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

Draft
Conceptual Plan of Development

July 2007

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LIST OF ACRONYMS

afy	acre-feet per year
BLM	U.S. Department of Interior, Bureau of Land Management
cfs	cubic feet per second
GWD Project	Clark, Lincoln, and White Pine Counties Groundwater Development Project
kV	kilovolt
LCCRDA	Lincoln County Conservation, Recreation, and Development Act of 2004
LCWD	Lincoln County Water District
MW	megawatts
NDOT	Nevada Department of Transportation
Nevada State Engineer	Nevada Division of Water Resources, Office of the State Engineer
rebar	reinforcing steel bars
ROW	Right(s)-of-Way
SNWA	Southern Nevada Water Authority
SR	State Route
US	United States Highway
WTF	Water Treatment Facility

1.0 PURPOSE OF PROJECT

The Southern Nevada Water Authority (SNWA) currently holds groundwater rights and applications in six hydrographic basins in Clark, Lincoln, and White Pine Counties. SNWA has purchased, been permitted, or applied for up to 167,000 acre-feet per year (afy) in Spring, Snake, Cave, Dry Lake, Delamar, and Coyote Spring Valleys. SNWA also has a cooperative agreement with Lincoln County, to provide capacity in water conveyance infrastructure in Lincoln County.

SNWA has submitted a right-of-way (ROW) application to the U. S. Bureau of Land Management (BLM) for the Clark, Lincoln, and White Pine Counties Groundwater Development (GWD) Project. The GWD Project includes groundwater production wells, pipelines, pumping stations, storage facilities, a treatment facility, and power facilities. The GWD Project would convey up to 200,000 afy of water, including up to 167,000 afy of groundwater developed by SNWA and the remaining capacity provided for Lincoln County.

1.1 PURPOSE AND NEED

SNWA's purpose in applying for ROWs for the GWD Project is:

(1) To develop and convey water rights that have been purchased by, permitted to or that may be permitted to SNWA in Spring, Snake, Cave, Dry Lake, Delamar, and Coyote Spring Valleys for use by SNWA's member agencies in Clark County; and

(2) To fulfill contractual obligation to provide capacity for potential future use by the Lincoln County Water District (LCWD), to transport as yet unspecified water resources to its customers in Lincoln County.

SNWA's need for the GWD Project is due to the growing population and associated increasing water demands in the Las Vegas Valley, along with the current reliance on the Colorado River to meet nearly all of southern Nevada's water resource needs. Southern Nevada has been one of the fastest growing areas in the nation for many decades. Despite SNWA's strong commitment to improving conservation and reducing water demands, additional water resources are required to meet projected demands. Diversification is also an essential goal of the GWD Project. Development of in-state groundwater resources is needed to improve the drought tolerance of SNWA's water supply and to reduce the vulnerability of water supplies to potential terrorist and other security threats.

1.2 PROPOSED PROJECT

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

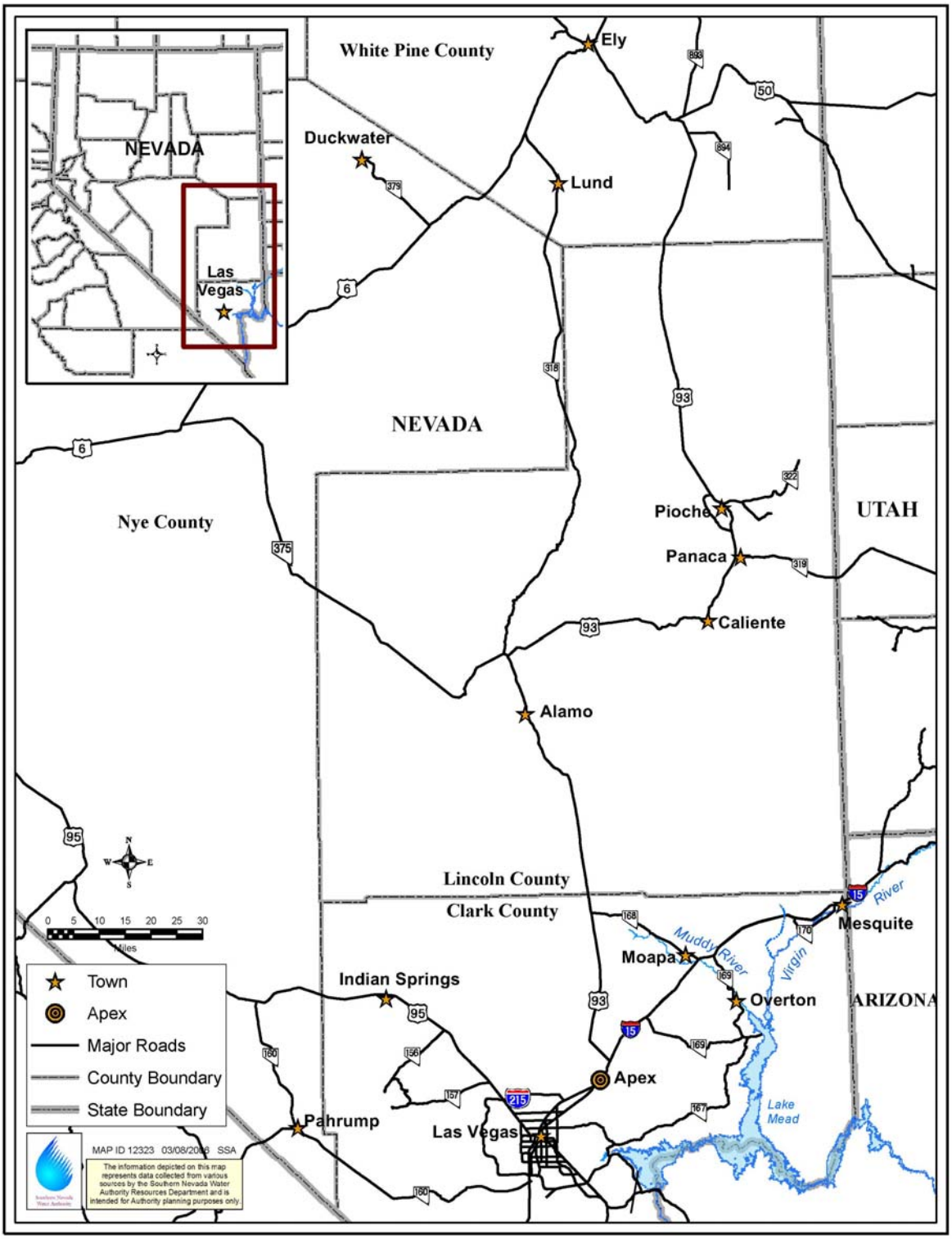

Figure 1-1 Regional Location Map

The SNWA has applied to the BLM for a ROW to construct and operate the GWD Project. Proposed facilities include:

- Pipelines – approximately 327 miles of buried water pipelines, between 10 and 84 inches in diameter
- Pumping Stations – 5 pumping station facilities
- Regulating Tanks – 6 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 349 miles of 230 kilovolt (kV), 69 kV, and 25 kV overhead power lines, 2 primary electrical substations (230 to 69 kV), 6 secondary substations (69 to 25 kV) and 4 hydroturbine energy recovery facilities
- Groundwater Production Wells – 14 groundwater production well sites

These facilities are generally displayed on Figure 1-2, and described in more detail in Chapter 2 of this document. These facilities are located predominantly on public lands managed by the BLM and are primarily within designated utility corridors.

The currently requested ROWs include 14 production well sites, located at permitted points of diversion in Spring Valley. SNWA intends to initiate the GWD Project with groundwater production wells at permitted points of diversion but also anticipates that additional production well sites would be developed in the future. These additional future groundwater production wells, along with collector pipelines and associated facilities, cannot be identified at this time because they are dependent upon rulings from the Nevada Division of Water Resources, Office of the State Engineer (Nevada State Engineer), exploratory drilling, and agency agreements. ROWs for these facilities will be requested in future applications. However, programmatic-level assumptions regarding these additional future facilities are included in this document (Chapter 2.9) to support a full analysis of the entire GWD Project. These assumptions include the anticipated maximum number of groundwater production wells and additional pipelines, power lines, and other facilities, so that any impact analysis evaluates the greatest extent of anticipated facilities.

1.3 WATER RIGHTS

The Nevada State Engineer has regulatory responsibility regarding water right decisions in the State of Nevada. The BLM has responsibility for land management and protection of federal water-related resources in Nevada, but does not have jurisdiction regarding issuance of water rights.

SNWA is planning to develop approximately 167,000 afy of groundwater, which it holds in water rights and applications in Spring, Snake, Cave, Dry Lake, Delamar, and Coyote Spring Valleys (Figure 1-3 and Table 1-1). The Nevada State Engineer issued Ruling 5726 on April 16, 2007 with regards to SNWA's groundwater applications in Spring Valley, permitting up to 60,000 afy subject to a monitoring and mitigation program and an initial staged development period. The Nevada State Engineer has not yet held

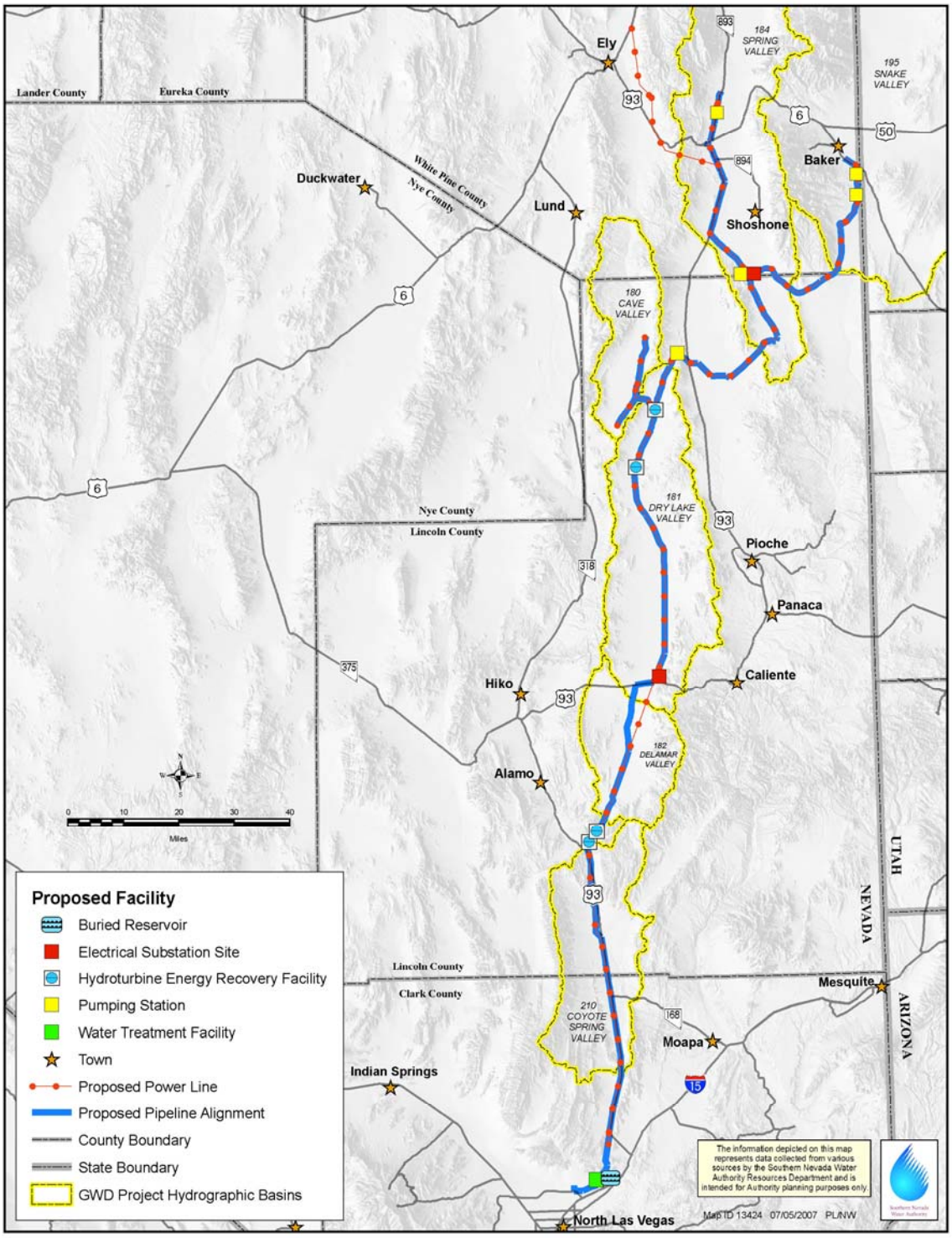

Figure 1-2 Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

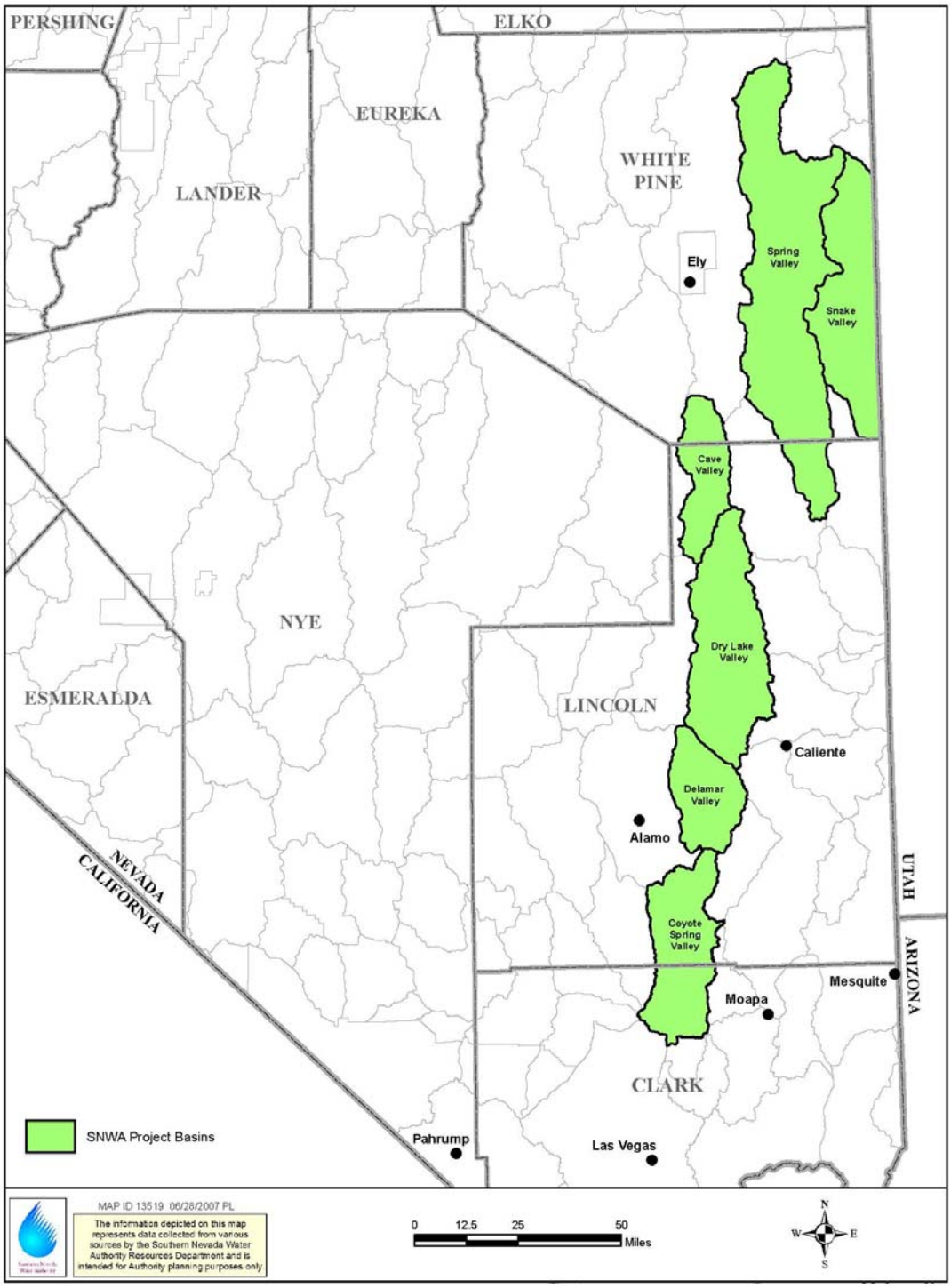

Figure 1-3 Hydrographic Basins of the GWD Project

Table 1-1 SNWA Groundwater Rights and Applications for the GWD Project

Hydrographic Basin	SNWA Applications		SNWA Rights	SNWA Acquisitions
	Cubic Feet per Second (cfs)	Acre Feet per Year (afy)		Acre Feet per Year (afy)
Snake Valley	70	50,679		
Spring Valley	~	~	60,000	6,000 – 8,000
Cave Valley	16	11,584		
Dry Lake Valley	16	11,584		
Delamar Valley	16	11,584		
Coyote Spring Valley	19	13,781		
TOTAL	**137**	**99,212**	**60,000**	**6,000 – 8,000**

hearings or issued rulings on applications in Snake, Cave, Dry Lake, Delamar, and Coyote Spring Valleys. In accordance with the Lincoln County Conservation, Recreation, and Development Act of 2004 (LCCRDA), an agreement between the States of Nevada and Utah is also required prior to export of groundwater from Snake Valley.

SNWA has purchased private property and water rights in Spring Valley. As part of the GWD Project, SNWA is planning to develop some or all of the groundwater rights associated with these properties. Approval from the Nevada State Engineer to convert the type of use and allow export from the basin would be required prior to conveyance of these water rights through the GWD Project.

The GWD Project has also been planned to allow for capacity to convey water 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 within Lincoln County for LCWD projects. The source, quantity, and timing of development and conveyance of this water have not yet been identified by LCWD. However, for project planning purposes, it is anticipated that up to 36,000 afy of water will be conveyed for LCWD through the GWD Project. Other assumptions regarding the LCWD water conveyance are included in Chapter 2.9.

1.4 GOVERNMENT AGENCIES INVOLVED

In addition to the ROWs from the BLM, a ROW is also required from the U.S. Air Force, Nellis Air Force Base, for the pipeline alignment and buried storage reservoir site on the Small Arms Range, in the northeastern Las Vegas Valley. Other federal, state, and local permits potentially required to construct and operate the GWD Project are listed in Table 1-2.

Table 1-2 Potentially Required Federal and State 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 rights-of-way grants
U.S. Army Corps of Engineers	Section 404 permit
U.S. Bureau of Land Management	Temporary and permanent rights-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
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 Underground injection control 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 Rights-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 Recharge, storage, and recovery of underground water permit
Public Utility Commission of Nevada	Permit to construct power facilities

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2.0 PROPOSED FACILITIES

The proposed GWD Project pipelines, power lines, and ancillary facilities are described below, and generally displayed on Figures 2-1 through 2-5. Specific facility locations are displayed on the project maps, attached as Map Volumes I, II, and III. Volumes I and II display the GWD Project ROWs on topographic and aerial photo backgrounds, respectively. Volume III displays groundwater exploratory areas, and permitted and application points of diversion. Legal descriptions for the proposed permanent and temporary facilities are provided in Appendix A.

2.1 GROUNDWATER PRODUCTION WELLS

Groundwater production wells are required to pump the groundwater conveyed through the GWD Project. SNWA anticipates that ultimately between 110 and 200 groundwater production wells may be required for the GWD Project. However, the specific locations of all of these wells are dependent upon future rulings from the Nevada State Engineer, exploratory drilling, agency agreements, and results of actual groundwater pumping. SNWA anticipates that it may take up to 20 years or more to site and install all of the groundwater production wells for the project.

SNWA is initially proposing groundwater production wells at 14 sites in Spring Valley, which are located at the permitted points of diversion in Spring Valley. SNWA intends to initiate the GWD Project with groundwater production wells at permitted points of diversion, but also anticipates that additional production well sites would be developed in the future. These additional future groundwater production wells, along with collector pipelines and associated facilities, cannot be identified at this time because they are dependent upon rulings from the Nevada State Engineer, exploratory drilling, and agency agreements. ROWs for these facilities will be requested in future applications (Chapter 2.9).

A ROW at point of diversion 54019 (see page 5 in Map Volume III) is not currently being requested. As part of the Stipulated Settlement with Department of Interior agencies on the Spring Valley water rights, SNWA agreed to work with the Hydrological Technical Review Panel to evaluate reasonable alternative point(s) of diversion for the water rights permitted at that location. The Technical Review Panel has not yet developed any recommendations regarding that point of diversion, and as a result ROWs will be requested in the future.

The groundwater production wells are anticipated to be drilled to depths between 1,000 and 2,000 feet deep, in basin fill and bedrock. The production well pumping equipment would be housed within a structure for protection from vandalism and the elements. The well housings would be aboveground, and are depicted on the preliminary site layout (Figure 2-6). The well housings would be constructed of concrete blocks. Electrical facilities, heating, ventilation, air conditioning equipment, and control facilities would be located in each structure. Access to the well pump room for the delivery of equipment would be available through a roll-up door.

Depending upon the water quality at each well site, groundwater treatment facilities may be required on-site, in or adjacent to the well building (Figure 2-6).

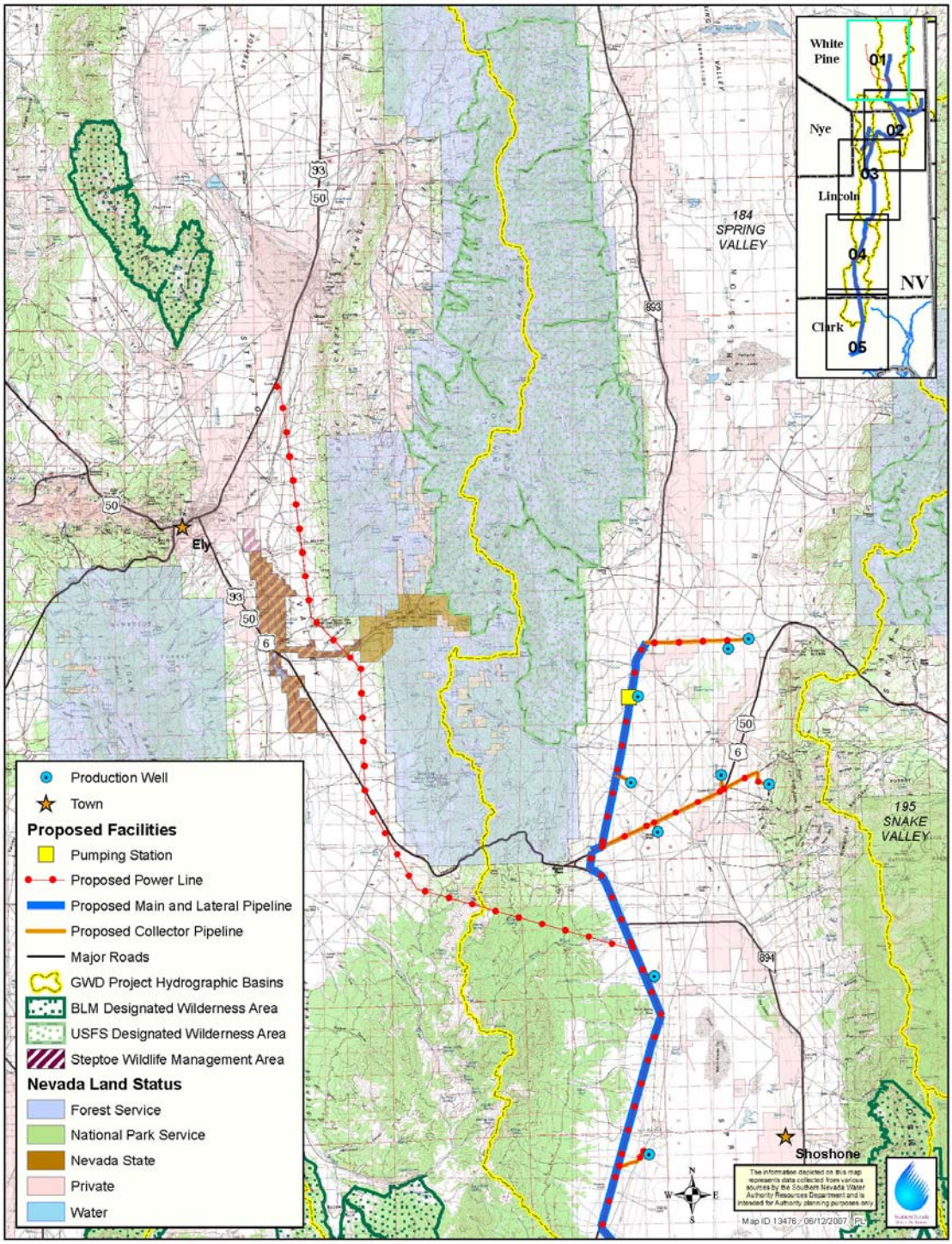


Figure 2-1 GWD Facilities – Steptoe, Spring, and Snake Valleys

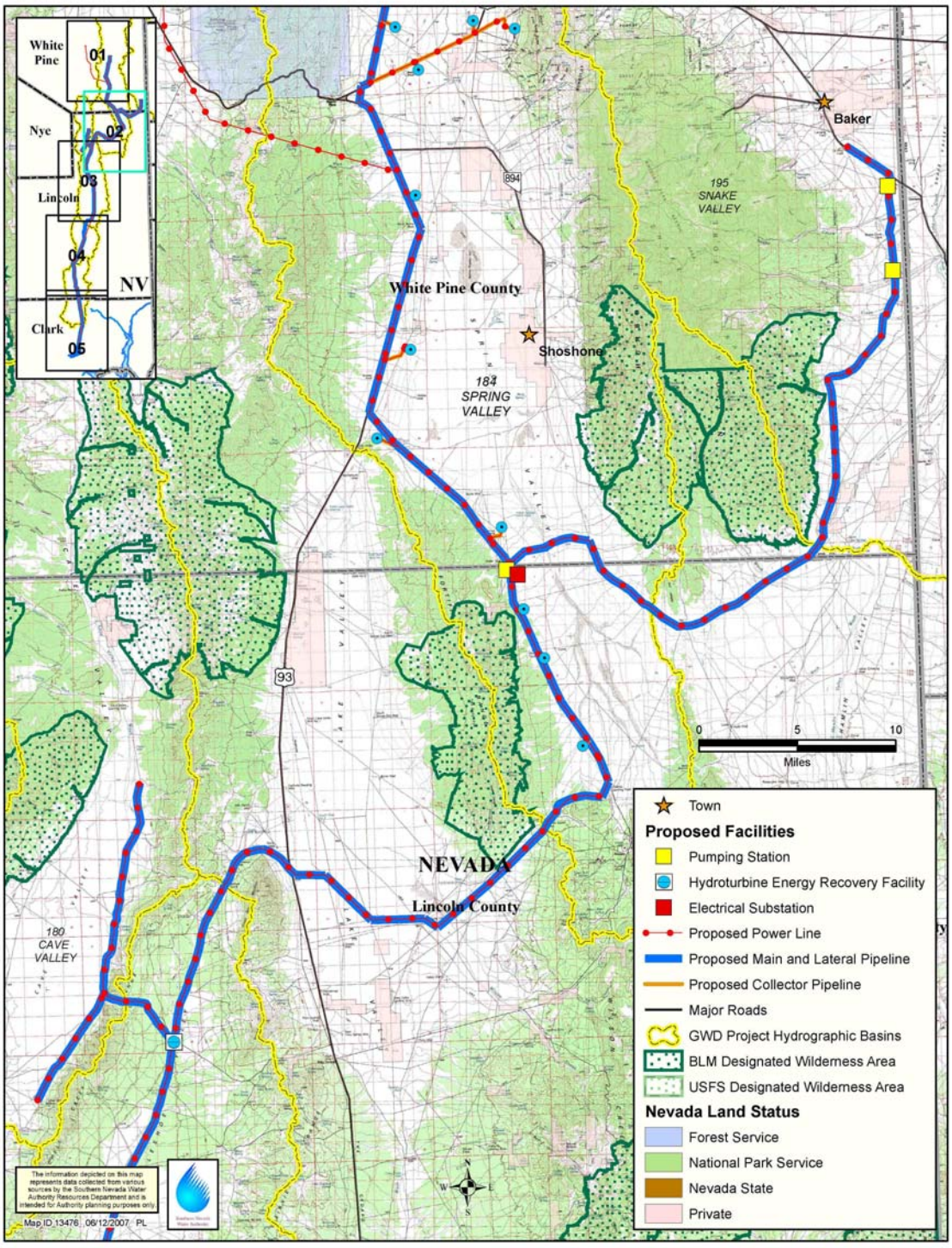


Figure 2-2 GWD Facilities – Spring, Snake, Hamlin, Lake, Cave, and Dry Lake Valleys

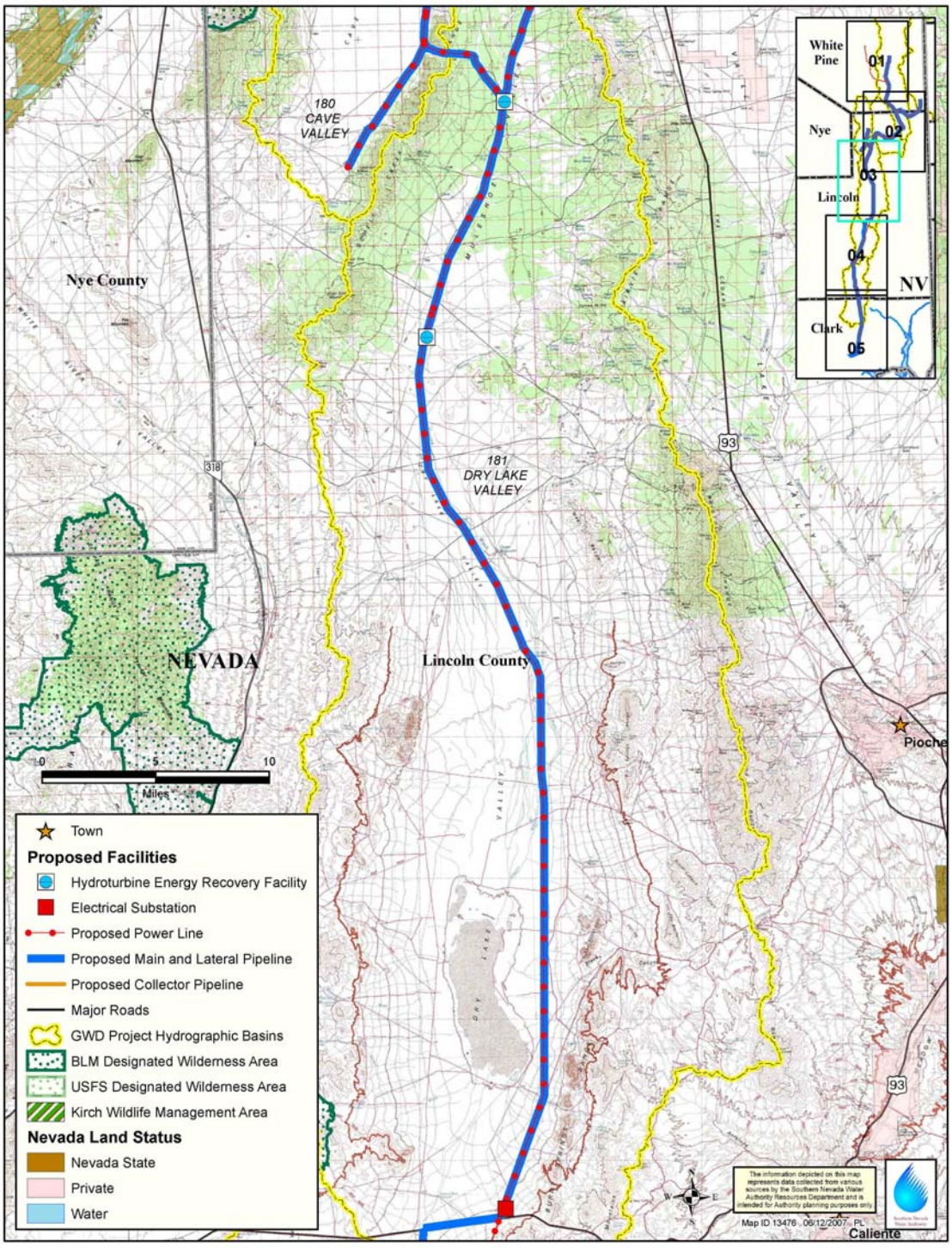


Figure 2-3 GWD Facilities – Cave and Dry Lake Valleys

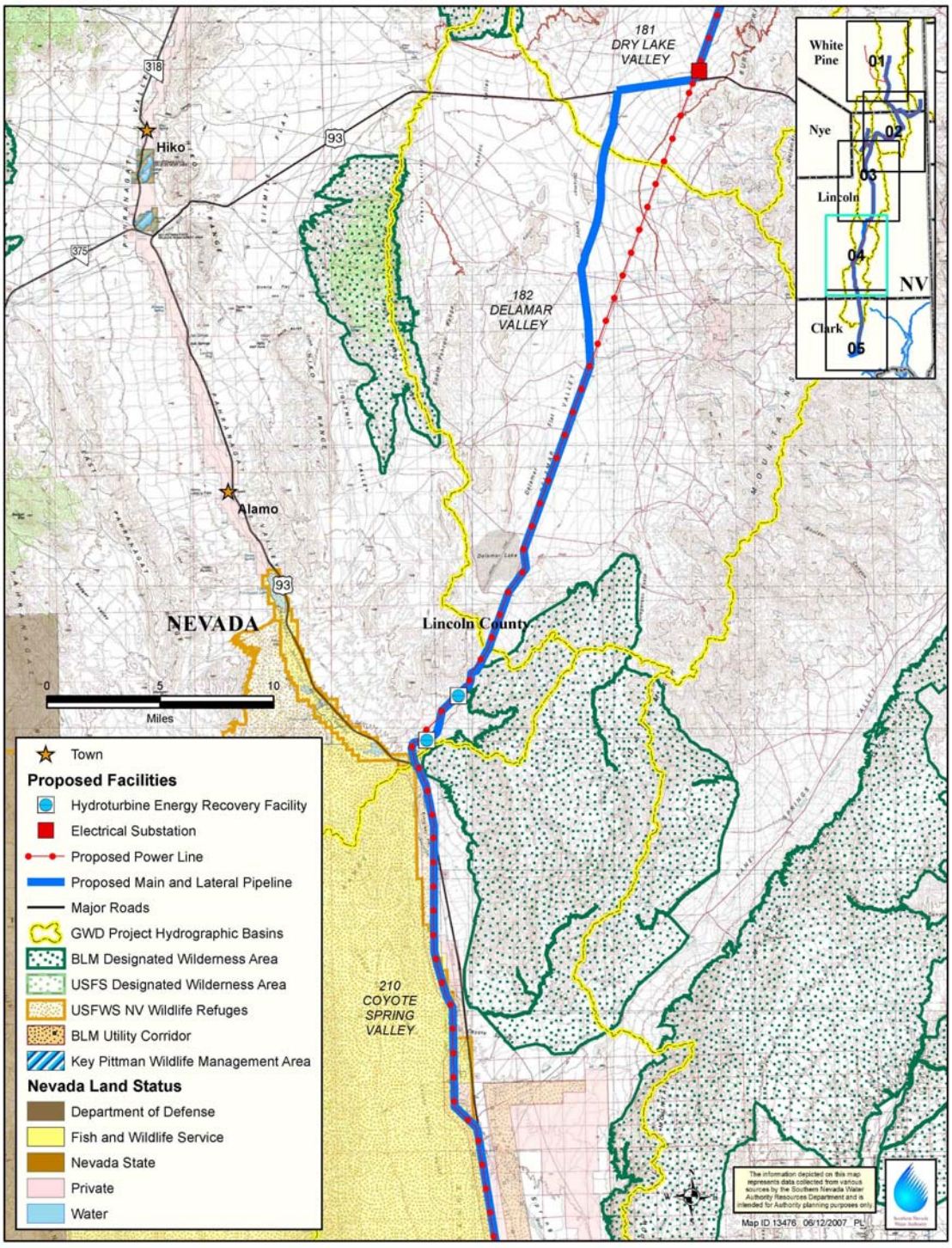


Figure 2-4 GWD Facilities – Dry Lake, Delamar, and Coyote Spring Valleys

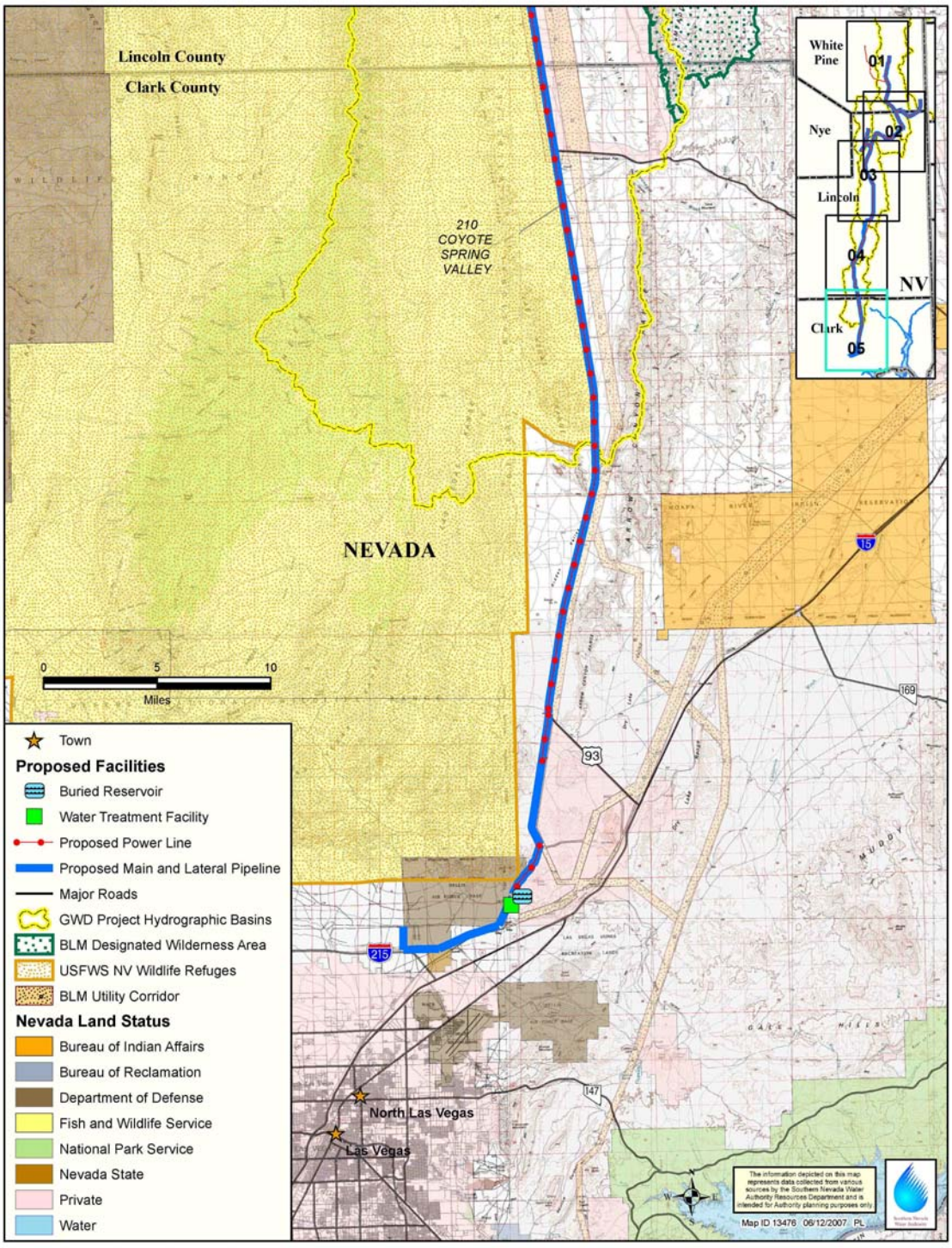


Figure 2-5 GWD Facilities – Coyote Spring, Hidden, Garnet, and Las Vegas Valleys

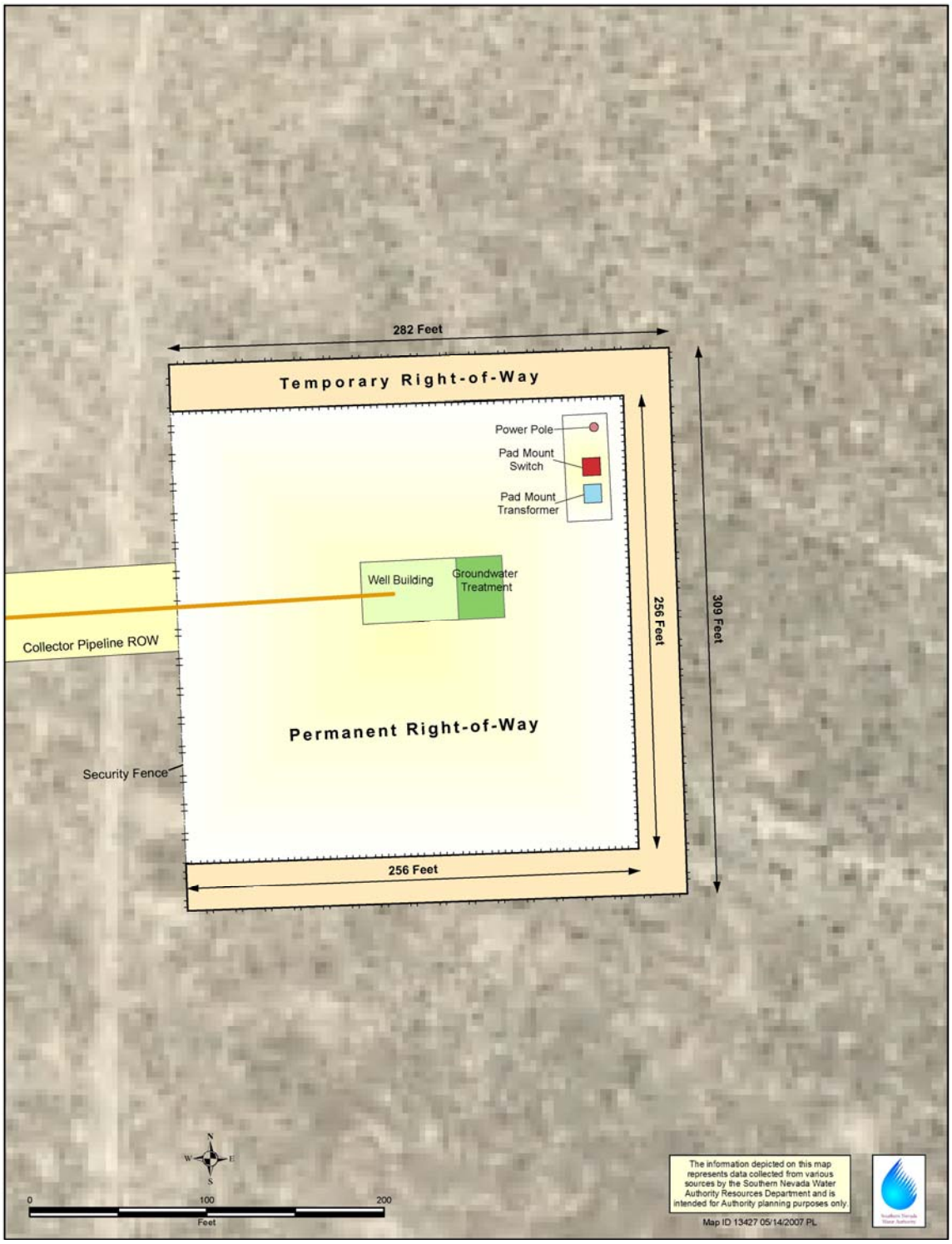


Figure 2-6 Preliminary Aboveground Well Housing Site Layout

If naturally-occurring arsenic is present in levels requiring treatment, ferric and aluminum coagulants may be added to precipitate the arsenic, which is then removed using filtration.

A permanent site ROW approximately 256 feet long and 256 feet wide, or 1.5 acre per well, is necessary. Additionally, around each permanent ROW, a 0.5 acre temporary ROW is necessary for construction purposes. The requested 14 groundwater production well sites at the currently permitted points of diversion total 21 acres of permanent and 7 acres of temporary ROW. The ROWs are all on lands managed by the BLM.

2.2 PIPELINES

A total of approximately 327 miles of pipelines are proposed for the GWD Project. Current estimates regarding pipe diameters are described below. The final sizes of the pipelines will be determined during facility design based on hydraulics, potential operational strategies, the need for operational flexibility, and the final locations of groundwater production well fields. However, final pipe sizes are not anticipated to be substantially larger than the diameters described or to require additional ROWs. The main pipeline may be up to 84 inches in diameter, extending between southern Spring Valley and the Las Vegas Valley. Lateral pipelines may be up to 54 inches in diameter and would extend into northern Spring, Snake, and Cave Valleys. Collector pipelines from the identified 14 initial well sites in Spring Valley may be up to 20 inches in diameter. Figure 2-7 displays the anticipated general areas of different pipeline diameters, which are also listed in Table 2-1.

Table 2-1 GWD Project Pipelines

Pipeline	Valley	Pipe Diameter (inches in diameter)	Pipe Length[a] (miles)
Main Pipeline	Spring	72	17
	Lake	72	21
	Dry Lake	72	9
		78	51
		84	6
	Delamar	84	23
	Pahranagat	84	7
	Coyote Spring	84	17
		78	24
	Hidden	78	12
	Garnet	78	7
	Las Vegas	78	8
Spring Lateral	Spring	54	39
Snake Lateral	Snake	54	24
	Hamlin	54	10
	Spring	54	9
Cave Lateral	Cave	30	19
	Dry Lake	30	4
Collector Pipeline	Spring	10-20	21
PROJECT TOTAL			**327**

[a] Pipe lengths are rounded to the nearest mile.

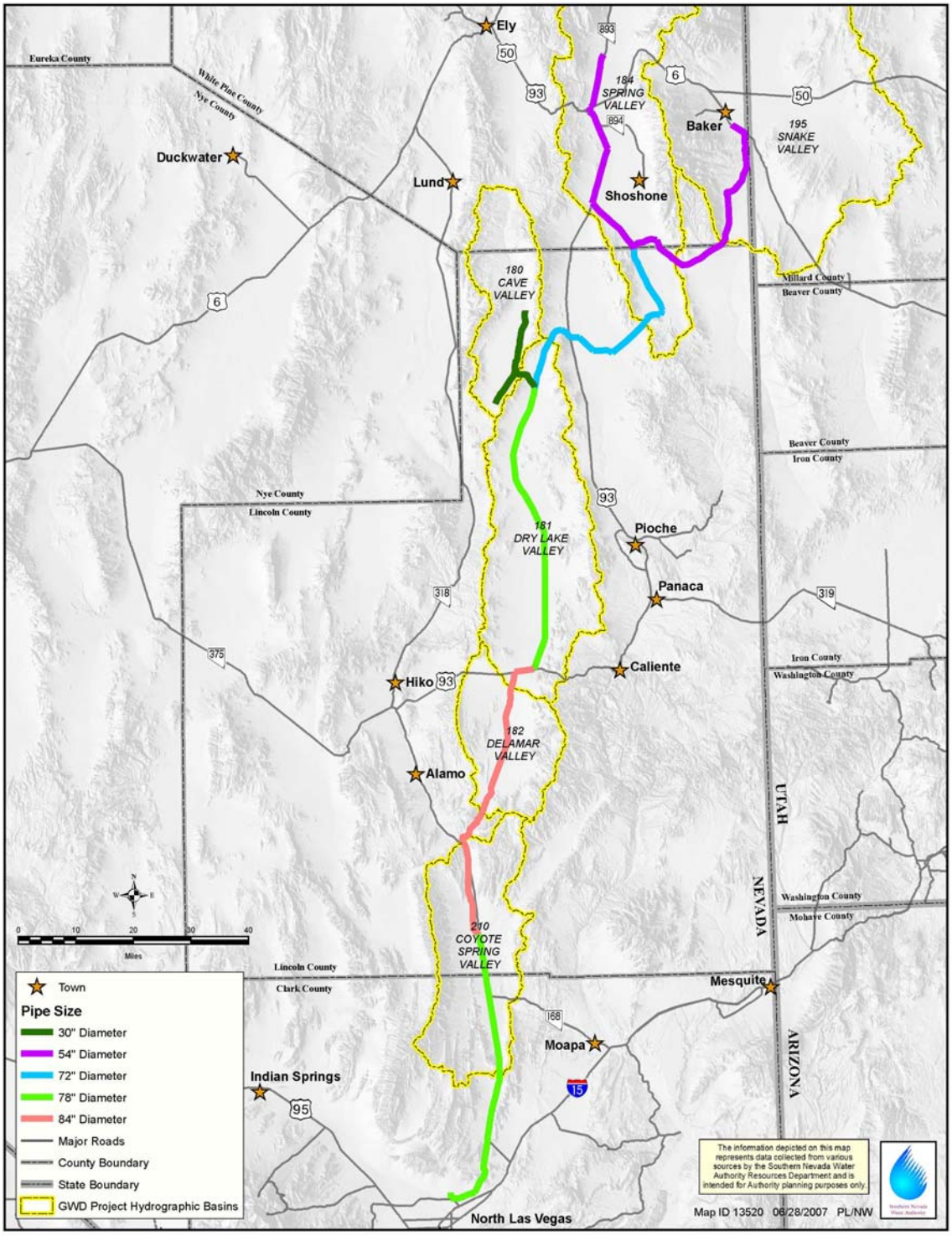


Figure 2-7 GWD Project Pipeline Diameters

Detailed descriptions of the pipeline routes are provided below. The mile references and map sheet numbers used in the text below refer to the attached project maps, in Volumes I and II.

A ground surface profile of the GWD Project is displayed in Figure 2-8. The estimated maximum elevation is approximately 6,500 feet at Muleshoe Summit in northern Dry Lake Valley. The minimum elevation is approximately 2,100 feet near the pipeline terminus in the Las Vegas Valley.

All pipelines would be completely buried, with the exception of a portion of the valve systems that extend above ground (Chapter 2.2.6). No permanent security fencing or other access restrictions along the pipeline ROWs are proposed.

Conduits for fiber optic cables may be installed along with the pipelines. The fiber optic cables may be used for system communications to manage facility operations.

2.2.1 Main Pipeline

The main pipeline would begin in southern Spring Valley, on the east side of the Fortification Range, just south of the Lincoln and White Pine County border (Sheet 1). This is also the location of the Spring Valley South Pumping Station (Chapter 2.3). The pipeline is estimated to be up to 72 inches in diameter. It would extend south towards the town of Atlanta, following an existing unpaved road (Indian Springs Road). Prior to reaching Atlanta, the alignment turns to the west (Sheet 5). It continues to follow an existing road and then crosses Horse Corral Pass into Lake Valley (Sheets 5 and 6).

In Lake Valley, the pipeline would 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 would cross U.S. Highway (US) 93 in the vicinity of Dutch John Well (Sheet 8), enter Muleshoe Pass, and turn south towards Dry Lake Valley (Sheets 8 through 10).

The main pipeline route extends south along existing roads through the center of Dry Lake Valley. With the addition of water at the junction point with the Cave Valley Lateral, the main pipeline may increase to up to 78 inches in diameter (Sheet 11). It would pass through the central part of the valley and around the eastern side of the dry lakebed until reaching US 93 (Sheet 25). With the addition of Dry Lake Valley water in this area, the pipeline may increase to up to 84 inches in diameter. The pipeline would 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 route continues south along the existing road before entering Delamar Valley (Sheets 25 and 26).

The main pipeline would extend south along existing dirt roads through the central part of Delamar Valley. It would follow the eastern side of the dry lakebed before entering the southern end of Pahranagat Valley (Sheets 26 through 32).

The main pipeline would cross through the southern end of Pahranagat Valley, following an existing road and fiber optic cable alignment, before reaching US 93 and entering northern Coyote Spring Valley (Sheets 32 and 33).

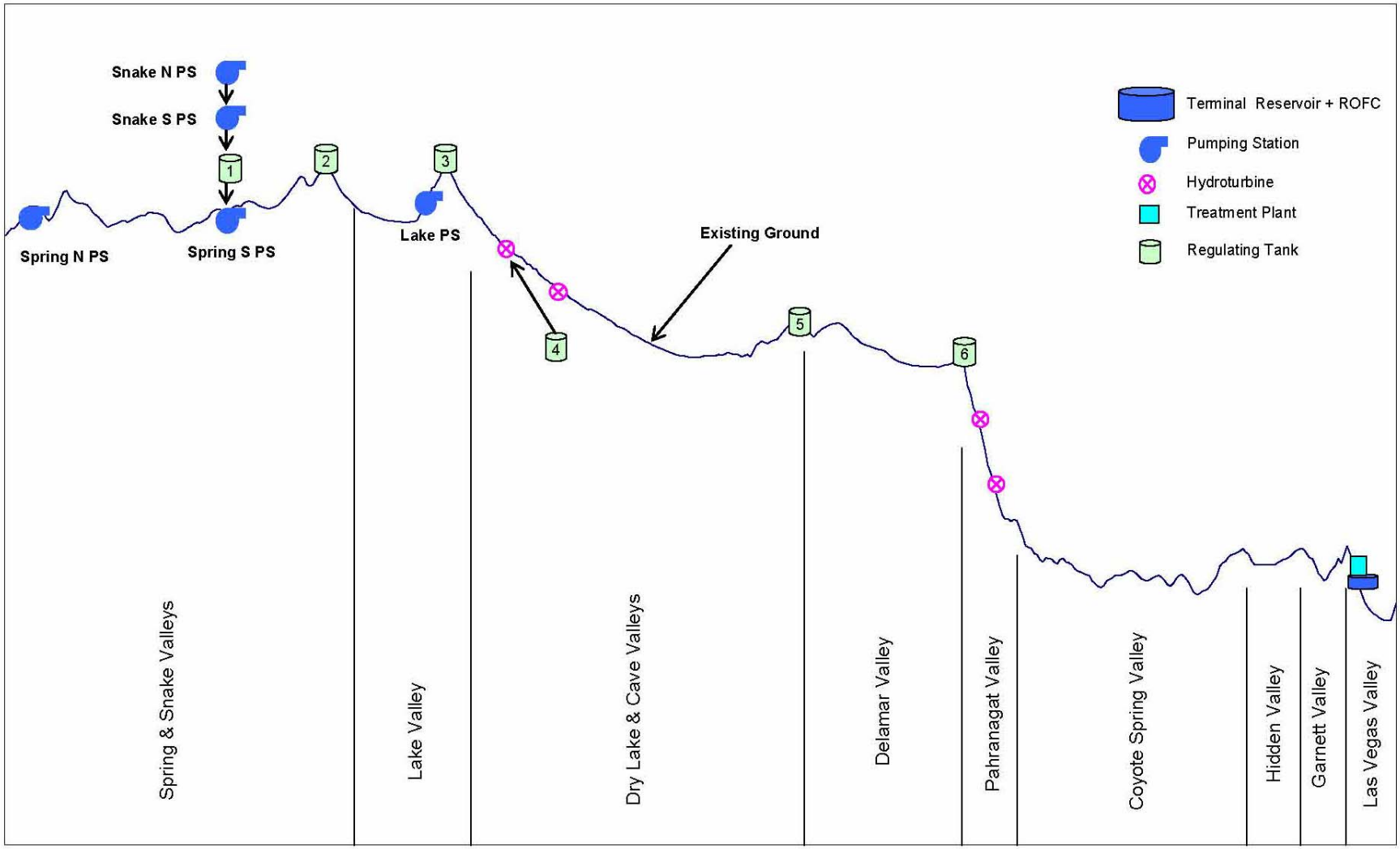


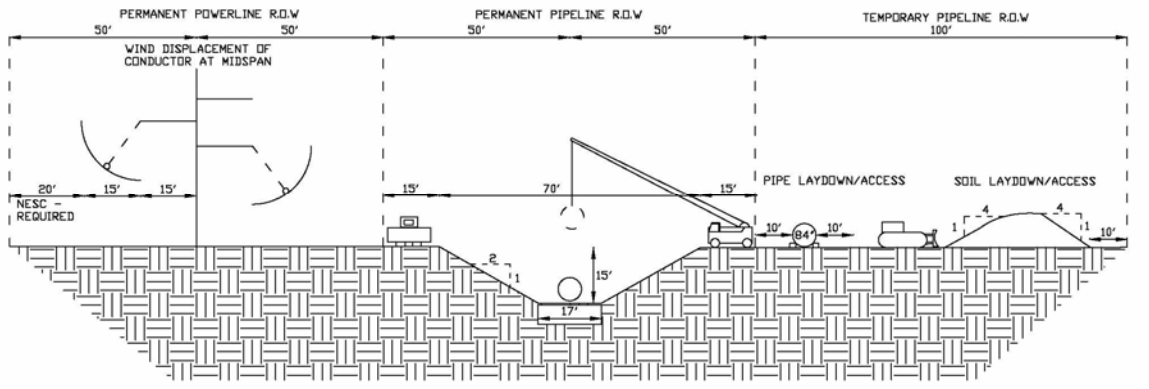
Figure 2-8 Preliminary GWD Project Ground Surface Profile

The main pipeline would follow US 93 through Coyote Spring Valley (Sheets 33 through 44). In the northern part of the valley, the alignment is on the east side of the highway, but then crosses to the west side. The pipeline is estimated to decrease in diameter to 78 inches in this area as Lincoln County's water leaves the main pipeline. South of the Coyote Springs Investment property, the pipeline would continue to follow US 93 into Hidden Valley (Sheet 45).

The pipeline would follow US 93 through Hidden Valley (Sheets 45 through 47). Upon reaching Garnet Valley, it would deviate from the highway and continue south within an existing utility corridor to enter the Las Vegas Valley (Sheets 47 through 49). The alignment extends parallel to, and in the vicinity of the existing Kern River gas line and Nevada Power Company power line alignments across the Nellis Air Force Base Small Arms Range, and terminates into an existing SNWA water line on Lamb Boulevard and Grand Teton Drive (Sheets 49 and 50).

Permanent ROWs of up to 100 feet in width and temporary construction ROWs of an additional 100 feet are required for the main pipeline. In areas of level terrain and stable soil conditions, the amount of disturbance of the temporary ROW may be reduced, however any potential reductions will not be known until after detailed alignment surveys and project design have been completed. Figure 2-9 shows a preliminary ROW cross section, which is representative of contiguous pipeline and power line ROWs throughout the majority of the GWD Project. The 100-foot permanent ROW for the main pipeline accommodates a 60 to 70 foot wide trench, with a slope of 2:1 and a depth of at least 8 feet from the ground surface to the top of the pipe. The remaining permanent and temporary ROW is used for excavated material storage, pipe storage before installation, movement of heavy equipment, and safe personnel work space.

The permanent ROWs requested for the main pipeline total 2,444 acres, and the temporary ROWs total 2,444 acres. The main pipeline route crosses lands managed by the BLM (total 2,301 acres permanent, 2,301 acres temporary), Department of Defense (Nellis Small Arms Range) (total 27 acres permanent, 27 acres temporary), U.S. Fish and Wildlife Service (total 110 acres permanent, 110 acres temporary), and State of Nevada (total 6 acres permanent, 6 acres temporary). A detailed list of ROW requirements is shown in Table 3-1.



NESC – National Electrical Safety Code

Figure 2-9 Preliminary Pipeline and Power Line ROW Cross Section

2.2.2 Lateral Pipelines

Three primary lateral pipelines would branch off the main pipeline and extend into northern Spring Valley, Snake Valley, and Cave Valley. They are described in more detail below. Permanent and temporary ROW widths for the laterals are 100 feet each. The ROW cross section is the same as described for the main pipeline and shown on Figure 2-9. Because the pipe diameter of the lateral is not substantially smaller than the diameter of the main pipeline, and the work space needs for equipment, soil stockpiles, and material remain fairly constant, the width of temporary ROW required for construction of a lateral remains at 100 feet. As described for the main pipeline, the amount of disturbance of the temporary ROW may be reduced in areas of level terrain and stable soil conditions, however any potential reductions would not be known until after detailed alignment surveys and project design have been completed.

Spring Valley Lateral

The Spring Valley Lateral would extend from the Spring Valley South Pumping Station into central Spring Valley. This lateral may be up to 54 inches in diameter. From the Spring Valley South Pumping Station (Sheet 1), the lateral would extend northward to US 93 on the north side of an existing dirt road (Sheet 52). The lateral would continue north on the east side of US 93 to the junction of US 93, 6, and 50 (Sheets 52 through 56). At this location, the Spring Valley Lateral would cross State Route (SR) 893 and continue northward on SR 893, terminating approximately 1 mile north of Bastian Creek (Sheets 57 through 60).

The Spring Valley lateral would be located on land managed by the BLM. The permanent ROW needed is approximately 38.3 miles long and 100 feet wide, or 464 acres. The temporary ROW is also 38.3 miles long and 100 feet wide, or 464 acres.

Snake Valley Lateral

The Snake Valley Lateral may be up to 54 inches in diameter, and would extend into Snake Valley from the Spring Valley South Pumping Station (Sheet 1). The lateral would extend east from the Spring Valley South Pumping Station on existing dirt roads around the southern end of the Snake Range (Sheets 62 and 63). The lateral pipeline would continue to follow existing dirt roads past "The Troughs," turn northeast and pass Big Spring Wash, where it would enter Snake Valley (Sheets 64 and 65). It would head north on existing dirt roads through the Nevada side of Snake Valley, passing several private properties. Near Chokecherry Creek, the lateral would turn northeast on existing dirt roads and extend cross-country (Sheets 66 through 68). The alignment remains in Nevada, and crosses the lower portions of Big Wash and Snake Creek before reaching Highway 487. Although this ROW would be on existing roads most of the way, there are stretches totaling approximately 3.5 miles near the terminus at Highway 487 where there are no existing roads. The lateral would follow the highway before terminating south of the town of Baker (Sheets 69 through 71).

The Snake Valley lateral would be on land managed by the BLM. The permanent ROW needed is approximately 43.3 miles long and 100 feet wide, or 525 acres. The temporary ROW is also 43.3 miles long and 100 feet wide, or 525 acres.

Cave Valley Lateral

The Cave Valley Lateral may be up to 30 inches in diameter, and would connect Cave Valley into the main pipeline. The lateral would have both north and south segments located on the existing Cave Valley Road, on the eastern side of Cave Valley. The Cave Valley Lateral would begin at the main line in northern Dry Lake Valley at Sidehill Pass (Sheet 11), and extend over Sidehill Pass to Cave Valley Road on the valley floor (Sheet 73). From the intersection of Sidehill Pass Road and Cave Valley Road, the north segment of the lateral would extend approximately 16 miles on Cave Valley Road, and terminate near the intersection of Cave Valley Road and Patterson Pass Road (Sheets 73 through 76). The south segment would extend approximately 6 miles to the vicinity of the Silver King Mine (Sheets 72 and 73).

The Cave Valley Lateral would be located on land managed by the BLM. The permanent ROW requested is approximately 22.4 miles long and 100 feet wide, or 272 acres. The temporary ROW is also 22.4 miles long and 100 feet wide, or 272 acres.

2.2.3 Collector Pipelines

Collector pipelines convey water from the groundwater production wells into the main and lateral pipelines. The collector pipelines from the currently identified 14 potential groundwater production well sites in Spring Valley may range from 10 inches in diameter, if only connected to a single well site, to up to 20 inches in diameter where three wells are connected.

The collector pipelines would be located on land managed by the BLM, except for two segments:

(1) Approximately 1.5 miles of the collector pipeline to sites 54014 and 54015, which extends through private land owned by SNWA (Sheet 60), and

(2) Approximately 0.9 miles of the collector pipeline to sites 54010, 54012, and 54020, which would be within a BLM ROW issued to the Nevada Department of Transportation (NVCC-020748) through privately-owned land (Sheet 58).

The permanent ROW required is approximately 20.9 miles long and 50 feet wide, or 126 acres. The temporary ROW is also 20.9 miles long and 50 feet wide, or 126 acres.

In the future, additional collector pipelines will be required to connect additional groundwater production wells and well fields into the GWD Project, but the location of these collector pipelines cannot be known at this time. Programmatic-level estimates regarding those future facilities are described in Chapter 2.9.

2.2.4 Staging Areas

Temporary construction staging areas are required to construct the main, lateral, and collector pipelines. These staging areas are 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 would include all of these uses. Temporary security fencing may be used to enclose staging areas during construction; this fencing would be removed at the completion of construction activities.

Staging areas are placed approximately 3 miles apart immediately adjacent to the pipeline ROWs. A total of 98 3-acre staging areas are proposed next to the main and lateral pipelines, and a total of 8 1-acre staging areas are proposed next to the collector pipelines. The locations of the staging areas are displayed in Map Volumes I and II. All of the ROWs for the staging areas are temporary, which total 302 acres.

2.2.5 Borrow Pits

Soil materials used for bedding and backfilling of the pipelines must meet specified engineering standards. Type II gravel or Controlled Low Strength Material, a cement based product, are needed for supporting the bottom of the pipe (bedding) and for backfilling that covers the pipe (pipe zone). Backfilling above the pipe zone (trench zone) does not require special soil material, but the trench zone material cannot contain large boulders or similar debris.

Preliminary geotechnical borings were conducted along the main pipeline alignment in 2006, and indicated that existing soils in some areas may be unsuitable for bedding and backfill. Therefore, imported soil material is anticipated to be required. Some of the needed material could be supplied from surplus that is excavated during pipeline trenching fairly close to where needed (e.g., in the same valley). However, it is anticipated that borrow pits would be required to supply backfill for pipeline construction in some areas.

A total of eight borrow pit sites have been identified:

- Borrow Pit 1 in northern Spring Valley, where the Spring Lateral pipeline crosses US 6 and 50 (Spring mile 28 on Sheet 56),
- Borrow Pit 2 in Snake Valley, near Big Spring Wash (Snake mile 18 on Sheet 65),
- Borrow Pits 3 and 4 in Lake Valley, where the main pipeline crosses US 93 (Main mile 33 on Sheet 8),
- Borrow Pits 5 and 6 in southern Cave Valley, approximately 3 miles south of Sidehill Pass (Cave South mile 3 on Sheet 73), and
- Borrow Pits 7 and 8 in Dry Lake Valley, approximately 20 miles north of US 93 in the vicinity of the Fissures (Main mile 79 on Sheet 20).

Each borrow pit site is approximately 7 acres in size. Approximately half of the space would be used for the borrow pit, and the other half for processing equipment, stockpiles for processed material, and transport equipment. Each borrow pit may be excavated up to a depth of approximately 15 feet. Approximately 18 million cubic feet of borrow material is anticipated to be removed from all eight pits if they were excavated to maximum proposed capacity. The borrow pits would be re-filled with the excess soils that are unsuitable for pipeline backfill. It is not anticipated that additional soil disposal sites would be needed.

All of the borrow pits would be on land managed by the BLM. Each borrow pit site is approximately 552 feet long and 552 feet wide, or 7 acres. The temporary ROW requested for all eight borrow pits is approximately 56 acres.

2.2.6 Pipeline Valves

The pipelines require appurtenances, including air release valves, isolation valves, air/vacuum valves, and drain valves. The locations of these valves are dependant upon elevation, and the final sites will be determined during pipeline design, after detailed topographic surveys have been completed.

Air release valves that discharge small amounts of air are at or near all high points, grade breaks on steep slopes, and long downward sloping pipe segments. Air/vacuum valves that allow large amounts of air to enter the pipeline are generally at significant high points and near isolation valves. Several hundred air release and air/vacuum valves along the main and lateral pipelines are anticipated.

Drain valves are at the lowest pipeline elevations in any pipe segment. Although locations cannot yet be determined, there may be several hundred drain valves along the pipeline alignments. For the purposes of analysis, it is assumed that they would be placed approximately 1 to 5 miles apart at every low point.

Isolation valves are built in-line with the water pipeline and block the flow of water through the pipeline when in the closed position. Isolation valves require an air/vacuum valve that equalizes the pressure inside the pipeline and avoids pipe collapse if the pipe is drained. Although locations cannot not be determined until the pipeline design is complete, for the purposes of analysis, it is anticipated that isolation valves would be placed every 3 to 15 miles along the pipelines.

The valve structures are buried with the pipeline but have a portion of the valve system that extends aboveground. An isolation valve with an air/vacuum valve and vault is typically constructed inside an underground, square or rectangular vault that is large enough for a person to access. The vault is built surrounding the water pipeline. The top of the vault is just below the ground surface and contains a large, removable access hatch and one or more, smaller access ways large enough to accommodate a person. The vault vent extends a few feet aboveground. There is no direct connection between the air vent and the pipe; air is exchanged between the pipe and the vault, and passes to the outside through the vault vent.

Typical air release valves are also enclosed within an underground vault, with an aboveground air vent consisting of a screened pipe. The air vent connects directly to the top of the water pipeline through check valves so air can pass aboveground.

There is typically no vault for a drain valve. Drain valve piping is connected to the bottom of the pipeline at a low point and extends to a discharge location which is generally a dry wash channel. The water is passed through an energy dissipater if required before being discharged, and the wash channel is typically lined with rip rap at and immediately below the discharge location to avoid the potential for erosion.

The valves are located within the permanent ROWs requested for the pipelines, and additional permanent or temporary ROWs are not needed.

2.3 PUMPING STATIONS

Five pumping stations are required to move water for the GWD Project. All of the pumping stations are located adjacent to a main or lateral pipeline. The location and size of each pumping station is described in more detail below. Facilities common to each pumping station include:

- Pumps and motors
- Forebay (surge facility or water storage tank)
- Surge control system
- Instrumentation and control systems
- Electrical facilities including switchgear, transformers, motor control centers, local control panels, lighting, and standby diesel generator with fuel storage tank
- Mechanical systems including heating, ventilation, air conditioning, plumbing, hoists, cranes, and compressors
- Chemical addition facilities, where needed
- Break room and restroom, with associated septic tank and leach field
- Site fencing and security provisions

Figures 2-10 and 2-11 respectively show a preliminary floor plan and cross-section of a pumping station using horizontal split-case pumps. Pumping stations are contained in a concrete or concrete block building. The approximate heights of the pumping station buildings vary between 24 and 40 feet above grade, depending on conditions such as terrain, pump size, and other environmental and equipment requirements.

A facility electrical substation is included at each pumping station site to reduce the power voltage to the operational requirements. The sites would be partially paved, with remaining areas covered with crushed gravel, and have security fencing with a locked gate enclosing each site.

A diesel-powered standby generator would be included at each pumping station site. The generator needs to be large enough to operate one of the pumps in each pumping station, in order to maintain pressures in the pipeline in the event of a power outage. As a conservative scenario, a catastrophic power loss might take up to 72 hours to repair. Therefore, the diesel generators would be desired to be capable of operating up to 72 hours continuously. A diesel storage tank for fuel storage to operate the generator would be located at each site. Each tank is anticipated to be up to 2,400 gallons in capacity, with a steel inner tank, outer reinforced concrete shell, and Styrofoam insulation in between. These tanks would meet current regulatory requirements for containment and be equipped with monitoring equipment for leak detection. The generator at each pumping station would be operated approximately once each month for 1 to 2 hours to ensure that it is in good working order. Diesel fuel would be hauled by tanker truck to the pumping station sites approximately once each year to fill the fuel storage tanks.

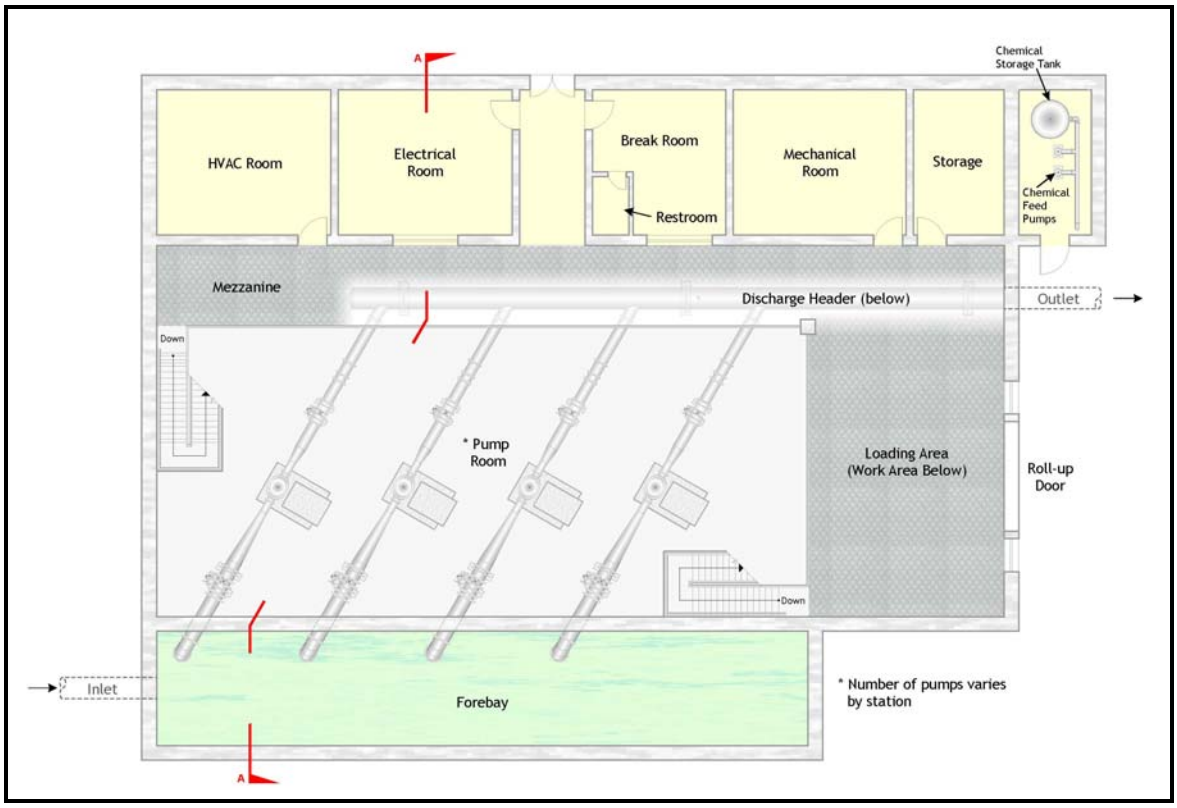


Figure 2-10 Pumping Station Layout, Preliminary Floor Plan

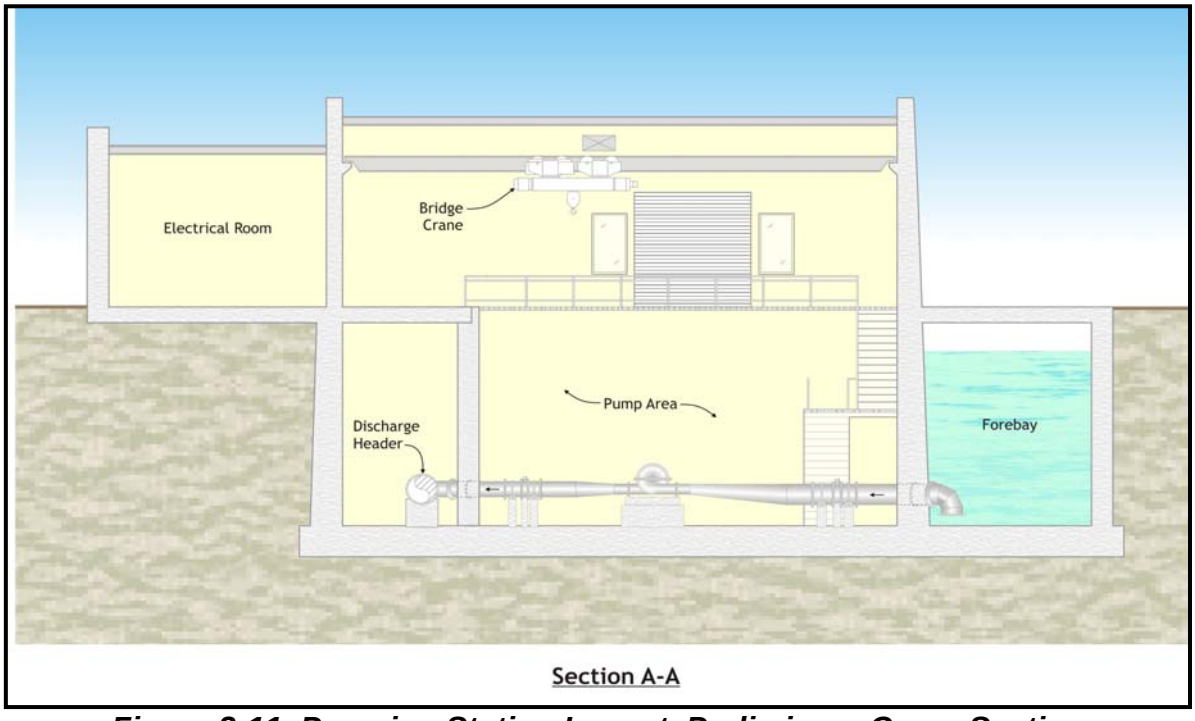


Figure 2-11 Pumping Station Layout, Preliminary Cross Section

2.3.1 Spring Valley North Pumping Station

The Spring Valley North Pumping Station would be located along the Spring Valley Lateral pipeline alignment adjacent to SR 893, approximately 7 miles north of US 6 and 50 (Sheet 59).

As shown on Figure 2-12, the site includes the pumping station, surge facilities, a generator building to house the standby electrical generator, and a small electrical substation to serve the pumping station. The pumping station would lift the water in the Spring Valley Lateral over a high point located near the junction of US 93, 50, and 6, and into southern Spring Valley where the lateral ties into the main pipeline at the Spring Valley South Pumping Station. Although the number of pumps required at this pumping station cannot be determined until the final facility design, for the purposes of analysis, 6 pumps at 500 horsepower each are anticipated.

The permanent ROW requested for the Spring Valley North Pumping Station is approximately 466 feet long and 466 feet wide, or 5 acres. Additionally, a temporary ROW (Facility Staging Area) 466 feet long and 466 feet wide, or 5 acres, is required for construction.

2.3.2 Spring Valley South Pumping Station

The Spring Valley South Pumping Station would be located on the west side of Indian Springs Road approximately 2 miles south of Indian Springs Knoll (Sheet 1). The pumping station would collect water from the Spring and Snake Laterals along with other groundwater in southern Spring Valley and move it over Horse Corral Pass. As shown in Figure 2-13, this site is larger than the other pumping station sites because, in addition to the pumping station, it accommodates a primary electrical substation (see Chapter 2.7.2, below), a warehouse, and an outdoor storage yard. Space is also allotted for possible future water treatment facilities, if determined to be needed.

The pumping station includes a surge facility to stabilize system hydraulics, a generator building to house the standby electrical generator, and a small facility electrical substation to serve the pumping station and maintenance yard. Although the number of pumps required at this pumping station cannot be determined until the final facility design, for the purposes of analysis, 10 pumps at 1,250 horsepower each are anticipated.

The electrical substation is needed to reduce power levels down to operational levels. It is described in detail in Chapter 2.7.2. The warehouse and outdoor storage yard would be used for storage of parts and equipment, and facility and equipment maintenance activities. If biological organisms, such as protozoans or bacteria, are present in the groundwater, chemicals for biological control, such as hypochlorite, may be stored and used at this facility.

The permanent ROW requested for the Spring Valley South Pumping Station is approximately 1,615 feet long and 1,615 feet wide, or 60 acres. A temporary ROW is not required for this site since the space allotted for the outdoor storage yard could be used during facility construction.

Figure 2-12 Preliminary Spring Valley North Pumping Station Site Plan

Figure 2-13 Preliminary Spring Valley South Pumping Station Site Plan

2.3.3 Snake Valley North Pumping Station

The Snake Valley North Pumping Station would be located along the Snake Valley Lateral pipeline alignment, approximately 5 miles south of the town of Baker (Sheet 70).

As shown on Figure 2-14, the site includes the pumping station, surge facilities, a generator building to house the standby electrical generator, and a small electrical substation to serve the pumping station. The pumping station would work in tandem with the Snake Valley South Pumping Station to lift the water in the Snake Valley Lateral over the south bench of the Snake Range, and into Spring Valley where the lateral ties into the main line at the Spring Valley South Pumping Station. Both this facility and the Snake Valley South Pumping Station are required in tandem because of physical limitations on pumping pressures associated with the elevation change around the Snake Range. Although the number of pumps required at this pumping station cannot be determined until the final facility design, for the purposes of analysis, 5 pumps at 500 horsepower each are anticipated.

The permanent ROW needed for the Snake Valley North Pumping Station is approximately 466 feet long and 466 feet wide, or 5 acres. Additionally, a temporary ROW 466 feet long and 466 feet wide, or 5 acres, is required for construction.

2.3.4 Snake Valley South Pumping Station

The Snake Valley Pumping Station would be located just north of Big Wash in southern Snake Valley (Sheet 69). As described above for the Snake Valley North Pumping Station, this facility would 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 South Pumping Station. As shown in Figure 2-15, the site includes a pumping station, surge facilities, generator building to house the standby electrical generator, outdoor storage yard, and a small electrical substation to serve the pumping station. Adjacent to the pumping station on the north side is the Snake Valley Secondary Substation, which is not part of the pumping station. The secondary substation is described in Chapter 2.7.2.

Although the number of pumps required at the Snake Valley Pumping Station cannot be determined until final facility design, for the purposes of analysis, 5 pumps at 1,000 horsepower each are anticipated.

The permanent ROW required for the Snake Valley Pumping Station is approximately 933 feet long and 466 feet wide, or 10 acres. A temporary ROW is not required for this site since the space allotted for the outdoor storage yard could be used during facility construction.

2.3.5 Lake Valley Pumping Station

The Lake Valley Pumping Station would be located along the main pipeline alignment, approximately 2 miles northwest of US 93 on Muleshoe Summit Road (Sheet 9). The pumping station would lift the water in the main line from Lake Valley, over Muleshoe Summit, and into Dry Lake Valley. As shown in Figure 2-16, the site includes a pumping station, surge facilities, a generator building to house the standby electrical generator, and a small electrical substation to serve the pumping station.

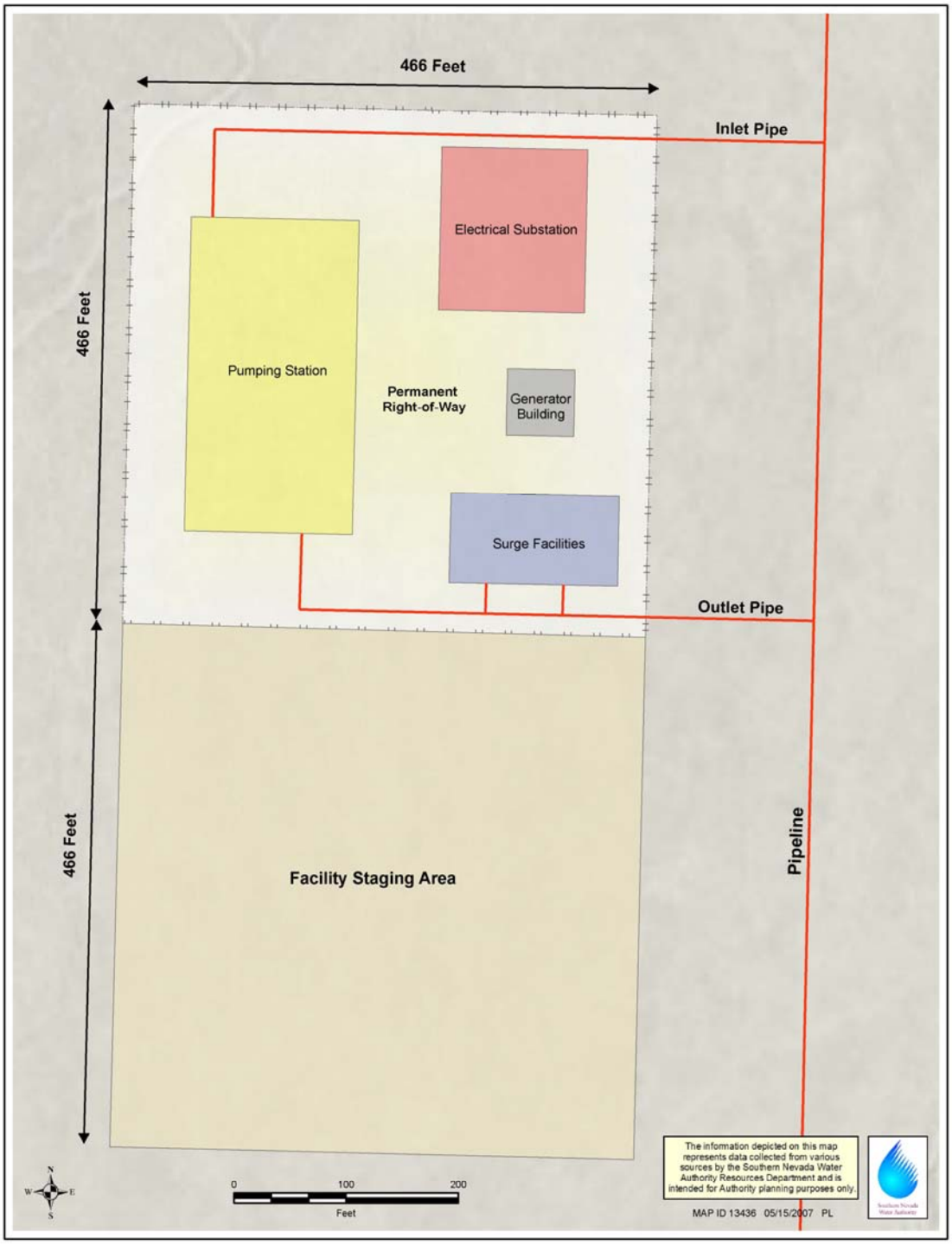


Figure 2-14 Preliminary Snake Valley North Pumping Station Site Plan

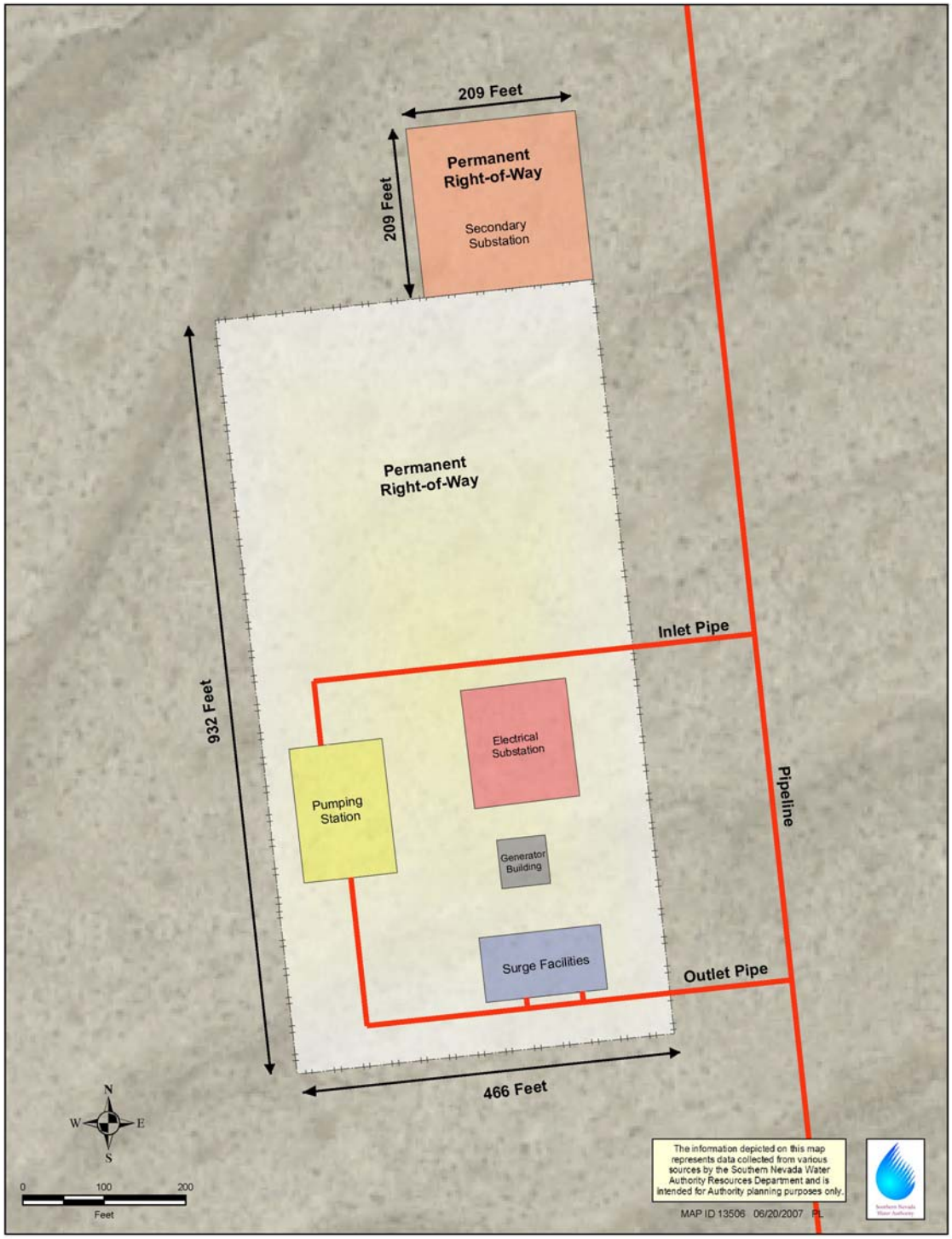


Figure 2-15 Preliminary Snake Valley South Pumping Station Site Plan

Figure 2-16 Preliminary Lake Valley Pumping Station Site Plan

Although the number of pumps required at this pumping station cannot be determined until final facility design, for the purposes of analysis, 11 pumps at 1,250 horsepower each are anticipated.

The permanent ROW requested for the Lake Valley Pumping Station is approximately 466 feet long and 466 feet wide, or 5 acres. Additionally, a temporary ROW is necessary for construction purposes. The temporary ROW is approximately 466 feet long by 466 feet wide, or approximately 5 acres.

2.4 REGULATING TANKS

Six regulating tanks, one each in Spring, Hamlin (on the Snake Lateral), Lake, Cave, Dry Lake, and Delamar Valleys, are necessary to regulate water flow through the pipeline. They may be constructed aboveground or belowground, depending upon site specific elevation as determined during final project design. Regulating tanks are constructed of steel if aboveground, and concrete if belowground. They consist of the tank structure, inlet and outlet pipes, an overflow pipe, and a drain pipe that connects to an energy dissipater (Figure 2-17). A radio antenna up to approximately 20 feet high for remote communication may be located on each regulating tank site.

The tanks are anticipated to have a capacity of up to approximately 3 million gallons each. Tanks are typically cylindrical, approximately 130 feet in diameter, and approximately 30 feet high. Security fencing, typically chain link, with a locked gate would enclose each site.

The tanks would be located at high points along the pipeline alignment:

- Spring Valley – at Horse Corral Pass which is located at the high point between Lake and Spring Valleys (Sheet 5)
- Hamlin Valley – on the Snake Valley lateral near Big Spring Wash (Sheet 65)
- Lake Valley – at Muleshoe Summit (Muleshoe Regulating Tank) in the east-central part of the valley (Sheet 9)
- Cave Valley – at the high point in Sidehill Pass (Sheet 73)
- Dry Lake Valley – in the southern part of the valley near US 93 (Sheet 25)
- Delamar Valley – at the Delamar Valley summit in the southern part of the valley (Sheet 32)

As shown on Figure 2-17, the permanent ROW needed for each of the regulating tanks is approximately 295 feet long and 295 feet wide, or 2 acres. Therefore, there is a total of approximately 12 acres of permanent ROW necessary for the 6 regulating tanks. Additionally, temporary ROWs are necessary for construction areas around each regulating tank. The temporary ROW surrounds three sides of each permanent regulating tank ROW, with a length of 466 feet and a width of 466 feet. The fourth side of the regulating tank is adjacent to the permanent pipeline ROW. No additional temporary ROW is required on the pipeline side of the regulating tank site. The temporary ROW includes approximately 3 acres per site, for a total of approximately 18 acres of temporary ROW necessary for the 6 regulating tanks

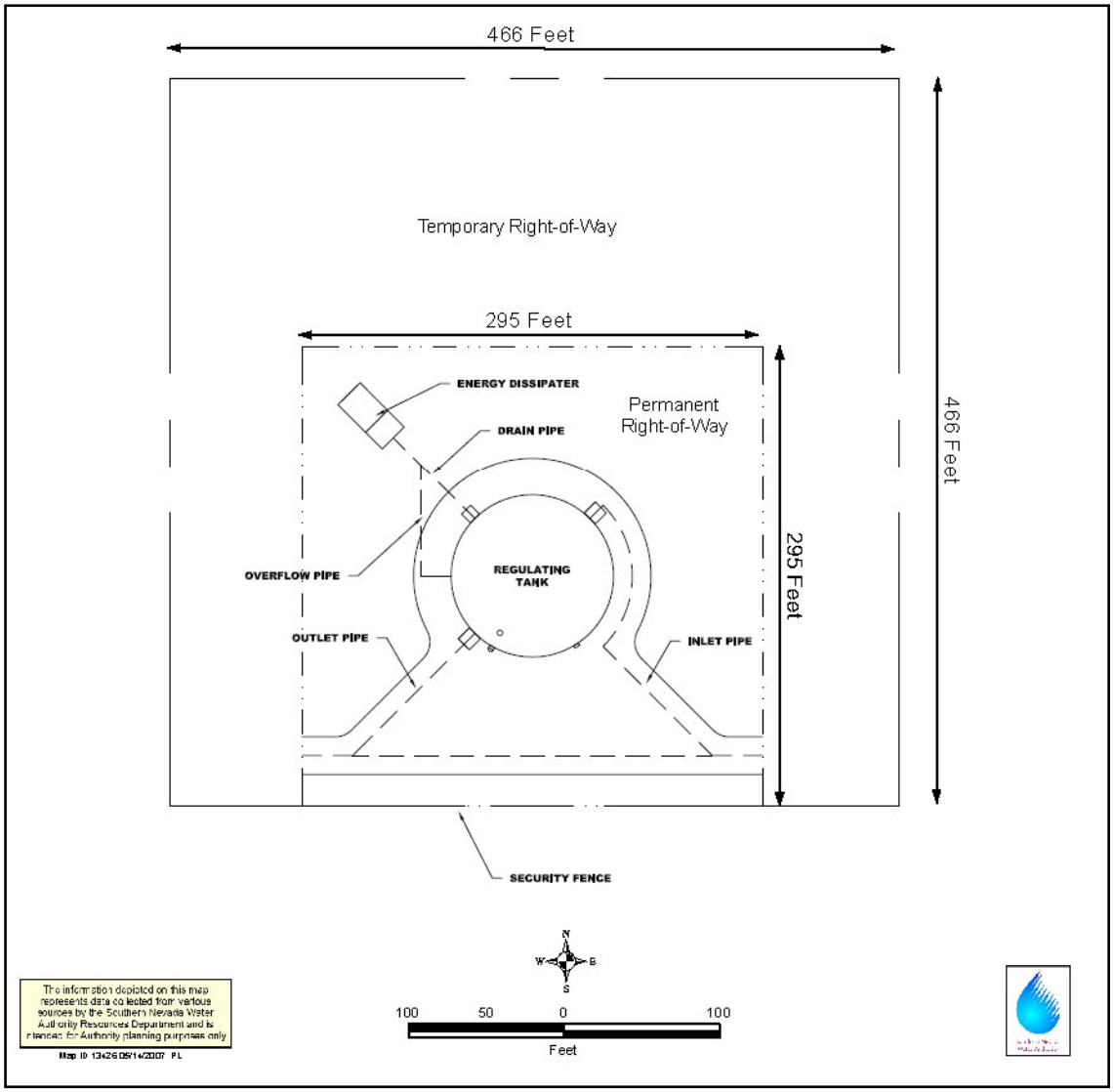


Figure 2-17 Preliminary Regulating Tank Site Plan

2.5 BURIED STORAGE RESERVOIR

A buried storage reservoir is required to manage flow and delivery of the water before it enters into SNWA's existing water system. The reservoir is planned to be a 40-million gallon, belowground, covered concrete tank. The reservoir site includes a flow control structure (rate of flow control structure), energy dissipater, utility building, maintenance yard, storage areas, and parking. The site would be partially paved, with the remainder covered with crushed gravel, and would have security fencing with a locked gate. A site plan of the buried reservoir is shown on Figure 2-18.

The main pipeline would terminate into SNWA's existing water system by gravity flow. This requires the reservoir to be sited at an elevation of at least 2,510 feet. This elevation requirement constrains available sites to the Apex area, in the northeastern Las Vegas Valley.

The proposed reservoir would be located on land managed by the U.S. Department of Defense/U.S. Air Force in northeastern Clark County, within the Nellis Air Force Base Small Arms Range. The site is located adjacent to several other existing utilities, including the Kern River natural gas pipeline and several overhead power lines, near the eastern boundary of the Small Arms Range (Sheet 49).

The permanent ROW needed is approximately 1,290 feet long and 1,120 feet wide, or 33 acres. A temporary ROW is necessary adjacent to the buried storage reservoir site, also on lands managed by the US Department of Defense. The temporary ROW is approximately 466 feet long and 466 feet wide, or 5 acres (Figure 2-18).

2.6 WATER TREATMENT FACILITY

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

A WTF would be located adjacent to the main pipeline, near the buried storage reservoir in the northeastern Las Vegas Valley. Because the WTF site is not constrained by elevation requirements, it has been sited on land managed by the BLM, between the Nellis Air Force Base Small Arms Range and Apex private property (Sheet 49). This location allows treatment of the water prior to entering into SNWA's water system.

A conceptual site plan for this facility is shown on Figure 2-19. Final site layout will be determined following completion of water quality testing and facility design. The capacity of the WTF is anticipated to be up to 150 million gallons per day.

The WTF is currently anticipated to consist of a chemical injection facility housed in the chemical building. Chemicals would be injected directly into the main pipeline to disinfect and fluoridate the water. Chlorine would be added for disinfection. Fluoride may be added to the water if needed to meet Nevada State requirements. An orthophosphate would be added to prevent corrosion of the pipeline.

Figure 2-18 Preliminary Buried Storage Reservoir Site Plan

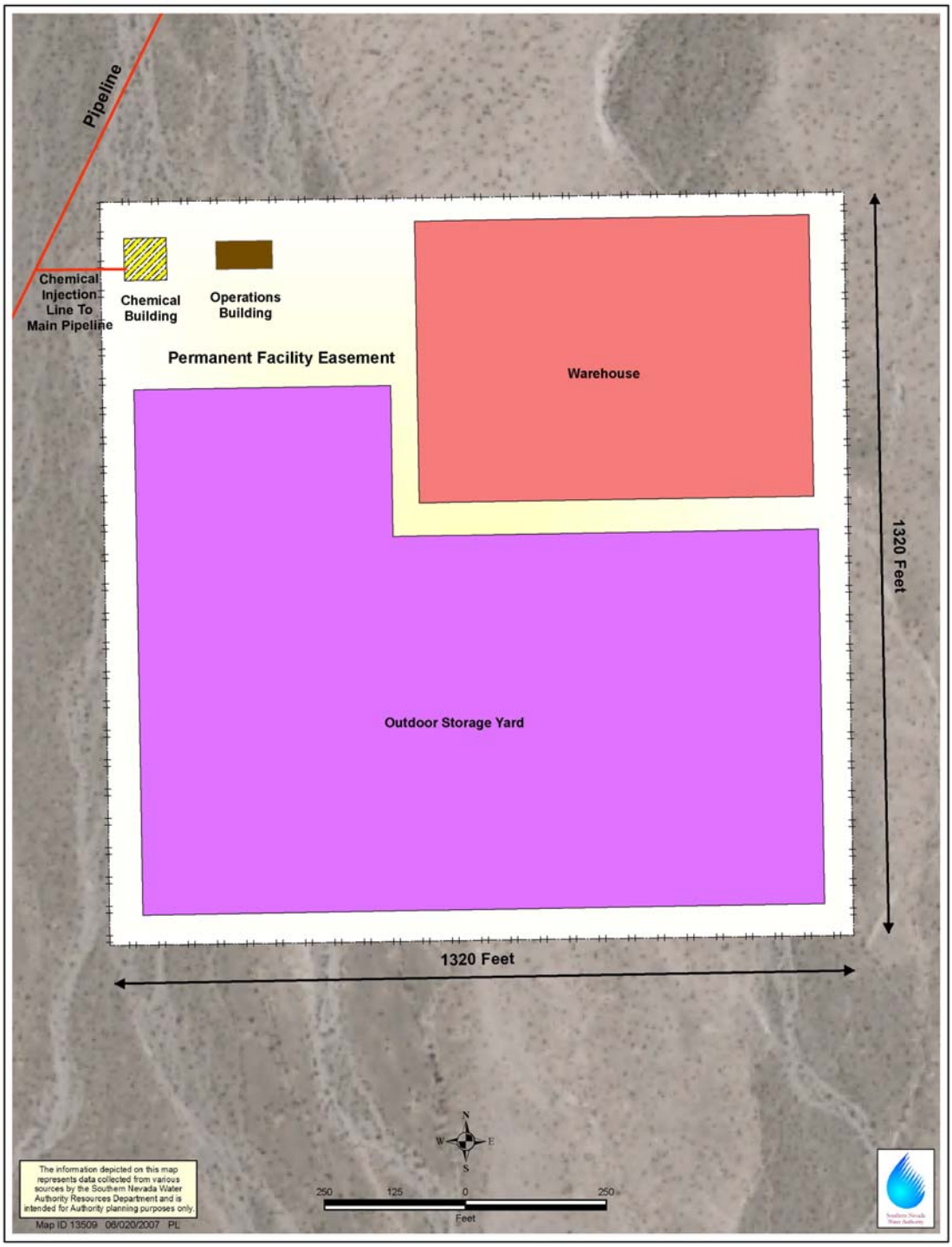


Figure 2-19 Preliminary Water Treatment Facility Site Plan

Chemicals required for water treatment would be stored in separate tanks, either above or below ground level, in designated areas inside the chemical building. Spill containment would be provided as required by federal, state, and local regulations.

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

The site would be partially paved, with remaining areas covered by crushed gravel, and have security fencing with a locked gate enclosing the site. A staffed security booth may be installed at the entry gate to the facility.

A permanent ROW with a width of 1,320 feet and a length 1,320 feet, or 40 acres, is needed for the WTF. A temporary ROW is not required since the space allotted for the outdoor storage and maintenance yard could be used during facility construction.

2.7 POWER FACILITIES

Electrical power is required to operate the proposed groundwater well pumps, pumping stations, WTF, and buried storage reservoir. Table 2-2 identifies the anticipated electrical power requirements for these facilities. In order to estimate overall total project power requirements, this table also includes assumptions regarding the anticipated power requirements for the future facilities (additional groundwater production wells and pumping stations), which are described in Chapter 2.9.

Table 2-2 Anticipated Power Requirements

Proposed GWD Project Facilities	Power (megawatts)
Spring Valley Wells (14)	4.1
Spring Valley North Pumping Station	2.9
Spring Valley South Pumping Station	10.9
Snake Valley North Pumping Station	2.5
Snake Valley South Pumping Station	4.6
Lake Valley Pumping Station	11.9
Buried Storage Reservoir	0.01
Water Treatment Facility	1.5
Anticipated Future Groundwater Wells and Pumping Stations	estimated 40.1
TOTAL	**78.5 (estimated)**

There is currently no electrical power distribution line in the GWD Project area sufficient to meet the needs of the GWD Project. Therefore, construction of a power line to connect into two regional electrical substations, the Gondor Substation near Ely and the 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.

SNWA owns 25% of the Silverhawk Generating Station, which can produce in excess of 500 megawatts (MW). SNWA also has power purchase contracts which are part of the Western States Grid. Therefore, construction of new power generation facilities is not required to support the approximately 79-MW power requirements of the GWD Project.

2.7.1 Power Lines

Power lines to operate the GWD Project would include 230 kV, 69 kV, and 25 kV conductors (electrical wires). Wherever possible, multiple conductors would be strung on the same power pole. Figure 2-20 depicts the locations of the power lines, including color coding where multiple conductor voltages are hung on the same pole, and Table 2-3 summarizes the power line lengths.

The main 230 kV power line would begin at the Gondor Substation located northeast of Ely in White Pine County (Sheet 77). The power line would follow an existing power line south along the west side of the Duck Creek Range. South of Steptoe Creek, it would diverge from the existing power line, but continue to stay on the west side of the Duck Creek Range. The power line would cross US 93, 50, and 6, and parallel the highway for a few miles before heading southeast across the Schell Creek Range. It would reach the main pipeline alignment approximately 4 miles south of the US 93, 50, and 6 interchange (Sheets 77 through 84, and 55).

The power line would parallel the main pipeline alignment south through Lincoln County until terminating at the existing Silverhawk Substation in Clark County (Sheets 47 and 48). There are five areas where the power line would not be immediately adjacent to the pipeline ROW:

1. In southern Spring Valley, approximately 1 mile northeast of Horse Corral Pass, the power line would separate from the pipeline for approximately 0.7 mile (Sheet 5). In this area, the power line ROW would extend in a straight line over a hill to avoid numerous short curves if it were to extend around the hill.
2. In southern Dry Lake and northern Delamar Valleys, the power line would separate from the pipeline for approximately 13 miles. Between US 93 and the vicinity of Delamar Wash, the power line would remain on the existing North Poleline Road (Sheets 25 through 28). This ROW was selected to keep the power line near an existing power line ROW and avoid potential interference with a desert landing strip.
3. In southern Pahranagat Valley, for approximately 1.5 mile the power line would be located up to approximately 500 feet northwest of the pipeline. The proposed power line ROW would extend parallel to an existing power line and avoid several changes in direction of the pipeline ROW (Sheet 32).

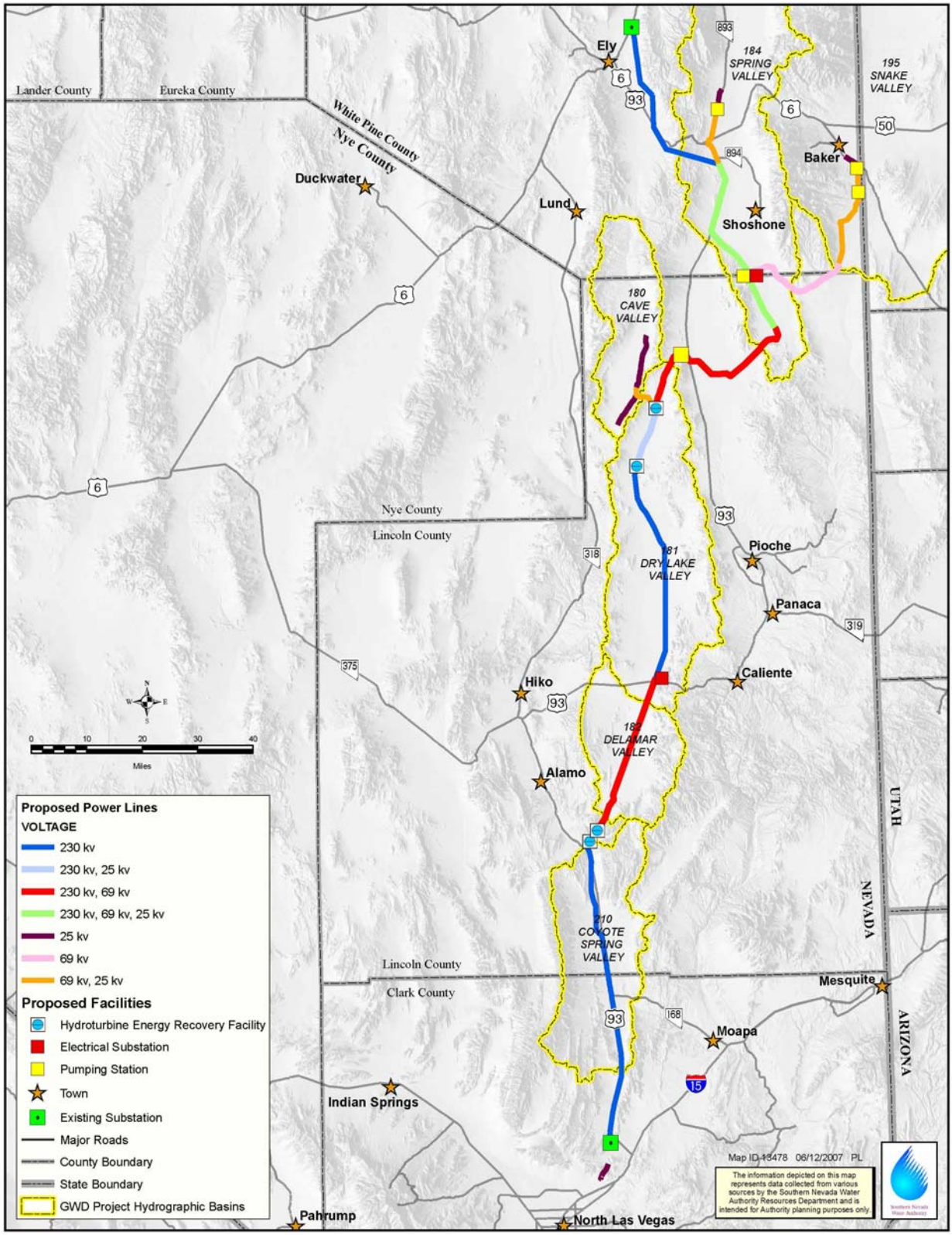


Figure 2-20 GWD Project Power Lines

Table 2-3 GWD Project Power Lines

Power Line Conductor Voltages	Total Miles
230 kV power line	134.4
69 kV power line	20.5
25 kV power line	45.4
230 kV power line with 69 kV and 25 kV underhang	34.5
230 kV power line with 69 kV underhang	66.1
230 kV power line with 25 kV underhang	10.9
69 kV power line with 25 kV underhang	37
TOTAL	**348.8**

4. In southern Pahranagat Valley, for approximately 1.5 mile the power line would be located on a ridge above the Pahranagat Narrows. The power line would follow an existing power line ROW along the ridgeline, avoiding the numerous curves along the bottom of the narrows (Sheet 33).
5. In Coyote Spring Valley, for approximately 13 miles the power line ROW would be located 150 feet west of the pipeline ROW (Sheets 37 through 41). This separation is to accommodate a request by Lincoln County Power District, which has proposed two power lines in this stretch and is seeking to avoid crossings of the higher voltage SNWA power line.

South of the Silverhawk Substation, the WTF and Buried Storage Reservoir would be supplied with power from an existing Nevada Power Company 69 kV line, located approximately 2 miles north of the sites (Sheet 49). A 25 kV overhead power line would run from a new secondary substation placed adjacent to an existing Nevada Power switching station on the existing power line (see Chapter 2.7.2), to the Buried Storage Reservoir and then to the WTF.

As displayed on Figure 2-21, a portion of the 230 kV power poles would also carry a 69 kV or 25 kV conductor line hung below the 230 kV line. The 230 kV power pole would carry both 69 and 25 kV conductors in some areas of the project (see Figure 2-20). The reduced voltages would be used to convey power to pumping stations and other project facilities, where it would subsequently be reduced to operational levels. Power lines conveying only 69 kV or only 25 kV, or both, would also be routed along portions of the Spring, Snake and Cave Valley Laterals.

The 230 kV power poles would be single, steel power poles approximately 100 feet in height and spaced approximately 800 feet apart depending on the terrain. A preliminary 69 kV power pole is shown on Figure 2-22. The 69 kV power poles would be single, steel poles approximately 60 feet in height and spaced approximately 600 feet apart depending on the terrain. The 25 kV power poles would be single, wooden poles, approximately 50 feet in height and spaced approximately 500 feet apart depending on terrain.

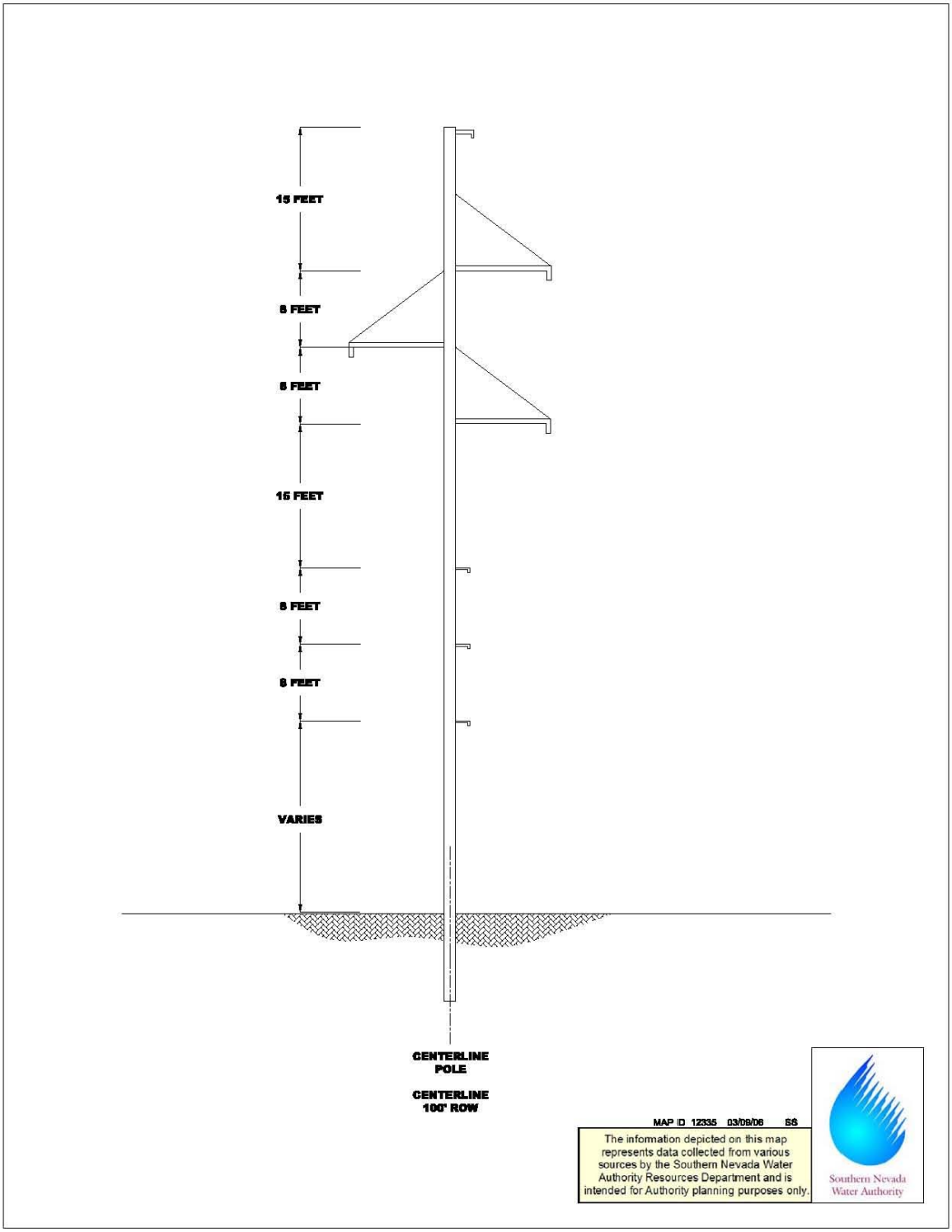


Figure 2-21 Preliminary 230 kV Power Pole with Underhang

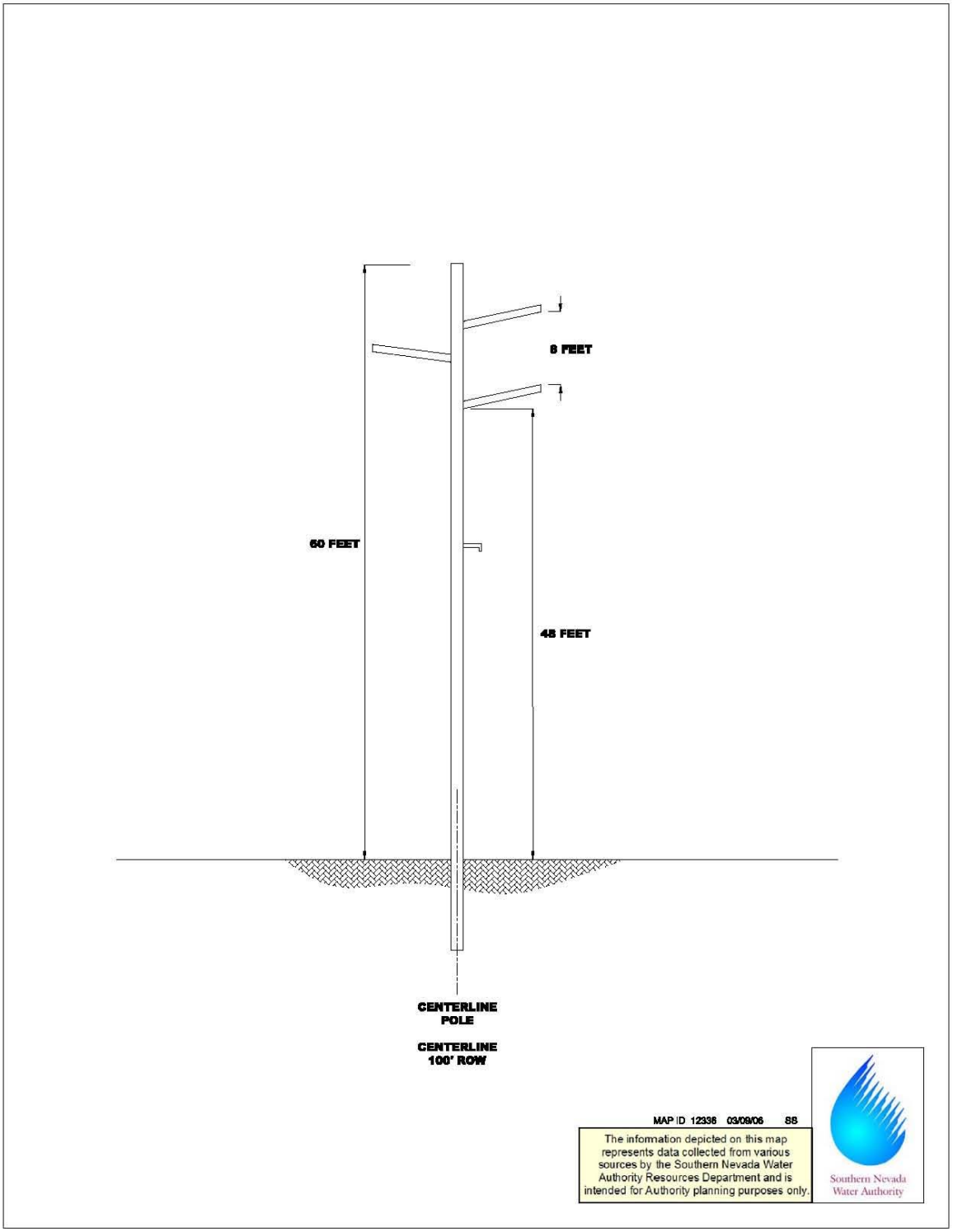


Figure 2-22 Preliminary 69 kV Power Pole

The tops of the power poles would be equipped with anti-perching devices to discourage raptors, ravens, and other birds from perching on the poles. The design of the crossbars and supports on the 230 kV poles discourages birds from flying between the conductors, and prevents bird injury. Based on Avian Power Line Interaction Committee recommendations revised in 2005, adequate spacing between conductors is 8 feet or greater based on the wingspan of the female golden eagle.

The permanent ROWs needed for power line combinations containing 230 kV and/or 69 kV conductors is 100 feet in width. This width is required for safety considerations to allow for displacement of the conductors. Only a portion of the permanent ROW would be disturbed for installation of power poles and access roads where needed. The permanent ROWs for the power lines carrying only 25 kV are 50 feet in width. Temporary ROWs for the power lines are not required because the permanent ROWs are sufficient for construction needs.

The total length of power line for the GWD Project is 348.8 miles; however 0.8 mile of the power line (located between the Las Vegas Valley Secondary Substation and the WTF) is within the pipeline ROW and does not require additional ROW. Therefore, 303.5 miles of power line requires a 100-foot wide ROW and 44.5 miles require a 50-foot wide ROW. The total permanent ROW required is 3,949 acres. The power lines would be located on lands managed by the BLM (total 3,818 acres), private property (total 14 acres), U.S. Fish and Wildlife Service (total 112 acres), and State Lands (Steptoe Valley Wildlife Management Area utility corridor) (total 5 acres).

2.7.2 Electrical Substations

The GWD Project includes two primary electrical substations and five secondary electrical substations.

Primary Electrical Substations

Two primary electrical substations are required to convey the 230 kV power and reduce it to 69 kV for transmission to project facilities. The first would be located within the Spring Valley South Pumping Station in southern Spring Valley (see Figure 2-13, and Sheet 1). The second would be located in southern Dry Lake Valley at the intersection of US 93 and North Poleline Road (Sheet 25). Figure 2-23 displays a preliminary site plan for a primary substation.

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

The primary substations would each be 660 feet in width and 660 feet in length, totaling 10 acres in size. Because the Spring Valley substation would be located within the Spring Valley South Pumping Station site, additional ROW is not required for this facility. The Dry Lake Valley substation is located on lands managed by the BLM, and permanent ROW of 10 acres is required. Temporary ROW is not required for construction of the substations.

Figure 2-23 Preliminary Primary Electrical Substation Site Plan

Secondary Electrical Substations

Six secondary electrical substations are required to reduce 69 kV to 25 kV. Two would be located in Spring Valley, and one each in Snake, Cave, Delamar, and Las Vegas Valleys:

1. The Spring Valley North Secondary Substation would be located adjacent to the Spring Valley North Pumping Station (Sheet 59).
2. The Spring Valley South Secondary Substation would be located approximately 10 miles northwest of the Spring Valley South Pumping Station site, where the Spring Lateral converges with US 93 (Sheet 52).
3. The Snake Valley Secondary Substation would be located adjacent to the Snake Valley South Pumping Station (Sheet 69).
4. The Cave Valley Secondary Substation would be located on the valley floor approximately 1 mile north of Sidehill Pass (Sheet 74).
5. The Delamar Valley Secondary Substation would be located near Hydroturbine 3 on the flat overlooking the Pahranagat Narrows (Sheet 32).
6. The Las Vegas Valley Secondary Substation would be located adjacent to an existing Nevada Power switching station in the Apex area (Sheet 49).

The secondary substations in Spring, Snake, and Cave Valleys are required to provide electrical power to the wells. The Cave Valley Secondary Substation would also receive power generated by Hydroturbines 1 and 2 and relay that power to the grid (see Chapter 2.7.3). The Delamar Valley Secondary Substation would receive power generated by Hydroturbines 3 and 4 and relay that power to the grid (see Chapter 2.7.3).

The secondary substation in Las Vegas Valley is required to provide 25 kV of electrical power to the reservoir and WTF facilities. This substation would tap into an existing Nevada Power Company 69 kV power line. The 25 kV power would be further reduced to operational levels on the reservoir and WTF sites using transformers. The transformers may be mounted on poles or located elsewhere on the reservoir and WTF sites.

The secondary substation sites are approximately 209 feet in width by 209 feet in length, totaling 1 acre in size. They would be located on lands managed by the BLM.

2.7.3 Hydroturbine Energy Recovery Facilities

Hydroturbines placed within or adjacent to the pipelines can generate electrical power as water flows from higher to lower elevations. Four hydroturbine energy recovery facilities each 2-acres in size have been identified: Hydroturbines 1 and 2 in Dry Lake Valley (Sheets 11 and 14, respectively), and Hydroturbines 3 and 4 in Pahranagat Valley (Sheets 32 and 33, respectively). Figure 2-24 depicts a preliminary hyroturbine energy recovery facility site.

The turbines for the energy recovery facilities are built belowground, in line with or parallel to the water pipelines. The hydroturbine facility buildings extend aboveground and house the switchgear, equipment to synchronize turbine-generated electrical power with the utility grid, control panels, access to the belowground turbines, and other

Figure 2-24 Preliminary Hydroturbine Energy Recovery Facility Site Plan

required equipment and controls. The turbines are controlled remotely, and can be manually operated locally as needed. Bypass piping shunts water around the turbines when they are not operational, for example during turbine maintenance or periods of low flow when conditions are not adequate for turbine operation. The valves that control the amount of water flowing through or around the turbines can be adjusted to regulate turbine speed, maintaining optimum operating conditions and avoiding turbine damage during high flow conditions.

The electrical power produced by each hydroturbine facility would be transmitted to a small substation located at each facility. The power would then be transmitted to the project electrical system where it adds to the utility grid, and used by, or exchanged for power for, the GWD Project facilities. When fully operational, the combined power added to the grid by all hydroturbines proposed for the GWD Project may be approximately 39 MW. Estimated quantities of electrical energy that may be generated by the hydroturbines are shown on Table 2-4.

Table 2-4 Estimated Hydroturbine Energy Recovery Quantities

Location	Power (MW)
Hydroturbine 1	9.7
Hydroturbine 2	6.1
Hydroturbine 3	10.6
Hydroturbine 4	12.4
Total	**38.8**

The permanent ROW required for each hydroturbine energy recovery facility is 295 feet long and 295 feet wide, or 2 acres, for a total of 8 acres for all four sites. Temporary ROWs for each site are 466 feet long and 466 feet wide, or approximately 5 acres, for a total of 20 acres for all four sites. The area for the temporary ROW is larger than the permanent ROW because of the substantial amount of equipment and work areas required for construction to store and assemble the components of the hydroturbines.

2.8 ACCESS ROADS

The majority of GWD Project pipelines, power lines, and appurtenant facilities are located along or adjacent to existing access roads, including paved highways and dirt roads. Throughout most of the GWD Project, the ROWs for the pipeline and power line are contiguous, jointly providing access to the pipeline and power line facilities.

With the exception of approximately 14 miles of shared access road near the Gondor Substation, all access roads for the GWD Project would be within the pipeline and power line ROWs previously described. Existing roads within these ROWs may require improvements, such as widening or paving. For some power line and pipeline segments where there are no existing access roads within or adjacent to the requested ROWs, new roads would be needed. Figure 2-25 displays the access road improvements, which are described below

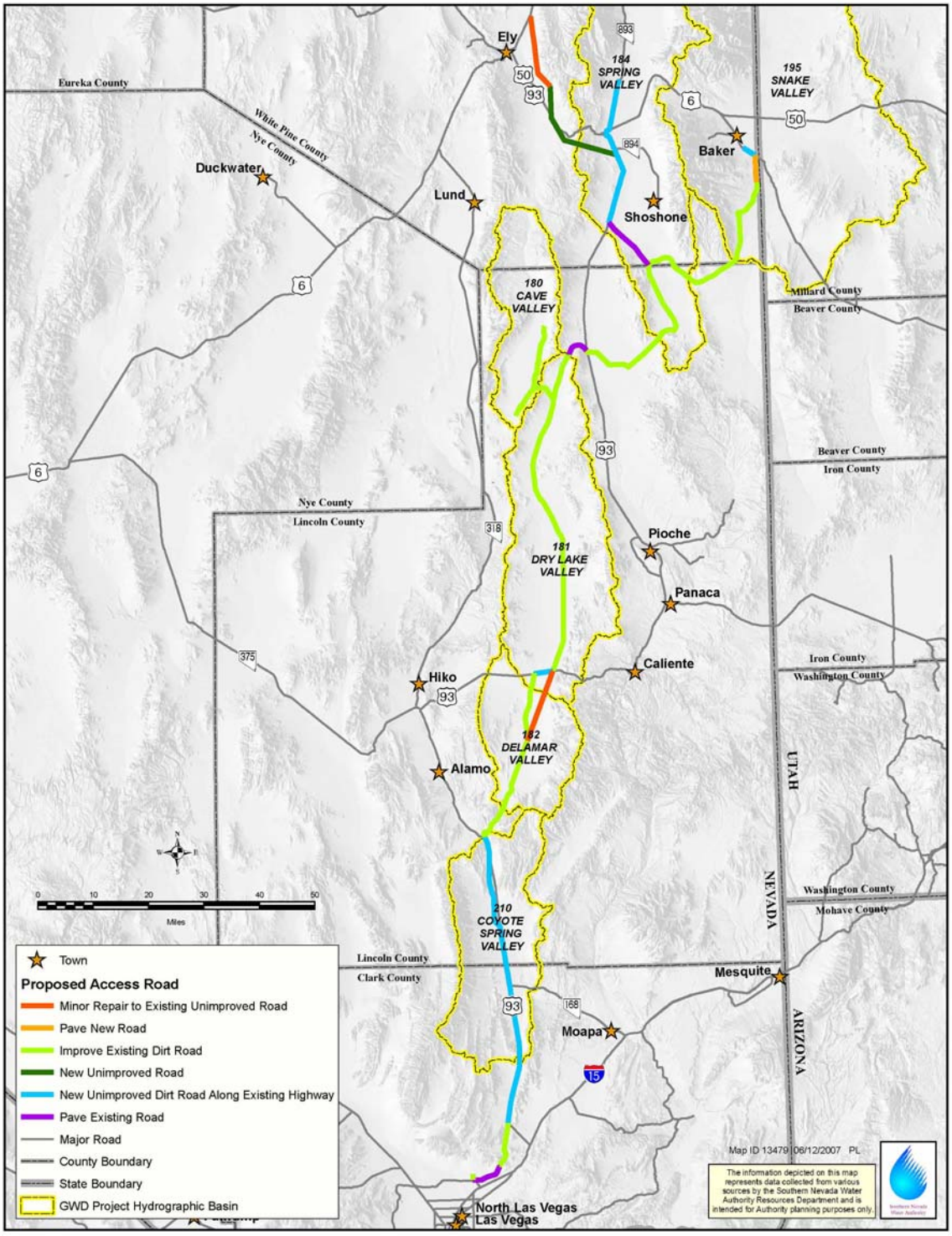


Figure 2-25 GWD Project Access Road Improvements

2.8.1 Existing Access Road Improvements

Existing improved and unimproved dirt access roads within project ROWs would require paving to accommodate traffic during operations, improvements such as widening and grading, or minor repairs. These three types of access road improvements are described below.

Paved Roads

Because of anticipated traffic during facility operation, road segments to the pumping stations and WTF facility would need paving. Four segments of existing road within the pipeline ROW would require paving:

- 10.6 miles between US 93 and Spring Valley South Pumping Station (Atlanta Road and Indian Springs Road)
- 5.5 miles between SR 487 and Snake Valley South Pumping Station
- 2 miles of road between US 93 and the Lake Valley Pumping Station (Muleshoe Summit Road)
- 4.7 miles between Range Road and the WTF (on the proposed pipeline ROW)

The existing roads would be graded, culverts installed where needed, and paved with asphalt. The planned width of the paved roads are 24 to 26 feet.

Access to the WTF and Buried Storage Reservoir would use the existing Range Road, which is paved, and an additional 4.7 miles of road segment on the proposed pipeline ROW described above, which would be paved. A locked gate is proposed to be installed on this road at the boundary of the Nellis Small Arms Range to restrict public access onto the Range. The other paved road segments are not proposed to be gated.

No additional permanent or temporary ROWs are required.

Improved Dirt Roads

Improvements to approximately 194.5 miles of existing dirt roads within the pipeline ROW are needed. These are generally shown on Figure 2-25 and include:

- 31.8 miles along the Snake Lateral
- 32.9 miles along the main pipeline between the Spring Valley South Pumping Station and US 93
- 22.3 miles along the Cave Valley Lateral
- 99.0 miles along the main pipeline in Delamar, Dry Lake, and Pahranagat Valleys
- 8.5 miles along the main pipeline ROW between US 93 and the Buried Storage Reservoir

The road improvements include grading, widened, and installation of culverts where needed. Gravel may be applied in some areas if necessary to maintain road conditions. The width of improved dirt roads would be 20 feet.

No additional permanent or temporary ROWs are required.

Unimproved Dirt Roads

For approximately 14 miles between the Gondor Substation and Steptoe Creek, the 230 kV power line would use an existing access road for an existing power line. Minor improvements to make the road usable during construction and operation may be required. Depending upon road conditions at the time of construction, these improvements may include minor road repairs such as leveling of deep ruts or placement of gravel. Although a permanent ROW of 20 feet is needed, widening or extensive grading of the road is not anticipated. Short spur roads would be constructed from this existing road to the locations of individual power poles. The width of these spur roads would be 12 feet. The total permanent ROW required is 34 acres on land managed by the BLM. The spur road segments to the power poles would be within the ROW requested for the power line.

For approximately 13 miles in northern Delamar and southern Dry Lake Valleys, starting at US 93 in Dry Lake Valley, the power line would branch off of the main pipeline. This power line would follow South and North Poleline Road, an unimproved road that traverses the valleys. Depending upon conditions at the time of construction, minor road repairs such as leveling of deep ruts or placement of gravel may be needed to make the road usable. However, widening or extensive grading of the road are not anticipated. This road would be within the requested ROW for the power line, and additional ROWs would not be required.

2.8.2 New Access Roads

For approximately 20 miles, the 230 kV power line in southern Steptoe and Spring Valleys would not be along an existing road or power line route. A new unimproved dirt road would be constructed along this ROW for construction and operation of the power line (Figure 2-25). The road would be roughly graded, but not be leveled, and culverts are not anticipated to be required. The width of the unimproved dirt road would be 12 feet. This new access road is within the ROWs requested for the power line, and additional ROW is not required.

For approximately 3.5 miles, the Snake Valley Lateral is not on an existing access road. A new, improved dirt road would be constructed along the pipeline alignment. The road would be graded and culverts installed where needed. The final width of the road would be 20 feet. It would be within the ROW requested for the lateral pipeline, and additional ROW is not required.

Primary access to the pipeline and power line along SR 893 and US 93 in Spring Valley, and along US 93 in Coyote Spring and Hidden Valleys would be from the paved highways and the project ROWs. Unimproved dirt roads, 12 feet in width, would be constructed along the power line in these areas, to provide for access to conduct inspection and maintenance when needed (Figure 2-25). The total length of these new unimproved access roads is 85 miles. They are within the ROW requested for the power line, and additional ROW is not required.

2.9 FUTURE FACILITIES

Additional ROWs will be required in the future for additional groundwater production wells, collector pipelines, and associated power facilities. These facilities cannot be identified at this time because they are dependent upon exploratory drilling and future rulings and decisions from the Nevada State Engineer. Agency agreements, including a required agreement between Utah and Nevada on export of water from shared hydrographic basins (Snake Valley), and existing and future stipulations with Department of Interior agencies pertaining to water rights and the associated recommendations of the Hydrological Technical Review Panel and Biological Working Group, would also affect selection of sites for future facilities. ROWs for these facilities will be requested in future applications. However, programmatic-level assumptions regarding these additional future facilities are described below, to support a full analysis of the entire GWD Project. These assumptions include the anticipated maximum number of groundwater production wells and additional pipelines, power lines, and other facilities, so that any impact analysis would evaluate the greatest extent of anticipated facilities.

2.9.1 SNWA Future Groundwater Production Wells

SNWA anticipates that between 110 and 200 groundwater production wells may ultimately be needed to develop groundwater for the GWD Project. This range of wells would allow for flexibility in groundwater pumping, and better management of facilities and potential hydrographic effects. The numbers of future groundwater production wells per valley are currently anticipated to be:

- Spring Valley: 40 to 65 wells
- Snake Valley: 30 to 55 wells
- Cave Valley: 10 to 20 wells
- Dry Lake Valley: 10 to 20 wells
- Delamar Valley: 10 to 20 wells
- Coyote Spring Valley: 10 to 20 wells

These future production wells are anticipated to be located within the groundwater exploratory areas described below. Siting of these facilities will consider hydrogeologic characteristics, minimum well spacing requirements, site access, proximity to main or lateral pipelines, maintaining minimum distances from sensitive environmental resources, and avoiding wilderness areas and other sensitive lands. The well housings may be either aboveground, as described in Chapter 2.1 above, or may be installed belowground, depending upon site-specific conditions.

Facility ROW needs for these future production wells would be the same as described in Chapter 2.1 above. Given the assumed number of wells identified above, approximately 165 to 300 acres of permanent ROW and 55 to 100 acres of temporary ROW may be required for future SNWA production wells.

Although the future groundwater production well sites cannot yet be identified, SNWA has identified groundwater exploratory areas within which future groundwater production facilities are anticipated to be located. Additional geophysical surveys, detailed geologic

mapping, and exploratory well drilling need to be conducted within these exploratory areas to determine specific proposed facility sites. These groundwater exploratory areas are displayed on the attached Map Volume III, and generally described below.

- Spring Valley – Three exploratory areas have been identified in central to southern Spring Valley. They are located on BLM lands, on the eastern side of the Schell Creek and Fortification Ranges. They cover an area of over 256,000 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 50,000 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 45,000 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 152,000 acres.
- Delamar Valley – One exploratory area has been identified in Delamar Valley. This area is on BLM lands west of the Delamar Mountains. It covers an area just less than 67,000 acres.
- Coyote Spring Valley – Two exploratory areas have been identified in north and central Coyote Spring Valley. They are located on BLM lands and Coyote Springs Investments private lands west of the Meadow Valley Mountains and Delamar Mountains. They cover an area of over 70,000 acres.

ROWs for these exploratory areas are not currently being requested, and disturbance of these entire areas is not anticipated.

2.9.2 Future Collector Pipelines

Future collector pipelines would convey water from the future groundwater production wells to the main and lateral pipelines. The size of these future collector pipelines would depend upon the number of wells connected to each. It is currently anticipated that the collector pipelines may range from 10 inches in diameter where connected only to a single well up to 30 inches in diameter when more than 3 wells are connected. Since the future groundwater production well sites cannot yet be identified, the sizes, routing, and distances of future collector pipelines also cannot yet be determined.

However, for the purpose of a programmatic analysis, based on the assumed number of future groundwater production wells identified above, it is assumed that approximately 265 miles of future collector pipeline will be needed. The 10- to 30-inch collector pipelines would require permanent ROWs of up to 50 feet in width and temporary ROWs of up to 50 feet in width. It is anticipated that most of these collector pipelines would be

located on lands managed by the BLM, extending from production wells in the groundwater exploratory areas identified above, to the main and lateral pipelines. Therefore, the anticipated total future permanent ROWs for the collector pipelines would be 1,606 acres, and the anticipated total future temporary ROWs would be 1,606 acres.

It is also assumed that temporary construction staging areas would be required along the collector pipelines, one every 3 miles. There would be a total of 88 staging areas, each 209 feet in length and 209 feet in width, or 1 acre each, for a total of 88 acres of temporary ROW.

2.9.3 Future Pumping Stations

Additional pumping stations may be required to convey water from some of the future groundwater production well areas into the main and lateral pipelines. Since the locations of the production wells cannot yet be determined, the need for and siting of additional pumping stations cannot yet be determined.

For the purposes of a programmatic analysis, based upon the currently-described groundwater exploratory areas, it is anticipated that three additional pumping stations may be required to convey water from groundwater production well areas into the main and lateral pipelines. One additional pumping station each in Delamar, Dry Lake, and Coyote Spring Valleys are assumed. It is assumed that each of these pumping stations would have four pumps. The pumps at the Delamar Valley and Dry Lake Valley Pumping Stations are assumed to be 100 horsepower each, and the pumps at the Coyote Spring Valley Pumping Station are assumed to be 500 horsepower each. Each of these facilities would include a small electrical substation to reduce power levels down to serve the facility. The permanent ROW estimated for each pumping station is 5 acres, for a total of 15 acres. The temporary ROW estimated for each pumping station is 5 acres, for a total of 15 acres.

2.9.4 Future Power Facilities

Additional power lines and substations would convey power to the future groundwater production wells and future pumping stations. Since the locations of those facilities cannot yet be determined, these future power facilities also cannot yet be defined.

For the purposes of a programmatic analysis, it is assumed that 265 miles of additional 25 kV power lines and poles will be needed. It is assumed that these power lines would be routed along and adjacent to the future collector pipeline alignments. Additional 25 kV conductors may also need to be hung on the power poles constructed as part of the GWD Project primary power supply system, described in Chapter 2.7.1 above. The anticipated future permanent ROWs required for these additional power lines would be 50 feet in width, and would total 1,606 acres.

It is also assumed that additional secondary substations would be required to reduce power from 69 kV to 25 kV to provide power to future groundwater production wells and pumping stations. The locations of these secondary substations would depend upon the specific locations of the groundwater production wells and pumping stations. However, for the purposes of a programmatic analysis, it is assumed that an additional three 69/25 kV substations will be required, one each in Delamar, Dry Lake, and Coyote Spring Valleys.

Each of the future substations may require a site of approximately 1 acre. The anticipated total future permanent ROWs for these additional substations is 3 acres.

2.9.5 Future Access Roads

For the purposes of a programmatic analysis, it is assumed that access to the groundwater production wells would be routed along the collector pipeline alignments, and that additional ROWs for future access roads are not required.

2.9.6 SNWA Future Facilities Summary

A summary of the assumed future SNWA facilities by project basin is provided in Table 2-5 below.

Table 2-5 Estimated Future SNWA Facilities

Location	Facility
Spring Valley	40-65 groundwater production wells 95 miles collector pipeline 95 miles 25 kV power line
Snake Valley	30-55 groundwater production wells 85 miles collector pipeline 85 miles 25 kV power line Secondary substation
Cave Valley	10-20 groundwater production wells 20 miles collector pipeline 20 miles 25 kV power line
Dry Lake Valley	10-20 groundwater production wells 25 miles collector pipeline Pumping station 25 miles 25 kV power line Secondary substation
Delamar Valley	10-20 groundwater production wells 20 miles collector pipeline Pumping station 20 miles 25 kV power line Secondary substation
Coyote Spring Valley	10-20 groundwater production wells 20 miles collector pipeline Pumping station 20 miles 25 kV power line Secondary substation

2.9.7 Lincoln County Future Facilities

As described in Chapter 1.3, capacity for up to 36,000 afy is being provided in the GWD Project for Lincoln County. Because LCWD has not yet identified a source of water that would be conveyed through the GWD Project, identifying additional future facilities at this time would be speculative.

Under the terms of a 2003 cooperative agreement with SNWA, Lincoln County is entitled to the first 3,000 afy of any water rights granted in Spring, Cave, Dry Lake, or Delamar Valleys. It is assumed that the remaining 33,000 afy capacity provided in the GWD Project for Lincoln County would consist of existing water rights or water applications held in whole or in part by Lincoln County and/or LCWD. It is anticipated that existing water rights purchased by Coyote Springs Investments in Lake Valley would be transferred to the LCWD, for conveyance through the GWD Project facilities to development in Coyote Spring Valley, located in southern Lincoln County. Transfers of existing water rights are subject to approval by the Nevada State Engineer, thus the specific locations and quantities of diversions cannot be determined at this time.

Lincoln County and/or LCWD hold applications for additional groundwater rights in several basins in Lincoln County. The development of those applications is not being evaluated as part of the GWD Project, as it is unknown which, if any, of those applications might be pursued in the future, and if any water permitted under those applications would be conveyed through the GWD Project.

For these reasons, identifying the number and location of future Lincoln County groundwater production wells, collector pipelines, or other facilities that may be required to develop and convey water to the GWD Project is considered too speculative at this time. Any additional facilities required to develop that water and convey it to the GWD Project would be the subject of future ROW applications by LCWD and require future environmental analysis.

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3.0 LAND REQUIREMENTS

The GWD Project requires ROWs across federal lands managed by the BLM, U.S. Department of Defense, Nellis Air Force Base (Small Arms Range), and U.S. Fish and Wildlife Service (Desert National Wildlife Range utility corridor). ROWs needed across State Lands include parcels used by the Nevada National Guard and Steptoe Valley Wildlife Management Area (utility corridor). ROWs across private land in the northeastern Las Vegas Valley (Apex), and in Spring Valley (within the NDOT ROW) are also needed.

SNWA submitted applications to the BLM for temporary and permanent ROWs for the GWD Project on August 19, 2004 and it was assigned case number N-78803.

3.1 PERMANENT AND TEMPORARY RIGHTS-OF-WAY

A summary of the permanent and temporary ROWs required to construct and operate the GWD Project is presented in Table 3-1. This table also shows the types of facilities and acreages located on land managed by each agency or land owner. Permanent ROWs are being requested for groundwater production wells at 14 permitted points of diversion, main, lateral and collector pipelines, pumping stations, regulating tanks, a buried storage reservoir, a WTF, power lines, electrical substations, hydroturbine energy recovery facilities, and an access road. Temporary ROWs are being requested for groundwater production wells, pipelines, staging areas, borrow pits, some of the pumping stations, regulating tanks, buried storage reservoir, and hydroturbine energy recovery facilities. In areas of level terrain and stable soil conditions, the amount of disturbance of the temporary ROWs may be reduced; however, any potential reductions would not be known until after detailed alignment surveys and project design have been completed. Anticipated ROWs for future facilities are described in Chapter 3.2

The majority of the proposed permanent and temporary ROWs located in Clark and Lincoln Counties are within the utility corridor designated by LCCRDA, which established a 2,640-foot wide corridor on public lands for utilities. LCCRDA also directed the Secretary of the Interior to grant SNWA non-exclusive ROWs in perpetuity, within the corridor for roads, wells, well fields, pipes, pipelines, pumping stations, storage facilities, or other facilities that are necessary for the construction and operation of a water conveyance system.

Table 3-1 GWD Project Permanent and Temporary Right-Of-Way Estimates

Facility	Permanent Rights-of-Way			Temporary Rights-of-Way			Map Sheet
	Length*	**Width**	**Total Acres***	**Length***	**Width**	**Total Acres***	
U.S. Bureau of Land Management							
Groundwater Production Wells (14)							
Spring Valley- 14	256 ft/ea	256 ft/ea	21	309 ft/ea (not square)	282 ft/ea (not square)	0.5 ea/ 7	1, 2, 3, 4, 52, 53, 55, 57, 58, 59, 61
Subtotal	~	~	*21*	~	~	7	
Main Pipeline							
Spring Valley	16.9 mi	100 ft	205	16.9 mi	100 ft	205	1-5
Lake Valley	20.9 mi	100 ft	253	20.9 mi	100 ft	253	5-9
Dry Lake Valley	66.0 mi	100 ft	800	66.0 mi	100 ft	800	9-26
Delamar Valley	23.1 mi	100 ft	280	23.1 mi	100 ft	280	26-32
Coyote Spring Valley	31.7 mi	100 ft	384	31.7 mi	100 ft	384	33-44
Hidden Valley	12.1 mi	100 ft	147	12.1 mi	100 ft	147	44-47
Garnet Valley	7.2 mi	100 ft	87	7.2 mi	100 ft	87	47-49
Pahranagat Valley	6.7 mi	100 ft	81	6.7 mi	100 ft	81	32-33
Las Vegas Valley	5.3 mi	100 ft	64	5.3 mi	100 ft	64	49-50
Subtotal	*189.9 mi*	~	*2,301*	*189.9 mi*	~	*2,301*	
Lateral Pipelines (3)							
Spring Valley Lateral	38.3 mi	100 ft	464	38.3 mi	100 ft	464	1, 51-60
Snake Valley Lateral	43.3 mi	100 ft	525	43.3 mi	100 ft	525	1, 62-71
Cave Valley Lateral	22.4 mi	100 ft	272	22.4 mi	100 ft	272	72-76
Subtotal	*104 mi*	~	*1,261*	*104 mi*	~	*1,261*	
Collector Pipelines							
Spring Valley	18.5 mi	50 ft	112	18.5 mi	50 ft	112	1-4, 51-53, 55-61
Subtotal	*18.5 mi*	~	*112*	*18.5 mi*	~	*112*	
Staging Areas (100)							
Main Pipeline (61)	~	~	~	361 ft/ea	361 ft/ea	183	2-36, 41-50
Lateral Pipeline (31)	~	~	~	361 ft/ea	361 ft/ea	93	1, 51-57, 59, 62-64, 66, 68-75
Collector Pipeline (8)	~	~	~	209 ft/ea	209 ft/ea	8	1, 4, 52-53, 57-58, 60
Subtotal	~	~	~	~	~	*284*	
Burrow Pits (8)							
Spring Valley- Borrow Pit 1	~	~	~	552 ft	552 ft	7	56
Snake Valley- Borrow Pit 2	~	~	~	552 ft	552 ft	7	65
Lake Valley- Burrow Pit 3	~	~	~	552 ft	552 ft	7	8
Lake Valley- Burrow Pit 4	~	~	~	552 ft	552 ft	7	8
Cave Valley- Burrow Pit 5	~	~	~	552 ft	552 ft	7	73
Cave Valley- Burrow Pit 6	~	~	~	552 ft	552 ft	7	73
Dry Lake Valley- Burrow Pit 7	~	~	~	552 ft	552 ft	7	20
Dry Lake Valley- Burrow Pit 8	~	~	~	552 ft	552 ft	7	20
Subtotal	~	~	~	~	~	*56*	
Pipeline Valves							
Located within main pipeline alignment	~	~	~	~	~	~	~
Pumping Stations							
Spring Valley North	466 ft	466 ft	5	466 ft	466 ft	5	59
Spring Valley South	1,615 ft	1,615 ft	60	~	~	~	1
Snake Valley North	466 ft	466 ft	5	466 ft	466 ft	5	70
Snake Valley South	933 ft	466 ft	10	~	~	~	69
Lake Valley	466 ft	466 ft	5	466 ft	466 ft	5	9
Subtotal	~	~	*85*	~	~	*15*	

Facility	Permanent Rights-of-Way			Temporary Rights-of-Way			Map Sheet
	Length*	Width	Total Acres*	Length*	Width	Total Acres*	
U.S. Bureau of Land Management							
Regulating Tanks							
Spring Valley - Horse Corral Pass	295 ft	295 ft	2	466ft (not square)	466 ft (not square)	3	5
Snake Valley – Big Spring Wash	295 ft	295 ft	2	466ft (not square)	466 ft (not square)	3	65
Lake Valley- Muleshoe Summit	295 ft	295 ft	2	466ft (not square)	466 ft (not square)	3	9
Cave Valley- Sidehill Pass	295 ft	295 ft	2	466ft (not square)	466 ft (not square)	3	73
Dry Lake Valley	295 ft	295 ft	2	466ft (not square)	466 ft (not square)	3	25
Delamar Valley	295 ft	295 ft	2	466ft (not square)	466 ft (not square)	3	32
Subtotal	~	~	*12*	~	~	*18*	
Water Treatment Facility							
Las Vegas Valley	1,320 ft	1,320 ft	40	~	~	~	49
Subtotal	~	~	*40*	~	~	~	
Power Lines							
Steptoe Valley- 230 kV	26.6 mi	100 ft	322	~	~	~	77-84
Spring Valley- 230 kV, 69 kV, and 25 kV	68.6 mi	100 ft	832	~	~	~	1-5, 51-57, 59-60, 62-63, 84
Spring Valley- 25 kV	20.7 mi	50 ft	125	~	~	~	1-4, 51, 53, 55-61
Snake Valley- 69 kV and 25 kV	20.2 mi	100 ft	245	~	~	~	65-70
Snake Valley- 25 kV	3.2 mi	50 ft	19	~	~	~	70-71
Hamlin Valley- 69 kV	10.1 mi	100 ft	122	~	~	~	63-65
Lake Valley- 230 kV, 69 kV	20.8 mi	100 ft	252	~	~	~	5-9
Cave Valley- 69 kV, 25 kV	2.4 mi	100 ft	29	~	~	~	73
Cave Valley- 25 kV	16.3 mi	50 ft	99	~	~	~	72-76
Dry Lake Valley- 230 kV, 69 kV, and 25 kV	70 mi	100 ft	848	~	~	~	9-26, 73
Delamar Valley- 230 kV, 69 kV	22.7 mi	100 ft	275	~	~	~	26-32
Pahranagat Valley- 230 kV, 69 kV	6.5 mi	100 ft	79	~	~	~	32-33
Coyote Spring Valley- 230 kV	31.6 mi	100 ft	383	~	~	~	33-34
Hidden Valley (North)- 230 kV	12.1 mi	100 ft	147	~	~	~	44-47
Garnet Valley- 230 kV	2.4 mi	100 ft	29	~	~	~	47-48
Garnet Valley- 25 kV	1.3 mi	50 ft	8	~	~	~	*48-49*
Las Vegas Valley- 25 kV	0.7 mi	50 ft	4				*49-50*
Subtotal	*336.2 mi*	~	*3,818*	~	~	~	

Facility	Permanent Rights-of-Way			Temporary Rights-of-Way			Map Sheet
	Length*	Width	Total Acres*	Length*	Width	Total Acres*	
U.S. Bureau of Land Management							
Electrical Substations (8)							
Spring Valley (located within Spring Valley South Pumping Station)	660 ft	660 ft	0	~	~	~	1
Dry Lake Valley	660 ft	660 ft	10	~	~	~	25
Spring Valley North - Near Spring Valley North Pumping Station	209 ft	209 ft	1	~	~	~	59
Spring Valley South - Spring Lateral Diverges	209 ft	209 ft	1	~	~	~	52
Snake Valley- Near Snake Valley South Pumping Station	209 ft	209 ft	1				69
Cave Valley- Sidehill Pass	209 ft	209 ft	1	~	~	~	74
Delamar Valley- Pahranagat Narrows	209 ft	209 ft	1	~	~	~	32
Las Vegas Valley- Adjacent to switching station in Apex area	209 ft	209 ft	1	~	~	~	49
Subtotal	~	~	*16*	~	~	~	
Hydroturbine Energy Recovery Facilities (4)							
Hydroturbine 1	295 ft	295 ft	2	466 ft	466 ft	5	11
Hydroturbine 2	295 ft	295 ft	2	466 ft	466 ft	5	14
Hydroturbine 3	295 ft	295 ft	2	466 ft	466 ft	5	32
Hydroturbine 4	295 ft	295 ft	2	466 ft	466 ft	5	33
Subtotal	~	~	*8*	~	~	*20*	
Access Roads							
Paved Roads- Located within main pipeline ROW	~	~	~	~	~	~	
Improved Dirt Roads- Located within the pipeline ROW	~	~	~	~	~	~	
Unimproved Dirt Roads- Gondon Substation to Steptoe Creek	14 mi	20 ft	34	~	~	~	77-80
New Access Roads- Located within pipeline and power line ROW	~	~	~	~	~	~	
Subtotal	*14 mi*	~	*34*	~	~	~	
SUBTOTAL BLM	***7,708 ac***			***4,074 ac***			
U.S. Department of Defense/U.S. Air Force							
Main Pipeline	2.2 mi	100 ft	27	2.2 mi	100 ft	27	49-50
Buried Storage Reservoir	1,290 ft	1,120 ft	33	466 ft	466 ft	5	49
Power Line- 25kV located in Pipeline ROW	0.8 mi	50 ft	0	~	~	~	
SUBTOTAL US DOD/ USAF	***60 ac***			***32 ac***			
U.S. Fish and Wildlife Service/Desert National Wildlife Range- Utility Corridor							
Main Pipeline	9.1 mi	100 ft	110	9.1 mi	100 ft	110 ac	35-39
Power Lines- 230 kV	9.2 mi	100 ft	112	~	~	~	35-39, 80
Staging Areas- Main Pipeline (6)				361 ft/ea	361 ft/ea	18	36-40
SUBTOTAL USFWS/DNWR	***222 ac***			***128 ac***			
Private- Spring Valley (within Nevada Department of Transportation ROW)							
Collector Pipeline	0.9 mi	50 ft	5	0.9 mi	50 ft	5	60
Power Lines- 25 kV	0.8 mi	50 ft	5	~	~	~	60
SUBTOTAL PRIVATE	***10 ac***			***5 ac***			

Facility	Permanent Rights-of-Way			Temporary Rights-of-Way			Map Sheet
	Length*	Width	Total Acres*	Length*	Width	Total Acres*	
Private- Spring Valley (property owned by SNWA)							
Collector Pipeline	1.5 mi	50 ft	9	1.5 mi	50 ft	9	60
Power Lines- 25 kV	1.5 mi	50 ft	9	~	~	~	60
SUBTOTAL PRIVATE	***18 ac***			***9 ac***			
State Wildlife Reserve							
Power Lines-230 kV	0.4 mi	100 ft	5 ac	~	~	~	80
SUBTOTAL STATE WILDLIFE RESERVE	***5 ac***			**~**			
State of Nevada (Army National Guard)							
Main Pipeline	0.5 mi	100 ft	6 ac	0.5 mi	100 ft	6 ac	50
SUBTOTAL STATE OF NEVADA	***6 ac***			***6 ac***			
PROJECT TOTAL ACRES	***8,029 ac***			***4,254 ac***			

*Total and sub-total lengths are rounded to the nearest tenth. Total acres are rounded to the nearest whole number.

3.2 FUTURE FACILITIES

As described in Chapter 2.9, additional ROWs will be required in the future for additional groundwater production wells, collector pipelines, and associated power facilities. These facilities cannot be identified at this time and will be requested in future applications. However, programmatic-level assumptions have been made regarding these additional future facilities. Table 3-2 describes the anticipated ROW requirements for these future facilities. It is anticipated that all of these facilities will be located on lands managed by the BLM.

Table 3-2 GWD Future Facilities Programmatic Estimates

Facility	Permanent Rights-of-Way			Temporary Rights-of-Way			Map Sheet
	Length	Width	Total Acres*	Length	Width	Total Acres*	
U.S. Bureau of Land Management							
Groundwater Production Wells (110 to 200)							
Spring Valley- 40 to 65	256 ft/ea	256 ft/ea	60-97.5	309 ft/ea (not square)	282 ft/ea (not square)	0.5/ea/ 20-32.5	
Snake Valley- 30 to 55	256 ft/ea	256 ft/ea	45-82.5	309 ft/ea (not square)	282 ft/ea (not square)	0.5/ea/ 15-27.5	
Cave Valley- 10 to 20	256 ft/ea	256 ft/ea	15-30	309 ft/ea (not square)	282 ft/ea (not square)	0.5/ea/ 5-10	
Dry Lake Valley- 10 to 20	256 ft/ea	256 ft/ea	15-30	309 ft/ea (not square)	282 ft/ea (not square)	0.5/ea/ 5-10	
Delamar Valley- 10 to 20	256 ft/ea	256 ft/ea	15-30	309 ft/ea (not square)	282 ft/ea (not square)	0.5/ea/ 5-10	
Coyote Spring Valley- 10 to 20	256 ft/ea	256 ft/ea	15-30	309 ft/ea (not square)	282 ft/ea (not square)	0.5/ea/ 5-10	
Subtotal	~	~	*165-300*	~	~	55-100	
Collector Pipelines							
Spring, Snake, Cave, Dry Lake, Delamar, and Coyote Spring Valleys	265 mi	50 ft	1,606	265 mi	50 ft	1,606	
Subtotal	*265 mi*	~	*1,606*	*265 mi*	~	*1,606*	
Staging Areas (88)							
Collector Pipeline	~	~	~	209 ft/ea	209 ft/ea	88	
Subtotal	~	~	~	~	~	*88*	
Pumping Stations							
Delamar	466 ft	466 ft	5	466 ft	466 ft	5	
Dry Lake	466 ft	466 ft	5	466 ft	466 ft	5	
Coyote Spring	466 ft	466 ft	5	466 ft	466 ft	5	
Subtotal	~	~	*15*	~	~	*15*	
Power Facilities							
25 kV Power Line	265 mi	50 ft	1,606	~	~	~	
69/25 kV Substations (3)	209 ft/ea	209 ft/ea	3	~	~	~	
Subtotal	~	~	*1,609*	~	~	~	
Future Access Roads							
Located within ROW	~	~	~	~	~	~	
Subtotal	~	~	~	~	~	~	
TOTAL ON BLM	***3,395-3,530***			***1,764-1,809***			

*Total acres are rounded to the nearest whole number.

4.0 CONSTRUCTION

Standard construction techniques would be used for construction of the GWD Project. The general construction methods and procedures are described in this chapter. The construction contracting breakdown (i.e., number of construction contracts and sequencing) will be identified during project design.

4.1 STANDARD CONSTRUCTION METHODS

Some construction methods are common for all of the GWD facilities. These are briefly described below.

4.1.1 Surveying and Staking

Prior to ground disturbance activities SNWA would survey and stake the pipeline or facility centerline and ROW boundaries. In addition, environmental features including sensitive habitats, sensitive wildlife or plant populations along the pipeline would be staked and fenced as necessary and in accordance with approved environmental measures and federal and state environmental conditions and stipulations. Existing utility lines, culverts, and other existing features would be staked to prevent accidental damage during construction.

4.1.2 Clearing and Grading

Clearing would occur within the staked boundaries of the permanent and temporary ROWs. Clearing would include removal of materials that would interfere with construction activities, create hazards or unsafe conditions, or impair subsequent site work. This includes cutting vegetation as approved by the BLM and the removal of boulders from the ROW. Boulders greater than 10 inches in diameter found on the soil surface would be moved to the edge of the ROW. This would be done carefully to leave the natural patina or desert varnish on the boulders. Clearing would be conducted with a backhoe, track hoe, or bulldozer.

In the Mojave Desert portion of the project, part of the clearing process would include salvage of cacti and yucca within the ROW on federal lands, in accordance with an approved Restoration Plan (Appendix D). Cacti and yucca would be placed within the temporary ROWs, in a temporary nursery site.

After site clearing and cacti and yucca salvage, the top 4 to 6 inches of topsoil would be salvaged to collect and preserve potential native and sensitive plant seed. The topsoil would be stockpiled or windrowed within the temporary ROW, and fenced or signed to ensure that it is not disturbed during other construction activities. The topsoil would be treated with a tackifier or watered to prevent erosion.

The facility ROWs would then be grubbed by removing a deep surface layer that includes stumps and roots. It would be graded as necessary to provide a level working surface for the heavy construction equipment. Grading of the ROW would most likely be conducted by a bulldozer or track hoe.

4.1.3 Site Fencing

Temporary security fencing would enclose facility construction sites (pumping stations, regulating tanks, buried storage reservoir, WTF, electrical substations, and hydroturbine

facilities) and temporary staging areas or temporary ROWs used to store materials or equipment (including plant nurseries). This fencing would consist of standard 6 to 8 foot high chain-link fencing.

In the Mojave Desert portion of the project, construction areas would be enclosed by temporary tortoise-exclusion fencing. The temporary tortoise fencing would be installed at the completion of cacti and yucca salvage, but before topsoil salvage or site grubbing and grading. The fencing would be maintained in place until restoration activities are completed.

4.1.4 Site Access

Some of the project ROWs overlie or are adjacent to existing improved and unimproved roads. Access along these existing roads would not be impaired or restricted during construction activities. In areas where road improvements are necessary, the improvements would be conducted at the beginning of construction activities.

4.1.5 Restoration

At the completion of construction, the ROWs would be cleaned of construction debris. Temporary ROWs and permanent ROWs that are to be restored (pipelines and power lines, excluding any access roads) would be graded to preconstruction contours as closely as possible. After cleanup and grading, restoration activities pursuant to an approved BLM Restoration Plan would be conducted. These activities would include re-spreading of stockpiled topsoil, replanting of salvaged plants including cacti and yucca, restoration of drainages, reseeding, and signage. A detailed description of restoration requirements and activities is provided in Chapter 6.0 and Appendix D.

4.2 GROUNDWATER PRODUCTION WELLS

For each of the 14 permitted points of diversion in Spring Valley, exploratory drilling must first be conducted to determine if the site is appropriate for groundwater production. The wells would be drilled using rotary drilling methods, using either mud or air foam. Typical groundwater production well construction requires a conductor casing to at least 50 feet in depth, grouted in place to provide a sanitary seal. For wells completed in shallow bedrock, the conductor casing is generally set at least 20 feet into bedrock. For wells completed into bedrock beneath alluvium, an intermediate casing string is set at least 20 feet into bedrock, in addition to the sanitary seal at the surface. The conductor and intermediate casing are expected to be steel pipe and meet standards of the American Society for Testing and Materials and the American Petroleum Institute. The well completion pipe is generally 18 to 24 inches in diameter with a steel well screen on the end of the well pipe.

Depending on the borehole condition and lithology of the well, it may be packed with disinfected gravel free of silt or contaminants in accordance with the American Water Works Association. The casing depth, screen size, and gravel pack size will be determined in the field based on geophysical logging results.

The wells are anticipated to be drilled to approximately 1,000 to 2,000 feet in depth. Well drilling generally occurs on a 24 hour/7 day a week basis, and each well is expected to take approximately 30 days for drilling and well completion.

Following drilling, each well would be tested to determine yield and production capacity. It is estimated that between 24- and 72-hour pumping tests may be conducted at each well, discharging approximately 1,000 gallons per minute of water per well. Total discharge volume for each well may range between 1.4 million and 4.3 million gallons per day. The groundwater is proposed to be discharged to the local drainage network during testing. Energy dissipating equipment would be used to reduce the potential for erosion and scouring of natural drainages.

If the exploratory drilling determines the well site is suitable for groundwater production, the well would be equipped. Construction activities for equipping groundwater production wells includes construction or installation of the wellhead piping, pumps, fencing, lighting, and electrical equipment. The site would be covered with gravel after construction and drilling to provide a working surface and provide dust and weed control. If the exploratory drilling and testing determines that the well sites are not suitable for groundwater production facilities, the wells would be kept as groundwater monitoring wells or abandoned in accordance with State of Nevada requirements.

Exploratory drilling of the 14 groundwater production wells currently identified could require approximately 1 year. Equipping of the wells for groundwater production would be completed later, in conjunction with pipeline construction, and would require approximately 1 year. Construction of the future groundwater production wells could take 20 or more years to complete.

4.3 PIPELINE

Construction of the pipeline would be standard cut and cover, using an open trench. The only exception would be highway crossings and crossings of the Kern River natural gas pipeline, where jack and bore construction would be used. Construction of the pipeline is anticipated to take approximately 8 years.

Temporary trailers would be installed within staging areas for each construction contract, to house construction management personnel and office equipment. Portable sanitary facilities and potable water storage would be provided for construction personnel.

4.3.1 General Pipeline Construction Techniques

In addition to surveying and staking, clearing and grading, and site fencing, as described in Chapter 4.1 above, the following general construction techniques would be applied to pipeline construction.

Trenching

Excavators, backhoes, track hoes, or other similar equipment would be used to dig the trench. The pipe trench would be approximately 60 to 70 feet wide, with side slopes of 2:1 and a depth of at least 8 feet from the ground surface to the top of the pipe. Material excavated from the trench would be stockpiled adjacent to the trench.

Bedding

Bedding materials which meet engineering standards would be laid in the bottom of the pipeline trench. Excavated soils or materials imported from borrow pits would be

screened and processed, and placed in the trench for pipe bedding. Conversely, gravel or a cement-based commercial product may be imported and used for bedding.

Pipe Laying and Welding

Following trenching, sections of the pipe would be transported from the staging areas to the ROW and strung along the trench. Next, the pipe would be lowered into the trench and the sections welded together. All welds would be visually inspected and tested using radiographic (X-ray) or other non destructive and approved testing methods. Welds that do not meet established specifications would be repaired or removed. Once the welds are approved, the welded joints would be tape wrapped and then mortar coated. Wrapped and coated joints would be inspected for faults or voids in the coating. Next, appurtenant structures would be affixed to the pipe.

Pipe Zone Backfilling

After the pipe has been placed in the trench, the area immediately around the sides of the pipe (pipe zone) would be backfilled. Materials used for backfill would include excavated soils or materials imported from borrow pits that have been screened and processed. The backfill material would be crushed rock, gravel, and/or sand up to 3/8 inches in diameter.

Hydrostatic Testing

Hydrostatic testing needs to be conducted to pressure test the completed pipeline. The testing would be conducted in segments, as the pipeline is completed. Water used for the hydrostatic testing is anticipated to be obtained from one of the groundwater production wells included in the GWD Project, or another existing permitted source.

Water from the hydrostatic testing of a pipeline segment would be discharged using the pipeline drain valves into dry washes in the area or into the terminal reservoir. As described in Chapter 2.2.6, the specific site locations of the drain valves cannot be determined until detailed site elevations are obtained and facility design is completed. A detailed hydrostatic testing discharge plan will be prepared for each construction contract and approved by the BLM prior to conducting the testing (Appendix F). However, it is currently anticipated that drain valves would be placed approximately 1 to 5 miles apart. Therefore, for the maximum pipe diameter of 84 inches, the maximum quantity of water that would be discharged for a 1-mile segment of pipe would be approximately 1.5 million gallons. For the smallest pipe size of 10 inches in diameter, the maximum discharge quantity for a 1-mile segment of pipe would be approximately 21,500 gallons. The maximum discharge rate is anticipated to be 2,000 gallons per minute.

Discharges into dry washes would be conducted in accordance with requirements of a State of Nevada temporary discharge permit. A diffuser or similar device would be used, which is designed to accommodate the volume of discharge to reduce potential erosion and scouring of the dry washes.

Trench Backfill

After completion of hydrostatic testing, the trench would then be backfilled from the top of the pipe to approximately 18 inches below finished grade. Material that is up to 6 inches in diameter would be used as backfill. The final 18 inches of backfill would

consist of crushed rock up to 1-inch in diameter. Trench backfill would meet best management practices, and:

- Selected or processed as clean, well graded earth material
- Free of excessive fine particles, vegetation, or other deleterious materials
- Compacted in place for maximum pipeline stability, and
- Moistened or dried before backfilling to ensure optimum moisture content

A back hoe, track hoe, bulldozer or similar equipment would be used for backfilling.

If water accumulates in the trench prior to backfilling, dewatering may be necessary. If required, the discharge rate would be controlled and discharged at one or more points. The water would be pumped from the trench to stable upland areas into filter bags, hay bales, or other erosion control products to control sediment discharge to any natural surface waters and reduce erosion and scouring within drainages.

Following backfill, the pipe trench would be graded as close as possible to pre-existing elevations, and restored as described above in Chapter 4.1.

4.3.2 Special Pipeline Construction Techniques

In some areas, special pipeline construction techniques may be necessary. These are described below.

Highway and Road Crossings

The pipeline crosses US Highways 93, 50 and 6. Jack and bore construction, with jacking and boring pits placed on either side of the highway is anticipated for these crossings. The jack and bore pits would be 100 feet long by 20 feet wide (placed within the requested temporary or permanent ROWs), and minimum depth to the top of the pipe under highways would be 8 feet. Depending on Nevada Department of Transportation requirements, jack and bore may also be used to cross SR 894.

Standard cut and cover using an open trench would be used on all other minor paved and unpaved roads crossed by the pipeline. Open trench crossings would include establishing detours for temporary closing of the roads. If no reasonable detour is feasible, at least one lane of the road being crossed would be kept open for traffic, except during brief periods when it is essential to close the entire road to install the pipe. Most trench crossings would be completed in 1 day. All necessary measures would be taken to ensure safety and minimize traffic disruption.

Utility and Other Crossings

The pipeline crosses the Kern River natural gas pipeline in two places near Apex, in northeastern Clark County. Crossings would be done by jacking and boring, as described above.

There are no railroads crossed by the pipeline.

Steep Terrain

There are areas of steep terrain along the pipeline route through the Pahranagat Narrows. The excavated construction area may be narrowed through this stretch. However, no special construction techniques for steep terrain are anticipated.

Water and Wetland Crossings

A formal Section 404 jurisdictional delineation has not yet been conducted for the project to determine if any wetlands, perennial, or intermittent streams would be crossed by the proposed facilities. There are at least two locations along the Snake Valley Lateral, at crossings of Big Wash and Snake Creek, which may require special construction techniques. For wetlands or perennial stream flow, the pipeline could be jack and bored beneath the water, or open cut with temporary diversion of water flow. Any disturbance of streams or wetlands would require subsequent restoration in accordance with the approved Restoration Plan and Section 404 permit requirements, as applicable.

There are also many desert washes and ephemeral drainages along the pipeline route. These washes/drainages would be crossed with typical cut and cover open trench techniques. All necessary erosion control activities would be implemented during and after construction to eliminate bank erosion and prevent sedimentation, as necessary and stipulated by federal, state or local permits or regulations. After pipe installation and backfilling, the drainage would be re-contoured to preexisting conditions as much as feasible, and standard restoration activities implemented in accordance with an approved Restoration Plan.

Residential Areas

The proposed GWD Project facilities are not located in or adjacent to any residential areas. Therefore, no special construction techniques for residential areas are necessary.

Blasting

Blasting may be necessary when caliche or large boulders are encountered during excavation activities for the GWD Project. The BLM would be notified in advance if blasting is needed, and skilled and experienced specialists used to ensure that all blasting is conducted according to agency regulations and an approved Blasting Plan (see Appendix K).

4.4 PUMPING STATIONS

The temporary staging areas used for construction of each pumping station would also be used for storage of construction equipment and building materials. Equipment is expected to include, but not be limited to, graders, trenchers, haul trucks, and pickup trucks. Building materials may include, but not be limited to, sections of pipe for underground utilities and connection to the water pipeline, pumps, motors, concrete block, cement, reinforcing steel bars (rebar), gravel, and sand. Smaller items such as tools, lighting fixtures, and instruments would be stored in enclosed, portable storage units. Fuel for construction equipment and water for dust control and construction uses would also be stored at the site according to state, federal, and local rules and regulations. Trailers would house construction management personnel and office equipment. The lay

down areas would be fenced to secure the equipment and materials, and security at the site will be provided up to 24 hours a day, as necessary.

Sanitary facilities and potable water storage would be provided for construction personnel. Sanitary facilities would be portable units, or may consist of a septic system which could be used for the permanent facilities. Water is required at the start of construction, and would be provided from local sources, or production wells if available. Electrical power would be provided by portable generators, the GWD Project electrical system, or commercial power if available.

Plumbing, power conduits and other infrastructure beneath the pumping station floors would be constructed first. The foundations of the pumping stations would then be constructed, followed by the floors, walls and roof. Pumping station mechanical and interior components would be constructed once the building is completed. The pumping stations would be inspected and a certificate of occupancy issued according to required county regulations. Permanent power would be connected from the GWD Project electrical system to the pumping stations' electrical systems. The pumps and appurtenances within each pumping station would be connected to the incoming and outgoing water pipelines, and the system tested in its entirety. Temporary electrical, water, and sanitary systems not modified into permanent facilities would be removed. Final grading and site restoration of the temporary ROW would be completed in accordance with the approved Restoration Plan.

Construction of each pumping station may require up to approximately 2 years.

4.5 REGULATING TANKS

Following site clearing and grading, berms and drainage ditches would be constructed to contain runoff and divert floodwaters from the site. The berms and ditches would be incorporated into the final grading of the site, if feasible. The regulating tank site would then be graded close to the final contours. Fill would be imported if a site needs to be raised. If large quantities of poor soils are on site and cannot be utilized for construction, material would be imported from the identified borrow pits, and the poor soils removed and placed in borrow pits.

Following site grading and leveling, the regulating tanks would be constructed of steel or concrete. Steel tanks would 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 would be erected at varying sequences of construction.

At the completion of construction, the tanks would be hydrostatically tested. Hydrostatic testing of the regulating tanks would be coordinated with the testing of the pipelines, if feasible, to conserve the amount of water needed for the testing. The volume of water discharged from hydrostatic testing would be dependent upon the final size of each tank, which will not be determined until project design. However, it is anticipated that the maximum volume of water discharged per tank would be 3 million gallons. Water would be discharged into adjacent dry washes or drainage channels. The water would be

discharged in a controlled manner, in accordance with the requirements of a temporary discharge permit and the hydrostatic discharge testing plan (Appendix F).

Construction of each regulating tank would require approximately 1 year each, and be done in conjunction with construction of the adjacent pipeline.

4.6 BURIED STORAGE RESERVOIR

Following site clearing and grading, berms and drainage ditches would be constructed to contain runoff and divert floodwaters from the buried storage reservoir site. Construction of the reservoir would require excavation and partial burial of a concrete basin to house the valves and piping needed to control water inflow and outflow. Excavated material would be used for pipeline backfill or disposed of within approved borrow pits.

Plumbing, power conduits, and other infrastructure beneath the reservoir would be constructed first. The foundations of the reservoir would then be constructed, followed by the reservoir basin and roof. Ancillary components inside and outside of the reservoir would be constructed once the concrete structure is erected. The reservoir site would then be graded close to the final contours. Final connections would be made to the incoming and outgoing water pipelines, and the system tested.

Hydrostatic testing of the reservoir would be coordinated with the testing of the pipelines, if feasible, to conserve the amount of water needed for the testing. It is anticipated that approximately 40 million gallons of water may be discharged from hydrostatic testing of the reservoir. Water would be discharged into adjacent dry washes or drainage channels. The water would be discharged in a controlled manner, in accordance with the requirements of a temporary discharge permit and the hydrostatic discharge testing plan (Appendix F).

Construction of the buried storage reservoir may require approximately 3 years.

4.7 WATER TREATMENT FACILITY

Following WTF site clearing and grading, berms and drainage ditches would be constructed to contain runoff and divert floodwaters from the site. The berms and ditches would be incorporated into the final grading of the site, if feasible. The site would then be graded close to the final contours.

The lay down area for construction of the WTF would be used for storage of construction equipment and building materials. Equipment may include, but not be limited to, graders, trenchers, haul trucks, and pickup trucks. Building materials used on-site may include, but are not limited to, sections of pipe for underground utilities and connection to the water pipeline, pumps, concrete blocks, rebar, gravel, and sand. Smaller items such as tools, lighting fixtures, and instruments would be stored in enclosed, portable storage units. The need to store fuel at the site is not anticipated because fuel supplies are available in the Apex area. Water for dust control and construction uses would be stored at the site. Temporary trailers would be used to house construction management personnel and office equipment. The lay down area would be fenced to secure the equipment and materials, and 24-hour security would be provided at the site, as necessary.

Sanitary facilities and potable water storage would be provided for construction personnel. Sanitary facilities would be portable units, or may consist of a septic system which could be converted and used for the permanent facilities. Water would be required at the start of construction, and is anticipated to be provided from local sources. Temporary electrical power for construction would be provided by portable generators, or the existing electrical system at Apex.

Plumbing, power conduits and other infrastructure beneath the WTF floors would be constructed first. The foundations of the WTF would then be constructed, followed by the floors, walls, and roof.

The WTF mechanical and interior components would be constructed once the building is completed. The facilities would consist mainly of storage tanks for wet and dry treatment chemicals, treatment contact vessels, metering and transfer pumps, meters and gauges, and piping.

The WTF would be inspected and a certificate of occupancy issued according to required county regulations. Permanent power would then be connected from the GWD Project electrical system to the WTF electrical system. The internal WTF system would be connected to the incoming and outgoing water pipelines and the system tested in its entirety. Temporary electrical, water, and sanitary systems not modified into permanent facilities would be removed. Final grading and landscaping would follow.

Construction of the WTF is anticipated to require approximately 1 year.

4.8 POWER FACILITIES

Construction of the different power components is described below. The power facilities are anticipated to require approximately 5 years for construction.

Power Lines

Unlike other facilities, clearing and grading of the entire power line ROW would not be required. Following identification of specific power pole locations, work areas of approximately 100 feet by 100 feet around each power pole structure would be cleared. An access road or access road spur to the pole locations would be rough graded.

A truck-mounted rotary auger would bore pole locations to a depth of approximately 15 feet. After hardware and insulators are installed on each pole, the poles would be erected on site and placed using a truck-mounted crane. Soil removed by the auger would be used to backfill the space around the pole. Excess soil cuttings would be spread around the pole site, within the ROW. Where additional strength is needed to support a power pole, a concrete foundation may be used to reinforce a bore hole, or concrete may be used to backfill a hole after pole installation.

Conductor wires would be strung using tensioning equipment. Stringing conductor wires over US Highway 93, 50 and 6, and other frequently traveled roadways may require the erection of temporary guard structures to elevate the conductor wires to a sufficient height to avoid traffic conflicts. Temporary guard structures would be constructed using wood poles in H-frame configuration.

After connections are made with the substations, and facilities served by the power lines, the line would be energized. Electrical equipment on each distribution line network would be tested before it is entered into service.

Substations

Following site clearing and grading, berms and drainage ditches would be constructed to contain runoff and divert floodwaters from the substation sites. For each substation, concrete pads would be constructed for transformers. Each pad would include a curb around the perimeter for spill containment. Concrete foundations would be constructed for electrical structures and electrical conductors strung using pulleys. A concrete block control building would be constructed to house controls and relay equipment.

Substations would be enclosed by security fencing, typically 8-foot high chain link, with a locked gate. Once the substations are constructed, they would go through a testing and commissioning process, in accordance with applicable electrical industry procedures, codes, and testing.

Hydroturbine Energy Recovery Facilities

The portion of the hydroturbine vault located in-line with or parallel to the underground pipeline would 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 would be constructed after the trench is backfilled. Floors, walls, and roof of the hydroturbine structure would then be completed. The necessary mechanical equipment would be installed during or following completion of the vault, pipeline, and building.

4.9 ACCESS ROADS

Access road construction would occur simultaneously with the facility or pipeline segment served by that access road.

All roads would first be graded to level the surface as necessary. Gravel would be applied in areas needed to maintain road conditions during construction activities. In areas of improved roads, culverts would be installed where needed, and paving applied to the identified road segments.

Public use and access on existing roads and highways would not be impeded by construction. Signs and persons with flags would be used as necessary to direct traffic in accordance with all applicable Nevada Department of Transportation, county, and local rules and ordinances.

If roads within project ROWs are temporarily widened for use during construction, those widened areas would be restored along with other ROW restoration. The final width of unimproved roads would be 12 feet, improved roads would be 20 feet in width, and the paved roads would be 24 to 26 feet in width.

4.10 CONSTRUCTION SCHEDULE, MANPOWER, AND EQUIPMENT ESTIMATES

The detailed construction schedule will be determined during project design, as individual construction contracts are identified. However, for the purposes of conducting the environmental analysis, assumptions have been made regarding the construction schedule, manpower, and equipment needs.

4.10.1 Construction Schedule

Construction of the GWD Project facilities under this ROW request would begin upon receipt of the ROW grant in 2009 and reach completion in 2018. Various components of the GWD Project would be constructed simultaneously throughout the project area during this period. Table 4-1 provides a preliminary construction schedule for the GWD Project. The regulating tanks and access roads would be constructed in conjunction with the pipelines, and so are not separately listed on the table.

A construction schedule for future facilities would be speculative and cannot be identified at this time, however, it is estimated they may take an additional 20 years or more to complete.

Table 4-1 Preliminary Construction Schedule for Proposed Facilities

Facility			Anticipated Construction Start	Anticipated Construction Completion
Groundwater Production Wells (14 Spring Valley)			July 2009	October 2015
Main Pipeline	Terminus to Coyote Spring Valley (78-inch)		July 2009	January 2011
	Coyote Spring to Dry Lake Valleys (84-inch)		March 2010	May 2012
	Dry Lake to Cave Valleys (78-inch)		September 2011	October 2013
	Cave to Spring Valley South (72-inch)		February 2013	December 2014
Lateral Pipelines	Spring Valley		May 2013	March 2015
	Snake Valley		December 2015	August 2017
	Cave Valley		March 2015	March 2016
Collector Pipelines (Spring Valley)			July 2012	June 2013
Pumping Stations	Spring Valley North		October 2014	February 2016
	Spring Valley South		September 2012	December 2014
	Snake Valley North		July 2017	November 2018
	Snake Valley South		December 2015	August 2017
	Lake Valley		December 2011	March 2014
Buried Storage Reservoir			July 2009	February 2011
Water Treatment Facility			July 2009	September 2010
Power Facilities	Power Lines	230/69 kV main line	August 2012	February 2017
		69/25 kV laterals	August 2012	May 2017
	Substations		August 2012	August 2016
	Hydroturbines		September 2012	January 2014

4.10.2 Manpower Estimates

A preliminary estimate of the manpower required to construct the GWD Project facilities has been developed for the purposes of the environmental analysis. The anticipated construction schedule was broken down for each proposed facility into the average number of personnel anticipated per day, determined for each quarter throughout the estimated construction period. Then manpower estimates were consolidated by average workers per day occurring in each basin, determined for each quarter. Table 4-2 presents the estimated daily maximum, minimum, and average numbers of workers in each basin, and the quarter in which each is expected to occur.

Table 4-2 Estimated Daily Manpower Per Basin, Per Quarter

Project Basin	Maximum Number of Workers[a] (Quarter/Year)	Minimum Number of Workers (Quarter/Year)	Average Number of Workers (Duration)	Nearest Communities
Spring Valley	401 (Q2/2014)	7 (Q1/2016)	149 (Q1/2011 to Q1/2016)	Ely
Snake Valley	481 (Q3/2016)	6 (Q4/2018)	183 (Q1/2016 to Q4/2018)	Ely
Lake Valley	152 (Q2/2013)	8 (Q1/2012)	92 (Q1/2012 to Q3/2014)	Pioche and Caliente
Cave Valley	155 (Q4/2015)	1 (Q1/2015)	37 (Q3/2013 to Q1/2016)	Ely and Lund
Dry Lake Valley	273 (Q1/2013)	3 (Q1/2015)	104 (Q4/2011 to Q1/2015)	Pioche and Caliente
Delamar Valley	94 (Q4/2011)	15 (Q2/2012)	50 (Q3/2010 to Q2/2016)	Caliente and Alamo
Coyote Spring Valley	220 (Q3/2010)	3 (Q2/2011)	68 (Q4/2009 to Q2/2016)	Las Vegas and Alamo
Las Vegas, Garnet, & Hidden Valleys	422 (Q1/2010)	7 (Q2/2016)	109 (Q3/2009 to Q2/2016)	Las Vegas

[a] The maximum number of workers in each valley would not occur simultaneously in all basins due to construction phasing.

4.10.3 Construction Equipment

Preliminary estimates of construction equipment that may be required for the GWD Project have been developed for the purpose of environmental analysis. The estimated construction equipment types are listed in Table 4-3. The categories shown include the following components:

- Pipelines – includes pipelines, valves, regulating tanks, and hydroturbine energy recovery facilities
- Wells– includes groundwater production wells and associated equipment
- Water and Power Facilities – includes the WTF, buried storage reservoir, pumping stations, and substations, and
- Power Lines – includes power poles and power lines.

Table 4-3 Estimated Construction Equipment

Equipment Type	Pipelines	Wells	Water and Power Facilities	Power Lines
Auger truck				X
Boom truck			X	X
Bucket lift			X	X
Bulldozer	X	X	X	
Cable-stringing truck				X
Stringing machine				X
Cement mixer		X	X	X
Crane	X	X	X	X
Drill rig		X		
Excavator	X		X	
Flat bed truck		X	X	X
Forklift	X		X	
Fuel truck	X		X	
Generator, small	X	X	X	
Generator, large	X		X	
Grader	X		X	
Haul truck	X		X	
Loader	X	X	X	
Pick-up truck	X	X	X	X
Plate compactor	X		X	
Roller compactor	X		X	
Water truck	X	X	X	
Welding rig	X	X	X	

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5.0 OPERATION AND MAINTENANCE

The GWD Project would be operated and maintained by SNWA safely, correctly, and within environmental parameters required by the BLM ROW grant and other state, federal, and local agency requirements. In addition to routine operation of facilities, activities would include remote and on-site monitoring of system functions, inspection of the pipelines and facilities, regular maintenance of equipment, repairs conducted as needed, and responses to emergency conditions should they occur. All operation and maintenance activities would be confined to the permanent ROWs. If additional ROWs are required for unforeseen circumstances, SNWA would request additional ROWs from the BLM.

Operation of the GWD Project would 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 would be dispatched as needed if any concerns are noted.

Overall operation of the GWD Project would be coordinated with SNWA's other water systems, in order to meet water demands identified by SNWA purveyor members. The SNWA operations staff would manage the water systems to deliver water to the locations requested by the purveyor members.

A detailed operations and maintenance schedule would be developed for GWD Project facilities and components during facility construction and prior to operation. Facilities would 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 would track facility functions. Operation of the pumping stations and the WTF would require the use of consumable supplies and may require the use of chemicals that would need to be delivered on a regular basis.

5.1 GROUNDWATER PRODUCTION WELLS

The groundwater production wells would be continuously metered and operated remotely by SNWA. A Remote Terminal Unit installed on each well would be used to control pumping rate and equipment operations. Maintenance personnel are expected to visit the well sites weekly, or more frequently if needed. Maintenance activities would include equipment and site inspections, data recording, and repairs.

Possible treatment for arsenic removal at the production wells is discussed in Chapter 2.1. In the event that treatment is required, sludge from the on-site arsenic treatment coagulation would be periodically removed and disposed in accordance with applicable federal, state, and local requirements. The amount of arsenic in the groundwater is expected to be minimal; therefore, if sludge production is required, removal and disposal are also expected to be minimal (approximately once every quarter).

5.2 PIPELINES

Operational activity on the pipeline would be limited primarily to maintenance of the ROW and inspection, repair, and cleaning of the pipeline. Aerial and ground inspections by pipeline personnel would identify areas of exposed pipeline, erosion, unauthorized ROW encroachment, or any other conditions that could present a safety hazard or require preventive maintenance or reporting.

In the event of a system rupture resulting in the discharge of water, pressure sensors installed on the system would detect the pressure loss, and the groundwater pumps and wells would begin an automatic, sequenced shut down. Alarms would 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 would 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.

5.3 PUMPING STATIONS

Routine visual inspections of each of the pumping stations would be conducted, most likely on a daily basis. Inflow and outflow would be remotely monitored to ensure proper operation, including ancillary facilities such as the valves and piping needed to control water flow. Equipment would be activated or deactivated as needed to maintain flow through the system.

The maintenance yard adjacent to the Spring Valley South Pumping Station would be used to conduct maintenance and repair activities at the pumping station, and at other project facilities. Approximately 10 operational personnel are anticipated to be present at the pumping station daily. Weekly truck deliveries of supplies and materials would be made, using established access roads.

5.4 REGULATING TANKS

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

5.5 BURIED STORAGE RESERVOIR

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

5.6 WATER TREATMENT FACILITY

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

Operation of the WTF would require delivery and use of chemicals for water treatment. Table 5-1 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 would be determined after water quality testing of groundwater production wells and design of the facility are completed.

Table 5-1 Potential Water Treatment Chemicals

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

5.7 POWER FACILITIES

The power facilities would be monitored remotely to ensure proper operation and that adequate power is available. The structures, insulators, conductors, and related hardware would 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 would be performed on an as-needed basis.

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6.0 ENVIRONMENTAL COMMITMENTS

Environmental protection measures would be incorporated into the design, construction, and operation of the GWD Project. An initial list of environmental protection measures are described below. This list will be expanded and detailed through the environmental compliance process for the GWD Project. In addition, detailed plans to address specific resource issues are included in the Appendices.

Preconstruction Clearance Surveys

Qualified biologists approved by the BLM would conduct preconstruction clearance surveys at least 7 days prior to construction. The surveys would identify the presence of desert tortoise, burrowing owl, kit fox, bat species, Gila monster, and other sensitive species within the permanent and temporary ROWs. Tortoises and special status bat species would be removed to adjacent federal lands outside of the ROW. Tortoise, burrowing owl, and kit fox burrows would be investigated to assure they are unoccupied. The burrows would then be collapsed to assure that they are not reoccupied prior to construction. If occupied kit fox burrows are located within the permanent and temporary ROW, SNWA would consult with Nevada Division of Wildlife and the BLM on a case-by-case basis prior to relocation. Preconstruction clearance surveys would be repeated at least 24 hours prior to the start of construction for any areas not enclosed by tortoise-exclusion fencing. Washes would be surveyed before discharge of water used in well development or hydrostatic testing.

Desert Tortoise Exclusion Fencing

Temporary tortoise exclusion fencing would be used in desert tortoise habitat around ground surfaces to be disturbed during construction. The temporary tortoise fences would be placed prior to construction and removed only after restoration activities have been completed. Tortoise fencing would be installed in compliance with the BLM and US Fish and Wildlife Service requirements.

Desert Tortoise and Sensitive Species Handling

Desert tortoises and other sensitive wildlife species would only be moved by a qualified biologist and solely for the purpose of moving them out of harm's way. Appropriate state and federal permits or approvals would be obtained prior to handling any live species, tortoise carcass, or tortoise eggs.

Migratory Birds

Qualified biologists would conduct surveys for nesting birds, including nesting migratory birds and raptors between the periods of March 15 and July 30 in the Mojave Desert portion of the project, and May 1 and July 15 in the Great Basin portion of the project, as agreed upon by the BLM. Surveys would be conducted to avoid nests or minimize effects to the nest and fledglings. SNWA would consult with the BLM on a case-by-case basis to determine appropriate minimization efforts. A migratory bird take permit under 50 CFR parts 13 and 21 would be obtained from the US Fish and Wildlife Service if required by federal law.

Worker Education Program

A worker education program would be developed and used during construction and operation. A handout would be developed addressing environmental protection measures incorporated into the GWD Project, and the responsibility of each worker in environmental protection. Each worker would be briefed on their environmental compliance responsibilities, provided the handout, and required to sign a certification that they understand and will comply with those environmental protection measures. Specifics of the program may include but are not limited to:

- General site maintenance (i.e., trash disposal)
- Identification of sensitive species
- Prevention of sensitive species handling by unauthorized personnel
- Checking under vehicles for sensitive species
- Reporting procedures if a sensitive species is found
- Reporting procedures for injury to a sensitive species
- Consequences of harassment of sensitive species
- Terms and conditions of the Biological Opinion
- Penalties for violation of state and federal laws
- Prohibiting dogs or hunting on construction areas or operation sites
- Prohibiting driving off the cleared ROW
- Designated speed limits within construction areas or operation sites
- Prohibiting the feeding of wildlife

Sanitation

Any trash present within the ROWs would be removed before beginning construction activities. The ROWs would be kept free from any accumulation of trash and rubbish during construction. Trash would be stored in predator-proof storage containers on-site, and properly disposed of off-site.

Monitoring

Biological monitors and a compliance inspection contractor approved by the BLM would monitor construction activities to ensure compliance with the environmental protection requirements. Biological monitors would regularly inspect tortoise exclusion fencing to ensure it has not been breached. In addition to conducting preconstruction clearance surveys, biological monitors would monitor construction activities in areas not enclosed by tortoise-exclusion fencing.

The biological monitors and compliance inspection contractor would prepare monthly reports to the BLM documenting compliance with the environmental protection measures. Variances and corrective measures would be included in the reports.

Raptor Protection

Wires and insulators would be constructed to reduce the potential to electrocute raptors. The tops of the power poles would be equipped with anti-perching devices to discourage raptors, ravens, and other birds from perching on the poles. The design of the crossbars and supports on the 230 kV poles discourages birds from flying between the conductors, and the clearance prevents bird injury. Based on the recommendations of the Avian Power Line Interaction Committee 2005 Avian Protection Plan, adequate spacing between conductors (8 feet or greater based on the wingspan of the female golden eagle) would be implemented on the proposed power poles to prevent birds' wings from touching two wires at the same time.

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7.0 TERMINATION

The ROWs granted for the GWD Project would be in accordance with the Federal Land Policy and Management Act of 1976, Southern Nevada Public Lands Management Act of 1998, and LCCRDA. In accordance with those LCCRDA and the Southern Nevada Act, ROWs are granted in perpetuity. Termination and abandonment of the GWD Project is not anticipated, unless exceptional circumstances should arise. In such a case, the termination and abandonment would be subject to approvals by the BLM and other federal and private land managers. Termination and abandonment plans would be written in accordance with current management procedures and submitted to the BLM in advance of any associated actions. If the pipeline was abandoned in part or in whole, the ROWs would revert to the land managing agencies. In the event that upgrade or replacement of facilities is required, SNWA would coordinate with the BLM prior to initiating major construction in accordance with applicable stipulations of the final ROW grant.

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