QUICK REFERENCES

ACM – Applicant-committed Protection Measures
afy – acre feet per year
BLM – Bureau of Land Management
CEQ – Council on Environmental Quality
CFR – Code of Federal Regulations
FLPMA – Federal Land Policy and Management Act
GWD – Groundwater Development
LCCRDA – Lincoln County Conservation, Recreation, and Development Act of 2004
MOU – Memorandum of Understanding
NAGPRA - Native American Graves Protection & Repatriation Act
NDEP – Nevada Division of Environmental Protection
NDOT – Nevada Department of Transportation
NDOW – Nevada Department of Wildlife
NDWR – Nevada Department of Water Resources
NEPA – National Environmental Policy Act
NHPA – National Historic Preservation Act
NOI – Notice of Intent
NSE – Nevada Office of the State Engineer
RMP – Resource Management Plan
ROD – Record of Decision
ROW – Right-of-way
SHPO – State Historic Preservation Office
SNPLMA – Southern Nevada Public Lands Management Act
SNWA – Southern Nevada Water Authority
USACE – U.S. Army Corps of Engineers
USEPA – U.S. Environmental Protection Agency
USFWS – U.S. Fish and Wildlife Service
USGS – U.S. Geological Survey

2. Description of the Proposed Action and Alternatives

2.1 Introduction

This chapter describes the range of alternatives that are considered in this EIS. These alternatives were developed by the BLM with input from the SNWA, public issues and concerns, and from collaboration with cooperating agencies.

This EIS contains: specific environmental impact analyses for a main groundwater conveyance pipeline of up to 96 inches in diameter and related support facilities that require a ROW grant; and programmatic information for future groundwater development and supporting facilities.

Alternatives that address the SNWA's request for the BLM ROW grant and respond to the NEPA requirements include the following:

- No Action (no groundwater conveyance or groundwater development facilities would be constructed or operated);
- Proposed Action (the SNWA's proposed groundwater conveyance facilities and future groundwater sources); and
- Five groundwater conveyance and development alternatives (A through E).

As described in Chapter 1, Section 1.3.2, a tiered NEPA process can be used for multi-phased projects when specific locations and design elements have not been defined for all phases. See Section 2.1.2 for additional NEPA tiering information as it relates to the BLM's decision-making authority.

2.1.1 Alternatives Overview

An overview of the ROW alternatives and their associated facilities are summarized in **Table 2.1-1**.

The following section provides the basis for the range of ROW and groundwater development alternatives that are fully analyzed in this EIS. The volumes of water that are proposed for development by groundwater development alternatives are summarized in **Table 2.1-2**.

Table 2.1-1 Summary of Project Main Pipeline Right-of-way Alternatives and Groundwater Development Scenarios (see text for detailed descriptions)

Alternative	Main Pipeline ROW Description	Groundwater Development Scenario
Proposed Action Distributed Pumping at Application Quantities	All requested ROWs for a main pipeline of up to 96 inches in diameter, lateral pipelines, and associated ancillary facilities, required for this alternative.	Facilities to pump up to 176,655 afy of new applications from 5 basins at distributed locations.
A Distributed Pumping at Reduced Quantities	All requested ROWs for a main pipeline of up to 96 inches in diameter, lateral pipelines, and associated ancillary facilities required for this alternative.	Facilities to pump up to 114,755 afy of new applications from 5 basins at distributed locations.
B Point of Diversion Pumping at Application Quantities	All requested ROWs for a main pipeline of up to 96 inches in diameter and lateral pipelines, and associated ancillary facilities, required for this alternative.	Facilities to pump up to 176,655 afy of new applications from 5 basins at or near Points of Diversion.
C Intermittent Pumping at Reduced Quantities	All requested ROWs for a main pipeline of up to 96 inches in diameter and lateral pipelines, and associated ancillary facilities required for this alternative.	Facilities to pump a potential range of volumes from 12,000 afy to 114,755 afy of new applications from 5 basins at distributed locations; groundwater pumping over intermittent periods, based upon drought conditions and availability of Colorado River water.
D Distributed Pumping at Reduced Quantities in Lincoln County Only	ROWs for a main pipeline of up to 78 inches in diameter, lateral pipelines, and associated ancillary facilities required for this alternative within Clark and Lincoln counties only, as authorized under the LCCRDA.	Facilities to pump up to 78,755 afy of new applications from 4 basins at distributed locations (Cave, Dry Lake, and Delamar valleys and a portion of Spring Valley) in Lincoln County only.
E Distributed Pumping at Reduced Water Quantities in Spring, Cave, Dry Lake, and Delamar valleys	ROWs for a main pipeline of up to 78 inches in diameter and lateral pipelines, associated ancillary facilities required for this alternative from within Spring, Cave, Dry Lake, and Delamar valleys.	Facilities to pump up to 78,755 afy of new applications from 4 basins at distributed locations within Spring, Cave, Dry Lake, and Delamar valleys.

Table 2.1-2 Groundwater Development Volumes for the Groundwater Development Project Alternatives

Water Volume (afy)	Alternatives						
	Proposed Action	A	B	C		D	E
				Low	High		
New Groundwater Development							
Spring Valley	91,224	60,000	91,224	3,000	60,000	60,000	60,000
Snake Valley	50,679	36,000	50,679	2,000	36,000	0	0
Cave, Dry Lake, and Delamar valleys	34,752	18,755	34,752	7,000	18,755	18,755	18,755
Total Groundwater Development Volume (afy)	**176,655**	**114,755**	**176,655**	**12,000**	**114,755**	**78,755**	**78,755**

- **Proposed Action – Distributed Pumping at 1989 Application Quantities**. This alternative requires ROWs for a main pipeline of up to 96 inches in diameter, lateral pipelines, and associated ancillary facilities. As discussed in Chapter 1, Section 1.4.1.1, the SNWA holds groundwater applications originally filed in 1989. In 2007 and 2008, the NSE ruled on the SNWA's groundwater applications in Spring, Cave, Dry Lake, and Delamar valleys and allotted the SNWA a reduced volume of 78,755 afy of new groundwater rights, instead of the requested 125,976 afy. However, the NSE decisions granting these water rights were vacated on appeal to the Nevada Supreme Court. Based on the Nevada Supreme Court's decision, the Spring, Cave, Dry Lake, and Delamar valleys' applications will be re-noticed and the NSE will re-consider granting these applications. Due to the Nevada Supreme Court decision and the re-initiation of the NSE water appropriation process, the SNWA revised its conceptual Plan of Development (POD) in 2011 to consider conveyance of the full quantity of its applications in Spring, Snake, Cave, Dry Lake, and Delamar valleys. Under this alternative, groundwater wells would be distributed across five hydrologic basins with the objective of minimizing effects on senior water rights or areas containing water-dependent sensitive or listed species and their habitats.
- **Alternative A – Distributed Pumping at Reduced Quantities**. This alternative requires ROWs for a main pipeline of up to 96 inches in diameter, lateral pipelines, and associated ancillary facilities. In 2007 and 2008, the NSE ruled on the SNWA's groundwater applications in Spring, Cave, Dry Lake, and Delamar valleys and allotted the SNWA a reduced volume of 78,755 afy of new groundwater rights, instead of the requested 125,976 afy. However, the NSE decisions granting these water rights were vacated on appeal to the Nevada Supreme Court. Based on the Nevada Supreme Court's decision, the Spring, Cave, Dry Lake, and Delamar valleys' applications will be re-noticed and the NSE will re-consider granting these applications. While there is no guarantee that the NSE will allot the same amount of water to the SNWA, this alternative provides a benchmark to indicate the factors the NSE potentially will consider when making a decision on granting the SNWA its water rights in the Spring, Cave, Dry Lake, and Delamar valleys. This alternative also assumes that the SNWA may be permitted 36,000 afy of new groundwater rights in Snake Valley, instead of the requested 50,679 afy, as described in a draft Snake Valley Agreement between the states of Nevada and Utah. Under this alternative, groundwater wells would be distributed across the hydrologic basins with the objective of minimizing effects on senior water rights or areas containing water-dependent sensitive or listed species and their habitats.

Points of Diversion: Within the 5 basins, 34 specific locations—called Points of Diversion—for groundwater development have been identified in the groundwater applications. Under Alternative B, groundwater development would occur at or close to these Points of Diversion.

- **Alternative B – Points of Diversion Pumping at Application Quantities**. This alternative requires ROWs for a main pipeline of up to 96 inches in diameter, lateral pipelines, and associated ancillary facilities. Alternative B would develop and convey the same groundwater volume as the Proposed Action. However, groundwater would be developed within a 1-mile radius of the 34 application Points of Diversion locations. The expected effects of such a development plan would be to intensify the local drawdown effects in the vicinity of the points of diversion, and potentially avoid drawdown effects to other areas.
- **Alternative C – Intermittent Pumping at Reduced Quantities**. This alternative requires ROWs for a main pipeline of up to 96 inches in diameter, lateral pipelines, and associated ancillary facilities. The development pattern for this alternative would be the same as Alternative A. However, a lower overall volume of groundwater would be pumped over time as compared to any of the other alternatives. In this scenario, the volumes of water conveyed by the project would be related to the SNWA's Colorado River water supply. For the purposes of the EIS, it was assumed that drought conditions affecting the Colorado River Water supply would trigger increased pumping and would occur at an average interval of ten years, necessitating a 5 year period of minimal conveyance, with full conveyance during the other 5 years.

Intermittent Groundwater Pumping: The amount of groundwater pumped would be dependent upon the availability of SNWA's other Colorado River water resources.

- **Alternative D – Distributed Pumping at Reduced Quantities in Lincoln County Only**. The pipeline and groundwater development for this alternative is limited to Clark and Lincoln counties; no facilities would be constructed in White Pine County. This alternative requires ROWs for a main pipeline of up to 78 inches in

diameter, lateral pipelines, and associated ancillary facilities. This alternative was developed to examine effects of constructing a project that would allow the SNWA to utilize the LCCRDA utility corridor already designated by Congress, and to develop all granted water rights within Lincoln County. This alternative would not allow development of groundwater within Snake Valley, resulting in lower groundwater development volumes compared to the Proposed Action, and alternatives A, B, and C.

- **Alternative E – Distributed Pumping at Reduced Quantities – Spring, Cave, Dry Lake, and Delamar Valleys**. The pipeline and groundwater development for this alternative is limited to four groundwater development basins (Spring, Cave, Dry Lake, and Delamar valleys), with no facilities extending into Snake Valley, and no groundwater development occurring there. This alternative requires ROWs for a main pipeline of up to 78 inches in diameter, lateral pipelines, and associated ancillary facilities. This alternative was developed to address concerns regarding potential effects from groundwater development in Snake Valley. The volume of water would be the same as Alternative D because no water would be developed in Snake Valley.

Pipeline Conveyance Volumes

In addition to the application groundwater volumes described for each alternative (**Table 2.1-2**), the SNWA would potentially convey its existing water rights in Spring Valley, as well as those to be developed by LCWD in the future. The SNWA's main line pipeline design would accommodate these additional water rights for all alternatives. The construction and permanent main line pipeline ROW widths would be the same for all alternatives; therefore, the maximum dimensions of the ROWs that may be granted by the BLM in the ROD for this Tier 1 analysis would accommodate the range of pipeline lengths and diameters described for all the various action alternatives. The ultimate pipeline dimensions and water conveyance volumes would depend upon the volumes granted by the NSE, as well as the groundwater volumes developed in the future by Lincoln County. The following groundwater (in addition to that described in **Table 2.1-2**) may be conveyed in the SNWA pipeline system in the future, based on currently available information:

- SNWA existing agricultural water rights in Spring Valley consisting of 8,000 afy. The SNWA would first obtain approval to convert these agricultural rights to municipal uses. The SNWA would then develop the gathering pipeline infrastructure necessary to connect to the GWD Project mainline pipeline system. Specific development plans for this water would likely occur in the 2018 to 2020 time frame, based on the current overall project schedule. Specific plans have not been provided to the BLM to convey this water, and therefore all ROWS would be approved under subsequent NEPA tiers. SNWA proposes to convey these water rights for all alternatives. However, the SNWA would not convey these volumes under Alternative C (intermittent pumping) when groundwater pumping for the entire project would be minimized. These agricultural rights have been included in the No Action groundwater modeling in this EIS because they represent existing uses, and their general location is known.
- LCWD agricultural water rights in Lake Valley consisting of 11,300 afy. Similar to the description of the SNWA's agricultural rights in Spring Valley, LCWD would obtain approval to convert existing agricultural water rights to municipal uses, and then develop the infrastructure necessary to interconnect with the SNWA main line pipeline system in Lake Valley. Specific plans have not been provided to the BLM to convey this water, and therefore all ROWS would be approved under subsequent NEPA tiers. These agricultural rights have been included in the No Action groundwater modeling in this EIS because they represent existing uses, and their general location is known.
- Lincoln County pipeline conveyance request for 21,700 afy. A conveyance agreement has been reached between the SNWA and Lincoln County for transportation of this water in the future. For the purpose of this EIS these are undefined sources of water (there are no specific project plans and no water right applications) resulting in insufficient information to adequately characterize and analyze the Lincoln County water under this NEPA action. Independent NEPA analysis in the form of a separate Environmental Assessment or EIS would be required if, and when, the Lincoln County project plan is defined and specific plans submitted to the BLM for the requested ROW. There is no ROW application before the BLM for development and conveyance of this Lincoln County water; therefore, there is no basis for cumulative NEPA analysis in this Tier 1 EIS.

2.1.2 Bureau of Land Management Authority and Limitations

National Environmental Policy Act Tier 1

Rights-of-way and Ancillary Facilities

For this project, some project and site-specific details of the Proposed Action, primarily the proposed alignment of the main pipeline and associated operational facilities (power transmission lines, pump stations, etc.) are known. Consequently, this Tier 1 document addresses the environmental effects of these known components.

As discussed in Chapter 1, Section 1.3.1, subject to the requirements of the SNPLMA and the LCCRDA, the BLM generally has authority under the FLPMA to approve or deny ROWs on federal lands and to develop mitigation and monitoring procedures to minimize impacts to natural and human resources in accordance with the published land management plans. The effects of the BLM's ROW decisions on the SNWA's ability to develop its pending groundwater rights are summarized as follows:

- If the Proposed Action, or Alternatives A, B, or C were approved in the ROD, additional ROWs may be granted (after further NEPA analysis [subsequent tiers] are completed) for facilities to allow future groundwater development in all five hydrologic basins (Spring, Snake, Cave, Dry Lake, and Delamar).
- If Alternative D were approved in the ROD, additional ROWs may be granted (after further NEPA analysis [subsequent tiers] are completed) to allow future groundwater development only in hydrologic basins within Lincoln County (Southern Spring, Cave, Dry Lake, and Delamar valleys).
- If Alternative E were approved in the ROD, additional ROWs may be granted (after further NEPA analysis [subsequent tiers] are completed) to allow future groundwater development in four hydrologic basins (Spring, Cave, Dry Lake, and Delamar valleys).

Future Facilities

Details regarding future facilities for groundwater development, including the number and locations of wells, and the specific lengths and routes of collector pipeline and distribution power lines, are presently unknown. Thus, the environmental effects of that future groundwater development, including the long-term effects of groundwater production, are the subject of programmatic analysis in this EIS.

Programmatic Analysis

The programmatic portion of this Tier 1 document includes the future production wells, collector pipelines, additional pumping stations, distribution power lines, additional secondary substations, pressure reduction valves, and maintenance roads.

Subsequent National Environmental Policy Act Tiers

The analysis in this EIS provides the basis for subsequent NEPA tiering when plans for future ROWs and associated facilities are finalized and submitted to the BLM by the SNWA. At that time, the BLM would conduct NEPA reviews of the specific ROWs and facilities required to implement groundwater development (wells, collector pipelines, electrical power lines, access roads). The BLM would approve or deny these proposed ROWs in Decision Documents (ROD/FONSI) written for each additional phase of the groundwater development project.

For groundwater pumping, the NSE will decide which, if any, of the SNWA applications will be approved, and will identify the approved points of diversion and water volumes. Under the FLPMA, the BLM has the authority to "protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values" (Section 102 [43 U.S.C 1701] [a], paragraph 8). As a signatory to the stipulation agreements for Spring, Cave, Dry Lake, and Delamar Valleys, the BLM may negotiate monitoring programs that would identify changes in the quantity and quality of natural resources on the BLM-administered public lands. Through these same authorities and agreements, the BLM may request and enforce changes in groundwater pumping regimes to protect water-dependent natural resources on the BLM-administered public lands.

2.2 No Action

The No Action Alternative describes the baseline conditions, or the status quo, before any approval of the Proposed Action or other action alternative. The No Action Alternative assumes that the project ROW would not be granted by the BLM. Even when Congress mandates that an action take place, the impacts of the No Action Alternative are evaluated, although the evaluating agency might have limited or no authority to deny project authorization. The project water model included approximately 104,000 afy of groundwater that currently is permitted by the NSE in the project area. The water volume for the No Action Alternative includes 8,000 afy of groundwater associated with SNWA agricultural properties and 11,300 afy for which permits are held by Lincoln County. Because this water is currently being used, it is included in the No Action total.

Key Points—No Action

Maintain the status quo. The SNWA would not receive the approval necessary to construct and develop the GWD Project.

The current total amount of regional groundwater use is approximately 104,000 afy, including 11,300 afy of Lincoln County and 8,000 afy of the SNWA's existing agricultural water rights. The total No Action volume represents the entire hydrologic model area (**Figure 2.2-1**) including the project development basins.

2.2.1 Rights-of-way for the No Action Alternative

Pursuant to the SNPLMA and the LCCRDA, the BLM must grant the SNWA's ROW requests in Clark County and Lincoln County. However, the No Action Alternative in this EIS describes baseline conditions without construction of the GWD Project, as a benchmark for the comparison of the Proposed Action and alternatives.

The SNPLMA requires the BLM to grant ROWs in Clark County for "all reservoirs, canals, channels, ditches, pipes, pipelines, tunnels, and other facilities and systems needed for (i) the impoundment, storage, treatment, transportation, or distribution of water…" (Public Law 105-263, as amended).

The LCCRDA requires that ROWs be granted in Lincoln and Clark counties for any "roads, wells, well fields, pipes, pipelines, pumping stations, storage facilities, or other facilities and systems that are necessary for the construction and operation of a water conveyance system…" (H.R. 4593, Title III-Utility Corridors, Section 301. Utility Corridors and Rights-of-Way. Paragraph [b][1]).

Although certain ROWs are required to be granted, the No Action Alternative in this EIS describes baseline conditions without construction of the GWD Project, as a benchmark for the comparison of the Proposed Action and action alternatives.

Under the analysis presented in the No Action Alternative, the lack of a federal ROW would effectively preclude the SNWA from developing and conveying via pipeline, its existing and pending groundwater rights from the five groundwater basins (Spring, Snake, Cave, Dry Lake, and Delamar valleys) across public lands as proposed by the SNWA and analyzed in the Proposed Action and Alternatives A through C. Limited private lands exist in these basins, and the SNWA would be limited to constructing a water conveyance system without crossing BLM-administered land.

Selection of the No Action Alternative would not address the SNWA's needs to augment its existing water resources and to diversify available water supplies, as discussed in the SNWA's supporting rationale (**Appendix A**). It is likely the SNWA would pursue additional water resource development activities to accomplish these objectives, either by 1) pursuing an entirely new proposed project or 2) by pursuing development of a shorter public-lands-based groundwater pipeline project utilizing the ROW approved by Congress in Clark County and Lincoln County as specified by the SNPLMA and the LCCRDA.

2.2.2 Groundwater Development for No Action

Groundwater development under the No Action Alternative would consist of a continuation of historical and permitted uses, including the continued development of Lincoln and White Pine counties' agricultural water rights. Land sales specified in the Ely RMP/EIS could change the current water use or increase slightly the amount of water being used. However, changes in water use would require NSE approval, and would not occur automatically with a land sale. **Figure 2.2-1** illustrates the locations of water supply wells for agricultural, municipal, and industrial/power purposes that were included in the No Action Alternative for the groundwater modeling simulation. These sources represent a total volume of approximately 104,000 afy of existing and other planned future groundwater use and consumption and include the 11,300 afy of Lincoln County's existing agricultural water rights in Lake Valley and 8,000 afy of existing

SNWA agricultural groundwater rights associated with the SNWA properties in Spring Valley. Because these agricultural water rights are associated with private property and currently are being developed regardless of the Proposed Action, they are included in the No Action Alternative.

Figure 2.2-1 Existing Water Rights (No Action Alternative)

2.3 Management Common to All Alternatives

This section summarizes the BLM management decisions, actions, and other guidance that must be addressed for the GWD Project, regardless of the action alternative.

2.3.1 Bureau of Land Management Resource Management Plans

All actions approved or authorized by the BLM must conform to the existing land use plan where one exists (43 CFR 1610.5-3, 43 CFR 2920.2-5). The BLM's planning regulations state that the term "conformity" or "conformance" means that "...a resource management action shall be specifically provided for in the plan, or if not specifically mentioned, shall be clearly consistent with the terms, conditions, and decisions of the approved plan or amendment" (43 CFR 1601.0-5[b]). According to the BLM Handbook (BLM 2008a), if the proposed action does not conform to the existing land use plan, either the proposal should be modified to conform, or a land use plan amendment that allows the action should be considered. Additionally, if the existing land use plan is silent about an activity, the plan direction, including the broad and programmatic goals and objectives, should be reviewed.

As stated in Chapter 1, Section 1.4.1, the BLM Ely District RMP (2008b) and the BLM Las Vegas District RMP (1998) provide management direction for all BLM-managed lands that would be occupied by the GWD Project facilities. Conformance of the proposed and alternative ROWs with the applicable RMPs was evaluated in accordance with the following process:

- The Ely District RMP management actions, best management practices (BMPs), and USFWS Biological Order terms and conditions that would apply to the GWD Project were identified. These same measures also would be applied in the Southern Nevada District. The management actions are listed in **Appendix D**; the BMPs are listed on **Table 2.3-1**.
- The locations of proposed groundwater development facilities were evaluated for their conformance with approved BLM utility corridors, and with the management prescriptions for special use areas, such as Areas of Critical Environmental Concern (ACECs).
- The applicant-committed measures (ACMs) included in the SNWA POD were evaluated for their conformance with the RMP management actions and BMPs.
- The RMP management actions, BMPs, and ACMs were then evaluated for their effectiveness to avoid or reduce the environmental consequences identified for each resource discussed in the Affected Environment portion of Chapter 3.
- For some resources, additional mitigation measures were developed to further reduce or avoid resource impacts after the BLM RMP management actions, BMPs, and ACMs are fully implemented. These additional measures conform to the resource management direction contained in the RMPs.

Table 2.3-1 Bureau of Land Management Ely District – Best Management Practices to be Applied to the Groundwater Development Project[1]

Air Resources
1. Use dust abatement techniques on unpaved, unvegetated surfaces to minimize airborne dust.
2. Post and enforce speed limits (e.g., 25 miles per hour [mph]) to reduce airborne fugitive dust.
3. Cover construction materials and stockpiled soils if they are a source of fugitive dust.
4. Use dust abatement techniques before and during surface clearing, excavation, or blasting activities.
Water Resources
3. Construct a containment barrier around all pumps and fuel containers utilized within 100 feet (30.5 meters) of a stream channel. The containment barrier would be of sufficient size to contain all fuel being stored or used on site.
12. Limit stream crossings on travel routes and trails to the minimal number necessary to minimize sedimentation and compaction. The BLM Authorized Officer will determine if any impacts need to be rehabilitated by the permittee.

Table 2.3-1 Bureau of Land Management Ely District – Best Management Practices to be Applied to the Groundwater Development Project[1] (Continued)

13. Conduct mixing of herbicides and rinsing of herbicide containers and spray equipment only in areas that are a safe distance from environmentally sensitive areas and points of entry to bodies of water (storm drains, irrigation ditches, streams, lakes, or wells).
Soil Resources
2. During periods of adverse soil moisture conditions caused by climatic factors such as thawing, heavy rains, snow, flooding, or drought, suspend activities on existing roads that could create excessive surface rutting. When adverse conditions exist, the operator would contact the BLM Authorized Officer for an evaluation and decision based on soil types, soil moisture, slope, vegetation, and cover.
3. When preparing the site for reclamation, include contour furrowing, terracing, reduction of steep cut and fill slopes, and the installation of water bars, as determined appropriate for site-specific conditions.
5. Restoration requirements include reshaping, re-contouring, and/or resurfacing with topsoil, installation of water bars, and seeding on the contour. Removal of structures such as culverts, concrete pads, cattle guards, and signs would usually be required. Fertilization and/or fencing of the disturbance may be required. Additional erosion control measures (e.g., fiber matting and barriers) to discourage road travel may be required.
Vegetation Resources
1. Where seeding is required, use appropriate seed mixture and seeding techniques approved by the BLM Authorized Officer.
2. The BLM Authorized Officer will specify required special handling and recovery techniques for Joshua trees, yucca, and some cactus in the southern part of the planning area on a site-specific basis.
3. Keep removal and disturbance of vegetation to a minimum through construction site management (e.g., using previously disturbed areas and existing easements, limiting equipment/materials storage and staging area sites, etc.).
4. Generally, conduct reclamation with native seeds that are representative of the indigenous species present in the adjacent habitat. Document rationale for potential seeding with selected nonnative species. Possible exceptions would include use of nonnative species for a temporary cover crop to out-complete weeds. In all cases, ensure seed mixes are approved by the BLM Authorized Officer prior to planting.
5. Certify that all interim and final seed mixes, hay, straw, and hay/straw products are free of plant species listed on the Nevada noxious weed list.
6. An area is considered to be satisfactorily reclaimed when all disturbed areas have been recontoured to blend with the natural topography, erosion has been stabilized, and an acceptable vegetative cover has been established. Use the Nevada Guidelines for Successful Revegetation prepared by the NDEP, the BLM, and the U.S. Department of Agriculture Forest Service (USDA) (or most current revision or replacement of this document) to determine if revegetation is successful.
7. The perennial plant cover of the reclaimed area would equal or exceed perennial cover of selected comparison areas (normally adjacent habitat). If the adjacent habitat is severely disturbed, an ecological site description may be used as a cover standard. Cover is normally crown cover as estimated by the point intercept method. Selected cover can be determined using a method as described in Sampling Vegetation Attributes, Interagency Technical Reference, 1996, BLM/RS/ST-96/002+1730. The reclamation plan for the area project would identify the site-specific release criteria and associated statistical methods in the reclamation plan or permit.
8. Utility companies will manage vegetation in their ROWs for safe and reliable operation while maintaining vegetation and wildlife habitat.
9. Respread weed-free vegetation removed from the ROWs to provide protection, nutrient recycling, and seed source.

Table 2.3-1 Bureau of Land Management Ely District – Best Management Practices to be Applied to the Groundwater Development Project[1] (Continued)

Fish and Wildlife
1. Install wildlife escape ramps in all watering troughs, including temporary water haul facilities, and open storage tanks. Pipe the overflow away from the last water trough on an open system to provide water at ground level.
2. As appropriate, mark certain trees on BLM-administered lands for protection as wildlife trees.
3. Consider seasonal distribution of large wildlife species when determining methods used to accomplish weed and insect control objectives.
4. Protect active raptor nests in undisturbed areas within 0.25 mile of areas proposed for vegetation conversion using species-specific protection measures. Inventory areas containing suitable nesting habitat for active raptor nests prior to the initiation of any project.
5. When used to pump water from any pond or stream, screen the intake end of the draft hose to prevent fish from being ingested. Screen opening size would be a maximum of 3/16 inch (4.7 millimeters).
Special Status Species
1. Avoid line-of-sight views between the power poles along power lines and sage grouse leks, whenever feasible.
2. Use current science, guidelines, and methodologies (Avian Power Line Interaction Committee [APLIC] 2006, 1994; APLIC and USFWS 2005) for all new and existing power lines to minimize raptor and other bird electrocution and collision potential.
3. When managing weeds in areas of special status species, carefully consider the impacts of the treatment on such species. Wherever possible, hand spraying of herbicides is preferred over other methods.
4. Do not conduct noxious and invasive weed control within 0.5 mile of nesting and brood rearing areas for special status species during the nesting and brood rearing season.
7. For streams currently occupied by any special status species, do not allow extraction of water from ponds or pools if stream inflow is minimal (i.e., during drought situations) and extraction of water would lower the existing pond or pool level.
Wild Horses
1. To protect wild horses and wildlife flag all new fences every 16 feet with white flagging that is at least 1 inch wide and has at least 12 inches hanging free from the top wire of the fence.
2. If a project involves heavy or sustained traffic, require road signs for safety and protection of wild horses and wildlife.
Cultural Resources
1. Ensure that all activities associated with the undertaking, within 325 feet of the discovery, are halted and the discovery is appropriately protected, until the BLM issues a Notice to Proceed. A Notice to Proceed may be issued by the BLM under any of the following conditions:
• Evaluation of potentially eligible resource(s) results in a determination that the resource(s) are not eligible;
• The fieldwork phase of the treatment option has been completed; and
• The BLM has accepted a summary description of the fieldwork performed and a reporting schedule for that work.
2. The operator will inform all persons associated with the project that knowingly disturbing cultural resources (historic or archaeological) or collecting artifacts is illegal.
Paleontological Resources
1. When paleontological resources of potential scientific interest are encountered (including all vertebrate fossils and deposits of petrified wood), leave them intact and immediately bring them to the attention of the BLM Authorized Officer.

Table 2.3-1 Bureau of Land Management Ely District – Best Management Practices to be Applied to the Groundwater Development Project[1] (Continued)

Visual Resources
1. On industrial facilities authorized by the Ely District Office, utilize anti-glare light fixtures to limit light pollution.
3. When feasible, bury utility lines on public land when in the viewshed of residential or community development.
Travel Management and Off-highway Vehicle Use
1. Design access roads requiring construction with cut and fill to minimize surface disturbance and take into account the character of the landform, natural contours, cut material, depth of cut, where the fill material would be deposited, resource concerns, and visual contrast. Avoid construction of access roads on steep hillsides and near watercourses where alternate routes provide adequate access.
2. Where adverse impacts or safety considerations warrant, limit or prohibit public access when authorizing specific routes to areas or sites under permit or lease.
Recreation
1. Do not allow surface or underground disturbance to occur within 100 yards (horizontally or vertically) of known cave resources.
Livestock Grazing
1. Water troughs
• Place troughs connected with spring developments outside of riparian and wetland habitats to reduce livestock trampling damage to wet areas; and
• Control trough overflow at springs with float valves or deliver the overflow back into the native channel.
Fire Management
3. Within the area of operation, every effort will be made to prevent, control, or suppress any fire. Fire-fighting equipment may be required to be on site while operations are in progress, depending on hazards inherent in the type of operation and fire hazard levels. Report uncontrolled fires immediately to the BLM Ely District Office Manager or Authorized Officer. The BLM Fire Dispatch telephone number is (775) 289-1925 or 1-800-633-6092. After working hours, call 911 or the White Pine County Sheriff's Office at (775) 289-8801, the Lincoln County Sheriff's Office at (775) 962-5151, or the Nye County Sheriff's Office at (775) 482-8101.
Noxious and Invasive Weed Management
2. When maintaining unpaved roads on BLM-administered lands, avoid the unnecessary disturbance of adjacent native vegetation and the spread of weeds. Grade road shoulders or barrow ditches only when necessary to provide for adequate drainage. Minimize the width of grading operations. The BLM Authorized Officer will meet with equipment operators to ensure that they understand this objective.
Health and Safety
1. Consider nozzle type, nozzle size, boom pressure, and adjuvant use and take appropriate measures for each herbicide application project to reduce the chance of chemical drift.
2. All applications of approved pesticides will be conducted only by certified pesticide applicators or by personnel under the direct supervision of a certified applicator.
3. Prior to commencing any chemical control program, and on a daily basis for the duration of the project, the certified applicator will provide a suitable safety briefing to all personnel working with or in the vicinity of the herbicide application. This briefing will include safe handling, spill prevention, cleanup, and first aid procedures.
4. Store all pesticides in areas where access can be controlled to prevent unauthorized/untrained people from gaining access to the chemicals.
5. Do not apply pesticides within 440 yards (0.25 mile) of residences without prior notification of the resident.

Table 2.3-1 Bureau of Land Management Ely District – Best Management Practices to be Applied to the Groundwater Development Project[1] (Continued)

6. Areas treated with pesticides will be adequately posted to notify the public of the activity and of safe re-entry dates, if a public notification requirement is specified on the label of the product applied. The public notice signs will be at least 8 1/2" x 11" in size and will contain the date of application and the date of safe re-entry.
9. Properly dispose of all tailings, dumps, and deleterious materials or substances. Take measures to isolate, control, and properly dispose of toxic and hazardous materials.
10. Remove and properly dispose of all trash, garbage, debris, and foreign matter. Maintain the disposal site and leave it in a clean and safe condition. Do not allow burning at the site.
11. Do not drain oil or lubricants onto the ground surface. Immediately clean up any spills under 25 gallons; clean up spills over 25 gallons as soon as possible and report the incident to the BLM Authorized Officer and NDEP.
12. The operator will work with the BLM Authorized Officer on the containment of drilling fluids and drill hole cuttings. Adequately fence, post, or cover mud and separation pits, and hazardous material storage areas.
14. Containerize petroleum products such as gasoline, diesel fuel, helicopter fuel, and lubricants in approved containers. Properly store hazardous materials in separate containers to prevent mixing, drainage, or accidents.

[1] Numbered measures are selected from the RMP BMPs list.

The following GWD Project ROW location conformance issues were identified:

- The proposed buried water reservoir would be located in the Coyote Springs ACEC in the BLM Southern Nevada District. This ACEC is a ROW avoidance area. The proposed facilities would be located within the LCCRDA corridor, which was approved by Congress. The provisions of the LCCRDA supersede the BLM ACEC management prescriptions.
- An approximately 10-mile segment of the proposed mainline pipeline in the Delamar Valley is proposed for location outside the LCCRDA corridor under the Proposed Action, and Alternatives A through E. This segment would be located outside the LCCRDA corridor to avoid the need for an additional pumping station and to avoid an area of dense Joshua trees. Alignment Option 4 is a route option that would locate the pipeline within the LCCRDA corridor in Delamar Valley. Implementation of Alignment Option 4 would provide an opportunity to ensure that project facilities would be located within approved utility corridors.

For groundwater development facilities, the BLM would make determinations on RMP conformance in future NEPA analyses (subsequent tiers). The following are examples of potential future effects on resources that may not conform to management actions contained in the Ely District RMP:

Aquatic resources in Shoshone Ponds and vegetation resources in the Swamp Cedars and Baking Powder Flat ACECs may be affected by construction of groundwater development facilities, and aquifer drawdowns from pumping in the future. These areas are classified as avoidance areas, on which facilities may be located on a case-by-case basis. Management direction for the effects of aquifer drawdown from groundwater pumping on these ACECs is not included in the Ely District ROD management prescriptions for the ACECs (BLM 2008b), and groundwater pumping may not comply with the management prescriptions to protect the identified sensitive vegetation and other biotic communities.

Potential riparian vegetation changes related to aquifer drawdown may occur within some wilderness areas (e.g., Fortification Range, Highland Ridge, and Mount Grafton) based on estimated aquifer drawdown contours. Groundwater pumping and the related impacts may not comply with the Wilderness Act and its requirements to protect the vegetation and other biotic communities found within the wilderness areas.

The visual impacts of the future project construction may not comply with Visual Resource Management (VRM) guidelines in the RMP; a final determination of compliance would be made when site-specific facility locations are proposed and evaluated.

2.3.2 Stipulation Agreements for Monitoring, Management, and Mitigation

The SNWA has entered into several stipulation agreements with DOI bureaus (i.e., BIA, BLM, USFWS, and NPS). The agreements apply to the SNWA's water rights applications with the NSE and are not tied specifically to the water volume requests contained in the applications. The terms of these stipulation agreements currently are in full force among the parties, and were amended so that the terms of the stipulations apply to the SNWA's 1989 applications as well as the SNWA applications refiled in 2010. These agreements are intended to manage the development of groundwater by the SNWA in various hydrologic basins. This management will occur through the implementation of monitoring, management, and mitigation plans, to monitor and manage development properly without causing injury to federal water rights or unreasonable adverse effects to federal resources and special status species within a defined area of interest. A synopsis and full text of the Spring Valley and Cave, Dry Lake, and Delamar valleys agreements are included in **Appendix C**. The following sections provide an overall summary.

2.3.2.1 Spring Valley Stipulation

The stipulation describes actions that various parties will take to initiate monitoring programs, as well as the administrative structure that will be established to oversee these programs (**Appendix C**). The following is a summary of activities to be undertaken:

- Establish a system of monitoring wells within the Spring Valley and Hamlin Valley hydrologic basins, in both the alluvial and carbonate aquifers;
- Conduct constant-rate aquifer tests, groundwater chemistry sampling, and spring and stream discharge measurements;
- Establish biological resource monitoring programs;
- Prepare annual monitoring reports; and
- Will not affect Federal Resources within the boundaries of GBNP from groundwater withdrawal by the SNWA.

2.3.2.2 Cave, Dry Lake, and Delamar Valley Stipulations

The stipulations describe actions that various parties will take to initiate monitoring programs, as well as the administrative structure that will be established to oversee these programs (**Appendix C**). The following is a summary of activities to be undertaken:

- Establish a system of monitoring wells within the Cave, Dry Lake, and Delamar hydrologic basins in both the alluvial and carbonate aquifers. Establish monitoring wells in adjacent hydrologic basins (e.g., White River, Pahranagat, Pahroc);
- Conduct constant-rate aquifer tests, groundwater chemistry sampling, and spring and stream discharge measurements;
- Prepare annual monitoring reports; and
- Prepare a written Hydrologic Management and Mitigation Operation Plan that identifies and defines early warning indicators for adverse impacts.

Amendments to the Spring and Cave, Dry Lake, and Delamar valleys stipulation agreements were signed in April 2010. These amendments extend the terms and conditions of the 2006 and 2008 Spring and Cave, Dry Lake, and Delamar valleys stipulations to the SNWA applications refilled in 2010.

2.3.2.3 Snake Valley Stipulations/Draft Monitoring, Mitigation, and Management Plan for Snake Valley, Utah-Nevada

In 1989 the SNWA submitted water rights applications in five hydrographic basins (Spring, Snake, Delamar, Dry Lake, and Cave valleys) as part of a proposed project to develop a water conveyance system through Clark, Lincoln, and White Pine counties. In 2004 the Lincoln County Conservation, Recreation, and Development Act (P.L. 108-424) was signed into law. A portion of the Act required the states of Nevada and Utah to reach an agreement regarding the division of water resources for any groundwater basins located within both states, prior to any transbasin diversion. In

response to this requirement, the two states negotiated a Draft Agreement, which was released for public review on August 13, 2009. One component of this draft agreement was the division of the water identified as available for appropriation and use on an annual basis. This water quantity, based on best available data, was estimated to be 132,000 afy; of which Nevada was allocated 36,000 afy. The SNWA had previously applied for 50,697 afy of water in Snake Valley.

The NSE originally scheduled the SNWA Snake Valley water applications hearing for September or October 2009. In subsequent actions, the draft UT/NV Snake Valley Agreement specified that the NSE will not schedule a hearing for SNWA's Snake Valley applications until after September 1, 2019. This 10-year period would be used to conduct additional studies and collect data on the Snake Valley aquifer and groundwater availability. Subsequent to publication of the draft agreement and receipt of public comments, Utah and Nevada published a revised draft with minor changes. Due to circumstances outlined in Section 1.4, The Relationship of the Bureau of Land Management Decisions to the Nevada Water Rights Process, the draft agreement was tabled until the state of Nevada acted on the water rights litigation on Spring, Delamar, Dry Lake, and Cave valleys. Since Snake Valley does not currently have a mitigation/monitoring plan in place, the Utah BLM drafted a Monitoring, Mitigation, and Management Plan (commonly referred to as the "3M Plan") to provide management direction for resources on the Utah portion of the valley. This plan has been included in this draft EIS as **Appendix B**.

2.4 Environmental Inspection, Compliance Monitoring, and Post-Approval Variances

Under the FLPMA, the BLM may impose conditions on any ROW grant that it permits for the GWD Project. These conditions could include additional requirements and mitigation measures recommended in this EIS to minimize environmental impacts resulting from the construction and operation of the GWD Project (see Chapter 3). Additional requirements and mitigation measures may be included as specific conditions to the ROD issued by the BLM. It is understood that the SNWA would implement the ACMs it has proposed as part of its project unless superseded by the Ely or Las Vegas RMPs' management actions, BMPs, or USFWS Biological Order Terms and Conditions, or unless specifically modified by other ROW conditions.

The SNWA has committed to prepare a comprehensive POD that will include detailed environmental protection plans and procedures that can be implemented during construction (ACM A.1.1 in Section 2.5, Proposed Action). These plans would provide the basis for the environmental inspection program to be developed and approved by the BLM prior to the date that construction begins.

As part of the detailed environmental protection plan, environmental inspectors would be on site during all facets of project construction. These inspectors' responsibilities are to ensure that the environmental conditions attached to the BLM ROW grant and other permits and authorizations are met. During the construction phase, environmental inspectors would inspect and report to the BLM all construction and mitigation activities to ensure compliance with the requirements of environmental plans, permits, and conditions. Environmental inspectors also may oversee cultural resource and/or biological monitors that may be required to monitor and evaluate construction impacts on resources as specified in this EIS.

After construction is completed, the BLM would continue to conduct oversight inspection and monitoring. If it is determined that any of the proposed monitoring time frames are not adequate to assess the success of restoration, the SNWA would be required to extend its post-construction monitoring programs.

Surface disturbance locations and acreages identified in this EIS represent reasonable estimates for the construction, operation, and maintenance of the project up to, but not including, future groundwater development activities. However, route refinements and other project refinements often continue past the project review phase and into the construction phase. As a result, work location and disturbed acres documented in the EIS may change after project approval. These changes frequently involve minor route realignments or moving approved temporary workspaces, adding new temporary workspaces, adjusting workspaces based on site-specific conditions and adding access routes to work areas and associated workspace areas.

When work areas different from those evaluated in this EIS are needed, additional inventory and evaluation would be performed to ensure that impacts on biological, cultural, and other resources are avoided or minimized to the extent practicable. New workspace location and survey results would be documented and forwarded to the BLM in the form of a "variance request." The request would be reviewed by the BLM, consultations would be conducted, and other approvals would be obtained before the BLM would approve the variance. At the conclusion of the project, as-built drawings would be provided to the BLM. In addition, the SNWA, when working with specific requirements of the ROW (e.g., a 0.5-mile buffer from a raptor nest), could make a "variance request" if circumstances warranted (e.g., the nest is not within line of sight of the construction). The BLM would address these requests on a case-by-case basis.

2.5 Proposed Action—Distributed Pumping at Application Quantities

2.5.1 Rights-of-way

2.5.1.1 Overview

The SNWA has developed a preliminary POD (SNWA 2011, included in **Appendix E**), that provides a description of the proposed project facilities as well as the construction methods, construction schedules, and ACMs to be used. If this alternative were selected, the following project components would be approved for construction.

- **Pipelines:** Approximately 306 miles of buried water pipelines, between 30 and 96 inches in diameter, and temporary construction areas including staging areas, construction support area, plant nursery sites, construction camps, and borrow pits.
- **Power facilities:** Approximately 323 miles of 230-kilovolt (kV), 69-kV, and 25-kV overhead power lines, as well as 2 primary and 5 secondary electrical substations.
- **Ancillary facilities:** Five pumping stations, six regulating tanks, three pressure-reducing stations, a water treatment facility and buried storage reservoir, access roads, and communications facilities.

ROWs would be required across federal lands managed by the BLM, state lands (Nevada National Guard in east-central Las Vegas Valley and Steptoe Valley Wildlife Management Area), and private lands (Apex area in east-central Las Vegas Valley, land in central Coyote Spring Valley, and land in west Caliente). **Table 2.5-1** summarizes land ownership of the requested ROWs.

Key Points—Proposed Action

Under this alternative, the SNWA proposes to construct and operate a pipeline capable of conveying the full quantity of SNWA's groundwater rights and NSE applications identified in SNWA's application with the BLM.

The Proposed Action would consist of 306 miles of buried water pipelines, 323 miles of overhead power lines, 7 electrical substations, and ancillary facilities.

In the future, pumping would occur at distributed locations in 5 basins.

If approved, pumping could begin in approximately 2020 and reach full development by 2050; however, this schedule could change dependent on the impact to SNWA's other water supplies by drought conditions on the Colorado River.

Table 2.5-1 Land Ownership Percentage for the Proposed Action

Ownership	Percent of Total Acres
Bureau of Land Management	97
Department of Defense	<1
Nevada State	1
Private	2
Total	**100**

Note: Only those components that require a separate ROW are listed.

ROWs can be permanent or temporary. If the BLM decides to approve ROWs in the ROD, then permanent ROW locations and dimensions on BLM lands will be specified in the ROW grant to the SNWA. On private lands, the SNWA would either obtain easement agreements or purchase the land from private landowners.

A temporary ROW is defined as an area of land that is required for project construction purposes but then would revert to its previous use. On BLM lands, the BLM would issue temporary ROWs that contain conditions for restoring any surface disturbance. On private lands, the SNWA would either obtain temporary ROWs under easement agreements or purchase the land from private landowners.

A **permanent ROW** is defined as an area of land on which a permanent ROW is maintained. This may include areas where permanent project facilities are installed.

A **temporary ROW** is defined as an area of land that is required for project construction purposes but then would revert to its previous use.

It is estimated that total construction surface disturbance for all ROWs (pipeline and ancillary facilities) would be 12,303 acres; it is expected that 11,289 acres of temporary disturbance would be revegetated after the construction period, and that 1,014 acres would represent permanent disturbance (land committed to industrial uses over the project life).

2.5.1.2 Pipeline System

To transport the volumes of water identified by the SNWA, a total of approximately 306 miles of pipelines would be required. The pipeline system would consist of buried main and lateral pipelines (**Figure 2.5-1**). **Table 2.5-2** lists anticipated pipeline lengths (by valley) and anticipated pipe diameter. The final sizes of the pipelines would be determined during facility design.

Table 2.5-2 Pipeline Characteristics for the Proposed Action

Pipeline	Valley	Pipe Diameter (inches in diameter)	Pipe Length (miles)[1]
Main Pipeline	Spring	78	17
	Lake	78	21
	Dry Lake	84	66
	Delamar	90	23
	Pahranagat	66-78	7
	Coyote Spring	96	41
	Hidden	96	12
	Garnet	90-96	7
	Las Vegas	90	9
Spring Lateral	Spring	60	38
Snake Lateral	Snake	54	24
	Hamlin	54	10
	Spring	54	9
Cave Lateral	Cave	30	19
	Dry Lake	30	3
Total			**306**

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

The main pipeline would be between 66 and 96 inches in diameter and the route would extend between southern Spring Valley and Las Vegas Valley. Lateral pipelines could be between 30 and 60 inches in diameter, and would extend into northern Spring, Snake, and Cave valleys. All pipelines would be buried, with the exception of structures for air/vacuum valves, isolation valves, and drain valves, which might be partially buried or be installed with vents extending aboveground.

Air/vacuum valves are used to release air within the pipeline and would be located at or near all high points, grade breaks on steep slopes, and long downward-sloping pipe segments. The valves would be housed in belowground or partially buried structures, with 12- to 24-inch gooseneck pipe extending approximately 2 to 3 feet above ground.

Isolation valves would be placed along the pipeline and would stop the flow of water when in the closed position. These valves would be constructed belowground or would be partially buried, and would be remotely monitored and controlled (Section 2.5.1.8).

Figure 2.5-1 Pipeline Alignment – Proposed Action and Alternatives A through C

Drain valves, used to drain the pipeline, would be located at the lowest pipeline elevations in any segment. These valves would extend to a discharge location, such as a dry-wash channel, that would be lined with riprap if necessary to reduce or avoid erosion. Valve locations would be dependent upon elevation, and final locations would be determined during pipeline design after detailed topographic surveys have been completed. All valves would be located within the pipeline ROWs.

There would be no permanent security fencing or other permanent access restrictions on the pipeline ROWs. Temporary security and environmental exclusion fencing might be used on pipeline segments during construction.

A permanent 100-foot ROW plus an adjacent 100-foot temporary construction ROW would be required for the main and lateral pipelines. The preliminary ROW cross section, shown in **Figure 2.5-2**, is representative of contiguous pipeline and power line ROWs, which occur throughout the majority of the alignment.

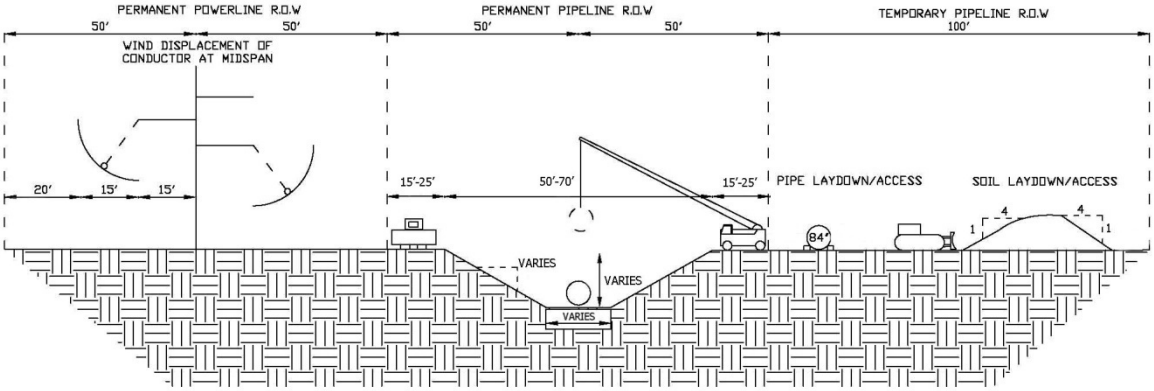


Figure 2.5-2 Preliminary Pipeline and Power Line Right-of-way Cross Section for a 96-inch Pipe

The 100-foot permanent ROW for the main pipeline would accommodate a 50- to 70-foot-wide trench at the ground surface, with a slope of up to 2:1 and a depth equal to the pipe diameter from the ground surface to the top of the pipe. For a 96-inch pipe, this would result in a trench at least 16 feet deep. The remaining permanent and temporary ROWs would be used for excavated material storage, pipe storage before installation, movement of heavy equipment, and safe personnel workspace.

Pipeline construction also would require the following temporary construction areas:

- **Staging Areas**: These areas would be used for equipment and materials storage, construction office trailers, fuel storage, equipment maintenance, and temporary stockpiling. Temporary security fencing might be used to enclose staging areas during construction. Staging areas of 3 acres would be placed approximately every 3 miles along the pipeline ROW.
- **Caliente Construction Support Area**: This area would be used for pipe and equipment storage, temporary construction management offices, and other support activities. Some or all of the pipe required for construction would be fabricated at one or more existing manufacturing plants in the western U.S. and delivered by rail or truck.
- **Temporary Plant Nursery Sites**: These sites would be used for storing cactus, yuccas, and other plants that might be salvaged from within the ROW for use in post-construction restoration.
- **Temporary Construction Camps**: These areas would be used for temporary housing of construction workers and would be located on private lands in and near existing communities. The size, number, location, and amenities of the temporary camps cannot be determined until facilities are designed and a detailed construction schedule is determined. The need for temporary camps also would vary depending upon the availability of lodging and

support services in nearby communities. Temporary camps may require permits for sanitary facilities, water, and other requirements.

- **Borrow Pits**: These sites would provide soil materials for bedding and backfilling of pipeline where existing soils are unsuitable. Eight potentially suitable sites have been identified, each of which could be partially excavated to a depth of approximately 15 feet. The borrow pits would be refilled with excess soils from excavated pipe trenches that are unsuitable for pipeline backfill.

2.5.1.3 Power Facilities

No existing electrical power distribution lines are sufficient to meet the needs of the GWD Project. Therefore, construction of a power line is identified as part of the GWD Project. The power line would begin in the south, at the Silverhawk Generating Station near Apex, and would tie into the Gonder Substation near Ely (**Figure 2.5-3**).

The anticipated power supply of approximately 97 megawatts (MW) necessary to operate project facilities would be obtained from the Silverhawk Generating Station. The SNWA owns 25 percent of that facility, which can produce in excess of 500 MW. Construction of new power generation facilities would not be required. A substation connection at the northern end of the power line provides improved reliability for system operations. The Gonder Substation is owned by Mount Wheeler Power.

Power Lines

Power lines would include 230-kV, 69-kV, and 25-kV conductors (electrical wires). Example 230-kV and 69-kV power pole configurations are shown in **Figure 2.5-4**. Wherever possible, multiple conductors would be strung on the same power pole. **Figure 2.5-3** depicts the power line alignments, including places where multiple conductor voltages would be hung on the same pole. **Table 2.5-3** summarizes anticipated power line lengths. The 230-kV power poles would be single, steel power poles. These poles would be approximately 100 feet in height and spaced approximately 800 feet apart, depending on the terrain. The 69-kV power poles would be single, steel poles. These poles would be 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. These poles would be approximately 50 feet in height and spaced approximately 500 feet apart, depending on terrain.

Table 2.5-3 GWD Project Power Lines for the Proposed Action

Power Line Conductor Voltages	Total Miles	Power Line ROW Width
230-kV Power Line	100	100
69-kV Power Line	21	100
25-kV Power Line	24	50
230-kV Power Line with 69-kV and 25-kV Underhang	46	100
230-kV Power Line with 69-kV Underhang	97	100
69-kV Power Line with 25-kV Underhang	36	100
Total[1]	323	N/A

[1] Due to rounding, the total is less than the sum of the individual miles.

The permanent ROWs needed for the 230-kV or 69-kV power poles are 100 feet wide (**Figure 2.5-2**). This width is required for safe installation of the conductors. Only a portion of the permanent ROWs would be disturbed for installation of power poles and access spur roads, where needed. The permanent ROWs needed for 25-kV power poles are 50 feet wide. Temporary ROWs for the power lines are not required because the permanent ROWs are sufficient for construction needs.

Figure 2.5-3 Power Line Alignment – Proposed Action and Alternatives A through C

Figure 2.5-4 Power Line Configurations

Electrical Substations

Two new primary electrical substations and five secondary electrical substations (**Table 2.5-4**) are required to reduce electrical voltage from the higher levels for long-distance conveyance down to the lower levels appropriate for operational needs. A primary substation would reduce power from 230 kV to 69 kV, and a secondary substation would further reduce power to 25 kV. Additional facility substations beyond those identified below could be located within facility sites (e.g., pumping stations, water treatment facility) to reduce power to operational levels.

Table 2.5-4 Electrical Substations

Primary Electrical Substations	Spring Valley South (within Spring Valley South Pumping Station site)
	Southern Dry Lake Valley
Secondary Electrical Substations	Spring Valley North
	Spring Valley South
	Snake Valley
	Cave Valley
	Coyote Spring Valley (within Coyote Spring Valley Pressure Reduction site)

The primary electrical substation requires 10 acres of land, and the secondary substations require 1 acre. Temporary ROWs would not be required for construction of the substations.

2.5.1.4 Other Ancillary Facilities

Ancillary facilities required to operate the GWD Project include pumping stations, regulating tanks, pressure reduction stations, a water treatment facility and buried storage reservoir, access roads, and communications facilities.

Pumping Stations

Five pumping stations would be required to move water across elevation grade changes: Spring Valley North, Spring Valley South, Snake Valley North, Snake Valley South, and Lake Valley. All pumping stations would be located adjacent to a main or lateral pipeline and would include:

- Utility building;
- 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 generators with fuel storage tanks;
- Mechanical systems, including heating, ventilation, air conditioning, plumbing, hoists, cranes, and compressors;
- Chemical addition facilities, where needed;
- Facility electrical substation;
- Break room and restroom, with associated septic tank and leach field; and
- Site fencing and security provisions.

Pumping stations would be contained in a concrete or concrete-block building. The approximate heights of the buildings would vary between 24 and 40 feet above grade, depending on conditions such as terrain, pump size, and

other environmental and equipment requirements. The sites would be partially paved, and non-paved areas would be covered with crushed gravel. Security fencing with a locked gate would enclose each site.

Each pumping station would include a diesel-powered standby generator large enough to operate one of the pumps for periods of up to 72 hours to maintain pressures in the event of a power outage. A diesel fuel storage tank for generator operation would be located aboveground at each site. The tank would meet current regulatory requirements for containment and would be equipped with monitoring equipment for leak detection.

The Spring Valley South Pumping Station would require a 60-acre permanent ROW (encompassing a primary electrical substation); the Snake Valley South Pumping Station would require a 10-acre permanent ROW (encompassing an outdoor storage yard). Temporary ROWs would not be required because sufficient on-site space exists for construction. The Spring Valley North, Snake Valley North, and Lake Valley pumping stations would each require 5 acres of permanent and 5 acres of temporary ROWs.

Regulating Tanks

Six regulating tanks would be constructed to regulate water flow through the pipeline in the Spring, Hamlin, Lake, Cave, Dry Lake, and Delamar valleys. The main features at each site would be a tank, rate-of-flow control structure, and retention basin.

- The steel or concrete tanks typically are cylindrical and could be between 130 and 200 feet in diameter and 30 to 40 feet in height.
- The rate-of-flow control structure automatically would regulate flow into the tank and keep it from overflowing.
- The control structure would consist of water flow meter and valves that automatically reduce pressure and control flow.
- The valves and piping would be housed in a buried or partially buried concrete structure.
- The retention basin would be sized to contain emergency overflow in case of equipment malfunction.
- Inlet and outlet piping would connect to the pipelines and regulating tank features.
- Sites would be covered by crushed gravel for dust control, and security fencing with a locked gate would enclose each site.

The regulating tank sites in the Spring, Hamlin, Lake, and Cave valleys each would require 2 acres of permanent ROW and 3 acres of temporary ROW. The sites in the Dry Lake and Delamar valleys would require 5 acres of permanent ROW because larger tanks and retention basins might be required for surge control in those areas. Additional temporary ROWs should not be required at the Dry Lake Valley and Delamar Valley sites.

Pressure-Reducing Stations

Three pressure-reducing stations would be required to reduce pressures and control flow within the pipeline, as water moves from higher to lower elevations. Two stations would be located in Dry Lake Valley, and one would be located in northern Coyote Spring Valley. These facilities would maintain water pressures to the design limits within the pipelines and facilities and would mitigate the potential for pipeline rupture caused by excessive water pressure.

- These facilities would include isolation valves, pressure-reducing valves, storage tanks, and overflow basins.
- The valves would be located in a below-ground vault.
- The storage tanks would provide a discharge point for the valves to dissipate high pressures, regulation for valve opening and closing, and surge protection.
- The Coyote Spring Valley site would be occupied by three water storage tanks, as well as a secondary electrical substation and maintenance building.

- Each Dry Lake Valley pressure-reducing station would require a 2-acre permanent ROW and 5-acre temporary ROW.
- The Coyote Spring Valley pressure reducing station, which has additional tanks and other facilities, would require a 7-acre permanent ROW and a 6-acre temporary ROW.

Water Treatment Facility/Buried Storage Reservoir

A water treatment facility and buried storage reservoir would be constructed in Garnet Valley. This location would allow treatment of the water to drinking water standards before the water enters the SNWA's potable (drinking) water system via gravity flow. On-site facilities would include:

- Chemical building;
- Operations building;
- Energy dissipater;
- Rate-of-flow control structure;
- Buried storage reservoir;
- Warehouse; and
- Outdoor storage yard.

The maximum building height is anticipated to be approximately 20 to 30 feet to allow for chemical storage and overhead cranes. The sites would be partially paved, and non-paved area would be covered with crushed gravel. The sites would be surrounded by security fencing with locked gates.

Treatment processes are anticipated to include the addition of a disinfectant (sodium hypochlorite or sodium chlorine), corrosion inhibitor (zinc orthophosphate), and fluoride (hydrofluorosilicic acid). These treatments would be accomplished by direct injection into the main pipeline. If necessary, other treatment (e.g., arsenic removal) may be added at the water treatment facility. Until the production wells are drilled and their water quality determined, the specific treatment processes cannot be determined. Chemicals required for water treatment would be stored in isolated 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. The capacity of the water treatment facility could be as much as 165 million gallons per day (mgd).

Until the production wells are drilled and their water quality determined, the specific treatment processes cannot be determined.

The buried storage reservoir would be a 40-million-gallon, belowground, covered concrete tank. This tank would be used to manage flow and delivery of the treated water before it enters the SNWA's existing water system.

A permanent ROW of 75 acres would be required for the water treatment facility and buried storage reservoir. Additional temporary ROWs for construction would not be required.

Access Roads

Access to facilities would be required for both construction and operation. The majority of the pipeline and power line alignments are sited along or adjacent to existing roads, including paved highways and improved and unimproved dirt roads. Existing roads within the pipeline ROW would be used or improved, as necessary. **Figure 2.5-5** shows the access roads required for construction and operation.

Access Roads—Proposed Action

- Paved existing road: 14 miles
- Paved new road: 5 miles
- Improved existing road: 97 miles
- Improved new road: 267 miles
- Unimproved existing road: 28 miles
- Unimproved new road: 20 miles

Figure 2.5-5 Access Roads – Proposed Action and Alternatives A through C

Short segments of unimproved spur roads from the primary access roads also would be required to access power pole sites. These spur road segments would be identified during design, when individual poles sites were selected. These power pole spur roads are not included in reported unimproved spur road lengths.

The primary access roads would be constructed within the pipeline ROW and used for transport of equipment, materials, and personnel during construction. Access roads would be prepared at the beginning of construction, by grading, installing culverts and graveling (for improved roads). At the completion of construction, the access roads would remain for facility inspections and operations access. At the completion of construction, asphalt paving would be installed on three road segments to allow for operational access between Highway 93 and the Spring Valley South Pumping Station, Lake Valley Pumping Station, and the water treatment facility/buried storage reservoir. The width of the paved and improved roads would be approximately 20 to 26 feet, to allow for 2 lanes of traffic. Unimproved roads would be used only for power line construction and would be graded dirt roads approximately 12 feet wide.

Because the access roads would be within the pipeline and power line ROWs, additional ROWs for access roads are not required, with two exceptions. For approximately 14 miles in southern Dry Lake and northern Delamar Valley, where the pipeline and power line are not contiguous, access to the power line ROW would use North and South Poleline Road. For approximately 14 miles from the Gonder Substation, the power line would use an existing adjacent power line access road. For both of these road segments, the SNWA has requested a 20-foot ROW to allow for leveling of deep ruts and minor grading, if needed.

Where the ROW parallels but would not encompass other existing access roads, the SNWA would coordinate with the BLM prior to construction to determine which roads should be reclaimed. Permanent access would be required along the entire ROW, but this access could be accomplished by using the improved access roads developed for construction within the ROW or other adjacent access roads, if available. In addition to using the ROW access roads (both new and upgraded), construction access for personnel and material deliveries would use existing roads and highways. These include Interstate 15; U.S. Highways 93, 6, and 50; and Nevada State Highways 168, 317, 318, 319, 320, 893, 894, and 487. Several unpaved roads currently maintained by Lincoln and White Pine counties also might be used:

- Cave Valley Road (from Ely into Cave Valley);
- Atlanta Road (from U.S. 93 to the pipeline alignment in Spring Valley);
- Stampede Road (from Pioche to the pipeline alignment in Dry Lake Valley);
- Pan American/Ely Springs Road (from Pioche to the pipeline alignment in Dry Lake Valley); and
- Alamo Canyon Road (from Alamo to the pipeline alignment in Delamar Valley).

Beyond normal county maintenance activities, upgrades to these roads are not anticipated, so additional ROWs would not be required.

Communications Facilities

Communications facilities would be installed concurrently with project facilities for system operation and control, data collection, communication, and security surveillance. Communication requirements would be met through the use of fiber optics, radio systems, and possibly cellular communications equipment installed at facility sites.

Conduits for fiber-optic cables would be installed along with the pipelines. The fiber-optic cables would be installed underground, in either the pipeline trench or an adjacent access road, and would be contained within the requested ROW. No additional ROW would be required.

Facility sites also may encompass radio communication facilities. Radio communication facilities include non-licensed, broad-spectrum radio to communicate between the facility and nearby wells. A radio antenna as high as 20 feet may be mounted on top of buildings or tanks on facility sites for relay of operation information from the well sites, if fiber optics is not available. No additional permanent or temporary ROW would be required.

2.5.1.5 Construction Procedures

Standard pipeline, power line, and facility construction would be used. Detailed descriptions of construction methods and procedures, including manpower and equipment estimates, are provided in **Appendix E**. The following is a general summary of the construction methods, anticipated schedule, and workforce requirements.

Prior to ground disturbance, the ROW boundaries would be surveyed and staked. Areas that require avoidance would be staked and fenced, as necessary. Temporary fencing (security, tortoise exclusion, or wildlife fencing) would be installed as needed, and clearing, grading, and plant and topsoil salvage would occur. Access roads within the ROW would be constructed or improved at the beginning of construction, and portable sanitation and water storage facilities would be provided for construction personnel.

Pipeline construction would use a standard cut-and-cover technique, with an open trench. After trench excavation, engineered bedding would be laid, pipe sections would be placed and welded, and then the trench would be backfilled and compacted. The only exceptions would be a short segment of tunnel in the Apex area (because of rugged terrain) and highway and utility crossings (which would use jack-and-bore construction). Other short areas of tunnels or jack-and-bore construction might be necessary where the pipe depth exceeds 40 feet because of topography and the need to maintain an adequate hydraulic profile. Blasting might be necessary if caliche (a hardened deposit of calcium carbonate) or large boulders are encountered during excavation. For stream crossings with flowing water, the pipeline construction technique could be jack-and-bore beneath the water or open-cut with temporary diversion of water flow, in accordance with applicable USACE and State of Nevada permit requirements. These methods would be applied to Snake Creek (a perennial stream), and to Big Wash, and Lexington Creek if they contain water at the crossing location as can occur during high-flow years; all are in Snake Valley.

Cut-and-cover technique is a simple method of construction for shallow pipeline depths where a trench is excavated and backfilled after the pipe is laid.

Jack-and-bore is a method of tunnel construction where hydraulic jacks are used to push specially made pipes through the ground behind a tunnel boring machine or shield.

Snake Creek is a perennial stream, and Big Wash and Lexington Creek might contain water during high-flow years; all are in Snake Valley.

Water would be required for construction activities, including dust control, pipe bedding, trench backfill compaction, and hydrostatic testing. The SNWA has assumed that this water would be obtained from existing wells or exploratory wells that are available at the time of construction. A construction water supply well would be needed approximately every 10 miles along the pipeline alignment, and would need to be capable of a peak rate of 800 gallons per minute (gpm). It is estimated that between 5.5 and 8.7 million gallons of construction water would be needed for every mile of pipeline, with less water needed for dust control in wet winter conditions. The SNWA anticipates that existing and future exploratory wells capable of that peak rate would likely be sufficiently available. If needed, additional temporary construction water wells would be drilled within the construction staging areas. Additional ROWs or other water supplies for construction water would not be needed. Hydrostatic testing would be conducted to pressure-test the pipeline at the completion of construction; this testing might be done in segments as individual construction contracts are completed.

Power line construction would not require clearing and grading of the entire ROW. Work areas as large as 0.5 acre would be cleared around each power pole location, and an access road or road spur to the pole location would be rough-graded. A truck-mounted rotary auger would be used to bore pole locations, and poles would be erected on site. Conductor lines would be strung using tensioning equipment. Electrical equipment would be tested and the power lines would be energized after being connected to substations and facilities.

Ancillary facility sites would be fenced, cleared, and graded, and plant and topsoil salvage would be conducted for temporary ROW areas. Excavation would be conducted as needed, and then structures would be constructed and erected on site.

2.5.1.6 Pipeline and Ancillary Facility Construction Schedule

The anticipated construction schedule is provided in **Figure 2.5-6**. The SNWA has identified that construction could begin as early as the second quarter of 2012 if projected shortage conditions on the Colorado River become a reality.

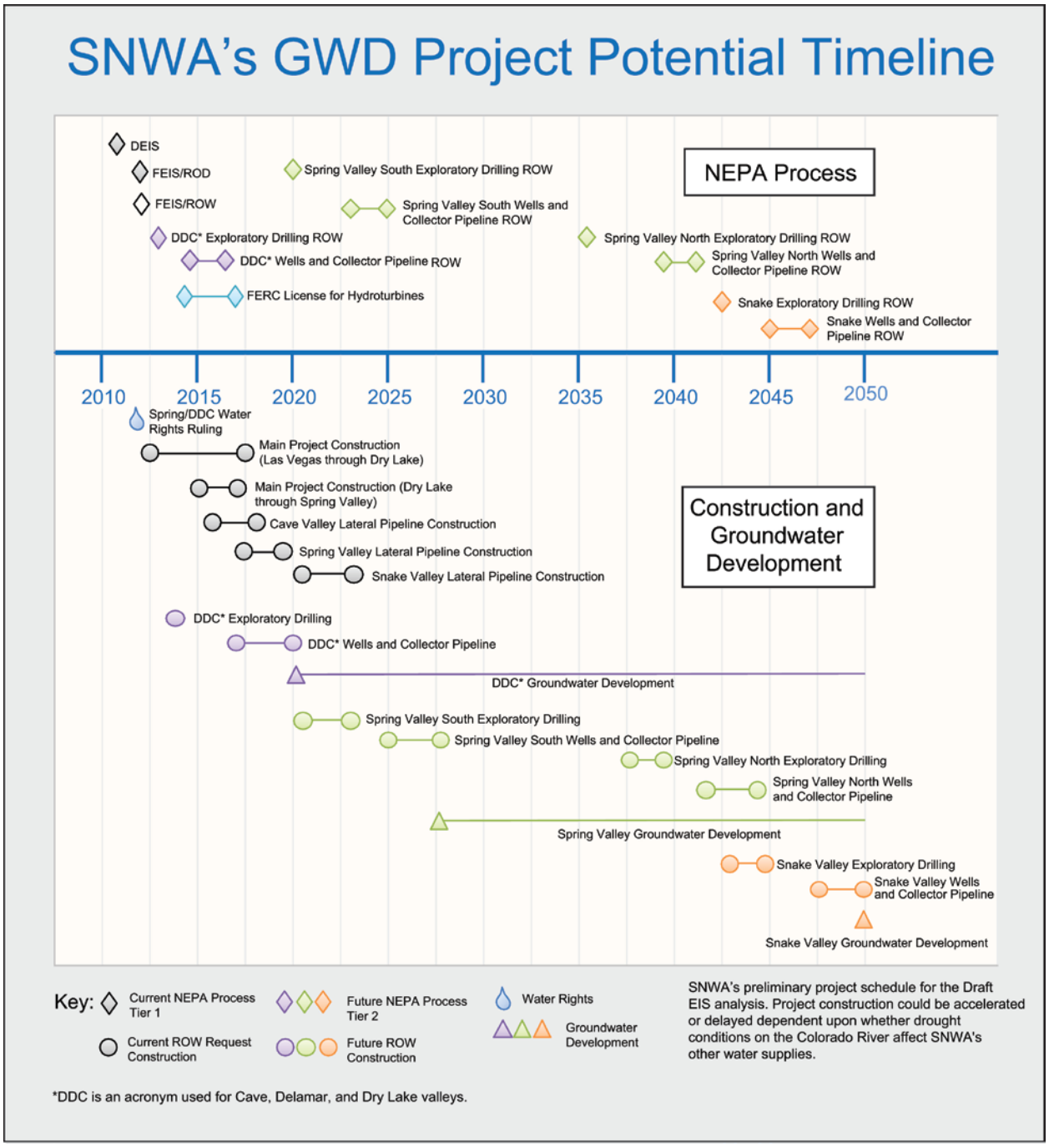


Figure 2.5-6 SNWA's Preliminary Construction Schedule for the Proposed Action

In August 2009, the SNWA's Board of Directors authorized staff to complete all necessary state and federal permitting to move forward with the project in case of this eventuality. Currently the project schedule projects the receipt of necessary ROW grants, permits, and applications in early 2012. If drought conditions improve and do not impact the SNWA's water supplies on the Colorado River, construction may be deferred for several years. In the absence of drought restrictions, the project would be constructed such that groundwater conveyance could begin by 2020. The regulating tanks and access roads would be constructed in conjunction with the pipelines and are not listed separately on the figure.

2.5.1.7 Construction Workforce

Figure 2.5-7 illustrates the construction workforce estimates, by year, for both ROW construction activities (i.e., pipeline, power lines, and ancillary facilities) over the entire project development period.

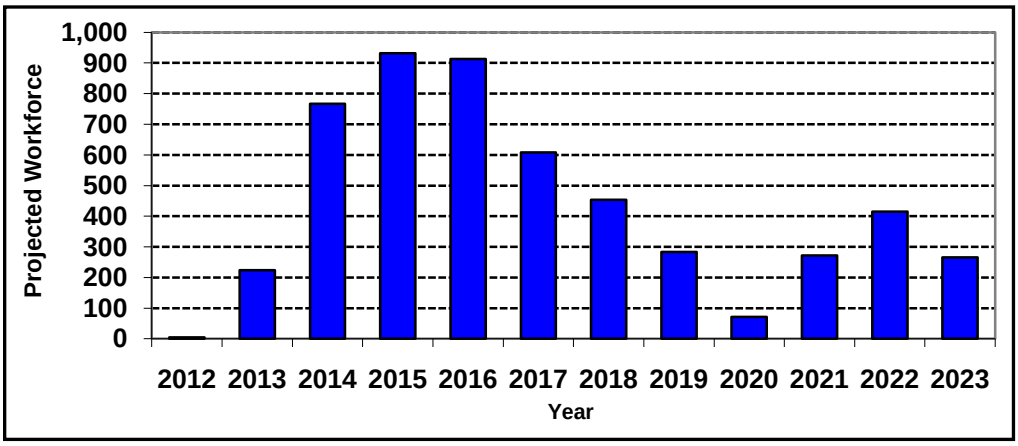


Figure 2.5-7 Construction Workforce Estimates – Proposed Action

2.5.1.8 Operation and Maintenance

The SNWA would use a remote monitoring system to continuously monitor operation of the GWD Project. This system would use fiber-optic cables installed along the pipelines to monitor overall performance, including water pressures, flow rates, power demands, and other factors. Staff would be dispatched as needed if any concerns are noted.

See the SNWA POD in **Appendix E** for estimated personnel, frequency of routine operations and maintenance activities, and consumable resource requirements.

Overall operation would be coordinated with the existing the SNWA water system. On-site personnel and the SNWA's remote monitoring and control system would track and manage facility functions.

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 ROW. The estimated personnel and frequency of routine operations and maintenance activities, plus consumable resource requirements (e.g., chemicals for the water treatment facility and power for project facilities) are detailed in the SNWA POD in **Appendix E**.

The service life of drinking water pipelines is estimated to range between 65 to 95 years (USEPA 2002). Future replacement of substantial portions of the pipeline may be subject to the NEPA and may require new approvals. The termination and abandonment would be subject to approvals by the BLM.

Pipelines

Operational activity on the pipeline would include maintenance of the ROWs and inspection, repair, and cleaning of the pipeline and valves. Aerial and ground inspections by pipeline personnel would identify areas of exposed pipeline, erosion, nearby excavation by third-party entities, encroachment on the ROW by permanent structures, vandalism, or any other conditions that could present a safety hazard or require preventive maintenance or reporting.

In the unlikely event of a system rupture or malfunction 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 shutdown. Shutdown would be sequenced to avoid buildup of dangerous pressures in the pipelines and other facilities. Valve closing times would vary between valves but is anticipated to take approximately 15 to 25 minutes to avoid over-pressurizing the pipeline (i.e., water hammer). Alarms would sound at manned facilities along the pipeline alignment and at the SNWA operations centers, triggering a plan of action to investigate the source of the problem. Depending upon location of the incident, a manned response to reach remote areas could take up to 3 hours.

In the unlikely event of a system rupture or malfunction 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.

The quantity of water that might be released in the unlikely event of a pipeline rupture or valve failure cannot be precisely quantified because it would depend upon the type and extent of a break, along with the location of the break within a pipeline segment and the closest isolation valves. The SNWA has assumed, for a conservative analysis, that pipeline isolation valves may be located up to 10 miles apart. Assuming an extremely unlikely, but worst possible scenario of catastrophic failure with complete severing of the largest diameter pipeline over a 10 mile stretch, the maximum quantity of water that could be discharged would be 24.6 million gallons. This assumption uses a 35 minute response time (10 minutes for the system to identify the location and 25 minutes to close the nearest upstream isolation valve), and does not consider the effect of decreasing flow rate during the valve closure time period on the total discharge volume (**Appendix E**).

Power Facilities

Table 2.5-5 lists the anticipated power requirements necessary to operate project facilities.

Table 2.5-5 Anticipated Operational Power Requirements for the Proposed Action

Proposed Facilities	Power (MW)
Spring Valley North Pumping Station	5
Spring Valley South Pumping Station	17
Snake Valley North Pumping Station	3
Snake Valley South Pumping Station	5
Lake Valley Pumping Station	14
Buried Storage Reservoir	<1
Water Treatment Facility	2
Anticipated Future Groundwater Wells and Associated Facilities	52 (estimated)
Total	**97 (estimated)**

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

Other Ancillary Facilities

Pumping stations, regulating tanks, and pressure reducing stations would be remotely monitored to ensure proper operation, including controlling the valves to maintain water flow through the system. Visual inspections of facilities would vary depending upon size, location, and amount of use. Pumping stations would likely be visually inspected daily, regulating tanks weekly, and pressure reducing stations 2 to 3 times per week. Routine inspections would use existing access roads and designated access roads within the ROW. No off-road or overland travel would occur for routine inspections.

An integrated control system would be developed for operation of the water treatment facility, which would be coordinated with the SNWA's other water supply facilities. Shifts of 3 to 6 operational personnel are anticipated to be present at the facility daily.

Proposed Future Facilities Key Points—Proposed Action

In the future, as many as 174 groundwater wells would be located within development areas in the 5 hydrologic basins.

Conveyance of the groundwater produced from these future wells would require new facilities, consisting of as many as 434 miles of collector pipelines, 434 miles of electrical power lines, two electrical substations, and additional ancillary facilities.

Future facilities would require additional ROWs, including as many as 5,537 acres of permanent ROW and 2,875 acres of temporary ROW.

2.5.2 Future Facilities - Proposed Action

As illustrated in **Figure 2.5-8**, a total volume of 176,655 afy is analyzed for development under the Proposed Action. The development time period also is shown. This volume reflects groundwater applications held by the SNWA that have not yet been permitted by the NSE, but are planned for development. These water right volumes have been included in the groundwater modeling and subsequent EIS analysis for this alternative.

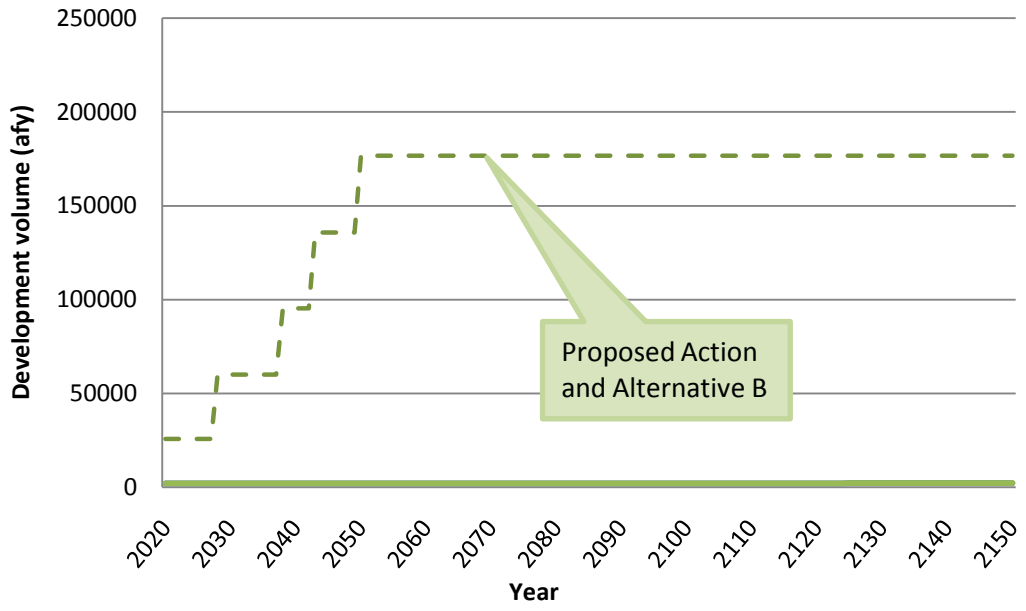


Figure 2.5-8 Groundwater Development Volumes for the Proposed Action

Groundwater pumping would be spatially distributed within the project development basins. This distribution could help minimize the pumping effects on senior water rights and on areas that contain sensitive or listed species and their groundwater-related habitat. The groundwater pumping locations would be selected by using groundwater modeling and other tools. **Figure 2.5-9** displays the groundwater development areas within which groundwater pumping would be anticipated.

Figure 2.5-9 Groundwater Development Areas – Proposed Action and Alternatives A and C

Future facilities (identified in **Table 2.5-6**) are analyzed at a programmatic level in this EIS so that the BLM can consider the entire effect of the Proposed Action. It is assumed that these future facilities would be located on federal lands that are managed by the BLM, and would be the subject of future ROW applications and associated subsequent NEPA analysis.

Table 2.5-6 Future Facilities for the Proposed Action

Facilities
Future Groundwater Production Wells (144 to 174 wells)
Spring Valley – 75-93 wells
Snake Valley – 39-48 wells
Cave Valley – 10-11 wells
Dry Lake Valley– 10-11 wells
Delamar Valley – 10-11 wells
Future Collector Pipelines (177-434 miles)
Spring Valley – 57-144 miles
Snake Valley – 20-48 miles
Cave Valley – 30-88 miles
Dry Lake Valley – 20-44 miles
Delamar Valley – 50-110 miles
Future Staging Areas
Staging Areas – 59-145 1-acre sites
Future Power Facilities
25-kV Power Line[1] (50 feet wide)
Dry Lake Valley 69/25-kV Substation
Delamar Valley 69/25-kV Substation
Hydroturbine Energy Recovery Facilities (3)[2]
Future Pumping Stations (2)
Delamar
Dry Lake
Future Access Roads
Located within ROWs

[1] The distances by valley are the same as for the collector pipelines in this table.

[2] Hydroturbines would be located on pressure reducing station sites, therefore no additional ROWs are required.

Full development of the GWD Project would require groundwater production wells, collector pipelines, and associated facilities, for which specific locations cannot yet be identified. The production well locations would be based on several factors, including but not limited to, geology, hydrology, well interference studies, environmental issues, existing senior water rights, and proximity to main and lateral pipelines. Production well locations also are subject to approval by the NSE. Because the specific locations of these facilities cannot currently be identified, the SNWA has not yet requested ROWs for them from the BLM.

For purposes of analysis, it was assumed that construction surface disturbance for all ROWS would be within a range of 3,530 to 8,265 acres; it is expected that 1,165 to 2,727 acres of temporary disturbance would be revegetated after the

construction period; and that 2,365 to 5,538 acres would represent permanent disturbance (land converted to industrial uses for the project life).

2.5.2.1 Future Groundwater Production Wells

Future groundwater production wells would be located within development areas in the five hydrologic basins, as shown in **Figure 2.5-9**. As many as 174 groundwater production wells could be required (**Table 2.5-6**).

These estimates of future production wells were based on the assumption that each well would have an average well yield of approximately 800 to 1,000 gpm. A contingency of approximately 20 percent also was considered in the estimated number of wells because production capacity would not be known until after the wells are drilled, and it could be lower than estimated. Wells also were assumed to be located at least 1 mile apart, and could be clustered in well fields, in grids of up to 4 wells.

The groundwater production wells would be drilled to depths between 1,000 and 2,000 feet in basin-fill and bedrock. The production well pumping equipment would be housed within a concrete block or pre-cast concrete structure for protection from vandalism and the elements. Electrical facilities, heating, ventilation, air-conditioning equipment, and control facilities would be located in each structure as required.

Depending upon the water quality at each well site, groundwater treatment facilities might be required on site, in or adjacent to the well building. Any treatment facilities would be equipped with secondary containment in accordance with Occupational Safety and Health Administration standards. Any sludge generated from the filtration would be disposed of in a permitted landfill.

Each well site is anticipated to require a permanent ROW of 1.5 acres, with an additional temporary 0.5-acre ROW for construction.

2.5.2.2 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 them (**Table 2.5-7**). Currently, the collector pipelines are anticipated to range from 10 inches in diameter (where connected to a single well) to 30 inches in diameter (where connected to more than 3 wells).

Table 2.5-7 Future Collector Pipelines

Hydrologic Basin	Pipeline Length	Assumptions
Spring Valley	57 to 144 miles	Assumes wells might be clustered in groups of 4 wells, with each cluster located 3 to 6 miles from the main or lateral pipeline
Snake Valley	20 to 48 miles	Assumes wells might be clustered in groups of 4 wells, with each cluster located 2 to 4 miles from the lateral pipeline
Cave Valley	30 to 88 miles	Assumes individual wells might be located 3 to 8 miles from the lateral pipeline
Dry Lake Valley	20 to 44 miles	Assumes individual wells might be located 2 to 4 miles from the main pipeline
Delamar Valley	50 to 110 miles	Assumes individual wells might be located 5 to 10 miles from the main pipeline

Because 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, assumptions as to the potential distances of future collector pipelines can be made based on the assumed number of future groundwater production wells. **Table 2.5-7** lists the estimated miles of collector pipeline per valley and the associated assumptions.

The collector pipelines would require a 50-foot permanent ROW and an adjacent 50-foot temporary ROW. A temporary construction staging area also might be required every 3 miles along the collector pipelines.

2.5.2.3 Future Power Facilities

Additional distribution power lines and substations would convey power to the future groundwater production wells and future pumping stations. The future power lines would be overhead 25-kV power lines, routed along the future collector pipeline alignments. Thus, the length of new overhead 25-kV power lines is assumed to be the same as the collector pipeline lengths. Additional 25-kV conductors might need to be hung on the power poles that are constructed as part of the GWD Project primary power supply system. The ROW width requirements for future distribution power lines (25 kV) would be 50 feet of permanent ROW.

Additional secondary substations might be required to reduce power from 69 to 25 kV and to provide operational power to future groundwater production wells and pumping station. Their locations would depend on the specific locations of the groundwater production wells and pumping stations. However, an additional 69/25-kV substation probably would be required in both Dry Lake and Delamar valleys. Each of the future substations would require a site of about 1 acre.

2.5.2.4 Future Ancillary Facilities

Pumping Stations

Two future pumping stations would be required to convey water from some of the future groundwater production well areas into the main and lateral pipelines. Based on known topography, a pumping station in Dry Lake Valley and one in Delamar Valley might be required. These facilities would be similar to the Lake Valley pumping station (Section 2.5.1.4). Five acres of permanent and 5 acres of temporary ROW would be required for each pumping station.

Access Roads

Access roads to future facilities would be located within the collector pipeline ROW. These might be either new roads or improvements to existing roads within the ROW. The road improvements could include grading, widening, and installing culverts, where needed. Gravel might be applied in some areas, if necessary, to maintain road conditions. Improved dirt roads would be 20 feet wide. No additional permanent or temporary access road ROWs would be required because the roads would be located within the collector pipeline ROW.

Communications Facilities

Communications facilities would be installed along with groundwater production wells, collector pipelines, and other facilities for system operation and control, data collection, communication, and security surveillance. Conduits for fiber-optic cables could be installed along with the collector pipelines. The fiber-optic cables would be installed underground in either the pipeline trench or adjacent access road, and would be contained within the requested ROW. No additional ROW would be required.

Hydroturbines

Hydroturbines may be installed in the future to generate electrical power as the water flows from higher to lower elevations. These facilities would be built belowground, with turbines placed within pipeline bypass piping. Electrical power generated by the hydroturbines would be used by the GWD Project or added to the utility grid. For operation of future facilities, it is estimated that future hydroturbines installed at the pressure reducing station sites could generate approximately 62 MW of power. The hydroturbines would be located within other sites and additional ROW is not anticipated to be required, but these facilities would require permitting through the Federal Energy Regulatory Commission (FERC).

Future Right-of-way Requirements

Future distribution power lines (25 kV) would require 50-foot-wide permanent ROW. Each of the future substations may require a 1-acre site.

2.5.2.5 Future Construction and Operations

Future construction methods would be similar to those described in Section 2.5.1.5 and would be in compliance with applicable federal and state regulations and the BLM and industry standards at the time of construction. Estimated future workforce requirements are identified in **Figure 2.5-7**.

Future operations would be similar to those described in Section 2.5.1.8 and would be in compliance with applicable federal and state regulations and the BLM and industry standards at the time of operation.

2.5.2.6 Abandonment

The ROW would be granted in accordance with the FLPMA, the SNPLMA, and the LCCRDA. In accordance with the LCCRDA and the SNPLMA, the ROW is granted in perpetuity. Termination and abandonment are not anticipated, unless exceptional circumstances should arise. In such a case, the termination and abandonment would be subject to approvals by the BLM. Termination and abandonment plans would be written in accordance with current management procedures and would be submitted to the BLM in advance of any associated actions. If the GWD Project were to be abandoned in part or in whole, the ROW would revert to the land managing agencies.

If upgrade or replacement of facilities is required, the SNWA would coordinate with the BLM prior to initiating major construction, in accordance with applicable stipulations of the final ROW grant.

2.5.3 Applicant-committed Environmental Protection Measures

The following section describes ACMs to which the SNWA has committed for the Project. Because of the large number of individual measures that are presented in the POD for the GWD Project, the protection measures are presented here in summary form. A complete listing of all SNWA ACMs for this project can be found in **Appendix E**.

SNWA's ACMs address construction procedures and operational practices, and identify specific measures to address environmental resources. Additionally, the ACMs include programmatic measures to address future development, operations, and regional water-related effects.

2.5.3.1 Applicant-committed Environmental Protection Measures

A. ROW Measures

1. General Construction Measures

- SNWA will obtain necessary permits and approvals prior to commencing construction.
- (ACM—A.1.1) The SNWA will complete a detailed POD for the final project approved by the BLM. More than one POD may be developed if the project is constructed in phases. The detailed POD(s) will incorporate mitigation contained in the ROD and provide detailed project design and construction specifics, including but not limited to construction contract timing and phasing, construction access roads and ROW entry points, locations of refueling and equipment maintenance, hydrostatic discharge locations, areas of fencing for special status species, and other details. The POD(s) shall contain detailed plans, including, but not limited to, those listed below. The BLM will review and approve the POD(s) prior to notice to proceed for any surface disturbance activity.
  - Agency Coordination Plan
  - (ACM—A.1.50) Blasting Plan
  - (ACM—A.1.1) Construction Plan
  - (ACM—A.1.28 to 37) Construction Traffic Management Plan
  - (ACM—A.10.1) Dust Control Plan
  - Emergency Response Plan
  - (ACM—A.1.47) Fire Prevention Plan
  - (ACM—A.1.51, 62, 64) Hydrostatic Discharge Plan
  - (ACM—A.1.26, 35, 58, 81 to 89, A.2.12, 13) Integrated Weed Management Plan
  - Mitigation Plan
  - (ACM—A.1.6) Public Information Plan
  - (ACM—A.1.25, 27, 66 to 89) Restoration Plan

- (ACM—A.1.43 to 46, 55) Spill Prevention, Control, and Countermeasure Plan
- (ACM—A.1.53 to 68) Stormwater Pollution Prevention Plan

- (ACM—A.1.1) The Construction Plan shall describe a process under which changes from the POD can be requested in the field during construction. The SNWA may make a written request to the BLM for a site-specific variance, and the BLM shall respond to the SNWA's request for a variance within five business days. Changes may require additional clearances and environmental compliance to be completed, and would be authorized by the BLM's Authorized Officer.
- (ACM—A.1.2) The SNWA will provide a Compliance Inspection Contractor for the project. The Compliance Inspection Contractor will provide environmental oversight and compliance/regulatory activities on behalf of the BLM during construction activities of the project. The Compliance Inspection Contractor will be responsible for ensuring that the ROW holder complies with all terms, conditions, stipulations and other measures required for the project, and will have the authority to halt activities that are in non-compliance.
- (ACM—A.1.9) The SNWA will survey and clearly delineate construction areas with stakes or fencing to ensure that work activities occur within the permitted area and to identify and protect sensitive resources.
- (ACM—A.1.10) The SNWA will conduct biological and cultural surveys to determine the potential presence of sensitive resources within the ROW permitted area.
- (ACM—A.1.12 to 18) As necessary, temporary fencing may be erected to enclose certain work areas and used to exclude wildlife from construction areas. Permanent fencing will be used at facility sites.
- (ACM—A.1.20, 23) Clearing procedures will crush vegetation to avoid topsoil stripping in areas to be disturbed only by vehicle traffic. In areas where topsoil stripping is required, topsoil handling procedures are identified to avoid mixing of topsoil with subsoils, minimize loss of topsoil to erosion, and avoid the spread of noxious weeds.
- (ACM—A.1.28) The Construction Traffic Management Plan addresses operating procedures and coordination approaches with the BLM and other agencies to minimize traffic congestion and provide safety measures during construction.
- (ACM—A.1.30 to 37) These measures involve maintaining public access routes within the ROWs or identifying detour routes during construction activities (A.1.30), signing and traffic controls during construction (A.1.31), use of signs and persons with flags to direct construction traffic (A.1.32), designated construction entry locations into the ROWs and measures to stabilize or prevent sediment trackout (A.1.33 to 35), maintenance of unpaved roads during construction (A.1.36), and access road restoration at completion of construction (A.1.37).
- (ACM—A.1.51, 53 to 65) The POD will identify procedures that will be used during construction to control storm water runoff and to reduce erosion. Examples of these procedures include minimum setbacks for refueling and soil storage at jurisdictional waterways, the installation of temporary and permanent erosion and sediment control measures (e.g., berms, silt fencing), and energy dissipating devices for non-storm water discharges.
- (ACM—A.1.22, 66 to 68) During restoration, terrain will be regraded to match surrounding topography to the extent practical. Stabilizing measures, such as riprap, will be used at certain drainages and washes to protect facilities and reduce erosion.
- (ACM—A.1.68 to 81) The Restoration Plan will identify reclamation objectives and methods; seeding mixes and application rates; cactus and yucca salvage, maintenance, and replanting procedures within Mohave Desert habitat; enhanced restoration efforts for ACECs; restoration success standards; and follow-up monitoring and reporting.
- (ACM—A.1.26, 82 to 89) Implementation of procedures identified within the Integrated Weed Management Plan will minimize the spread of noxious weeds. Procedures will include pre-treatment of areas currently infested by noxious weeds; use of materials (e.g., borrow or fill material, hay, straw, seed

mixes) that are certified free of noxious weeds; use of vehicle cleaning stations; and use of herbicides as necessary.

2. Operational Practices

   - (ACM—A.1.29, A.2.1) During operations, access will occur only along established access roads. Vehicle speed limit will be set at 25 mph along dirt roads to minimize dust and to reduce the chance of striking wildlife.
   - (ACM—A.1.40, 41, 43 to 46; A.2.2, A.2.5, 3) The POD will address operational procedures to minimize environmental impacts during operations, including handling and disposal of waste (hazardous and non-hazardous materials) and maintenance of permanent erosion control structures.
   - (ACM—A.2.4) The pipeline and its facilities will be equipped with pressure and flow sensors to indicate a major release or rupture of the pipe. Valves will be placed at locations to minimize the potential volume of water released in the event of a rupture. If a release occurs, personnel will be dispatched immediately to evaluate and repair any failure.
   - (ACM—A.2.1, 6, 7, 8) Routine maintenance will occur within the ROW. If additional temporary workspace outside the ROW is required for facility repairs, replacements, or improvements, BLM approval will be required prior to activities outside the ROW.
   - (ACM—A.2.9, 10) On the BLM lands, vegetation restoration success, and noxious weed conditions will be monitored for 7 years post-construction. Results will be reported annually to the BLM. If monitoring indicates that vegetation success will not meet restoration success standards, restoration activities may be revised and remedial measures implemented, subject to the BLM approval.
   - (ACM—A.2.9) Vegetation restoration success on private lands will be coordinated with the landowner.
   - (ACM—A.2.11) In the unlikely event of a system rupture, the SNWA will coordinate with the BLM to implement appropriate restoration measures.

3. Geologic Hazards and Soils

   - (ACM—A.3.1 and 2) In areas where active geological faults have been identified, or in the "fissures" area of Dry Lake, additional design features will be implemented to increase pipeline integrity, reducing the chance of pipeline failure in the event of earth movement.

4. Water Resources

   - (ACM—A.4.1) Construction across Snake Creek and Big Wash will use industry-accepted best management practices and be conducted in accordance with the CWA permitting requirements to minimize impacts.

5. Biological Resources

   - (ACM—A.5.1) For applicable portions of the project, the SNWA will comply with the Clark County Multiple Species Habitat Conservation Plan to minimize overall impacts to species in the area.
   - (ACM—A.5.2, 7) The BLM-approved qualified biologists will monitor construction and ensure compliance with mitigation measures, regulations, and other agreements. Monitoring and compliance updates will be provided to the BLM throughout construction.
   - (ACM—A.5.5) Wildlife will not be harassed or intentionally harmed. Wildlife that become entrapped in trenches and that cannot escape on their own will be removed by qualified monitors.
   - (ACM—A.5.3) All necessary federal and state permits for handling special status species will be obtained.
   - (ACM—A.5.6) Prior to discharge of hydrostatic water, drainage locations will be surveyed for special status species and nesting migratory birds. If these species are found, then the BLM will be notified and additional mitigation measures implemented, if necessary.

- (ACM—A.5.8) Perch deterrents will be used on power lines to limit hunting perches for raptors and corvids, reducing depredation on sage-grouse, pygmy rabbit, and desert tortoise.
- (ACM—A.5.9) In areas where sensitive plant species were identified in previous surveys, either within or adjacent to the ROW, pre-construction surveys will be conducted during appropriate periods to determine the presence of special status plant species.
- (ACM—A.5.9 and 11) For special status plants located within the construction area, locations will be recorded for subsequent salvage or seed collection in the event that relocation of construction area is not possible.
- (ACM—A.5.10, 15) The SNWA will adjust construction activities to the extent practical to avoid construction within special status plant species locations. Exclusion fencing will be used and compliance monitors will ensure the area is protected from construction impacts.
- (ACM—A.5.12, 13) The SNWA will consult with the BLM regarding discoveries of special status species located within the ROW. The on-site biological monitor will have the authority to temporarily halt construction activities to protect special status species.
- (ACM—A.5.14) The SNWA will avoid using herbicides within or around exclusion areas created for special status plant species.
- (ACM—A.5.16 to 36) For desert tortoises and desert tortoise eggs, specific procedures are identified for handling and relocation to avoid harm and to maximize the likelihood for continued survival. USFWS-approved survey protocols will be followed for desert tortoise, unless determined to be unnecessary by the USFWS. Other measures include examination and excavation of burrows, exclusion fencing, biological monitoring, and reporting.
- (ACM—A.5.37 to 39) For banded Gila monster and chuckwalla, specific protection measures by qualified biologists include pre-construction surveys in suitable habitat following NDOW Gila monster protocol, examination and excavation of burrows, handling and relocation procedures, and reporting.
- (ACM—A.5.40 to 48) For burrowing owls and kit fox, specific procedures are identified for pre-construction surveys in suitable habitat during nesting season, examination of burrows, creation of avoidance areas using construction fencing, excavation and intentional destruction of burrows in ROW, mitigation for burrows destroyed during construction, relocation, and biological monitoring. If burrows are occupied by nesting burrowing owls or dening kit foxes, the area will be avoided until the young have left the area or have been relocated by qualified biologists, in coordination with and approval of the BLM and NDOW.
- (ACM—A.5.49 to 56) For greater sage-grouse, specific protection measures include facility siting criteria, biological monitoring, limitations on nighttime lighting, construction timing restrictions, enhanced restoration measures, and habitat enhancement.
- (ACM—A.5.57 to 60) For pygmy rabbit, specific protection measures include surveys, habitat improvement, livestock management, and enhanced restoration measures.
- (ACM—A.5.61) For the desert valley kangaroo mouse, qualified biologists will trap and relocate individuals within documented habitat within Dry Lake Valley.
- (ACM—A.5.62 to 69) For migratory birds (including raptors), specific protection measures include use of predictive models to identify critical nesting periods and locations, potential use of pre-construction ground clearing or tree removal, surveys, use of exclusion areas, adherence to recommendations to avoid electrocution or collisions with power lines and poles, construction monitoring, and compliance reporting.
- (ACM—A.5.70 to 76) For big game and wild horses, specific protection measures include provisions to allow seasonal movements across the ROW, ensuring water sources are available during construction and operations, consultation with the BLM and the NDOW to identify potential big game mitigation, and prioritization of restoration in important habitat areas.

- (ACM—A.5.77 to 78) For game fish, best management practices, including habitat compensation, will be implemented in Snake Creek and, if a high water year, in Big Wash.

6. Paleontological Resources

   - (ACM—A.6.1 to 3) A field survey will occur in areas of high potential for paleontological resources. Areas of high potential will be monitored during construction and any fossils discovered will be recovered and curated.

7. Cultural Resources

   - (ACM—A.7.1 to 8) The SNWA will enter into a PA with appropriate entities that will identify survey methodologies, mitigation measures, treatments (including avoidance), protection and proper handling of cultural resources and human remains discovered during construction and operations, and reporting requirements.

8. Land Use and Range Management

   - (ACM—A.8.1) In advance of construction, the SNWA will coordinate with the BLM and grazing permit holders regarding access and grazing practices.
   - (ACM—A.8.2) Range improvements and livestock watering sources that are affected by construction will be restored to the BLM standards and be functional by the completion of construction.
   - (ACM—A.8.3) The SNWA will compensate owners for livestock struck by vehicles during construction.
   - (ACM—A.8.4) Alternative water sources will be provided to livestock if access is temporarily restricted by construction.

9. Noise

   - (ACM—A.9.1 to 4) Construction equipment and facilities will be operated in a manner to avoid unreasonable noise disturbances.

10. Air Quality

    - (ACM—A.10.1 and 2) Fugitive dust control permits will contain a Dust Control Plan describing mitigation measures specific to the area and type of construction activities that will occur.
    - (ACM—A.10.3) Tackifiers will be used for dust control.
    - (ACM—A.10.4 and 5) Air quality permits for stationary sources (e.g., rock crushers, internal combustion engines at facilities) will include operating requirements, reporting requirements, and pollution emission limits.

11. Visual Resources

    - (ACM—A.11.1) Facilities will be designed and painted or constructed of colored block to minimize visual impacts.
    - (ACM—A.11.2 and 3) During construction and operation, use of nighttime lighting will be minimized, with lights shielded and directed downwards.
    - (ACM—A.11.4) Artificial varnish will be used to minimize impacts on disturbed rock faces in the Pahranagat Canyon area.

12. Socioeconomics

    - (ACM—A.12.1, 3, and 4) The SNWA will use local workers and resources as available. A Project Labor Agreement will cover the construction of the pipeline. The SNWA will work with labor unions and local governments to develop local trade resources.
    - (ACM—A.12.2) The SNWA will pay White Pine County for property taxes and lost revenue associated with the purchase of private property in Spring Valley.

B. Programmatic Measures – Future ROWs

1. Planning and Design

- (ACM—B.1.1 and 3) Siting of future facilities will consider collocation opportunities and avoidance of sensitive environmental areas (e.g., wetlands, cultural resource sites).
- (ACM—B.1.2) Monitoring wells will utilize solar panels for power to the extent practical.
- (ACM—B.1.4) Groundwater production well sites will be housed with security fencing and lighting and designed to minimize visual impacts.

2. General Construction Practices

- (ACM—B.2.1) All necessary notices, permits, and waivers for drilling wells will be submitted or obtained from the NSE. Well abandonment and plugging will be in accordance with Nevada Department of Water Resources requirements.
- (ACM—B.2.2 and 3) Water generated during drilling or from hydrostatic testing will be discharged into dry washes, as feasible, and will follow practices designed to control flow of water and minimize erosion.
- (ACM—B.2.4) Use of nighttime lighting will be minimized, with lights shielded and directed downwards.

3. General Operation Practices

- (ACM—B.3.1) Water levels and discharges will be recorded as required by applicable permits and agreements.

4. Water Resources

- (ACM—B.4.1) Exploratory wells unsuitable as production wells will be converted to groundwater monitoring wells.

5. Biological Resources

- (ACM—B.5.1) Groundwater production wells and power lines will not be sited within 0.25 mile of active sage-grouse leks. Collector pipelines will be similarly restricted unless built within an existing road and constructed outside of the sage-grouse breeding season.

C. Regional Water-Related Effects

- The general extent of regional water-related effects associated with the SNWA's groundwater withdrawal for the GWD Project is being estimated using groundwater modeling. Since the precise nature, extent, or location of water-related effects cannot yet be determined, the SNWA has identified a suite of potential ACMs that may be implemented, as needed, to avoid, minimize or mitigate potential water-related effects associated with the SNWA's groundwater withdrawals. Measures in this section are identified in two categories: 1) measures from the SNWA agreements and NSE water right permit conditions, and 2) adaptive management measures.
- SNWA has committed to a number of monitoring, management, and mitigation requirements under pre-existing agreements and NSE conditions, including:
  - Stipulation with DOI agencies on Spring Valley water rights (Spring Valley Stipulation);
  - Stipulation with DOI agencies on Cave, Dry Lake, and Delamar valleys (Cave, Dry Lake, and Delamar valleys Stipulation);
  - Spring Valley Hydrologic Monitoring and Mitigation Plan as determined by the NSE after the applications are reconsidered;
  - State of Utah Conservation Agreement for Least Chub; and
  - State of Utah Conservation Agreement for Columbia Spotted Frog.

- The SNWA is working on development of a Candidate Conservation Agreement with assurances to provide benefit to specific species (greater sage-grouse, northern leopard frog, and pygmy rabbit) that occur on the SNWA private properties in Spring Valley and associated grazing allotments. When those agreements are completed, other pertinent measures will be added.
- The SNWA has developed an Adaptive Management Plan to outline a process that would collect baseline data, identify environmental indicators and establish adaptive management thresholds, conduct monitoring of environmental indicators and the SNWA's groundwater pumping, determine whether the SNWA's groundwater pumping has likely caused or contributed to adverse environmental impacts, and if so, then to determine the appropriate adaptive management strategy to avoid future adverse environmental impacts and minimize or mitigate those that have already occurred.

D. Measures from the SNWA Agreements are summarized in Section 2.3.2, and full text is contained in **Appendix C**.

2.6 Comparison of Alternatives to the Proposed Action

The following sections compare the Proposed Action to the other alternatives being analyzed in this draft EIS. An overview of the ROW alternatives and their associated facilities are summarized in **Table 2.6-1**. See **Table 2.6-2** for a tabular comparison summary of the alternatives.

Table 2.6-1 Comparison of Project Main Pipeline Right-of-way Alternatives and Groundwater Development Scenarios (see text for detailed descriptions)

Alternative	Main Pipeline ROW Description	Groundwater Development Scenario
No Action No Project Pumping	No ROW granted.	Existing water development would continue.
Proposed Action Distributed Pumping at Application Quantities	All requested ROWs for a main pipeline of up to 96 inches in diameter, lateral pipelines, and associated ancillary facilities, required for this alternative.	Facilities to pump up to 176,655 afy of new applications from 5 basins at distributed locations.
A Distributed Pumping at Reduced Quantities	All requested ROWs for a main pipeline of up to 96 inches in diameter, lateral pipelines, and associated ancillary facilities required for this alternative.	Facilities to pump up to 114,755 afy of new applications from 5 basins at distributed locations.
B Point of Diversion Pumping at Application Quantities	All requested ROWs for a main pipeline of up to 96 inches in diameter and lateral pipelines, and associated ancillary facilities, required for this alternative.	Facilities to pump up to 176,655 afy of new applications from 5 basins at or near Points of Diversion.
C Intermittent Pumping at Reduced Quantities	All requested ROWs for a main pipeline of up to 96 inches in diameter and lateral pipelines, and associated ancillary facilities required for this alternative.	Facilities to pump a potential range of volumes from 12,000 afy to 114,755 afy of new applications from 5 basins at distributed locations; groundwater pumping over intermittent periods, based upon drought conditions and availability of Colorado River water.
D Distributed Pumping at Reduced Quantities in Lincoln County Only	ROWs for a main pipeline of up to 78 inches in diameter, lateral pipelines, and associated ancillary facilities required for this alternative within Clark and Lincoln counties only, as authorized under the LCCRDA.	Facilities to pump up to 78,755 afy of new applications from 4 basins at distributed locations (Cave, Dry Lake, and Delamar valleys and a portion of Spring Valley) in Lincoln County only.
E Distributed Pumping at Reduced Water Quantities in Spring, Cave, Dry Lake, and Delamar valleys	ROWs for a main pipeline of up to 78 inches in diameter and lateral pipelines, associated ancillary facilities required for this alternative from within Spring, Cave, Dry Lake, and Delamar valleys.	Facilities to pump up to 78,755 afy of new applications from 4 basins at distributed locations within Spring, Cave, Dry Lake, and Delamar valleys.

Table 2.6-2 Comparison of the Clark, Lincoln, and White Pine Counties GWD Project EIS Alternatives

	No Action	Proposed Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
ROW and Facility Requirements							
Pipeline (miles)	0	306	306	306	306	225	263
Electric Power Lines (miles)	0	323	323	323	323	208	280
Electrical Substations (number)	0	7	7	7	7	4	6
Pumping Stations (number)	0	5	5	5	5	2	3
Regulating Tanks (number)	0	6	6	6	6	5	5
Pressure-reducing Stations (number)	0	3	3	3	3	3	3
Water Treatment Facility/Buried Storage Reservoir (number, location)	0	1 (Garnet Valley)	1 (Garnet Valley)	1 (Garnet Valley)	1 (Garnet Valley)	1 (Garnet Valley)	1 (Garnet Valley)
Access Roads (total miles)	0	431	431	431	431	315	388
Power Requirements (MW)	0	97	74	97	74	54	55
Estimated Construction Surface Disturbance	0	12,303	12,303	12,303	12,303	8,843	10,696
Temporary Disturbance Area to be Revegetated	0	11,289	11,289	11,289	11,289	8,020	9,736
Permanent Disturbance	0	1,014	1,014	1,014	1,014	823	960
Conceptual Analysis – Groundwater Development Plan							
Current Groundwater Production (afy)[1]	105,700	0	0	0	0	0	0
Volume of Developed Groundwater (afy)	0	176,655	114,755	176,655	12,000[2] to 114,755[3]	78,755	78,755
Year of Full Development	NA	2050	2050	2050	2050	2043	2049
Well Locations	NA	5 basins; dispersed well sites	5 basins; dispersed well sites	5 basins; well sites within 1 mile of 34 Points of Diversion	5 basins; dispersed well sites	4 basins; dispersed well sites	4 basins; dispersed well sites
Intermittent Pumping	No	No	No	No	Yes	No	No

Table 2.6-2 Comparison of the Clark, Lincoln, and White Pine Counties GWD Project EIS Alternatives (Continued)

	No Action	Proposed Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Programmatic Analysis – Future Facilities							
Groundwater Production Wells (number, distribution)	0	144 to 174 within 5 basins; dispersed within the groundwater development area	97 to 117 within 5 basins; dispersed within the groundwater development area	136 within 5 basins; within 1-mile radius of 34 Points of Diversion	97 to 117 within 5 basins; dispersed within the groundwater development area	69 to 83 within 4 basins; dispersed within the groundwater development area	69 to 83 within 4 basins; dispersed within the groundwater development area
Collector Pipelines (miles)	0	177 to 434	100 to 246	236	100 to 246	127 to 206	86 to 210
Staging Areas (number of 1-acre sites)	0	59 to 145	33 to 82	79	33 to 82	42 to 69	29 to 70
Electric Power Lines (miles)	0	177 to 434	100 to 246	236	100 to 246	127 to 206	86 to 210
Total Construction Disturbance	0	3,530 to 8,265	2,035 to 4,732	4,585	2,035 to 4,732	2,470 to 3,936	1,725 to 3,987
Temporary Disturbance Area to be Revegetated	0	1,165 to 2,727	672 to 1,562	1,513	672 to 1,562	815 to 1,299	569 to 1,316
Permanent Disturbance	0	2,365 to 5,538	1,363 to 3,170	3,072	1,363 to 3,170	1,655 to 2,637	1,156 to 2,661
Ancillary Facilities							
Pumping Stations	0	2	2	2	2	2	2
Substations	0	2	2	2	2	2	2

[1] The groundwater production estimate is the current use volume (total of the No Action sources evaluated in the groundwater modeling analysis).

[2] Includes 3,000 afy of the SNWA water rights that will be transferred to Lincoln County Water District.

[3] Range of values is based on minimum and maximum conveyance volumes during intermittent pumping.

2.6.1 Alternative A, Distributed Pumping at Reduced Quantities

All requested ROWs for a main pipeline of up to 96 inches in diameter, lateral pipelines, and associated ancillary facilities would be required for this alternative. Alternative A is based on a reduced volume of groundwater development based on previously granted groundwater rights in Spring, Cave, Dry Lake, and Delamar valleys totaling 78,755 afy. These rights were subsequently vacated on appeal to the Nevada Supreme Court. In addition, 36,000 afy are assumed for Snake Valley; the amount of groundwater rights described in the Draft Snake Valley Stipulation Agreement between the states of Nevada and Utah. This alternative provides a benchmark to indicate the factors the NSE considered in granting

SNWA its water rights in the Spring and Cave, Dry Lake, and Delamar valleys and incorporates the Draft Snake Valley Stipulation Agreement between the states of Nevada and Utah when considering the proposed development volume in Snake Valley. Under this alternative, groundwater wells would be distributed across the hydrologic basins with the objective of minimizing effects on senior water rights or areas containing water-dependent sensitive or listed species and their habitats.

Alternative A ROWs would be the same as the Proposed Action for the following project components:

- Construction schedule for mainline pipeline and associated facilities (**Figure 2.5-6**);
- Land Ownership (**Table 2.5-1**);
- Overall land requirements (**Table 2.6-2**);
- Mainline pipeline and ancillary facilities, and construction and operation procedures (Sections 2.5.1.5 through 2.5.1.8);
- Construction schedule and workforce requirements (**Figures 2.5-6** and **2.5-7**); and
- ACMs (Section 2.5.3).

Alternative A differs from the Proposed Action as follows:

- The volume of groundwater developed would not exceed 114,755 afy (**Figure 2.6-1**), which is 61,900 afy less than the Proposed Action. This alternative would involve a reduced volume of water, the amount of which reflects the water rights previously approved by the NSE in Spring, Cave, Dry Lake, and Delamar valleys and the water rights recommended in the Draft Snake Valley Stipulation Agreement between the states of Nevada and Utah in Snake Valley.
- Main pipeline and lateral lengths are the same, but diameters are smaller (**Table 2.6-2**);
- Power lines sizes and configuration are different (**Table 2.6-3**), and operational power requirements are less (**Table 2.6-4**); and
- Facilities or other parameters that differ from the Proposed Action are shown in **Table 2.6-5**.
- ROW requirements and groundwater development facilities would differ slightly from the Proposed Action, Facilities or other parameters that differ from the Proposed Action are shown in **Table 2.6-6**.

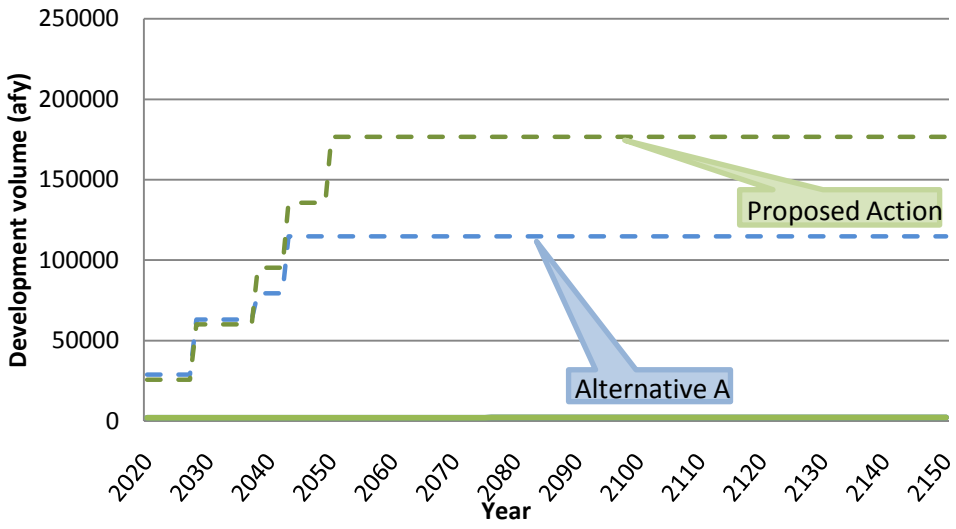


Figure 2.6-1 Groundwater Development Volume for Alternative A (and the Proposed Action)

Table 2.6-3 Pipeline Lengths, Alternative A

Pipeline	Valley	Pipe Diameter (inches in diameter)	Pipe Length (miles)[1]
Main Pipeline	Spring	66–72	17
	Lake	66–72	21
	Dry Lake	66–84	66
	Delamar	72–84	23
	Pahranagat	52–72	7
	Coyote Spring	52–84	41
	Hidden	72–84	12
	Garnet	72–84	7
	Las Vegas	72–78	9
Spring Lateral	Spring	42–54	38
Snake Lateral	Snake	42–54	24
	Hamlin	42–54	10
	Spring	42–54	9
Cave Lateral	Cave	16–30	19
	Dry Lake	16–30	3
Total			**306**

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

Table 2.6-4 GWD Project Power Lines for Alternative A

Power Line Conductor Voltages	Total Miles	Power Line ROW Widths
230-kV Power Line	80	100
69-kV Power Line	10	100
25-kV Power Line	26	50
230-kV Power Line with 69-kV and 25-kV Underhang	135	100
230-kV Power Line with 69-kV Underhang	49	100
69-kV Power Line with 25-kV Underhang	22	100
Total	**322**	**N/A**

Table 2.6-5 Anticipated Operational Power Requirements for Alternative A

Proposed Facilities	Power (MW)
Pump Station:	
Spring Valley North	3
Spring Valley South	11
Snake Valley North	3
Snake Valley South	5
Lake Valley	12
Dry Lake	0
Delamar	0
Cave Valley	0
Buried Storage Reservoir	<1
Water Treatment Facility	2
Future Wells	40
Total[1]	**74**

[1] The total is less than the sum of the individual power requirements due to the effects of rounding.

Table 2.6-6 Alternative A, Comparison to the Proposed Action

	Proposed Action	Alternative A
ROW and Facility Requirements		
Power Requirements (MW)	97	74
Conceptual Analysis – Groundwater Development Plan		
Volume of Developed Groundwater (afy)	176,655	114,755
Programmatic Analysis – Future Facilities		
Groundwater Production Wells (number, distribution)	144 to 174 within 5 basins; dispersed within groundwater development areas	97 to 117 within 5 basins; dispersed within groundwater development areas
Collector Pipelines (miles)	177 to 434	100 to 246
Staging Areas (number of 1-acre sites)	59 to 145	33 to 82
Electric Power Lines (miles)	177 to 434	100 to 246
Estimated Construction Disturbance (acres)	3,530 to 8,265	2,035 to 4,732
Temporary Disturbed Area (acres)	1,165 to 2,727	672 to 1,562
Permanent Disturbance (acres)	2,365 to 5,538	1,363 to 3,170

2.6.2 Alternative B, Points of Diversion Pumping at Application Quantities

This alternative requires ROWs for a main pipeline of up to 96 inches in diameter, lateral pipelines, and associated facilities. Future groundwater pumping for Alternative B would occur at or within a 1-mile radius of 34 Points of Diversion in the 5 project basins (**Figure 2.6-2**). The Points of Diversion include all locations of the current SNWA groundwater applications in Spring (19 locations), Snake (9 locations), Cave (2 locations), Dry Lake (2 locations), and Delamar (2 locations) valleys. Future groundwater production wells would be capable of developing the full quantity of groundwater rights from within 1 mile of these Points of Diversion.

Key Points—Alternative B

- The main and lateral pipelines and associated facilities for Alternative B (e.g., miles of main and lateral pipelines and power lines; number of electrical substations; ancillary facilities; ROW requirements; and conceptual pumping volume and schedule) would be identical to those described for the Proposed Action.
- In contrast to the Proposed Action, future groundwater pumping associated with Alternative B would be limited to a 1-mile radius around 34 Points of Diversion in the 5 project basins.

For Alternative B, an average of 4 wells would be located at or near the Points of Diversion, roughly spaced in a circular pattern at a radius of approximately 1 mile from each Point of Diversion. Thus, the numbers of wells identified in **Table 2.6-1** are presented as a total number per valley instead of as a range (as for other alternatives). This alternative assumes that sufficient well yield could be achieved to reach full development of all the groundwater applications at the Points of Diversion.

The length of future collector pipeline for Alternative B is estimated as: 1) the distance between the main or lateral pipeline and each Point of Diversion, and 2) the 1-mile radius for wells around each Point of Diversion (average of 4 miles per Point of Diversion). For future production wells for this alternative, this assumption results in a single total of pipeline distance per valley, instead of a range (as for other alternatives)

Alternative B would be the same as the Proposed Action for the following project components:

- Potential volumes of water developed (**Figure 2.6-3**);
- Land Ownership (**Table 2.5-1**);
- Operational Power Requirements (**Table 2.5-5**);

Figure 2.6-2 Groundwater Development Areas – Alternative B

- Construction and workforce schedule. (**Figure 2.5-6** and **2.5-7**);
- Mainline pipeline and ancillary facilities, and construction and operation procedures (Sections 2.5.1.5 through 2.5.1.8); and
- ACMs (Section 2.5.3).

Alternative B differs from the Proposed Action in the manner that future groundwater development would occur. These differences include:

- Future groundwater development would be centralized around 34 Points of Diversion; and
- ROW requirements and groundwater development facilities would differ slightly from the Proposed Action, Facilities or other parameters that differ from the Proposed Action are shown in **Table 2.6-7**.

Table 2.6-7 Alternative B, Comparison to the Proposed Action

	Proposed Action	Alternative B
Programmatic Analysis – Groundwater Development Plan		
Well Locations	5 basins; dispersed well sites	5 basins; well sites within 1 mile of 34 Points of Diversion
Programmatic Analysis – Future Facilities		
Groundwater Production Wells (number, distribution)	144 to 174 within 5 basins; dispersed within the groundwater development area	136 within 5 basins; well sites within 1 mile of 34 Points of Diversion
Collector Pipelines (miles)	177 to 434	236
Staging Areas (number of 1-acre sites)	59 to 145	79
Electric Power Lines (miles)	177 to 434	236
Estimated Construction Disturbance (acres)	3,530 to 8,265	4,585
Temporary Disturbed Area (acres)	1,165 to 2,727	1,513
Permanent Disturbance (acres)	2,365 to 5,538	3,072

Figure 2.6-3 shows the groundwater development volume and schedule for Alternative B compared to the Proposed Action.

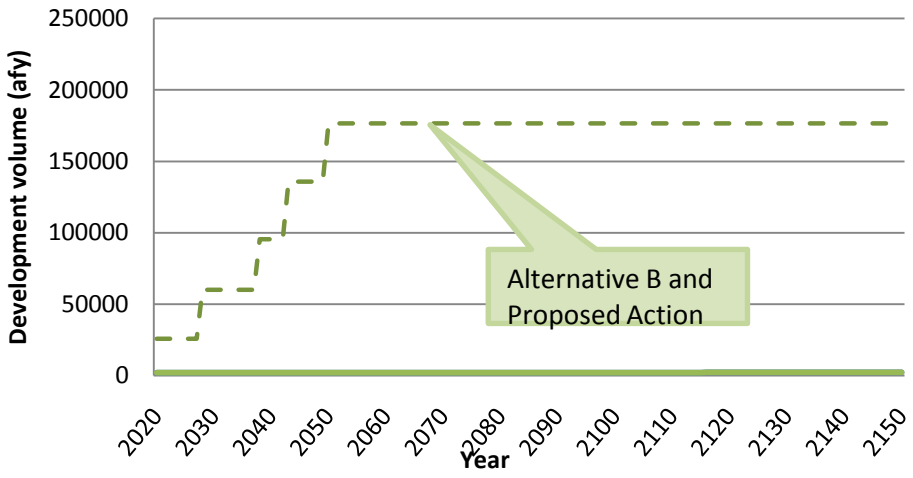


Figure 2.6-3 Groundwater Development Volume for Alternative B (and the Proposed Action)

2.6.3 Alternative C, Intermittent Pumping at Reduced Quantities

This alternative requires ROWs for a main pipeline of up to 96 inches in diameter, lateral pipelines, and associated ancillary facilities. The differences between the pumping schedule for the Proposed Action and Alternative C are due to assumptions made regarding potential availability of surplus Colorado River water to the SNWA. Projecting occurrences of drought and surplus on the Colorado River are inherently uncertain due to variability in climatic conditions affecting surface water runoff to the Colorado River. For the purposes of EIS analysis, the schedule for groundwater pumping assumes 5-year intermittent periods, cycling between full development and a minimum operational pumping volume. A minimum annual volume of groundwater pumping is necessary to maintain functionality of pumps, pipelines, and other facilities; to avoid sediment buildup; and to allow for conveyance of Lincoln County's water. This schedule also would allow wells to be pumped rotationally to avoid sediment plugging of the well screens. During periods of minimal development, the total volume of water conveyed would be approximately 45,000 afy. The quantity would consist of continued system conveyance of 33,000 afy for Lincoln County, and 12,000 afy minimum operational volumes for the SNWA facilities. As with Alternative A, the maximum volume of water analyzed for periods of full development is approximately 114,755 afy (**Table 2.1-2**). Groundwater development would proceed as described for the Proposed Action and Alternative A, reaching full capacity by 2050. For the purpose of analysis, groundwater withdrawal under Alternative C is assumed to cycle in 5-year intervals between full and minimum development, beginning in 2050.

Key Point—Alternative C Conceptual Future Facilities

- All future facilities that are associated with Alternative C (e.g., number of future wells, miles of pipelines and electrical power lines, number of electrical substations, ancillary facilities, ROW requirements) would be identical to those described for Alternative A.
- Development volumes would not exceed those described for Alternative A. However, annual development volumes may vary depending upon whether drought conditions on the Colorado River affect SNWA's other water supplies.

Alternative C would be the same as the Proposed Action for the following project components:

- Land Ownership (**Table 2.5-1**);
- Overall land requirements (**Table 2.5-1**);
- Mainline pipeline and ancillary facilities, and construction and operation procedures (Sections 2.5.1.3 through 2.5.1.6);
- Construction schedule and workforce requirements (**Figures 2.5-6** and **2.5-7**);
- General operation and maintenance practices; and
- ACMs (Section 2.5.3).

Alternative C differs from the Proposed Action in the following manner:

- Main pipeline and lateral lengths are the same, but diameters are smaller (same as Alternative A) (**Table 2.6-2**);
- Power line sizes and configurations are different (same as Alternative A) (**Table 2.6-3**);
- Annual development volumes are reduced and also may fluctuate depending upon whether drought conditions on the Colorado River affect the SNWA's other water supplies (**Figure 2.6-4**);
- Operational power requirements reflect intermittent pumping (**Table 2.6-8**); and
- ROW requirements and groundwater development facilities that differ from the Proposed Action are shown in **Table 2.6-9**.

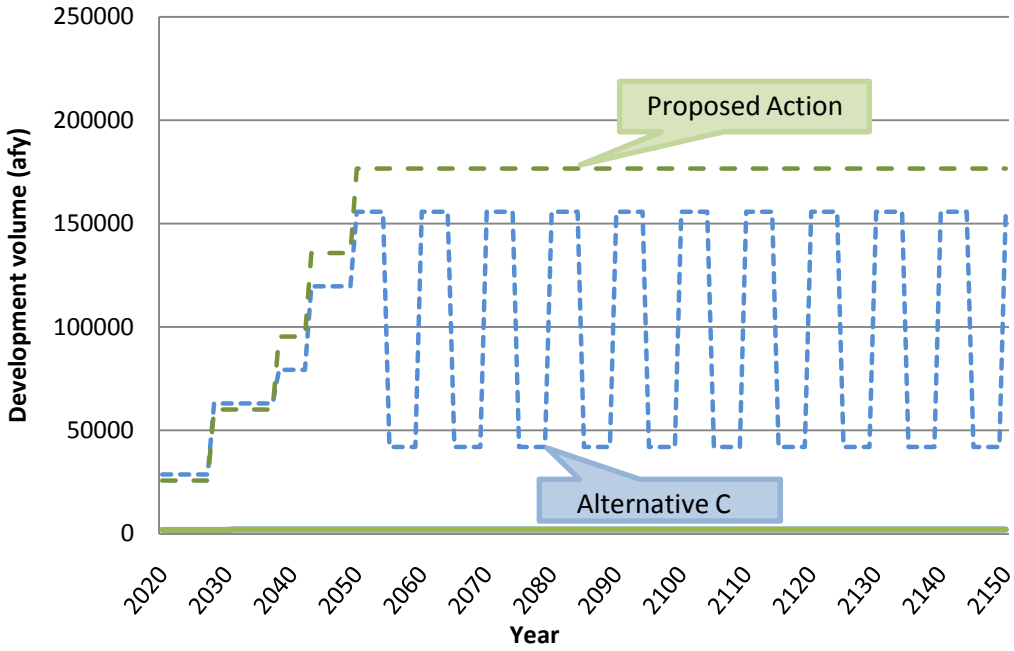


Figure 2.6-4 Groundwater Development Volume for Alternative C (and the Proposed Action)

Table 2.6-8 Anticipated Operational Power Requirements for Alternative C

Proposed Facilities	Power (MW)
Pump Station:	
Spring Valley North	<1 - 3
Spring Valley South	<1 - 11
Snake Valley North	<1 - 3
Snake Valley South	<1 - 5
Lake Valley	3 - 12
Dry Lake	0
Delamar	0
Cave Valley	0
Buried Storage Reservoir	<1
Water Treatment Facility	2
Future Wells	11 - 40
Total	**76**

[1] The total is less than the sum of the individual power requirements due to the effects of rounding.

Table 2.6-9 Alternative C, Comparison to the Proposed Action

	Proposed Action	Alternative C
ROW and Facility Requirements		
Power Requirements (MW)	97	16 - 74
Conceptual Analysis – Groundwater Development Plan		
Volume of Developed Groundwater (afy)	176,655	12,000 to 114,755
Intermittent Pumping	No	Yes
Programmatic Analysis – Future Facilities		
Groundwater Production Wells (number, distribution)	144 to 174 within 5 basins; dispersed within the groundwater development area	97 to 117 within 5 basins; dispersed within the groundwater development area
Collector Pipelines (miles)	177 to 434	100 to 246
Staging Areas (number of 1-acre sites)	59 to 145	33 to 82
Electric Power Lines (miles)	177 to 434	100 to 246
Estimated Construction Disturbance (acres)	3,530 to 8,265	2,035 to 4,732
Temporary Disturbed Area to be Revegetated (acres)	1,165 to 2,727	672 to 1,562
Permanent Disturbance (acres)	2,365 to 5,538	1,363 to 3,170

2.6.4 Alternative D, Distributed Pumping at Reduced Quantities in Lincoln County Only

Alternative D was developed to examine effects of constructing a project that would allow the SNWA to utilize the LCCRDA utility corridor already designated by Congress, and to develop all granted water rights within Lincoln County. This alternative would not allow development of groundwater within Snake Valley, resulting in lower groundwater development volumes compared to the Proposed Action, and alternatives A, B, and C.

Main Points—Alternative D—ROWs

- For Alternative D, the BLM would grant LCCRDA-mandated ROWs for facilities only in Clark and Lincoln counties.
- Alternative D would disturb fewer acres of land and would require fewer ancillary facilities, compared to the Proposed Action. Pipeline diameters, alignments, and distances would be less than the Proposed Action.
- Electrical power facilities and requirements would be less and would not extend into White Pine County, and would not connect to the Gonder Substation.
- Groundwater development by SNWA of up to 78,755 afy would occur in four basins at distributed locations, rather than the five basins in the Proposed Action.
- Pumping would begin in 2020, ramp up incrementally, and would reach full capacity by 2043, 7 years earlier than for the Proposed Action.

Unlike the Proposed Action, ROWs for Alternative D would be granted only within Lincoln and Clark Counties. Consequently, Alternative D differs from the Proposed Action in the following manner:

- Volumes of groundwater developed would not exceed 78,755 afy;
- No groundwater development by the SNWA in Snake Valley (i.e., the SNWA would not be able to access any groundwater that may be permitted by the NSE in that basin);
- Mainline pipeline would differ in diameter, length, and location;
- The number and size of ancillary facilities, including pumping stations, regulating tanks, and access roads, would be reduced;
- The length of power line would be reduced, and there would be no connection to the Gonder Substation;
- Proposed pumping would begin in 2020, reaching full volumes by 2043;
- Workforce requirements would be lower;

- The overall construction schedule would be shorter with the elimination of the Spring Valley and Snake Valley laterals;
- Land ownership of the requested ROWs (only those components that require a separate ROW are listed); and
  - BLM – 98 percent;
  - Private – 2 percent; and
  - State of Nevada – <1 percent.
- Estimated land requirements and ROW restoration.
  - Estimated Construction Disturbance – 8,843 acres;
  - Temporary Disturbed Area – 8,020 acres; and
  - Permanent Disturbance – 823 acres.

2.6.4.1 Pipeline System

To transport the volumes of water identified under Alternative D, a total of approximately 225 miles of pipelines would be required. The pipeline system would consist of a buried main pipeline and one lateral pipeline (Cave Valley) (**Figure 2.6-5**). The final sizes of the main and lateral pipelines would be determined during facility design. **Table 2.6-10** lists pipeline lengths and anticipated pipe diameter by valley. Because a reduced quantity of water would be developed under this alternative, pipeline diameters are as much as 12 inches smaller than those under the Proposed Action or Alternatives A, B, or C. Because facilities are sized for hydraulic efficiencies, facility size reductions are not directly proportional to decreased water volume.

Table 2.6-10 Pipeline Length, Alternative D

Pipeline	Valley	Pipe Diameter (inches in diameter)	Pipe Length (miles)[1]
Main Pipeline	Spring	60–66	17
	Lake	54–66	21
	Dry Lake	54–78	66
	Delamar	60–72	23
	Pahranagat	42–66	7
	Coyote Spring	42–78	41
	Hidden	66–78	12
	Garnet	60–72	7
	Las Vegas	60–72	9
Cave Lateral	Cave	16–30	19
	Dry Lake	16–30	3
Total			**225**

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

The main pipeline between southern Spring Valley and Las Vegas Valley would be up to 78 inches in diameter. The lateral pipeline would be 16 to 30 inches in diameter and would extend into Cave Valley. The pipeline and work area requirements would be the same as those described for the Proposed Action (Section 2.5) and Alternatives A, B, and C.

Figure 2.6-5 Pipeline Alignment – Alternative D

Because most of the pipeline ROW requirements are associated with space that is needed for construction (**Figure 2.5-1**), reductions in pipe diameters would not change the widths of the permanent and temporary construction ROWs. The pipeline temporary construction areas would be the same as those described for the Proposed Action (Section 2.5.1.3), and Alternatives A, B, and C except that the areas in Northern Spring Valley and Snake Valley would be eliminated.

2.6.4.2 Power Facilities

As described for the Proposed Action (Section 2.5.1.3) and Alternatives A, B, and C, construction of a new power line is needed to provide power supply to project facilities. Under Alternative D, a new power line would be constructed between the Silverhawk Generating Station (near Apex) and the Spring Valley South pumping station (**Figure 2.6-6**). The power line would not tie into the Gonder Substation.

The anticipated power supply to operate project facilities for Alternative D would be approximately 54 MW (**Table 2.6-11**). This power supply would be obtained from the Silverhawk Generating Station and would be operated as described for Alternatives A, B, and C. Construction of new power generation facilities would not be required.

Table 2.6-11 Anticipated Operational Power Requirements for Alternative D

Proposed Facilities	Power (MW)
Spring Valley South Pumping Station	14
Lake Valley Pumping Station	12
Buried Storage Reservoir	<1
Water Treatment Facility	2
Anticipated Future Groundwater Wells and Associated Facilities	27 (estimated)
Total[1]	**54**

[1] The total is less than the sum of the individual power requirements due to the effects of rounding.

Power Lines

Power lines would include 230-kV, 69-kV, and 25-kV conductors, as described for the Proposed Action (Section 2.5.1.4). The locations of the power lines, including where multiple conductor voltages would be hung on the same pole, would be the same as displayed in **Figure 2.6-6,** except no power lines would extend into White Pine County. **Table 2.6-12** summarizes the power line lengths for Alternative D.

Table 2.6-12 GWD Project Power Lines for Alternative D

Power Line Conductor Voltages	Total Miles
230-kV Power Line	66
69-kV Power Line	0[1]
25-kV Power Line	17
230-kV Power Line with 69-kV and 25-kV Underhang	22
230-kV Power Line with 69-kV Underhang	97
69-kV Power Line with 25-kV Underhang	6
Total	**208**

[1] Length of 69-kV power line would be approximately 0.3 mile and is included in the total estimated length of power lines for Alternative D.

Figure 2.6-6 Power Line Alignment – Alternative D

The ROW widths that would be required for power lines under Alternative D would be the same as those described for the Proposed Action, and Alternatives A, B, and C. The total length of power line would be 208 miles, of which approximately 191 miles would require a 100-foot-wide ROW and 17 miles would require a 50-foot-wide ROW.

Electrical Substations

Under Alternative D, there would be two primary and two secondary electrical substations. The primary electrical substations would be the same as described for the Proposed Action (Section 2.5.1.3) and Alternatives A, B, and C. The secondary electrical substations would be the same as the Cave and Coyote Spring Valley facilities described for the Proposed Action and Alternatives A, B, and C.

2.6.4.3 Ancillary Facilities

The ancillary facilities that would be required under Alternative D include pumping stations, regulating tanks, pressure-reducing stations, water treatment facility and buried storage reservoir, access roads, and communications facilities. Regulating tanks and pumping stations could be downsized to approximately 20 percent of their capacity with the reduced quantity of water under this alternative.

Pumping Stations

Under Alternative D, two pumping stations would be required: Spring Valley South and Lake Valley. The pumping station descriptions and ROW requirements for these facilities would be the same as described for the Proposed Action (Section 2.5.1.4) and Alternatives A, B, and C. Although the capacity of these facilities under Alternative D might be slightly smaller than under the Proposed Action or Alternatives A, B, or C, these reductions would not be enough to reduce the amount of permanent and temporary ROWs required for construction.

Regulating Tanks

Five regulating tanks would be required to regulate water flow through the pipeline in Spring, Lake, Cave, Dry Lake, and Delamar valleys. The facility descriptions and ROW requirements would be the same as described for the Proposed Action (Section 2.5.1.4) and Alternatives A, B, and C. Although the capacity of these facilities under Alternative D might be slightly smaller than under the Proposed Action and Alternatives A, B, and C, these reductions would not be enough to reduce the amount of permanent and temporary ROWs required for construction.

Pressure-reducing Stations

Because of elevation grade changes, three pressure-reducing stations would be required to reduce pressure and control flow within the pipeline. Two stations would be in Dry Lake Valley, and one would be in northern Coyote Spring Valley. These facilities would be the same as described for the Proposed Action (Section 2.5.1.4) and Alternatives A, B, and C.

Water Treatment Facility/Buried Storage Reservoir

The water treatment facility and buried storage reservoir site and structures would be the same as described for the Proposed Action (Section 2.5.1.4) and Alternatives A, B, and C. The water treatment facility would be sized for an approximate flow of 107 mgd, based on the anticipated maximum flow. The buried storage reservoir would remain the same size (40 million gallons), to meet downstream daily flow requirements.

Access Roads

Access roads for construction and operation also would be required under Alternative D (**Figure 2.6-7**). These roads generally would be as described for the Proposed Action and Alternatives A, B, and C (Section 2.5.1.4), with the following differences:

Access Roads—Alternative D
Access roads for this alternative total 315 miles.

- Paved existing road: 3 miles
- Improved existing road: 70 miles
- Improved new road: 228 miles
- Unimproved existing road: 14 miles

Figure 2.6-7 Access Roads - Alternative D

2.6.4.4 Construction Procedures

Construction procedures would be the same as described for the Proposed Action.

2.6.4.5 Construction Schedule

The anticipated construction schedule and projected workforce is illustrated in **Figure 2.6-8**. The construction workforce for the pipeline and ancillary facilities would be employed from 2012 through 2019.

2.6.4.6 Construction Workforce Estimate

The construction workforce for the pipeline and ancillary facilities would be employed from 2012 through 2020 (**Figure 2.6-8**).

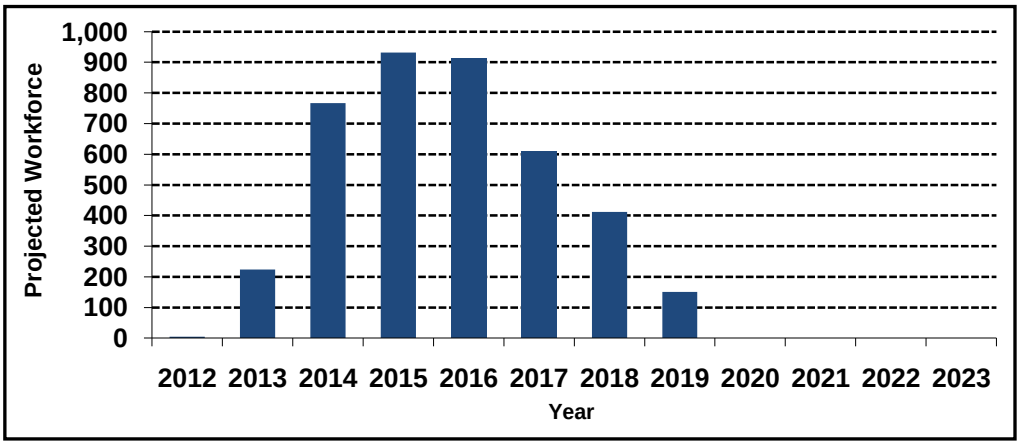


Figure 2.6-8 Construction Workforce Estimate—Alternative D

Table 2.6-13 provides a list of project construction milestones for the main line pipeline and ancillary facilities through 2017. It is anticipated that groundwater well development, and ancillary facility construction would proceed northward by valley (Delamar, Dry Lake, Spring valleys).

Table 2.6-13 Construction Milestones for Alternative D

Facility		Anticipated Construction Start (Quarter/Year)	Anticipated Construction Finish (Quarter/Year)
Main Pipeline	South Terminus to Reservoir/Water Treatment Facility	Q2/2012	Q2/2015
	Reservoir/Water Treatment Facility to Delamar Valley Regulating Tank	Q3/2013	Q3/2014
	Delamar Valley Regulating Tank to Dry Lake Valley Regulating Tank	Q4/2014	Q3/2015
	Dry Lake Valley Regulating Tank to Muleshoe Regulating Tank	Q3/2015	Q2/2016
	Muleshoe Regulating Tankto Spring Valley Regulating Tank	Q4/2016	Q3/2017
	Spring Valley Regulating Tank to Spring South Pumping Station	Q2/2017	Q4/2017
Lateral Pipelines	Cave Valley Lateral	Q2/2016	Q2/2016
Pumping Stations	Lake Valley Pumping Station	Q4/2015	Q2/2016
	Spring Valley South Pumping Station	Q1/2017	Q1/2018

Table 2.6-13 Construction Milestones for Alternative D (Continued)

Facility		Anticipated Construction Start (Quarter/Year)	Anticipated Construction Finish (Quarter/Year)
Pressure Reducing Stations	Coyote Spring Valley Pressure-reducing Station	Q3/2013	Q1/2013
	Dry Lake Valley South Pressure-reducing Station	Q2/2014	Q4/2013
	Dry Lake Valley North Pressure-reducing Station	Q4/2014	Q3/2014
Water Treatment Facility/ Buried Storage Reservoir Site	Buried Storage Reservoir	Q3/2014	Q4/2015
	Water Treatment Facility	Q2/2015	Q4/2015
Power Facilities	Transmission, Distribution, and Substations	Q2/2014	Q4/2017

2.6.4.7 Operation and Maintenance

Operation and maintenance procedures, including staffing and monitoring frequency, would be the same as described for the Proposed Action (Section 2.5.1.8) and Alternatives A, B, and C.

2.6.4.8 Conceptual Future Facilities

Conceptual Groundwater Development Volumes and Schedule

Alternative D would include development of a reduced quantity of the SNWA existing water rights and application volumes in Cave, Dry Lake, Delamar, and Spring valleys. The total volume of groundwater analyzed for development under this alternative would be up to 78,755 afy. The development schedule for Alternative D would be shorter than for the Proposed Action; full development would be completed by 2043 (**Figure 2.6-9**). The future groundwater production and ancillary facilities would be reduced, since there would be no groundwater development by the SNWA in Snake Valley.

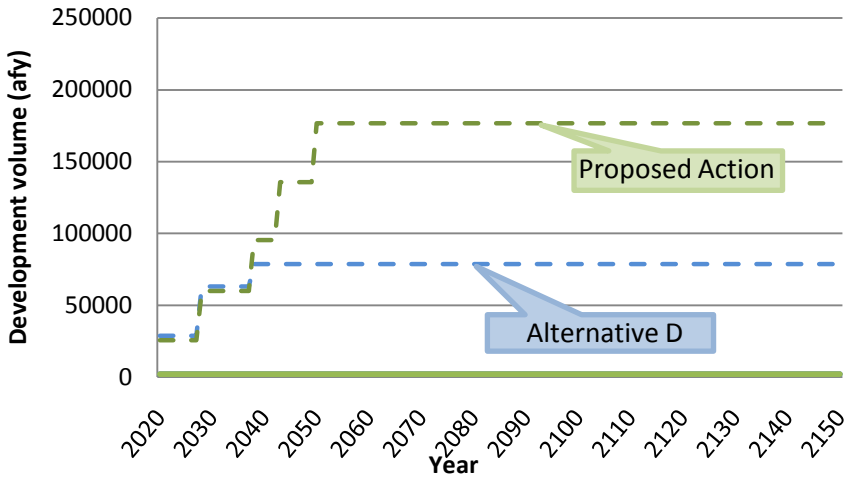


Figure 2.6-9 Groundwater Development Volumes for Alternative D (and the Proposed Action)

Figure 2.6-10 Groundwater Development Areas – Alternative D

Conceptual Groundwater Development Plan

For Alternative D, the BLM would grant only those ROWs mandated under the LCCRDA for facilities in Clark and Lincoln counties. Thus, groundwater development would occur in Cave, Dry Lake, and Delamar valleys and the southern portion of Spring Valley. All of these development areas are located within Lincoln County. Groundwater development under this alternative does not include Snake Valley because only a very small portion of Snake Valley (approximately 0.5 square mile) is within Lincoln County, and extending facilities to develop groundwater from such a small area is considered to be unreasonable (**Figure 2.6-10**). See **Table 2.6-14** for land requirements.

Table 2.6-14 Land Requirements

Surface Disturbance Estimate	Acres
Estimated Construction Disturbance	2,470 to 3936
Temporary Disturbed Area	815 to 1,299
Permanent Disturbance	1,655 to 2,637

The groundwater pumping for Alternative D would be spatially distributed within Cave, Dry Lake, and Delamar valleys, as described for the Proposed Action. It is assumed that all of the SNWA's water rights in Spring Valley could be developed from the southern portion of this valley within Lincoln County. Because this is a smaller geographic area, the groundwater pumping in southern Spring Valley would be more concentrated than under the Proposed Action or Alternatives A, B, and C. As shown in **Figure 2.6-10**, groundwater development in southern Spring Valley would be located within an area where the entire portion of the hydrologic basin is within Lincoln County, excluding private lands, wilderness area, and areas that have slopes greater than 20 degrees.

Groundwater development under Alternative D would occur only within Lincoln County. This alternative assumes that the NSE would approve the move of points of diversion for existing permitted rights, including the SNWA's existing agricultural water rights in central and northern Spring Valley (in White Pine County), into southern Spring Valley (in Lincoln County).

Future Groundwater Production Wells

Under Alternative D, individual well yields in Cave, Dry Lake, and Delamar valleys would be the same as described for the Proposed Action, and Alternatives A and C, so those valleys would contain the same number of production wells as under the Proposed Action, and Alternatives A and C. However, production wells in southern Spring Valley would be spaced more closely together than in the other basins or in Spring Valley under the Proposed Action and Alternatives A and C.

In Spring Valley, the wells would be distributed in the southern portion of the valley within Lincoln County in the groundwater development area displayed in **Figure 2.6-10**. Because this geographic area is smaller than the entire valley, the wells likely would be more closely spaced in southern Spring Valley than under other alternatives. The wells would be evenly distributed throughout the entire development area.

For Cave, Dry Lake, and Delamar valleys, the wells would be distributed as described for the Proposed Action and Alternatives A and C (Section 2.5.2.1). Well construction, equipment, treatment, and ROW site requirements for individual wells under Alternative D would be the same as described for the Proposed Action and Alternatives A and C.

Future Collector Pipelines

The future collector pipelines in Spring Valley would convey water from production wells distributed across southern Spring Valley within Lincoln County, as mandated under the LCCRDA. For the purposes of analysis, it is assumed that collector pipelines would form a grid across the southern portion of the valley, with the following characteristics:

- Six primary collector pipelines extending from the main pipeline across the valley:
  - Three each at 6 miles in length;
  - One at 4 miles; and
  - Two at 3 miles.
- Individual wells spaced approximately 1 mile apart and as far as 1 mile from the primary collector lines.

Thus, the estimated length of collector pipelines for Spring Valley under Alternative D would be between 127 and 206 miles.

Assumptions of the potential lengths, sizes, ROW width requirements, and staging area dimensions of future collector pipelines for Cave, Dry Lake, and Delamar valleys would be the same as described under the Proposed Action (Section 2.5.2.2) and Alternatives A and C.

Comparison to Proposed Action

ROW requirements and groundwater development facilities that differ from the Proposed Action are shown in **Table 2.6-15**.

Table 2.6-15 Alternative D, Comparison to the Proposed Action

	Proposed Action	Alternative D
ROW and Facility Requirements		
Power Requirements (MW)	97	54
Conceptual Analysis – Groundwater Development Plan		
Volume of Developed Groundwater (afy)	176,655	78,755
Intermittent Pumping	No	No
Programmatic Analysis – Future Facilities		
Groundwater Production Wells (number, distribution)	144 to 174 within 5 basins; dispersed within the groundwater development area	69 to 83 within 4 basins; dispersed within the groundwater development area
Collector Pipelines (miles)	177 to 434	127 to 206
Staging Areas (number of 1-acre sites)	59 to 145	42 to 69
Electric Power Lines (miles)	177 to 434	127 to 206
Estimated Construction Disturbance (acres)	3,530 to 8,265	2,470 to 3,936
Temporary Disturbed Area to be Revegetated (acres)	1,165 to 2,727	815 to 1,299
Permanent Disturbance (acres)	2,365 to 5,538	1,655 to 2,637

2.6.5 Alternative E, Distributed Pumping at Reduced Quantities - Spring, Dry Lake, Delamar, and Cave Valleys

Alternative E was designed to address concerns regarding potential effects from groundwater development in Snake Valley. The volume of groundwater developed under Alternative E would be the same as Alternative D, because no water would be developed in Snake Valley.

Key Points – Alternative E

- Alternative E represents Alternative A, minus development in Snake Valley.
- Alternative E would consist of 263 miles of buried pipelines, 280 miles of overhead power lines, 6 electrical substations, and ancillary facilities.
- Up to 2,683 acres of permanent ROW and 1,396 acres of temporary ROW would be required.
- Alternative E would develop up to 78,755 afy of groundwater from four basins (Snake Valley not included).

Unlike the Proposed Action, ROWs for Alternative E would be granted only within Spring, Cave, Delamar, and Dry Lake valleys. Consequently, Alternative E differs from the Proposed Action in the following manner:

- Mainline pipeline segments would differ in diameter, length, and location (**Table 2.6-16**);
- Like Alternative D, the volumes of groundwater developed would not exceed 78,755 afy (**Table 2.1-2**). No water would be developed by the SNWA in Snake Valley;
- No pipeline laterals, power line laterals, or groundwater development by the SNWA would be constructed in Snake Valley (i.e., the SNWA would not be able to access any groundwater that may be permitted by the NSE in that basin);
- The number and size of ancillary facilities, including pumping stations, regulating tanks, and access roads, would be reduced;
- Power facilities would be similar, excluding power facilities for Snake Valley;
- Land requirements would be less;
- Proposed pumping would begin in 2020, reaching full volumes by 2043;
- Workforce requirements would be less;
- The overall construction schedule would be shorter, with the elimination of the Snake Valley lateral;
- Future ancillary facilities would be fewer;
- Land ownership for the requested ROWs; and
  - BLM – 98 percent
  - Private – 2 percent
  - State of Nevada - <1 percent
- Estimated land requirements and ROW restoration.
  - Estimated Construction Disturbance – 10,696 acres
  - Temporary Disturbed Area – 9,736 acres
  - Permanent Disturbance – 960 acres

ROWs would be required across federal lands that are managed by the BLM, state lands (Nevada National Guard in east-central Las Vegas Valley and Steptoe Valley Wildlife Management Area), and private lands (Apex area in east-central Las Vegas Valley, land in central Coyote Spring Valley, and land in west Caliente).

2.6.5.1 Pipeline System

To convey the volumes of water identified under this alternative, a total of approximately 263 miles of pipelines would be required under Alternative E. The pipeline system would consist of a buried main pipeline and two lateral pipelines (Spring and Cave valleys). **Table 2.6-16** lists Alternative E pipeline lengths and anticipated pipe diameters by valley.

The (**Figure 2.6-11**) final sizes of the main and lateral pipelines would be determined during facility design. Because of the reduced quantity of water that would be developed under this alternative, pipeline diameters are as much as 12 inches smaller than those under the Proposed Action or Alternatives A, B, or C. Because facilities are sized for hydraulic efficiencies, facility size reductions are not directly proportional to decreased water volume.

Table 2.6-16 Pipeline Lengths, Alternative E

Pipeline	Valley	Pipe Diameter (inches in diameter)	Pipe Length (miles)
Main Pipeline	Spring	60-66	17
	Lake	54-66	21
	Dry Lake	54-78	66
	Delamar	60-72	23
	Pahranagat	42-66	7
	Coyote Spring	42-78	41
	Hidden	66-78	12
	Garnet	60-72	7
	Las Vegas	60-72	9
Spring Lateral	Spring	42-54	38
Cave Lateral	Cave	16-30	19
	Dry Lake	16-30	3
Total			**263**

The pipeline work area requirements would be the same as described for the Proposed Action. Because most of the pipeline ROW width requirements are associated with the space required for construction (**Figure 2.5-2**), reductions in pipe diameters would not affect the widths of the required permanent and temporary construction ROWs. Similarly, because facilities are sized for hydraulic efficiencies, reductions in facilities' sizes are not directly proportional to decreased water volume.

2.6.5.2 Power Facilities

The power facilities for Alternative E would be the same as described for the Proposed Action, excluding the power facilities associated with the Snake Valley Lateral.

The anticipated power supply to operate project facilities for Alternative E would be approximately 55 MW (**Table 2.6-17**) and would be obtained from the Silverhawk Generating Station as described for the Alternative D.

Table 2.6-17 Anticipated Operational Power Requirements for Alternative E

Proposed Facilities	Power (MW)
Spring Valley North Pumping Station	3
Spring Valley South Pumping Station	11
Lake Valley Pumping Station	12
Buried Storage Reservoir	<1
Water Treatment Facility	2
Anticipated Future Groundwater Wells and Associated Facilities	28 (estimated)
Total[1]	**55**

[1] The total is less than the sum of the individual power requirements due to the effects of rounding.

Figure 2.6-11 Pipeline Alignment – Alternative E

Power Lines

Power lines would include 230-kV, 69-kV, and 25-kV conductors, as described for the Proposed Action. The locations of the power lines, including where multiple conductor voltages would be hung on the same pole, as illustrated on **Figure 2.6-12**. **Table 2.6-18** summarizes the power line lengths for Alternative E.

Table 2.6-18 GWD Project Power Lines for Alternative E

Power Line Conductor Voltages[1]	Total Miles
230-kV power line	100
25-kV power line	21
230-kV power line with 69-kV and 25-kV underhang	46
230-kV power line with 69-kV underhang	97
69-kV power line with 25-kV underhang	16
Total	**280**

[1] The only GWD Project 69-kV power line without an underhang was proposed for the Snake Lateral, which is not part of this alternative, thus, there is no listing for 69-kV (no underhang) on this table.

The ROW widths that would be required for power lines under Alternative E would be the same as those described for the Proposed Action. The total length of power line for Alternative E would be 280 miles, of which approximately 259 miles would require a 100-foot-wide ROW and 21 miles would require a 50-foot-wide ROW.

Electrical Substations

Under Alternative E, there would be two primary and four secondary electrical substations. The electrical substations would be the same as described for the Proposed Action, excluding the Snake Valley secondary substation.

2.6.5.3 Ancillary Facilities

Ancillary facilities required are the same as described for the Proposed Action, with the exception of the two Snake Valley pumping stations. As described for Alternative D, regulating tank and pumping station capacities could be downsized approximately 20 percent from the Proposed Action with the reduced quantity of water conveyed under this alternative. However, these reductions would not be enough to reduce the amount of permanent and temporary ROWs required for construction.

Pumping Stations

Under Alternative E, three pumping stations would be required: Spring Valley North and South, and Lake Valley. The pumping station descriptions and ROW requirements for these facilities would be the same as described for the Proposed Action. Although the capacity of these facilities under this alternative might be slightly smaller than capacity under the Proposed Action, these reductions would not be large enough to reduce the amounts of permanent and temporary ROWs required for construction.

Regulating Tanks

The five regulating tanks would be the same as described for the Proposed Action, and would be sized as described for Alternative D.

Pressure-reducing Stations

The three pressure-reducing stations would be the same as described for the Proposed Action.

Water Treatment Facility/Buried Storage Reservoir

The water treatment facility and buried storage reservoir would be the same as described for the Proposed Action and would be sized as described for Alternative D.

Figure 2.6-12 Power Line Alignment – Alternative E

Access Roads

Access roads needed for construction and operation under Alternative E would generally be the same as described for the Proposed Action, but would be reduced to a total of 388 miles due to the elimination of the Snake Valley Lateral and associated facilities (**Figure 2.6-13**).

- Paved existing road: 14 miles
- Improved existing road: 70 miles
- Improved new road: 258 miles
- Unimproved existing road: 28 miles
- Unimproved new road: 20 miles

Communications Facilities

Communications facilities would be the same as described for the Proposed Action.

2.6.5.4 Construction Procedures

Construction procedures would be the same as described for the Proposed Action.

2.6.5.5 Construction Workforce Estimate

The construction workforce for the pipeline and ancillary facilities would be employed from 2012 through 2020 (**Figure 2.6-14**).

2.6.5.6 Construction Schedule

The anticipated construction schedule would be the same as described for the Proposed Action, excluding the Snake Valley Lateral and associated facilities (**Table 2.6-19**).

Table 2.6-19 Construction Milestones for Alternative E

Facility		Anticipated Construction Start (Quarter/Year)	Anticipated Construction Finish (Quarter/Year)
Main Pipeline	South Terminus to Reservoir/Water Treatment Facility	Q2/2012	Q2/2015
	Reservoir/Water Treatment Facility to Delamar Valley Regulating Tank	Q3/2013	Q3/2014
	Delamar Valley Regulating Tank to Dry Lake Valley Regulating Tank	Q4/2014	Q3/2015
	Dry Lake Valley Regulating Tank to Muleshoe Regulating Tank	Q3/2015	Q2/2016
	Muleshoe Regulating Tank to Spring Valley Regulating Tank	Q4/2016	Q3/2017
	Spring Valley Regulating Tank to Spring South Pumping Station	Q2/2017	Q4/2017
Lateral Pipelines	Cave Valley Lateral	Q2/2016	Q2/2016
Pumping Stations	Lake Valley Pumping Station	Q4/2015	Q2/2016
	Spring Valley South Pumping Station	Q1/2017	Q1/2018
Pressure Reducing Stations	Coyote Spring Valley Pressure-reducing Station	Q3/2013	Q1/2013
	Dry Lake Valley South Pressure-reducing Station	Q2/2014	Q4/2013
	Dry Lake Valley North Pressure-reducing Station	Q4/2014	Q3/2014
Water Treatment Facility/ Buried Storage Reservoir Site	Buried Storage Reservoir	Q3/2014	Q4/2015
	Water Treatment Facility	Q2/2015	Q4/2015
Power Facilities	Transmission, Distribution, and Substations	Q2/2014	Q4/2017

Figure 2.6-13 Access Roads – Alternative E

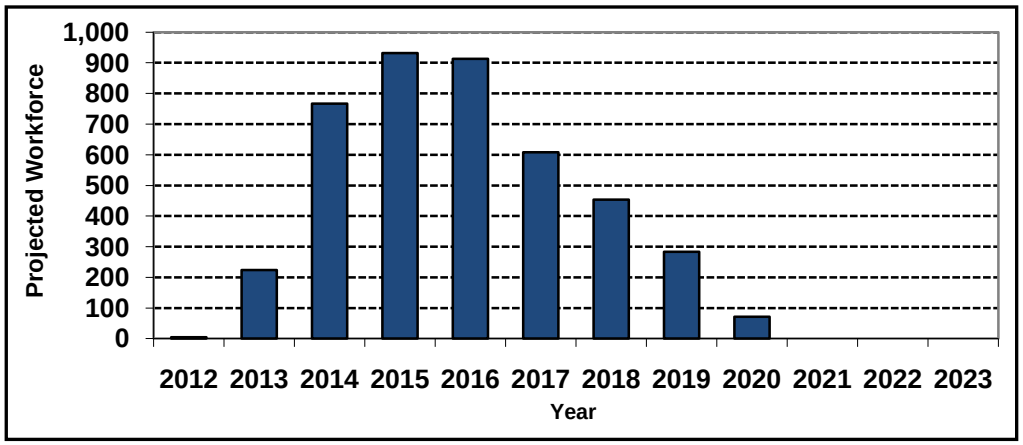


Figure 2.6-14 Construction Workforce Estimate – Alternative E

2.6.5.7 Operation and Maintenance

Operation and maintenance procedures, including staffing and monitoring frequency, would be the same as described for the Proposed Action.

2.6.5.8 Conceptual Future Facilities

Conceptual Groundwater Development Schedule and Volumes

Alternative E would include development of a reduced quantity of the SNWA existing water rights and application volumes in Spring, Cave, Dry Lake, and Delamar valleys. The total volume of water that is analyzed for conveyance under Alternative E (78,755 afy) would be the same as described under Alternative D, which is reduced quantity in four development basins (Section 2.1.1). A summary of groundwater development facilities is provided in **Table 2.6-2** and the groundwater development volume and schedule is shown in **Figure 2.6-15**.

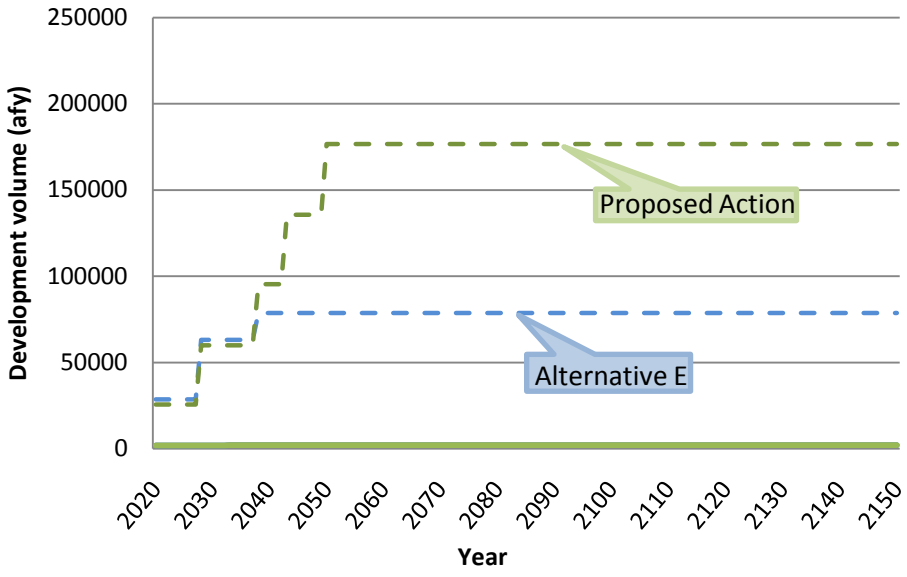


Figure 2.6-15 Groundwater Development Volume for Alternative E (and the Proposed Action)

Conceptual Groundwater Development Plan

Alternative E would exclude groundwater development from Snake Valley. Alternative E (**Figure 2.6-16**) is similar to Alternative D, except that groundwater development in all the remaining project basins, including Spring Valley, would be spatially distributed as described for the Proposed Action. Under Alternative E, the BLM would not grant ROWs for the Snake Lateral and its facilities in Spring, Hamlin, and Snake valleys. ROWs in the other project basins would be as described for the Proposed Action. **Table 2.6-20** summarizes the estimated land and ROW restoration requirements for the groundwater development facilities.

Main Points – Alternative E Conceptual Future Facilities

Future facilities associated with Alternative E are identical to those for Alternative D, except pumping locations could be more dispersed in Spring Valley than allowed in Alternative D.

Table 2.6-20 Land Requirements

Surface Disturbance Estimate	Acres
Estimated Construction Disturbance	1,725 to 3,987
Temporary Disturbed Area	569 to 1,316
Permanent Disturbance	1,156 to 2,671

The total volume of water that is analyzed for development under Alternative E (78,755 afy) would be the same as described under Alternative D. This volume assumes the development of a portion of pending the SNWA water rights in Spring, Cave, Dry Lake, and Delamar valleys, (**Table 2.1-2**). The groundwater development schedule for Alternative E would be the same as described for Alternative D. Construction of future facilities may extend from 2015 through approximately 2044.

Future Groundwater Production Wells

Under Alternative E, individual well yields in Cave, Dry Lake, Spring, and Delamar valleys would be the same as described for the Proposed Action, so those valleys would contain the same number of production wells as under the Proposed Action. However, under Alternative E, no production wells or associated facilities would be developed in Snake Valley.

For Cave, Dry Lake, Spring, and Delamar valleys, the wells would be distributed as described for the Proposed Action (Section 2.5.2.1). Well construction, equipment, treatment, and ROW site requirements for individual wells under Alternative E in these valleys would be the same as described for the Proposed Action. No development would occur in Snake Valley under Alternative E.

Future Collector Pipelines

Assumptions of the potential lengths, sizes, ROW width requirements, and staging area dimensions of future collector pipelines for Cave, Dry Lake, Spring, and Delamar valleys would be the same as described under the Proposed Action (Section 2.5.2.2). No pipelines would be developed in Snake Valley under Alternative E.

Figure 2.6-16 Groundwater Development Areas – Alternative E

Comparison to Proposed Action

ROW requirements and groundwater development facilities that differ from the Proposed Action are shown in **Table 2.6-21**.

Table 2.6-21 Alternative E, Comparison to the Proposed Action

	Proposed Action	Alternative E
ROW and Facility Requirements		
Power Requirements (MW)	97	55
Conceptual Analysis – Groundwater Development Plan		
Volume of Developed Groundwater (afy)	176,655	78,755
Intermittent Pumping	No	No
Programmatic Analysis – Future Facilities		
Groundwater Production Wells (number, distribution)	144 to 174 within 5 basins; dispersed within the groundwater development area	69 to 83 within 4 basins; dispersed within the groundwater development area
Collector Pipelines (miles)	177 to 434	86 to 210
Staging Areas (number of 1-acre sites)	59 to 145	29 to 70
Electric Power Lines (miles)	177 to 434	86 to 210
Estimated Construction Disturbance (acres)	3,530 to 8,265	1,725 to 3,987
Temporary Disturbed Area to be Revegetated (acress)	1,165 to 2,727	569 to 1,316
Permanent Disturbance (acres)	2,365 to 5,538	1,156 to 2,671

2.6.6 Alignment Options 1 through 4

Local-scale option locations for certain facilities (pipelines, power lines) also are evaluated. **Table 2.6-22** provides a description and rationale for these options, and identifies the alternatives where they could be applied.

Table 2.6-22 Local-scale Facility Location Options

Option	Description/Rationale	Alternative					
		Proposed Action	A	B	C	D	E
1	Humboldt-Toiyabe Electrical Power Line Alignment • Opportunity to locate the Gonder to Spring Valley electrical power line within an existing transmission line corridor across USFS land.	X	X	X	X	X	X
2	North Lake Valley Pipeline and Electrical Power Line Alignment • Opportunity to locate the main pipeline and power line within an existing transportation utility corridor (U.S. 93).	X	X	X	X		X
3	Muleshoe Substation and Power Line Alignment • Opportunity to tie into a different regional substation, if regional power lines are constructed by other entities as planned, and avoid construction of the Gonder to Spring Valley power line segment.	X	X	X	X		X
4	North Delamar Valley Pipeline Alignment • Opportunity to locate both the pipeline and power line within the LCCRDA corridor. One additional pumping station would be required.	X	X	X	X	X	X

Alignment Options 1 through 4 address potential changes in facility locations or alignments from the Proposed Action. Each of these options assumes conceptual development of the full quantity of groundwater associated with the SNWA rights and applications, as identified for the Proposed Action (Section 2.5). Thus, the descriptions provided in this

section focus on the changes in ROWs that would be granted under Alignment Options 1 through 4. **Figure 2.6-17** shows the relative location of the alignment options.

2.6.6.1 Alignment Option 1—Humboldt-Toiyabe Power Line Alignment

In this option, the Humboldt-Toiyabe 230-kV power line would parallel an existing transmission line over the Schell Creek Range between the Gonder Substation and Spring Valley. **Table 2.6-23** shows the major differences of this option when compared to the segment replaced in the Proposed Action.

Table 2.6-23 Comparison of Alignment Option 1 to the Proposed Action

	Alignment Option 1	Proposed Action
Length of ROW (miles)	Transmission Line: 12.4 miles	Transmission Line: 20.3 miles
Disturbance (acres)	150 acres	245 acres
Land Ownership	BLM: 27 % USFS: 70 % Private: 3 %	BLM: 100 %
Land Cover	Pinyon Juniper Woodland: 46 % Greasewood/Salt Desert Shrubland: 1 % Sagebrush Shrubland: 53 %	Pinyon Juniper Woodland: 28 % Greasewood/Salt Desert Shrubland: 8 % Sagebrush Shrubland: 63 % Perennial Grassland: 1 %

- The Humboldt-Toiyabe alignment option would represent an incremental expansion in the width of an existing cleared transmission line ROW.
- The corresponding segment of the Proposed Action power line would be constructed in a new ROW, which would require tree and shrub clearing of power pole sites and construction of a new access road.
- This alternative power line segment is shorter (8 miles) than the 230-kV power line for the Proposed Action in this area, but it crosses steeper terrain.

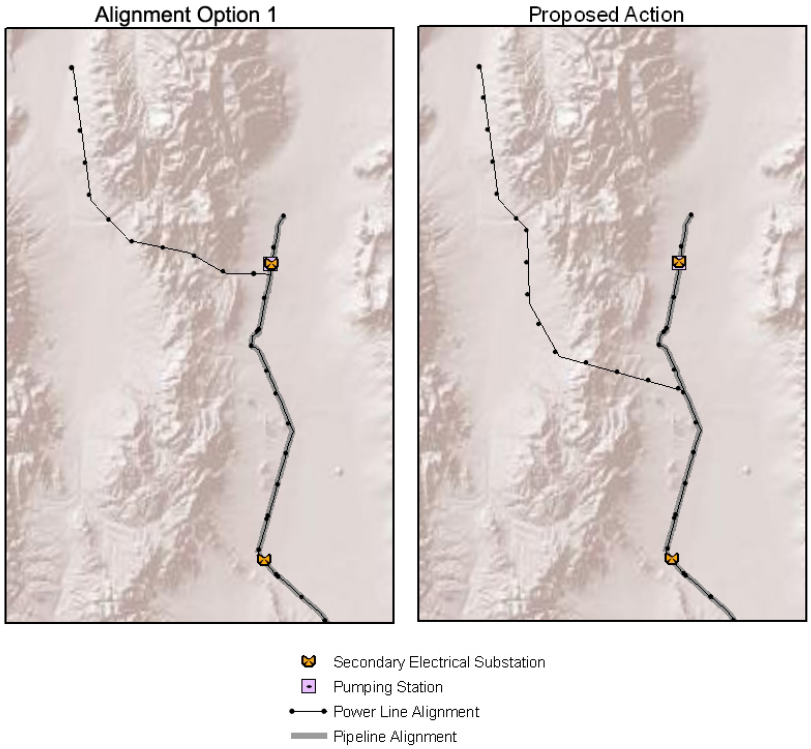


Figure 2.6-17 Alignment Options

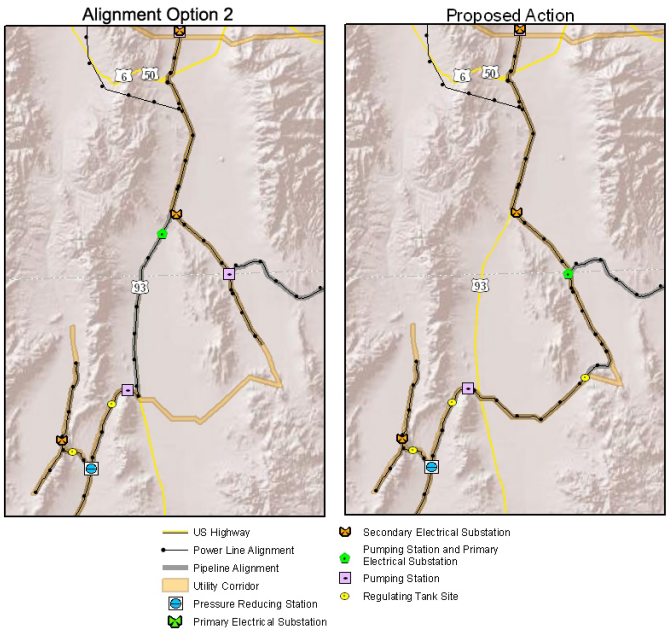
2.6.6.2 Alignment Option 2—North Lake Valley Pipeline and Power Line Alignments

This option would change the location of the mainline pipeline and associated power line in North Lake Valley. The primary environmental consequences of this option would be the collocation of more of the project facilities within the Highway 93 transportation corridor, as compared to the Proposed Action. **Table 2.6-24** shows the major differences of this alignment option compared to the segment replaced in the Proposed Action.

Table 2.6-24 Comparison of Alignment Option 2 to the Proposed Action

	Alignment Option 2	Proposed Action
Length of ROW (miles)	Pipeline ROW: 24.3 miles Transmission Line: 24.3 miles	Pipeline ROW: 23.0 miles Transmission Line: 22.9 miles
Disturbance (acres)	975 acres	915 acres
Land Ownership	BLM: 94 % Private: 6 %	BLM: 100 %
Land Cover	Pinyon Juniper Woodland: < 1 % Greasewood/Salt Desert Shrubland: 8 % Sagebrush Shrubland: 68 % Perennial Grassland: 23 % Annual Invasive Grassland: < 1 %	Pinyon Juniper Woodland: 6 % Greasewood/Salt Desert Shrubland: 4 % Sagebrush Shrubland: 89 % Perennial Grassland: < 1 %

- The mainline pipeline and power line would be located parallel to Highway 93, over a distance of about 8 miles.
- An additional Pumping Station would be required along Highway 93, 3 miles south of the intersection with Atlanta Road (a 60-acre site).
- The proposed Pumping Station in southern Spring Valley would be reduced in size (to a 5-acre permanent site); a regulating tank would not be required.
- The power line that is parallel to the Spring Valley lateral pipeline would be reduced from 230 to 69 kV.



This option would be longer than the Proposed Action and would require an additional Pumping Station. The overall length of the alignment would be approximately 25 miles, replacing approximately 20 miles of the Proposed Action alignment through central Lake Valley.

2.6.6.3 Alignment Option 3—Muleshoe Substation and Power Line Alignment

This option depends on the implementation of at least one major regional power line project in the GWD Project area. Great Basin Transmission and NV Energy are planning and developing the ON Line (formerly Southwest Intertie) Project, a 500 kV power line that is being constructed from a substation west of Ely in White Pine County to the Harry Allen Power Plant in Clark County. NV Energy and others also have proposed additional high voltage power lines through this region. The ON Line project would cross into the GWD Project area in northern Dry Lake Valley (also known as Muleshoe Valley). This option assumes that this project would be completed, would have available capacity, and an agreement could be reached for the SNWA to tie into that line. A new regional substation would be required. A tie-in to a regional transmission line project would eliminate the need for the proposed 34-mile groundwater development 230-kV transmission line from Gonder to Spring Valley. For this option, the following facilities would be constructed:

- The Muleshoe Substation, on a 43-acre site, would decrease power from that 500-kV power line to 138 kV, for conveyance to project facilities. This site is adjacent to the boundaries but outside of the BLM-designated utility corridors. An approximately 1,000-foot-long segment of permanent ROW for an additional 138-kV power line segment would be constructed between the main line and the Muleshoe Substation.
- 138-kV power lines would be used to convey power along the main alignment. The 138-kV power poles would be single, steel power poles, approximately 70 feet tall and spaced at approximately 700-foot intervals, depending on the terrain. The routing and ROW width requirements of the 138-kV power line would be the same as those described for the Proposed Action.
- The primary and secondary electrical substations that are identified for the Proposed Action would still be needed, to further convert power for conveyance to project facilities. The primary electrical substations would convert from 138 kV instead of from 230 kV. There would be no change in the ROW requirements for these substation sites.

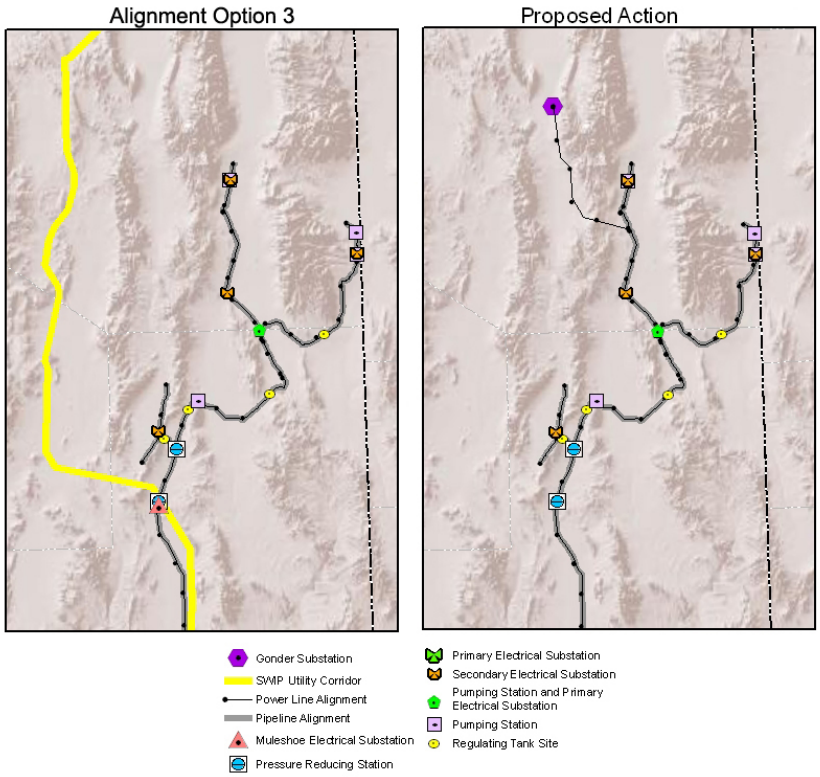


Table 2.6-25 shows the major differences of this option compared to the segment replaced in the Proposed Action.

Table 2.6-25 Comparison of Alternative Option 3 to the Proposed Action

	Alternative Option 3	Proposed Action
Length of ROW (miles)	Transmission Line: 0 miles	Transmission Line: 34 miles
Disturbance (acres)	44.7 acres	409 acres
Land Ownership	BLM: 100 %	BLM: 88 % State: 10 % Private: 2 %
Land Cover	Greasewood/Salt Desert Shrubland: 39 % Sagebrush Shrubland: 61 %	Pinyon Juniper Woodland: 77 % Greasewood/Salt Desert Shrubland: 5 % Sagebrush Shrubland: 38 % Perennial Grassland: < 1 %

2.6.6.4 Alignment Option 4—North Delamar Valley Pipeline Alignment

Alignment Option 4 would be the same as the Proposed Action, except that the pipeline and power line in northern Delamar Valley would follow the same alignment along Poleline Road. Under the Proposed Action, the pipeline and power line would diverge in this area because of an elevation increase along the road. Under Alignment Option 4, both the pipeline and power line would parallel each other and be within the LCCRDA corridor. For this option, the following facilities would be constructed:

- An additional Pumping Station would be built to move water across the higher elevation along Poleline Road. This new Pumping Station would be located on BLM land at U.S. 93 and North Poleline Road. The Pumping Station would be similar to the Lake Valley Pumping Station described under the Proposed Action, and would require a 5-acre permanent ROW and a 5-acre temporary ROW.
- The length of pipeline under Alignment Option 4 would be slightly shorter than under the Proposed Action. The overall length of the specified pipeline segment under this alternative would be approximately 14 miles, compared to 16 miles under the Proposed Action.

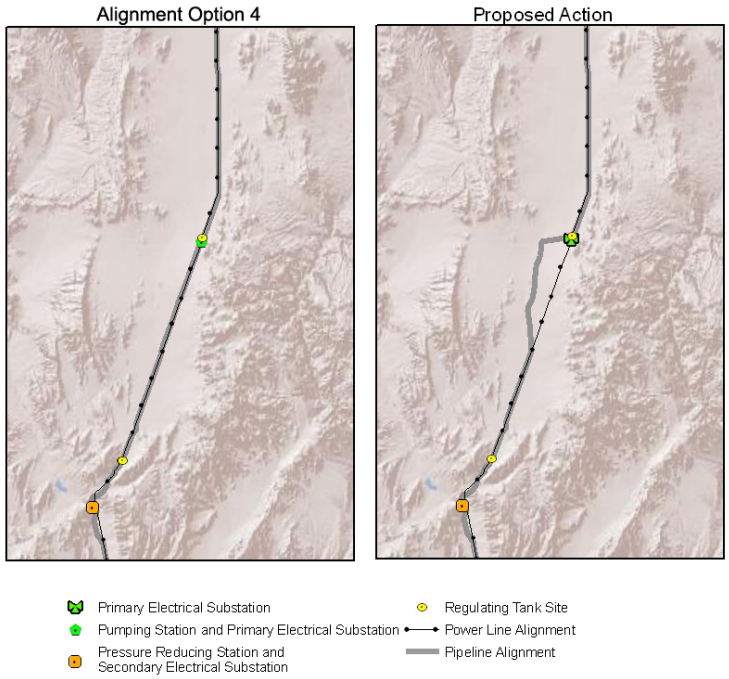


Table 2.6-26 shows the major differences of this option compared to the Proposed Action.

Table 2.6-26 Comparison of Alignment Option 4 to the Proposed Action

	Alignment Option 4	Proposed Action
Length of ROW (miles)	Pipeline: 13.4 miles	Pipeline: 16.1 miles
Disturbance (acres)	352 acres	403 acres
Land Ownership	BLM: 100 %	BLM: 100 %
Land Cover	Greasewood/Salt Desert Shrubland: 7 % Sagebrush Shrubland: 81 % Mojave Mixed Desert Scrub: 12 % Perennial Grassland: < 1 %	Greasewood/Salt Desert Shrubland: 15 % Sagebrush Shrubland: 80 % Mojave Mixed Desert Scrub: 4 % Annual Invasive Grassland: 1 % Barren: < 1 %

2.7 Alternatives Considered But Not Carried Forward for Detailed Analysis

The BLM is required to explore and evaluate reasonable alternatives to the Proposed Action, and to briefly discuss the reasons for eliminating potential alternatives from detailed study (40 CFR § 1502.14[a]). The goal of the alternative selection process is to provide a reasonable range of alternatives to the Proposed Action, and to foster informed decision making and informed public participation.

Main Points—Alternatives Considered But Eliminated

- The BLM considered but eliminated 5 conveyance alternatives for environmental and economic reasons.
- Other water supply alternatives were eliminated because they did not meet the purpose and need of the Proposed Action.

The purpose and need of a project dictates the range of reasonable alternatives. The BLM's *NEPA Handbook*, H 1790-1, V-5 (BLM 2008a), provides that, except for the No Action Alternative, alternatives that are selected for the EIS should "respond to the purpose and need for the action." Project alternatives are potential substitutes for the Proposed Action and might accomplish the general goal of the project in another manner, or they may provide other means of carrying out the Proposed Action.

As described in Section 1.1.2, the purpose of the action addressed in this draft EIS is for the BLM to respond to the SNWA's request for legal access across federal land managed by the BLM for construction and operation of a groundwater development and conveyance system. Groundwater would be developed within hydrologic basins in Lincoln and White Pine counties, Nevada. Groundwater would be delivered to interconnections with municipal systems in Lincoln County, and the Las Vegas Valley. The need for the action arises from the BLM's responsibilities under the FLPMA and other legislation to respond to the SNWA's ROW request. Possible alternatives were screened against this purpose and need criterion.

Further, an agency is not required to consider alternatives that are infeasible, ineffective, or inconsistent with the basic policy objectives for federal management of an area. Alternatives that are remote, speculative, or impractical need not be considered in detail. A reasonable alternative should "avoid or minimize adverse effects of these actions upon the quality of the human environment" (40 CFR 1500.2[c]). Although legal issues or conflicts might represent an obstacle to implement an alternative, the CEQ has indicated that legal factors cannot be used as the sole basis to eliminate an otherwise reasonable alternative (CEQ 1981).

2.7.1 Groundwater Conveyance and Water Management Alternatives

BLM examined the feasibility of transporting groundwater from groundwater development areas to Lincoln County and the Las Vegas Valley via trains, trucking, and aqueducts, and implementing different configurations of the proposed water development and conveyance system. None of these alternatives would result in a reduction in environmental impacts, or be more economical to develop than the Proposed Action.

Trucking: Based on the need to transport approximately 218,000 afy of water, the number of tanker trucks, each capable of transporting 8,400 gallons, would be 8,365,654 tanker trucks on an annual basis, equivalent to 22,919 trucks daily. The actual fleet needed would be approximately twice this size (46,000 tanker trucks), since the trucks would need to return to the groundwater area empty to be refilled. The trucks would need to travel hundreds of miles, obtaining water from various regions of Nevada and hauling the water to Clark and Lincoln counties. Trucking poses a greater safety risk to the public than pipelines (Pipeline and Hazardous Materials Safety Administration 2010). The substantial number of trucks required to haul this volume of water would likely cause a substantial increase in vehicular accidents with associated injuries and fatalities. Further, the emissions from the transport trucks would decrease air quality due to an increase in mobile emissions.

Railroads: Transportation by train would require a substantial number of rail cars transporting water on a daily basis. New rail lines would need to be constructed, causing temporary and permanent surface disturbances and a significant economic investment in land acquisition since the rail ROW would not be reclaimed to previous use, like a pipeline. Like trucking, transportation by rail also would increase public safety risks compared to pipelines. Rail cars can transport 84,000 gallons. Based on approximately 218,000 afy of water to be conveyed, this would require an annual

total of 636,654 rail cars, equivalent to 2,292 rail cars per day. The rail cars would need to travel hundreds of miles, obtaining water from various regions of Nevada and hauling the water to Clark and Lincoln counties. Rail transport poses a greater safety risk to the public than pipelines (Pipeline and Hazardous Materials Safety Administration 2010). The substantial number of rail cars required to haul this volume of water would likely cause a substantial increase in accidents with associated injuries and fatalities. Further, the emissions from the train traffic would decrease air quality due to an increase in mobile emissions.

Aqueducts: Because of numerous changes in elevation between the groundwater source areas and the delivery points, construction of an aqueduct would likely have to be combined with a pipeline system in areas of steep topography. Pumping stations and pipelines would still be required to move water over drainage divides. Construction of aqueducts would create temporary and permanent surface disturbance. Like railroads, construction of aqueducts would require a significant investment in land acquisition, since the land would not be restored to previous uses, like a pipeline. Also like railroads, existing land uses would be impacted by the permanent aboveground aqueduct that would reduce amount of land available for grazing and would fragment habitat and create potential hazards for livestock and wildlife. In addition, there would be evaporative loss of water associated with aqueducts as a water source.

Phased Development of the GWD Project: This alternative would consist of constructing two smaller pipelines to achieve a similar conveyance capacity of the Proposed Action. The rationale for a phased approach is to address potential uncertainties in available groundwater for transport, and to reduce the initial facilities capital investment. A phased development of the project would result in construction of smaller, but duplicate parts of the conveyance system. This approach would result in greater overall surface disturbance impacts to environmental resources. The project completion time frame would spread out over a longer period than the Proposed Action. Construction costs would be substantially higher than the Proposed Action due to added design, mobilization, and additional material compared to the Proposed Action.

Return of Groundwater to Original Hydrographic Basins: This alternative would modify the Proposed Action by constructing a second pipeline system to return treated wastewater to the hydrographic basins from which the groundwater was originally withdrawn, and then reinjecting the water into the aquifer through wells or infiltration basins. Although this alternative potentially would increase aquifer recharge, it would not increase the amount of water conveyed to Lincoln and Clark counties. Since the SNWA accounts for return waters in its planning calculations, this scenario would actually decrease the amount of water available for the SNWA member users. This alternative would require substantial pumping capacity and electrical power because of the elevation gain between Las Vegas and the individual hydrologic basins. Components would include additional treated water pipelines in the Las Vegas Valley, a secondary pipeline of similar size as the water supply pipeline; pumping stations and injection wells or infiltration basins. Project surface disturbance would be at least twice as great as the Proposed Action due to the duplication of systems. In addition, returning water to the basins of origin is not economically feasible. Capital and infrastructure to build return pipelines would likely be more than twice the cost of the Proposed Action.

2.7.2 Water Supply and Management Alternatives Suggested by the Public

Water supply and management alternatives different in type and location from the SNWA proposal were offered during public scoping. None of these water supply alternatives would fulfill the project purpose (which is for the BLM to provide the SNWA with legal access for a water conveyance system across federal land managed by the BLM) or the need (BLM's responsibilities to comply with the FLPMA and other legislation).

Table 2.7-1 provides a summary of other water supply and water conservation alternatives that were brought forward by the public. Implementation considerations for future water supply acquisition and delivery are provided for each alternative. Several of these future water supply alternatives were recently evaluated as a means of augmenting long-term water supplies (Colorado River Water Consultants 2008). For example, the feasibility of increased cloud seeding is currently being studied within the Colorado River drainage, and desalination projects and agricultural water conservation projects are being implemented in California at various scales to increase regional municipal water availability.

Table 2.7-1 Summary of Water Supply and Conservation Alternatives Provided by the Public

Water Supply and Conservation Alternatives	Implementation Considerations
Water Conservation / Demand Management in Las Vegas Valley: Water conservation, broadly defined, includes reducing consumption relative to established use patterns and increasing the efficiency of use of the presently available water supply. By definition, this alternative affects long-term demand rather than supply. Technologies to reduce water use/increase efficiency are being adopted and implemented in Las Vegas, both in conjunction with retrofits/upgrades and as part of new construction.	• SNWA does not have the legal authority to implement progressive water rate structures (which can decrease demand). The adoption of progressive rate structures is primarily under the auspices of the member utilities and/or local governments. • Conservation actions and incentives would assist in reducing demand, but are insufficient by themselves to accommodate the need for additional water supplies associated with predicted population growth rates. Conservation actions also would not help diversify resources in the event of drought.
Diversion or Conveyance of Conserved Water from Nevada Irrigated Farmland: Fallow irrigated farm land in Nevada or other off-system agricultural users in Nevada would be acquired to fallow currently irrigated lands. Credit would be obtained to divert the resulting reductions in water consumption, factoring in adjustments to account for groundwater recharge requirements, to the Las Vegas Valley to help meet future demand. This alternative would require construction of facilities to convey conserved water from central Nevada to the Las Vegas Valley, similar to the Proposed Action.	• Opportunities for diverting water from existing irrigated lands within the hydrologic basins proposed for groundwater pumping are very limited, and far less than the groundwater rights that SNWA holds, or for which the SNWA has applied in the project basins. • New or modified facilities would be required for diversion, treatment, and transport of water from fallowed lands to the SNWA system. The widely-spaced distribution of irrigated lands in Nevada would require an extensive system of pipelines to collect and convey the water to Las Vegas Valley. • Trans-basin diversion of water within Nevada would require approval from the NSE. Water rights would have to be converted from irrigation to municipal and industrial use; again through proceedings with the NSE. There are regulatory restrictions/constraints which limit the segregation of less than 100 percent share of an existing water right. • Potential quality of life and socioeconomic effects on affected local communities, as well as on the state economy, associated with fallowing currently irrigated lands are expected to result in a regional scale expansion of potential socioeconomic effects.
Modifications of the Colorado River Compact: This modification would require approval from the seven basin states and Congress to change the apportionment under the Compact to increase Nevada's share of water.	• Reallocation of more than 200,000 afy would require an act of Congress, approval of the Secretary of the Interior, and substantial negotiation between basin states. A reallocation is unlikely at best and could take decades to accomplish.
Freshwater Harvested from Icebergs: Icebergs would be located and towed from the Arctic or Antarctic to a location off the coast of California.	• The legal rights and technology to tow icebergs are untested and cost basis has not been established.
Water Banking from Underground Storage: Surface or groundwater would be pumped into aquifers and storage formations and then withdrawn for future use.	• Water banking provides flexibility in water storage, but does not result in a net increase in water available for municipal uses.

Table 2.7-1 Summary of Water Supply and Conservation Alternatives Provided by the Public (Continued)

Water Supply and Conservation Alternatives	Implementation Considerations
Water Purchase from Large Water Supply: Surface water would be diverted from a regional water supply in the western U.S. with delivery to Las Vegas via existing canal systems and new pipelines. Project components would include existing or new canal systems, existing or new pipeline systems, pumping stations, power supplies, and a possible impoundment near Las Vegas to store water.	• Capital and operational costs to implement interstate diversions are unquantifiable, but are expected to be very large to pay for the construction and operation of a long interstate pipeline and associated pumping system. • The likelihood of reaching inter-basin and interstate agreements would be very low, particularly because these transfers could affect downstream water rights holders. The time frame to obtain regulatory approvals and complete construction of a new interstate water transport system would likely require decades.
Riparian Vegetation Management: Phreatophyte vegetation would be removed along stream banks in the Colorado River system to potentially increase the amount of available water.	• Successful eradication methods are labor intensive, would require long-term ongoing vegetation management, • Water saved by phreatophyte control would be very difficult to measure and apportion among the Colorado Compact states. • Quantity of water potentially available would be substantially less than the groundwater rights the SNWA has applied for in the project basins.
Desalination: This alternative would require the construction and operation of an ocean desalination plant along the Pacific coastline and a water exchange with the Colorado River system (e.g., Lake Mead).	• Project feasibility is dependent on modifying agreements between Compact states, and potentially the U.S. and Mexico, for Colorado River deliveries. Regulatory compliance would be required for International Boundary and Water Commission, Mexico's environmental laws, California Environmental Quality Act, California Coastal Act, and other state and local permits. The time frames for modifying these agreements and regulatory approvals could be lengthy. • Operation and maintenance costs of desalination facilities are high. • Desalination brine disposal through an ocean outfall presents environmental and regulatory issues due to the concentration of residuals in the effluent. • Desalination would not help diversify southern Nevada's water resources in the event of Colorado River system drought.
Weather Modification: Cloud seeding would be used to increase precipitation and snow pack in the Colorado River drainage.	• Cloud seeding is sensitive to location and weather, limiting the areas that can be effectively seeded. • Weather modification to increase precipitation can be considered an opportunity to supplement available supplies, but cannot be considered a stable or reliable supply because of year-to-year variability in precipitation. • Given the yield uncertainty and the difficulty of statistically demonstrating and predicting precise amounts of increased snowpack from a certain level of effort, this alternative is an unlikely solution for reliably increasing the quantity of water managed by the SNWA.

2.8 Agency Preferred Alternative

2.8.1 Selection of the Preferred Alternative

BLM has not identified an agency preferred alternative for this draft EIS.

Under the BLM's NEPA regulations (43 C.F.R. § 46.420(d)), the BLM's "preferred alternative" is the alternative which the BLM believes would best accomplish the purpose and need of the proposed action while fulfilling its statutory mission and responsibilities, giving consideration to social, cultural, environmental, technical, economic and other factors. Those regulations only require the draft EIS to include a preferred alternative if one or more exists. This is consistent with the CEQ regulations and guidance. In a draft EIS on an agency action, typically the preferred alternative would be the agency's proposed action. Here, the proposed action that is the subject of this draft EIS concerns whether to grant an application for a ROW to a non-federal entity, the Southern Nevada Water Authority. For the reasons stated below, the BLM has not identified an agency preferred alternative at this draft EIS stage. The BLM may decide at the final EIS stage, based on the draft EIS, and the public and agency comments, that an alternative other than the proposed action is the agency's preferred alternative.

As discussed in this draft EIS, the proposed action concerns whether the BLM should grant a ROW to the SNWA to construct a pipeline to convey water, primarily from wells to be located in the five hydrologic basins. This draft EIS analyzes the site specific impacts of the construction and operation of the proposed water conveyance pipeline and it associated facilities (Tier 1). Specific plans and the quantities of the water to be conveyed in the pipeline system is unknown and will be the subject of subsequent NEPA analysis (Tier 2) when plans are submitted by the SNWA to the BLM in the future for development in the five basins.

The predominant source of water for the pipeline is groundwater that is subject to the jurisdiction of the NSE. For the reasons explained earlier in this chapter, the NSE has yet to act on the SNWA's water right applications, thus, the actual quantity of water that may be pumped from any of the five basins is unknown and therefore will be the subject of future NEPA analysis (Tier 2) as specific plans are submitted to the BLM. In addition, there is, in general, a limited amount of information on the groundwater system in the five basins and in particular in the Snake Valley area of the project, as well as, disagreement on how best to technically interpret various hydrologic and scientific studies. Thus, the BLM has chosen to not select a preferred alternative until after the public has had a chance to review and comment on the draft EIS.

Even though the BLM is not selecting a preferred alternative at this time, it has identified—consistent with its environmental review and ROW permitting responsibilities, and recognizing the NSE's jurisdiction over the SNWA's groundwater applications—that Alternative A (including the mitigation and monitoring identified in Chapter 3) may be considered as a reasonable scenario for the proposed water conveyance pipeline and the related groundwater rights process before the NSE. The BLM asks the reader to use Alternative A as a starting point in reviewing the draft EIS. The groundwater withdrawal amounts in Alternative A are based on the amounts previously approved by the NSE for Cave, Delamar, Dry Lake, and Spring valleys, which approvals were subsequently set aside by the Nevada Supreme Court in June 2010, and the estimated amount for Snake Valley from prior discussions between the States of Nevada and Utah concerning potential groundwater availability from that valley. As noted previously, the BLM's role as a federal land manager considering the SNWA's ROW applications is separate from the NSE water rights process. Only the NSE has the jurisdiction to grant or deny the SNWA's pending groundwater applications.

The draft EIS also proposes four specific alignment options for the proposed action (water conveyance pipeline system and associated facilities) which are under consideration and which the BLM may include as part of the preferred alternative in the final EIS. The BLM specifically requests the public to comment on these options.

Due to the controversial nature of this project (see Section 1.7.2), the BLM is particularly interested in seeing comments and suggestions for the analysis of the Snake Valley portion of the proposed project and identification of impacts to resources in the area, especially to those in GBNP. Concern has been voiced by the NPS, the USFWS, local counties and others about the potential for impacts to water-dependent resources of interest from the proposed groundwater withdrawals associated with this project.

2.9 Past, Present, and Reasonably Foreseeable Future Actions

A *cumulative impact* is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions (RFFAs) regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). BLM Instruction Memo NV-90-435 specifies that impacts first must be identified for the Proposed Action before cumulative impacts with interrelated actions occurs.

The geographic area for evaluating cumulative effects varies by the type of resource that could be affected. In some instances, impacts for certain resources are restricted to the actual area of surface disturbance. Other resources, such as livestock and wildlife, might range over a wide area, and cumulative impacts might involve more than surface disturbance to forage or habitat (such as surface water sources that are required for drinking). Socioeconomic effects might be bounded by political jurisdictions such as towns, counties, and states. Resource-specific cumulative effects study areas were developed for each resource and are discussed in Chapter 3, Affected Environment and Environmental Consequences.

The cumulative effects analysis for this EIS has been separated into two parts, as described below.

Tier 1 Project Facilities. This analysis addresses the combined effects of the project facilities, past and present actions, and the reasonably foreseeable projects within the time frame required to complete this EIS process (expected to be 2012). The primary unit of geographic analysis is the hydrologic basin, consisting specifically of the basins included within the GWD Project groundwater model region of study. This analysis is focused primarily on the interactions of:

1) GWD Project facilities (mainline pipeline and ancillary facilities; groundwater development areas) by alternative;

2) Past and present actions. These actions include existing energy and transportation infrastructure, and current land uses (mining, grazing, recreation). The sources used to define these actions are further described in Section 2.1.1.

3) Surface disturbance projects and activities that meet the reasonably foreseeable criteria for inclusion in the cumulative analysis. A variety of renewable energy generation and transmission projects have been proposed within the cumulative study areas of various resources in the past 5 years. Many of these projects have been subsequently been withdrawn, or become dormant for economic reasons. The criteria for inclusion of reasonably foreseeable projects in the cumulative analysis are described in Section 2.9.1.2.

As discussed in Chapter 1, it is anticipated that site-specific NEPA analysis will be conducted in the various groundwater development basins over the next 30 to 40 years. Because of this long time frame, it is anticipated that the cumulative analysis will be updated in each successive NEPA process to accurately characterize cumulative effects.

This analysis does not attempt to specifically address future projects that may be implemented beyond the time frame of this EIS because it would be speculative to include them. The economic viability of many renewable energy projects, particularly wind and solar projects, are predicated on access to states with renewable energy portfolio standards. These portfolio standards may either be augmented (which would encourage new project proposals), or may be eliminated (which would likely result in the abandonment of new proposals). Proposals for power generation and large transmission projects represent large, long-term permitting efforts. The viability of these projects depend on many factors, and there may be a sufficient market for only one or two of several projects proposed within a region.

Groundwater Development. The cumulative analysis of groundwater drawdown effects is based on a regional groundwater modeling exercise that was initiated in 2006. The past and present actions reflect the best available information on consumptive uses in the groundwater basins included in the model. The reasonably foreseeable projects were those that were known at the time the modeling effort was initiated. For example, the reasonably foreseeable projects include industrial consumptive uses for a power plant project in Steptoe Valley that is currently on hold; the timing of groundwater development in hydrologic basins that would serve residential developments in Lincoln County are not known because of housing overdevelopment and the economic downturn in southern Nevada.

As described for the Tier 1 Project Facilities, it is anticipated that the regional model would be adjusted to include new sources of groundwater use as they become better defined. These new sources would be included in future NEPA analyses for the SNWA groundwater development in individual hydrologic basins.

2.9.1 Tier 1 Facilities

2.9.1.1 Past and Present Actions

Past and present actions (PPAs) within the GWD Project region are illustrated on **Figure 2.9-1**. Also included in this category are large-scale wildfires. The portion of the GWD Project in White Pine and Lincoln counties is sparsely populated. The project would be located almost entirely on federal lands that are administered by the BLM, and more than 90 percent of the land surface in these two counties is under federal ownership.

The primary land uses in these two counties are livestock grazing and limited irrigated agriculture (primarily in the White River, Spring, and Snake valleys). All existing towns and unincorporated communities are small (less than 500 residents, with the exception of Ely) and serve as regional commercial centers that support the agricultural, mining, and recreation industries. Mining is an important industry in eastern Nevada but no existing mining districts would be crossed by GWD Project facilities. Dispersed recreation—including hunting, off-highway vehicle use, hiking, and visitation to GBNP—provides an important economic element within these two counties.

Two major U.S. highways (U.S. 93 running north and south, and the collocated U.S. 6 and U.S. 50 running east and west) serve the GWD Project area in these counties. A system of unpaved county and private roads extends across the large valley floors. A railroad segment that carries a high volume of rail traffic between Salt Lake City and Las Vegas extends across southern Lincoln County.

The land uses in the project area of northern Clark County are influenced by the proximity to the Las Vegas urban area. Land uses also are influenced by multistate pipeline and electrical utility corridors, which extend from energy source regions in Wyoming and Utah to high energy demand areas in Las Vegas, and in California and Arizona.

The past and present actions and their overlap with the GWD Project were analyzed. Data from the following past and present actions were compiled using Geographic Information System (GIS) shapefile layers for the following components:

- Roads and Railroads (assumed a 100-foot width to account for potentially collocated electrical power lines);
- Populated Places (places from the National Atlas in U.S. Populated Places, 2005);
- Agricultural lands (Southwest Regional Gap Analysis Project [SWreGAP] vegetation, with additional agricultural lands from Basin and Range Carbonate Aquifer Study [BARCAS] and the SNWA evapotranspiraton [ET] studies);
- Fires (BLM 2005);
- Vegetation treatment areas (BLM 2010);
- Mining districts (BLM Ely Field Office);
- Section 368 Energy Corridor Zones; and
- ROWs (Power, Communication Sites, Telephone, Pipelines, Railroads, Roads, Water, General, and Other).

Surface disturbance or land use components not included in the analysis are: 1) Nellis AFB, since it falls outside of the main ROW cumulative effects study area and 2) Patriot missile sites, whose aboveground temporary communication tower sites are used only periodically. Also not included are the specific locations of a small number of the SNWA exploration and monitoring groundwater wells that were developed under separate Environmental Assessments approved by the BLM.

Figure 2.9-1 PPAs, RFFAs, GWD Project

Approved surface uses on BLM lands (e.g. livestock grazing, recreational uses, transportation corridors) were considered in the cumulative impact analysis where there was a likelihood that the surface use might be affected by cumulative project interactions.

2.9.1.2 Reasonably Foreseeable Future Actions

The reasonably foreseeable future actions were compiled to determine overlap relationships with the GWD Project. An initial screening of RFFAs used a variety of resources:

- The BLM Ely District and Las Vegas District pending project lists;
- The NDEP list of mining projects;
- The Nevada Wind Energy Projects list;
- Projects that are addressed in the cumulative impact sections of other water project NEPA analysis (e.g., BLM 2008a, Kane Springs EIS) in the area of interest;
- Internet and literature searches; and
- Pending Utah projects gathered from the BLM Fillmore and Cedar City web sites.

To develop a footprint for the RFFA GIS map overlay, the following shapefiles and documents were used and assumptions made.

- BLM LR2000 System.
- Wind and Solar Energy (Plans of Development, EAs, and Pending and Authorized ROWs).
- The private land parcel near Coyote Springs (for residential and solar development).
- The Nevada BLM land ownership data.

The project lists and descriptions were then reviewed to determine the projects to be included in the cumulative analysis. The following criteria were applied:

1. A ROW application and a preliminary POD have been filed with the BLM. The POD must contain sufficient information to provide an estimate of types of facilities, land requirements, and other infrastructure needed (roads, electrical service, water). Evidence of project advancement via periodic meetings with the BLM, requests for right of entry to survey, or initiation of a NEPA process must be documented.

2. Evidence of continued development activity for projects approved under an Environmental Assessment or EIS process. In general, a project that shows no forward development progress within a year of receiving a ROD and ROW grant is considered inactive, and was not considered in this analysis.

3. Development on private land that shows evidence of forward progress within the past year, based on filings with local governments, or evidence of new construction based on aerial photo reviews.

Based on these criteria the reasonably foreseeable projects, and associated development areas (hydrologic basins) are summarized on **Figures 2.9-1** and **2.9-2**. The following section provides a description of each of the reasonably foreseeable projects, and the anticipated interactions with GWD Project.

Figure 2.9-2 RFFA Projects in the Apex Area Clark County, NV

Wilson Creek Wind Project.

- Location. This project is being developed in three phases along the summits of the Wilson Peak Range, located between southern Spring and northern Lake Valley (**Figure 2.9-1**) within an overall lease area of approximately 31,000 acres.
- Permitting/Development Status. The Wilson Creek/Table Mountain area represents the first project phase. The Atlanta Summit and White Rock areas would be developed at a later time, depending on the quality of the wind resource. This project is currently undergoing an EIS review process under the lead of the BLM Schell Field Office. The Wilson Creek/Table Mountain area is being analyzed on a site specific level; the other two areas are being evaluated at a programmatic level. Public scoping is anticipated during the first half of 2011. A ROD is expected in 2012 or 2013.
- Project Description. The following is a summary of facilities, and an estimate of land requirements for the Phase 1 facilities, based on the POD (Wilson Creek Power Partners 2010).
  - Turbines. The first phase is planned for 195 turbines of various sizes.
  - Roads. It is estimated that a total of 178 miles of roads would be required to support the first phase of the project. Of this mileage, approximately 50 percent represents existing roads requiring improvement.
  - Transmission line. The project transmission line would extend from the project area to the LCCRDA corridor boundary on the divide between Spring and Lake valleys. The transmission line would then be located within the LCCRDA corridor across Lake and Dry Lake Valley to an interconnection with the ON 500 kV transmission line in Dry Lake Valley.
  - Project surface disturbance. It is assumed that approximately 750 acres of temporary surface disturbance would be required for new and upgraded surface roads, and turbine pads for Phase 1. It is assumed that the 50 mile transmission line would require a construction ROW 100 feet wide, and temporary surface disturbance of approximately 600 acres. Permanent land commitments to roads and turbine sites is estimated to be about 500 acres.
- Relationship to the GWD Project.
  - Transmission lines for both projects would be located within the LCCRDA corridor within the Lake and Dry Lake valleys, and ROWs could be adjacent.

Spring Valley Wind Project

- Location. The project is being constructed north of the intersection of Highway 93 and 6&50 in Spring Valley within an overall development area of 7,653 acres (**Figure 2.9-1**).
- Permitting/Development Status. The ROD and FONSI were issued by the BLM in October 2010. It was assumed in the EA that the project would be in service by the end of 2011. The project ROD and FONSI have been appealed, but some predevelopment activities are occurring.
- Project Description (based on the EA):
  - Turbines. 75 wind turbines would be installed (subsequently reduced to 66 turbines).
  - Roads. Approximately 28 miles.
  - Transmission Lines. Direct interconnection via substation with an existing NV Energy 230 kV line in Spring Valley.
  - Project Surface disturbance. Temporary surface of approximately of 337 acres; permanent land commitments to access roads and turbines of 111 acres.
- Relationship to the GWD Project. Overlaps with a GWD Project groundwater development area in Spring Valley.

ON Line Transmission Project

- Location. The 500 kV transmission line project is being constructed in a 200 foot wide ROW within an approved BLM utility corridor between a substation west of Ely in White Pine County and a terminus at the Harry Allen Power Plant in Clark County (**Figures 2.9-1** and **2.9-2**).
- Permitting/Development Status. ROW grants and partial Notices to Proceed received. Facility construction is being initiated in 2011.
- Project Description. 500 kV alternating current (AC) transmission line, with an associated access road. Based on information contained in the project description chapter of the supplemental Final EIS (BLM 2010), it is assumed that temporary surface disturbance required for roads, pulling stations, and other temporary work areas would require 12 acres per mile; permanent road and transmission structures would require 3 acres per mile. Assuming an overlap with the GWD Project facilities in the same utility corridor for 136 miles, temporary surface disturbance would be 1,632 acres; permanent land commitments to access roads and transmission line structures would be 408 acres.
- Relationship to the GWD Project. Groundwater development facilities (pipeline and transmission line) would share the same utility corridor with the ON transmission line in Cave, Dry Lake, Delamar, Pahranagat, Coyote Springs, Hidden, and Garnet Valleys over a distance of approximately 136 miles. ROWS of the two projects could be adjacent.

Kane Springs Valley Groundwater Development Project

- Location. This groundwater development and pipeline system is located in Kane Springs and Coyote Springs Valley northeast of the Lincoln/Clark County line, Nevada.
- Permitting/Development Status. The ROD was signed in November 2008. Project is currently undergoing engineering analysis and construction design.
- Project Description. The project consists of groundwater wells in Kane Springs Valley, a 9 mile water conveyance pipeline, a 4 mile transmission line, and water storage tanks. Total land requirements would be 191 acres.
- Relationship to the GWD Project. The utility ROWs would not overlap, but would be located within the same hydrologic basin. The groundwater pumping for this project is a foreseeable project under groundwater development.

Silver State Energy Association Eastern Nevada Transmission project

- Location. This 230 kV transmission line project is proposed in two separate alignments in Clark County, Nevada. One of the alignments would extend 21 miles from the Gemmill substation near the intersection of U.S. Highway 93 and Nevada Highway 168 (south of the Coyote Springs private land block) to a terminus at the Tortoise substation near Moapa. The second alignment would extend 33 miles from the Silverhawk power plant to the Newport Substation south of Henderson (**Figures 2.9-1** and **2.9-2**).
- Permitting/Development Status. A draft Environmental Assessment is currently under review by the BLM Southern Nevada District. It is possible that a FONSI may be reached by the BLM for the Gemmill Substation to Moapa Substation in 2011. The BLM's ROW grant for the Silverhawk to Newport segment may be delayed, pending resolution of whether a new transmission line ROW is available across the Sunrise Mountain Instant Study Area east of Las Vegas.

Project Description. The following is a summary of facilities, and land requirements.

  - Transmission line and roads. The two project transmission line alignments are proposed within a 150 foot wide permanent ROW. Both alignments would be located in existing utility corridors in which other transmission lines and roads are present. For purposes of analysis, it is assumed that surface disturbance would average 12 acres per mile. This disturbance area would include staging, conductor stringing areas, and

temporary access roads. It is also assumed that permanent surface disturbance (structure sites, spur roads) represents 10 percent of the construction surface disturbance, or 1.2 acres per mile.

- Project surface disturbance.
  - Gemmill Substation to Moapa Substation. It is assumed that this segment would require a construction surface disturbance area of 252 acres, and a permanent commitment of 25 acres to spur roads and transmission structure sites.
  - Silverhawk Substation to Newport Substation. It is assumed that this segment would require a construction surface disturbance area of 396 acres, and permanent commitment of 40 acres to spur roads and transmission structure sites.

- Relationship to the GWD Project.
  - Gemmill Substation to Moapa Substation. The Gemmill Substation would be located on the east side U.S. Highway 93; the GWD Project ROW would be located parallel to Highway 93 on the west side of the highway. The Eastern Nevada Transmission project would traverse approximately 6 miles of the Coyote Spring Valley, a hydrographic basin shared with the GWD Project. .
  - Silverhawk Substation to Newport Substation. The proposed transmission line ROW would parallel the proposed GWD Project main pipeline ROW for approximately four miles in the Garnet Valley between the Silverhawk power plant and the vicinity of Apex, where the two ROWs would diverge.
  - The GWD Project and the two segments of the Eastern Nevada Transmission Project are located within the BLM Coyote Springs ACEC, which spans the Coyote Springs, Hidden Valley North, and Garnet Valleys. This ACEC was established for desert tortoise protection. The GWD Project and the Eastern Nevada Transmission Project together would cause approximately 1,540 acres of surface disturbance in the BLM Coyote Springs ACEC within these three hydrographic basins.

Table 2.9-1 provides a summary of the land requirements (estimated construction surface disturbance) by hydrologic basin for the GWD Project Proposed Action (ROWs and groundwater development facilities), Past and Present Actions, and the Reasonably Foreseeable Projects. **Table 2.9-2** includes the projects and actions that have not been included in the cumulative surface analysis.

2.9.1.3 Groundwater Development

Groundwater consumptive uses included for the cumulative impact evaluations include:

- Continuation of historical and permitted groundwater uses incorporated under the No Action Alternative;
- Pumping associated with the Proposed Action or alternatives to the Proposed Action (Alternatives A through E) specific to the cumulative impact evaluations for each alternative groundwater development scenario.
- Reasonably foreseeable future groundwater development, including:
  - Future development of existing permitted groundwater rights that are likely to occur associated with private lands and previously authorized projects; and
  - Additional groundwater developments that may occur in the future associated with proposed projects that have submitted formal development plans to regulatory agencies for permitting purposes.

Table 2.9-1 Summary of Surface Disturbing Actions for Past and Present and Reasonably Foreseeable Future Actions in Basins Crossed by the GWD Project Facilities

Hydrologic Basin	Total Acres in Hydrologic Basin	Past and Present Actions (acres)	Groundwater Development Proposed Action Project ROW Construction Impacts (acres)	Groundwater Development Proposed Action Groundwater Development Impacts (acres)	Reasonably Foreseeable Future Actions (acres)	Sum of Past and Present Actions, Proposed Action, and RFFAS
Cave Valley	229,646	5,723	712	523	0	6,958
Coyote Spring Valley	392,730	43,404	1,727	0	893	46,042
Delamar Valley	231,443	52,681	891	523	268	54,363
Dry Lake/Muleshoe Valleys	573,399	10,846	2,631	523	1588	15,588
Garnet Valley	100,936	1,941	306	0	96	2,343
Hamlin Valley	520,085	33,196	384	0	0	33,580
Hidden Valley (North)	53,475	357	478	0	66	901
Lake Valley	354,464	27,019	804	0	990	28,813
Las Vegas Valley	987,568	317,845	223	0	0	318,068
Lower Meadow Valley Wash	605,291	224,433	121	0	0	224,554
Pahranagat Valley	495,042	14,380	252	0	102	14,734
Snake Valley	1,766,192	57,762	879	2,280	0	60,921
Spring Valley	1,066,063	54,854	2,568	4,416	337	62,175
Steptoe Valley	1,248,646	72,690	327	0	0	73,017
Total	**8,624,980**	**917,131**	**12,303**	**8,265**	**4,340**	**942,039**

Table 2.9-2 Projects and Actions not Included in the GWD Project Tier 1 Analysis

Hydrographic Basin(s)	Proponent	Project/Action	Rationale for not including in the Tier 1 analysis.
Renewable Energy Projects			
Steptoe	Apex (formerly NV Wind)	Wind energy projects, multiple sites (Cherry Creek, Egan, Robinson Summit, Schell	Apex acquired projects from NV Wind; existing PODs being reviewed; no time frame for re-starting project permitting.
Steptoe	Gridflex Energy	White Pine Pumped Storage	On hold
Spring	NextEra	Blackhorse Wind	Monitoring, no POD filed.
Hamlin	Wasatch Wind	Hamlin Valley Wind	Monitoring, no POD filed.
Lake	Windlabs	Horse Corral Pass Wind	Monitoring, no POD filed.
Delamar	Solar Reserve	Pahroc South Solar	On hold
Coyote Spring	BrightSource	Coyote Springs Solar	No evidence of current development
Power Plants			
Virgin River, Tule Desert	Sithe Global	Toquop Power Plant (natural gas)	Surface facilities – located outside hydrologic basins potentially affected by GWD project. On hold.
Steptoe	LS Power	White Pine Power Project	NEPA process completed; on hold.
Transmission Lines			
LCCRDA corridor, Lincoln, Clark Counties.	TransWest, LLC	TransWest Transmission Project	EIS alternatives being formulated; Proposed Action corridor is parallel to I-15. Alternatives utilizing the LCCRDA corridor may not be carried forward in the EIS analysis.
Existing Transmission Line Utility Corridor (Apex to Marketplace)	Great Basin Transmission	SWIP Extension (Harry Allen Power Plant to Marketplace)	Project would be outside the utility corridors being proposed for the GWD project. Determination needs to be made whether this transmission line project can be constructed across the Sunrise Mountain Instant Study Area. An alternative would be to utilize an available circuit on an existing double circuit transmission line.
Groundwater Development and Conveyance Projects			
Clover	Lincoln County Water District	Lincoln County Land Act	Surface facilities – located outside hydrologic basins potentially affected by GWD project. Groundwater requirements included in GWD foreseeable projects.
Residential Development Projects			
Coyote Spring	Coyote Springs Development	Residential Development (Clark and Lincoln Counties)	No evidence of current development.

2.9.1.4 Past and Present Actions

The current groundwater consumptive uses were compiled from the broad region that the SNWA groundwater model encompasses (SNWA 2009). The hydrographic basins with past or present consumptive use are shown in **Table 2.9-3**.

Table 2.9-3 Past and Present Consumptive Groundwater Use, by Hydrologic Basin[1]

Basin Number	Hydrographic Basin	Total (afy)
195	Snake Valley	21,649
184	Spring Valley	9,045
215	Black Mountains Area	1,688
204	Clover Valley	742
198	Dry Valley	3,520
200	Eagle Valley	129
216	Garnet Valley	770
183	Lake Valley	13,373
205	Lower Meadow Valley Wash	3,077
220	Lower Moapa Valley	2,705
219	Muddy River Springs Area	8,117
209	Pahranagat Valley	2,754
203	Panaca Valley	9,325
202	Patterson Valley	2,819
194	Pleasant Valley	232
199	Rose Valley	362
179	Steptoe Valley	11,673
207	White River Valley	11,671

[1] Sources used for No Action Alternative as shown on **Figure 3.3.2-20**.

2.9.1.5 Reasonably Foreseeable Groundwater Use

The estimated reasonably foreseeable future groundwater developments for each of the proposed pumping basins and additional basins included the water resources region of study are listed in **Table 2.9-4**.

Table 2.9-4 Estimated Reasonably Foreseeable, Future Groundwater Developments Included in the Cumulative Analysis

Hydrographic Basin	Reasonably Foreseeable Future Groundwater Developments			
	Quantity (afy)	Use Type	Water Right Status	Comments
Project Groundwater Development Basins				
Delamar Valley	—	—	—	No additional reasonably foreseeable, future uses
Dry Lake Valley	1,009	Irrigation	Permit	Lincoln County
Cave Valley	—	—	—	No additional reasonably foreseeable, future uses
Spring Valley	1,426	Irrigation	Permit	—
Snake Valley	—	—	—	No additional reasonably foreseeable, future uses
Other Basins				
Coyote Spring Valley	9,000	Municipal	Permit	SNWA Coyote Spring Pipeline
	4,600		Permit	Coyote Spring Investment, Inc.
Steptoe Valley	2,046	Irrigation	Permit	—
	8,000	Industrial	Permit	White Pine County lease to LS Power Co. (project start assumed in 2020)
	20		Permit	Other existing permitted industrial
	2,635	Mining	Permit	Robinson Nevada Mining Co.
Garden Valley	83	Irrigation	Permit	—
	5	Industrial	Permit	—
Kane Springs Valley	1,000	Municipal	Permit	Lincoln County/Vidler groundwater rights based on NSE Ruling Nos. 5712 and 5987
Panaca Valley	1,240	Irrigation	Permit	—
Clover Valley	37	Irrigation	Permit	—
	14,480	Municipal	Application	Lincoln County / Vidler groundwater applications (67964, 67965, 67966, 67967); Lincoln County Land Act Project
Lower Meadow Valley Wash	380	Irrigation	Permit	—
	580	Municipal	Permit	Coyote Springs Investment, Inc.
Pahranagat Valley	924	Irrigation	Permit	—

Table 2.9-5 provides a summary of the total estimated cumulative groundwater consumptive use for the hydrologic basins within the overall hydrologic Region of Study. The Proposed Action represents the GWD Project alternative with the maximum potential groundwater withdrawal from the five project basins. No past or current pumping is occurring in Cave, Delamar, and Dry Lake valleys. Very small groundwater pumping volumes, or no additional pumping are foreseeable in the five project basins. Based on these estimates, the GWD Project would be the primary groundwater user in all five groundwater development proposed pumping basins.

Table 2.9-5 Estimated Cumulative Total Groundwater Consumptive Use by Hydrogic Basin

Hydrographic Basin	GWD Project – Proposed Action (afy)	Past and Present Actions (afy)	RFFAs (afy)	Total (afy)
Cave Valley	11,584	0	0	11,584
Delamar Valley	11,584	0	0	11,584
Dry Lake Valley	11,584	0	1,009	12,593
Snake Valley	50,679	21,649	0	72,328
Spring Valley	91,224	9,045	1,426	101,695
Black Mountains Area	0	1,688	0	1,688
Clover Valley	0	742	14,517	15,259
Coyote Spring Valley	0	0	13,600	13,600
Dry Valley	0	3,520	0	3,520
Eagle Valley	0	129	0	129
Garden Valley	0	0	88	88
Garnet Valley	0	770	0	770
Kane Springs Valley	0	0	1,000	1,000
Lake Valley	0	13,373	0	13,373
Lower Meadow Valley Wash	0	3,077	960	4,037
Lower Moapa Valley	0	2,705	0	2,705
Muddy River Springs Area	0	8,117	0	8,117
Pahranagat Valley	0	2,754	924	3,678
Panaca Valley	0	9,325	1,240	10,565
Patterson Valley	0	2,819	0	2,819
Pleasant Valley	0	232	0	232
Rose Valley	0	362	0	362
Steptoe Valley	0	11,673	12,701	24,374
White River Valley	0	11,671	0	11,671

2.10 Environmental Impact Summary

Three tables are used to summarize impacts of the GWD Project on environmental resources. **Table 2.10-1** identifies the impacts of ROW and ancillary facilities on environmental resources. Subsequent tables summarize groundwater pumping impacts on resources for two of the model time frames: full build out plus 75 years (**Table 2.10-2**) and full build out plus 200 years (**Table 2.10-3**).

Table 2.10-1 ROW Areas and Ancillary Facility Impact Summary for the Proposed GWD Project

Resource	Impact Parameter Information			
	Proposed Action and Alternatives A, B, and C	**Alternative D**	**Alternative E**	**No Action**
Air	Air pollutant emissions from construction equipment over an area of approximately 12,303 acres and an 8-year period.	Air pollutant emissions from construction equipment over an area of approximately 8,843 acres and a 6-year period.	Air pollutant emissions from construction equipment over an area of approximately 10,686 acres and a 6-year period.	Regional air pollutant concentrations would remain similar to current levels because land uses (agriculture, mining) would continue at a similar activity level.
	Slight increase in air pollutant emissions from operation and maintenance activities.	Slight increase in air pollutant emissions from operation and maintenance activities but at a reduced scale.	Slight increase in air pollutant emissions from operation and maintenance activities but at a reduced scale.	No increases in air pollutant emissions would occur from construction and operations equipment.
	Minor contribution of greenhouse gas emissions.	Minor contribution of greenhouse gas emissions.	Minor contribution of greenhouse gas emissions.	Minor contribution of greenhouse gas emissions.
Geology/ Paleontology	Even if trench monitoring is implemented, some scientifically valuable fossils would be disturbed and lost during trench excavation and ROW grading over a distance of approximately 150 miles.	Same type of impact as the Proposed Action and Alternatives A through C except that ROWs would not occur in White Pine County.	Same type of impact as the Proposed Action and Alternatives A through C except that ROWs would not occur in Snake Valley.	Locations of scientifically valuable fossils would remain undisturbed on BLM lands, based on current land uses and activities.
Water	Channel alteration and potential water quality effects on one perennial stream crossed by the pipeline ROW.	No perennial streams crossed by the pipeline ROW.	No perennial streams crossed by the pipeline ROW.	No human-caused disturbance would occur in these perennial streams, although channels may be altered by natural high flow events (flash floods, high spring runoff).
	Potential water quality effects on two perennial streams by the power line ROW.	No perennial streams by the power line ROW.	No perennial streams by the power line ROW.	No human-caused disturbance would occur in these perennial streams, although channels may be altered by natural high flow events (flash floods, high spring runoff).
	Potential channel alteration and water quality effects on numerous intermittent and ephemeral streams by the pipeline and power line ROWs.	Fewer intermittent streams crossed by the pipeline and power line ROWs.	Fewer intermittent streams crossed by the pipeline and power line ROWs.	No human-caused disturbance would occur in these intermittent and ephemeral stream channels, although these channels may be altered by natural high flow events (flash floods, high spring runoff).

Table 2.10-1 ROW Areas and Ancillary Facility Impact Summary for the Proposed GWD Project (Continued)

Resource	Impact Parameter Information			
	Proposed Action and Alternatives A, B, and C	**Alternative D**	**Alternative E**	**No Action**
Soils	Short-term disturbance to the following acres of sensitive soils: highly wind erodible (1,476), highly water erodible (369), compact prone (123), and vegetation growth limitations (10,580).	Short-term disturbance to same types of sensitive soils but fewer acres.	Short-term disturbance to same types of sensitive soils but fewer acres.	No surface disturbance to soils underlying native vegetation would occur, and therefore soil losses from wind and soil erosion would continue at current rates.
	Short-term disturbance to approximately 2,584 acres of soil with prime farmland characteristics (no currently active cropland would be affected).	Short-term disturbance to 2,288 acres of soils with prime farmland characteristics (no currently active cropland would be affected).	Short-term disturbance to 2,354 acres of soils with prime farmland characteristics (no currently active cropland would be affected).	No surface disturbance to soils with prime farmland characteristics would occur.
Vegetation	Long-term removal of approximately 12,303 acres of vegetation during construction. Permanent removal of 1,000 acres due to facility installation.	Long-term removal of approximately 8,843 acres of vegetation. Permanent removal of 800 acres due to facility installation.	Long-term removal of approximately 10,696 acres of vegetation. Permanent removal of 960 acres due to facility installation.	No surface disturbance to vegetation communities would occur. The stability of vegetation communities may be affected by other factors (noxious weed invasion, wild fires).
	Potential spread of noxious weeds due to construction equipment.	Potential spread of noxious weeds due to construction equipment, but affected area would be 25 percent less than the Proposed Action and Alternatives A through C.	Potential spread of noxious weeds due to construction equipment, but affected area would be 20 percent less than the Proposed Action and Alternatives A through C.	Noxious weed populations may continue to spread in response to existing surface disturbance (roadways, agriculture, grazing), and wildfires.
	Potential fire risk due to construction areas.	Potential fire risks due to construction equipment, but affected area would be 25 percent less than the Proposed Action and Alternatives A through C.	Potential fire risks due to construction equipment, but affected area would be 20 percent less than the Proposed Action and Alternatives A through C.	The potential for wildfires caused by both human and natural sources would continue in all vegetation communities.
	Salvage of yucca and cacti in disturbance areas.	Same as the Proposed Action and Alternatives A through C.	Same as the Proposed Action and Alternatives A through C.	No surface disturbance to yucca and cacti populations would occur.
	Potential disturbance to six BLM sensitive plant species populations.	Same as the Proposed Action.	Same as the Proposed Action.	No disturbance to six BLM sensitive plant species populations would occur.
Wildlife	Big game range construction impacts include: antelope (7,950 acres), elk (4,019 acres), mule deer (3,918 acres), and desert bighorn sheep (285 acres).	Big game range construction impacts are reduced: antelope (4,571 acres); elk (2,704 acres); mule deer (2,949 acres). Desert bighorn sheep (260 acres).	Big game range construction impacts are reduced: antelope (6,345 acres); elk (4,019 acres); mule deer (3,547 acres). Desert big horn sheep (260 acres).	No big game habitat would be removed.

Table 2.10-1 ROW Areas and Ancillary Facility Impact Summary for the Proposed GWD Project (Continued)

Resource	Impact Parameter Information			
	Proposed Action and Alternatives A, B, and C	**Alternative D**	**Alternative E**	**No Action**
	Habitat impacts for special status wildlife species (desert tortoise, sage-grouse, pygmy rabbit, western burrowing owl, bald eagle, golden eagle, ferruginous hawk, bats, dark kangaroo mouse, Gila monster, and Mojave poppy bee).	Habitat impact for special status wildlife species reduced by 23 to 59 percent. Mojave poppy bee impacts the same.	Habitat impact for special status wildlife species reduced by 20 to 50 percent. Mojave poppy bee impacts the same.	No special status species habitat would be removed.
	Operation of electrical power lines could result in bird collisions, electrocution, and increased predation on desert tortoise, pygmy rabbit, and other wildlife species.	Same potential impacts as listed for the Proposed Action.	Same potential impacts as listed for the Proposed Action.	No new electrical power lines would be constructed. Existing power lines would continue to allow predation on vulnerable wildlife species.
Aquatic Biology	Habitat alteration and potential water quality effects on one perennial stream containing game fish and special status fish species crossed by the pipeline ROW.	No perennial streams crossed by the pipeline ROW.	No perennial streams crossed by the pipeline ROW.	No human-caused disturbance would occur in these perennial streams, although channels may be altered by natural high flow events (flash floods, high spring runoff).
	Potential water quality effects on two perennial streams containing game fish species crossed by the power line ROW.	No perennial streams by the power line ROW.	No perennial streams by the power line ROW.	No human-caused disturbance would occur in these perennial streams, although channels may be altered by natural high flow events (flash floods, high spring runoff).
	Potential habitat alteration and water effects on numerous intermittent streams potentially containing macroinvertebrates crossed by the pipeline and power line ROWs.	Fewer intermittent streams potentially containing macroinvertebrates crossed by the pipeline and power line ROWs.	Fewer intermittent streams potentially containing macroinvertebrates crossed by the pipeline and power line ROWs.	No human-caused disturbance would occur in these perennial streams, although channels may be altered by natural high flow events (flash floods, high spring runoff).
	Potential amphibian mortalities near waterbodies from vehicle traffic within the ROWs (431 miles).	Potential amphibian mortalities near waterbodies from vehicle traffic within the ROWs (315 miles).	Potential amphibian mortalities near waterbodies from vehicle traffic within the ROWs (388 miles).	No surface disturbance or increased traffic would cause amphibian mortalities.

Table 2.10-1 ROW Areas and Ancillary Facility Impact Summary for the Proposed GWD Project (Continued)

Resource	Impact Parameter Information			
	Proposed Action and Alternatives A, B, and C	**Alternative D**	**Alternative E**	**No Action**
Land Use	Short-term disturbance to 12,303 acres of which 97 percent is managed by the BLM.	Short-term disturbance to 8,843 acres of which 97 percent is managed by the BLM.	Short-term disturbance to 10,696 acres of which 97 percent is managed by the BLM.	No surface disturbance would occur on BLM lands.
	Short-term disturbance to 8.5 acres of agricultural land.	No disturbance to agricultural land.	Short-term disturbance to 8.5 acres of agricultural land.	No surface disturbance would occur on agricultural lands.
	Approximately 25 percent of disturbance located outside of designated utility corridors.	Approximately 7 percent of disturbance located outside of designated utility corridors.	Approximately 15 percent of disturbance located outside of designated utility corridors.	No disturbance would occur outside designated utility corridors.
Recreation	Short-term effects on access for OHV race routes.	No change in access would occur on OHV race routes.	No change in access would occur on OHV race routes.	No change in access would occur on OHV race routes.
	Short-term disturbance to the Caliente Special Recreation Permits, Chief Mountain Special Recreational Management Areas (SRMA), Las Vegas Valley SRMA, Loneliest Highway SRMA, Pioche Special Recreation Permits, and Steptoe Valley Wildlife Management Area.	Same as the Proposed Action and Alternatives A through C except the Loneliest Highway Wildlife Management Areas and Steptoe Valley Wildlife Management Areas would not be crossed.	Same as the Proposed Action and Alternatives A through C.	No surface disturbance would occur in recreational management areas.
	Short-term interference with hunting access.	Same as the Proposed Action and Alternatives A through C but fewer miles of ROW involved.	Same as the Proposed Action and Alternatives A through C but fewer miles of ROW involved.	No short-term interference with hunting access would occur.
Transportation	Short-term disturbance to traffic and potential vehicle/animal collisions.	Reduced traffic levels and animal collisions due to elimination of Snake Valley and most of Spring Valley.	Reduced traffic levels and animal collisions due to elimination of Snake Valley.	No short-changes in traffic volume would occur on regional roads and highways.
Minerals	Potential short-term reductions in access to minerals and minor use of sand and gravel supplies.	Same as Alternatives A through C except that no impacts would occur in Snake Valley and most of Spring Valley.	Same as Alternatives A through C except that no impacts would occur in Snake Valley and most of Spring Valley.	No potential short-reductions in access to minerals and sand and gravel sources would occur.
Rangeland	Total of 23 grazing allotments involving approximately 10,544 acres.	Total of 14 grazing allotments involving 7,162 acres.	Total of 20 grazing allotments involving 8,937 acres.	No forage losses would occur.
	Long-term disturbance to 708 acres in 18 allotments.	Long-term disturbance to 564 acres in 11 allotments.	Long-term disturbance to 562 acres in 16 allotments.	No forage losses would occur.

Table 2.10-1 ROW Areas and Ancillary Facility Impact Summary for the Proposed GWD Project (Continued)

Resource	Impact Parameter Information			
	Proposed Action and Alternatives A, B, and C	**Alternative D**	**Alternative E**	**No Action**
Wild Horses	Total of two herd management areas (HMAs) crossed by ROWs; involving 3,015 acres, long-term loss of 164 acres within 2 HMAs.	Same as the Proposed Action and Alternatives A through C	Same as the Proposed Action and Alternatives A through C	No surface disturbance would occur in HMAs.
Special Designations	Project surface disturbance within two Special Designations: Coyote Springs ACEC and Kane Springs ACEC.	Same as the Proposed Action and Alternatives A through C	Same as the Proposed Action and Alternatives A through C	No surface disturbance would occur in Special Designation areas.
Visual	Long-term changes in landscape appearance on approximately 12,303 acres due to removal of shrub vegetation in ROWs. These changes may be observed from scenic byways (Highways 93, 6, and 50) over long viewing periods.	Long-term changes on approximately 8,843 acres due to removal of shrub vegetation in ROWs. These changes may be observed from scenic byways (Highways 93, 6, and 50) over long viewing periods.	Long-term changes on approximately 10,696 acres due to removal of shrub vegetation in ROWs. These changes may be observed from scenic byways (Highways 93, 6, and 50) over long viewing periods.	No surface disturbance would occur, and landscape appearance would remain the same where current land uses are present (agriculture, grazing, mining).
	Project aboveground facility lighting sources would be seen, but would not attract attention, at an intensity less than the typical effects of a single family residence.	Project aboveground facility lighting sources would be seen, but would not attract attention, at an intensity less than the typical effects of a single family residence.	Project aboveground facility lighting sources would be seen, but would not attract attention, at an intensity less than the typical effects of a single family residence.	No new lighting sources would be operated
	Evidence of landscape appearance changes from project facilities in Spring and Snake Valleys may be seen from higher elevation viewpoints in Great Basin National Park over distances of 5 to 10 miles. These changes are not expected to meet the intent of National Park Service scenery management objectives.	Project facilities would not be seen by visitors from Great Basin National Park from higher elevation viewpoints across Spring and Snake Valleys.	Evidence of landscape appearance changes from project facilities in Spring Valley may be seen from higher elevation viewpoints in Great Basin National Park over distances of 5 to 10 miles These changes are not expected to meet the intent of National Park Service scenery management objectives.	No changes landscape appearance from project facilities would occur in Spring and Snake Valleys.

Table 2.10-1 ROW Areas and Ancillary Facility Impact Summary for the Proposed GWD Project (Continued)

Resource	Impact Parameter Information			
	Proposed Action and Alternatives A, B, and C	**Alternative D**	**Alternative E**	**No Action**
Cultural	Potential adverse effects to National Register of Historic Places (NRHP)-sites mitigated prior to construction.	Same as the Proposed Action and Alternatives A through C; except no disturbance in White Pine County.	Same as the Proposed Action and Alternatives A through C; except no disturbance in Snake Valley.	No surface disturbance would occur; therefore not mitigation would be required.
	Unanticipated discoveries of cultural resources would be protected by the PA.	Same as the Proposed Action and Alternatives A through C; except no disturbance in White Pine County.	Same as the Proposed Action and Alternatives A through C; except no disturbance in Snake Valley.	No surface disturbance would occur; therefore no unanticipated discoveries would occur.
	Potential illegal collection of artifacts or vandalism to cultural resources.	Same as the Proposed Action and Alternatives A through C; except no disturbance in White Pine County.	Same as the Proposed Action and Alternatives A through C; except no disturbance in Snake Valley.	The risk of potential collection of artifacts or vandalism would occur on all lands accessible to the public.
Native American Traditional Values	Potential effects to traditional cultural properties, sacred sites, and areas of cultural or religious importance would be protected by PA.	Same as the Proposed Action and Alternatives A through C; except no disturbance in White Pine County.	Same as the Proposed Action and Alternatives A through C; except no disturbance in Snake Valley.	No surface disturbance would occur; therefore no direct effects to traditional properties, sacred sites, or areas of cultural or religious importance would occur.
Socioeconomics	Construction employment increased demand for temporary housing that exceeds availability especially in Lincoln County.	Same as the Proposed Action and Alternatives A through C except for shorter duration and less demand mainly in White Pine County.	Same as the Proposed Action and Alternatives A through C except for shorter duration and less demand mainly in Snake Valley.	No workforce would be assembled; therefore no temporary housing would be needed.
	Construction employment temporary increased demands on local law enforcement and emergency service that may strain rural communities.	Same as the Proposed Action and Alternatives A through C except for shorter duration and less demand mainly in White Pine County.	Same as the Proposed Action and Alternatives A through C except for shorter duration and less demand mainly in Snake Valley.	No workforce would be assembled; therefore no additional requirements for law enforcement or emergency service would be needed.
	Temporary increased demand on county services in White Pine and Lincoln counties could result in fiscal budget pressures. The SNWA tax exempt status affects sales and use tax receipts.	Same as the Proposed Action and Alternatives A through C except for shorter duration and less demand mainly in White Pine County.	Same as the Proposed Action and Alternatives A through C except for shorter duration and less demand mainly in Snake Valley.	There would be no increase in demand on county services; there would be no change in sales and use tax receipts.

Table 2.10-1 ROW Areas and Ancillary Facility Impact Summary for the Proposed GWD Project (Continued)

Resource	Impact Parameter Information			
	Proposed Action and Alternatives A, B, and C	**Alternative D**	**Alternative E**	**No Action**
	SNWA facilities exempt from property taxes.	Same as the Proposed Action and Alternatives A through C but with no facilities in White Pine County.	Same as the Proposed Action and Alternatives A through C but with no facilities in Snake Valley.	No change in the SNWA exemption from property taxes.
Public Safety	Potential spills or leaks from use of hazardous materials mostly consisting of fuels and lubricants during construction and operation.	Same as the Proposed Action and Alternatives A through C.	Same as the Proposed Action and Alternatives A through C.	No transportation or storage of hazardous materials would occur, eliminating the risk of leaks and spills.
	Low risk of encountering contaminated media during construction.	Same as the Proposed Action and Alternatives A through C.	Same as the Proposed Action and Alternatives A through C.	No excavation activities would occur; therefore there would be no risk of encountering contaminated media.
	Temporary noise would be generated by construction equipment. Aboveground facilities (pumping stations) would generate long-term noise from water pumps. All noise sensitive noise locations would be located more than a mile from pumping stations, and noise would be less than a commonly accepted residential standard (55 A-weighted decibel).	Temporary construction noise would be the same as the Proposed Action and Alternatives A through C but with no construction activities in White Pine County. All noise sensitive locations be located more than a mile from pumping stations, and noise would be less than a commonly accepted residential noise standard (55 A-weighted decibel).	Temporary construction noise would be the same as the Proposed Action and Alternatives A through C but with no construction activities in Snake Valley. All noise sensitive locations be located more than a mile from pumping stations, and noise would be less than a commonly accepted residential noise standard (55 A-weighted decibel).	No temporary or long-term noise would be generated. It is anticipated that the rural character of the noise environment would be maintained, because of low population density, and high percentage of BLM lands.

Table 2.10-2 Summary of Future Groundwater Development Impacts Associated with Surface Disturbance for the Proposed GWD Project Alternatives

Disturbance/Impacts	Proposed Action	Alternatives A & C	Alternative B	Alternative D	Alternative E
Disturbance (Acres)[1]					
Spring Valley	1,187-2,805	813-1,873	2,461	1,559-1,801	813-1,855
Snake Valley	443-969	311-723	1,163	226-738	0
Cave Valley	565-1,623	226-738	307	395-834	226-736
Dry Lake Valley	395-834	395-834	318	395-834	395-832
Delamar Valley	940-2,034	291-563	336	291-563	291-563
Total	3,530-8,265	2,035-4,732	4,585	2,470-3,936	1,725-3,987
Number of Ancillary Facilities					
Pumping Stations	2	2	2	N/A	N/A
Substations	2	2	2	N/A	N/A
Impacts Related to Disturbance Acres					
Air Resources, Geology, Soils, Vegetation, Wildlife. Land Use, Transportation, Minerals, Rangeland, Wild Horses, Visual Resources, Cultural Resources, Native American Traditional Values, Public Health and Safety	Construction and operation-related disturbance impacts could occur in all 5 groundwater development basins with relative effects related to the range in acres listed above. The types of impacts would be the same as those discussed for ROWs.			Construction and operation-related disturbance impacts could occur in four groundwater development basins (Snake Valley eliminated) with relative effects related to the range in acres listed above. The types of impacts would be the same as those discussed for ROWs.	
Impacts for Other Resources					
Water Resources	• Potential disturbance to 28 perennial stream reaches in Spring and Snake valleys. • Potential disturbance to 60 springs in all 5 valleys.	• Same as the Proposed Action.	• Potential disturbance to 3 perennial stream reaches in Snake Valley. • Potential disturbance to 7 springs in Snake Valley.	• No disturbance to perennial stream reaches. • Potential disturbance to 13 springs in Spring, Cave, Dry Lake, and Delamar valleys.	• Potential disturbance to 23 perennial stream reaches in Spring and Cave valleys. • Potential disturbance to 49 springs in Spring, Cave, Dry Lake, and Delamar valleys.

Table 2.10-2 Summary of Future Groundwater Development Impacts Associated with Surface Disturbance for the Proposed GWD Project Alternatives (Continued)

Disturbance/Impacts	Proposed Action	Alternatives A & C	Alternative B	Alternative D	Alternative E
Aquatic Biological Resources	• Potential disturbance to aquatic habitat and species in 17 perennial streams and 3 springs with game fish or special status species in Spring and Snake valleys. • Potential mortalities to amphibians during movement periods from vehicle traffic within or accessing pipeline ROWs.	• Potential disturbance to aquatic habitat and species in 17 perennial streams and 3 springs with game fish or special status species in Spring and Snake valleys. • Potential mortalities to amphibians during movement periods from vehicle traffic within or accessing pipeline ROWs.	• Potential disturbance to aquatic habitat and species in 1 perennial stream in Snake valley and 1 spring in Snake Valley. No special statutes species occur in these waterbodies. • Potential mortalities to amphibians during movement periods from vehicle traffic within or accessing pipeline ROWs.	• No disturbance to perennial streams or springs with game fish or special status species. • Potential mortalities to amphibians during movement periods from vehicle traffic within or accessing pipeline ROWs.	• Potential disturbance to aquatic habitat and species in 13 perennial streams in Spring and Snake valleys and 3 springs in Spring Valley with game fish or special status species. • Potential mortalities to amphibians during movement periods from vehicle traffic within or accessing pipeline ROWs.
Recreation	• Potential disturbance to 5 recreation areas.	• Same as Proposed Action.	• Potential disturbance to 2 recreation areas.	• Potential disturbance to 4 recreation areas.	• Potential disturbance to 5 recreation areas.
Special Designations	• Potential disturbance to three special designation areas in Spring and Snake valleys.	• Same as Proposed Action.	• Same as Proposed Action.	• Potential disturbance to 1 special designation area in Delamar Valley.	• Potential disturbance to 3 special designation areas in Spring and Delamar valleys.
Socioeconomics	Temporary employment and population gains. Limited scale and duration for each well. Multiple rigs could operate simultaneously in different locations. Increased intensity of social effects, both for those opposed and supporting the project.			Same as the Proposed Action but less intense in White Pine County.	Same as the Proposed Action but less intense in White Pine County.

[1] Disturbance was estimated based on the addition of temporary and permanent ROWs (pipeline and power line), wells, and other ancillary facilities.

Table 2.10-3 Groundwater Pumping Impact Summary for the Proposed GWD Project – Full Build Out Plus 75 Years

Resource[1]	Impact Information	Alternatives						
		Proposed Action	A	B	C	D	E	No Action
Air	PM_{10} Emissions (tons per year) from Windblown Dust Compared to No Action Conditions	24,122	17,198	13,743	6,158	1,991	10,470	0 (4,757 total)
Geology	Square Miles of High (>5 feet) Ground Surface Subsidence Risk from Groundwater Drawdown.	147	5	172	<1	139	5	0
Water	Number of Inventoried Springs with Moderate or High Risks of Potential Flow Reductions	44	29	54	19	13	19	12
	Miles of Perennial Streams with Moderate or High Risks of Potential Flow Reductions	80	58	91	37	4	7	19
	Number of Surface Water Rights in Drawdown Area with Moderate or High Risks of Effects	145	109	141	78	23	60	105
	Total Groundwater Rights in Drawdown Area (>10 Feet)	199	174	184	133	27	70	372
	Percent Reduction in Spring Valley Groundwater Discharge to ET	77	51	66	37	18	52	7
	Percent Reduction in Snake Valley Groundwater Discharge to ET	28	23	18	15	4	0	3
	Percent Reduction in Great Salt Lake Desert Flow System Groundwater Discharge to ET	48	34	37	24	10	21	5
Soils	Acres of Hydric Soils within Drawdown Area (>10 Feet)	13,143	7,374	6,817	2,626	1,143	5,586	1,571
Vegetation	Wetland/Meadows with Risk of Composition and Growth Effects (Acres)	5,460	4,624	5,794	2,287	1,507	2,548	261
	Basin Shrublands with Risk of Composition and Growth Effects (Acres)	136,990	106,414	97,174	42,703	16,747	71,429	32,229

Table 2.10-3 Groundwater Pumping Impact Summary for the Proposed GWD Project – Full Build Out Plus 75 Years (Continued)

Resource[1]	Impact Information	Alternatives						
		Proposed Action	A	B	C	D	E	No Action
Wildlife	Number of Important Bird Areas with Springs or Perennial Streams in Drawdown Area	2	2	2	0	0	0	1
	Pumping Effects on Wildlife Habitats	Wildlife habitats may be modified by changes in composition of groundwater dependent vegetation, and seasonal availability of surface water. For this alternative, see: • Water – risks to springs and streams; • Vegetation – risks to Wetland/ Meadows and Basin Shrublands						No changes in wildlife habitats would occur because no groundwater pumping would occur in project hydrographic basins.
Aquatic Biological Resources	Number of Perennial Streams with Game Fish and Special Status Species in Drawdown Area with Moderate or High Risk of Flow Reductions	25	14	18	12	2	7	3
	Miles of Perennial Streams with Game Fish and Special Status Species in Drawdown Area with Moderate or High Risk of Flow Reductions	60	45	59	29	3	5	6
	Number of Small Springs (<100 gpm) with Aquatic Species in Drawdown Area with Moderate or High Risk of Flow Reductions	13	7	9	3	1	1	1
	Number of Springs Containing Game Fish and Special Status Aquatic Species in Drawdown Area with Moderate or High Risk of Flow Reductions	10	8	10	8	3	5	4

Table 2.10-3 Groundwater Pumping Impact Summary for the Proposed GWD Project – Full Build Out Plus 75 Years (Continued)

Resource[1]	Impact Information	Alternatives						
		Proposed Action	A	B	C	D	E	No Action
Land Use	Acres of Private Agricultural Land in Drawdown Area	15,792	14,605	13,865	12,359	299	3,635	14,204
Recreation	Number of Springs in Drawdown Area with Moderate or High Risk of Flow Reductions	20	13	40	3	0	5	14
	Miles of Game Fish Streams in Drawdown Area with Moderate or High Risk of Flow Reductions	8	6	17	1	0	0	<1
Rangeland	Number of Perennial Springs within Grazing Allotments and Drawdown Area with Moderate or High Risk of Flow Reductions	210	118	156	63	41	55	46
	Perennial Stream Miles within Grazing Allotments and Drawdown Area with Moderate or High Risk of Flow Reductions	73	52	78	37	5	6	19
	Acres of Phreatophytic Vegetation and Wet Meadow Vegetation in Grazing Allotments and Drawdown Area	142,975	111,564	103,467	45,413	18,245	73,977	32,490
Wild Horses	Number of Perennial Springs within HMAs and Drawdown Area with Moderate or High Risk of Flow Reductions	2	2	2	2	7	2	19
	Acres of Phreatophytic Vegetation and Wet Meadow Vegetation in HMAs and Drawdown Area	0	0	0	0	0	0	2,511
Special Designations	Number of Special Designations with Phreatophytic Vegetation Potentially Affected by Drawdown	3	3	3	3	1	3	0
	Acres of Phreatophytic Vegetation in Special Designations and Drawdown Area	13,729	11,222	13,534	4,912	8,262	11,222	0
Visual	Changes in Appearance of Wetland/Meadows with Potential Composition and Growth Effects (Acres)	5,460	4,624	5,794	2,287	1,507	2,548	261
	Changes in Appearance of Basin Shrublands Shrubs with Potential Composition and Growth Effects (Acres)	136,990	106,414	97,174	42,703	16,747	71,429	32,229

Table 2.10-3 Groundwater Pumping Impact Summary for the Proposed GWD Project – Full Build Out Plus 75 Years (Continued)

Resource[1]	Impact Information	Alternatives						
		Proposed Action	A	B	C	D	E	No Action
Native American Traditional Values	Drawdown Effects on Water and Biological Resources (Vegetation, Aquatic Biology, and Wildlife)	The location and availability of plants used for food and traditional uses, fishery quality, and flows of streams and springs may be modified by groundwater pumping. For this alternative, see: • Water – risks to springs and streams; • Aquatic Biology – risks to game fish and special status species. Vegetation – risks to Wetland/ Meadows and Basin Shrublands						No changes in the availability of plants used for food and traditional uses, and flows in springs and streams because no groundwater pumping would occur in project hydrographic basins.
Socioeconomics	Acres of Private Agricultural Land Potentially Affected by Drawdown of ≥ 10 Feet	15,792	14,605	13,865	12,359	7,320	3,635	14,204
	Acres of Private Agricultural Land Potentially Affected by Drawdown of ≥ 50 Feet	8,564	140	3,289	0	0	0	3,189
	Acres of Public Lands Identified for Potential Disposal Potentially Affected by Drawdown	4,926	4,926	4,926	4,926	0	107	29,612
	Adverse Social Impacts in Rural Areas Due to Uncertainty and Risks Associated with Drawdown	Yes	Yes	Yes	Yes	Yes, but reduced compared to Proposed Action and Alternatives A through C	Yes, but reduced compared to Proposed Action and Alternatives A through C	No

[1] No pumping effects would occur for transportation, cultural resources, and public safety, since there is no connection to surface water or affected vegetation.

Table 2.10-4 Groundwater Pumping Impact Summary for the Proposed GWD Project – Full Build Out Plus 200 Years

Resource	Impact Information	Alternatives						
		Proposed Action	A	B	C	D	E	No Action
Air	PM_{10} Emissions (tons per year) from Windblown Dust Compared to No Action Conditions	34,742	20,902	22,686	7,075	11,313	12,787	0 (6,011 total)
Geology	Square Miles of High (>5 feet) Ground Surface Subsidence Risk from Groundwater Drawdown.	525	159	669	1	269	153	0
Water	Number of Inventoried Springs with Moderate or High Risks of Potential Flow Reductions	57	46	78	26	31	30	20
	Miles of Perennial Streams with Moderate or High Risks of Potential Flow Reductions	112	81	120	59	48	23	52
	Number of Surface Water Rights in Drawdown Area with Moderate or High Risks of Effects	212	151	186	98	56	94	164
	Total Groundwater Rights in Drawdown Area (>10 Feet)	264	223	301	171	213	110	409
	Percent Reduction in Spring Valley Groundwater Discharge to ET	84	57	73	37	28	56	7
	Percent Reduction in Snake Valley Groundwater Discharge to ET	33	27	24	17	8	3	3
	Percent Reduction in Great Salt Lake Desert Flow System Groundwater Discharge to ET	54	39	44	25	16	24	5
Soils	Acres of Hydric Soils within Drawdown Area (>10 Feet)	20,077	11,924	12,005	2,995	6,377	9,696	3,068
Vegetation	Wetland/Meadows with Composition and Growth Effects (Acres)	8,048	6,137	9,190	3,250	4,453	3,835	2,023
	Basin Shrublands with Composition and Growth Effects (Acres)	191,506	123,714	146,998	50,076	81,349	81,389	41,436

Table 2.10-4 Groundwater Pumping Impact Summary for the Proposed GWD Project – Full Build Out Plus 200 Years (Continued)

Resource	Impact Information	Alternatives						
		Proposed Action	A	B	C	D	E	No Action
Wildlife	Number of Important Bird Areas with Springs or Perennial Streams in Drawdown Area	4	2	4	2	1	0	1
	Pumping Effects on Wildlife Habitats (See Water, Vegetation)	Wildlife habitats may be modified by changes in composition of groundwater dependent vegetation, and seasonal availability of surface water. For this alternative, see: • Water – risks to springs and streams; • Vegetation – risks to Wetland/ Meadows and Basin Shrublands	Wildlife habitats may be modified by changes in composition of groundwater dependent vegetation, and seasonal availability of surface water. For this alternative, see: • Water – risks to springs and streams; • Vegetation – risks to Wetland/ Meadows and Basin Shrublands	Wildlife habitats may be modified by changes in composition of groundwater dependent vegetation, and seasonal availability of surface water. For this alternative, see: • Water – risks to springs and streams; • Vegetation – risks to Wetland/ Meadows and Basin Shrublands	Wildlife habitats may be modified by changes in composition of groundwater dependent vegetation, and seasonal availability of surface water. For this alternative, see: • Water – risks to springs and streams; • Vegetation – risks to Wetland/ Meadows and Basin Shrublands	Wildlife habitats may be modified by changes in composition of groundwater dependent vegetation, and seasonal availability of surface water. For this alternative, see: • Water – risks to springs and streams; • Vegetation – risks to Wetland/ Meadows and Basin Shrublands	Wildlife habitats may be modified by changes in composition of groundwater dependent vegetation, and seasonal availability of surface water. For this alternative, see: • Water – risks to springs and streams; • Vegetation – risks to Wetland/ Meadows and Basin Shrublands	No changes in wildlife habitats would occur because no groundwater pumping would occur in project hydrographic basins.
Aquatic Biological Resources	Number of Perennial Streams with Game Fish and Special Status Species in Drawdown Area with Moderate or High Risk of Flow Reductions	30	19	24	13	10	15	7
	Miles of Perennial Streams with Game Fish and Special Status Species in Drawdown Area with Moderate or High Risk of Flow Reductions	75	52	72	43	29	13	26
	Number of Small Springs (<100 gpm) with Game Fish and Special Status Aquatic Species in Drawdown Area with Moderate or High Risk of Flow Reductions	15	12	13	6	5	5	2
	Number of Springs Containing Game Fish and Special Status Aquatic Species in Drawdown Area with Moderate or High Risk of Flow Reductions	12	11	14	8	6	7	5
Land Use	Acres of Private Agricultural Land in Drawdown Area	17,203	15,021	17,522	13,749	7,320	3,791	14,913

Table 2.10-4 Groundwater Pumping Impact Summary for the Proposed GWD Project – Full Build Out Plus 200 Years (Continued)

Resource	Impact Information	Alternatives						
		Proposed Action	A	B	C	D	E	No Action
Recreation	Number of Springs in Drawdown Areas with Moderate or High Risk of Flow Reductions	23	19	53	12	11	8	14
	Miles of Game Fish Streams in Drawdown Area with Moderate or High Risk of Flow Reductions	16	12	28	10	8	2	9
Rangeland	Number of Perennial Springs within Grazing Allotments and Drawdown Area with Moderate or High Risk of Flow Reductions	303	180	259	94	121	104	86
	Number of Perennial Stream Miles within Grazing Allotments and Drawdown Area with Moderate or High Risk of Flow Reductions	102	72	105	50	39	20	52
	Acres of Phreatophytic Vegetation and Wet Meadow Vegetation in Grazing Allotments and Drawdown Area	200,080	130,378	156,713	53,799	85,811	87,224	43,460
Wild Horses	Number of Perennial Springs within HMAs and Drawdown Area with Moderate or High Risk of Flow Reductions	14	5	9	2	27	5	30
	Acres of Phreatophytic Vegetation and Wet Meadow Vegetation in HMAs and Drawdown Area	2,511	0	2,511	0	2,511	0	2,511
Special Designations	Number of Special Designations with Phreatophytic Vegetation Potentially Affected by Drawdown	5	3	5	3	2	3	1
	Acres of Phreatophytic Vegetation in Special Designations and Drawdown Area	14,032	12,635	14,032	6,673	10,407	12,408	202
Visual	Changes in Appearance of Wetland/Meadows with Potential Composition and Growth Effects (Acres)	8,048	6,137	9,190	3,250	4,453	3,835	2,023
	Changes in Appearance of Basin Shrublands with Potential Composition and Growth Effects (Acres)	191,506	123,714	146,998	50,076	81,349	81,389	41,436

Table 2.10-4 Groundwater Pumping Impact Summary for the Proposed GWD Project – Full Build Out Plus 200 Years (Continued)

Resource	Impact Information	Alternatives						
		Proposed Action	A	B	C	D	E	No Action
Native American Traditional Values	Drawdown Effects on Water and Biological Resources (Vegetation, Aquatic Biology, and Wildlife)	The location and availability of plants used for food and traditional uses, fishery quality, and flows of streams and springs may be modified by groundwater pumping. For this alternative, see: • Water – risks to springs and streams; • Aquatic Biology – risks to game fish and special status species. Vegetation – risks to Wetland/Meadows and Basin Shrublands	The location and availability of plants used for food and traditional uses, fishery quality, and flows of streams and springs may be modified by groundwater pumping. For this alternative, see: • Water – risks to springs and streams; • Aquatic Biology – risks to game fish and special status species. Vegetation – risks to Wetland/Meadows and Basin Shrublands	The location and availability of plants used for food and traditional uses, fishery quality, and flows of streams and springs may be modified by groundwater pumping. For this alternative, see: • Water – risks to springs and streams; • Aquatic Biology – risks to game fish and special status species. Vegetation – risks to Wetland/Meadows and Basin Shrublands	The location and availability of plants used for food and traditional uses, fishery quality, and flows of streams and springs may be modified by groundwater pumping. For this alternative, see: • Water – risks to springs and streams; • Aquatic Biology – risks to game fish and special status species. Vegetation – risks to Wetland/Meadows and Basin Shrublands	The location and availability of plants used for food and traditional uses, fishery quality, and flows of streams and springs may be modified by groundwater pumping. For this alternative, see: • Water – risks to springs and streams; • Aquatic Biology – risks to game fish and special status species. Vegetation – risks to Wetland/Meadows and Basin Shrublands	The location and availability of plants used for food and traditional uses, fishery quality, and flows of streams and springs may be modified by groundwater pumping. For this alternative, see: • Water – risks to springs and streams; • Aquatic Biology – risks to game fish and special status species. Vegetation – risks to Wetland/Meadows and Basin Shrublands	No changes in the availability of plants used for food and traditional uses, and flows in springs and streams because no groundwater pumping would occur in project hydrographic basins.
Socioeconomics	Acres of Private Agricultural Land Potentially Affected by Drawdown of ≥ 10 Feet	17,203	15,021	17,522	13,749	7,320	3,791	14,913
	Acres of Private Agricultural Land Potentially Affected by Drawdown of ≥ 50 Feet	13,439	11,592	13,224	0	198	2,916	3,730
	Acres of Public Lands Identified for Potential Disposal Potentially Affected by Drawdown	5,399	4,926	7,255	4,926	915	107	35,632
	Adverse Social Impacts in Rural Areas Due to Uncertainty and Risks Associated with Drawdown	Yes	Yes	Yes	Yes	Yes, but reduced compared to Proposed Action and Alternatives A through C	Yes, but reduced compared to Proposed Action and Alternatives A through C	No

[1] No pumping effects would occur for transportation, cultural resources, and public safety, since there is no connection to surface water or affected vegetation.

Table 2.10-5 Key Differences in Impacts for the Local Alignment Options as Compared to those under the Proposed Action

Alignment Option	Key Differences in Impacts
1 Humboldt-Toiyabe Power line	This option is approximately 6 miles shorter and steeper than the relevant segment of the Proposed Action. The estimated disturbance is 150 acres, compared to 245 acres under the Proposed Action. Key impact differences include: • Vegetation – There would be 24 fewer acres of vegetation disturbance and less removal of mature juniper and pinyon pine trees. • Wildlife – Reduced impacts to some big game species and 8 special status species or species groups. • Land Use – USFS lands (104 acres) would be crossed. • Recreation – There would be 43 percent less disturbance to the Loneliest Highway SMRA. • Visual – Overall visual effects would be reduced by following an existing transmission line and road corridors.
2 North Lake Valley Pipeline	This option requires an additional Pumping Station in southern Spring Valley, reduces the power line voltage from 230 to 69 kV, and adds approximately 5 miles compared to the relevant segment of the Proposed Action. A net increase in disturbance of 60 acres. Key impact differences include: • Water Resources – Potential water quality changes to one perennial stream (Geyser Creek in Lake Valley) and three springs located within the ROW. • Vegetation – There would be 23 additional acres of sagebrush shrubland removed and the long-term loss of 5 acres for pump station site. • Wildlife – Both increased and decreased disturbance to various big game and special status species. • Aquatic Resources – Potential habitat alteration and effects on species in Geyser Creek and Wambolt Spring. • Visual – Overall visual effects would increase due to facilities being visible from a scenic byway.
3 Muleshoe Substation	This option requires completion of at least one other regional power line in the region, thereby allowing a new power line tie-in and eliminating the need for the Gonder to Spring Valley transmission line. Disturbance would be approximately 365 acres less than for the relevant segment of the Proposed Action. Key impact differences include: • Water and Aquatic Resources – Impacts would be reduced by the elimination of the Steptoe Creek crossing. • Vegetation – Vegetation disturbance would be reduced due to the elimination of the power line, but with 43 acres of disturbance to sagebrush shrubland for the Muleshoe Substation. • Wildlife - Both increased and decreased disturbance to various big game and special status species. • Recreation – There would be 47 percent less disturbance to the Loneliest Highway SMRA. • Visual – Overall visual effects would be reduced, eliminating 34 miles of power lines and access roads.
4 North Delamar Valley Pipeline	This option would place the pipeline and transmission lines within the LCCRDA corridor in an area where the current alignment goes around a hill. An additional pumping station would be required, but the ROW would be approximately 3 miles shorter than the Proposed Action. Net disturbance would be 51 acres less than under the Proposed Action. Key impact differences include: • Vegetation – Additional loss of Joshua trees, yucca, and cacti in Delamar Valley. • Wildlife - Both increased and decreased disturbance to various big game and special status species. • Recreation – There would be increased disturbance for the Caliente SRP (6 percent) and Chief Mountain SMRA (12 percent). • Special Designations – Impacts to Lands with Wilderness Characteristics would be reduced by eliminating 1 of 2 roadless units. • Visual Resources – Overall visual effects would be increased due to construction of a new pumping station near Highway 93.

After consideration of the potential resource effects of implementing each option, the following are brief conclusions concerning the tradeoffs as compared to the Proposed Action, and other applicable alternatives:

- Humboldt-Toiyabe Power line. This option provides an opportunity to reduce both surface disturbance area and visual resource effects to scenic byways by locating the transmission line in an existing Forest Service transmission line corridor.
- North Lake Valley Pipeline. This option allows reduction in transmission line voltage, but increases the number of aboveground facilities near and adjacent to Highway 93, thereby increasing the overall project visibility from a scenic byway.
- Muleshoe Substation. This option would eliminate the need for constructing a 230 kV transmission line from Gonder Substation to Spring Valley, with a consequent reduction in long term visible surface disturbance in the vicinity of a scenic byway, and an overall reduction of wildlife habitat disturbance. The feasibility of this option is substantially improved by the current construction of the ON Transmission Line where the Muleshoe Substation would interconnect.
- North Delamar Valley Pipeline. This option would reduce the overall surface disturbance effects to Mojave Desert shrublands (including mature Joshua trees) by using an existing utility ROW. However, this option would require construction of a new pumping station which would be located very close to Highway 93, adding a new aboveground structure that would be visible to highway travelers.