rhyolitic Volcanic Flows
- Tertiary Fine-Grained Semiconsolidated Sediments
- Valley Floor
- Volcanic Breccias/Welded Tuffs/Old Volcanics
- Water

Map Reference
- Towns
- Major Roads
- Minor Roads
- Mina Rail Alignment
- Caliente Rail Alignment
- Basin Boundary
- County Boundary
- USGS National Elevation Dataset

N W E S

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

0 1 2 4 Miles

Plate 4-2: Alkali Spring Valley (142)

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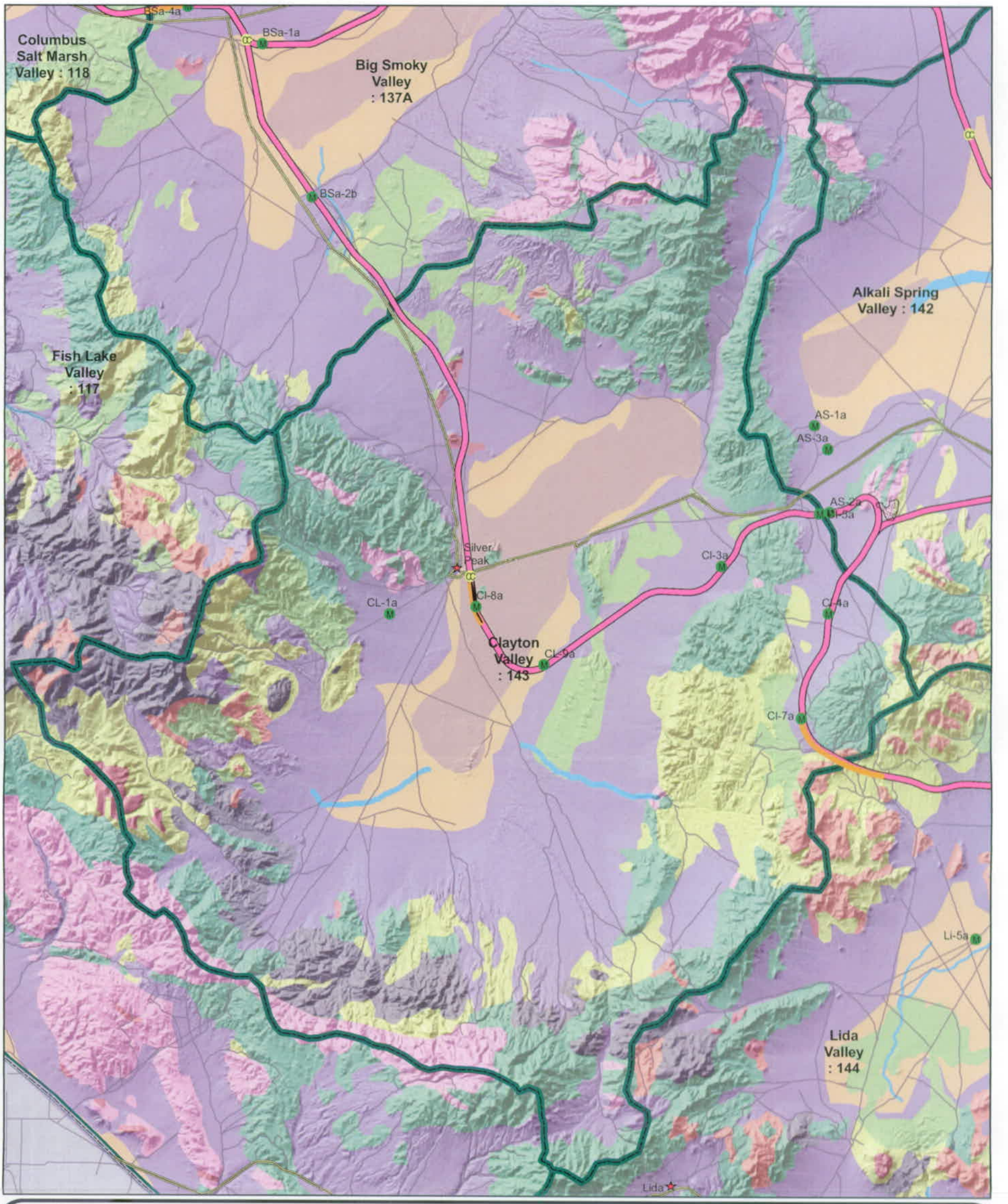

Legend

Proposed Well Sites
- Mina Well Site
- Caliente Well Site

Camps and Facilities
- Construction Camps
- Mina Sidings
- Quarry Location
- Facility

Hydrogeology
- Alluvial Slope
- Andesitic Volcanic Flows
- Basaltic Volcanic Flows
- Clastic/Carbonate
- Clastic Sandstones and Siltstones
- Fluvial Deposits
- Intrusive and Metamorphic Rocks
- Playa
- Rhyolitic Volcanic Flows
- Tertiary Fine-Grained Semiconsolidated Sediments
- Valley Floor
- Volcanic Breccias/Welded Tuffs/Old Volcanics
- Water

Map Reference
- Towns
- Major Roads
- Minor Roads
- Mina Rail Alignment
- Caliente Rail Alignment
- Basin Boundary
- County Boundary
- USGS National Elevation Dataset

N W E S

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

Plate 4-3: Clayton Valley (143)

0 2 4 8 Miles

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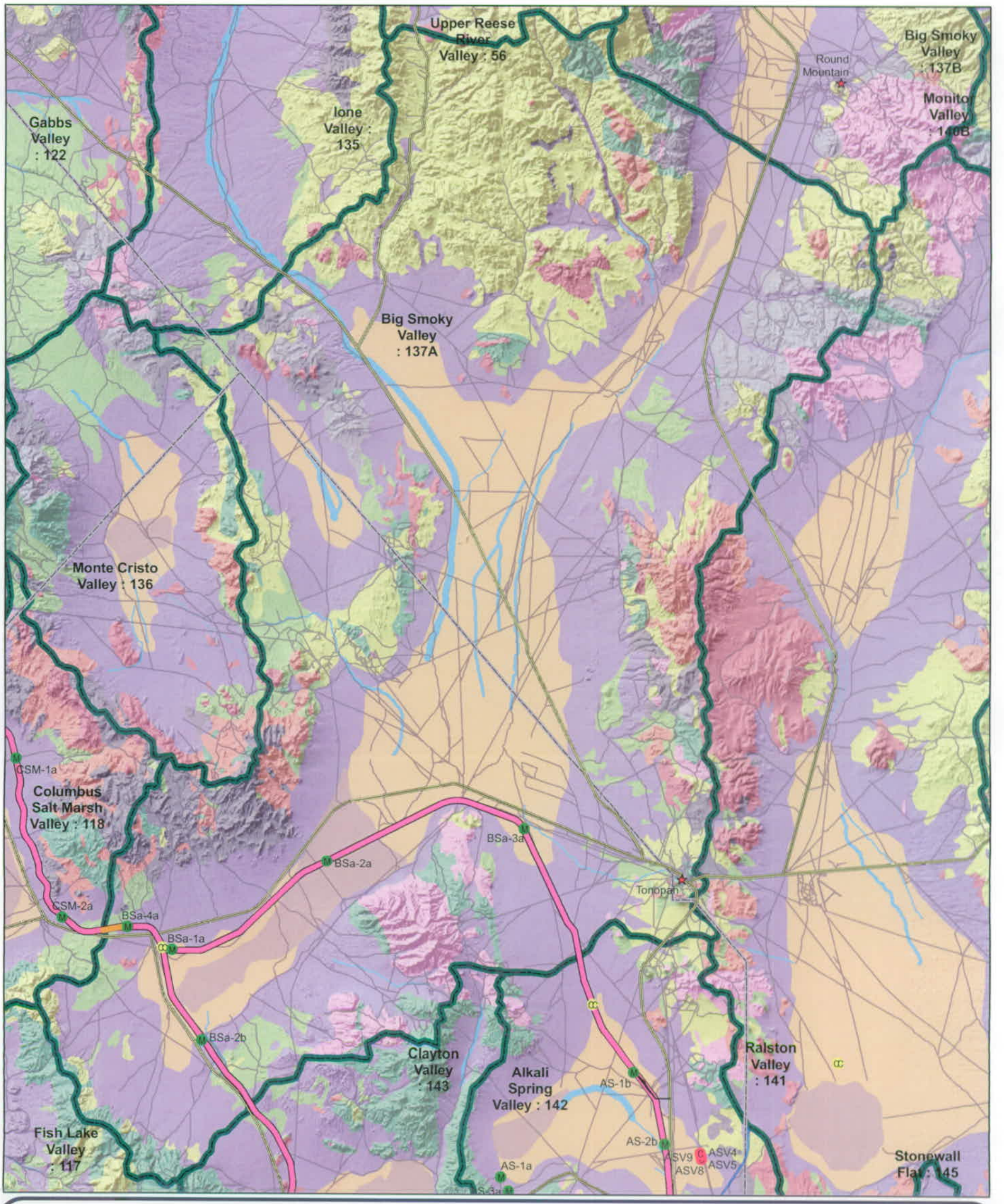

Legend

Proposed Well Sites

- Mina Well Site
- Caliente Well Site

Camps and Facilities

- Construction Camps
- Mina Sidings
- Quarry Location
- Facility

Hydrogeology

- Alluvial Slope
- Andesitic Volcanic Flows
- Basaltic Volcanic Flows
- Clastic/Carbonate
- Clastic Sandstones and Siltstones
- Fluvial Deposits
- Intrusive and Metamorphic Rocks
- Playa
- Rhyolitic Volcanic Flows
- Tertiary Fine-Grained Semiconsolidated Sediments
- Valley Floor
- Volcanic Breccias/Welded Tuffs/Old Volcanics
- Water

Map Reference

- Towns
- Major Roads
- Minor Roads
- Mina Rail Alignment
- Caliente Rail Alignment
- Basin Boundary
- County Boundary
- USGS National Elevation Dataset

N
W E
S

Plate 4-4:
Big Smoky Valley - Tonopah Flat (137A)

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

0 3 6 12 Miles

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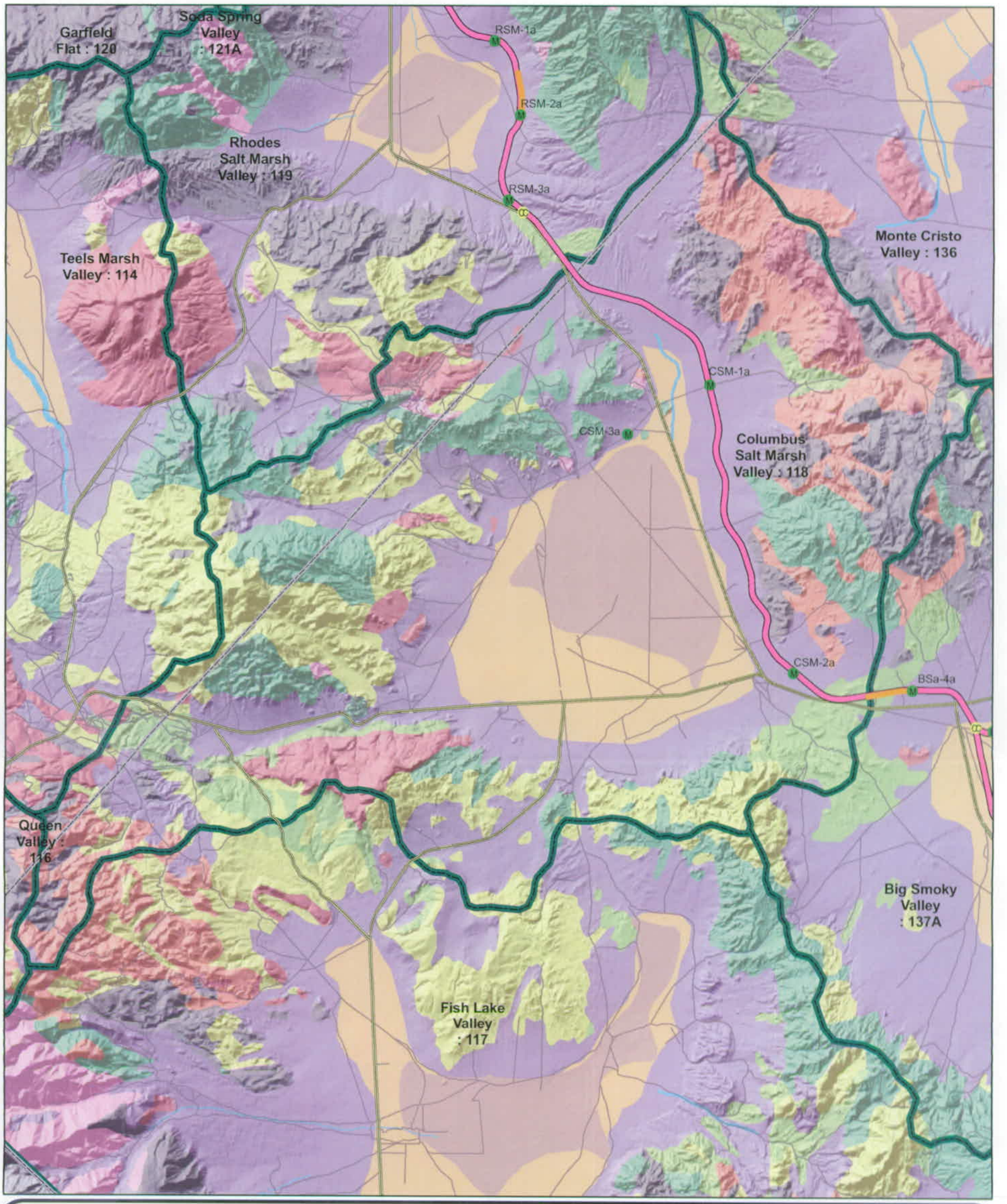


Legend

Proposed Well Sites
- Mina Well Site
- Caliente Well Site

Camps and Facilities
- Construction Camps
- Mina Sidings
- Quarry Location
- Facility

Hydrogeology
- Alluvial Slope
- Andesitic Volcanic Flows
- Basaltic Volcanic Flows
- Clastic/Carbonate
- Clastic Sandstones and Siltstones
- Fluvial Deposits
- Intrusive and Metamorphic Rocks
- Playa
- Rhyolitic Volcanic Flows
- Tertiary Fine-Grained Semiconsolidated Sediments
- Valley Floor
- Volcanic Breccias/Welded Tuffs/Old Volcanics
- Water

Map Reference
- Towns
- Major Roads
- Minor Roads
- Mina Rail Alignment
- Caliente Rail Alignment
- Basin Boundary
- County Boundary
- USGS National Elevation Dataset

N W E S

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

Plate 4-5: Columbus Salt Marsh Valley (118)

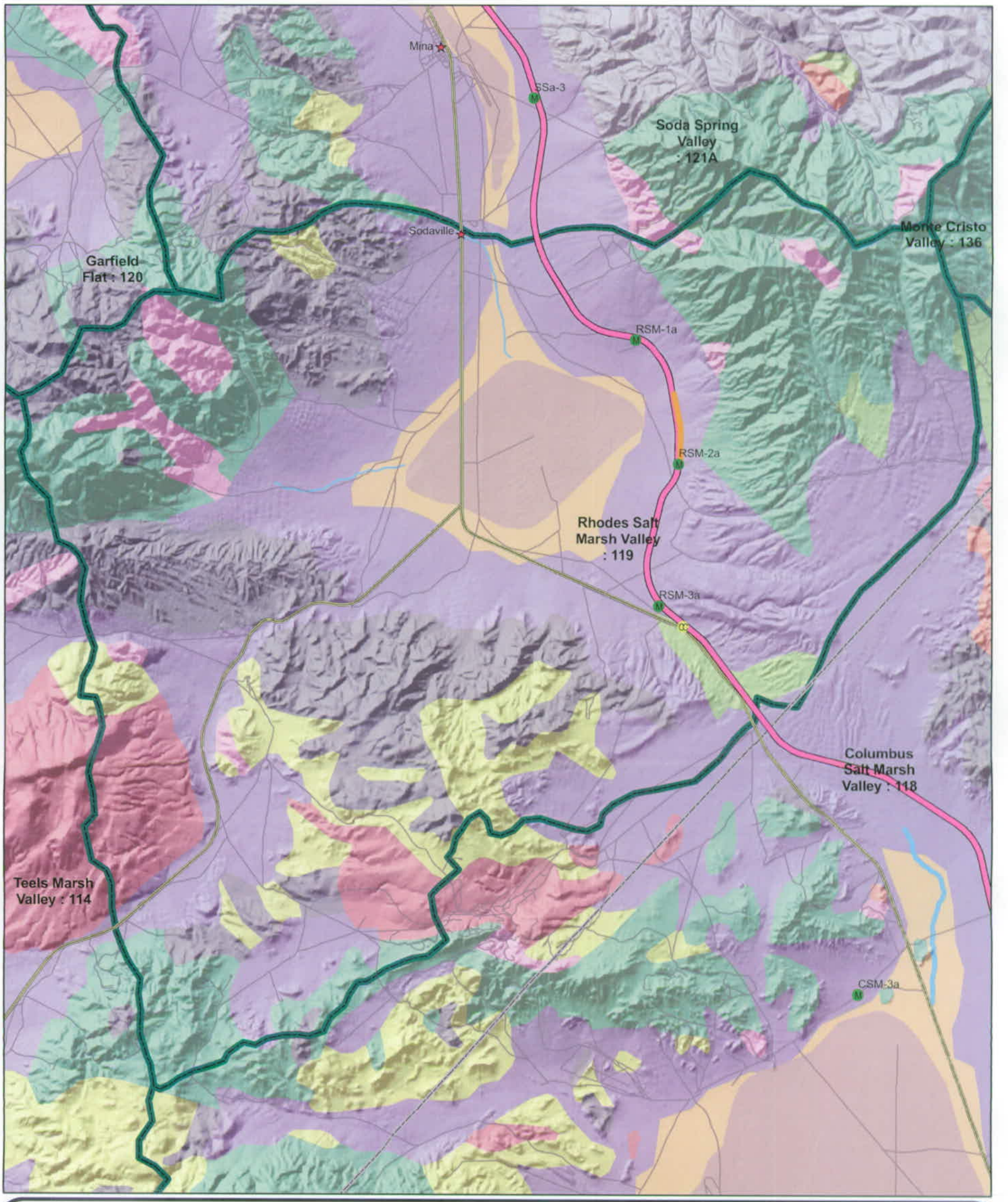
0 1.5 3 6 Miles

ymp_deis_analysis.mxd

Converse Consultants

Over 60 Years of Dedication in Geotechnical Engineering and Environmental Services

PB 100 YEARS



Legend

Proposed Well Sites

- Mina Well Site
- Caliente Well Site

Camps and Facilities

- Construction Camps
- Mina Sidings
- Quarry Location
- Facility

Hydrogeology

- Alluvial Slope
- Andesitic Volcanic Flows
- Basaltic Volcanic Flows
- Clastic/Carbonate
- Clastic Sandstones and Siltstones
- Fluvial Deposits
- Intrusive and Metamorphic Rocks
- Playa
- Rhyolitic Volcanic Flows
- Tertiary Fine-Grained Semiconsolidated Sediments
- Valley Floor
- Volcanic Breccias/Welded Tuffs/Old Volcanics
- Water

Map Reference

- Towns
- Major Roads
- Minor Roads
- Mina Rail Alignment
- Caliente Rail Alignment
- Basin Boundary
- County Boundary
- USGS National Elevation Dataset

N W E S

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

0 1 2 4 Miles

Plate 4-6: Rhodes Salt Marsh Valley (119)

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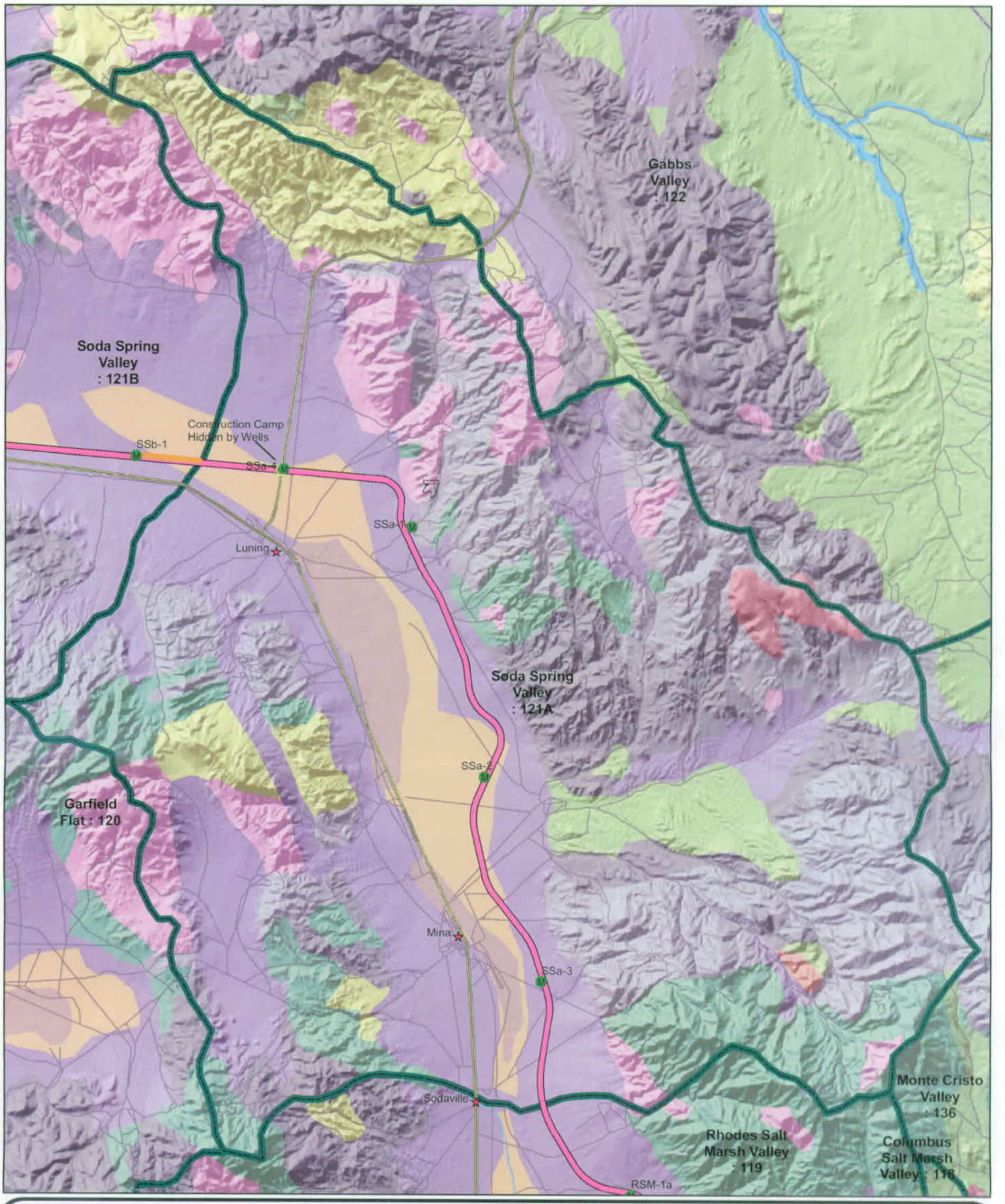

Legend

Proposed Well Sites
- Mina Well Site
- Caliente Well Site

Camps and Facilities
- Construction Camps
- Mina Sidings
- Quarry Location
- Facility

Hydrogeology
- Alluvial Slope
- Andesitic Volcanic Flows
- Basaltic Volcanic Flows
- Clastic/Carbonate
- Clastic Sandstones and Siltstones
- Fluvial Deposits
- Intrusive and Metamorphic Rocks
- Playa
- Rhyolitic Volcanic Flows
- Tertiary Fine-Grained Semiconsolidated Sediments
- Valley Floor
- Volcanic Breccias/Welded Tuffs/Old Volcanics
- Water

Map Reference
- Towns
- Major Roads
- Minor Roads
- Mina Rail Alignment
- Caliente Rail Alignment
- Basin Boundary
- County Boundary
- USGS National Elevation Dataset

N W E S

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

Plate 4-7: Soda Spring Valley East (121A)

0 1 2 4 Miles

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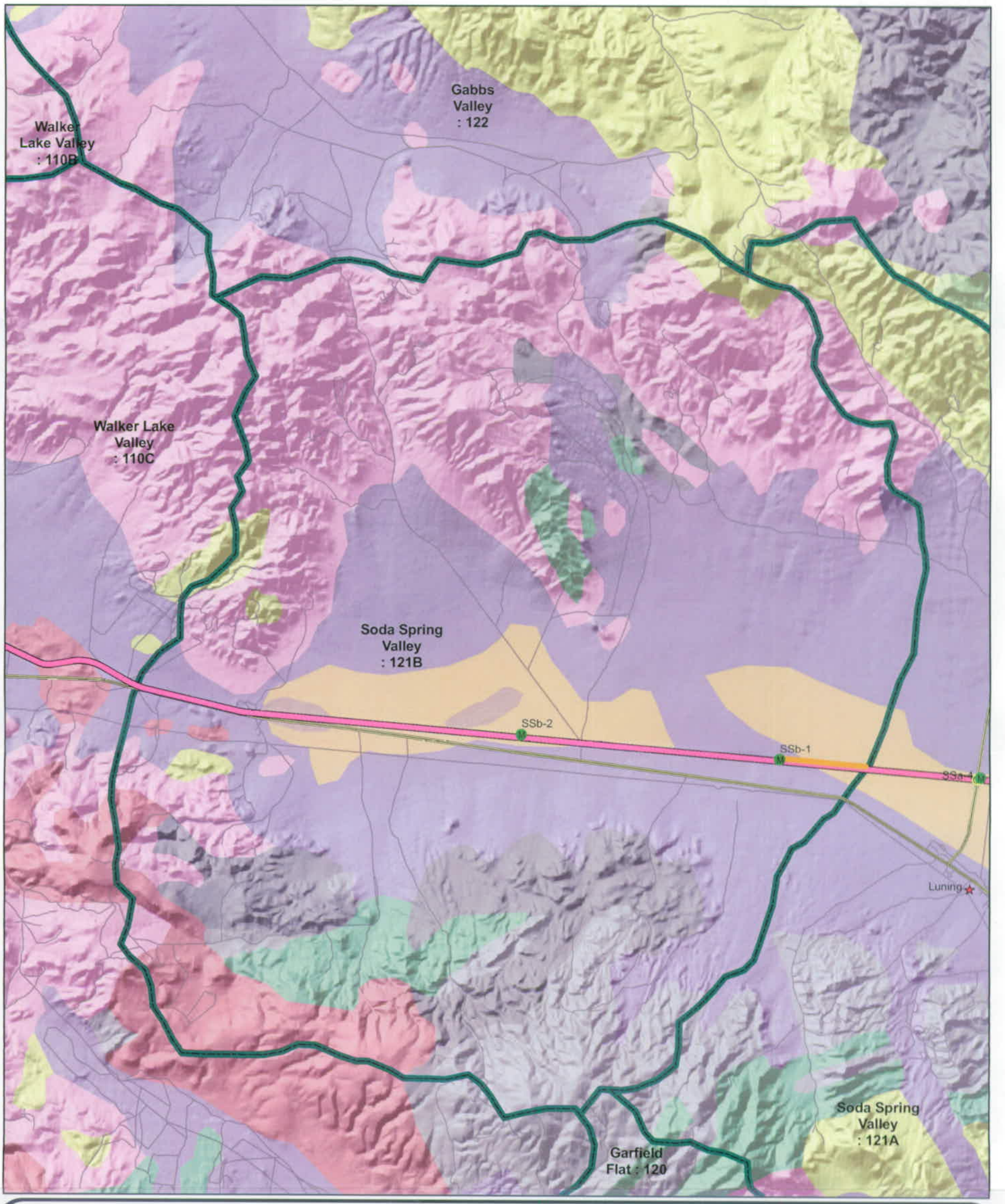
PB 100 YEARS



Legend

Proposed Well Sites
- Mina Well Site
- Caliente Well Site

Camps and Facilities
- Construction Camps
- Mina Sidings
- Quarry Location
- Facility

Hydrogeology
- Alluvial Slope
- Andesitic Volcanic Flows
- Basaltic Volcanic Flows
- Clastic/Carbonate
- Clastic Sandstones and Siltstones
- Fluvial Deposits
- Intrusive and Metamorphic Rocks
- Playa
- Rhyolitic Volcanic Flows
- Tertiary Fine-Grained Semiconsolidated Sediments
- Valley Floor
- Volcanic Breccias/Welded Tuffs/Old Volcanics
- Water

Map Reference
- Towns
- Major Roads
- Minor Roads
- Mina Rail Alignment
- Caliente Rail Alignment
- Basin Boundary
- County Boundary
- USGS National Elevation Dataset

N W E S

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
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Plate 4-8: Soda Spring Valley West (121B)

0 1 2 4 Miles

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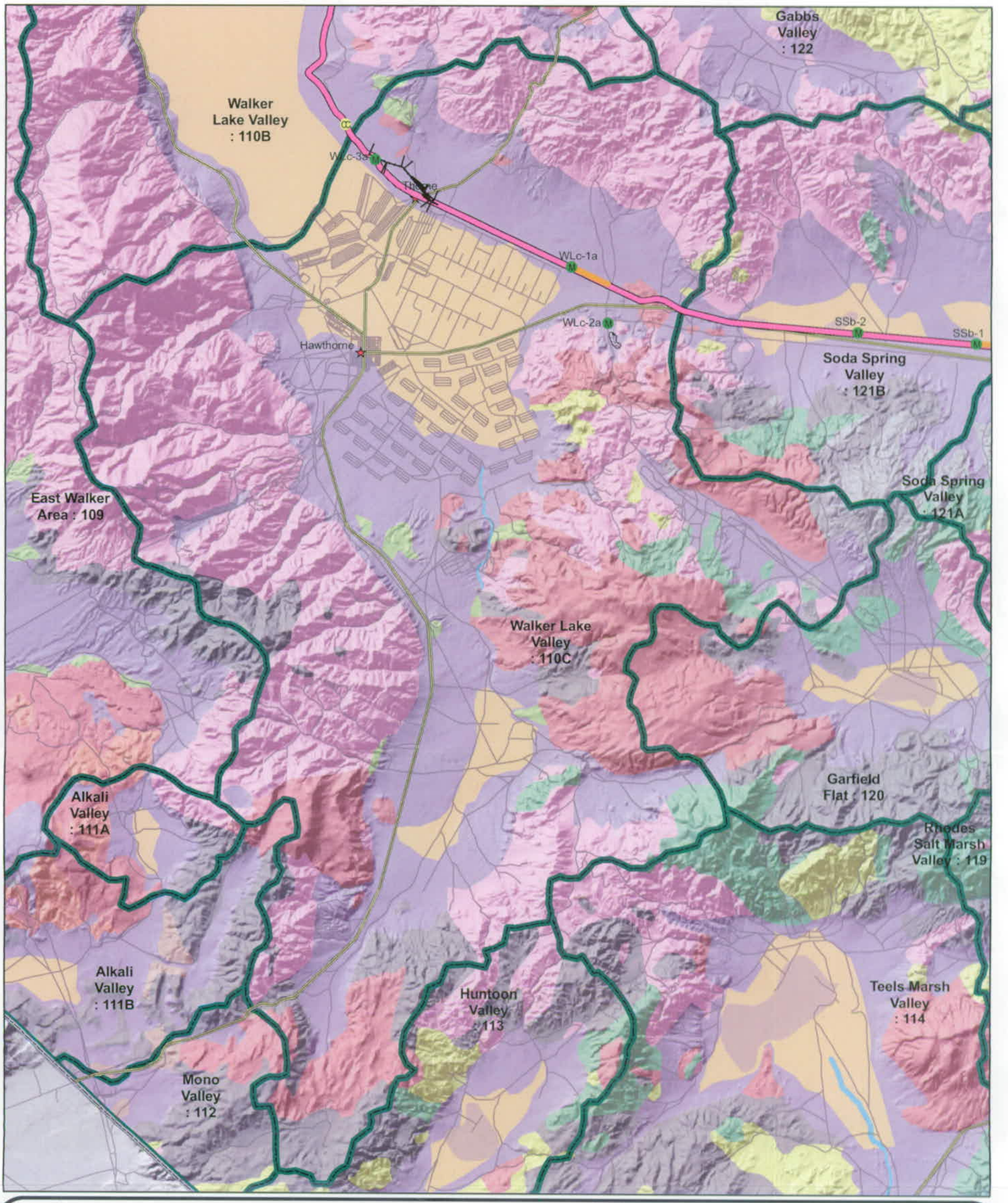
Over 60 Years of Dedication in Geotechnical Engineering and Environmental Services

PB 100 YEARS



Legend

Proposed Well Sites
- Mina Well Site
- Caliente Well Site

Camps and Facilities
- Construction Camps
- Mina Sidings
- Quarry Location
- Facility

Hydrogeology
- Alluvial Slope
- Andesitic Volcanic Flows
- Basaltic Volcanic Flows
- Clastic/Carbonate
- Clastic Sandstones and Siltstones
- Fluvial Deposits
- Intrusive and Metamorphic Rocks
- Playa
- Rhyolitic Volcanic Flows
- Tertiary Fine-Grained Semiconsolidated Sediments
- Valley Floor
- Volcanic Breccias/Welded Tuffs/Old Volcanics
- Water

Map Reference
- Towns
- Major Roads
- Minor Roads
- Mina Rail Alignment
- Caliente Rail Alignment
- Basin Boundary
- County Boundary
- USGS National Elevation Dataset

N W E S

Plate 4-9:
Walker Lake Valley - Hawthorne (110C)

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

0 2 4 8 Miles

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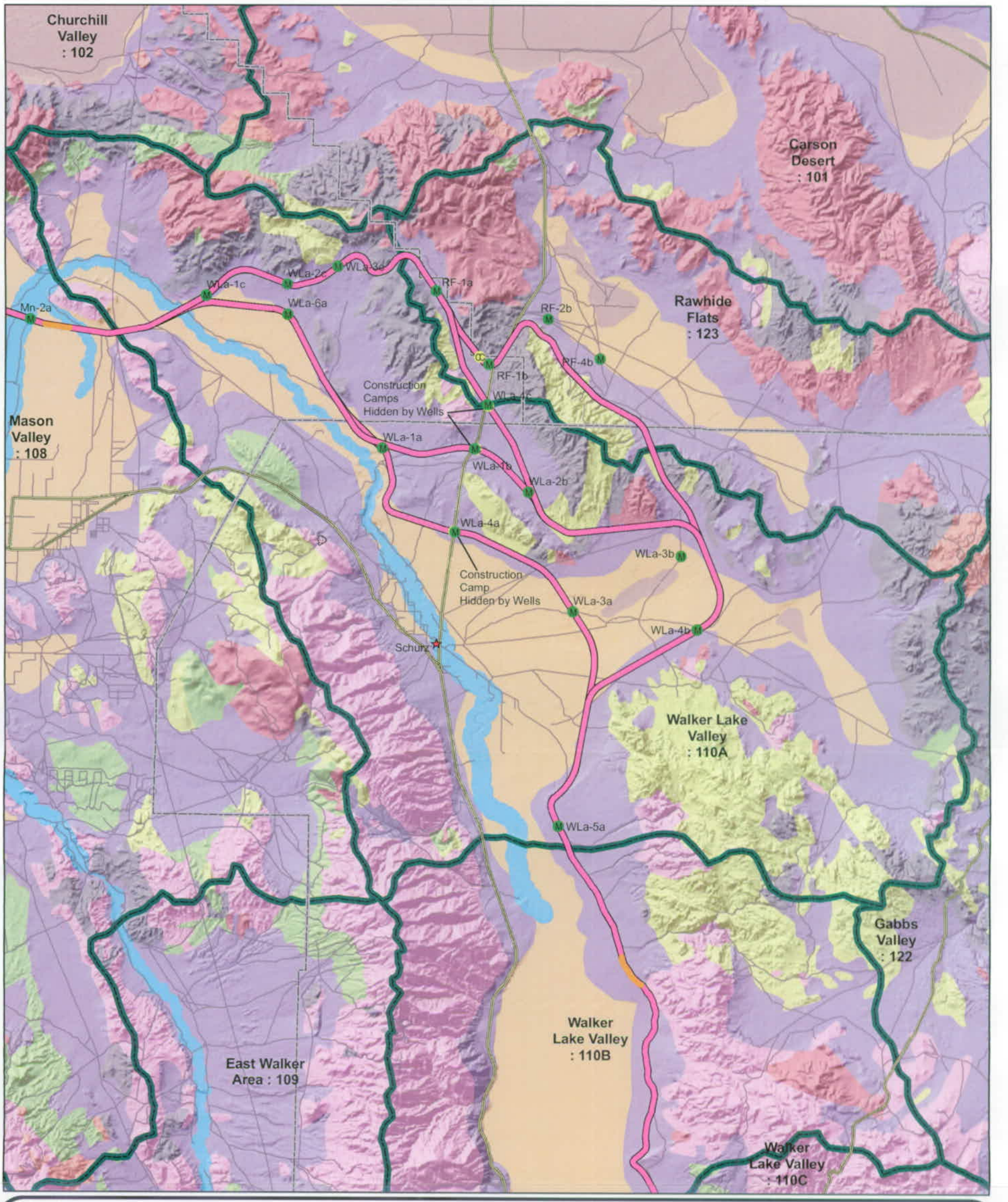
Over 60 Years of Dedication in Geotechnical Engineering and Environmental Services

PB 100 YEARS



Legend

Proposed Well Sites
- Mina Well Site
- Caliente Well Site

Camps and Facilities
- Construction Camps
- Mina Sidings
- Quarry Location
- Facility

Hydrogeology
- Alluvial Slope
- Andesitic Volcanic Flows
- Basaltic Volcanic Flows
- Clastic/Carbonate
- Clastic Sandstones and Siltstones
- Fluvial Deposits
- Intrusive and Metamorphic Rocks
- Playa
- Rhyolitic Volcanic Flows
- Tertiary Fine-Grained Semiconsolidated Sediments
- Valley Floor
- Volcanic Breccias/Welded Tuffs/Old Volcanics
- Water

Map Reference
- Towns
- Major Roads
- Minor Roads
- Mina Rail Alignment
- Caliente Rail Alignment
- Basin Boundary
- County Boundary
- USGS National Elevation Dataset

N W E S

Plate 4-10:
Walker Lake Valley - Schurz (110A)

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

0 2.5 5 10 Miles

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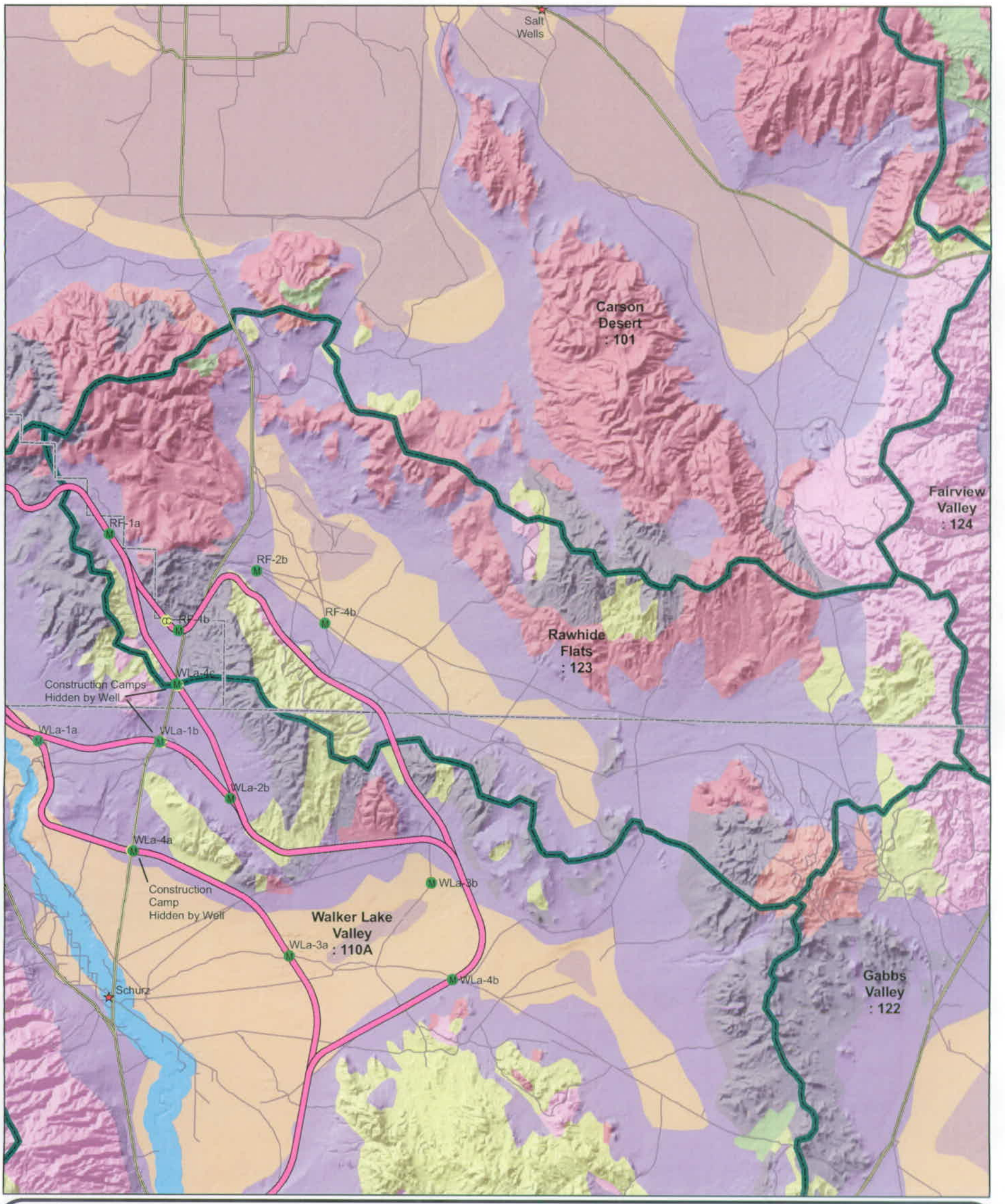
Converse Consultants

Over 60 Years of Dedication in Geotechnical Engineering and Environmental Services

PB 100 YEARS



Legend

Proposed Well Sites

- Mina Well Site
- Caliente Well Site

Camps and Facilities

- Construction Camps
- Mina Sidings
- Quarry Location
- Facility

Hydrogeology

- Alluvial Slope
- Andesitic Volcanic Flows
- Basaltic Volcanic Flows
- Clastic/Carbonate
- Clastic Sandstones and Siltstones
- Fluvial Deposits
- Intrusive and Metamorphic Rocks
- Playa
- Rhyolitic Volcanic Flows
- Tertiary Fine-Grained Semiconsolidated Sediments
- Valley Floor
- Volcanic Breccias/Welded Tuffs/Old Volcanics
- Water

Map Reference

- Towns
- Major Roads
- Minor Roads
- Mina Rail Alignment
- Caliente Rail Alignment
- Basin Boundary
- County Boundary
- USGS National Elevation Dataset

N W E S

HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

Plate 4-11: Rawhide Flats Valley (123)

0 1.5 3 6 Miles

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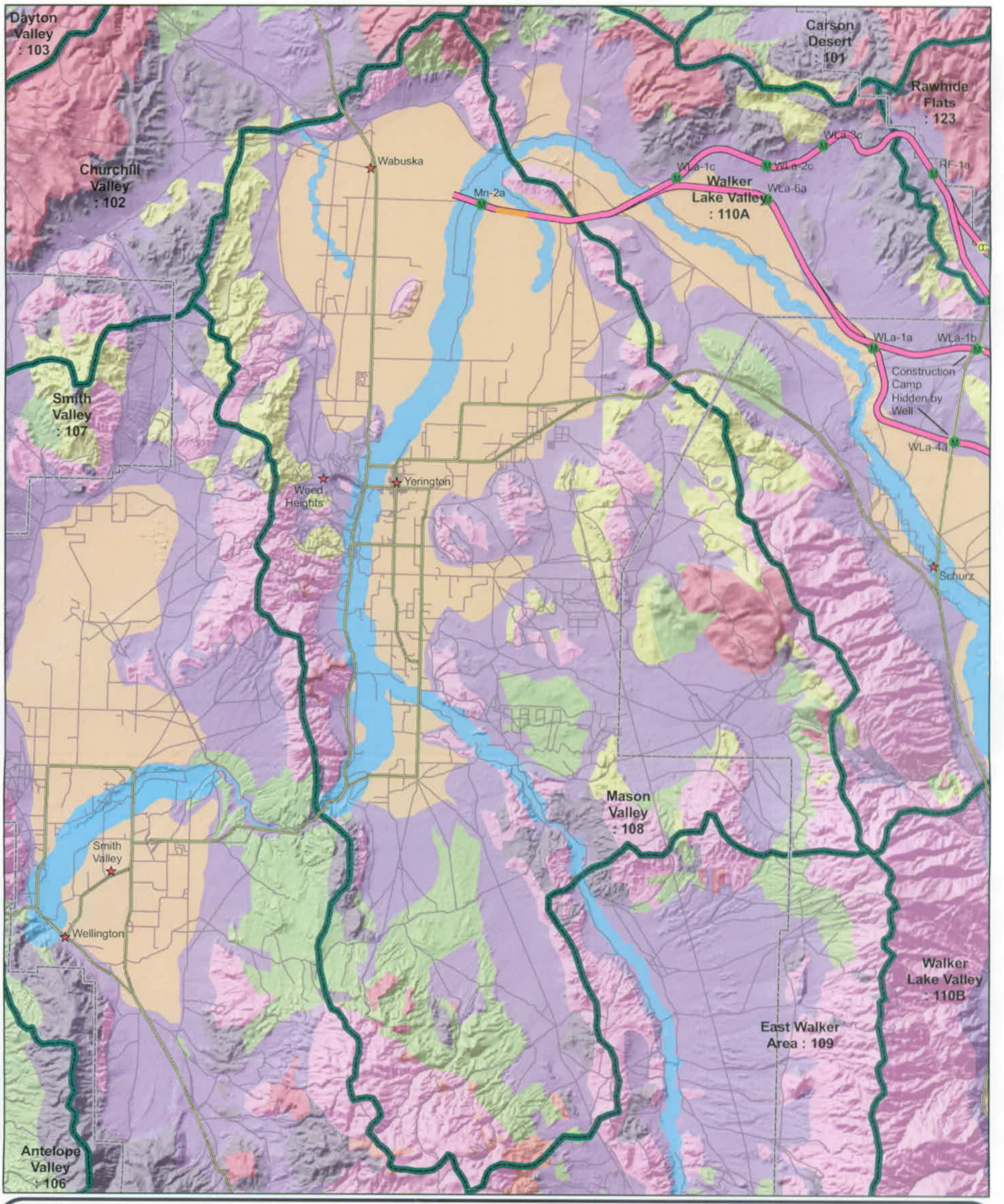

Legend

Proposed Well Sites
- Mina Well Site
- Caliente Well Site

Camps and Facilities
- Construction Camps
- Mina Sidings
- Quarry Location
- Facility

Hydrogeology
- Alluvial Slope
- Andesitic Volcanic Flows
- Basaltic Volcanic Flows
- Clastic/Carbonate
- Clastic Sandstones and Siltstones
- Fluvial Deposits
- Intrusive and Metamorphic Rocks
- Playa
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- Tertiary Fine-Grained Semiconsolidated Sediments
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- Water

Map Reference
- Towns
- Major Roads
- Minor Roads
- Mina Rail Alignment
- Caliente Rail Alignment
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- County Boundary
- USGS National Elevation Dataset

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HYDROGEOLOGIC DEIS ANALYSIS
MINA RAIL CORRIDOR
REV 0 April 27, 2007

Plate 4-12: Mason Valley (108)

0 2 4 8 Miles

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