Southern Nevada Water Authority
Clark, Lincoln,
and White Pine Counties
Groundwater Development Project

Draft Conceptual Plan of Development

March 17, 2006

Prepared By:
Southern Nevada Water Authority
1900 East Flamingo Road
Las Vegas, Nevada 89119

Prepared For:
U.S. Bureau of Land Management
Nevada State Office
1340 Financial Boulevard
Reno, Nevada 89502

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMNS AND ABBREVIATIONS

afy	acre-feet per year
BLM	U.S. Bureau of Land Management
CSI	Coyote Springs Investment, LLC
GWD	Clark, Lincoln, and White Pine Counties Groundwater Development
kV	kilovolt
LCCRDA	Lincoln County Conservation, Recreation, and Development Act of 2004
LCWD	Lincoln County Water District
LS Power	LS Power Development, LLC
Nevada State Engineer	Nevada Division of Water Resources, Office of the State Engineer
ROW	right-of-way
SNWA	Southern Nevada Water Authority
US	United States Highway
WTF	water treatment facility

1.0 PURPOSE OF PROJECT

The Southern Nevada Water Authority (SNWA) proposes to construct and operate the Clark, Lincoln, and White Pine Counties Groundwater Development (GWD) Project. The GWD Project will develop and convey approximately 200,000 acre-feet per year (afy) of groundwater from seven hydrographic basins in northern Clark, central Lincoln, and eastern White Pine Counties. The water will be used to serve SNWA purveyor members in the Las Vegas Valley and customers of the Lincoln County Water District (LCWD) in Coyote Spring Valley.

1.1 PROPOSED PROJECT

The GWD Project will consist of the construction and operation of groundwater production, conveyance, and treatment facilities, and power conveyance facilities. The regional location of the GWD Project is shown on Figure 1-1.

The SNWA has applied to the U.S. Bureau of Land Management (BLM) for rights-of-way (ROWs) to construct and operate the GWD Project. Proposed facilities include:

- Pipelines – approximately 285 miles of buried water pipelines, between 30 and 84 inches in diameter
- Pumping Stations – three pumping station facilities
- Regulating Tanks – six regulating tanks, each approximately 3 million gallons in capacity
- Buried Storage Reservoir – a 40 million gallon buried storage reservoir
- Water Treatment Facility (WTF) – a 150 million gallon per day facility
- Power Facilities – approximately 265 miles of 230 kilovolt (kV) and 120 miles of 69 kV overhead power lines, two electrical substations, and two hydroturbine energy recovery facilities

These facilities are generally displayed on Figure 1-2, and described in more detail in Chapter 3 of this document. They will be located predominantly on public lands managed by the BLM (see Chapter 2), and primarily within designated utility corridors. Some alternate pipeline and power line alignments and facilities have been identified as part of the project (described in Chapter 3). Groundwater production wells, collector pipelines, and related production facilities are not identified in this document. The ROWs for those facilities will be requested in the future, and will be the subject of separate environmental analysis and federal approvals (see Chapter 3.8).

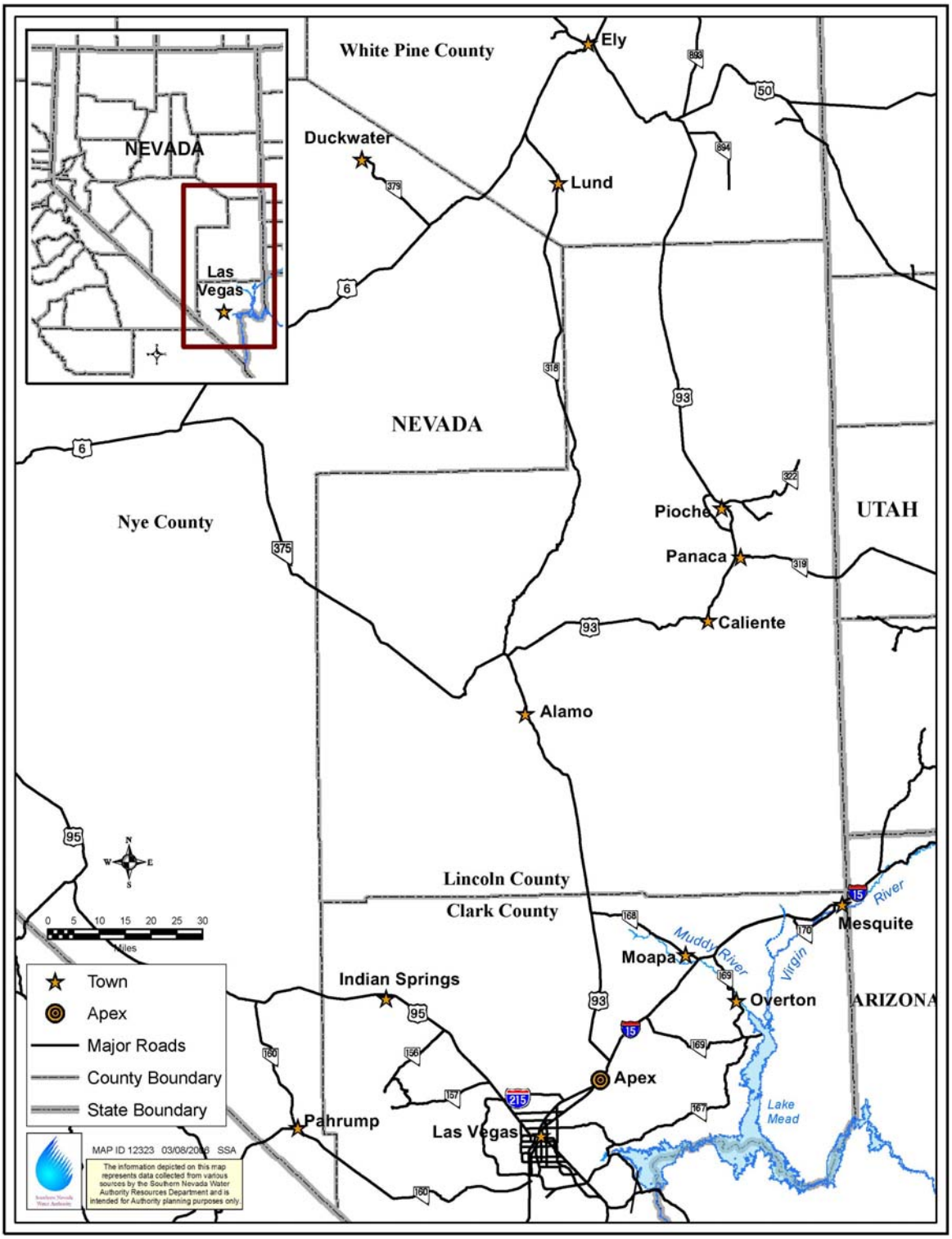

Figure 1-1 Regional Location Map

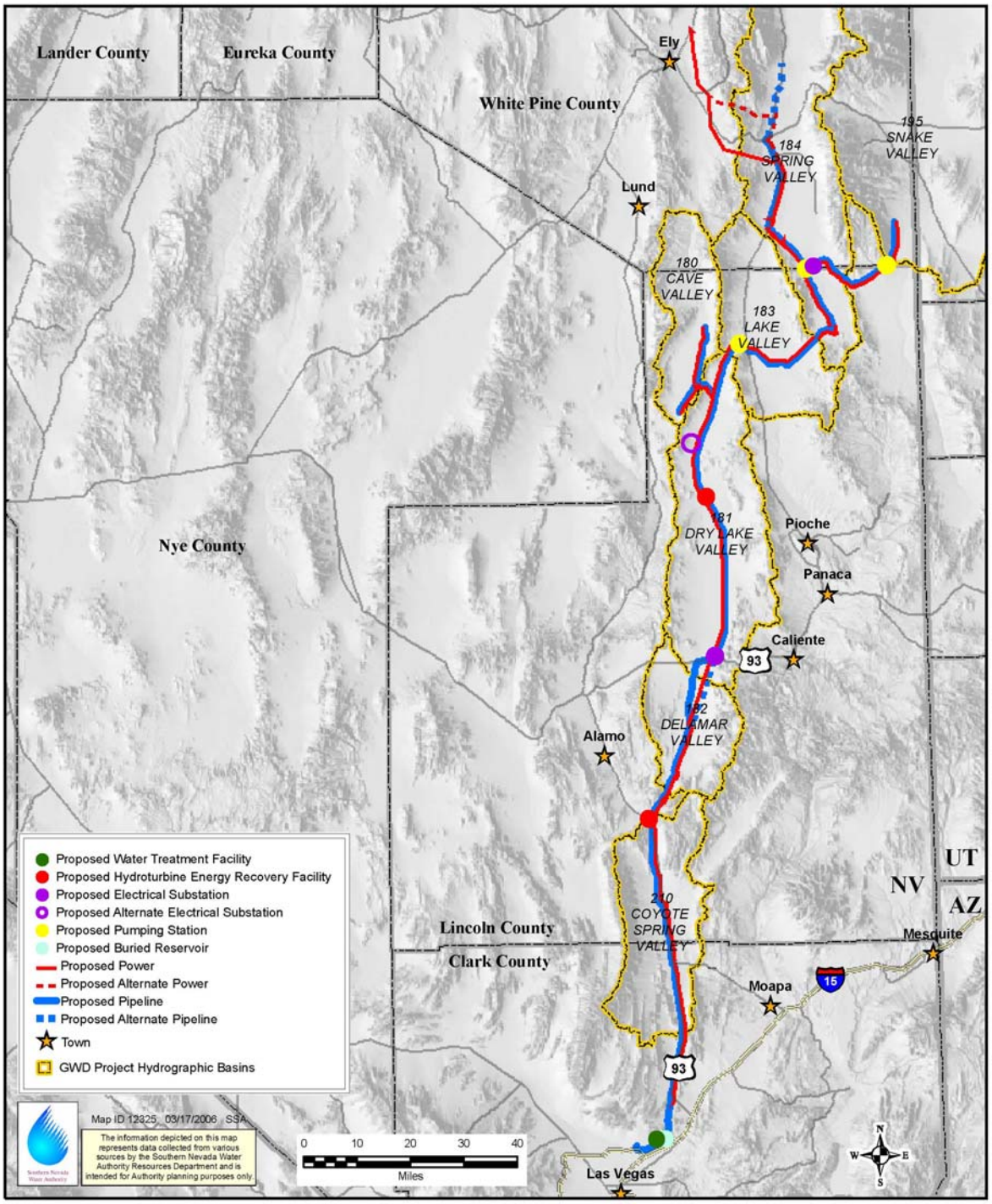

Figure 1-2 Proposed Clark, Lincoln, And White Pine Counties Groundwater Development Project

1.2 WATER RIGHTS

The GWD Project is proposed to develop and convey approximately 200,000 afy of groundwater from seven hydrographic basins in northern Clark, central Lincoln, and eastern White Pine Counties for SNWA and LCWD. The groundwater will include both existing and future permitted water rights, as permitted by the Nevada Division of Water Resources, Office of the State Engineer (Nevada State Engineer). The hydrographic basins from which water will be removed as part of the GWD Project are displayed on Figure 1-3.

The SNWA is planning to develop approximately 168,000 afy of groundwater from Spring, Snake, Cave, Dry Lake, Delamar, and Coyote Spring Valleys for use by its purveyor members in the Las Vegas Valley. This water will include water rights that will be permitted by the Nevada State Engineer, based upon applications originally filed by the Las Vegas Valley Water District in 1989, and/or existing permitted water rights that may be acquired by SNWA. The Nevada State Engineer is currently reviewing the groundwater applications that were filed in 1989, which are listed on Table 1-1. Those applications were transferred from the Las Vegas Valley Water District to SNWA.

The GWD Project will also convey existing water rights from Spring and Lake Valleys for LCWD. In January 2006, SNWA and LCWD completed a cooperative agreement regarding capacity interest in the GWD Project. Under that agreement, SNWA will provide capacity in the GWD Project to convey water for LCWD. This water will include existing permitted water rights that have been acquired, or are in negotiations for acquisition, by Coyote Springs Investment, LLC (CSI). It is anticipated that approximately 36,000 afy of water will be conveyed for LCWD through the GWD.

Table 1-1 SNWA Groundwater Applications

Hydrographic Basin	SNWA Applications	
	cfs	afy
Snake Valley	38	27,512
Spring Valley	126	91,224
Cave Valley	16	11,584
Dry Lake Valley	16	11,584
Delamar Valley	16	11,584
Coyote Spring Valley	19	13,781
TOTAL	**231**	**167,269**

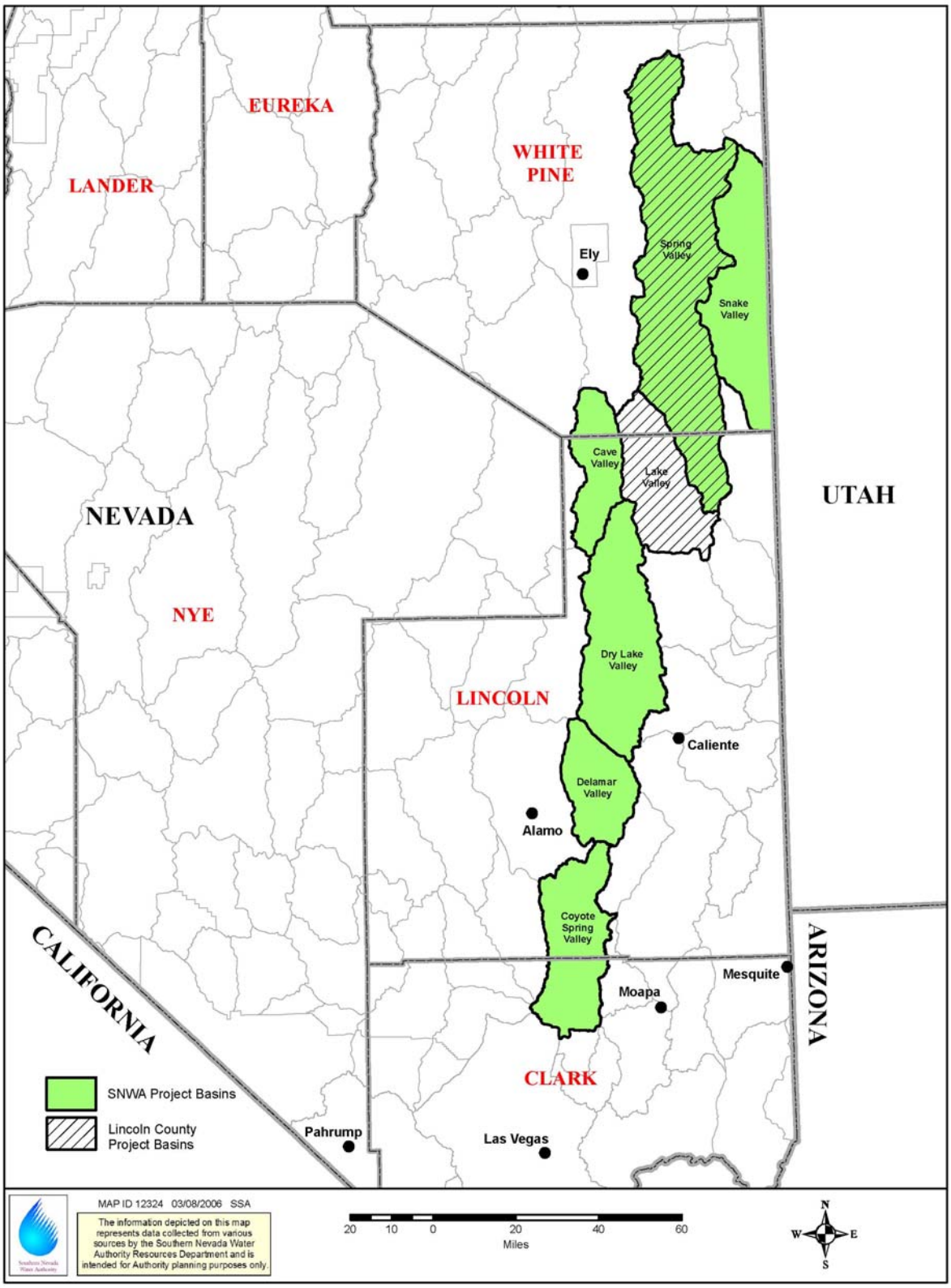

Figure 1-3 Hydrographic Basins Of The GWD Project

2.0 RIGHTS-OF-WAY

The SNWA submitted applications to the BLM for temporary and permanent ROWs for the GWD Project on August 19, 2004. The GWD Project has been assigned Case File No. N-78803.

A summary of the estimated permanent and temporary ROWs that will be required to construct and operate the GWD Project is presented in Table 2-1. Table 2-2 identifies permanent and temporary ROWs for potential alternative alignments, which are described in Chapter 3. These ROW estimates will be revised through the environmental compliance and engineering design processes. Detailed maps of the proposed alignments and associated ROWs are provided under separate cover as the Conceptual Plan of Development Maps (referred to herein as the maps). The majority of the proposed ROWs in Clark and Lincoln Counties are within the utility corridor designated by the Lincoln County Conservation, Recreation, and Development Act of 2004 (LCCRDA), as shown on the maps.

The ROWs that will be required for individual groundwater production wells, well fields, and the associated collector pipelines and power lines are not identified in this document. Those ROWs will be requested in the future, and will be the subject of separate environmental analysis and federal approvals.

Legal descriptions of the proposed facilities are included in Appendix A. Site-specific engineering surveys will be conducted after selection of final alignments and facility locations through the environmental compliance process.

Table 2-1 GWD Project Permanent And Temporary Right-Of-Way Estimates

Facility	Permanent Rights-of-Way	Temporary Rights-of-Way
	Acres	Acres
U.S. Bureau of Land Management		
Pipelines	3,246	3,246
Pumping Stations	65	5
Regulating Tanks	6	24
Water Treatment Facility	40	none
Power Facilities	3,692	none
Construction Staging Areas	NA	270
Subtotal	7,049	3,545
U.S. Department of Defense/U. S. Air Force		
Pipelines	41	41
Buried Reservoir	35	5
Construction Staging Areas	NA	3
Subtotal	76	49
U.S. Fish and Wildlife Service/Desert National Wildlife Range – Utility Corridor		
Pipelines	116	116
Power Facilities	116	none
Construction Staging Areas	NA	9
Subtotal	232	125
Private – Apex		
Power Facilities	7	none
State Wildlife Reserve – Utility Corridor		
Power Line	3	none
State Lands		
Pipelines	3	3
PROJECT TOTAL	**7,370**	**3,722**

Table 2-2 GWD Alternate Alignments Permanent And Temporary Right-Of-Way Estimates

Facility	Permanent Rights-of-Way	Temporary Rights-of-Way
	Acres	Acres
U.S. Bureau of Land Management		
Alternate Pipelines	333	333
Alternate Power Facilities	97	none
Alt. Construction Staging Areas	NA	12
Subtotal	430	345
U.S. Forest Service		
Alternate Power Facilities	104	none
ALTERNATES TOTAL	**534**	**345**

Note: Temporary rights-of-way for alternate construction staging areas will be determined and submitted to BLM if alternates are considered for further action.

3.0 FACILITIES

The proposed GWD Project facilities are described below, and generally displayed on Figures 3-1 through 3-5. These descriptions present SNWA's initial estimates of facility requirements for the GWD Project. Some areas of alternate pipeline and power line alignments are also identified. Details about these facilities may be revised as a result of the environmental compliance and engineering design processes.

3.1 PIPELINES

Approximately 285 miles of pipeline, between 30 and 84 inches in diameter, will be required for the GWD Project. The main pipeline will begin in Spring Valley and extend south to the Las Vegas Valley. Three primary laterals will connect northern Spring, Snake, and Cave Valleys to the main pipeline. The different pipe diameters by valley are shown on Figure 3-6, and pipe diameters and lengths are listed in Table 3-1. Table 3-2 lists diameters and lengths of alternate pipelines. More detailed descriptions of the main and lateral pipelines are provided below.

A ground surface profile of the GWD Project is displayed in Figure 3-7. The maximum elevation will be approximately 6,600 feet at Horse Corral Pass in Spring Valley near the beginning of the pipeline. The minimum elevation will be approximately 2,100 feet near the pipeline terminus in the Las Vegas Valley.

Permanent ROWs of up to 100 feet in width and temporary construction ROWs of an additional 100 feet will be required for the pipelines. In areas that have level terrain and stable soil conditions, these ROW widths may be reduced. Final ROW widths will be determined during the project design, after alignment surveying has been completed.

The pipelines will require appurtenances, which may include isolation valves, air release and vacuum valves, and drain valves. Isolation valves are used to isolate different segments of pipeline, to allow for future repairs and maintenance. They are placed within the pipeline, and are typically accessed via a small belowground concrete vault. Air release and vacuum valves are placed at high points along the pipeline and drain valves are placed at low points. Air release valves release small amounts of air to prevent build up at high points along the pipeline. Vacuum valves allow air to enter the pipeline when there is a sudden loss of pipeline pressure, which prevents the pipe from collapsing. Air and vacuum valves are sometimes located together, and are typically placed within an aboveground structure approximately 2 feet in diameter. Drain valves are used to drain the pipeline if required. They are typically buried, and have a buried outlet pipe that is routed to adjacent dry washes or drainage ditches, which are stabilized with rip-rap or other erosion control measures as needed. The sizes and locations of these appurtenances will be determined during engineering design. The appurtenances will be located within the pipeline ROW.

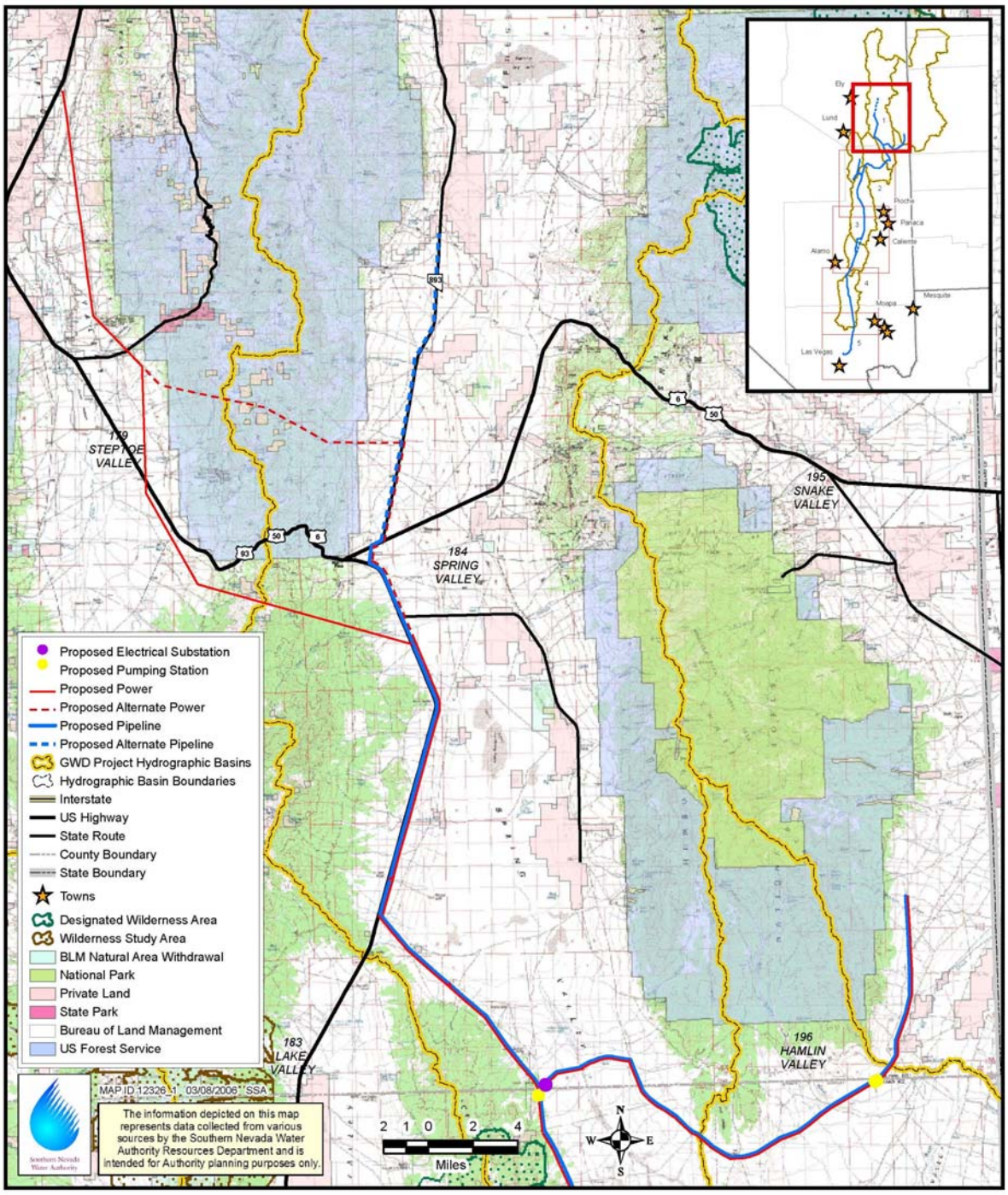

Figure 3-1 GWD Facilities – Steptoe, Spring, Snake, And Hamlin Valleys

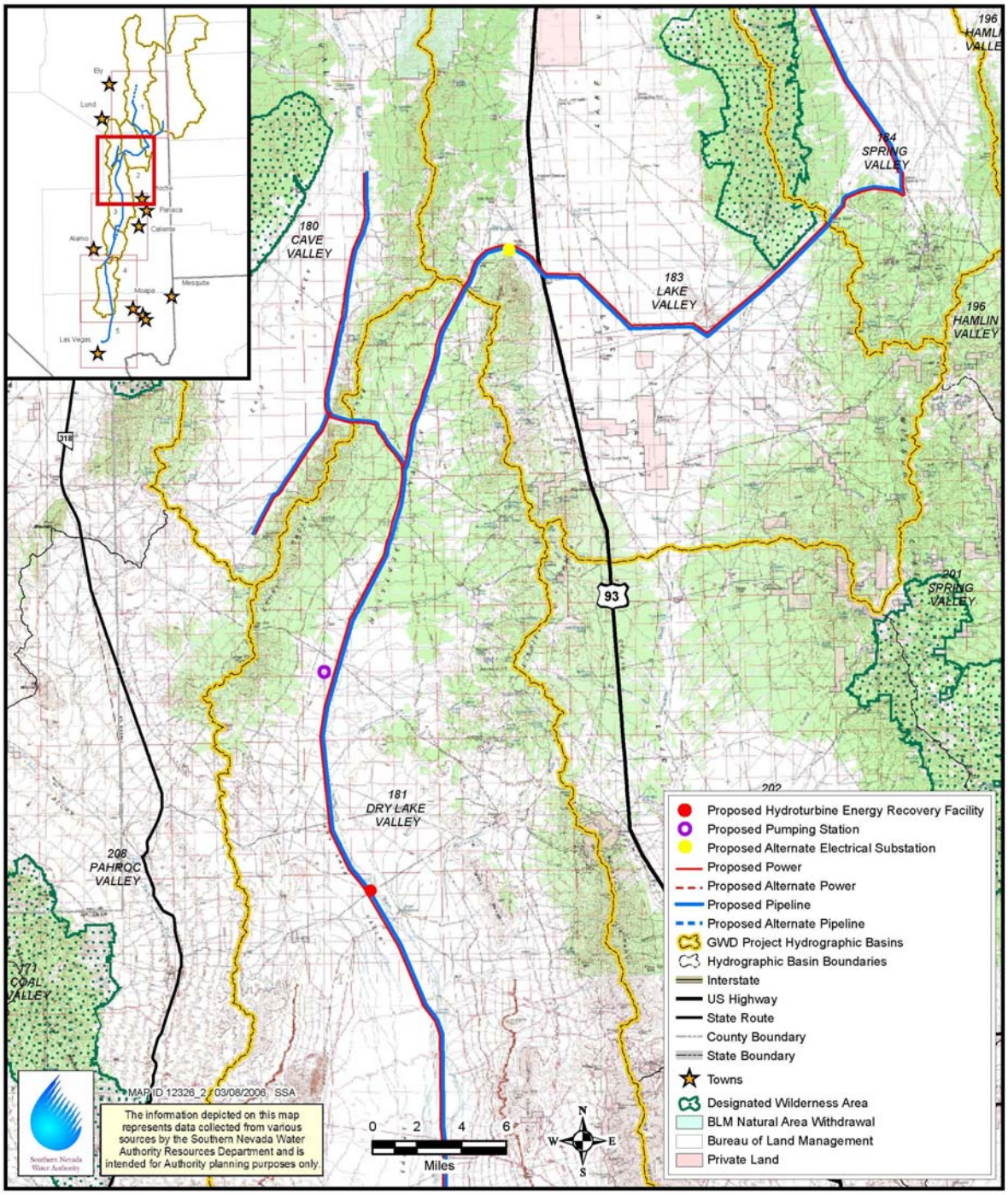

Figure 3-2 GWD Facilities – Lake, Cave, And Dry Lake Valleys

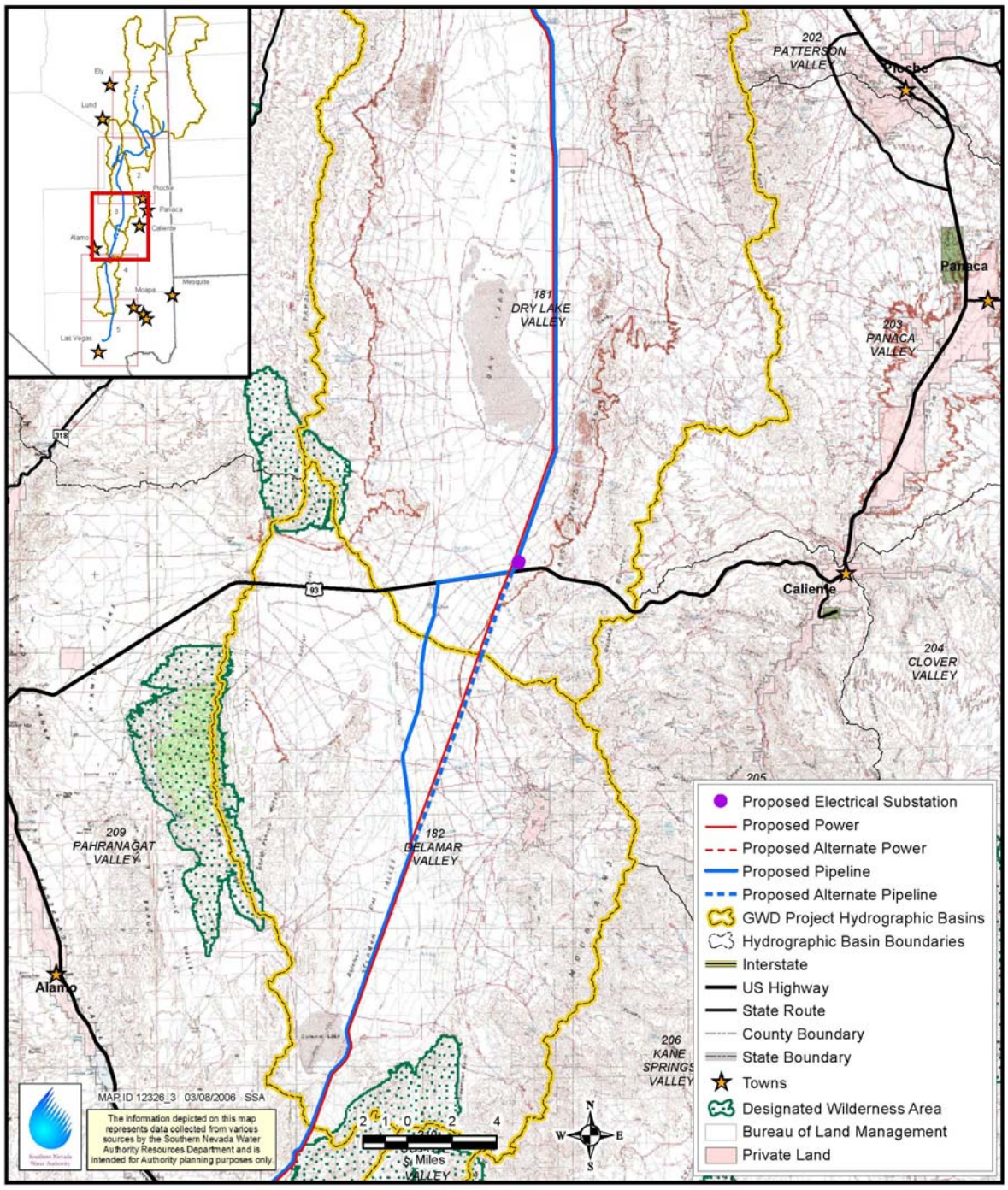

Figure 3-3 GWD Facilities – Dry Lake And Delamar Valleys

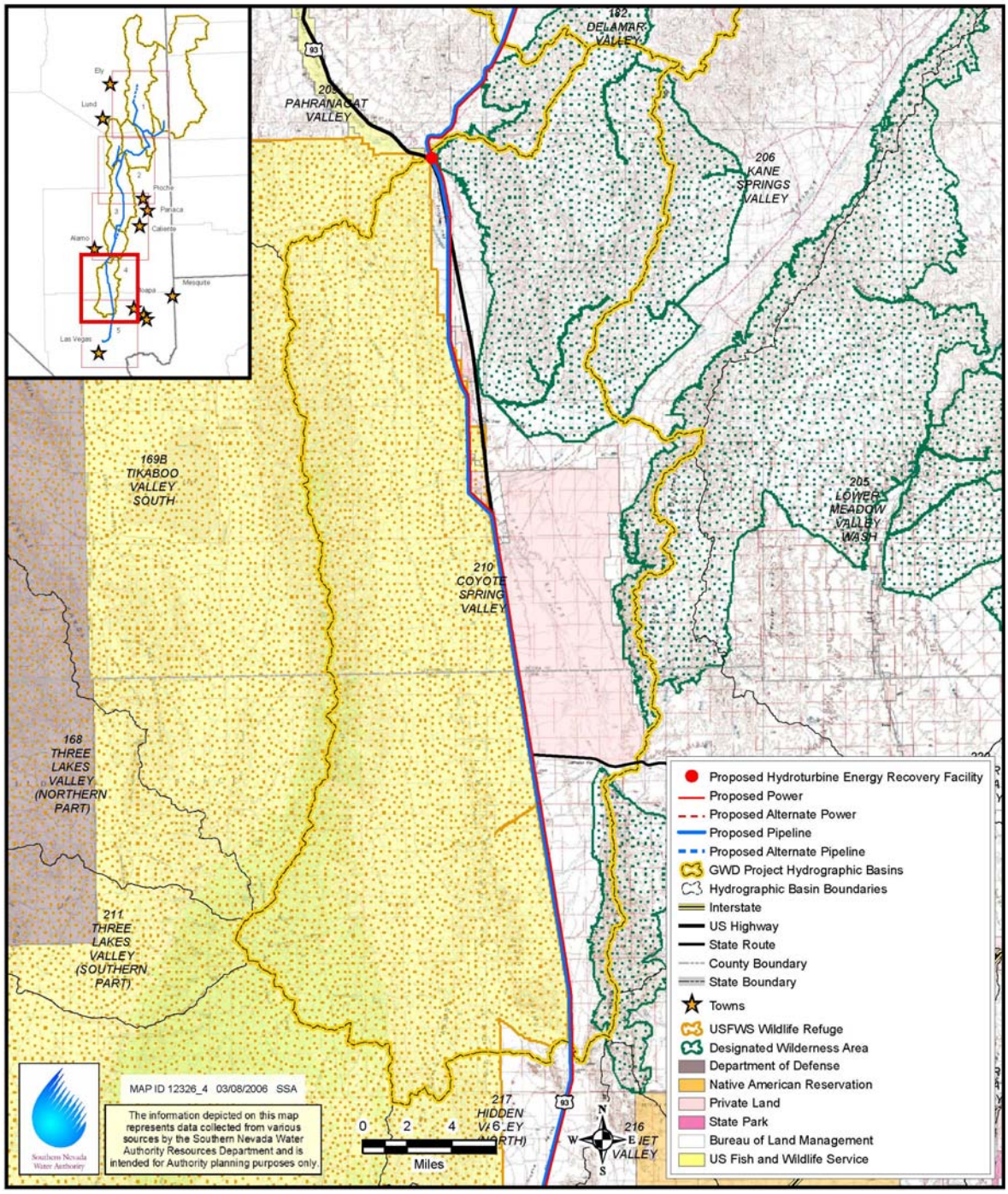

Figure 3-4 GWD Facilities – Pahranagat And Coyote Spring Valleys

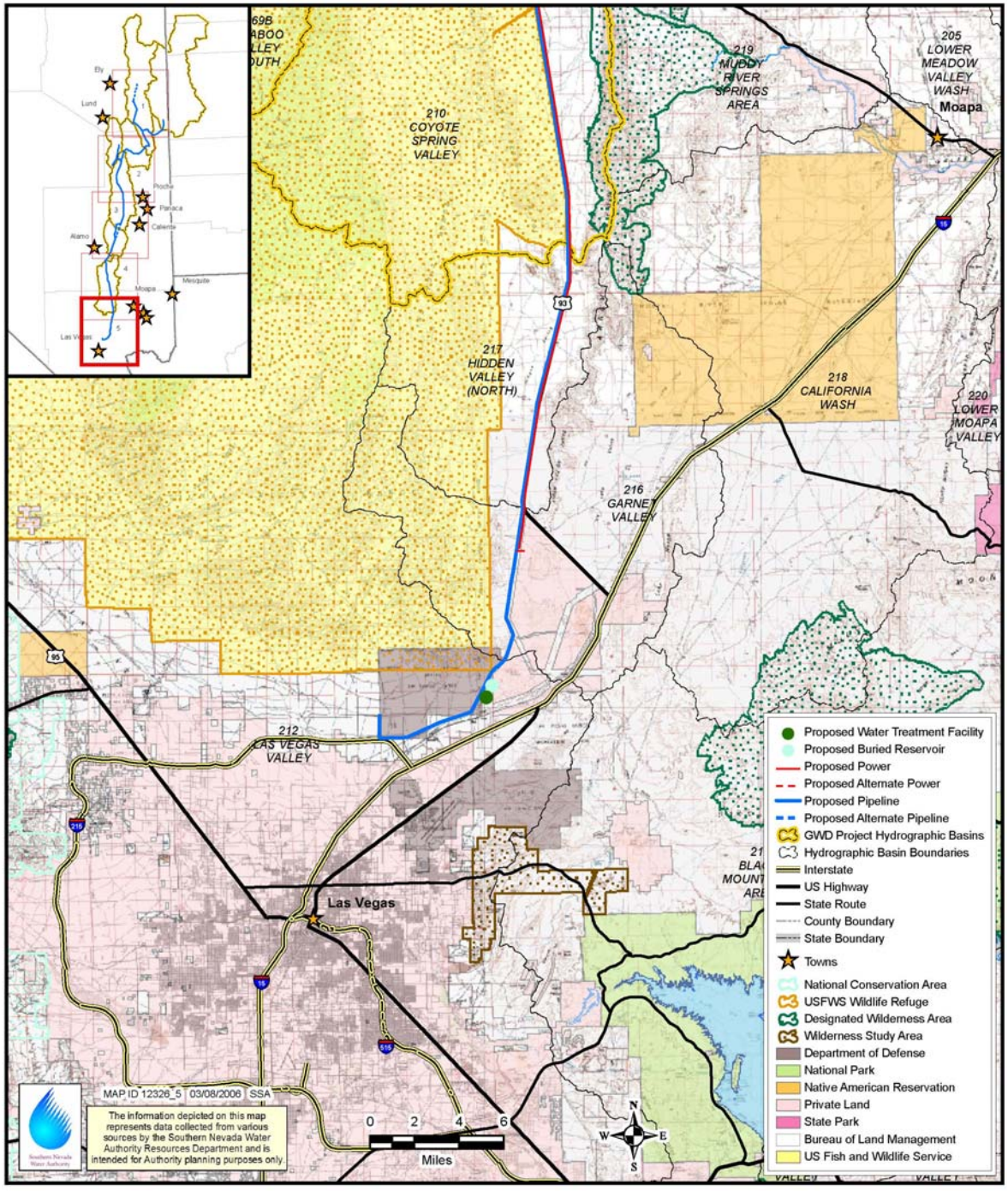

Figure 3-5 GWD Facilities – Hidden, Garnet, And Las Vegas Valleys

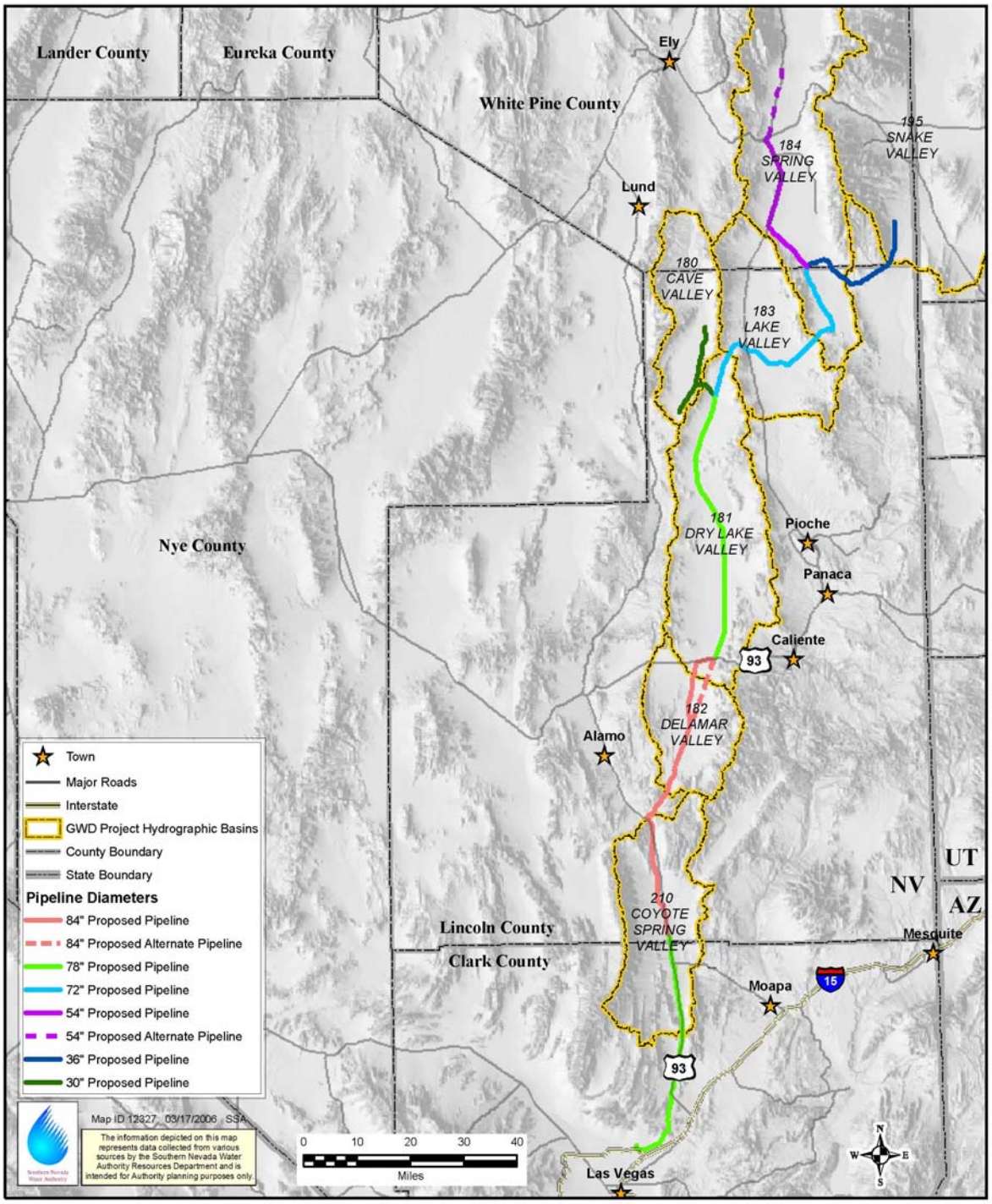

Figure 3-6 GWD Project Pipeline Diameters

Table 3-1 GWD Project Pipelines

Pipeline	Valley	Pipe Diameter (inches in diameter)	Pipe Length (miles)
Main Pipeline	Spring	72	16
	Lake	72	21
	Dry Lake	72	9
		78	57
		84	5
	Delamar	84	25
	Pahranagat	84	7
	Coyote Spring	84	17
		78	24
	Hidden	78	11
	Garnet	78	7
	Las Vegas	78	8
Spring Lateral	Spring	54	29
Snake Lateral	Snake	36	10
	Hamlin	36	7
	Spring	36	10
Cave Lateral	Cave	30	18
	Dry Lake	30	4
		PROJECT TOTAL	**285**

Table 3-2 GWD Project Alternate Pipelines

Hydrographic Basin	Pipe Diameter (inches in diameter)	Pipe Length (miles)
Spring Valley alternate	54	16
Dry Lake Valley alternate	78	1
Delamar Valley alternate	84	25
	ALTERNATE TOTAL	**42**

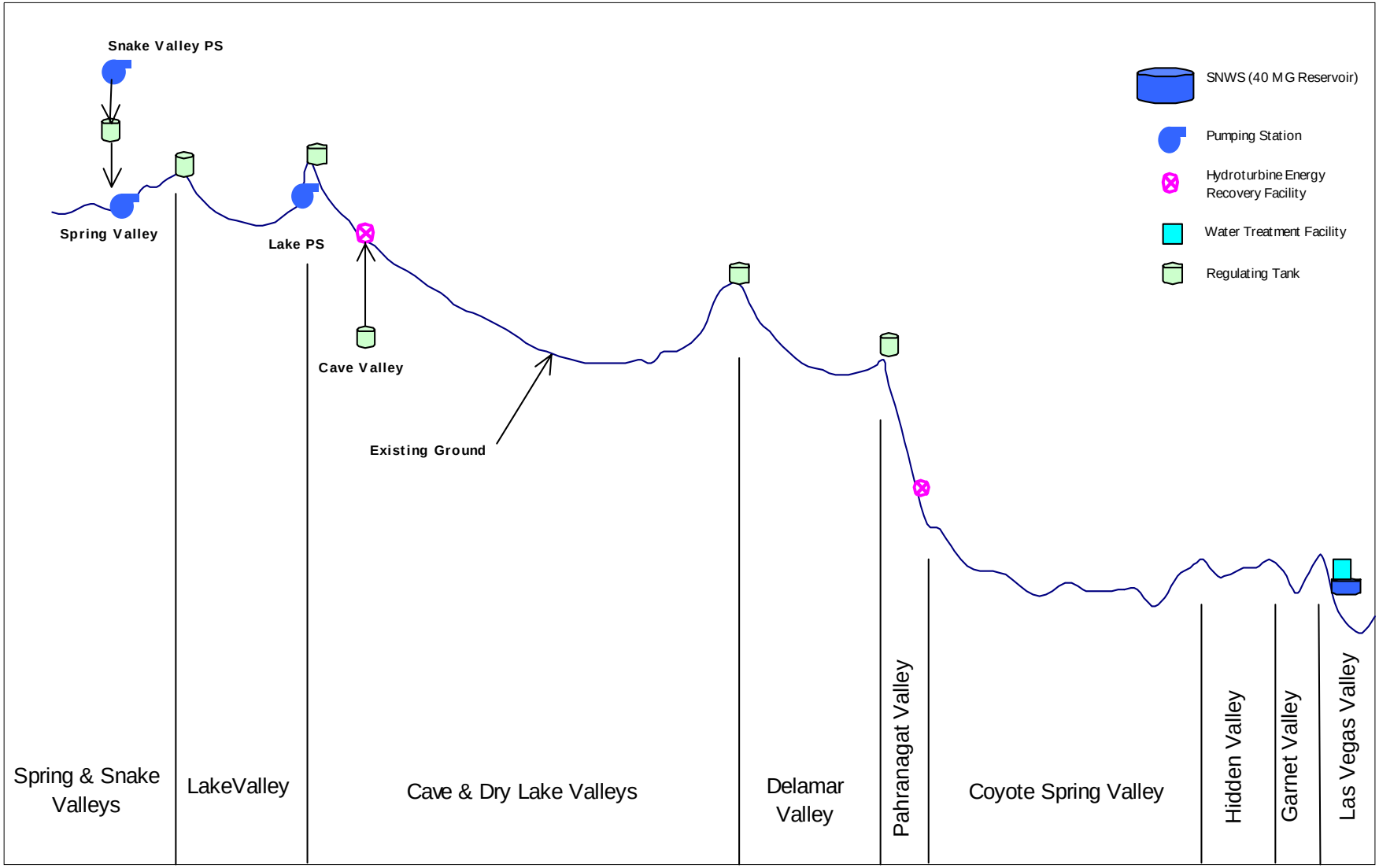

Figure 3-7 GWD Project Ground Surface Profile

Conduit for fiber optic cable may be installed along with the pipelines. The fiber optic cables may be used for communications to manage facility operations. No permanent security fencing of the pipeline ROW or appurtenances is anticipated.

The main and lateral pipelines are described below from their beginning in Spring Valley to their terminus in Las Vegas Valley. Detailed maps of the alignments and associated ROWs are provided under separate cover in the Conceptual Plan of Development Maps. The mile references used in the text below are shown on those maps.

As further described in Chapter 3.8, the pipelines described in this document do not include secondary laterals and collector pipelines from the wells to the main pipeline or primary laterals. The ROWs for those pipelines will be requested in the future, and will be the subject of separate environmental analysis and federal approvals (see Chapter 3.8).

3.1.1 Main Pipeline

The main pipeline will begin in southern Spring Valley, on the east side of the Fortification Range, just south of the Lincoln and White Pine County border (Main mile 0 on Sheet 1 of the maps). This is also the location of the Spring Valley Pumping Station (Chapter 3.2.1, below). The pipeline will be 72 inches in diameter. It will extend south towards the town of Atlanta, following an existing unpaved road (Indian Springs Road). Prior to reaching Atlanta, the alignment will turn to the west (Main mile 13 on Sheet 4 of the maps). It will continue to follow an existing road and then cross Horse Corral Pass into Lake Valley (Sheets 5 through 7 of the maps).

In Lake Valley, the pipeline will follow existing dirt roads to the southwest, around the southern end of the Fortification Range, and then turn westward along existing roads across the valley floor. The main pipeline will cross U.S. Highway (US) 93 in the vicinity of Dutch John Well (Main mile 33 on Sheet 10 of the maps), and then cross over Muleshoe Pass and turn south towards Dry Lake Valley (Sheets 11 through 14 of the maps).

The main pipeline will extend south along existing roads through the center of Dry Lake Valley. At the junction point with the Cave Valley Lateral, the main pipeline will increase to 78 inches in diameter (Main mile 47 on Sheet 14 of the maps). It will pass through the central part of the valley and around the eastern side of the dry lakebed until reaching US 93 (Main mile 98 on Sheet 31 of the maps). In this area, water pumped from Dry Lake Valley will be added and the main pipeline will increase to 84 inches in diameter. The pipeline will extend west along the northern side of US 93 for approximately 3 miles before turning south along an existing dirt road near the old Delamar Landing Field. The main pipeline will continue south along the existing road before entering Delamar Valley at Main mile 103 (Sheets 32 through 33 of the maps).

The main pipeline will extend south along existing dirt roads through the central part of Delamar Valley. It will go around the eastern side of the dry lakebed before entering the southern end of Pahranagat Valley near Main mile 130 (Sheets 40 through 42 of the maps).

The main pipeline will cross through the southern end of Pahranagat Valley, following an existing road and fiber optic cable alignment, before reaching US 93. It will enter northern Coyote Spring Valley near Main mile 134 (Sheets 43 through 44 of the maps).

The main pipeline will follow US 93 through Coyote Spring Valley (Sheets 44 through 57 of the maps). In the northern part of the valley, the alignment will be on the east side of the highway, but will cross to the west side near Main mile 137. The water that is conveyed in the pipeline for Lincoln County will exit the pipeline in central Coyote Spring Valley, in the area of the CSI property (Main miles 142 to approximately 145, on Sheets 46 through 47 of the maps). In the same area, however, SNWA's Coyote Spring water will enter the pipeline. Because the volume of water that will enter the pipeline is less than what will leave, the diameter of the pipeline will decrease to 78 inches. South of the CSI property, the pipeline will continue to follow US 93 into Hidden Valley (Main mile 177 on Sheet 58 of the maps).

The pipeline will follow US 93 through Hidden Valley (Sheets 58 through 61 of the maps). Upon reaching Garnet Valley, the pipeline will deviate from the highway and continue south within an existing utility corridor to enter the Las Vegas Valley (Sheets 61 through 63 of the maps). The alignment will follow the existing Kern River gas line and Nevada Power Company power line alignments across the Nellis Air Force Base Small Arms Range, and terminate into an existing SNWA water line on Lamb and Grand Teton Avenues (Sheets 63 through 66 of the maps).

An alternate alignment to the main pipeline in southern Dry Lake and northern Delamar Valleys has been identified (Sheet 31 and Sheets 34 through 37 of the maps). This alignment would stay along the existing North Poleline Road. However, because of the increasing elevation grade along this stretch, this pipeline alignment is approximately 400 feet higher in elevation. As a result, staying on North Poleline Road in this area would require an additional pumping station (Chapter 3.2.4), and installation of more costly piping with thicker walls and higher operational pressures. This alternate alignment reduces head pressure that would otherwise be used for power generation at the proposed hydroturbine energy recovery facility (Chapter 3.6.3). It also extends through a dense area of Joshua trees. For these reasons, this alternate alignment is not preferred by SNWA for the GWD Project.

3.1.2 Lateral Pipelines

Three primary lateral pipelines will branch off the main pipeline and extend into northern Spring, Snake, and Cave Valleys. The northern Spring Valley and Snake Valley Laterals will connect into the beginning of the main pipeline at the Spring Valley Pumping Station, and the Cave Valley Lateral will connect to the main pipeline in northern Dry Lake Valley (also known as Muleshoe Valley).

Spring Valley Lateral

The Spring Valley Lateral will extend into southern and central Spring Valley. An alternate segment would continue further into northern Spring Valley. The lateral will be up to 54-inches in diameter. The length and diameter of the proposed and/or alternate pipeline segments may be reduced, depending upon final siting of the production wells and well fields in southern Spring Valley (Chapter 3.8).

The Spring Valley Lateral will extend northwest from the Spring Valley Pumping Station, at the beginning of the main pipeline, on the north side of an existing dirt road to

US 93. The lateral will continue north on the east side of US 93 to terminate near the junction of US 93, 6, and 50 (Sheet 1, and Sheets 66 through 74 of the maps).

The alternate pipeline alignment on the Spring Valley Lateral would extend the pipeline further north in Spring Valley. This alternate alignment would begin just south of US 93, 6, and 50, and continue northward along State Route 893 to the vicinity of Cleve Creek (Sheets 74 through 78 of the maps). This alternate alignment has been identified because until Nevada State Engineer approvals are obtained, SNWA cannot determine if an extension of the primary lateral will be required or if groundwater from this area could be conveyed through future secondary laterals or collector pipelines (Chapter 3.8).

Snake Valley Lateral

A 36-inch lateral pipeline will extend into Snake Valley from the main pipeline in southern Spring Valley. The lateral will extend east from the Spring Valley Pumping Station, across the valley floor on an existing dirt road, and towards the foothills of the Snake Range (Snake mile 9, Sheet 80 of the maps). There it will turn southeast on existing dirt roads, then east at the base of the Snake Range, and enter Hamlin Valley (Sheet 81 of the maps.). The lateral pipeline will continue to follow existing dirt roads past "The Troughs," turn northeast, and pass Big Spring Wash where it enters Snake Valley. It will then turn north through Snake Valley, passing the Big Springs complex and several private ranches, and terminate in the vicinity of Chokecherry Creek (Snake mile 27.1, Sheet 86 of the maps).

Cave Valley Lateral

A 30-inch lateral pipeline will connect Cave Valley into the main pipeline. The lateral is comprised of both north and south segments located on the existing Cave Valley Road on the eastern side of Cave Valley. The Cave Valley Lateral will begin at the main line in northern Dry Lake Valley at Sidehill Pass, and extend over Sidehill Pass to Cave Valley Road on the valley floor (Sheet 14 and Sheet 87 of the maps). From the intersection of Sidehill Pass Road and Cave Valley Road, the north segment of the lateral will extend approximately 11 miles on Cave Valley Road, and terminate near the intersection of Cave Valley Road and the road to Rosebud Spring (Sheets 87 through 90 of the maps). The south segment will extend approximately 6 miles to the vicinity of the Silver King Mine (Sheets 91 through 92 of the maps).

3.2 PUMPING STATIONS

Three pumping stations will be required to move water for the GWD Project. One alternate pumping station may be required if the alternate Delamar and Dry Lake pipeline alignment is selected. These pumping stations are described in more detail below. Pumping stations typically include:

- Pumps and motors
- Forebay (water storage tank)
- Instrumentation and control systems
- Electrical facilities including switchgear, transformers, motor control centers, local control panels, and lighting

- Mechanical systems including heating, ventilation, air conditioning, plumbing, hoists, cranes, and compressors
- Chemical addition facilities, where needed
- Surge control system
- Break room and restroom, with associated septic tank and leach field
- Site fencing and security provisions
- Access road, where needed

Figures 3-8 and 3-9 show the floor plan and cross-section of a typical water pumping station using horizontal split-case pumps.

A standby generator may be included at each pumping station site. The generator would be large enough to operate one of the pumps in each station to maintain pressures in the pipeline in the event of a power outage.

Pumping stations typically are contained in a concrete or concrete block building. A facility electrical substation will be included at each pumping station site to lower the power voltage to the operational requirements. The sites will be partially paved, and remaining areas will be covered with crushed gravel. Security fencing with a locked gate will enclose each site.

3.2.1 Spring Valley Pumping Station

The Spring Valley Pumping Station will be located on the west side of Indian Springs Road about 2 miles south of Indian Springs Knoll (Sheet 1 of the maps). A 60-acre site will be required for this facility, which will include the pumping station, possible water treatment facilities, a maintenance yard, and a primary electrical substation (Figure 3-10).

The pumping station will include a forebay to stabilize system hydraulics, an electrical generator building, and a small facility electrical substation to serve the pumping station and maintenance yard. The pumping station will collect water from the Spring and Snake Laterals along with other groundwater in southern Spring Valley, and move it over Horse Corral Pass. Although the number of pumps required at this station will not be determined until the final facility design, it is anticipated that 16 pumps at 1,500 horsepower each will be required.

The pumping station site may also include water treatment facilities. Chemicals for biological control, such as hypochlorite, may be incorporated if biological organisms, such as protozoans or bacteria, are present.

The proposed maintenance yard will be used for storage of parts and equipment, and facility and equipment maintenance activities. A warehouse building and an operations building will be located at the maintenance yard. The remainder of the site will consist of parking areas and outdoor storage areas.

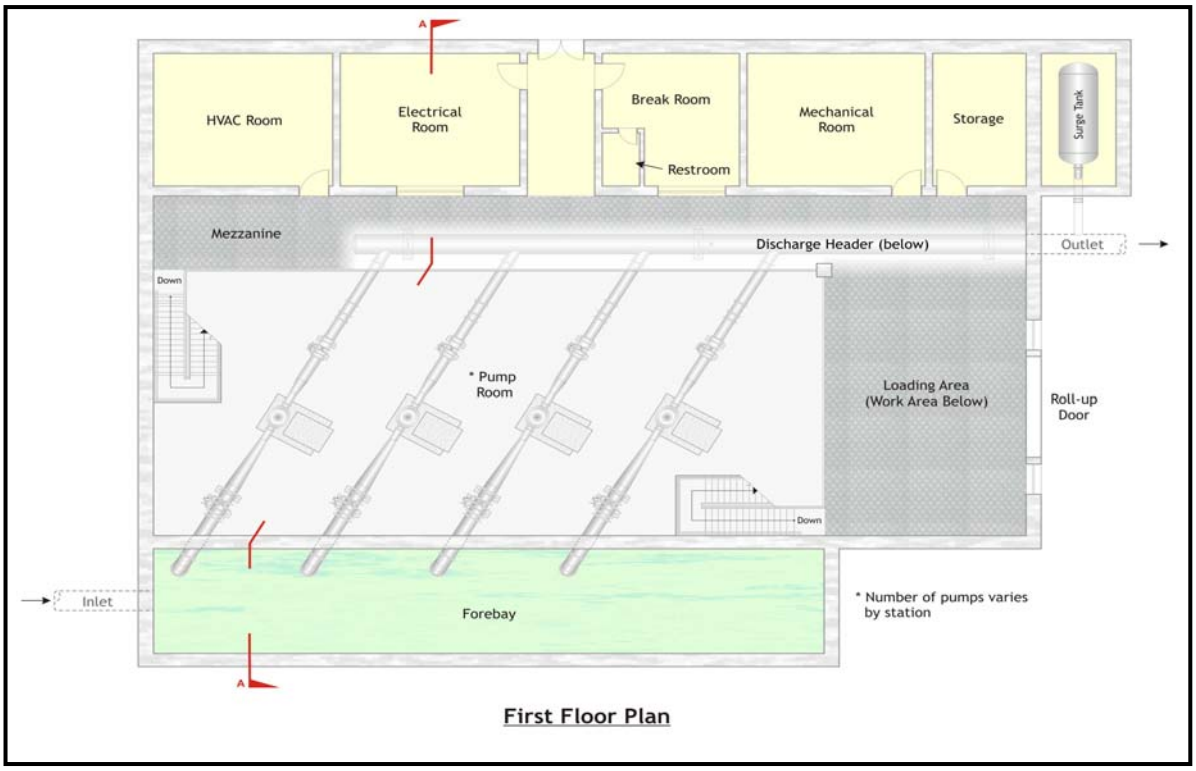

Figure 3-8 Pumping Station Layout, Conceptual Floor Plan

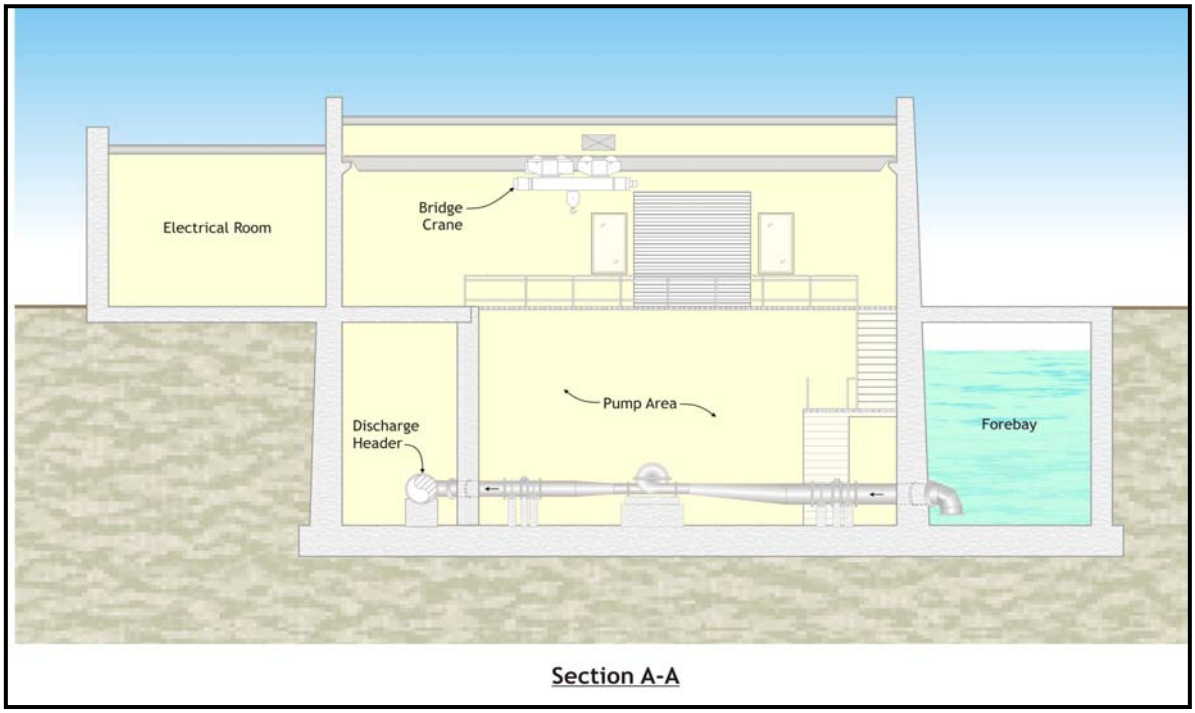

Figure 3-9 Pumping Station Layout, Conceptual Cross Section

Figure 3-10 Spring Valley Pumping Station Site

3.2.2 Snake Valley Pumping Station

The Snake Valley Pumping Station will be located approximately 3 to 4 miles southwest of Big Springs in southern Snake Valley (Sheet 83 of the maps). A 10-acre site will be required for this facility, which will include the pumping station, surge facilities, generator building, outdoor storage yard, and small electrical substation (Figure 3-11). The pumping station will lift the water from Snake Valley over the south bench of the Snake Range, and into Spring Valley where the lateral ties into the main line at the Spring Valley Pumping Station. Although the number of pumps required at this station will not be determined until final facility design, it is anticipated that 4 pumps, at 100 horsepower each, will be required.

3.2.3 Lake Valley Pumping Station

The Lake Valley Pumping Station will be located along the main pipeline alignment, approximately 2 miles northwest of US 93 on Muleshoe Summit Road (Sheet 11 of the maps). The 5-acre site will include the pumping station, surge facilities, a generator building, and a small electrical substation to serve the pumping station (Figure 3-12). The pumping station will lift the water in the main line from Lake Valley over Muleshoe Summit, and into Dry Lake Valley. Lincoln County water that is collected from Lake Valley may also enter the system at this facility. Although the number of pumps required at this station will not be determined until final facility design, it is anticipated that 12 pumps, at 1,200 horsepower each, will be required. Because of the smaller size of this site, a temporary facility staging area of 5 acres will be required for construction of this pumping station.

3.2.4 Alternate Dry Lake Valley Pumping Station

As described in Chapter 3.1.1, an alternate alignment of the main pipeline in southern Dry Lake and northern Delamar Valleys would require another pumping station because of elevation differences. This alternate pumping station would only be constructed if the alternate alignment were selected for the GWD Project. This alternate pumping station would be located near the northeast quadrant of the intersection of US 93 and North Poleline Road (Sheet 31 of the maps). The 5-acre site would include a pumping station, surge facilities, a generator building, and a small electrical substation to serve the pumping station, similar to the Lake Valley pumping station (Figure 3-12). Although the number of pumps required would not be determined until final facility design, up to 12 pumps, at 1,200 horsepower each, may be required. Because of the smaller size of this site, a temporary facility staging area of 5 acres will be required for construction of this pumping station.

3.3 REGULATING TANKS

Six regulating tanks will be required along the pipeline alignments to regulate water flow through the pipeline. Each will require a 1-acre permanent site and a 4-acre temporary facility staging area. They may be constructed above or below ground, as determined during final project design, and will be concrete or steel if above ground, and concrete if below ground. They will consist of the tank structure, inlet and outlet pipes, and an

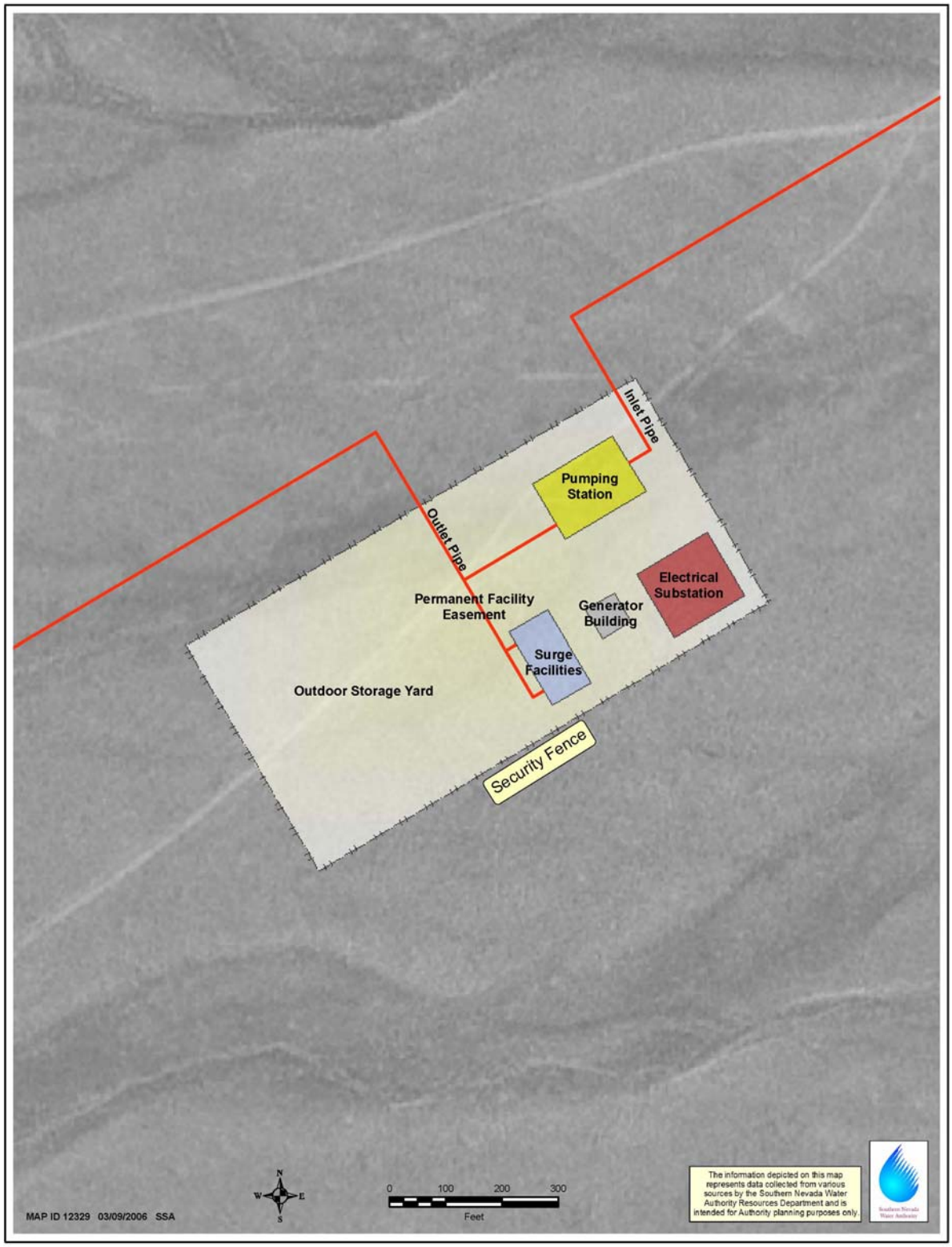

Figure 3-11 Snake Valley Pumping Station Site

Figure 3-12 Lake Valley Pumping Station Site

overflow and a drain pipe that are connecting to an energy dissipater (Figure 3-13). A radio tower for remote communication may be located on each regulating tank site.

The tanks will have capacities of up to about 3 million gallons, with the final capacity decided during engineering design. Tanks of those capacities are typically about 130 feet in diameter, and are approximately 30 feet high if aboveground. Security fencing, typically chain link, with a locked gate will enclose each site.

The tanks will be located at high points along the pipeline alignment, including:

- Spring Valley (1) – on the Snake Valley lateral at the southern end of the Snake Range (Sheet 80 of the maps)
- Spring Valley (2) – at Horse Corral Pass at the high point between Lake and Spring Valleys (Sheet 5 of the maps)
- Lake Valley – at Muleshoe Summit in the east-central part of the valley (Sheet 11 of the maps)
- Cave Valley – at the high point in Sidehill Pass (Sheet 14 of the maps)
- Dry Lake Valley – in the central portion of the valley near US 93 (Sheet 31 of the maps)
- Delamar Valley – at the Delamar Valley summit in the south of the valley (Sheet 42 of the maps)

3.4 BURIED STORAGE RESERVOIR

A buried storage reservoir will be required to manage flow and delivery of the water before it enters into SNWA's existing water system. The reservoir will be a 40 million gallon, belowground, covered concrete tank. The reservoir site will be 35 acres in size, and will include a flow regulating structure, energy dissipater, maintenance yard, storage areas, and parking. Security fencing with a locked gate will enclose the site. The site will be partially paved with the remainder covered with crushed gravel. A conceptual site plan of the buried reservoir is shown on Figure 3-14.

The reservoir site will be located in northeastern Clark County, on the Nellis Air Force Base Small Arms Range, adjacent to the existing Kern River gas line and Apex (Sheet 63 of the maps). This location meets the elevation need of 2,510 feet, which will allows the water to flow by gravity into SNWA's existing water system.

3.5 WATER TREATMENT FACILITY

Treatment of the pumped groundwater to drinking water standards will be required before it enters the existing potable (drinking) water systems. The water must meet standards of the Safe Drinking Water Act and Nevada Primary and Secondary water quality standards before it can be delivered as potable water.

The WTF will be located in the northeastern Las Vegas Valley, on BLM lands between the Nellis Air Force Base Small Arms Range and Apex private lands (Sheet 63 of the maps). This location is near the buried storage reservoir, allowing treatment of the water before it enters into SNWA's water system.

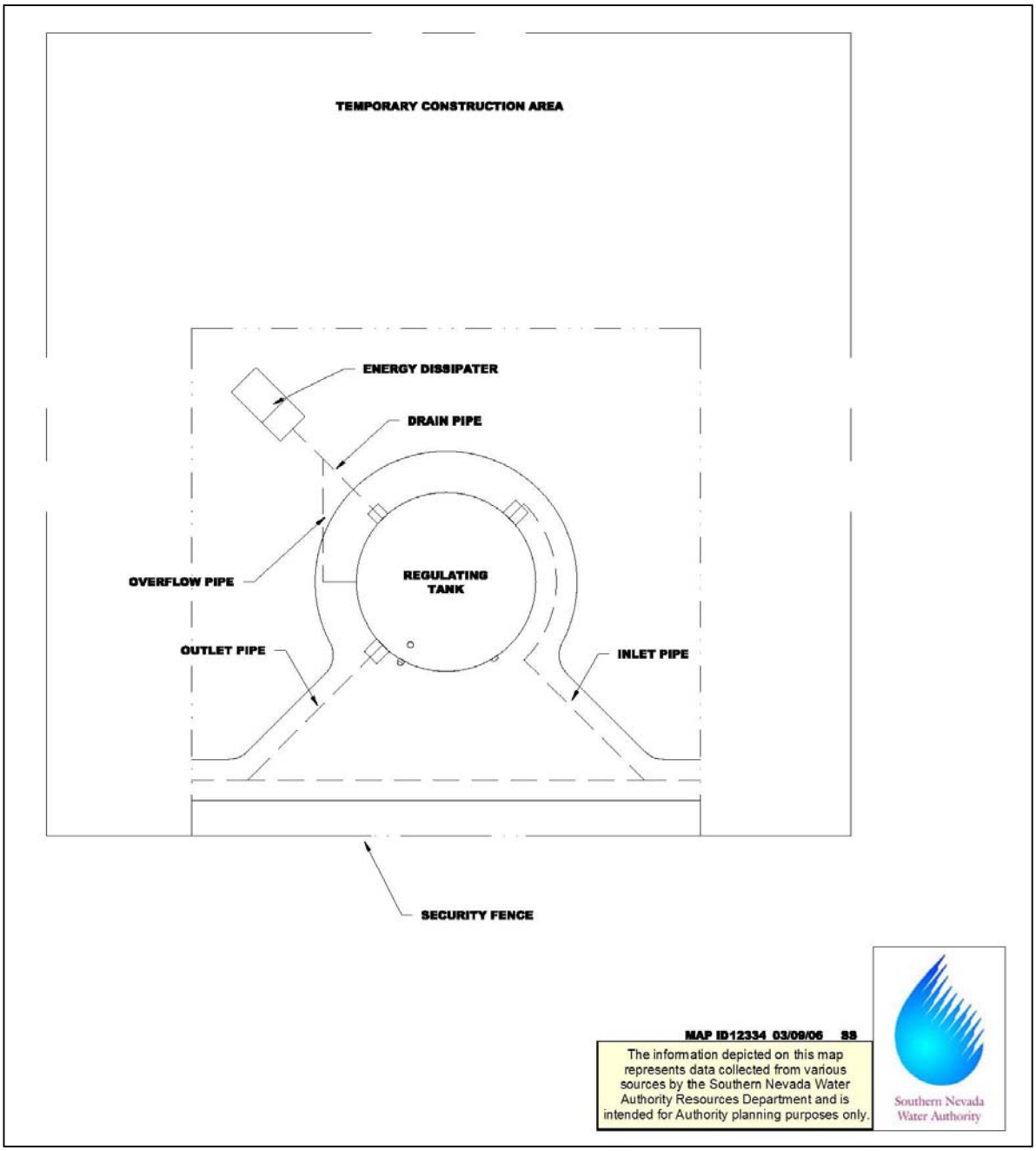

Figure 3-13 Conceptual Regulating Tank Site Plan

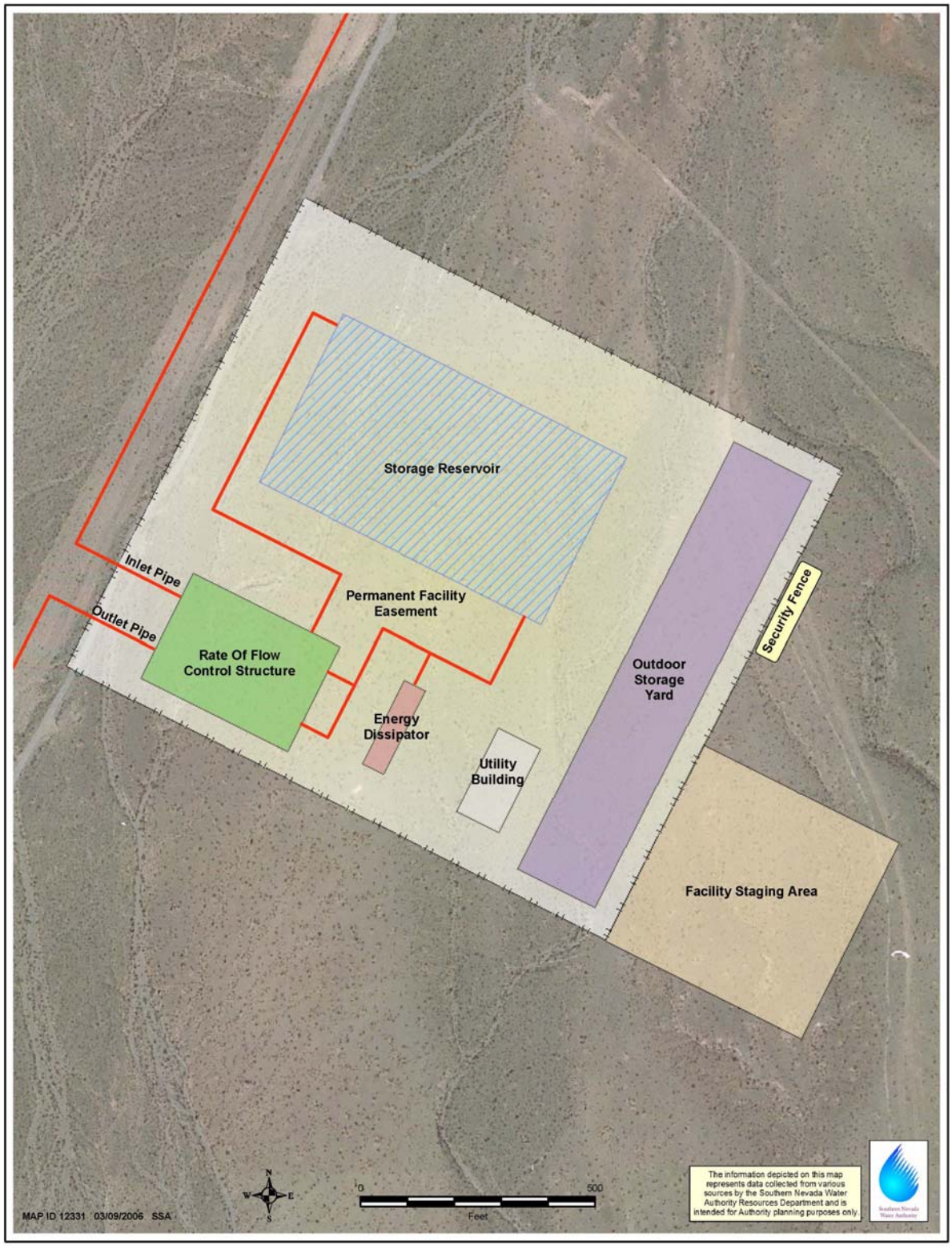

Figure 3-14 Conceptual Buried Storage Reservoir Site Plan

The WTF will be a chemical injection facility to disinfect and fluoridate the water. Chemicals will be injected directly into the main pipeline. Chlorine will be added for disinfection. Fluoride may be added to the water if needed to meet Nevada State requirements. An orthophosphate will be added to prevent corrosion of the pipeline. Chemicals required for water treatment (see Chapter 8.5) will be stored in separate tanks, either above or belowground, in designated areas. Spill containment will be provided as required by Federal, State, and local regulations.

The WTF site will require 40 acres. A conceptual site plan for this facility is shown on Figure 3-15. Final site layout will be determined following completion of water quality testing and final facility design. The capacity of the WTF will be up to 150 million gallons per day.

A maintenance yard will be located within the WTF site. This yard will be used for storage of parts and equipment, along with facility and equipment maintenance activities. A warehouse building and an operations building will also be located on site.

Security fencing with a locked gate will enclose the site. A staffed security booth may be installed at the entry gate to the facility. The site will be partially paved with remaining areas covered by crushed gravel.

The CSI is constructing a WTF for the CSI development in Coyote Spring Valley. The CSI WTF will treat water from various sources owned by CSI and/or LCWD, sufficient to meet the needs of the CSI development. Environmental analysis of the CSI development, which includes the CSI WTF, has been done separately in support of a U.S. Army Corps of Engineers permit. The CSI WTF is scheduled to begin construction in early 2006.

3.6 POWER FACILITIES

Electrical power will be required to operate the proposed pumping stations, WTF, and buried storage reservoir. Table 3-3 identifies the anticipated electrical power requirements for these facilities.

Table 3-3 also includes the estimated power requirements for the future groundwater production wells and related facilities (see Chapter 3.8, below). Because the number and location of these production facilities are subject to review and approval by the Nevada State Engineer and further environmental review and federal approvals, their power requirements are only estimates. The power facilities described as part of the GWD Project will be capable of conveying this estimated power requirement.

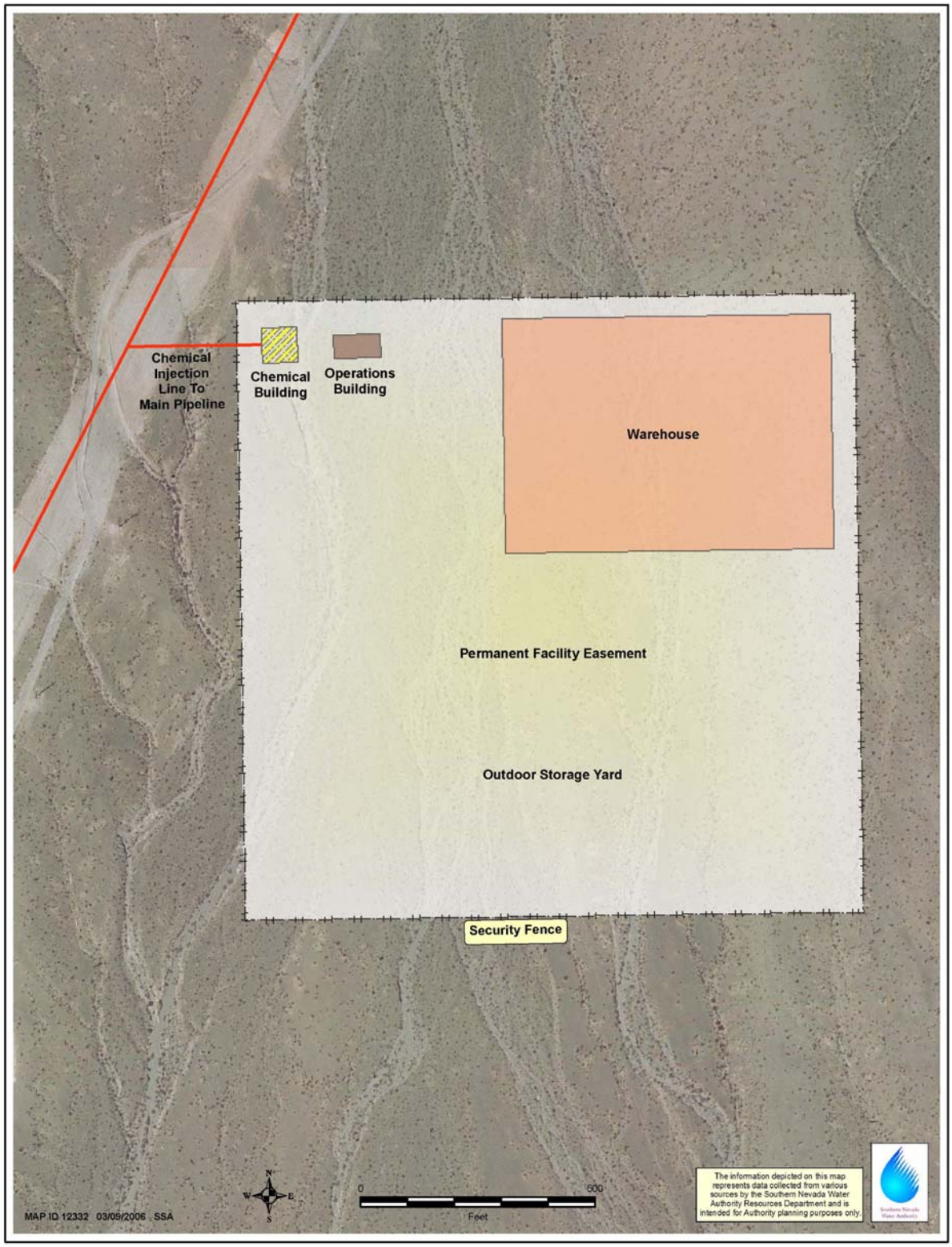

Figure 3-15 Conceptual Water Treatment Facility Site Plan

Table 3-3 Anticipated Power Requirements

GWD Project Facilities	Power (kilowatts)
Proposed Facilities:	
Spring Pumping Station	10,100
Snake Valley Pumping Station	2,500
Lake Pumping Station	8,500
Buried Storage Reservoir	10
Water Treatment Facility	1500
Future Facilities:	
Future Groundwater Production Facilities and Appurtenances	estimated 19,500
TOTAL	**42,110**

There is currently no electrical power distribution line in the GWD Project area sufficient to meet needs of the GWD Project. Therefore, construction of a 230 kV power line to connect into regional electrical substations, Gondor Substation near Ely and Silverhawk Substation near Apex, has been identified as part of the project. Gondor Substation is owned by Mount Wheeler Electric, and Silverhawk Substation is owned by Nevada Power Company and SNWA. Both of these substations are major sources of electrical power on the Western States Grid.

In addition to the 230 kV power line, two primary electrical substations will decrease power levels to 69 kV to convey the lower voltage needed to operate GWD Project facilities. The hydroturbine energy recovery facilities will generate small amounts of power that will be used by the GWD Project. These power facilities are described in more detail below.

LS Power Development, LLC (LS Power) is currently proposing to develop a major north-south power line that would pass through the GWD Project area. This LS Power project would be similar to the Southwest Intertie Power project, for which BLM issued ROWs in 1993. If LS Power does develop its project, alternate GWD Project power facilities could be constructed. These alternate power facilities are described in more detail below in Chapter 3.6.4.

3.6.1 Power Lines

Primary power lines to operate the GWD Project will include 230 kV and 69 kV lines. A total of 265 miles of 230 kV power line and 120 miles of 69 kV power line will be required. Both will require 100-foot wide permanent ROWs.

The 230 kV power line will begin at the Gondor Substation located northeast of Ely (Sheet 93 of the maps). The line will follow an existing power line south along the west side of the Duck Creek Range. South of Steptoe Creek the 230 kV power line will diverge from the existing power line, but continue to stay on the west side of the

Duck Creek Range. The power line will cross US 93, 6, and 50, and parallel the highway for a few miles before heading southeast across the Schell Creek Range. It will connect to the main pipeline approximately four miles south of the US 93, 6, and 50 interchange (Power miles 0 to 33.8, on Sheet 3 and Sheets 93 through 102 of the maps).

The 230 kV power line will follow the main pipeline alignment south until it terminates at the existing Silverhawk Substation (Sheet 61 of the maps), with the exception of 13 miles in southern Dry Lake and northern Delamar Valleys. Between US 93 and the vicinity of Delamar Wash, the 230 kV power line will remain on the existing North Poleline Road (Alternate Pipe/Main Power miles 0 to 13, on Sheet 31 and Sheets 34 through 37 of the maps).

Power line conductors carrying 69 kV will be strung beneath the 230 kV conductor, on the same power pole, between Spring and Coyote Spring Valleys (Figure 3-16). The 69 kV power will be transmitted to project facilities, where it will be lowered to operational levels.

Power lines transmitting 69 kV will be routed along the Snake and Cave Valley Laterals to operate future groundwater production facilities in those valleys. The 69 kV power lines will be placed adjacent to the lateral pipelines.

A typical 230 kV power pole with additional insulators (crossbars) to carry a 69 kV line is shown on Figure 3-16. Single steel power poles, approximately 100 feet tall and spaced approximately 800 feet apart depending on the terrain, will be used for the new 230/69 kV power lines. A typical 69 kV power pole is shown on Figure 3-17. The 69 kV power poles will be single steel poles, approximately 60 feet in height and spaced approximately 600 feet apart depending on the terrain.

The tops of the power poles will be equipped with anti-perching devices to discourage raptors, ravens, and other birds from perching on the poles. The design of the vertical conductors on the 230 kV poles will discourage birds from flying between the conductors, and clearance will be provided to prevent bird injury. Based on Avian Power Line Interaction Committee recommendations, adequate spacing between conductors (8 feet or greater based on the wingspan of female golden eagle) will be implemented on the proposed power poles.

An alternate alignment for the 230 kV power line between the Gondor Substation and the main pipeline has been identified. Instead of crossing the Schell Creek Range south of the US 93, 6, and 50 interchange, the alternate power alignment would follow existing power lines across the Humboldt-Toiyabe National Forest through Cooper Canyon. It would meet up with the Spring Valley Lateral alternate pipeline alignment along State Route 893, approximately 4 miles north of US 93, 6, and 50 (Power Alternate miles 0 to 12.4, on Sheet 76 and Sheets 103 through 106 of the maps).

For the WTF and buried storage reservoir, which are located south of the 230 kV power line's terminus at the Silverhawk Substation, a tap will be made into an existing Nevada Power Company 69 kV line. This existing power line is adjacent to the proposed WTF site. A 0.25-mile long 12.5 kV overhead power line will extend from the WTF to the buried storage reservoir. This power line will be located within the requested pipeline ROW between these facilities, and additional ROWs will not be required.

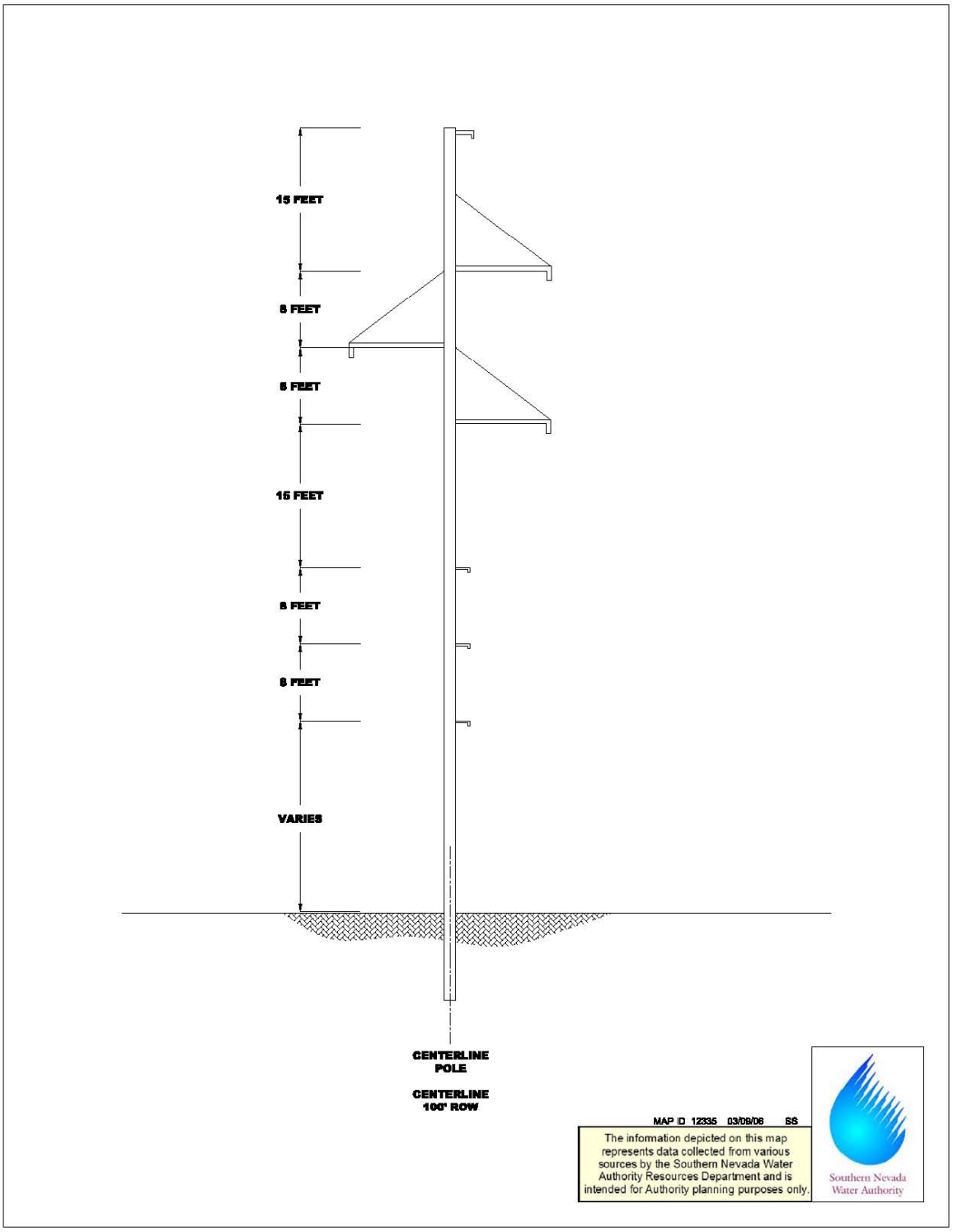

Figure 3-16 Typical 230 kV Power Pole

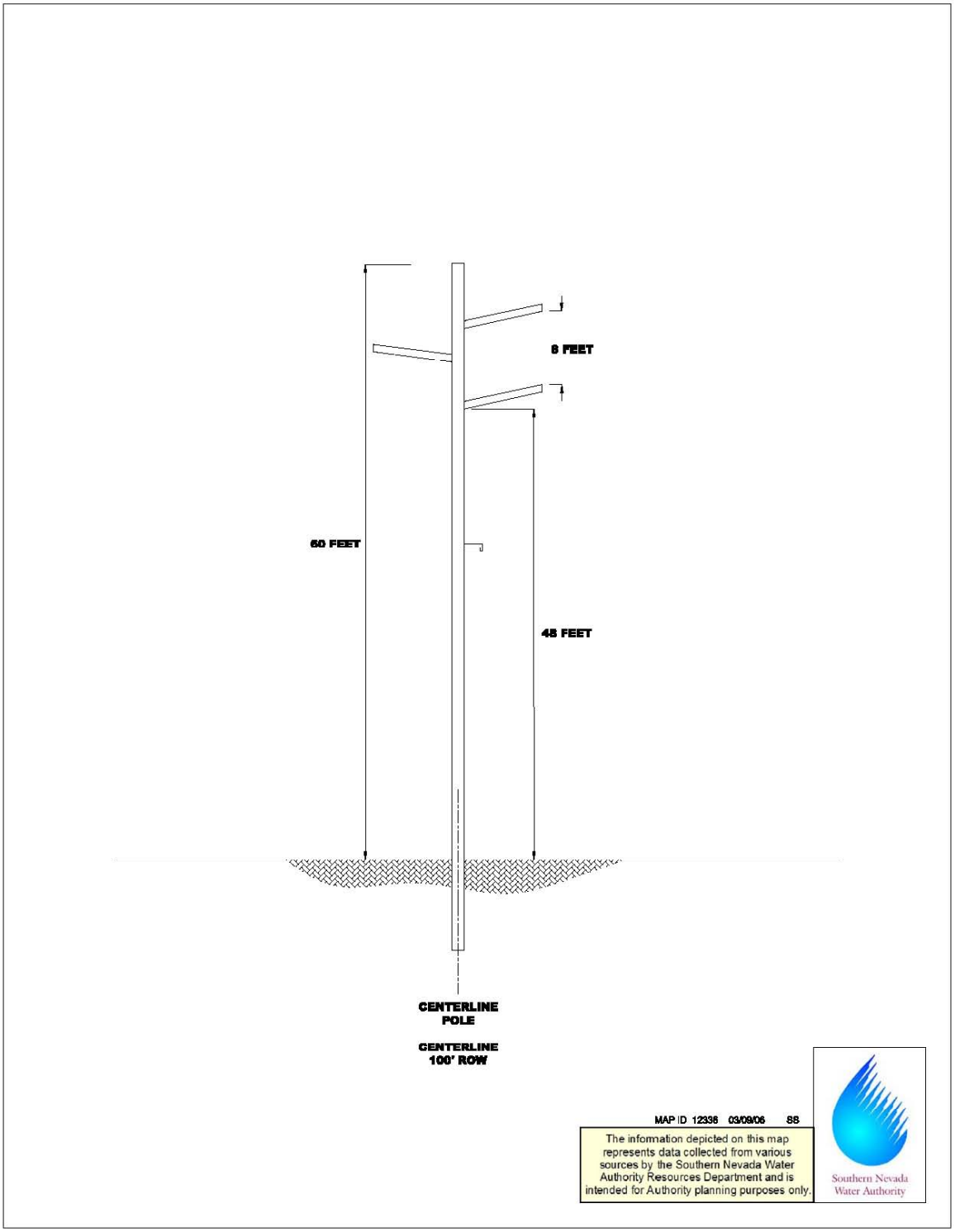

Figure 3-17 Typical 69 kV Power Pole

As described in Chapter 3.6 above, individual groundwater production wells and well field areas are subject to review and approval. Additional 12.5 or 25 kV power lines will be required to operate those wells. These lower voltage power lines will be identified when the groundwater productions wells and well fields are approved, but will most likely be routed on the same alignment as the collector pipelines. Those additional power lines will be addressed in future ROW requests and associated environmental compliance documents for the groundwater production facilities.

3.6.2 Electrical Substations

Two primary electrical substations will be required to convey the 230 kV power and lower it to 69 kV for transmission to project facilities. The first will be located within the Spring Valley Pumping Station site (Figure 3-10 and Sheet 1 of the maps), and an additional ROW will not be required. The second will be located in Dry Lake Valley at the intersection of US 93 and North Poleline Road, and will require a 10-acre site (Sheet 31 of the maps).

Primary substations will include power lines and switchgear, a transformer, control building, and warehouse facility. The transformer will be placed on a concrete pad with a curb around the perimeter for spill containment. The substations will be enclosed by security fencing, typically 8-foot high chain link.

A facility substation will be included within each pumping station facility site. The facility substations decrease incoming power to 4 kV to operate the pumping station equipment. A facility substation will also be located within the WTF site, to decrease the 69 kV power from the existing Nevada Power Company line to 12.5 kV, for operation of the WTF and buried storage reservoir.

Additional secondary substations will be required in the future within the area of the groundwater production well fields to lower power from 69 kV to 12.5 or 25 kV to operate the wells and associated facilities. These secondary substations will be identified after the groundwater production wells and well fields have been approved, and will be the subject of future ROW requests and environmental compliance.

3.6.3 Hydroturbine Energy Recovery Facilities

Two potential hydroturbine energy recovery facilities have been identified, one in Coyote Spring Valley and the other in Dry Lake Valley. These facilities will recover energy generated by the elevation change along the pipeline. Hydroturbine energy recovery facilities will consist of a turbine, located in the main pipeline, and a generator. A concrete building will house the hydroturbine. The facilities will require a 2-acre site.

The energy recovered will be added to the electrical grid through an electrical transformer that is included on site, and will be used by or exchanged for power for GWD Project facilities. Estimated potential hydroturbine energy recovery quantities are shown on Table 3-4.

Table 3-4 Estimated Hydroturbine Energy Recovery Quantities

Location	Power (kilowatts)
Cave Valley	8,400
Delamar Valley	22,000

3.6.4 Alternate Power System

In the event that LS Power or some other entity constructs a major north-south power line in the GWD Project area, SNWA may construct an alternate power system. The major north-south power line being planned by LS Power is a 500 kV power line. Where this line crosses the GWD Project alignment in northern Dry Lake Valley, a major substation would be required (Sheet 18 of the maps). This major substation would be 40 acres in size and would decrease power from 500 kV to 138 kV. The 138 kV power would then be conveyed along the main GWD Project pipeline alignment eliminating the proposed 230 kV transmission line. The routing of the 138 kV transmission line would follow the proposed routing of the 230 kV transmission line.

The alternate power system would utilize 138 kV power poles along the pipeline alignment between Spring Valley and Coyote Spring Valley in lieu of the 230/69 kV and 69 kV power poles. The 138 kV power poles would be single steel power poles, approximately 70 feet tall and spaced approximately 700 feet apart depending on the terrain. The design would be similar to the 69 kV power poles described above and shown on Figure 3-17. The two primary electrical substations in Spring and Dry Lake Valleys described in Chapter 3.6.2 would not be required.

3.7 ADDITIONAL COMPONENTS OF RIGHT-OF-WAY

3.7.1 Staging Areas

Temporary construction staging areas will be required to construct the GWD Project facilities. There will be both pipeline staging areas and facility staging areas. These areas will be used for equipment and materials storage, plant nurseries, construction office trailers, fuel storage, equipment maintenance, and temporary stockpiling and handling of excavated material. Not every staging area will include all of these uses. Temporary security fencing may enclose staging areas.

A total of 140 staging areas, each 3 acres in size and placed approximately 3 miles apart, have been identified for construction of the pipeline. The staging areas are immediately adjacent to the temporary or permanent pipeline ROWs.

Construction of the Lake Pumping Station, buried storage reservoir, and hydroturbine energy recovery facilities will each require a facility staging area of 5 acres in size. The regulating tanks will each require a facility staging area of 4 acres in size. These facility staging areas will be sited immediately adjacent to the respective sites.

Temporary construction staging areas are not anticipated to be required for construction of the Spring Valley and Snake Pumping Stations, WTF, power lines, and substations.

All construction-related activities for those facilities will be completed within the requested permanent ROWs.

3.7.2 Borrow Pits

Sand, gravel, clay, and other earthen fill materials will be needed for construction of the GWD Project. A determination of on-site and off-site fill material sources will be made during geotechnical investigations. Development of borrow pits on BLM lands may be required. If determined to be needed, borrow pits will be the subject of future ROW requests and environmental compliance.

3.8 FUTURE FACILITIES RELATED TO THE PROJECT

SNWA has applied to the Nevada State Engineer to appropriate groundwater for the GWD Project. The locations where the water will be diverted have been substantially accurately described in SNWA's groundwater applications. However, the exact location and number of groundwater production wells for the GWD Project will be determined through the process established by the Nevada State Engineer.

Lincoln County and CSI have acquired, and are in negotiations to acquire, existing permitted water rights in Lake and southern Spring Valleys. However, approvals from the Nevada State Engineer to change the place and manner of use of these existing water rights will need to be obtained before they can be conveyed by the GWD Project.

Other facilities associated with the groundwater production, including collector pipelines and power lines, can only be identified after production well sites are approved. For these reasons, these facilities will be the subject of future ROW requests and associated environmental compliance processes. However, these groundwater production facilities are described in this document in order to fully identify components associated with the GWD project.

3.8.1 SNWA Groundwater Production

In addition to obtaining Nevada State Engineer approvals, additional hydrologic and geologic investigations will need to be conducted and exploratory production wells drilled to define the specific well sites and well field areas. Although SNWA intends to divert water from the areas substantially accurately described in its water right applications, there may need to be some adjustments of the exact location of production wells, once the exploration areas are investigated.

SNWA will be seeking to ensure that the location of the places for diversion of water meet both the requirements of the Nevada State Engineer and have been reviewed under applicable environmental requirements. These environmental reviews and the approvals by the Nevada State Engineer may require adjustment of the locations of the groundwater production wells in order to avoid injury to existing water rights and/or adverse effects on the environment. For those reasons, SNWA is not requesting ROWs for the groundwater production facilities at this time. Additional investigations and subsequent environmental analyses and approvals may be required for these groundwater production facilities in the future.

Exploratory Areas

Although SNWA intends to appropriate groundwater from the areas substantially accurately described in its water right applications, additional exploratory work must be accomplished. SNWA has identified preliminary groundwater exploratory areas (see attached Exploratory Area Maps), within which SNWA proposes to locate groundwater production facilities. These exploratory areas are located within the basins where SNWA has substantially accurately described the location of its places of diversion in its pending applications to appropriate water. These areas may be changed in the future, and/or further exploratory areas may be defined. The current areas are generally described below.

- Spring Valley – An exploratory area has been identified in central to southern Spring Valley. It is located on BLM lands, on the eastern side of the Schell Creek and Fortification Ranges. It covers an area of over 180,000 acres.
- Snake Valley – Two exploratory areas in southern Snake Valley have been identified. They are located on BLM lands in Nevada on the eastern side of the Snake Range. They cover an area of over 40,000 acres.
- Cave Valley – One exploratory area has been identified in southern Cave Valley. This area is located on BLM lands on the eastern side of the Egan Range and the western side of the Schell Creek Range. It covers an area of over 30,000 acres.
- Dry Lake Valley – Four exploratory areas have been identified in Dry Lake Valley, all on BLM lands. The first is in the central part of upper Dry Lake Valley (also known as Muleshoe Valley). The second is west of the West Range in central Dry Lake Valley. The third is on the western side of the Pahroc Range in central and southern Dry Lake Valley. The fourth is on the western side of the Burnt Springs Range in the central part of the Valley. They cover an area of over 150,000 acres
- Delamar Valley – One exploratory area has been identified in Dry Lake Valley. This area is on BLM lands west of the Delamar Mountains. It covers an area of over 60,000 acres.
- Coyote Spring Valley – Two exploratory areas have been identified in north and central Coyote Spring Valley. They are located on BLM lands and CSI private lands west of the Meadow Valley Mountains and Delamar Mountains. They cover an area of over 70,000 acres.

The SNWA will conduct geophysical surveys, perform detailed geologic mapping, and drill exploratory production wells within these exploratory areas. The SNWA will consider specific criteria in the siting of groundwater production wells including: hydrogeologic characteristics; minimum well spacing requirements; site access; proximity to power sources and regulating tanks; maintaining minimum distances from sensitive environmental resources; and avoiding wilderness areas, private lands, and other sensitive lands.

Groundwater Production Wells

SNWA has applied for 34 places where production wells will be sited. The exact number of production wells that will be required is not known at this time. Wells may be between 1,000 and 1,700 feet in depth, and are expected to be placed in alluvial, volcanic, and carbonate rocks.

All production well pumping equipment will be housed within a structure and protected from the elements. SNWA may use either or both aboveground and belowground well housings. Aboveground well housings will be constructed of concrete blocks and belowground well housings will consist of concrete vaults. Electrical facilities, heating, ventilation, and air conditioning equipment, and control facilities will be located in each structure. Access to the well pump room for the delivery of equipment will be available through a roll-up door and roof hatch for aboveground buildings, and a large hatch at grade for belowground vaults.

Collector Pipelines and Associated Facilities

After the groundwater production wells have been approved, collector pipelines and power supply facilities will be determined. It is anticipated that collector pipelines from the individual wells will range between 10 and 30 inches in diameter, but may be larger. Access roads to the well sites will be located along the collector pipeline routes.

Power to operate the wells will be routed along the collector pipeline routes. These are anticipated to be overhead, low voltage (12.5 to 25 kV) power lines. Secondary substations will be located in the vicinity of the major well fields.

3.8.2 Lincoln County Groundwater Production

The CSI has purchased, and is in negotiations to purchase, existing water rights in Lake and Spring Valleys. While the Nevada State Engineer may condition future requests to change the points of diversion and use of these existing water rights, it is being planned that 36,000 afy of existing water rights will be conveyed by the GWD Project for Lincoln County. Until those purchases are completed and the Nevada State Engineer issues decisions on requested changes, the water production facilities cannot be determined. Those facilities would be the subject of future ROW requests and associated environmental compliance, as described above for SNWA's facilities.

4.0 GOVERNMENT AGENCIES INVOLVED

In addition to the ROWs required from the BLM, other federal, state, and local permits will be required to construct and operate the GWD Project. Potential permits and regulatory reviews that have currently been identified are summarized in Table 4-1.

The BLM may be required to consult with the U.S. Fish and Wildlife Service under Chapter 7 of the Endangered Species Act, if the proposed BLM action (issuance of ROWs) is determined by BLM to be likely to adversely affect listed species or their designated critical habitats.

Crossings of jurisdictional streams may require a Section 10 permit under the Rivers and Harbors Act from the U.S. Army Corps of Engineers for work in navigable waters of the United States (including tributaries). A Section 404 permit under the Clean Water Act, regulating discharge of dredged and fill material, may be required from the U.S. Army Corps of Engineers for construction activities associated with jurisdictional streams (generally streams which flow for part or all of the year, marked on topographic maps with a blue line).

Table 4-1 Potentially Required Regulatory Permits And Reviews

Agency	Permit/Approval
Federal	
Federal Highway Administration	Permit for construction, operation, and abandonment of transmission lines across or within highway rights-of-way Permit to cross Federal Aid highway
U.S. Air Force	Temporary and permanent right-of-way grants
U.S. Army Corps of Engineers	Section 404 permit Section 10 permit
U.S. Bureau of Land Management	Temporary and permanent right-of-way grants Conformity with Las Vegas and Ely Field Offices Resource Management Plans
U.S. Fish and Wildlife Service	Section 7 Consultation and Biological Opinion
State	
Nevada Department of Cultural Affairs, State Historic Preservation Office	Section 106 review and concurrence

Table 4-1 Potentially Required Regulatory Permits And Reviews

Agency	Permit/Approval
Nevada Division of Environmental Protection, Bureau of Water Pollution Control	401 Water Quality Certification General storm water permit for construction (National Pollutant Discharge Elimination System permit) Temporary discharge permit Temporary groundwater discharge permit Working in waterways permit
Nevada Division of Environmental Protection, Bureau of Safe Drinking Water	Letter of approval to construct
Nevada Department of Transportation	Encroachment into State Highway rights-of-way Right-of-way occupancy permits
Nevada Department of Wildlife	Handling permit for desert tortoise, gila monster, and other sensitive species
Nevada Division of Forestry	Collection permit for state-listed plants
Nevada Division of Water Resources	Water right permits Well driller's permit Dam safety permit
Public Utility Commission of Nevada	Permit to construct power facilities
County	
Clark County Comprehensive Planning Department	Multiple Species Habitat Conservation Plan mitigation fee Special use permit for facilities and staging areas
Clark County Department of Air Quality Management	Authority to construct certificate Dust control plan and permit for construction Sand and gravel processing permit Various location permits
Clark County Fire Department	Hazardous materials management plan Emergency response plan Blasting permit Aboveground fuel storage permit
Clark County Department of Development Services	Encroachment permit Construction water permit Drainage study Grading permit
Clark County Regional Flood Control District	Letter of approval from review of Federal Emergency Management Agency maps and Clark County Regional Flood Control District plan

5.0 CONSTRUCTION OF FACILITIES

Facility construction details for the GWD Project, such as construction contract sequencing, schedules, materials requirements, and facility design, will be identified during engineering design. Some aspects, such as specific equipment and methodologies used, may be left to the discretion of the construction contractor. Measures identified during the environmental compliance and permitting process that may affect construction will also be incorporated into the final facility design and construction bid packages. However, for the purposes of this conceptual plan of development and the environmental compliance process, SNWA has estimated the anticipated construction procedures for the GWD Project.

An estimated general construction schedule is depicted on Table 5-1. The GWD Project will be divided into multiple construction contracts, and various phases of construction will occur simultaneously at different locations throughout the construction process.

Table 5-1 Estimated Groundwater Development Project Construction Schedule

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Pre-Construction									
Geotech, Surveying									
Design									
Construction									
Pipelines									
Power Lines									
Electrical Substations									
Reservoir									
Regulating Tanks									
Hydroturbine Energy Recovery									
Water Treatment Facility									
Pumping Stations									

Some construction activities are common to all of the GWD facilities. These are briefly described below.

Pre-construction activities will include staking of the ROW (anticipated every 100 to 300 feet along the ROW, depending upon terrain), surveying, geotechnical investigations, and environmental clearance surveys. These activities are typically conducted by overland driving within the approved ROWs.

Access by the public within the ROWs will be restricted during construction for public safety. Where existing public roads pass through the ROWs, the roads will be maintained as much as possible, or alternative routes will be provided.

Access to the facility sites and staging areas by construction personnel, vehicles, and equipment will be via existing roads where available. Access to GWD Project facilities will be from the pipeline ROW.

At the initiation of facility construction, ROWs will be cleared and grubbed, then graded. Grubbing consists of removal from the ground surface of stumps, roots, and vegetation matter after clearing, and prior to further site modification. Wherever possible, disturbance will be minimized by driving overland and crushing vegetation within the ROWs, without clearing and grubbing.

Typical construction equipment for the proposed facilities will include graders, excavators, trenchers, backhoes, dozers, cranes, haul trucks, flatbed trucks, concrete trucks, and pickup trucks. Building materials will include sections of pipe, pumps and associated parts, concrete blocks, reinforcing steel bars, concrete, steel, gravel, and sand. These materials will be stored in temporary construction ROWs or staging areas. Smaller items such as tools and instruments will be stored in enclosed, portable storage units. Fuel for construction equipment, and water for dust control and construction uses, will be stored within the ROWs. Fuel containers will be stored in a secured area with spill containment. Trailers may be required for construction management personnel and office equipment.

The facility construction sites and temporary staging areas may be enclosed with temporary security fencing to secure the equipment and materials, and on-site security personnel may be provided up to 24 hours a day, as necessary.

Sanitary facilities and potable water will be provided for construction personnel. Sanitary facilities are typically portable units, or may consist of septic systems on permanent facility sites that subsequently can be converted for use in the permanent facilities. Temporary water for construction may be obtained from SNWA's existing water rights or from approved local sources. Portable generators or temporary power lines may be needed to provide electrical power during construction until the proposed GWD power facilities are constructed and operational.

During facility design, SNWA will balance the amount of earthen cut and fill to minimize the need to import fill material and/or dispose of excess soils. If there are large quantities of poor soils that cannot be utilized for construction, SNWA will consult with BLM to dispose of the soils in BLM approved disposal areas. Berms and drainage ditches needed to control storm water runoff and divert it from facility sites will also be identified during design.

5.1 PIPELINES

Pipeline installation will be open trench construction except at highway crossings, where depending on road traffic and requirements of the Nevada Department of Transportation and the county, either jack-and-bore or open trench construction will be used. Jack-and-bore construction will require jacking and boring pits on either side of the crossing; and open trench construction will require flagmen and placement of temporary trench plates during non-working hours. Drill and blast construction may be required for installation of pipelines in areas where hard rock is present.

The sequence of construction activities is typically clearing and grading, excavation, stockpiling of soils, placement of pipe bedding, pipe laying, welding, trench backfill, hydrostatic testing, final grading, and restoration. An access road will be constructed along the pipeline ROW.

Hydrostatic testing will be carried out to test completion of the pipeline. The hydrostatic testing will likely be conducted in sections, corresponding to construction contracting that will be determined during design. Water for hydrostatic testing will be either trucked in or pumped from existing wells. Water in the pipeline south of the WTF will also be chlorinated to disinfect the pipeline following hydrostatic testing since it will be conveying treated water.

After hydrostatic testing, the water will be discharged into existing dry washes or drainage channels in the area in accordance with a State of Nevada discharge permit. Chlorinated water will be neutralized prior to discharge. The water will be discharged in a controlled manner through one or more outlets to limit the volume discharged at any one location and to reduce the potential for erosion due to discharge of water. Appropriate erosion control measures will be taken during discharge, such as use of a diffuser or other energy dissipater. It is anticipated that approximately 60 million gallons of water will be discharged from hydrostatic testing of the entire pipeline.

Public access along highways and existing major roads will be maintained during construction. If needed during construction, a road may be temporarily re-routed, but will remain within the pipeline ROW.

Construction for the pipelines and ancillary facilities will require approximately 6 years.

5.2 PUMPING STATIONS

Plumbing, power conduits, and other infrastructure beneath the pumping station floors will be constructed first, following initial site excavation. The foundations will then be constructed, followed by the floors, walls, and a roof to form the building housing the pumps in each pumping station. Pumping station mechanical and other interior components will be installed once the building is completed. Pumps and appurtenances within each pumping station will then be connected to the incoming and outgoing water pipelines.

Each pumping station will have a facility substation to provide operational power (described in Chapter 3.6.2). After the permanent power is connected to the pumping stations' electrical systems, the systems will be tested.

Temporary water and sanitary systems that are not modified into permanent facilities will be removed at the completion of construction.

Construction of the pumping stations will require approximately 3 years.

5.3 REGULATING TANKS

Following site grading and leveling, the regulating tanks will be constructed of steel or concrete. Steel tanks will be built on a concrete foundation, with steel panels welded together to form the floor, walls, and roof, and the tank painted. Concrete tanks may be reinforced, poured in place, or pre-stressed. Overflow pipes, drain pipes, inlet and outlet pipes, ladders, and other appurtenances will be constructed at varying sequences of construction.

At the completion of construction, the tanks will be hydrostatically tested. Hydrostatic testing of the regulating tanks will be coordinated with the testing of the pipelines, if feasible, to conserve the amount of water needed for the testing. After hydrostatic

testing, the water will be discharged into existing dry washes or drainage channels in the area, in accordance with a State of Nevada discharge permit. The water will be discharged in a controlled manner through one or more outlets to limit the volume discharged at any one location and to reduce the potential for erosion due to discharge of water. Appropriate erosion control measures will be taken during discharge, such as use of a diffuser or other energy dissipater. The volume of water discharged from hydrostatic testing will be dependent upon the final size of each tank.

Construction of the regulating tanks will require approximately 1 year each.

5.4 BURIED STORAGE RESERVOIR

Construction of the buried storage reservoir will require excavation and partial burial of a concrete basin to house valves and piping needed to control water inflow and outflow. Plumbing, power conduits, and other infrastructure beneath the reservoir will be constructed first. The foundations of the reservoir will then be constructed, followed by the reservoir basin and roof. Ancillary components inside and outside of the reservoir will be constructed once the concrete structure is erected. The reservoir site will then be graded close to the final contours. Final connections will be made to the incoming and outgoing water pipelines, and the system will be tested in its entirety.

At the completion of construction, the buried reservoir will be hydrostatically tested. Hydrostatic testing of the reservoir will be coordinated with the testing of the pipelines, if feasible, to conserve the amount of water needed for the testing. After hydrostatic testing, the water will be discharged into existing dry washes or drainage channels in the area, in accordance with a State of Nevada discharge permit. The water will be discharged in a controlled manner through one or more outlets to limit the volume discharged at any one location and to reduce the potential for erosion due to discharge of water. Appropriate erosion control measures will be taken during discharge, such as use of a diffuser or other energy dissipater. It is anticipated approximately 40 million gallons of water will be discharged from hydrostatic testing of the buried reservoir.

Construction of the buried storage reservoir will require approximately 2 years.

5.5 WATER TREATMENT FACILITY

Following excavation for individual buildings, plumbing, power conduits, and other infrastructure beneath the facility floors will be installed. The foundations of the buildings will then be constructed, followed by the floors, walls and a roof. The mechanical and other interior components will be installed once the buildings are completed.

After the permanent power is connected to the WTF's electrical systems, and final connections are made to the incoming and outgoing water pipelines, the WTF system will be tested in its entirety.

Construction of the WTF will require approximately 3 years. The maintenance yard will be constructed first for use during WTF construction.

5.6 POWER FACILITIES

Installation of each new power pole will disturb approximately a 1-acre area within the power line ROW. The power pole site will be graded and the foundation for the pole excavated, possibly with a truck-mounted auger. The poles will be assembled on-site, set into the foundation by crane, and the footing backfilled. Electrical wire will be strung by bucket truck using pulleys temporarily mounted on the poles.

For each substation, concrete pads will be constructed for transformers and each pad will include a curb around the perimeter for spill containment. Concrete foundations will be constructed for electrical structures and electrical wire connected using pulleys. A concrete block control building will be constructed to contain controls and relay equipment. Substations will be enclosed by security fencing, typically 8-foot high chain link, with a locked gate. Once the substations are constructed, they will go through a testing and commissioning procedure per the International Electrical Testing Association. The local power utility will need to review and approve the testing results prior to operation of the substation.

The portion of the hydroturbine vault located in-line with the underground pipeline will be constructed when the pipeline is installed, including pipe connections into and out of the hydroturbine vault. The foundations for the hydroturbine energy recovery facilities on the ground surface will be constructed after the trench is backfilled. Floors, walls, and roof of the hydroturbine structure will then be completed. The necessary mechanical equipment will be installed during or following completion of the vault, pipeline, and building.

Construction of the power facilities will require approximately 6 years.

6.0 RESOURCE VALUES AND ENVIRONMENTAL CONCERNS

The Environmental Impact Statement that will be prepared for the GWD Project will analyze potential environmental effects of the project. A summary of environmental concerns will be provided in the Final Plan of Development. Environmental concerns could include, but are not limited to:

- Construction effects on state and federally-listed, and BLM and state sensitive species
- Construction effects on big game migration and seasonal habitat
- Construction effects on air quality
- Construction effects on highway traffic
- Effects on existing grazing allotments
- Construction-related introduction and spread of noxious weeds
- Visual effects of construction disturbance and permanent facilities
- Effects of groundwater pumping on existing water rights and wells
- Effects of groundwater pumping on springs and spring dependent species
- Effects of groundwater pumping on groundwater dependent plant communities, aquatic riparian areas, and associated sensitive species
- Effects of new power lines on raptor mortality and increased raptor density

Based upon the environmental analysis, the facilities described in this Conceptual Plan of Development may be modified, another alternative may be selected, and/or reasonable mitigation measures may be incorporated to mitigate possible impacts.

The Final Plan of Development will include environmental measures or plans to address potential environmental effects. These plans could include, but may not be limited to:

- Environmental compliance
- Cultural resource compliance
- Dust control
- Topsoil management and erosion control
- Fire prevention and control
- Hazardous materials and waste management
- Storm water management
- Noxious weed control
- Restoration

7.0 STABILIZATION AND REHABILITATION

A Restoration Plan will be prepared for the GWD Project and included in the final Plan of Development. The plan will address specific restoration measures for different habitat types within the project area. Restoration measures that are anticipated to be applied to the GWD Project include, but are not limited to:

- Topsoil salvage, stockpiling, and replacement
- Soil stabilization and erosion control
- Cactus and yucca salvage, nursery development, and plant replacement
- Native seed collection and reseeding
- State-listed plant salvage and replacement, or other mitigation
- Noxious weed control
- Restoration monitoring

8.0 OPERATIONS AND MAINTENANCE

The SNWA will operate and maintain the GWD Project to assure its proper functioning. In addition to routine operation of facilities, activities will include remote and on-site monitoring of system functions, inspection of the pipelines and facilities, regular maintenance of equipment, repairs conducted as needed, and responding to emergency conditions should they occur. All operation and maintenance activities will be confined to the permanent ROWs. If additional ROWs are required for unforeseen circumstances, SNWA will request additional ROWs from the BLM.

Operation of the GWD Project will be continuously monitored by SNWA with a remote monitoring system. This system may utilize fiber optic cables installed along the pipelines to monitor overall performance, including water flow, pipeline pressures, pumping rates, power loads, and other factors. Staff will be dispatched as needed if any concerns are noted.

The SNWA intends to coordinate overall operation of the GWD Project with SNWA's other water systems in order to meet water demands identified by SNWA purveyor members. The SNWA operations staff will manage the water systems to deliver water to the locations requested by the purveyor members.

An operations and maintenance schedule will be developed for GWD Project facilities and components during construction and prior to operation of the facilities. Facilities will periodically be visually inspected to ensure proper functioning, with emphasis on major facilities and mechanical equipment. On-site personnel and SNWA's remote monitoring system will track facility functions. Operation of the pumping stations and the WTF will require the use of chemicals and other consumable supplies that will need to be delivered on a regular basis.

8.1 PIPELINES

Routine visual inspections of the pipeline and associated appurtenances will be conducted, most likely weekly. This will involve driving along the pipeline and facility access roads to identify areas of exposed pipeline, erosion, unauthorized ROW encroachment, or any other conditions that could damage the pipeline. More detailed inspections of valves may occur quarterly.

In the event of a system rupture resulting in the discharge of water, pressure sensors installed on the system will detect the pressure loss, and the groundwater pumps and wells will begin an automatic, sequenced shut down. Alarms will sound at manned facilities along the pipeline alignment and at the SNWA operations centers. A plan of action to investigate the source of the problem will commence immediately. Considering the remoteness of some facilities, initial response time for a pipeline break, including time to find the closest upstream valve and shut it off, may be 3 hours or longer.

8.2 PUMPING STATIONS

Routine visual inspections of each of the pumping stations will be conducted, most likely on a daily basis. Inflow and outflow will be remotely monitored to ensure proper operation, including ancillary facilities such as the valves and piping needed to control

water flow. Equipment will be activated or deactivated as needed to maintain flow through the system.

The maintenance yard adjacent to the Spring Valley pumping station will be used to conduct maintenance and repair activities at the pumping station, and at other project facilities. Approximately 10 operational personnel will be present at the Spring Valley pumping station daily. Up to weekly truck deliveries of supplies and materials will be made, using established access roads.

8.3 REGULATING TANKS

In addition to the remote system monitoring, SNWA will conduct routine visual inspections of the regulating tanks. The tanks will be visually inspected monthly.

8.4 BURIED STORAGE RESERVOIR

In addition to the remote system monitoring, SNWA will conduct routine visual inspections of the buried reservoir. It will be visually inspected monthly. Valves to maintain water levels in the reservoir will be remotely controlled.

8.5 WATER TREATMENT FACILITY

An integrated control system will be developed for operation of the WTF, which will be coordinated with SNWA's other water supply facilities. Approximately 15 operational personnel will be present at the WTF daily.

Operation of the WTF will require delivery and use of chemicals for water treatment. Table 8-1 shows the major chemicals that may be needed for water treatment, along with potential on-site storage quantity, the approximate number of days of supply, and delivery frequency. The final list and quantities of chemicals will be determined after water quality testing of selected groundwater production wells and design of the facility is completed.

Table 8-1 Potential Major Water Treatment Chemicals

Chemical	Stored Quantity	Days of Supply	Monthly Truck Trips
Sodium Chloride (salt)	83 tons	30	5
Sodium Hypochlorite	80,000 gallons	NA	(generated on-site)
Inhibitor-Zinc Orthophosphate	5,000 gallons	30	1
Hydroflosilic acid (23% liquid)	14,000 gallons	30	5

8.6 POWER FACILITIES

The power facilities will be monitored remotely to ensure proper operation and that adequate power is available. The structures, insulators, conductors, and related hardware will be visually inspected at least annually. Additional (unscheduled) visual inspections may be carried out following severe weather or other events that could damage the facilities. Maintenance will be performed on an as-needed basis.

9.0 TERMINATION

The ROWs granted for the GWD Project will be in accordance with the Federal Land Policy and Management Act of 1976, Southern Nevada Public Land Management Act of 1998, and LCCRDA. In accordance with those laws, ROWs will be granted in perpetuity. Termination and abandonment of the GWD Project is not anticipated, unless exceptional circumstances should arise. In the event that upgrade or replacement of facilities is required, SNWA will coordinate with the BLM prior to initiating major construction in accordance with applicable stipulations of the final ROW grant.