



Southern Nevada  
Water Authority

# Concepts for Development of Additional In-State Water Resources

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## **SUMMARY INTRODUCTION**

This document presents the proposed development of in-state, non-Colorado River water resources forming a part of the portfolio of potential additional water resources identified in the Southern Nevada Water Authority (SNWA) Water Resource Plan. The document is conceptual in nature and intended to address broad or general considerations only. These considerations include definition of resource opportunities, conceptual facility planning, project phasing, stakeholder interests and environmental protection.

The in-state water resource opportunities presented here consist of both groundwater and surface water. The decision to pursue development of any one water resource is not necessarily contingent on the proposed or actual development of any other water resource. In fact, SNWA intends to develop in-state surface water resources independently from development of available groundwater resources and certain groundwater resources will be developed regardless of the potential for development of any other groundwater resource. Moreover, the SNWA intends to identify and implement individual projects only as needed. This is consistent with the SNWA stated goal of acquiring and managing a portfolio of diversified water resources, and the objective of phasing the planning, design and construction of the infrastructure associated with development of SNWA resources, wherever possible.

At present, the SNWA has preliminarily identified three distinct projects proposed for developing a part of its in-state, non-Colorado River water resources portfolio. Each of these projects are independent actions, in different geographic areas, with different anticipated timing for development. The first and smallest of these projects is groundwater development in the Three Lakes Valley area immediately adjacent to and northwest of the Las Vegas Valley, within Clark County. The second project involves development of the surface waters associated with the Virgin and Muddy rivers within Clark County. The third project entails development of groundwater resources in several hydrographic basins to the north of the Las Vegas Valley, within Clark, Lincoln, and White Pine counties.

For each of these resource projects, the unique requirements and geographic location will require a tailored approach to development, independent of the specific outcome or requirements of any other actual or potential water resource in the SNWA portfolio. Because of its proximity to the Las Vegas Valley, implementation of the Three Lakes Valley project will be similar to other local groundwater development projects. Therefore, this document focuses on the more difficult and complex issues associated with development of the larger groundwater and surface water projects in establishing a framework for future action.

The following points summarize the background, principles, and proposals expressed in this document.

1. The Colorado River has been the primary source of water supply for the Las Vegas metropolitan area for more than 30 years. Nevada's allocation from the Colorado River is 300,000 acre-feet per year (AFY) of consumptive use, plus surplus Colorado River flows when available. The Colorado River resource is in addition to approximately 46,000 AFY of permanent groundwater rights within the Las Vegas Valley hydrographic basin that are permitted to SNWA purveyor members.
2. Since its first issue in 1996 and in every subsequent revision, the SNWA Water Resource Plan has explained the need for developing a diverse portfolio of water resources to meet projected water demands for the Las Vegas area. The water resources identified in the plan include a combination of Colorado River water resources and in-state water resources, including Nevada's basic apportionment of Colorado River water, return-flow credits, interim surplus Colorado River water, unused Nevada apportionment of Colorado River water, water banked in Arizona, water banked in Southern Nevada, Colorado River transfers/exchanges, Las Vegas Valley groundwater rights, Las Vegas Valley shallow groundwater, Muddy River surface water rights, Virgin River surface water rights, groundwater rights and applications in Clark, Lincoln, Nye, and White Pine counties, and reclaimed non-Colorado River water. Under the plan, Southern Nevada will use temporary supplies, like Colorado River surpluses and banked water, as a bridge to the time when the other, more permanent in-state water resources can be developed. These permanent in-state water resources will then be managed conjunctively with Colorado River water to ensure long-term viability of the water resources.
3. The use of Colorado River water remains the best and most cost-effective option to meet demands in Southern Nevada, surpassed only by conservation as a demand management tool. However, the current ongoing drought in the Colorado River Basin has reduced the probabilities of surplus Colorado River water being available to Southern Nevada through 2016. These reduced probabilities have influenced near-term planning by requiring continued emphasis on drought response and conservation measures in Southern Nevada, as well as accelerated development of additional in-state resources.
4. Consistent with the direction of the SNWA Water Resource Plan, immediate action should be initiated to secure and develop additional water resources for the communities in Southern Nevada, both to assure adequate supplies and to provide for a flexible and reliable regional water system with improved drought tolerance.
5. Conservation, wastewater reuse, treated wastewater discharged to Lake Mead (resulting in return flow credits), and importation of non-Colorado River water are all integrally related. The associated volumes of each of the resources mentioned impact the required capacity of the Southern Nevada

Water System (SNWS). To optimize and efficiently utilize these resources, an integrated plan needs to be developed that assesses the availability of each resource and the combined capacity needs of the water treatment and distribution facilities. Such a plan will be developed with the input of affected stakeholders.

6. The SNWA has surface water rights on the Virgin River and Muddy River within Nevada. These rivers currently flow into Lake Mead. SNWA can build facilities to transmit all or a portion of this water to the Las Vegas Valley. In addition, arrangements to obtain credit for non-Colorado River water entering Lake Mead are being discussed. Diversion of non-Colorado River water through SNWA's intake facilities at Saddle Island may require expansion of intake and other facilities of the SNWS. Development of the Virgin River and Muddy resources will proceed separately and independently from development of the groundwater resources.
7. The SNWA also has existing rights and applications to groundwater outside of the Las Vegas Valley; in Clark, Lincoln, Nye, and White Pine counties. Water rights under the groundwater applications will be quantified through the State Engineer's administrative hearing process. Development of groundwater resources will proceed separately and independently from development of the Virgin and Muddy River resources. Non-Colorado River water will be reused and some non-Colorado River water conveyed to the Las Vegas Valley will flow eventually to Lake Mead. SNWA is exploring options to obtain credit for these return flows to increase SNWA's allowable diversions from Lake Mead. Increased diversions from Lake Mead at SNWA's Saddle Island facilities may require expansion of intake and other facilities of the SNWS.
8. Wells, transmission pipelines, pumping stations and reservoirs will need to be constructed to access in-state water resources. Treatment facilities may also be required. Proposed facilities will be planned, designed and constructed as separate projects when they have independent utility and benefit. Three separate projects are currently envisioned: 1) Three Lakes Valley Groundwater Development, 2) Virgin and Muddy Rivers Surface Water Development and 3) Clark, Lincoln and White Pine Counties Groundwater Development. Construction of facilities will be phased over a period of many years consistent with anticipated requirements.
9. Cooperative agreements with various communities in the region may lead to a sharing of both water rights and water systems. The SNWA already has agreements in place with several parties, including Lincoln County, Moapa Valley Water District, Virgin Valley Water District, and Muddy River Irrigation Company establishing the foundation for ongoing cooperative efforts in developing in-state water resources and facilities. The concepts of a proposed agreement have been discussed with White Pine County. Nye County also has expressed interest in discussing potential concepts regarding an agreement.

10. Public outreach efforts will be applied to establish ongoing communication with those who have a stake in the decisions that could affect their community's interests. A variety of stakeholders will be involved, each of whom may have different issues and levels of interest. The public outreach program will provide channels for both information dissemination and input. Key stakeholder groups will include residents of urban Southern Nevada, rural community leaders and residents, environmental or special interest organizations, and elected officials, among others. Issues of interest may include resource planning in the context of the overall development, access and rights-of-way, funding, design and construction factors, and environmental impacts. The interrelated and complex nature of these issues may require an approach that incorporates both overview-level communication and specific outreach tactics tailored to address the individual issues of particular stakeholder groups. Public outreach efforts will continue throughout the duration of the projects.
11. Dedicated project teams consisting of SNWA staff integrated with consultant specialists will accomplish the multitude of activities required to implement individual projects. The activities will begin with an evaluation of resource options and availability, capacity needs, facility planning, and an assessment of environmental impacts associated with the proposed facilities. In conjunction with the planning process, scientific investigations must be completed in support of the previous groundwater applications, and the water rights issued through the State Engineer's administrative hearing process. Once water rights are established, planning concepts are defined, and environmental approvals are secured, then activities will transition to design and construction of approved facilities.
12. A Steering Committee composed of technical and financial representatives of those SNWA Purveyor Members participating in the costs of the projects for water resource development will guide the activities of the project teams to ensure that goals are achieved. Representatives of other communities who elect to participate in the benefits and costs of the projects by having facilities constructed to meet their needs will also be invited to participate on the Steering Committee.

## **BACKGROUND**

### **Context**

Southern Nevada has been one of the fastest growing areas in the nation for many decades. The communities of the Las Vegas Valley first relied on artesian springs, then local groundwater wells, and then the Colorado River to meet their water supply needs. Under the Boulder Canyon Project Act of 1928, Nevada was allocated a consumptive use apportionment from the Colorado River of 300,000 acre-feet per year (AFY). Nevada's withdrawals from the Colorado River were small until construction of the first phase of the Southern Nevada Water System (SNWS) was completed in 1971. This included the first stage of the SNWS to treat and transmit Colorado River water from Lake Mead to Las Vegas. As water needs increased, a second phase of the SNWS was constructed and put into full operation in 1982, which increased treatment and transmission capacity to 400 million gallons per day. Southern Nevada's Colorado River water resources are supplemented by approximately 46,000 AFY of permanent groundwater rights available to SNWA purveyor members within the Las Vegas Valley hydrographic basin. These groundwater rights were originally permitted in the first half of the last century.

During the 1980s and early 1990s, Southern Nevada experienced record population growth. The capacity of the SNWS began to reach its practical limits during this period and the SNWS became the primary source of water supply for the Las Vegas metropolitan area.

The Southern Nevada Water Authority (SNWA) was formed in 1991 to coordinate regional water supply issues and to acquire resources and develop the facilities needed to deliver water to the SNWA's purveyor members. The members of the SNWA are the cities of Boulder City, Henderson, Las Vegas, and North Las Vegas, the Big Bend Water District, the Clark County Water Reclamation District and the Las Vegas Valley Water District.

In 1994, with the help of an integrated resource planning advisory committee, SNWA began developing concepts for meeting the future water supply needs of the community. The advisory committee made several recommendations for future action in the areas of resources, facilities, conservation, financing, and planning. In the area of resources, in addition to recommending that SNWA seek permanent, long-term water supplies, the advisory committee recommended formulation of a water resources plan that utilized all available water supplies, including unused Colorado River apportionments, surpluses, leases, and other water supplies. In the area of facilities, the advisory committee recommended implementation of phased improvements to meet demands "just in time" and to increase system reliability.

## **Water Resource Planning**

In response to the recommendations of the integrated resource planning advisory committee, SNWA launched a comprehensive water resource planning effort. The first SNWA Water Resource Plan was issued in 1996. That first issue and every subsequent revision has emphasized the need for developing a diverse portfolio of water resources in order to meet projected long-term water demands for the Las Vegas area. The plan recognized that Nevada's 300,000 AFY apportionment from the Colorado River would not be sufficient to indefinitely meet future needs at projected rates of water consumption. Consequently, the water resource plan recommended increased water conservation and the development of supplementary water resources. The water resources identified in the plan include a combination of Colorado River water resources and in-state water resources, including Nevada's basic apportionment of Colorado River water, return-flow credits, interim surplus Colorado River water, unused Nevada apportionment, water banked in Arizona, water banked in southern Nevada, Colorado River transfers/exchanges, Las Vegas Valley groundwater rights, Las Vegas Valley shallow groundwater, Muddy River surface water rights, Virgin River surface water rights, groundwater rights and applications in Clark, Lincoln, Nye, and White Pine counties, and reclaimed non-Colorado River water. Under the plan, Southern Nevada will use intermittently available supplies, like Colorado River surpluses and banked water, as a bridge to the time when other, more permanent in-state water resources could be developed. These permanent in-state water resources will then be managed conjunctively with Colorado River water to ensure long-term viability of the water resources.

In 1995, a comprehensive capital improvements plan was approved for increasing the capacity of the SNWS from 400 million gallons per day (mgd) to 900 mgd. These improvements were intended to not only give Southern Nevada full access to its Colorado River entitlements and available surplus flows, but also increase system reliability and improve water quality.

Since 1996, the SNWA has applied efforts to implement both the water resource plan and the 1995 capital improvements plan. These plans are reviewed annually and updated as necessary. Significant progress has been made in accomplishing the goals of both the water resource plan and capital improvements plan. The SNWA reached agreement with Arizona for banking of Colorado River water in Arizona's groundwater aquifers that can be used as a credit against Nevada's future withdrawals from the Colorado River. Those withdrawals will be diverted at the SNWA's current intake facilities in Lake Mead. The projects of the capital improvements plan have been accomplished in time to meet demands and within the authorized budget.

The Interim Surplus Guidelines define Nevada, Arizona, and California's rights to access available surplus flows from the Colorado River through 2016. Access to these surplus flows could provide Southern Nevada with additional resources to meet increasing water demands through 2016.



The current ongoing drought in the Colorado River Basin began in 1999 and has reduced the probabilities associated with various amounts of surplus Colorado River water being available to Southern Nevada. These reduced probabilities have influenced near-term planning by requiring continued emphasis on drought response and conservation measures in Southern Nevada, as well as accelerated development of additional in-state resources such as Virgin and Muddy River water and groundwater resources.

### **In-State Water Resource Development**

The concept of developing groundwater and surface water resources within the State of Nevada is not new. The Nevada Department of Conservation and Natural Resources proposed in planning documents as early as the 1970s the importation of groundwater from hydrographic basins outside the Las Vegas Valley. In 1989, before SNWA was created, the Las Vegas Valley Water District (LVVWD) filed 147 applications for groundwater rights in 30 different valleys and one surface water right, all within Nevada.

The 1991 Agreement that created the SNWA specified that one of the conferred functions of the SNWA is “[t]o acquire the rights of LVVWD under applications filed with the Nevada State Engineer to appropriate surface and groundwater in northern Clark, Lincoln, Nye and White Pine Counties; to perfect any or all of such applications as may be appropriate; and to develop and implement the Cooperative Water Project initiated by LVVWD, or any other project, for the use of such water in Clark County” (Article 5.b). The SNWA also was granted certain powers, including the power to develop, store, transport, and treat water (Article 6.b). Therefore, development of these in-state water resources fits well within the purview of the SNWA. In December 2003, the Las Vegas Valley Water District transferred the rights to most of the 1989 applications to the SNWA.

### **Cooperative Efforts**

Since the groundwater and surface water applications were filed in 1989, the SNWA and the LVVWD have worked closely with the affected counties and other rural interests to negotiate equitable water sharing arrangements that benefit all parties involved. The following summarizes the most prominent examples of those cooperative efforts.

- Some of the groundwater applications originally filed by the LVVWD have been withdrawn or have been subject to agreements with private and public partners. For example, in 1990, 27 applications in eight valleys were withdrawn and, in 1999, several agreements with private parties in eight valleys outside of Clark County allowed those parties' junior applications to be acted upon by the State Engineer before acting on the senior 1989 applications in order to facilitate development in the rural counties.

- In 1996 and 1997, the SNWA entered into agreements with the Moapa Valley Water District and the Muddy Valley Irrigation Company relating to SNWA's purchase of Muddy River irrigation shares and conditions for future use of the water resources associated with those purchased shares. Under these agreements, SNWA's transfer of Muddy River water from Moapa Valley is limited to approximately 8,000 AFY unless agreed in writing by Moapa Valley Water District and the Muddy Valley Irrigation Company or unless the Moapa Valley Water District acquired additional groundwater rights.
- In 2000, the SNWA entered into an agreement with the Virgin Valley Water District establishing provisions for sharing Virgin River water rights. To ensure that future municipal water supplies exist for Virgin Valley Water District, the SNWA agreed to limit the amount of Virgin River water that could be purchased and transferred from Virgin Valley to 5,000 AFY (in addition to SNWA's existing 113,000 AFY of Virgin River rights). In addition, for each acre-foot of Virgin River water it acquires, the SNWA will convey one acre-foot of its Virgin River rights to Virgin Valley Water District. The SNWA in 2003 also assigned an undivided one-half interest in 16 groundwater applications in the Virgin Valley hydrographic basin to Virgin Valley Water District, resolving priorities of groundwater applications under the 2000 agreement.
- In March of 2002, the SNWA, LVVWD and the Moapa Valley Water District agreed to terms regarding groundwater applications in Coyote Spring Valley. Under this agreement, the Moapa Valley Water District will receive the first 3,750 AFY of any water granted under the 1989 applications in Coyote Spring Valley. Any water granted by the State Engineer above 3,750 AFY will be divided on a percentage basis between the SNWA and the Moapa Valley Water District (58/42 percent respectively). This agreement effectively divides the total applications between the two entities, but ensures that the first cut of available water provides for the long-term security of the community of origin.
- In 2003, the SNWA also entered into an agreement with Lincoln County that effectively resolved longstanding concerns over groundwater applications in that county. Under the agreement, the applications in Lincoln County are divided into three categories: Category I basins are allocated to the SNWA; Category II basins are allocated to Lincoln County; and Category III basins are shared basins where Lincoln County is entitled to the first 3,000 AFY from these basins.
- Under an agreement pending approval by the U.S. Bureau of Indian Affairs between the Moapa Band of Paiutes, the SNWA and the LVVWD, the Paiutes will receive one permit for 2,500 AFY and one application for up to 7,240 AFY of groundwater in the California Wash hydrographic basin.

These agreements establish a framework for how the SNWA will continue to develop resources in the rural communities of Nevada. In its future negotiations and development plans, the SNWA is committed to ensuring the long-term viability of these local communities and will continue to plan in ways that ensure that the communities of origin have access to water supplies adequate to meet their short and long-term needs, while providing for the needs of Southern Nevada at the same time.

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## **DEVELOPMENT CONCEPTS**

### **Purpose**

The SNWA proposes development of in-state water resources in Clark, Lincoln, and White Pine counties to meet community water supply needs. The realization of these improvements will be accomplished under various individual and separate projects. Further definition of the actual scope, configuration, and size of the project facilities will develop from future activities described later in this document.

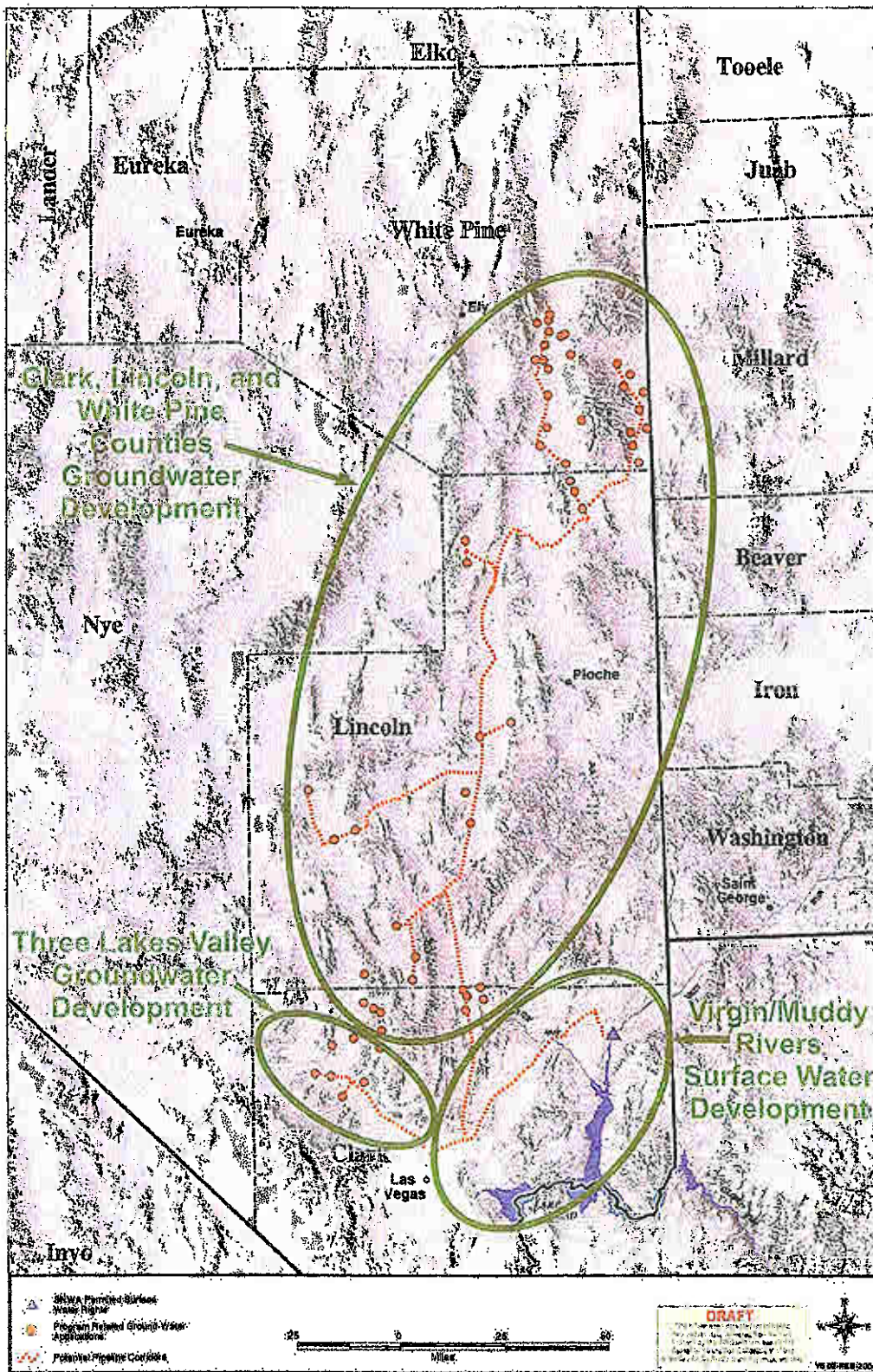
The proposed improvements are vital to the communities participating in this development in accomplishing the following purposes:

- Replacing the dependency on the use of surplus Colorado River.
- Improving the reliability of the water supply.
- Developing access to supplemental water supplies that could be used in time of drought.
- Increasing the availability of water to meet increasing water demands.
- Maximizing in-state water resources.
- Improving economic opportunities for rural areas.

### **Preliminary Facilities Concepts**

The capital improvements contemplated include wells, pipelines, pumping stations, reservoirs, power lines and related supporting facilities for the transmission of groundwater resources from various hydrographic basins. Also contemplated are diversion or collection structures, pipelines, pumping stations, reservoirs, power lines and related supporting facilities for the transmission and treatment of surface waters from the Virgin and Muddy Rivers. The conceptual extent of these project facilities is shown in Figure 1.

Figure 1 – Facilities Concept Map



Independent and distinct projects will be planned, designed and constructed when they have independent utility and benefit. At present, the SNWA has preliminarily identified three distinct projects for developing part of the in-state, non-Colorado River water resources.

1. Three Lakes Valley Groundwater Development
2. Virgin and Muddy Rivers Surface Water Development
3. Clark, Lincoln and White Pine Counties Groundwater Development

Each of these projects are independent actions, in different geographic areas, with different anticipated timing for development. The first and smallest of these projects is groundwater development in Three Lakes Valley, which is immediately adjacent to and northwest of the Las Vegas Valley, within Clark County. The second project involves development of the surface waters associated with the Virgin and Muddy Rivers within Clark County. The third project entails development of groundwater resources in several hydrographic basins to the north of the Las Vegas Valley, within Clark, Lincoln, and White Pine counties.

Each project requires evaluating the unique requirements and issues related to the associated geographic location of the water resource and will require a tailored approach to development, independent of the specific outcome or requirements of any other actual or potential water resource in the SNWA portfolio. Therefore, presentation of these three different projects together in this one document is for administrative convenience in explaining their distinguishing characteristics and in planning for efficient and organized accomplishment of the various work efforts.

Each project will be developed to allow facilities to be constructed in a series of phased steps. This phasing approach will reduce financing risk by committing monies only as they are needed to meet community requirements and will facilitate the ability to adjust the phasing plan in harmony with changing needs and conditions.

The Three Lakes Valley Groundwater Development project is relatively small in scope and similar to other local groundwater development projects. It will include up to seven groundwater production wells connected to a single small diameter pipeline, which will convey the water to a single receiving reservoir integrated with the existing Las Vegas Valley community water systems. The proposed facilities will be located primarily within an existing utility corridor. Because of the small scope of this project and its proximity to the Las Vegas Valley, this document focuses more on the complex issues associated with the Virgin and Muddy Rivers surface water development and the Clark, Lincoln, and White Pine counties groundwater development projects in establishing a framework for future action.

A general summary description of these two resource development projects follows.

**Virgin and Muddy Rivers Surface Water Development:** In addition to in-state groundwater rights and applications outside the Las Vegas Valley, SNWA proposes the development of in-state surface water rights on the Virgin and Muddy Rivers. The waters of the Virgin and Muddy Rivers will require treatment for particulates, total dissolved solids, total organic carbon and other undesirable constituents. Therefore, in addition to the diversion, pumping and transmission facilities, treatment facilities will be required to make these surface waters suitable for distribution to customers in a community potable water system.

Treating and transmitting the Virgin and Muddy River waters to customers in the Las Vegas Valley could be accomplished by a combination of two approaches. SNWA could build the facilities necessary to divert, treat and transmit all or a portion of the Virgin and Muddy River waters to the Las Vegas Valley by an overland route which bypasses Lake Mead. These facilities would consist of diversion structures, pumping stations, pipelines, and treatment works. The distance from the Virgin River to the Las Vegas Valley is approximately 70 miles. A conceptual study of these required facilities was accomplished during 2003. The study identified potential diversion structures and locations, feasible pipeline alignments, and potential treatment processes. The study presented a preliminary, concept level construction cost estimate for these facilities, but the estimate did not include administrative, planning, environmental, design, or construction management costs.

If hydrologic or environmental concerns would prevent diversion of all the surface waters from their normal channels, a portion of the Virgin River and the Muddy River could be left to flow into Lake Mead. The SNWA already has existing facilities for diverting, treating and transmitting water from Lake Mead to the Las Vegas Valley. However, diversions of non-Colorado River water through SNWA's existing facilities have a host of political, legal, and facility capacity issues that would have to be analyzed and resolved.

**Clark, Lincoln, and White Pine Counties Groundwater Development:** In addition to existing purveyor groundwater rights in the Las Vegas Valley, the SNWA has groundwater rights and applications in hydrographic basins outside the Las Vegas Valley. This project encompasses the proposed development of water rights in northern Clark, Lincoln, and southeastern White Pine counties. The hydrographic basins containing these groundwater resources are widely dispersed, with the northernmost basin located over two hundred miles from Las Vegas. An as-yet undetermined number of groundwater production wells will have to be sited, drilled, and equipped. Then the water will have to be pumped

and conveyed in a network of pipelines to the point where the water can be delivered to connections with other water distribution systems.

The groundwater in these hydrographic basins is part of an extensive hydrologic system involving seasonal cycles of precipitation, subsurface flows through complex geologic features, and multiple surface discharges at various locations as springs or seeps. The springs and seeps support various ecosystems, some of which are habitat for protected species. The groundwater systems also are important to established agriculture, livestock, and recreational endeavors in the region. The potential effects of withdrawing groundwater from the underlying aquifers of this region will need to be further evaluated. Additionally, water rights will be quantified through the State Engineer's administrative hearing process. SNWA is currently preparing to conduct test pumping of groundwater in the Coyote Spring Valley hydrographic basin in compliance with an order of the State Engineer as a condition precedent to quantification of water rights in that basin.

Installation of wells, pipelines, power lines, communication systems and other facilities will be planned to minimize undesirable effects. The topographic relief of the area involves a series of desert valley basins separated by mountain ranges. Existing utility corridors and the orientation of the mountain ranges will dictate the alignment of pipeline corridors to a significant extent. Where pipelines cross mountain passes and where other changes in surface topography exist, additional pumping of water will be required to overcome elevation increases. Every well and pumping station will require a source of power, typically an electric motor which must be supplied from an electric distribution grid or some other localized electric generator. Instrumentation, control and communication systems will be required for proper monitoring and operation of the water facilities.

Although groundwater in these areas is typically of good quality for drinking water purposes, an assessment of groundwater quality from each hydrographic basin and individual wells will be required to best define and address any potential issues with arsenic, fluoride or other undesirable dissolved minerals. Where necessary, water treatment options will be considered.

### **Project Management**

The projects for development of these in-state water resources will be significant in magnitude, involving years of effort and hundreds of millions of dollars. Successful implementation of these projects on a brisk time schedule will require organized and effective project management. Management tasks include proceeding with the water rights permitting process, administering and executing an integrated water plan, facility planning, environmental compliance, schedule development, cost estimating, design review, and construction management, along with many other related administrative functions.



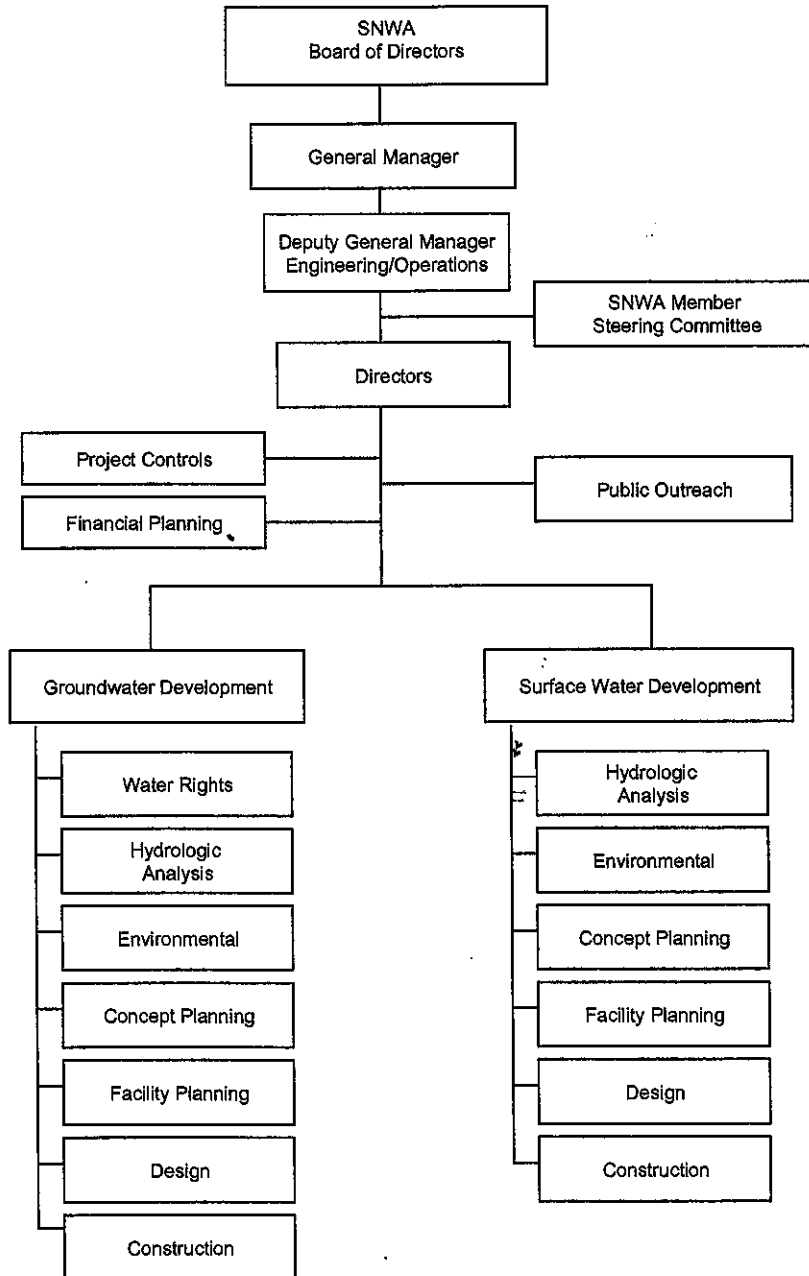
A management structure will be organized and applied to the many activities of the projects. Specific project activities will be under the direction of a senior manager of the SNWA, aided by the in-house technical and administrative staff of the SNWA, but will need to be supplemented by outside contractors during certain phases of intensive work efforts.

The SNWA Members will be closely aligned with the management team through participation by their representatives in steering and advisory committees. These member representatives will provide oversight and guidance to assure that the interests of the members are protected and that the goals of the projects are preserved.

Figure 2 provides a conceptual overview of the management structure under consideration for these activities.

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**Figure 2 – Management Structure**



## **Project Activities**

Development of each individual project will require a significant effort, involving a serious commitment of funding and technical/administrative resources. Each project involves a series of activities, many that will be similar in nature but others that will be distinct and unique to that project. Each project will benefit from general efforts such as establishment of a stakeholder involvement and outreach process, organization of an administrative project controls structure, and preparation of a financial plan. Other activities associated with the development efforts are categorized as follows:

- Secure environmental approvals/acceptance
- Secure water rights
- Define well and diversion facilities
- Define transmission facilities
- Define water treatment facilities
- Develop cost estimates
- Complete right of way and property acquisitions
- Design facilities
- Construct facilities

An expanded outline of the planned activities in each category and for each of the two major projects is presented in Appendix 1. These outlines provide a general conceptual guide to the work that will have to be accomplished in development of the identified resources. Anticipated activities generally are listed in their sequence of accomplishment, although many activities will be performed concurrently. Adjustment and refinement of activities will occur as the projects advance.

Appendix 2 offers a general preliminary schedule for the primary activities of each project. Some of the early activities relating to water rights, hydrologic analysis, planning and environmental have already started. In fact, early work for many of these activities began years ago as part of the effort to identify the potential of these water resources for the resource portfolio. However, until the planning and environmental phases are complete and all necessary approvals for the projects are secured, there will be no construction of facilities.

A few of the planned activities merit additional explanation and emphasis. Of prime importance is compliance with the National Environmental Policy Act and Endangered Species Act before federal actions relating to use of federal lands and issuance of federal permits for each project's facilities can be approved.

Initial planning work is needed to provide a basis for the environmental analysis. The environmental analysis cannot proceed without some initial definition of the proposed facilities. Because compliance with environmental regulations and development of the funding models both are dependent on information to be established during initial facility planning, authorization of funding for the initial planning activities is required early, before the full scope of each project has been defined in detail.

It is essential that, throughout the project development, public outreach occur with a broad range of stakeholders, including urban Southern Nevada residents, rural communities, legislators, and environmental/special interest organizations, among others. The primary goals of this outreach will be to provide access to information about the projects, establish a channel through which affected stakeholders can provide input, and ensure public notification requirements are satisfied in conducting the environmental impact analyses. A variety of possible outreach activities will be evaluated for their potential effectiveness at fostering input, disseminating information, and resolving concerns about the projects and related activities.

Another critical activity is the identification of the funding sources that could be applied to pay for the development of the projects. Using preliminary projections derived from the initial planning work for the configuration and size of the proposed facilities, cost estimating criteria can be applied to the facilities to develop a planning level budget for the total scope of each project. A preliminary time schedule for construction will also be needed so that a cash flow model can be established. From this cash flow model, a financial evaluation can be accomplished to identify the funding requirements for the projects, thus allowing an informed discussion and agreement on the necessary funding commitments.

Once the planning efforts are accomplished and broad-based consensus on the goals and benefits of the proposed projects has been established, an authorizing document, such as one or more capital improvement plans, will be prepared to identify the scope of the project efforts, estimated costs, authorized funding, and time frame for implementation. Under the authority of its Cooperative Agreement and the corollary SNWS Facilities and Operations Agreement, SNWA is to accomplish capital improvements in accordance with capital improvements plans approved by the SNWA Board of Directors and the SNWA Purveyor Members.

The project facilities could be described and authorized under their own capital improvements plans or could be included in the SNWA's existing Major Construction and Capital Plan. Development of separate capital improvements plans will likely require amendment of the existing Facilities and Operations Agreement.

## **SUMMARY CONCLUSIONS**

The following summarizes the conclusions presented in this document:

1. SNWA has the responsibility and authority to secure and develop adequate water resources to accommodate the needs of the communities of Southern Nevada.
2. The in-state, non-Colorado River water resources located outside the Las Vegas Valley are critical to meeting the long-term water supply needs and protecting the quality of life for communities of the region. To optimize and efficiently utilize these resources an integrated water plan will be developed that considers the availability of each resource and the combined capacity needs of the water treatment and transmission facilities.
3. Development of the water resources identified in this document is consistent with the SNWA Water Resource Plan.
4. The proposed projects will provide the means for increasing the availability, reliability and drought tolerance of the water supply, and reducing the region's dependence on Colorado River surplus flows.
5. Significant efforts are required to accomplish the planning and environmental evaluations necessary to establish the scope of each project, describe the proposed facilities, and secure the necessary approvals from affected stakeholders.
6. The projects, once approved, will be phased under a multi-year, multi-disciplinary effort.

## Appendix 1 – Activity Outlines

### Virgin River and Muddy River Surface Water Development

- I. **ESTABLISH STAKEHOLDER OUTREACH**
  - A. Identify stakeholder categories/groups
    - Examples
    - 1. Urban Southern Nevada
    - 2. Rural communities
    - 3. Environmental
    - 4. Special interests (such as Clean Water Coalition)
    - 5. Elected officials
  - B. Identify key communication elements
    - 1. Purpose
    - 2. Funding
    - 3. Design
    - 4. Construction timeline
    - 5. Environmental issues
  - C. Develop outreach strategy/tactics
  - D. Initiate stakeholder outreach
  
- II. **DEVELOP PROJECT SCOPE**
  - A. Evaluate future water demands
  - B. Evaluate reuse potential of non-Colorado River water
  - C. Evaluate potential for credits for non-Colorado River water returned to Lake Mead
  - D. Evaluate potential water demands along pipeline corridor
  - E. Evaluate existing system capacity and required operational parameters
  - F. Define facility components and alternatives for surface water diversions
    - 1. Pipeline alignments
    - 2. Treatment requirements
    - 3. Facility locations
    - 4. Interconnections with existing water systems
    - 5. Power sources
  
- III. **OBTAIN ENVIRONMENTAL APPROVAL**
  - A. Describe project purpose and need
  - B. Identify and consult with stakeholders
  - C. Identify the NEPA Lead Agency and Cooperating Agencies
  - D. Issue Notice of Intent and hold public scoping meetings
  - E. Develop criteria and screen alternatives
  - F. Conduct required studies, surveys and data collection
  - G. Prepare Draft Environmental Impact Statement
  - H. Hold public meetings

- I. Respond to public and agency comments
  - J. Prepare Final Environmental Impact Statement and obtain Record of Decision
  - K. Implement mitigation measures
- IV. DEFINE WATER RESOURCE AVAILABILITY**
- A. Evaluate existing permit conditions and pursue modification if necessary
  - B. Evaluate point of diversion alternatives
  - C. Conduct hydrologic analysis to examine reliability of surface water flows
- V. DEFINE DIVERSION, CONVEYANCE AND TREATMENT FACILITIES**
- A. Define diversion points and facilities
    - 1. Determine diversion locations
    - 2. Determine use of collector wells or diversion structure, and develop characteristics and configurations
    - 3. Determine need for storage capacity
    - 4. Identify power sources
    - 5. Identify means of communication for monitoring/controlling operations
  - B. Define conveyance facilities
    - 1. Perform hydraulic analyses
    - 2. Determine preliminary sizes/locations for pipelines
    - 3. Determine preliminary pumping needs
    - 4. Determine intertie locations
    - 5. Identify power sources
    - 6. Identify means of communication for monitoring and controlling operations
  - C. Define water treatment facilities
    - 1. Assess existing and proposed Safe Drinking Water Act requirements
    - 2. Determine water quality goals relative to source water quality
    - 3. Define treatment processes
    - 4. Determine treatment facility locations
    - 5. Determine land requirements
    - 6. Identify power sources
    - 7. Identify means of communication for monitoring and controlling operations.
- VI. DEVELOP COST ESTIMATES**
- A. Establish cost estimating criteria
  - B. Make planning level cost estimates for use in financial models
- VII. PREPARE FINANCIAL PLAN**
- A. Conduct cost analyses of options
  - B. Prepare cost loaded project schedule(s)

- C. Develop financing plan(s)

**VIII. COMPLETE RIGHTS-OF-WAY AND PROPERTY ACQUISITIONS**

- A. Identify existing land ownership
- B. Negotiate with property owners and obtain rights-of-way

**IX. DESIGN FACILITIES**

- A. Diversion facilities/storage reservoir
- B. Conveyance systems/pumping stations
- C. Power systems
- D. Treatment systems
- E. Control/communication systems

**X. CONSTRUCT FACILITIES**

- A. Diversion facilities/storage reservoir
- B. Conveyance systems/pumping stations
- C. Power systems
- D. Treatment systems
- E. Control/communication systems

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## Clark, Lincoln, and White Pine Counties Groundwater Development

### **I. ESTABLISH STAKEHOLDER OUTREACH**

- A. Identify stakeholder categories/groups
  - Examples
  - 1. Urban Southern Nevada
  - 2. Rural communities
  - 3. Environmental
  - 4. Special interests (such as Clean Water Coalition)
  - 5. Elected officials
- B. Identify key communication elements
  - 1. Purpose
  - 2. Funding
  - 3. Design
  - 4. Construction timeline
  - 5. Environmental issues
- C. Develop outreach strategy/tactics
- D. Initiate stakeholder outreach

### **II. DEVELOP PROJECT SCOPE**

- A. Evaluate future water demands
- B. Evaluate reuse potential of non-Colorado River water
- C. Evaluate potential for credits for non-Colorado River water returned to Lake Mead
- D. Determine volume of resources and hydrologic basins to be pursued
- E. Evaluate existing system capacity and required operational parameters
- F. Define preliminary facility alternatives
  - 1. Groundwater production well sites
  - 2. Pipeline alignments
  - 3. Treatment requirements
  - 4. Facility locations
  - 5. Interconnections with existing water systems
  - 6. Power sources

### **III. CONDUCT HYDROLOGIC EFFECTS ANALYSIS**

- A. Assemble databases
- B. Characterize current groundwater conditions
- C. Conduct hydrologic characterization of current spring conditions
- D. Characterize current phreatophyte conditions
- E. Develop groundwater budgets
- F. Characterize hydrogeologic setting
- G. Develop a groundwater model
- H. Evaluate the hydrologic and biologic management and monitoring alternatives

**IV. OBTAIN ENVIRONMENTAL APPROVAL**

- A. Describe project purpose and need
- B. Identify and consult with stakeholders
- C. Identify the NEPA Lead Agency and Cooperating Agencies
- D. Issue Notice of Intent and hold public scoping meetings
- E. Develop criteria and screen alternatives
- F. Conduct required studies, surveys and data collection
- G. Prepare Draft Environmental Impact Statement
- H. Hold public meetings
- I. Respond to public and agency comments
- J. Prepare Final Environmental Impact Statement and obtain Record of Decision
- K. Implement mitigation measures

**V. SECURE WATER RIGHTS**

- A. Determine priority of water right actions
- B. Conduct hydrologic investigations and compile associated reports in support of water right applications and determine water amounts available for appropriation by the State Engineer
- C. Develop monitoring and management plan
- D. Request State Engineer take action on applications
- E. Identify issues and concerns of water right protestants and address as appropriate
- F. Obtain water right permits and permit conditions through State Engineer process
- G. Implement terms of permit conditions, including monitoring, management, and mitigation

**VI. DEFINE WELL AND DIVERSION FACILITIES**

- A. Determine monitoring well locations
- B. Determine production well locations
- C. Identify power sources
- D. Identify means of communication for monitoring/controlling operations

**VII. DEFINE CONVEYANCE FACILITIES**

- A. Perform hydraulic analyses
- B. Determine preliminary sizes/locations for pipelines
- C. Determine preliminary pumping needs
- D. Determine intertie locations
- E. Identify power sources
- F. Identify means of communication for monitoring and controlling operations

**VIII. DEFINE WATER TREATMENT FACILITIES**

- A. Assess existing and proposed Safe Drinking Water Act requirements
- B. Determine water quality goals relative to source water quality
- C. Define treatment processes
- D. Determine treatment facility locations
- E. Determine land requirements
- F. Identify power sources
- G. Identify means of communication for monitoring and controlling operations.

**IX. DEVELOP COST ESTIMATES**

- A. Establish cost estimating criteria
- B. Make planning level cost estimates for use in financial models

**X. PREPARE FINANCIAL PLAN**

- A. Conduct cost analyses of options
- B. Prepare cost loaded project schedule(s)
- C. Develop financing plan(s)

**XI. COMPLETE RIGHTS-OF-WAY AND PROPERTY ACQUISITIONS**

- A. Identify existing land ownership
- B. Negotiate with property owners and obtain rights-of-way

**XII. DESIGN FACILITIES**

- A. Monitoring and production wells
- B. Conveyance systems/pumping stations
- C. Power systems
- D. Treatment systems
- E. Control/communication systems

**XIII. CONSTRUCT FACILITIES**

- A. Monitoring and production wells
- B. Conveyance systems/pumping stations
- B. Power systems
- C. Treatment systems
- E. Control/communication systems

## Appendix 2 – Preliminary Schedule

