COYOTE SPRING WELL AND MOAPA TRANSMISSION SYSTEM PROJECT N-76493

DRAFT ENVIRONMENTAL ASSESSMENT

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LIST OF ABBREVIATIONS AND ACRONYMS

$\mu g/m^3$	micrograms per cubic meter
Advisory Committee	Integrated Water Planning Advisory Committee
afy	acre-feet per year
APE	Area of Potential Effect
BA	Biological Assessment
BLM	U.S. Department of Interior, Bureau of Land Management
BO	Biological Opinion
CAA	Clean Air Act
CBER	Center for Business and Economic Research
CFR	Code of Federal Regulations
cfs	cubic feet per second
CO	carbon monoxide
COE	U.S. Army Corps of Engineers
Coyote Spring Project	Coyote Spring Well and Moapa Transmission System Project
CSI	Coyote Springs Investments, LLC
DAQEM	Clark County Department of Air Quality & Environmental Management
Drought Plan	Southern Nevada Water Authority Drought Plan
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FLPMA	Federal Land Policy and Management Act
GPCD	gallons per capita per day
gpm	gallons per minute
GWD Project	Clark, Lincoln, and White Pine Counties Groundwater Development Project
km	kilometer
KOP(s)	key observation points
kV	kilovolt
LCPD	Lincoln County Power District
LVVWD	Las Vegas Valley Water District
MBTA	Migratory Bird Treaty Act of 1918
MMM Plan	Monitoring, Management, and Mitigation Plan
MOA	Memorandum of Agreement
MSHCP	Multiple Species Habitat Conservation Plan
MVIC	Muddy Valley Irrigation Company
MVNWR	Moapa Valley National Wildlife Refuge
MVWD	Moapa Valley Water District
NAAQS	National Ambient Air Quality Standards
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act

Nevada State Engineer	Nevada Division of Water Resources, Office of the State Engineer
NHPA	National Historic Preservation Act of 1966
NO_x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NRS	Nevada Revised Statutes
O_3	ozone
Pb	lead
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
ppm	parts per million
RIP	Recovery Implementation Program
RMP	Las Vegas Resource Management Plan
ROW	Right(s)-of-Way
SHPO	Nevada State Historic Preservation Office
SIP	State Implementation Plan
SNWA	Southern Nevada Water Authority
SO_2	sulfur dioxide
UNLV	University of Nevada, Las Vegas
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
VRM	Visual Resource Management
WBWG	Western Bat Working Group
ZOI	Zone of Influence

1.0 PURPOSE AND NEED

This chapter includes an introduction with background information, describes Resource Management Plan conformity, discusses purpose and need, describes other permits and approvals, and summarizes public scoping.

1.1 INTRODUCTION

The Southern Nevada Water Authority (SNWA) is a political subdivision of the State of Nevada, created in 1991 under Nevada State law pursuant to a Cooperative Agreement among seven water and wastewater agencies in southern Nevada. The member agencies include Big Bend Water District, City of Boulder City, City of Henderson, City of Las Vegas, City of North Las Vegas, Clark County Water Reclamation District, and Las Vegas Valley Water District (LVVWD).

The SNWA was formed to coordinate regional water supply issues, promote conservation, acquire additional water resources, and develop the treatment and transmission facilities needed to deliver wholesale water to its member agencies. The SNWA is obligated to allocate its water supplies in conformance with its Cooperative Agreement and to deliver available water supplies to meet the demands of its member agencies. The member agencies are each individually responsible for and have sole authority over the allocation and delivery of retail water to customers within their respective service areas.

The SNWA serves as the wholesale water provider for its member agencies, and is responsible for:

- Acquisition and management of regional water rights and supplies
- Implementation of projects for the development, treatment, and transportation of regional water supplies
- Operation, maintenance, and construction of regional facilities to deliver water
- Establishment of a water budget and water resource plan
- Preparation of a conservation plan for water supplies in Clark County

The Moapa Valley Water District (MVWD) is a political subdivision of the State of Nevada, created in 1983 by an act of the State of Nevada legislature. In establishing the MVWD, the State of Nevada legislature recognized the need for a single governmental entity to manage water service in the Moapa Valley area. MVWD is responsible for the storage, conservation, distribution, and sale of water within its service area.

The SNWA proposes to develop its existing groundwater rights in Coyote Spring Valley. The Coyote Spring Well and Moapa Transmission System Project (Coyote Spring Project) would develop and convey 9,000 acre-feet per year (afy) of groundwater from Coyote Spring Valley in northeastern Clark County, using new and existing facilities.

1.1.1 Coyote Spring Valley Water Rights

The Nevada Division of Water Resources, Office of the State Engineer (Nevada State Engineer) has permitted 16,300 afy of groundwater rights in Coyote Spring Valley. The SNWA owns 9,000 afy of these existing permitted water rights, with points of diversion

within the Coyote Spring Valley hydrographic basin under Permit Numbers 49414, 49660 through 49662, and 49978 through 49987. These rights were purchased progressively from 1998 through 2002. Holders of the majority of the remaining permitted water rights in Coyote Spring Valley include Nevada Power Company and Coyote Springs Investments, LLC (CSI).

In July 2001, SNWA and the LVVWD entered into a stipulation with the U.S. Department of Interior, Bureau of Land Management (BLM), National Park Service (NPS), and U.S. Fish & Wildlife Service (USFWS), which provided for the development and implementation of a Monitoring, Management, and Mitigation Plan (MMM Plan) applicable to existing and future permitted groundwater development in the Coyote Spring Valley (Appendix A). The MMM Plan provides for monitoring of groundwater production impacts through the use of monitoring wells and surface water measurement, requires that carbonate aquifer groundwater be developed in a manner that does not cause unreasonable adverse impacts, and requires mitigation of unreasonable adverse impacts. The MMM Plan establishes a Technical Review Panel to provide a forum for the scientific and technical review of hydrologic data collected and the related interpretation of potential impacts on the flow system.

1.1.2 Nevada State Engineer Order 1169

To date, only about 200 afy of the permitted 16,300 afy of water rights in Coyote Spring Valley have been pumped. In March 2002, the Nevada State Engineer issued an order (Order 1169; Appendix B) on pending groundwater applications in Coyote Spring Valley and other nearby hydrologic basins. Order 1169 holds in abeyance applications for new groundwater rights in several groundwater basins, including Coyote Spring Valley, pending the completion of a study of the regional carbonate aquifer system. This order requires the major groundwater right holders in Coyote Spring Valley to participate in a five-year study to provide information on the effects of pumping existing permitted water rights. During this five-year study, at least half of the existing permitted groundwater rights in Coyote Spring Valley (at least 8,150 afy) must be pumped for at least two consecutive years. The primary purpose of the mandatory study is to collect data on the effects of sustained groundwater pumping, including the magnitude of groundwater level declines, the effect on surface flows, and the effectiveness of mitigation measures designed to avoid impacts and interference with senior water rights. Since the Nevada State Engineer's ruling, SNWA has worked with the other water right holders and the Federal agencies to develop and implement the required study. On March 11, 2005, the Nevada State Engineer approved a "Conceptualization of Hydrologic Testing of the Carbonate Rock Aquifer pursuant to Order 1169" dated March 4, 2005 (SNWA, 2005), under which the Order 1169 groundwater pumping study and associated monitoring would be conducted.

1.1.3 Memorandum of Agreement

The USFWS administers the Moapa Valley National Wildlife Refuge (MVNWR), in the Upper Moapa Valley hydrographic basin. The MVNWR is habitat for the Moapa dace, an aquatic species listed as endangered under the Endangered Species Act (ESA), 16 U.S.C. § 1531 *et seq*. The USFWS holds a water right for a flow rate of 3.5 cubic feet per second (cfs) at the Warm Springs West flume (Figure 1-1) for the maintenance of

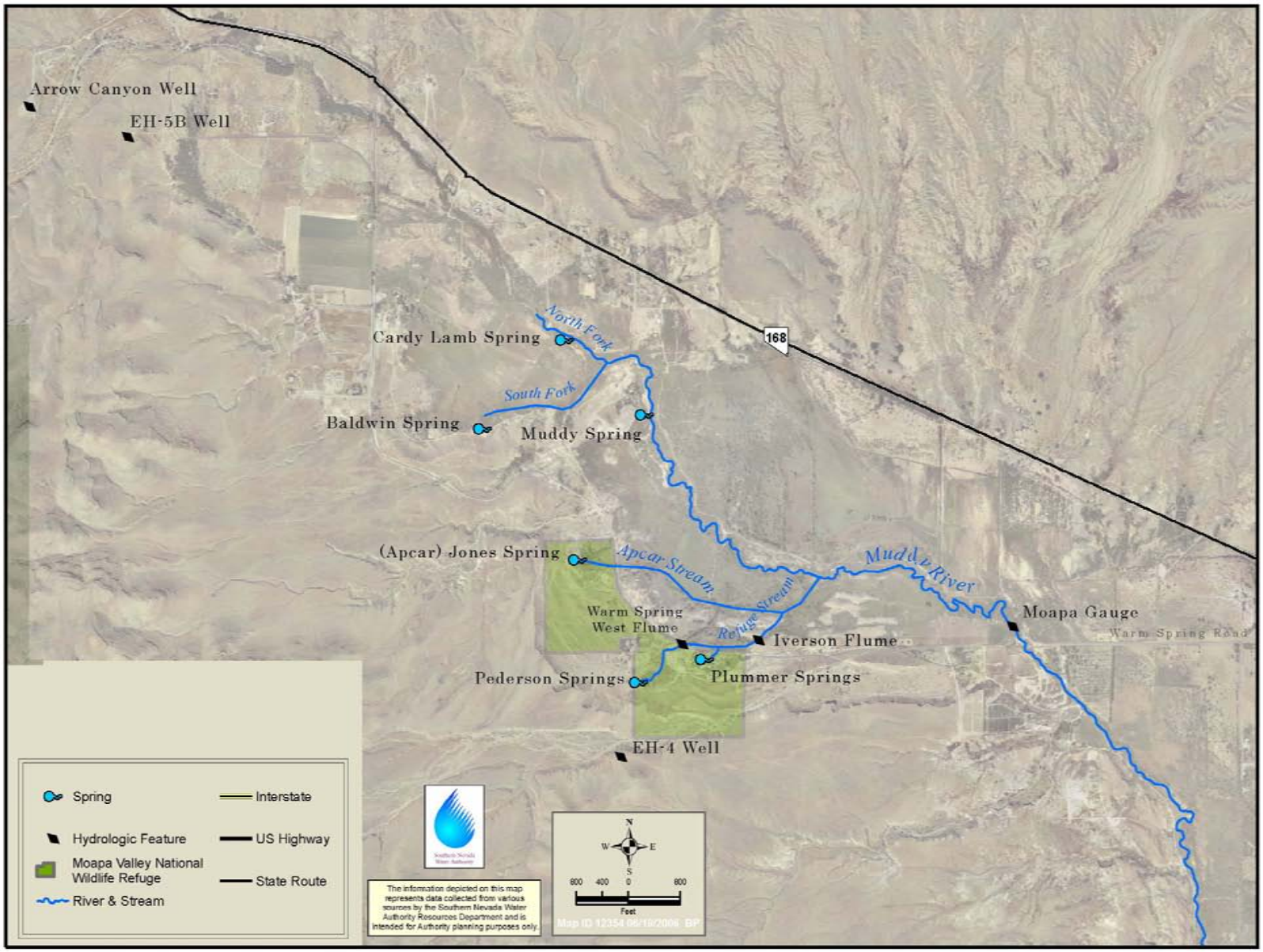


Figure 1-1 Muddy Springs (Warm Springs) Area

habitat of the Moapa dace and other wildlife purposes. The USFWS has postulated that current groundwater pumping by MVWD at its Arrow Canyon Well in Upper Moapa Valley is causing a decline in spring flows in the Muddy Springs area, and that future withdrawals of groundwater in Coyote Spring Valley may cause spring flows to decline. The SNWA, MVWD, and CSI do not believe the available hydrologic data supports these conclusions. However, all parties share a common interest in the conservation and recovery of the Moapa dace and its habitat.

The CSI, USFWS, Moapa Band of Paiutes, MVWD, and SNWA have entered into a Memorandum of Agreement (MOA), which sets forth conservation measures providing for the protection and recovery of the Moapa dace, coordination of monitoring, management and mitigation measures, and protection of respective water rights (Appendix C). The MOA requires the dedication of certain water rights to preserve in-stream flows, establishes funding for habitat restoration and recovery measures, and creates a Hydrologic Review Team to oversee monitoring, data collection and analysis activities. The MOA also provides for pumping restrictions whereby the parties agree to curtail pumping in the event spring flows in the Muddy Springs area decline to specified "trigger levels." Any future production of groundwater from Coyote Spring Valley by the parties would be subject to the terms of the MOA, including pumping that may occur after the two-year pump study or as a result of other groundwater development projects. The conservation measures that SNWA has agreed to implement under the MOA have been incorporated into the Coyote Spring Project as applicant-committed conservation measures and are part of this action under review by BLM (Chapter 2.1.7). The MOA conservation measures include:

- Establishment of a Recovery Implementation Program (RIP) for the Moapa dace
- Dedication of the Apcar (Jones) Spring water right to provide in-stream flows
- Dedication of a portion of CSI's water rights in Coyote Spring Valley
- Habitat restoration and recovery measures, including funding for restoration of Moapa dace habitat, development of an ecological model for the Moapa dace, construction of fish barriers, eradication of non-native fish species, and cultivation of native vegetation
- Protection of in-stream flows through the establishment of minimum in-stream flow levels that would trigger various conservation actions including restriction of groundwater pumping
- Establishment of a Hydrologic Review Team to coordinate data collection, analyses of impacts, and assessments of pumping restrictions
- Acquisition of additional land and water rights to assist in the recovery of the Moapa dace
- Operational coordination among the USFWS, SNWA, CSI, and MVWD
- Adaptive management measures, including additional conservation measures to protect and recover the Moapa dace

On January 30, 2006, the USFWS issued a final programmatic biological opinion (BO) on the MOA (Case File No. 1-5-05-FW-536). The BO was prepared in accordance with the USFWS's guidance for programmatic-level consultations, and evaluates the effects to the Moapa dace of cumulative groundwater withdrawal of 16,100 afy from two hydrographic basins, Coyote Spring Valley and California Wash, along with the performance by the parties of the conservation measures required by the MOA. The BO concludes that such groundwater withdrawal, in concert with the performance of the MOA's conservation measures, will not jeopardize the Moapa dace. The withdrawal and conveyance by SNWA of the 9,000 afy, which are the subject of this EA, are considered within and as a part of the cumulative withdrawal amount considered in the BO. The other withdrawals evaluated under the programmatic BO include withdrawal of 4,600 afy by CSI in Coyote Spring Valley and 2,500 afy by the Moapa Band of Paiutes in California Wash. Future Section 7 consultations for federal actions under the MOA, including the Coyote Spring Project, would be tiered from this programmatic BO.

1.2 CONFORMANCE WITH RESOURCE MANAGEMENT PLAN AND RELATIONSHIP TO EXISTING LAWS AND REGULATIONS

The Coyote Spring Project would largely be constructed on land managed by the BLM. Thus, BLM is the federal lead agency for the Coyote Spring Project. The Authorized Officer of the Las Vegas Field Office has final approval authority for the National Environmental Policy Act (NEPA) compliance document. The environmental analysis contained in this EA would provide the decision-maker with the information needed to make an informed, reasoned decision in compliance with all applicable laws, ordinances, and regulations. The rights-of-way (ROW) that would be issued by BLM for the Coyote Spring Project would be in accordance with the requirements of the Federal Land Policy and Management Act (FLPMA), Southern Nevada Public Land Management Act, and the BLM's ROW regulatory requirements.

The BLM land uses in southern Nevada are managed under the Las Vegas Resource Management Plan (RMP) and Final Environmental Impact Statement (BLM, 1998). The RMP provides management guidelines for lands within the Las Vegas District of the BLM in the form of objectives and management directions. The BLM manages approximately 2.5 million acres of public land in Clark County. The Coyote Spring Project is in conformance with the RMP, specifically objectives RW-1 (providing legal access to major utility transmission lines) and RW-1h (public land is available for ROW at agency discretion under the FLPMA).

In 2004 Congress passed the Lincoln County Conservation, Recreation, and Development Act. The Act directs the Secretary of Interior to establish 2,640-foot wide utility corridors on public lands in Lincoln and Clark Counties. One of these utility corridors is along Highway 168, between Highway 93 and Moapa Valley, within which the majority of the Coyote Spring Project is located. The Act also directs the Secretary of the Interior to grant non-exclusive ROWs to SNWA for water conveyance facilities within the corridors, subject to compliance with NEPA.

1.3 PURPOSE

The purpose of the Coyote Spring Project is to develop and convey SNWA's existing 9,000 afy of Coyote Spring Valley water rights in an efficient and practical manner to locations where such water can be placed to a beneficial use by SNWA and/or MVWD.

1.4 NEED

SNWA has three needs for the Coyote Spring Project:

- Facilitate at least two years of groundwater pumping in Coyote Spring Valley, in support of the study of the regional carbonate aquifer mandated by Nevada State Engineer Order 1169.
- Provide a means to convey SNWA's existing Coyote Spring groundwater rights to locations that would make that water available for SNWA's future use, as a water resource option to assist SNWA in meeting southern Nevada's projected future water demands and reduce its reliance on the State of Nevada's Colorado River water entitlement.
- Provide a means to convey a portion of SNWA's existing Coyote Spring groundwater rights that would be transferred to MVWD into the Moapa Valley area.

1.4.1 Groundwater Pumping Under Order 1169

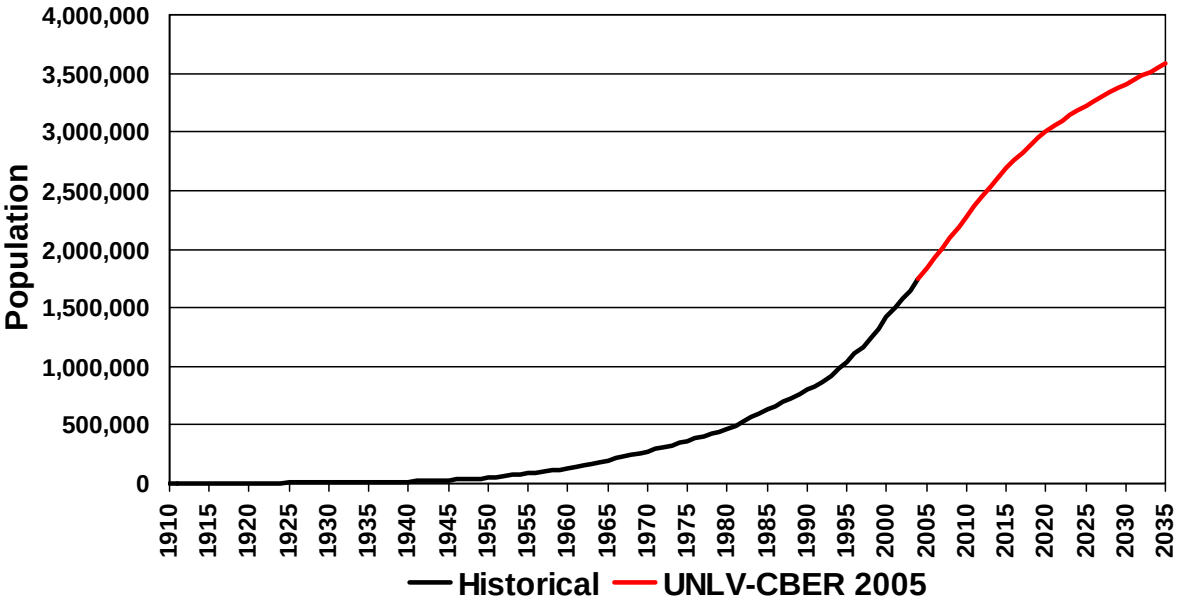
As described in Chapter 1.1.2 above, the Nevada State Engineer has issued Order 1169, which requires at least two consecutive years of pumping of at least half of the existing permitted rights in Coyote Spring Valley to support a study of the regional carbonate aquifer system. To comply with Order 1169, SNWA proposes to develop the 9,000 afy of permitted groundwater rights that it currently owns in Coyote Spring Valley.

As a part of the Coyote Spring Project, SNWA would withdraw its permitted groundwater rights from Coyote Spring Valley. A water conveyance system is proposed as part of the Coyote Spring Project to transport the developed groundwater out of the Coyote Spring Valley hydrographic basin. Removing the water from this hydrographic basin ensures that data on water level changes are not influenced by re-infiltration of the pumped groundwater to the local alluvial aquifer in Coyote Spring Valley.

The SNWA would also put groundwater produced during the two years of the Order 1169 groundwater pumping study to beneficial use as feasible. Beneficial use is a term used in the State of Nevada and many other western states, generally meaning a socially acceptable (e.g., residential, commercial, agricultural, recreational, wildlife, etc.) and non-wasteful use. In conjunction with MVWD, groundwater developed during the pumping study may be substituted for other MVWD water sources (e.g. Arrow Canyon well), and/or used by other residential, municipal, industrial, or agricultural water users in the Moapa Valley area for the duration of the Order 1169 pumping study. This proposal allows for beneficial use of the water produced during the pumping study, since potential future uses of the groundwater rights remain speculative until after completion of the Order 1169 pumping study.

1.4.2 Future Water Resource Option for SNWA

The Coyote Spring Project is also needed to provide SNWA with a future in-state water resource option that may be used to help meet southern Nevada's projected future demands and reduce its reliance on the State of Nevada's Colorado River water entitlement. Southern Nevada has been one of the fastest growing areas in the nation for many decades. Since 1910, the annual population growth in Clark County has averaged approximately 7 percent per year, compared to a nationwide average of approximately 1 percent annually. By 2004, Clark County's population increased to over 1.7 million people. The majority of the population resides in the Las Vegas Valley. In addition to its growing population, Las Vegas attracts a large number of visitors each year. In 2004 alone, Las Vegas attracted over 37 million visitors. Population projections developed by the University of Nevada Las Vegas (UNLV), Center for Business and Economic Research (CBER) in 2005, project that Clark County's population may exceed 2 million by the year 2007, and may exceed 3.5 million by 2035 (CBER, 2005), (Figure 1-2).



Source CBER, 2005

Figure 1-2 Clark County Population (Historical and Projected)

In 1998, Congress enacted the Southern Nevada Public Lands Management Act (Public Law 105-263). This act authorized the BLM to dispose for development approximately 52,000 acres of public lands located within a specific boundary of the Las Vegas Valley. In 2002, Congress authorized the disposal of an additional 22,000 acres of BLM-managed lands in the Clark County Conservation of Public Land and Natural Resources Act of 2002 (Public Law 107-282). To date, over 31,000 acres of BLM-managed lands have been sold for private development pursuant to these Congressional authorizations. These BLM land sales have and would continue to play a critical role in supporting the recent population growth and development of the Las Vegas Valley. BLM likely will continue to offer public lands located within the congressionally authorized disposal area for sale pursuant to the terms of these Acts. The

development of these lands would likely facilitate the future population growth in, and the associated water demands of, the Las Vegas Valley.

1.4.2.1 Demand Management and Water Conservation

Since its inception, SNWA has undertaken coordinated efforts to achieve long-term conservation of water resources, recognizing that increasingly efficient water use would have a direct impact on the amount of water resources needed in the future. Using 1990 as a base year, and building on a recommendation from its integrated resource planning process of the mid-nineties, SNWA established a goal of 25 percent conservation by 2010. Through the adoption of coordinated water conservation measures, steady progress towards this conservation goal continued through the 1990's.

In response to declining levels of conservation achievement, SNWA and its member agencies launched a conservation strategic planning process in 2001. A five-year Conservation Plan was developed in 2004 that identifies water conservation goals and programs. SNWA is currently pursuing four major conservation strategies:

(1) Incentives - SNWA operates the nation's largest known incentive programs to encourage existing customers to make long-term efficiency improvements. Three of the major incentive programs are a landscape conversion program (Water Smart Landscapes Program), a rebate program to encourage installation of irrigation clocks, and a water efficient technologies program to partially fund capital improvements that permanently increase water efficiency. The Water Smart Landscapes Program offers $1 per square foot to convert lawns to drought tolerant landscapes. To date, this program has converted 64 million square feet of landscape at a rebate cost of $52.4 million and has reduced water demand by more than 3.5 billion gallons annually.

(2) Pricing – While SNWA does not provide retail service; its member agencies have implemented conservation-oriented water rates. These water rates reflect a multi-tier, increasing block rate structure, with higher rates for increased levels of water use.

(3) Regulation - Although SNWA itself has no ability to regulate water use by end users, it has initiated collaborative efforts with local governments and its member agencies to implement highly effective conservation policies, including landscape and development codes, plumbing standards, water waste enforcement, and water budgeting.

(4) Education - Extensive education and public outreach efforts are being conducted to assure that water users understand issues of water resource availability and wise use of water. These efforts include advertising, community events, publications, an interactive website, public-private partnerships, and demonstration gardens to inspire water-efficient landscape designs.

The SNWA also supports a variety of research initiatives to develop cutting-edge techniques and technologies to further water conservation. These programs demonstrate that from its inception, SNWA has focused on achieving aggressive conservation goals through the implementation of conservation programs.

In 2002, as drought conditions on the Colorado River became more severe, SNWA and its member agencies recognized that a more immediate and actionable community response was necessary. As a result, conservation efforts were expanded to address drought conditions. The SNWA Drought Plan (Drought Plan) (SNWA, 2003) was adopted in 2003, to encourage more efficient water use during times of drought. The Drought Plan, amended in 2005, is designed to generate additional water savings to address current and potential challenges posed by the drought. In addition to SNWA's conservation programs, the Drought Plan implements further water demand reduction tools as needed to respond to various drought stages. These drought response measures include landscape watering restrictions and schedules, landscape development codes, water budgets for golf courses, drought surcharges, and increased water waste fines and enforcement.

Through the combination of these conservation and drought measures, SNWA achieved 23.1 percent conservation in 2003, and 29.5 percent in 2004. This exceeded SNWA's 25 percent conservation goal for 2010, a full 6 years ahead of schedule (Figure 1-3).

In addition to the progress already made in reducing water demands, SNWA continues to pursue even more aggressive conservation goals. In 2004, SNWA established the Integrated Water Planning Advisory Committee (Advisory Committee) to develop recommendations concerning the integration of in-state water resources into the water planning and management activities of southern Nevada. After over a year of meetings and deliberations, the Advisory Committee adopted recommendations in September 2005. One of the Advisory Committee's recommendations is that SNWA pursue more aggressive water conservation and decrease total per capita water demands over the next 30 years. This goal should be pursued by:

- Permanently implementing major drought demand reduction tools identified in the SNWA Drought Plan (SNWA, 2003), including landscape water restrictions, landscape development codes, golf course water budgets, increased water waste fines, and increased enforcement
- Ensuring water rates keep pace with inflation
- Maintaining or exceeding the 2004 participation levels in SNWA's Water Smart Landscapes Rebate Program

The SNWA Board of Directors adopted the Advisory Committee's recommendations in November 2005.

1.4.2.2 Meeting Southern Nevada's Projected Future Water Demands

To ensure the continued availability of adequate wholesale water supplies for its member agencies, SNWA regularly develops water demand forecasts for southern Nevada. The most recent water demand forecasts have been calculated using the CBER 2005 population projections.

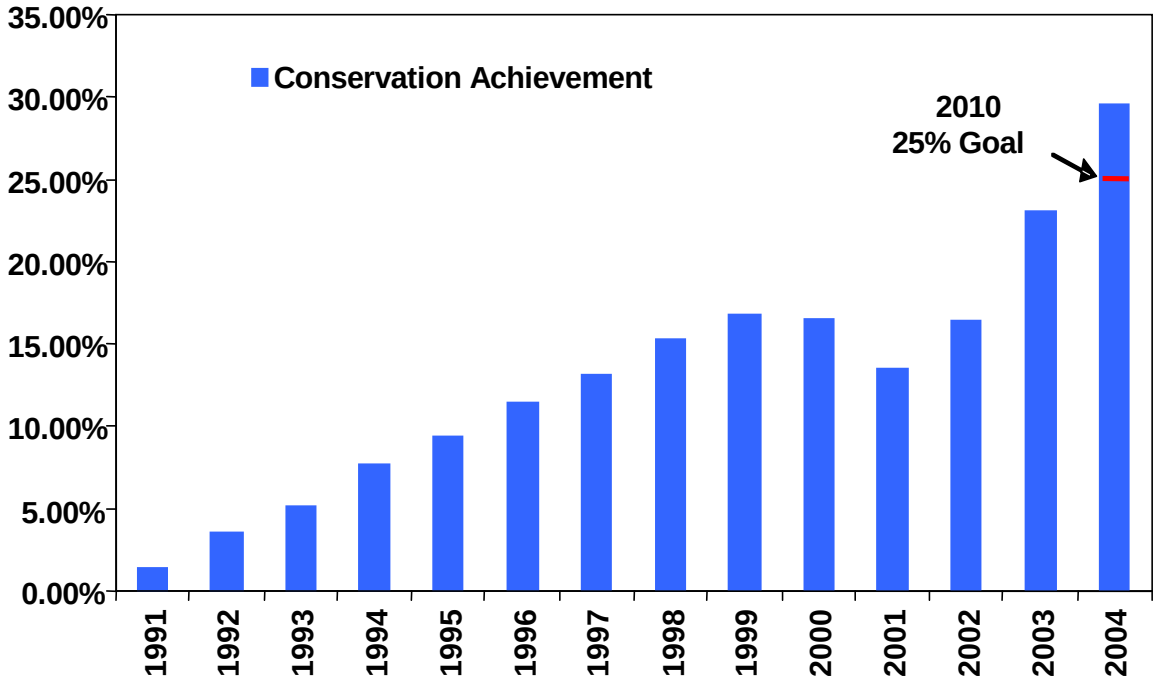


Figure 1-3 Conservation Achievement 1991-2004

Water demand is a function of both population and a measure of individual water use. A commonly used measure of individual water use is gallons per capita per day (GPCD), which is equal to the total community water use, divided by the community population, divided by 365 days per year. While GPCD is not useful for comparison between different communities because of inconsistent water use accounting practices, varying climate conditions, different demographic factors between communities, and other factors (e.g., economic factors), it is a good tool for an individual community to measure its water usage.

The SNWA remains committed to continuing additional conservation. The 25 percent conservation goal for 2010 equates to a demand of approximately 282 GPCD. The Advisory Committee has recommended SNWA pursue a goal of further reducing water use to 250 GPCD by 2010 and to 245 GPCD by 2035. Figure 1-4 displays projected water demands for these GPCD goals using the CBER 2005 population projections.

Despite SNWA's strong commitment to improving conservation and reducing water demands, additional water resources are still required to meet projected water demands.

Based on projections that assume southern Nevada will increase conservation levels to reduce usage to 245 GPCD, southern Nevada will require approximately 400,000 afy of additional water by 2035.

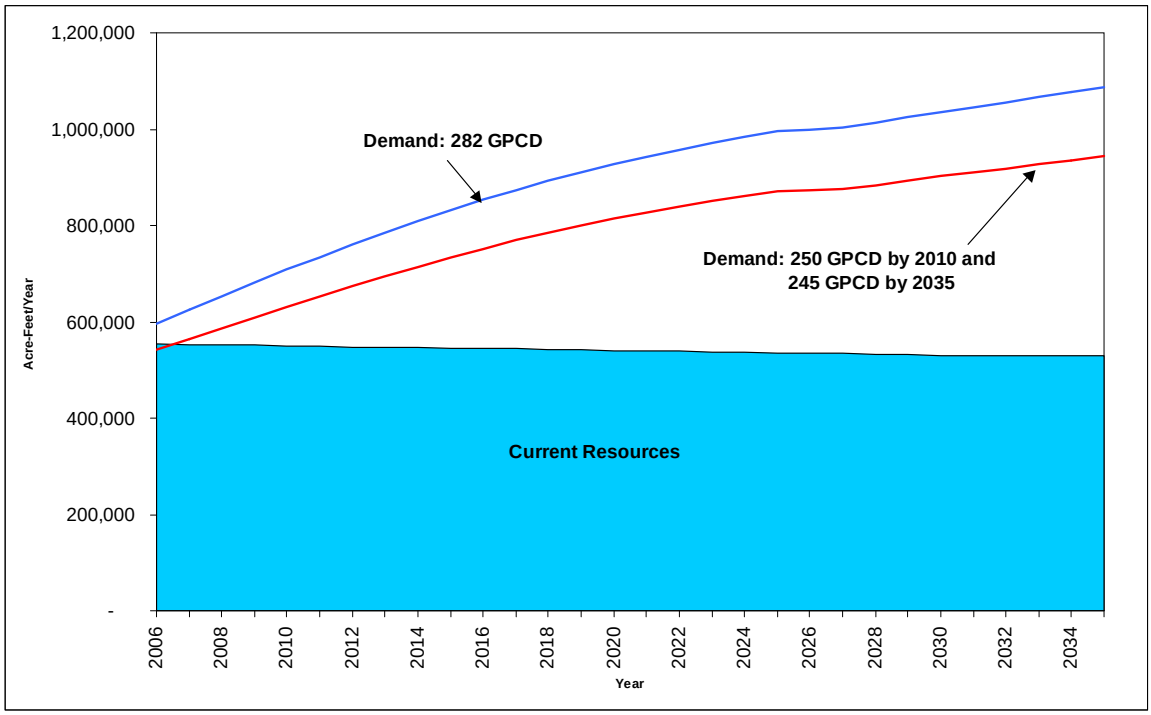


Figure 1-4 Projected Water Demands

The Coyote Spring Project is capable of meeting only a small portion of southern Nevada's projected future demands. However, SNWA's existing Coyote Spring groundwater rights are a permanent water resource that will help meet the anticipated demands. As such, it is a critical component in securing an adequate water supply for southern Nevada.

1.4.3 Reducing Reliance on the State of Nevada's Colorado River Water Entitlement

The SNWA has recognized the need to reduce its reliance on Nevada's Colorado River water entitlement, and further diversify its current water resources. Currently, Nevada's Colorado River apportionment of 300,000 afy meets approximately 90 percent of southern Nevada's water resource needs. The SNWA and Colorado River Commission of Nevada have worked with various agencies in the Department of the Interior to maximize southern Nevada's efficient use of Colorado River water. These accomplishments include off-stream storage agreements with the States of Arizona and California. For example, in late 2004, SNWA reached an agreement with the State of Arizona that secured up to a total of 1.25 million acre-feet of banked water for SNWA's future use through 2060. In addition, SNWA has supported the establishment of the Interim Surplus Guidelines in the Lower Colorado River Basin, which allow Nevada, Arizona, and California to access additional surplus Colorado River water, when available, through 2016. Since these additional Colorado River sources cannot be relied on as permanent water resource options, SNWA must continue to develop other permanent water resources.

In 1999, the Colorado River Basin began to experience drought conditions that, over the next few years, quickly became one of the worst droughts in the recorded history of the basin. Under the drought, water levels in the two primary storage reservoirs, Lake Mead and Lake Powell, have declined to levels not observed since the late 1960's while Lake Powell was filling. Since 2000, inflows to Lake Powell have averaged about 59 percent. This drought has highlighted the need for SNWA to reduce its reliance on the Colorado River and to develop additional water resources that will provide flexibility to respond to drought conditions, and to meet current and future projected demands.

The SNWA has identified a goal of diversifying its current resources by meeting approximately 40 percent of its future water resource needs from in-state, non-Colorado River resources. As a part of this ongoing diversification effort, SNWA is pursuing the development of in-state water resources. This is consistent with the Advisory Committee's recommendation that SNWA pursue the development of all its in-state water resource options, including its existing Coyote Spring Valley groundwater rights. The SNWA groundwater rights developed through the Coyote Spring Project would assist in reducing the region's reliance on the Colorado River.

1.4.4 Convey Existing Groundwater Rights To MVWD

During the Order 1169 pumping study, the Coyote Spring Project would be used to convey SNWA's existing groundwater rights into the MVWD system. MVWD may use some or all of that water to meet its municipal and domestic needs. Under the terms of the MOA, the Coyote Spring Project would be used to provide water to MVWD, in the event MVWD has to cease pumping from its Arrow Canyon well during the Order 1169 pumping study due to declining spring flows.

Under the terms of the MOA, MVWD would dedicate its entire 1.0 cfs flow right of the Apcar (Jones) Spring to the purpose of providing in-stream flows that would be beneficial to the Moapa dace. The Apcar (Jones) Spring water is currently being used by MVWD to serve their existing municipal customers, and is an important component of MVWD's water resource portfolio.

The SNWA would transfer 724 afy of its Coyote Spring water rights at no cost to MVWD, to replace the loss of this portion of MVWD's water supply. The dedication of 1.0 cfs at the Jones Spring for the benefit of the Moapa dace is physically contingent on the ability of SNWA to convey replacement water to MVWD through the Coyote Spring Project. The Coyote Spring Project would continue to be used after the Order 1169 pumping study to convey this groundwater to MVWD.

Under the terms of a previous agreement, the MVWD would be assigned approximately half of any future SNWA/LVVWD water rights (up to 13,729 afy) that may be granted by the Nevada State Engineer in Coyote Spring Valley. As described above in Chapter 1.1.2, the Nevada State Engineer will not decide on pending applications until completion of the pumping study. As described in the MOA, except for the 724 afy described above, SNWA is not obligated to supply MVWD with any water from its existing Coyote Spring Valley water rights after completion of the Order 1169 pumping study.

The Coyote Spring Project is designed to convey SNWA's existing permitted rights, and conveyance of any future rights assigned to MVWD would likely require separate

conveyance facilities, which would be subject to a future federal rights-of-way (ROW) request and associated environmental analysis.

1.5 OTHER REVIEWS, PERMITS AND REGULATIONS

The USFWS has authority to review this project under Section 7 of the ESA. As described in Chapter 1.1.3, the USFWS has issued a final programmatic BO (File No. 1-5-05-FW-536), which addresses the effects of the groundwater withdrawal that would be part of the Coyote Spring Project. A project-specific Biological Assessment (BA) was also completed for the Coyote Spring Project, and submitted to the USFWS (Wildland International, 2003). A project-specific BO for the Coyote Spring Project is anticipated to be issued by the USFWS in mid-2006.

The Nevada State Historic Preservation Office (SHPO) has review authority regarding potential impacts to cultural resources resulting from project implementation per the National Historic Preservation Act of 1966 (NHPA) and other relevant regulations and executive orders addressing cultural resources and Native American concerns. The BLM has completed consultation with the SHPO under Section 106 of the NHPA and mitigation of one cultural site in the Area of Potential Effect (APE) has been completed (see Chapters 3.2 and 4.2). No Native American cultural resource concerns have been identified to date.

The U.S. Army Corps of Engineers (COE) is the permitting authority for discharges into waterways of the U.S. under the Clean Water Act. The SNWA has received a permit from the COE under Section 404 of the Clean Water Act, for construction activities in jurisdictional waterways. A Section 404 permit would also be obtained for discharge of water into the Muddy River system. The COE is also providing grant funding to the MVWD under Section 595 of the Water Resources Development Act of 1999. This federal funding would be utilized by MVWD for a portion of the MVWD cost-share on the Coyote Spring Project.

The Nevada Division of Environmental Protection (NDEP), Bureau of Water Pollution Control is the permitting authority for discharges into waters of the U.S. and the State. SNWA is coordinating with NDEP to obtain a National Pollutant Discharge Elimination System (NPDES) Permit for discharge of project water into Bowman Reservoir and the Muddy River.

The Federal, State and local permits and approvals that may be required for the Coyote Spring Project are summarized on Table 1-1.

1.6 PUBLIC SCOPING

A public meeting on the Coyote Spring Project was held at the Moapa Town Board on July 10, 2003, at the Moapa Community Center in Moapa, Nevada. Notices for this meeting, including a brief description of the project, were distributed June 12, 2003. Notices were also publicly posted and distributed, and published in the Moapa Valley Progress on July 9, 2003.

Table 1-1 Regulatory Permits and Reviews Potentially Required for the Coyote Spring Project

Agency	Permit/Approval
Federal	
U.S. Bureau of Land Management	Temporary and permanent right-of-way grants Conformity with Las Vegas Field Office Resource Management Plan
U.S. Fish and Wildlife Service	Section 7 consultation and Biological Opinion
U.S. Army Corps of Engineers	Section 404 permit
State	
Nevada Department of Cultural Affairs, State Historic Preservation Office	Section 106 review and concurrence
Nevada Division of Environmental Protection, Bureau of Water Quality Planning Bureau of Water Pollution Control	401 Water Quality certification General storm water permit for construction (National Pollutant Discharge Elimination System permit) Temporary discharge permit for hydrotest water Temporary groundwater discharge permit Working in waterways permit Discharge permit into Bowman Reservoir and/or Muddy River
Nevada Division of Environmental Protection, Bureau of Safe Drinking Water	Letter of approval to construct
Nevada Department of Transportation	Encroachment into State Highway rights-of-way Right-of-way occupancy permits
Nevada Department of Wildlife	Handling permit for desert tortoise, gila monster, and other species
Nevada Division of Forestry	Collection permit for state-listed plants
Nevada Division of Water Resources	Well driller's permit
County	
Clark County Comprehensive Planning Department	Multiple Species Habitat Conservation Plan mitigation fee Special use permit for facilities and staging areas
Clark County Department of Air Quality Management	Authority to construct certificate Dust control plan and permit for construction Sand and gravel processing permit Various location permits
Clark County Fire Department	Hazardous materials management plan Emergency response plan Blasting permit Aboveground fuel storage permit

Table 1-1 Regulatory Permits and Reviews Potentially Required for the Coyote Spring Project

Agency	Permit/Approval
Clark County Department of Development Services	Encroachment permit Construction water permit Drainage study Grading permit
Clark County Regional Flood Control District	Letter of approval from review of Federal Emergency Management Agency maps and Clark County Regional Flood Control District plan

No written public scoping comments were received. Oral comments and questions received during the public meeting included:

- Where will excess water be discharged
- Are there existing water rights for the project, and how much water can be pumped without effecting existing wells and water rights
- Will Moapa town water rates or services be affected by the project
- Can development in Moapa occur from the temporary water
- How will effects on existing users be monitored, and where will monitoring wells be sited
- What type of pipe will be used
- How will the construction be contracted, will the work be union, and can locals get hired for construction
- How much water does MVWD currently have, and can they sell excess water in the future
- Can SNWA take this water out at Lake Mead
- Can homes in Moapa be tied into the new pipeline
- Will the project increase water pressures in the Muddy Springs area, and can MVWD do anything to increase water pressures in the area
- What is the relation of the project to CSI
- Is the project taxpayer funded
- What is the project benefit to Moapa

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2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action, Alternatives to the Proposed Action, and the No Action Alternative. Two alternatives were identified for analysis, after considering the purpose and need of the project and relevant environmental concerns. Several other alternatives were considered during initial project planning, but were eliminated from further consideration. These are all described below.

2.1 PROPOSED ACTION

The Proposed Action is the issuance of ROW by the BLM to SNWA to construct and operate a water transmission system from existing wells in Coyote Spring Valley into the existing MVWD storage reservoir in upper Moapa Valley. Major components of the Coyote Spring Project, which would be located on both federal and non-federal lands, include three existing wells, approximately 16 miles of pipeline, a regulating tank, less than 1 mile of power line, and system improvements by MVWD (Figure 2-1). The proposed facilities are described in more detail in the following subheadings.

Under the Proposed Action, the majority of the proposed facilities would be located on federal lands managed by BLM, and within the Nevada Department of Transportation (NDOT) ROW along Nevada State Highway 168 (Table 2-1). The western half of the proposed Coyote Spring Project lies within the Gold Butte-Pakoon unit of desert tortoise critical habitat, designated by the USFWS in 1994. This area is also designated as the Mormon Mesa Area of Critical Environmental Concern by BLM (BLM, 1998). Under the Proposed Action, facilities were designed to be within the NDOT ROW as much as feasible, to minimize effects on these resource areas.

Water pumped during the two-years of groundwater pumping under the Order 1169 study would be conveyed into the MVWD system. While MVWD would attempt to find beneficial use for the water during the study period, it is possible that there may be excess water. Excess water would be discharged from the MVWD system into Bowman Reservoir or an irrigation diversion ditch in Moapa Valley, both of which are used as a water supply source for the Muddy Valley Irrigation Company (MVIC).

Following the Order 1169 study period, SNWA would continue to convey its 9,000 afy of permitted water rights through the Coyote Spring Project. Although the mechanism for conveying this water to SNWA purveyor members in the Las Vegas Valley would not be defined until after completion of the Order 1169 pumping study, SNWA anticipates that it would involve continued conveyance of the pumped groundwater through the Coyote Spring Project, with discharge into the Muddy River. SNWA anticipates the water would be allowed to flow down the Muddy River into Lake Mead, for eventual withdrawal by SNWA from its intakes at Saddle Island. Appropriate permits and approvals would be requested for the introduction of non-Colorado River system water for credit with Colorado River water following completion of the Order 1169 pumping study, and any necessary environmental review for those permits and approvals would be conducted.

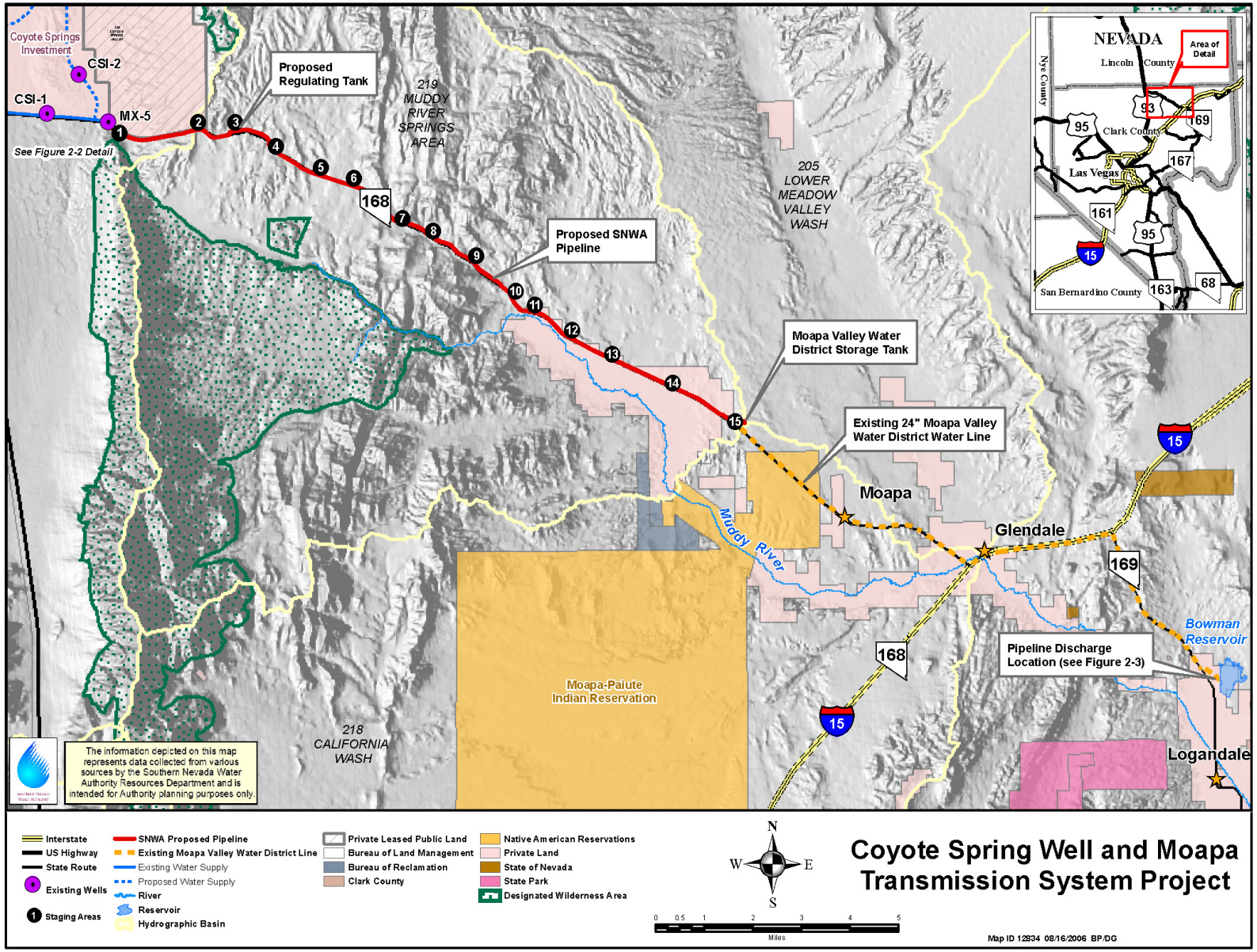

Figure 2-1 Proposed Action

Table 2-1 Estimated Permanent and Temporary Rights-of-Way for the Proposed Action

Facility (with estimated dimensions)	Bureau of Land Management Lands (acres)		Private Lands (acres)		Total (acres)
	Permanent	Temporary	Permanent	Temporary	
Wells and MX-5 Site					
MX-5 Well Site (330 by 660 feet plus temporary easements) [1, 2]			5.0	2.6	7.6
Additional Production Well Sites (three sites at 200 by 200 feet)			3.0		3.0
Pipelines					
Main Pipeline from MX-5 to MVWD Tank (34 to 85 feet wide)	40.3	65.7	13.8	24.6	144.4
Regulating Tank					
Regulating Tank Site (330 by 330 feet)	2.5				2.5
Access Road (20 feet wide)	0.2				0.2
Staging Areas					
15 Staging Areas (dimensions vary) [3]		11.9		7.7	19.6
Power Facilities					
Powerline (100 feet wide)	4.2				4.2
Tap Structure (150 by 150 feet)	0.5				0.5
MVWD Improvements					
Chlorination Facility (50 by 60) [2]	0.1				0.1
Dechlorination Facility (150 by 150 feet)			0.5		0.5
Discharge Pipelines (20 feet wide)			3.8		3.8
Project Total	47.8	77.6	26.1	34.9	**186.4**

[1] Existing facility
[2] Within an existing site, and new rights-of-way are not required
[3] Staging Area 3 is included in the right-of-way for the regulating tank

2.1.1 Wells and MX-5 Site

Three existing groundwater production wells located on private lands within Coyote Spring Valley would be used to pump groundwater under the Proposed Action. These include SNWA's MX-5 well, and/or CSI's 1 and 2 wells (Figure 2-2).

The MX-5 well site is 5 acres in size. In addition to the well, a forebay, pumping station, and electrical substation would also be located at the site. The permanent site would be surrounded by chain-link fencing. CSI, as part of its Coyote Springs Development, is developing access to this area from Highway 168, and SNWA is coordinating with CSI to maintain access to the MX-5 site.

The forebay would be a welded steel tank, with a capacity of 0.75 million gallons. The forebay would be partially buried, approximately 6 to 7 feet below grade.

The pumping station would be equipped with three pumps, each sized at 3,100 gallons per minute (gpm). One of these pumps would be a spare for use in the event of a pump failure or during necessary maintenance periods. Use of two pumps to move the water into the conveyance pipeline provides flexibility in operations, including varying the pumping rate if needed.

The MX-5 site may also be equipped for arsenic treatment, if required for operations or to meet Safe Drinking Water Act standards before the water enters MVWD's system.

SNWA's existing MX-5 well does not have the capability of pumping the entire 9,000 afy, so the two existing CSI wells (CSI 1 and 2) would also be used for the Proposed Action. Use of the existing CSI wells eliminates the need to drill new production wells to initiate the Order 1169 pumping study. CSI has equipped these existing wells and is currently constructing a water distribution system, as part of its Coyote Springs Development. Additional modifications to these wells are not anticipated to be necessary for their use in the Order 1169 pumping study. The MX-5 well, with an anticipated pumping capacity of 3,800 gpm, would be used to develop up to approximately 6,000 afy. The CSI 1 and 2 wells, with pumping capacities of approximately 1,700 and 4,200 gpm respectively, would be used alternately or in combination to develop the remaining 3,000 afy under the Proposed Action.

As agreed to under the MOA, SNWA has sited three additional production wells on private land in the northern part of Coyote Spring Valley (Figure 2-3). One or more of these wells may be used to continue the Order 1169 pumping study, in the event that geographic redistribution of groundwater pumping is necessary if flow levels at the Warm Springs West flume continue to decline below 3.0 cfs or less (Chapter 2.1.7). Analysis of all three well sites is included in this document. If needed, one or more of the wells would be equipped with a temporary pump for the duration of the pumping study.

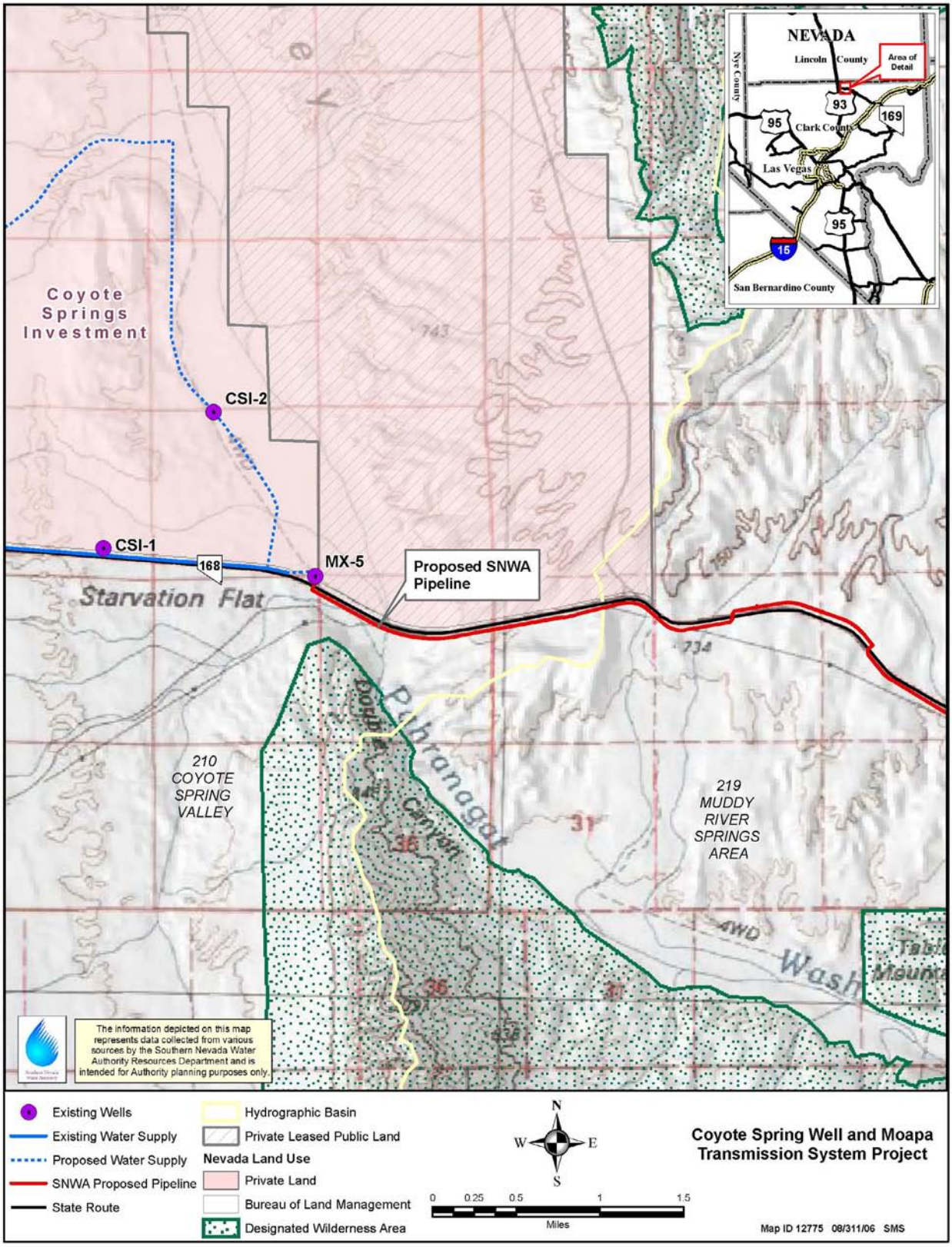

Figure 2-2 Existing Production Well Locations

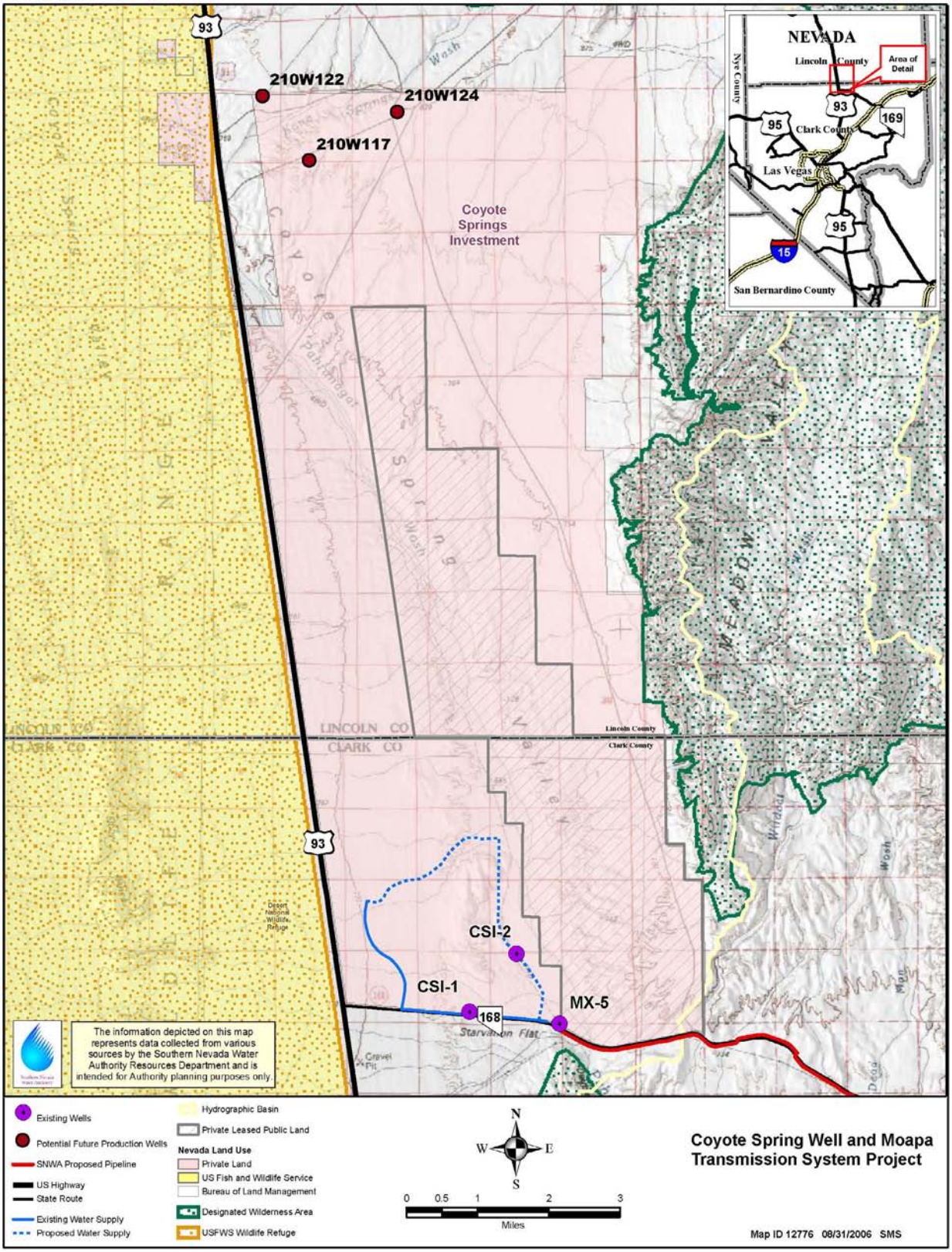

Figure 2-3 Additional Production Well Locations

2.1.1.1 Construction

Construction of the facilities at the MX-5 site is anticipated to begin in July 2007, and extend through July 2009. Equipping of the existing wells would occur between November 2008 and March 2009.

Standard construction techniques would be used to construct the MX-5 forebay, pumping station, and facility substation. The site would be cleared, graded, and excavated. Existing soils at the MX-5 site are inadequate to support the forebay tank and pumping station, so the soils would be over-excavated and recompacted. Typically, plumbing, conduits, and infrastructure would be installed, and then foundations, floors, walls, and roof constructed. Mechanical and other interior components would be installed once the building is completed. Pumps and appurtenances would then be connected to the inlet and outlet water pipelines.

Since these facilities are located on private lands, salvage of cactus and yucca would be conducted if requested by the landowner. Restoration on permanent facility sites is not planned. Restoration of temporary construction areas would be coordinated with the landowner.

At the completion of construction, the forebay and pumping station would be hydrostatically tested, to ensure there is no leakage. Hydrostatic testing may be coordinated with the testing of the pipeline, to conserve the amount of water needed for the testing. Approximately 0.75 million gallons of water would be used in the hydrostatic testing of the forebay and pumping station. After testing, the water may be used for testing the pipeline, or discharged off site in accordance with a temporary discharge permit.

2.1.1.2 Operation

The groundwater production wells and MX-5 facilities would be operated by either SNWA, LVVWD, or MVWD. The facility would not have full-time staff, but would likely be inspected daily. Operation of the wells, pumping station, and associated equipment would be monitored remotely to ensure proper operation. Staff would be dispatched from Las Vegas or Moapa in the event of any emergencies.

Facilities would be operated year-round, and are anticipated to pump and convey groundwater at a constant rate. Multiple pumps in the pumping station would allow flexibility with the pumping rate, if it is requested as part of the Order 1169 pumping study.

2.1.2 Pipelines

The primary conveyance pipeline from the MX-5 site to the MVWD tank would be 24 inches in diameter, and approximately 15.5 miles in length. The pipeline would follow along Highway 168, and be mostly within the NDOT ROW. The pipeline crosses the highway four times (Figure 2-1), based on topography and existing utility line conflicts. The permanent pipeline ROW would be 30 feet wide. The temporary work areas associated with the installation of the pipeline would be located immediately adjacent to the permanent ROW. These temporary work areas vary from 20 to 55 feet wide

depending on topography, and average approximately 50 feet in width. The total ROW required for the pipeline, by land status, is shown on Table 2-1.

Pressure-regulating valves would be required to reduce pressures along the 24-inch transmission pipeline. The valves would be contained within subsurface concrete vaults, with an access hatch elevated approximately one foot above ground surface. Flow control valves would also be located along the pipeline alignment within subsurface vaults. No permanent fencing of the pipeline ROW or valves is proposed.

SNWA has obtained permission from NDOT regarding the use of their ROW for the pipeline and associated temporary use areas. NDOT concerns regarding access points and construction methods have been incorporated into the project.

The pipelines that would discharge excess water from the MVWD system are discussed below in Chapter 2.1.6. CSI is in the process of constructing a water distribution system within its Coyote Springs Development (Chapter 5.1.1), and water from the CSI-1 and CSI-2 wells would be conveyed to the MX-5 site through that system. Additional pipelines to utilize these two wells for the two years of the Order 1169 pumping study are not anticipated to be required. If one or more of the additional production wells in northern Coyote Spring Valley are needed during the two years of the Order 1169 pumping study, temporary piping would be laid along existing access roads within the private lands to the MX-5 site. No ground disturbance for the temporary piping is anticipated to be needed, and the temporary piping would be removed at the completion of the pumping study.

2.1.2.1 Construction

Construction of the pipeline is anticipated to begin in July 2007, and extend through July 2009. Pipeline construction is typically open trench construction, except for the highway crossings. In compliance with NDOT requirements, either jack and bore construction, with jacking and boring pits placed on either side of the crossing, or open trench construction, with flagmen and placement of temporary trench plates during non-working hours are alternative construction methods. The sequence of typical construction activities is clearing and grading, excavation, stockpiling of soils, placement of pipe bedding, pipe laying, welding, trench backfill, hydrostatic testing, final grading, and restoration.

For the portion of the pipeline that is on federal lands, cactus and yucca would be salvaged from the temporary and permanent pipeline ROWs before the start of construction, and placed into temporary plant nurseries located within project staging areas. Following construction, restoration of the pipeline ROW would occur as described in Section 2.1.8. The pressure regulating and flow control vaults and other appurtenances, and access to the vaults, would not be restored at the completion of construction because those facilities would continue to need to be accessed during operation. Plant salvage and restoration on private lands crossed by the pipeline (temporary and permanent ROWs) would be coordinated with and approved by the individual landowners.

At the completion of construction, the pipelines would be hydrostatically tested, to ensure there is no leakage. Hydrostatic testing may be coordinated with the testing of the

forebay, pumping station, and regulating tank, to conserve the amount of water needed for the testing. Approximately 3.5 million gallons of water are anticipated to be used for hydrostatic testing of the pipelines. After testing, the water would be discharged into dry washes off-site in accordance with a temporary discharge permit.

2.1.2.2 Operation

The pipeline would be operated year round once construction is complete. Operation of the pipeline and appurtenances would be monitored remotely, and staff would be dispatched in the event of any emergencies.

Weekly visual inspections of the pipeline and associated valves would be conducted. This would include observing areas of erosion, exposed pipe, unauthorized ROW encroachment, or other conditions that could damage the pipeline. More detailed inspections of valves may occur quarterly.

2.1.3 Regulating Tank

A regulating tank would be required along the transmission pipeline alignment to regulate pressure and control water flow in the pipeline. It would be located approximately 3 miles east of the MX-5 well site, north of Highway 168, just outside of the NDOT ROW. The regulating tank requires a permanent ROW of approximately 2.5 acres (330 by 330 feet). The regulating tank would be an above ground welded steel tank, with a reinforced concrete footing. The tank would be partially shielded from view due to a rise along the highway, and painted to blend into the surrounding landscape. The capacity of the tank would be 0.75-million gallons. Chain-link fencing and a locked gate would surround the site.

A 380-foot long access road would be constructed from the existing pavement on Highway 168 to the regulating tank site. This access road would require a permanent ROW of 40 to 80 feet wide.

2.1.3.1 Construction

Construction of the regulating tank is anticipated to occur at the same time as the pipeline construction. Construction would require grading of the site, and minor excavation to install valves and piping for water inflow and outflow. The tank may be constructed in sections, using a crane to install each section. At completion of construction, the site would be graded. This is a permanent site enclosed by fencing, and no restoration or replanting would occur on the site area.

At the completion of construction the tank would be hydrostatically tested, to ensure there is no leakage. Hydrostatic testing may be coordinated with the testing of the pipeline, to conserve the amount of water needed for the testing. A total of 0.75 million gallons of water would be used in the hydrostatic testing of the tank. After testing, the water may be used for testing the remainder of the pipeline, or discharged off site in accordance with a temporary discharge permit.

2.1.3.2 Operation

Operation of the regulating tank would be as described for the MX-5 forebay, above.

2.1.4 Staging Areas

Up to 19.6 acres would be used for 15 temporary construction staging areas ranging in size from 0.5 to 2.6 acres during construction (Figure 2-1). The staging areas are located adjacent to the permanent and temporary ROWs for the pipeline. The majority (approximately 11.9 acres) of the staging areas occur on federal lands managed by BLM (Table 2-1).

Staging areas would be used during construction for storage of materials and equipment, construction office trailers, fuel storage, equipment maintenance, stockpiling and handling of excavated material, and other related construction activities. Some of the staging areas would be used as temporary nurseries for salvaged cactus, yucca, and other plant material. Each staging area would be fenced while it is in use. Staging areas would be accessed from the pipeline ROW and Highway 168.

For the staging areas that are located on federal lands, cactus and yucca would be salvaged from the area before the start of construction. Following construction, restoration of the staging areas would occur as described in Chapter 2.1.8. Plant salvage and restoration on the staging areas located on private lands would be coordinated with and approved by the individual landowners.

2.1.5 Power Facilities

Electrical power to operate the pumping station and the wells would be provided by the Lincoln County Power District (LCPD) No. 1. A facility substation would be located at the MX-5 well site, and a new 69 kilovolt (kV) power line segment would be routed to the site from the existing LCPD power line located along Highway 168.

The new power line segment would be an overhead power line approximately 1,890 feet long. Seven single wood power poles, each up to approximately 60-80 feet in height would be required. The poles would be equipped with anti-perching devices, to discourage perching by raptors and other large birds. A permanent ROW of 100 feet in width would be required to construct and operate the power line (Table 2-1).

At the connection point with the existing LCPD power line near Highway 168, a tap structure would be required. The tap structure would consist of a pole with switches installed and a fuse structure, and requires a permanent ROW of approximately 0.5-acre (150 by 150 feet).

The facility substation at the MX-5 site would be within the boundaries of the overall 5-acre site. The substation would be placed on a gravel pad, adjacent to the pumping station. The transformer would be placed on a concrete pad within an oil containment structure. The substation would be enclosed by 8-foot high chain-link and masonry block security fence.

2.1.5.1 Construction

The LCPD would construct the new 69 kV power line segment to the MX-5 site from their existing line. The SNWA would construct the facility substation.

Construction of the power facilities is anticipated to begin in June 2007 and complete in October 2008. For the 69 kV power line, placement of each power pole would disturb an

approximately 0.5 to 1-acre area within the power line ROW. The pole foundation is excavated with a truck-mounted auger. The poles are set into the foundation by crane, and the footing backfilled. Electrical wire is strung using pulleys. The tap structure would be constructed in a similar manner.

The substation would be constructed within the MX-5 site footprint. Cement pads would be constructed for transformers, with each pad having a curb around the perimeter for spill containment. Concrete foundations would be constructed for electrical structures, and electrical wire connected using pulleys. A prefabricated steel control cabinet would be constructed to contain controls and relay equipment.

Cactus and yucca would be salvaged from the temporary and permanent power facility ROWs on federal lands before the start of construction, and placed into the temporary plant nurseries. Following construction, restoration of the power facility ROWs would occur as described in Chapter 2.1.8. The substation located within the MX-5 well site and an access route to each pole would not be restored at the completion of construction because they are permanent site facilities.

2.1.5.2 Operation

The LCPD would operate the new 69 kV power line segment to the MX-5 site in conjunction with their existing power line along Highway 168. The SNWA would operate the facility substation. Operation of the power systems would be remotely monitored, to ensure proper operation of the equipment and that adequate power supply is available. The power lines and structures would be visually inspected at least annually, with additional inspections carried out following severe weather or other events that could cause damage to the facilities.

2.1.6 MVWD System Improvements

The MVWD would make some system improvements as part of the Coyote Spring Project, in order to accommodate input and discharge of pumped groundwater during the two years of the Order 1169 pumping study. These improvements would take place within the existing Moapa reservoir tank site, and on private lands near Bowman Reservoir (Figure 2-4). Additional ROWs from BLM for the MVWD improvements would not be required. However, these improvements are described here because they are a necessary component of the Coyote Spring Project. The MVWD improvements include:

- a chlorination facility at the MVWD storage reservoir tank
- a dechlorination facility near Bowman Reservoir
- a discharge pipeline into Bowman Reservoir and the MVIC diversion channel near Highway 169

A chlorination facility would be installed at the existing MVWD storage tank site. It would chlorinate water produced from the CSI and MX-5 wells prior to incorporation into the MVWD potable water system. The chlorination facility would require an area of approximately 0.07 acre within the existing MVWD site. No additional temporary or permanent ROWs would be required for the chlorination facility. The chlorination facility would consist of a concrete pad, sodium hypochlorite storage tank, metering

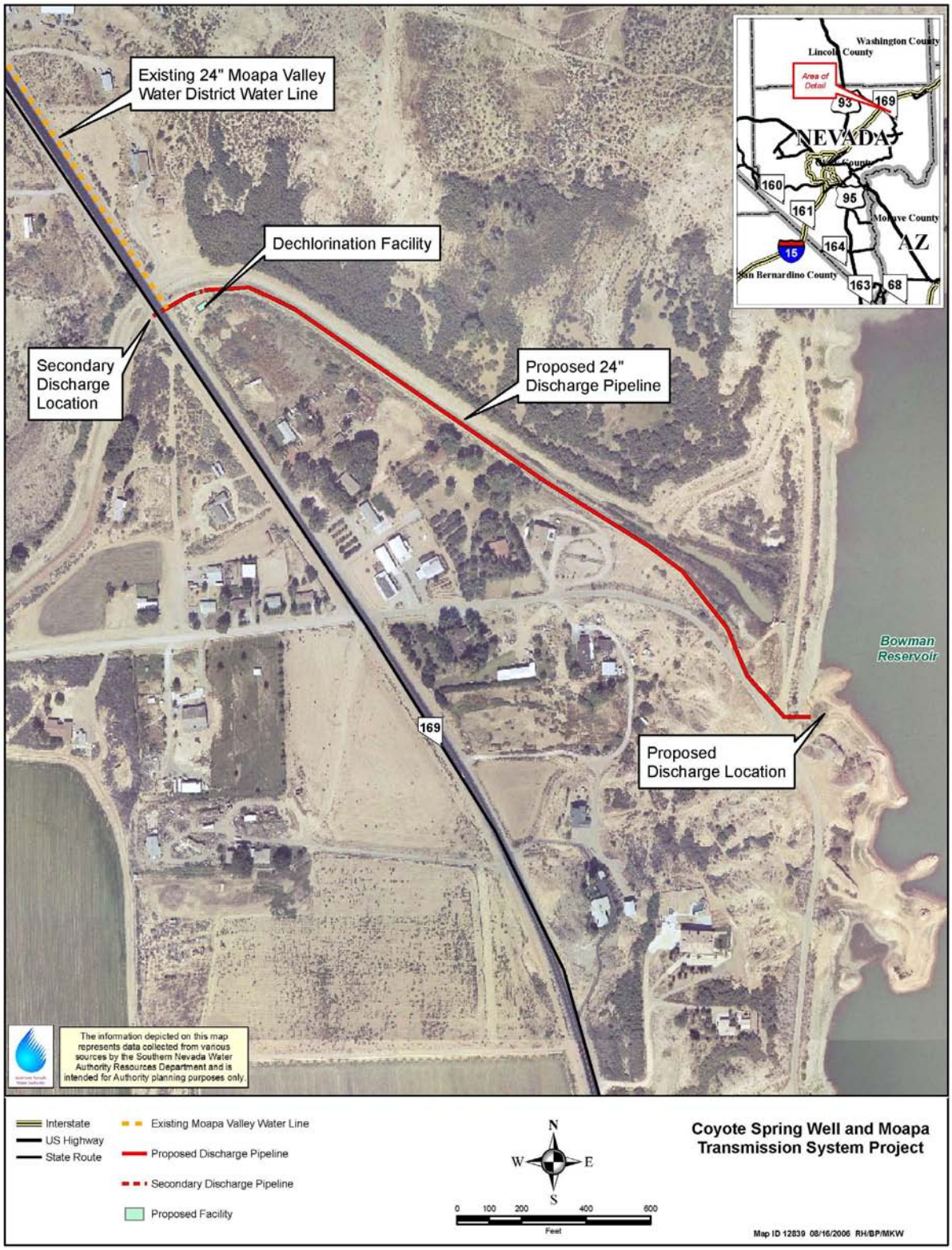

Figure 2-4 MVWD System Improvements

pumps, valves and fittings, a transfer pump and piping to inject the chemicals into the transmission pipeline. The facility would be located within the existing MVWD fenced area for security.

Although MVWD would attempt to put water developed during the Order 1169 pumping study to beneficial use, it is likely that some of the water would need to be discharged. MVWD's current water usage ranges from between 2,500 and 3,000 afy. For the purposes of this analysis, it is assumed that the full volume of 9,000 afy would need to be discharged under the Proposed Action.

To discharge excess water, MVWD would install a dechlorination facility (including an associated analyzer and flow control vaults) near Highway 169 and the Bowman Reservoir. The dechlorination facility would be placed on approximately 0.5 acre of private lands. A tap would be placed into the existing MVWD water line along Highway 169, and water routed into the dechlorination facility.

From the dechlorination facility, approximately 2,500 feet of 24-inch discharge pipeline would be installed in the private road on the top of the south levee adjacent to the existing MVIC diversion channel, extending eastward from Highway 169 to the Bowman Reservoir. To ensure that there are no indirect effects to southwestern willow flycatcher individuals that may use riparian habitat located along the levee, the discharge pipeline construction shall be conducted outside of the breeding season of May 1 through August 31 (USDA Forest Service, 2000). The discharge pipeline would terminate at a draw into Bowman Reservoir. To prevent potential soil erosion, the area below the discharge outfall would be armored using rip-rap material. Excess water that has been dechlorinated would then be discharged into Bowman Reservoir.

Bowman Reservoir is operated by MVIC, and the discharges would be coordinated with the MVIC to ensure that the discharged water would not affect reservoir operations. It is likely that some or all of the discharged water would be used by MVIC for agricultural irrigation, in lieu of or in addition to water the MVIC typically diverts from the Muddy River at the Wells Siding Diversion.

As a secondary backup for discharge in the event that Bowman Reservoir nears its capacity, approximately 100 feet of 24-inch discharge pipeline would be tunneled or bore and jacked beneath Highway 169, to discharge directly into the MVIC diversion channel on the west side of the highway. Water flow through this channel, which is at grade, would be diverted through existing taps for irrigation use or allowed to flow back to the Wells Siding Diversion impoundment. Excess water allowed to flow back to the Wells Siding Diversion would flow over the existing spillway and into the Muddy River. No modification of the diversion works or alteration of existing habitat at the diversion works would occur.

2.1.6.1 Construction

Construction of the MVWD improvements would be completed before July 2009. Standard construction methodologies would be used for construction of the discharge pipelines, as described above under pipelines (Chapter 2.1.2). Construction of the chlorination and dechlorination facilities would include grading of the sites, excavation to

install valves and piping, construction of the building and vaults, and installation of security fencing.

Discharged water would be monitored and sampled, in accordance with the terms and conditions of a temporary discharge permit.

Restoration of the MVWD improvements is not anticipated, because they are located on private lands and in previously disturbed areas.

2.1.6.2 Operation

The MVWD would operate the system improvements described above in conjunction with its existing water system.

2.1.7 MOA Conservation Measures

As described in Chapter 1.1.3, SNWA has agreed to implement conservation measures as part of the MOA. Implementation of these measures is part of SNWA's Proposed Action. The following conservation measures would be initiated or implemented by SNWA prior to groundwater pumping under the Proposed Action:

- Provide funding in the amount of $300,000 to develop a RIP. The RIP would identify measures necessary to accomplish the protection and recovery of the Moapa dace, operate and develop regional water facilities, and include necessary and interested third parties.
- Transfer to MVWD, at no cost, a portion of its existing Coyote Spring water rights (Permit No. 49414) equal to 724 afy. This water would replace the loss of the Apcar (Jones) Spring portion of MVWD's water supply, which MVWD would dedicate to enhance in-stream flows in areas of historical Moapa dace habitat. The proposed Coyote Spring Project would provide the mechanism for conveyance of this water to MVWD.
- Provide funding in the amount of $750,000 for the restoration of Moapa dace habitat, under the direction of the USFWS on the Apcar Unit of the MVNWR.
- Provide funding in the amount of $125,000 to assist in the development of an ecological model designed to investigate the effects of habitat change on the ecology of Moapa dace.
- Provide funding in the amount of $50,000 to construct fish barriers to help eliminate the predacious Tilapia from areas of Moapa dace habitat.
- Provide funding in the amount of $25,000 to implement programs related to the eradication of non-native fish species, including predacious Tilapia, in the Muddy Springs area.

In addition, minimum in-stream flow levels were established in the MOA that trigger various conservation actions, should those predetermined levels be reached. During groundwater pumping under the Proposed Action, SNWA would:

- Provide MVWD with all necessary municipal and domestic water supplies from the MX5 well or other sources available to SNWA, for the duration of the Order 1169 pumping study, if the average flow level (measured at the Warm

Springs West flume) decreases to an amount within the MOA trigger range of 3.0 cfs or less.

- Take necessary actions to prepare to geographically redistribute groundwater pumping in the Coyote Spring Valley should flow levels at the Warm Springs West flume continue to decline below 3.0 cfs or less.
- Restrict pumping from Coyote Spring Valley to no more than 8,050 afy, if the average flow level (measured at the Warm Springs West flume) decreases to an amount within the MOA trigger range of less than 3.0 cfs, but greater than 2.9 cfs.
- Restrict pumping from Coyote Spring Valley to no more than 6,000 afy, if the average flow level (measured at the Warm Springs West flume) decreases to an amount within the MOA trigger range of less than 2.9 cfs, but greater than 2.8 cfs.
- Restrict pumping from Coyote Spring Valley to no more than 4,000 afy, if the average flow level (measured at the Warm Springs West flume) decreases to an amount within the MOA trigger range of less than 2.8 cfs, but greater than 2.7 cfs.
- Restrict pumping from Coyote Spring Valley to no more than 724 afy, if the average flow level (measured at the Warm Springs West flume) decreases to an amount within the MOA trigger range of less than 2.7 cfs.
- Participate in a Hydrologic Review Team, which shall coordinate monitoring, establish sound analyses of impacts, and assess whether the above pumping restrictions, but not Trigger Ranges, should be adjusted to better reflect the extent of impacts from groundwater pumping on the Muddy Springs and Muddy River flows.
- Make a good faith effort to acquire land and water rights identified by the MOA Parties to assist in making measurable progress towards the recovery of the Moapa dace.
- Examine all reasonable water operational scenarios and agree to implement feasible scenarios that would minimize impacts to Moapa dace.
- Cooperate with the USFWS and CSI to locate and drill one or more production wells in the northern part of the Coyote Spring Valley hydrographic basin.
- Carry out additional conservation measures needed to protect and recover the Moapa dace following initiation of the RIP, and as more data becomes available.

2.1.8 Environmental Protection Measures

The SNWA has incorporated a number of environmental protection measures into the Coyote Spring Project in addition to the requirements of the MOA. These are summarized below.

2.1.8.1 Special Status Species Protection

Preconstruction Clearance Surveys – Qualified biologists approved by the BLM would conduct preconstruction clearance surveys on federal lands at least 7 days prior to construction. The surveys would identify the presence of desert tortoise, burrowing owl, kit fox, bat species day roosts, and other special status species within the permanent and

temporary ROW. Tortoises, kit foxes, and special status bat species found would be removed to adjacent federal lands outside of the ROW. Tortoise, burrowing owl, and kit fox burrows would be investigated to assure they are unoccupied. The burrows would then be collapsed to assure that they are not reoccupied prior to construction. Preconstruction clearance surveys would be repeated at least 24 hours prior to the start of construction for any areas enclosed by tortoise exclusion fencing.

Tortoise Exclusion Fencing - Temporary tortoise exclusion fencing would be used around construction ground disturbance areas on federal lands during construction. The temporary tortoise fences would be placed prior to construction and removed only after restoration activities have been completed. Permanent tortoise exclusion fencing would be incorporated into the site fencing around the MX-5 and regulating tank sites. Tortoise fencing would be installed in compliance with BLM and USFWS standards.

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

Southwestern Willow Flycatcher Habitat- Construction of the discharge pipeline along the MVIC diversion channel to the Bowman Reservoir would not occur during the breeding/nesting season for the flycatcher (May 1 through August 31).

2.1.8.2 Education Program

Worker Education Program - A worker education program would be developed and used during construction. A handout would be developed addressing environmental protection measures incorporated into the Coyote Spring Project, and the responsibility of each worker in environmental protection. Each worker would be briefed on their environmental compliance responsibilities, provided a handout, and required to sign a certification that they understand and would comply with those environmental protection measures. Specifics of the program would include:

- General site maintenance (i.e., trash disposal)
- Prevention of tortoise handling by unauthorized personnel
- Checking under vehicles for tortoises
- Reporting procedures if a tortoise is found
- Penalties for violation of state and federal laws
- Prohibiting dogs or hunting on the construction site
- Prohibiting driving off the cleared corridor
- Designated speed limits within construction areas

2.1.8.3 Sanitation and Trash Control

All earthmoving equipment would be washed prior to arrival on the site, to prevent and minimize the introduction or spread of exotic plants.

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

2.1.8.4 Monitoring

Monitoring - Biological monitors and a compliance inspection contractor approved by the BLM would monitor construction activities on federal lands to ensure compliance with the environmental protection requirements. In addition to conducting preconstruction clearance surveys, biological monitors would monitor construction activities in areas not enclosed by tortoise-exclusion fencing.

Between the period of March 15 and July 30, surveys for nesting migratory birds would be conducted by qualified biologists on federal lands. Construction activities would be conducted to avoid nests as feasible or minimize effects to the nest and fledglings. The SNWA would consult with the BLM on a case-by-case basis to determine appropriate minimization efforts. A migratory bird take permit under 50 CFR parts 13 and 21 would be obtained from the USFWS if required by federal law.

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

2.1.8.5 Habitat Restoration

A Restoration Plan has been completed for the Coyote Spring Project (SNWA, 2006b), which would identify restoration treatments for areas on federal lands that are disturbed by construction. The plan includes the following requirements.

Cactus and Yucca Salvage and Replanting - Cacti and yuccas within the ROW on federal lands would be salvaged in accordance with the BLM-approved Restoration Plan. It is anticipated that salvaged cactus and yucca would be placed within temporary nursery sites within the project ROW, and would be replanted within the project ROW at the completion of construction.

Topsoil Salvage and Replacement- In areas disturbed by grading and excavation, and not occupied by permanent aboveground facilities, the top 4 inches of topsoil would be salvaged. This salvage would occur following installation of temporary tortoise exclusion fencing and cactus and yucca salvage, but prior to any other construction activities. The topsoil would be stockpiled or windrowed within the tortoise exclusion fencing, and fenced and signed to ensure that it is not disturbed during other construction activities. Upon completion of construction activities, the disturbed areas within the ROW would be graded to original contours, and the topsoil would be re-spread.

Seeding – A comprehensive seeding program would be applied to disturbed federal lands, with the exception of permanent aboveground facilities, upon the completion of topsoil replacement. The type of seed mix and application rate would be approved by the BLM.

Soil and Rock Coloration – An artificial mineral dye may be added to the seed mix as slurry, to minimize the effects of soil and rock discoloration due to construction. The soil colorants would help screen the restored areas from the public, and help minimize other

public disturbance of the ROW. Permeon (an artificial varnish) would be applied to boulders and rock cut faces over 12-18 inches in diameter.

Watering – A final watering would be conducted approximately 2 weeks after completion of the final replanting, topsoil replacement, and seeding. The watering would help to remove air pockets and compact the soils in and around the roots of the transplanted vegetation.

Noxious weed control - Vehicles and equipment would be cleaned prior to arrival and departure at the work sites. In areas where noxious weeds are noted, cleared vegetation and salvaged topsoil would be separately stockpiled. Any organic sediment barrier material that may be used would be obtained from a state cleared source free of noxious/invasive weeds.

Shrub Salvage and Transplanting – Creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*) would be salvaged from the federal lands within desert tortoise critical habitat and outside of the NDOT Highway 168 ROW (approximately 9 acres), for use in revegetation of those lands. Alternately, the specified quantities may be salvaged from an offsite harvest site approved by the BLM. Salvaged plants would be stored within the two designated staging areas, or at a designated offsite storage yard as approved by BLM. Upon the completion of construction and topsoil replacement, salvaged shrubs would be replanted on the portion of those federal lands not occupied by permanent facilities (approximately 3.5 acres).

Phacelia Seed Salvage – Seed would be salvaged from *Phacelia filiae* plants that are located within the Coyote Spring Project ROWs prior to the initiation of construction. The seeds would be temporarily stored, and then applied with other seeds in *Phacelia* habitat areas during restoration of ROWs.

2.1.8.6 Erosion Control

During discharge of hydrostatic testing water, a diffuser or other energy dissipater would be used to control and reduce the flow of water. Straw bales would be used to contain water flow, and minor earthwork impoundments (within the project ROWs) may be made if needed to control and contain the water.

2.1.8.7 Hazardous and Toxic Materials

Hazardous and toxic material such as fuels, solvents, lubricants, and acids used during construction and operation would be controlled to prevent accidental spills. Toxic and hazardous materials would be stored in secondary containment structures to prevent any spilled material from leaving the area. Specific areas for equipment maintenance and refueling would be designated. Spill cleanup kits would be available on equipment and maintained so that spill of fuels, solvents, lubricants, or acids can be quickly cleaned up.

2.1.8.8 Fire Prevention

A water truck and other fire suppression equipment such as extinguishers and shovels would be available on-site during construction. A construction person on each welding crew would be responsible for fire watch and fire suppression.

2.1.8.9 Raptor Protection

Power lines would be designed to reduce the potential to electrocute raptors (migratory birds of prey). The design would assure that wires and insulators are spaced approximately 8 feet apart as described by APLIC (1996) to prevent birds' wings from touching two wires or insulators at the same time.

2.2 ALTERNATIVE 1 – POWER LINE ALIGNMENT

Alternative 1 would include the same well sites and power improvements identified for the Proposed Action. However, the pipeline alignment for this alternative would follow the existing LCPD power line alignment instead of Highway 168 (Figure 2-5). The pipeline alignment for Alternative 1 would be approximately 4,330 feet (0.8 mile) shorter than the Proposed Action, but would be located almost entirely outside of the NDOT Highway 168 ROW. Since this alternative pipeline alignment would not be constrained to stay within the existing NDOT ROW, SNWA's standard ROW widths for pipeline construction on open land would be used (for a 24-inch pipeline, 60-foot temporary and 40-foot permanent). As a result, the total width of the construction corridor proposed for Alternative 1 would be greater than that of Proposed Action. Alternative 1 would have approximately 30 more acres of ground disturbance than the Proposed Action. A summary of the temporary and permanent ROWs required is provided in Table 2-2.

2.2.1 Production Wells and MX-5 Site

The groundwater production wells and facilities at the MX-5 site under this alternative would be the same as described above for the Proposed Action (Chapter 2.1.1).

2.2.2 Pipeline

Pipeline size, construction, and operation under Alternative 1 would be the same as described for the Proposed Action (Chapter 2.1.2). However, the route of Alternative 1 pipeline deviates from the Proposed Action alignment approximately 2.4 miles east of the MX-5 well site. It would then follow the existing LCPD power line alignment that branches off and runs south of Highway 168. The pipeline would continue to follow the existing power line, which crosses Highway 168 approximately 6.8 miles east of the MX-5 well site and then runs north of Highway 168 in a straight line until it intersects with the MVWD storage tank.

2.2.3 Regulating Tank

The regulating tank would be the same size as that described for the Proposed Action (Chapter 2.1.3). However, the regulating tank would be placed adjacent to the Alternative 1 pipeline alignment (Figure 2-5). The proposed tank location is approximately 0.7 mile east of where the pipeline begins to deviate from the Proposed Action alignment (approximately 3.1 miles east of the MX-5 well site). A new access road of approximately 1,500 feet in length (0.7 acre) would be used to access the regulating tank from Highway 168.

Construction and operation of the regulating tank would be the same as described above for the Proposed Action (Chapter 2.1.3).

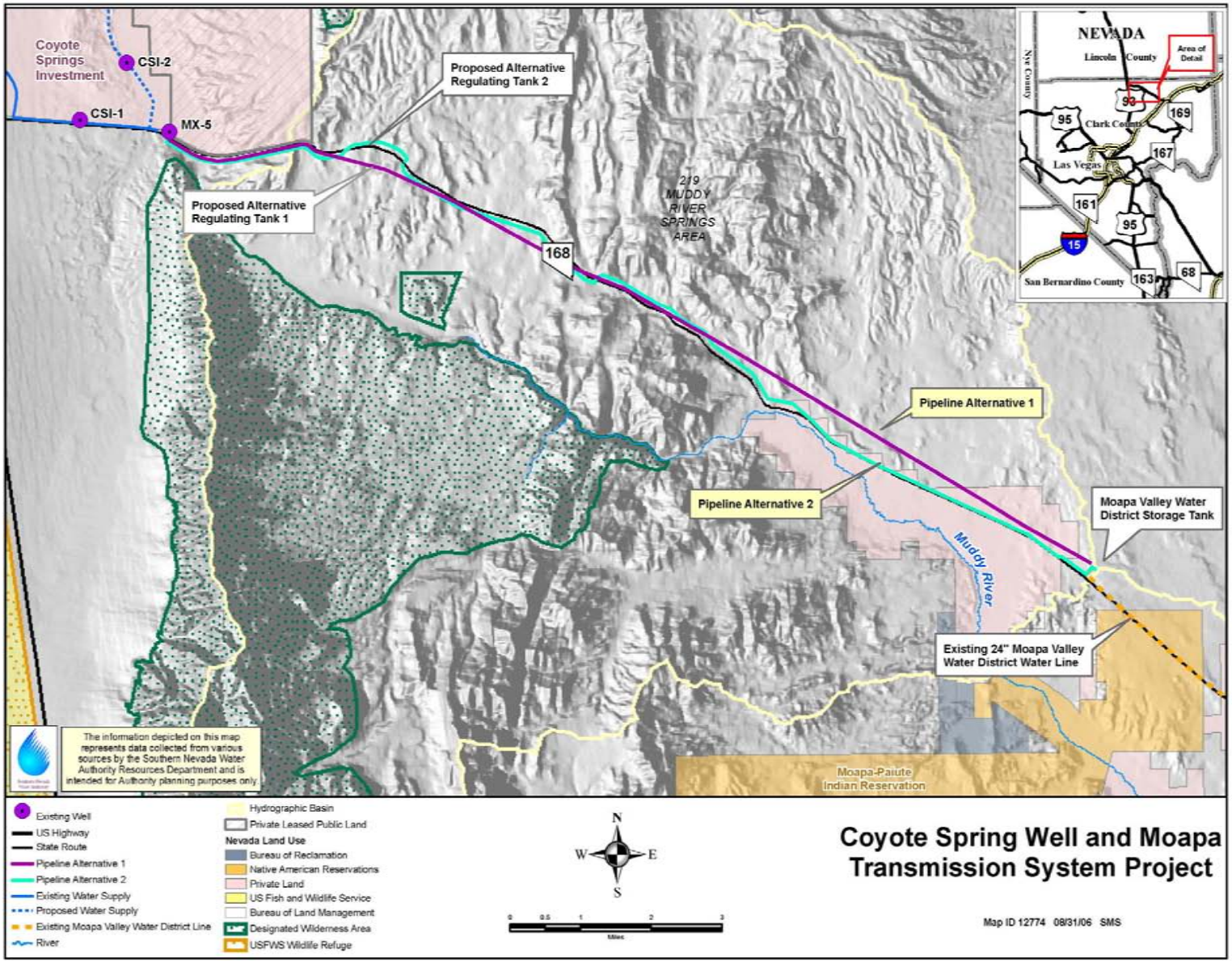

Figure 2-5 Alternatives to Proposed Action

Table 2-2 Estimated Permanent and Temporary Rights-of-Way for Alternative 1

Facility (with estimated dimensions)	Bureau of Land Management Lands (acres)		Private Lands (acres)		Total (acres)
	Permanent	Temporary	Permanent	Temporary	
Wells and MX-5 Site					
MX-5 Well Site (330 by 660 feet) [1, 2]			5.0	2.6	7.6
Additional Production Well Sites (three sites at 200 by 200 feet)			3.0		3.0
Pipelines					
Main Pipeline from MX-5 to MVWD Tank (100 feet wide)	61.8	92.6	9.7	14.5	178.6
Regulating Tank					
Regulating Tank Site (330 by 330 feet)	2.5				2.5
Access Road (20 feet wide)	0.7				0.7
Staging Areas					
5 Staging Areas (3 acres each) [3]		12.0		3.0	15.0
Power Facilities					
Powerline (100 feet wide)	4.2				4.2
Tap Structure (150 by 150 feet)	0.5				0.5
MVWD Improvements					
Chlorination Facility (50 by 60 feet) [2]	0.1				0.1
Dechlorination Facility (150 by 150 feet)			0.5		0.5
Discharge Pipelines (20 feet wide)			3.8		3.8
Project Total	69.8	104.6	22.0	20.1	**216.5**

[1] Existing facility
[2] Within an existing site, and new rights-of-way are not required
[3] Due to wider temporary ROW for the pipeline, fewer staging areas would be needed than under the Proposed Action

2.2.4 Staging Areas

Due to a wider temporary ROW for construction of the pipeline, fewer staging areas would be needed. Up to 5 temporary construction staging areas, each 3 acres in size, would be used during construction of Alternative 1. These staging areas would be placed approximately every 3 miles along the pipeline alignment. Use, construction, and restoration of the staging areas would be the same as described for the Proposed Action (Chapter 2.1.4)

2.2.5 Power Facilities

The power facilities needed to operate the groundwater production wells and MX-5 site facilities under this alternative would be the same as describe above for the Proposed Action (Chapter 2.1.5).

2.2.6 MVWD Improvements

The improvements to be made by MVWD to accept, convey, and discharge the groundwater for the two years of pumping under the Order 1169 pumping study would be the same under this alternative as described for the Proposed Action (Chapter 2.1.6).

2.2.7 MOA Conservation Measures

The conservation measures to be implemented by SNWA pursuant to the MOA under this alternative would be the same as described for the Proposed Action (Chapter 2.1.7).

2.2.8 Environmental Protection Measures

The environmental protection measures would be the same as described for the Proposed Action (Chapter 2.1.8).

2.3 ALTERNATIVE 2 – HIGHWAY 168 UTILITY CORRIDOR ALIGNMENT

Alternative 2 would include the same well sites and power improvements identified for the Proposed Action. The route of the Alternative 2 pipeline would follow Highway 168, but would not stay within the NDOT ROW (Figure 2-5). However, this alternative would remain within the federal utility corridor along Highway 168 designated under the Lincoln County Conservation, Recreation, and Development Act of 2004. Since the ROWs are not constrained to stay within the NDOT ROW, construction of this alternative would be less expensive. The pipeline alignment for Alternative 2 would be approximately 1,280 feet (0.2 mile) longer than the Proposed Action.

Since the pipeline for this alternative would not be constrained to stay within the existing NDOT ROW, SNWA's standard ROW widths for pipeline construction would be used (for a 24-inch pipeline, 60-foot temporary and 40-foot permanent). As a result, the construction corridor proposed for Alternative 2 would be wider than the Proposed Action. Alternative 2 would have approximately 43 more acres of ground disturbance than the Proposed Action. A summary of the temporary and permanent ROWs required is provided in Table 2-3.

Table 2-3 Estimated Permanent and Temporary Rights-of-Way for Alternative 2

Facility (with estimated dimensions)	Bureau of Land Management Lands (acres)		Private Lands (acres)		Total (acres)
	Permanent	Temporary	Permanent	Temporary	
Wells and MX-5 Site					
MX-5 Well Site (330 by 660 feet) [1, 2]			5.0	2.6	7.6
Additional Production Well Sites (three sites at 200 by 200 feet)			3.0		3.0
Pipelines					
Main Pipeline from MX-5 to MVWD Tank (100 feet wide)	54.4	81.5	22.4	33.5	191.8
Regulating Tank					
Regulating Tank Site (330 by 330 feet)	2.5				2.5
Access Road (20 feet wide)	0.2				0.2
Staging Areas					
5 Staging Areas (3 acres each) [3]		12.0		3.0	15.0
Power Facilities					
Powerline (100 feet wide)	4.2				4.2
Tap Structure (150 by 150 feet)	0.5				0.5
MVWD Improvements					
Chlorination Facility (50 by 60 feet) [2]	0.1				0.1
Dechlorination Facility (150 by 150 feet)			0.5		0.5
Discharge Pipelines (20 feet wide)			3.8		3.8
Project Total	61.9	93.5	34.7	39.1	**229.2**

[1] Existing facility
[2] Within an existing site, and new rights-of-way are not required
[3] Due to wider temporary ROW for the pipeline, fewer staging areas would be needed than under the Proposed Action

2.3.1 Production Wells and MX-5 Site

The groundwater production wells and facilities at the MX-5 site under this alternative would be the same as described above for the Proposed Action (Chapter 2.1.1).

2.3.2 Pipeline

Pipeline size, construction, and operation under Alternative 2 would be the same as described for the Proposed Action (Chapter 2.1.2). The route of Alternative 2 pipeline would follow Highway 168, but within the federal utility corridor instead of the NDOT ROW. It would generally follow the same alignment as the Proposed Action, but would be located approximately 1,000 feet from the centerline of Highway 168. Upon reaching the developed area and private lands in the Upper Moapa Valley, the Alternative 2 pipeline alignment would follow the Proposed Action alignment to its terminus at the existing MVWD reservoir tank.

2.3.3 Regulating Tank

The regulating tank for this alternative would be the same capacity and location as described above for the Proposed Action (Chapter 2.1.3).

2.3.4 Staging Areas

Due to a wider temporary ROW for construction of the pipeline, fewer staging areas would be needed. Up to 5 staging areas, each 3 acres in size, would be placed approximately every 3 miles along the pipeline alignment. The staging areas would be located immediately adjacent to the pipeline temporary ROW, within the utility corridor.

2.3.5 Power Facilities

The power facilities needed to operate the groundwater production wells and MX-5 site facilities under this alternative would be the same as describe above for the Proposed Action (Chapter 2.1.5).

2.3.6 MVWD Improvements

The improvements to be made by MVWD to accept, convey, and discharge excess groundwater for the two years of pumping under the Order 1169 pumping study would be the same under this alternative as described for the Proposed Action (Chapter 2.1.6).

2.3.7 MOA Conservation Measures

The conservation measures to be implemented by SNWA pursuant to the MOA under this alternative would be the same as described for the Proposed Action (Chapter 2.1.7).

2.3.8 Environmental Protection Measures

The environmental protection measures would be the same as described for the Proposed Action (Chapter 2.1.8).

2.4 NO ACTION

Consideration of the No Action Alternative is required under NEPA and its implementing regulations, 40 Code of Federal Regulations (CFR) § 1502.14(d). Under the No Action Alternative, no permanent or temporary ROWs on BLM lands would be granted to

SNWA, and the pipeline, regulating tank, staging areas, power facilities, and MVWD improvements proposed under Coyote Spring Project would not be constructed.

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED

Several other alternatives to utilize SNWA's existing 9,000 afy of groundwater rights in Coyote Spring Valley were considered, but eliminated from further consideration. These are described below, along with the rational for excluding them from further consideration.

2.5.1 Highway 93 Alignment to Apex Area

During the initial planning for the Coyote Spring Project, two areas were identified outside of Coyote Spring Valley where beneficial use of the permitted groundwater could be demonstrated for the water pumped during the Order 1169 pumping study. These two areas were Apex and Moapa. An alignment to the Apex area from the MX-5 site would be approximately 30 miles, if the route generally follows Highway 168 and Highway 93 to Apex. This alternative was eliminated from further study because of its greater distance than a pipeline to Moapa. It would have greater land disturbance, and a higher cost of construction and operation. It would also not meet the third part of the purpose and need for the project in providing a means to convey a portion of SNWA's existing Coyote Spring groundwater rights that, under the MOA, would be transferred to MVWD.

2.5.2 Temporary Above Ground Pipeline

This alternative would use a temporary above ground pipeline along Highway 168 to convey the groundwater pumped during the Order 1169 pumping study into the Moapa area for beneficial use. This alternative would involve placing the pipeline along the highway, from the MX-5 site into the MVWD tank. However, due to concerns over potential vandalism, the size of temporary pipe required, highway safety concerns, and the need to protect a municipal water system pipeline from potential contamination, it was determined that the temporary pipeline would still have to be buried. Due to the two years duration of groundwater pumping required for the Order 1169 pumping study, the same facilities at the MX-5 site would be required. Therefore, the disturbance and construction cost of this alternative would be the same as that of the Proposed Action. This alternative would also not meet the second part of the Coyote Spring Project's purpose and need, in that it would not provide a means to convey SNWA's existing Coyote Spring groundwater rights to locations that would make that water available for SNWA's future use.

2.5.3 Above Ground Discharge of Pumped Groundwater

Another alternative that was identified was to simply dump groundwater pumped for the two years under the Order 1169 pumping study into the Pahranagat Wash in Coyote Spring Valley. This alternative would not meet the Coyote Spring Project's purpose and need for three reasons. First, it would not place the groundwater rights to beneficial use. Second, it would not provide a means to convey SNWA's existing groundwater rights to locations that would make that water available for SNWA's future use. Lastly, it would not provide a means to convey a portion of SNWA's existing Coyote Spring groundwater rights that, under the MOA, would be transferred to MVWD.

2.5.4 Other Water Resource Options

Other alternative water supply options for SNWA and MVWD, such as other in-state resource projects, conservation, Colorado River water, and other options, were considered but rejected as viable alternatives to the Proposed Action.

The SNWA has identified Colorado River transfer/exchanges as a water supply option to help meet its longer-term demands (SNWA, 2006a). This may involve seawater desalination exchanges, transfers of conserved water or Tribal water, or agricultural to municipal water conversions. The SNWA continues to negotiate with the other Colorado Basin States and the Department of the Interior to pursue these options. In February 2006, the Seven Basin States recommended management strategies for the Colorado River system, which are expected to eventually allow for the development of additional Colorado River water resources for southern Nevada. However, the development of those resources will still require negotiation of future specific agreements and environmental compliance, which will take years to complete.

The SNWA is pursuing further water conservation efforts, as recommended by the Advisory Committee, to reduce individual demands even more. That additional conservation has been accounted for in SNWA's evaluation of the need for the Proposed Action (Chapter 1.4.2). Additional conservation measures, beyond the additional conservation already planned to reduce demands from current levels of 282 GPCD to 245 GPCD and incorporated into the Proposed Action, are not considered practicable. Growth in the region is projected to continue (CBER, 2005), and water conservation alone is not expected to be able to meet projected demands. Additionally, the timing and amounts of water conservation are difficult to predict. The risks of overestimating conservation are that demand could exceed available supply, resulting in unavailable water resources and inadequate water supply infrastructure to meet demands. For these reasons, it is not reasonable to rely solely on additional conservation alone to meet projected future water demands, and this was eliminated from further consideration.

Other Colorado River water supply options would not meet the purpose of the Coyote Spring Project, which is to develop and convey SNWA's existing Coyote Spring Valley water rights. They would also not meet the three parts of the need for the project. For these reasons, other water resource options were eliminated from further consideration.

3.0 AFFECTED ENVIRONMENT

This chapter addresses the existing environment, or baseline environment, that may be affected by the Coyote Spring Project. Impacts to these resources are addressed in Chapter 4.0.

Research has indicated that the following resources would not be impacted:

- Prime and unique farmlands
- Native American religious concerns
- Wild and scenic rivers
- Wild horse and burro management

Prime and unique farmlands and wild and scenic rivers would not be impacted because none exist in the area. During the consultation process with Native Americans for this project, no religious concerns were identified. The Coyote Spring Project is not located within a BLM's designated wild horse and burro management area, and wild horses and burros are not known to occur on the Coyote Spring Project area.

3.1 CLIMATE AND AIR QUALITY

Air quality is determined by several factors, including landform, amount of contaminants emitted into the atmosphere, and meteorological conditions. In southern Nevada, stable atmospheric conditions, low mixing heights, and light winds during the night and morning hours provide opportunities for contaminants to accumulate. Atmospheric dispersion of pollutants generally improves by mid-afternoon.

3.1.1 Climate

The climate is characterized by hot, dry summers and cool, dry winters. As a result, there are few rainy days throughout the year. Annual rainfall ranges between two to five inches in lower elevations (Western Regional Climate Center, 2000b). Precipitation occurs primarily during the winter months but also occurs during afternoon and evening thunderstorms that are common in mid-to late summer.

Average minimum temperature in the region ranges from 33.8 to 75.7 degrees Fahrenheit and the average maximum temperature ranges from 56.8 to 104.4 degrees Fahrenheit (Western Regional Climate Center, 2000a). Typically, the coldest month is January and the hottest month is July.

The prevailing wind direction in Clark County is from the southwest. Winds are generally light in the morning and stronger in the afternoon. The mean wind speed ranges from 7.3 mph in December to 11 mph in April, May, and June. Differential heating of the ground results in higher winds in the afternoon and early summer. Transient low-pressure systems, most common from November through April, bring higher winds, sometimes in excess of 40 mph (Western Regional Climate Center, 2000b), which effectively disperse gaseous pollutants and uplift dust and sand.

3.1.2 Air Quality Standards

The Federal government, through the EPA, has established primary and secondary National Ambient Air Quality Standards (NAAQS) under the Clean Air Act (CAA)

(EPA, 2004). There are federal ambient air quality standards for criteria pollutants, which include ozone (O_3), carbon monoxide (CO), oxides of nitrogen (NO_x), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). The EPA, State of Nevada, and the Clark County Department of Air Quality and Environmental Management (DAQEM) are responsible for promulgating the ambient air quality standards for Clark County. The federal ambient air quality standards for the criteria air contaminants are shown in Table 3-1.

3.1.3 Baseline Air Quality

Air quality at a given location is described by the concentration of various criteria pollutants in the atmosphere. Units of concentration are expressed in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The severity of a pollutant concentration is determined by comparing it with the federal, state and local primary and secondary air quality standards.

The maximum pollutant concentrations measured at various Clark County-operated air monitoring stations in Clark County from 2001 to 2003 (the latest years data is available for information) are used to characterize the baseline air quality of the region. Table 3-2 provides a summary of the latest three years of available data for maximum criteria air contaminant measurements.

3.1.4 Regulatory Setting

Air quality regulations were first established with passage of the CAA in 1969, and were last amended in 1990 (EPA, 2004). This act established the NAAQS and delegated enforcement of the air pollution control regulations to the states. In Clark County, the Board of County Commissioners has been designated by the governor of the State of Nevada to be the lead area-wide air quality planning agency. The DAQEM is designated as the local air pollution control agency and administers the county's air pollution control program.

The following is a summary of the relevant air quality rules and regulations that apply to the Coyote Spring Project.

3.1.4.1 Federal Regulations

Title 40 CFR Part 50 states that all applicable state and federal ambient air quality standards must be met during the operation of any emission source. The CAA provides for delegation to the states of the authority to establish air quality rules and regulations. In states where the NAAQS are exceeded, the EPA requires the preparation of a State Implementation Plan (SIP) detailing how the state will meet the air quality standards.

The EPA has designated the Las Vegas Valley airshed (which is the same as hydrographic basin 212) as a non-attainment area for CO (Serious), PM_{10} (Serious), and O_3 (Marginal for the 8-hour standard). Thus, under the requirements of the CAA, Clark County prepared SIP for CO and PM_{10}. The CO plan was completed in 2000 (Clark County Department of Air Quality and Environmental Management, 2000) and was approved by the EPA in 2004. There have been no monitored exceedances of the CO standards since 1999. The PM_{10} plan was completed in 2001 (Clark County Department of Air Quality and Environmental Management, 2001) and was approved by the EPA in 2004. The PM_{10} plan projects attainment of the PM_{10} standards by 2006.

Table 3-1 Ambient Air Quality Standards

Air Pollutant	Averaging Time	Federal Primary Standard	State of Nevada Standard	Clark County Standard
Ozone	1 hour	0.12 ppm	0.12 ppm	0.12 ppm
	8 hours	0.08 ppm		
Carbon Monoxide	1 hour	35 ppm	35 ppm	35 ppm
	8 hours	9 ppm	9 ppm	9 ppm
Nitrogen Dioxide	Annual Arithmetic Mean	0.053 ppm	0.05 ppm	0.05 ppm
	1 hour	---	0.25 ppm	---
Sulfur Dioxide	Annual Arithmetic Mean	0.03 ppm	0.03 ppm	0.02 ppm
	3 hours	---	0.5 ppm	0.5 ppm
	24 hours	0.14 ppm	0.14 ppm	0.1 ppm
Particulate Matter of 10 microns or less	Annual Arithmetic Mean	50 $\mu g/m^3$ (PM_{10})	50 $\mu g/m^3$ (PM_{10})	50 $\mu g/m^3$ (PM_{10})
		15 $\mu g/m^3$ ($PM_{2.5}$)	---	---
	24 hours	150 $\mu g/m^3$ (PM_{10})	150 $\mu g/m^3$ (PM_{10})	150 $\mu g/m^3$ (PM_{10})
		65 $\mu g/m^3$ ($PM_{2.5}$)	---	---

Source: Nevada Division of Environmental Protection, 2004
Note: ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter

O_3 is produced through a series of chemical reactions with NO_x with volatile organic compounds in sunlight. O_3 is an irritant of the respiratory system and health effects of exposure may include cough, throat irritation, increased responsiveness of asthma, increased susceptibility to respiratory system infections, and long term decreases in lung function (EPA, 1997). O_3 is more prevalent from May through October when sunlight, high temperatures, and stagnant air conditions trigger its formation. Clark County is currently developing an O_3 SIP to be completed in the year 2009, which will demonstrate attainment of the 8-hour O_3 standard.

3.1.4.2 Clark County Air Quality Regulations

The DAQEM has developed Air Pollution Control Regulations to regulate stationary sources of air pollution in Clark County. The regulations that would apply to the Coyote Spring Project are:

- Section 12, New or Modified Stationary Sources - establishes general DAQEM air quality permit application requirements for new and modified stationary sources of air pollutants
- Section 18, Permit and Technical Service Fees – sets annual operating fees for construction activities and a one-time fee for new or modified stationary sources

Table 3-2 Maximum Air Quality Concentrations – Clark County Nevada

Pollutant	Highest Station Reading		
	2001	**2002**	**2003**
Ozone Highest 1 hour, ppm Highest 8 hour, ppm	 0.116 0.094	 0.109 0.093	 0.115 0.092
Carbon Monoxide Highest 1 hour, ppm Highest 8 hour, ppm	 8.93 6.48	 7.80 6.55	 8.10 5.50
Nitrogen Dioxide Highest 1 hour, ppm AAM, ppm	 0.104 0.022	 0.66[1] 0.26[1]	 0.103 0.0217
Sulfur Dioxide Highest 24 hour, ppm AAM, ppm	 0.019 0.000	 0.013 0.0005	 0.007 0.0018
Particulates (PM_{10}) Highest 24 hour, ppm	 267	 535	 274
Particulates ($PM_{2.5}$), AAM, ppm	 11.2	 15	 13.48

Source: Clark County Department of Air Quality and Environmental Management, 2002, 2003, and 2004
[1] Oxides of Nitrogen (NO_x) data only; Nitrogen Dioxide (NO_2) data not reported
AAM - Annual Arithmetic Mean
PM_{10} – Particulate matter less than 10 microns in diameter
$PM_{2.5}$ - Particulate matter less than 2.5 microns in diameter
ppm - parts per million

- Section 40, Prohibitions of Nuisance Conditions - prohibits any source from discharging air contaminants or other material that would cause a nuisance
- Section 41, Fugitive Dust - specifies the conditions under which fugitive dust from construction would require abatement
- Section 45, Idling of Diesel Powered Motor Vehicles - sets limitations on allowed idling times for diesel-powered motor vehicles including trucks but not including trenching, well drilling or hoisting equipment
- Section 58, Emission Reduction Credits - establishes the procedures for the creation, banking (storage), and use of emission reduction credits
- Section 91, Fugitive Dust From Unpaved Roads, Unpaved Alleys, and Unpaved Easement Roads - specifies fugitive dust control measures for unpaved roads in hydrographic basins 210 (Coyote Spring Valley), 219 (Muddy River Springs Area or Upper Moapa Valley), and 220 (Lower Moapa Valley) in addition to dust nuisance controls required under Section 40
- Section 92, Fugitive Dust From Unpaved Parking Lots, Material Handling and Storage Yards, and Vehicle and Equipment Storage Yards - specifies fugitive dust control measures for these facilities in hydrographic basins 210, 219, and 220 in addition to dust nuisance controls under Section 40

- Section 94, Permitting and Dust Control for Construction Activities - requires a dust control permit and dust mitigation plan for all construction activities inside or out of the non-attainment boundary for dust equal to or greater than 0.25 acres of disturbance

Visibility is affected by both particulate matter and gases in the atmosphere and can degrade the aesthetic value of surrounding landscape. The highest haze levels tend to occur in late fall and winter when night and morning temperature inversions are most frequent and stagnant airshed conditions exist.

3.2 CULTURAL AND PALEONTOLOGICAL RESOURCES

3.2.1 Prehistoric Period (10,000BC – AD 1800)

Southern Nevada has been inhabited since at least the end of the Pleistocene, or 11,000 to 12,000 years ago. Prior to about 9,000 B.C. groups of hunter-gatherers, known collectively as the Paleo-Indian, are believed to have first inhabited the American west. A wetter environment than at present produced a floral community that consisted of mainly grasslands in the valleys, and mesas and a boreal type forest in the highlands.

During the period from 9,000 B.C. to the time of European contact, the original inhabitants adapted to the changing environment, including a dryer climate, a shift to modern animal species, and the shrinking of grasslands. Toward the end of this period, settlement patterns are characterized by a transition from small temporary campsites to larger, more permanent settlements, or villages.

The Southern Paiute inhabited the southern Great Basin and Mojave Desert in the late prehistoric period and early historic period when the first Europeans arrived in 1776.

3.2.2 Historic Period (AD 1800 – 1950)

The Spanish entered the southwest beginning in the 1540's. Spanish colonial expansion into what is now the southwest region of the United States may have included limited explorations of the present State of Nevada, but no settlements were founded. The end of the Mexican War and the annexation of Mexican territory in the American southwest brought an end to major commercial caravan traffic along the Old Spanish Trail. By this time, the trail had become a favored route for Mormon settlers traveling from the Great Salt Lake to southern California.

Under the terms of the Treaty of Guadalupe Hidalgo (1848) the United States acquired from Mexico the lands that now comprise California, Nevada, Arizona, Utah, and parts of New Mexico, Colorado, and Wyoming. Two years later, Congress established the Territory of Utah, which included much of the State of Nevada. The southern portion of the State of Nevada was included in the Territory of New Mexico. In 1861 the Nevada Territory was organized, and in 1864 Nevada became the 36th state.

Las Vegas began as a Mormon agricultural settlement in 1847, but was abandoned in 1858. Ranching in the area began in 1865, but significant growth did not begin until the railroad arrived in 1905. Development during World War II and the later growth of the gambling and entertainment industries accelerated urban growth that continues to the present day.

3.2.3 Cultural Resources Surveys

Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties, which are those cultural resources listed in or eligible for listing in the National Register of Historic Places. In compliance with Section 106, cultural resource investigations were conducted for the Coyote Spring Project.

In January 2003, December 2005, and May 2006, literature searches were conducted at the Southern Nevada Archeological Archives, Harry Reid Center for Environmental Studies, and Special Collections, Lied Library, UNLV by HRA, Inc. The searches consisted of reviewing all available information and identifying any previous surveys or previously recorded cultural resources within the Coyote Spring Project area.

Two previous cultural resource inventories were conducted over the Coyote Spring Project area. A total of 40 previously recorded cultural resource sites were identified within ½ mile of proposed or alternative facilities. These sites include lithic and artifact scatters, rock rings and circular depressions, petroglyphs and rock art, campsites, pueblo ruins, and rock shelters.

3.2.4 Paleontology

Paleontological resources are the fossilized remains of past life. Fossils are unique, non-renewable resources that are used to identify past life, and thus have scientific value. Fossils are generally found in fossil-bearing units including sedimentary rocks and unconsolidated sediments.

Geological formations in the Arrow Canyon Range are thought to contain paleontological resources. Trace fossilized imprints in the limestone sediment at the north end of the Arrow Canyon range are considered evidence of 20 million year old large birds. There are also unconfirmed reports of fossilized mammoths in the Moapa area (BLM, 1998). Additionally, some of the limestone formations in the area may contain fossilized brachiopods, crinoids, corals, and gastropods.

The Coyote Spring Project area is underlain by the Muddy Creek Formation, older alluvium, and recent alluvium derived from erosion of the Muddy Creek Formation. These sediments are considered to have high paleontological sensitivity, although diagnostic fossils are infrequent at best and only occasionally are localized concentrations found (BLM, 2004). Four paleontological sites have been identified within 5 miles of the Coyote Spring Project, but none are on or adjacent to the alignments (SBCM, 2003).

3.3 FISH AND WILDLIFE RESOURCES

3.3.1 Biological Setting

The Coyote Spring Project is located in the northern portion of the Mojave Desert. The two dominant habitat types in the project area are Mojave Creosote Bush Scrub and Desert Saltbush Scrub, which are described in more detail in Chapter 3.11, Vegetation. Primary resident species (those that spend their entire life within a single habitat) include a diversity of reptiles, rodents, and small passerines (songbirds). Characteristic rodent species include Merriam's kangaroo rat (*Dipodomys merriami*), desert kangaroo rat (*Dipodomys deserti*), white-tailed antelope ground squirrel (*Ammospermophilus*

leucurus), desert woodrat (*Neotoma lepida*), southern grasshopper mouse (*Onychomys torridus*), cactus mouse (*Peromyscus eremicus*), and canyon mouse (*Peromyscus crinitus*). Desert cottontail (*Sylvilagus audoboni'*) and black-tailed jack rabbit (*Lepus californicus*) are also common. Resident bird species typically associated with these habitats include LeConte's thrasher (*Toxostoma lecontei*), common raven (*Corvus corax*), house finch (*Carpodacus mexicanus*), mourning dove (*Zenaida macroura*), horned lark (*Eremophila alpestris*), rock wren (*Salpinctes obsoletus*), black-throated sparrow (*Amphispiza bilineata*), and greater roadrunner (*Geococcyx californianus*). The open vegetative structure and abundant prey base also provide foraging opportunities for a variety of raptors and mammalian predators, including red-tailed hawk (*Buteo jamaicensis*), golden eagle (*Aquila chrysaetos*), great horned owl (*Bubo virginianus*), coyote, gray fox (*Urocyon cinereoargenteus*), desert kit fox, and bobcat (*Felis rufus*).

A literature search was conducted and resource agencies were contacted to inventory the biological resources potentially affected by the Coyote Spring Project (Figures 3-1 and 3-2). Field studies were conducted in February and March of 2003 (Knight & Leavitt Associates, 2003) followed by the preparation of a BA (Wildland International, 2003), to comply with the requirements of Section 7 of the ESA.

The USFWS is responsible for the enforcement of the ESA and maintains a list of all of the federally listed species. The BLM maintains a list of sensitive species identified as requiring special management and/or consideration for any undertaking. The BLM sensitive species include species afforded some level of protection or management by the State of Nevada, and those that are addressed under the Clark County Multiple Species Habitat Conservation (MSHCP). Table 3-3 lists the federally listed and other special status species with potential to occur in the Coyote Spring Project area.

3.3.2 Federally Listed and Candidate Species

The USFWS identified five federally listed species that may occur in the vicinity of the Coyote Spring Project. These species are described below:

3.3.2.1 Desert Tortoise

The desert tortoise is widely distributed over portions of the Mojave, Sonoran, and Colorado deserts of the western United States and northwestern Mexico. Habitat ranges from sandy flats and gravelly bajadas to rocky mountainsides up to 5,000 feet in elevation. Population numbers in southern Nevada and within the Coyote Spring Project area are highly variable from site to site due to differences in habitat quality and human disturbance.

In the State of Nevada, the desert tortoise typically inhabits creosote bush scrub within valleys and on low bajadas and subsists on a variety of annual flowers, perennial grasses, and small shrubs. Tortoises are adept diggers, preferring consolidated alluvium as the substrate for burrow construction. However, burrows are often found in less optimal conditions. Burrows may be constructed in a variety of locations, including under boulders, beneath canopies of shrubs, in wash embankments, or in the open (Woodbury and Hardy, 1984; Burge and Bradley, 1976; Coombs, 1977). Burrow depth ranges from shallow "pallets" that are used during active periods to deeper, more extensive burrows

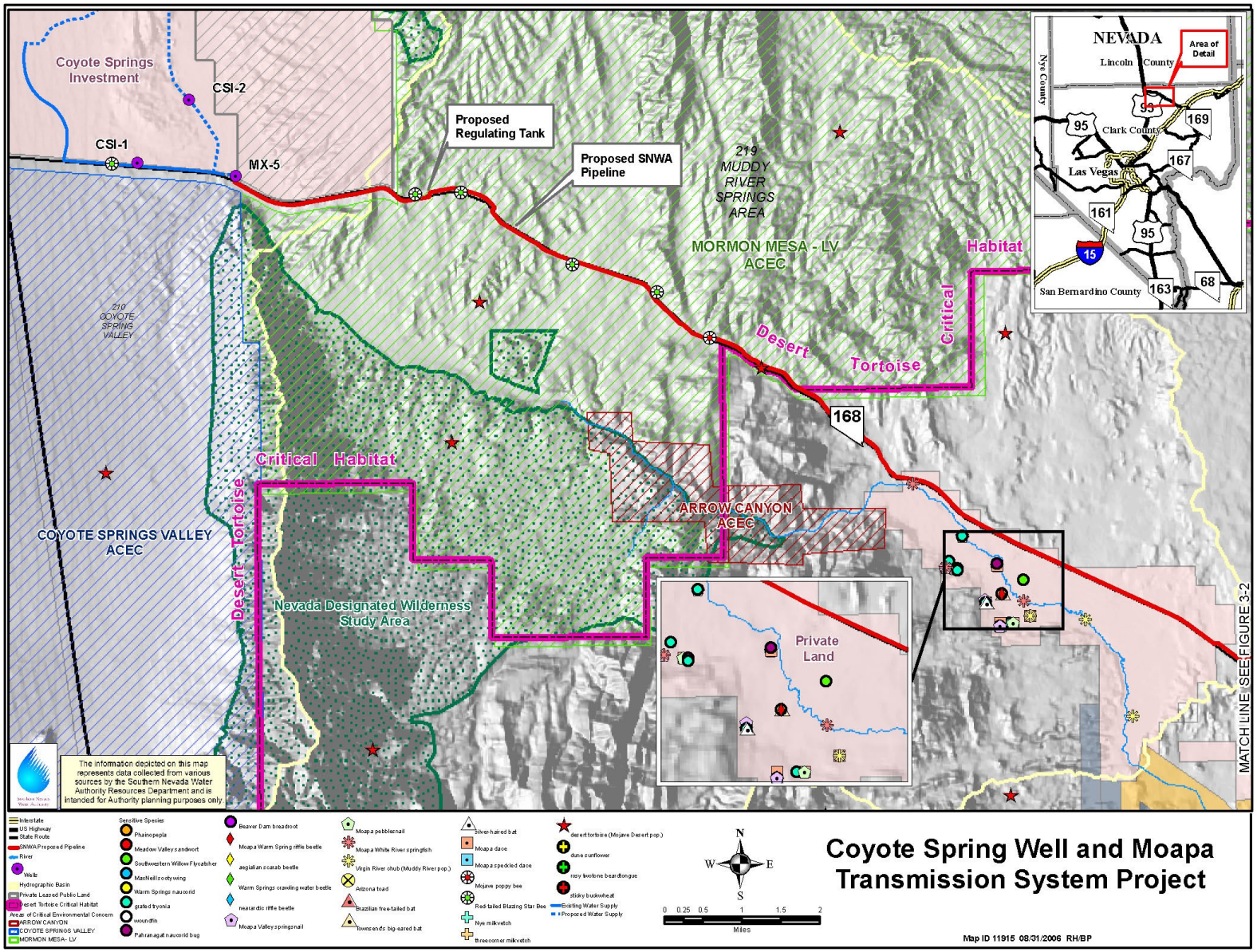

Figure 3-1 Special Status Species in the Western Coyote Spring Project Area

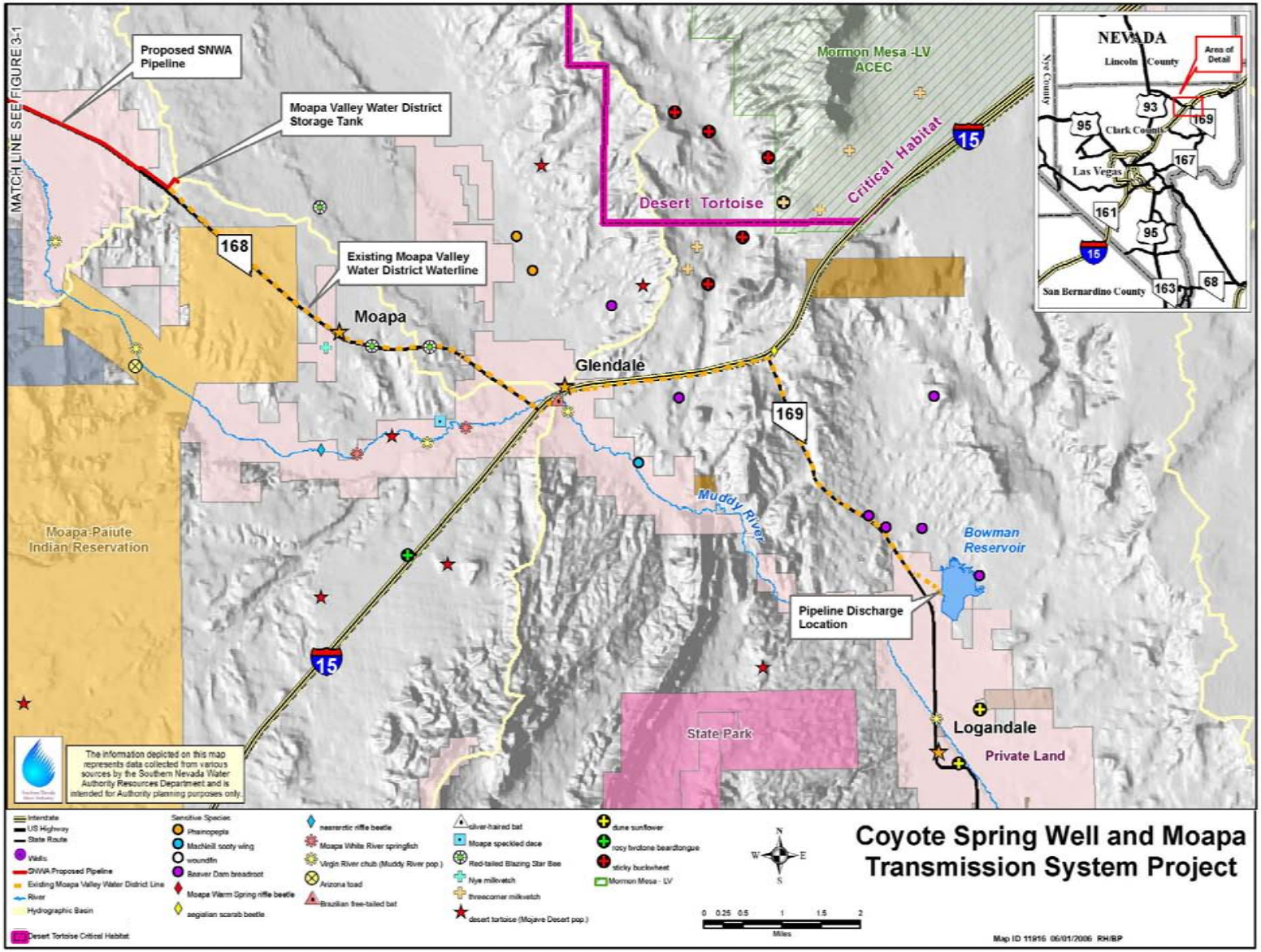

Figure 3-2 Special Status Species in the Eastern Coyote Spring Project Area

Table 3-3 Federally Listed and Special Status Species in the Coyote Spring Project Area

Species	Status	Range and Habitat of Species	Occurrence in Project Area
Birds			
Yuma clapper rail (*Rallus longirostris yumanensis*)	Federal: Endangered BLM: Special Status State: Protected Clark County MSHCP: Watch	Fresh water marshes with dense grasses and weeds in the southwestern United States and northern Mexico.	No habitat in ROW; occurs in Overton Wildlife Management area and Logandale
Southwestern willow flycatcher (*Empidonax trailli extimus*)	Federal: Endangered BLM: Special Status State: Protected Clark County MSHCP: Covered	Riparian areas in southwestern United States	No habitat in ROW; documented in Muddy Springs area; possible habitat near Bowman Reservoir
Western yellow-billed cuckoo (Coccyzus americanus occidentalis)	Federal: Candidate Species BLM: Special Status State: Protected Clark County MSHCP: Covered	Occurs in large blocks of riparian habitat	No habitat in ROW; documented in Muddy Springs area
Phainopepla *(Phainopepla nitens)*	BLM: Sensitive State: Protected NNHP: S2B Clark County MSHCP: Covered	Riparian areas in southwestern United States	Documented in mesquite thicket in ROW
Western burrowing owl *(Athene cunicularia hypugea)*	BLM: Sensitive State: Protected NNHP: S3B Clark County MSHCP: Evaluation	Sparsely vegetated open habitats	Not documented, but habitat available in ROW
Gray flycatcher *(Empidonax wrightii)*	State: Protected	Occupies a number of habitats in Mojave Desert	No habitat in ROW; occurs in riparian habitat in Muddy Springs area
Blue grosbeak *(Guiraca caerulea)*	State: Protected Clark County MSHCP: Covered	Riparian areas in southwestern United States	No habitat in ROW; occurs in riparian habitat in Muddy Springs area

Table 3-3 Federally Listed and Special Status Species in the Coyote Spring Project Area

Species	Status	Range and Habitat of Species	Occurrence in Project Area
Lucy's warbler *(Vermivora luciae)*	BLM: Sensitive State: Protected NNHP: S3B	Riparian areas in southwestern US	Potential habitat in mesquite within ROW; occurs in mesquite in Muddy Springs area
Summer tanager *(Piranga rubra)*	State: Protected Clark County MSHCP: Covered	Riparian areas in southwestern US	No habitat in ROW; occurs in riparian habitat in Muddy Springs area
Vermillion flycatcher (*Pyrocephalus rubinus*)	State: Protected Clark County MSHCP: Covered	Riparian areas in southwestern US	No habitat in ROW; occurs in riparian habitat in Muddy Springs area
Arizona Bell's vireo *(Vireo bellii arizonae)*	BLM: Proposed Sensitive State: Protected NNHP: S2?B Clark County MSHCP: Covered	Riparian areas in southwestern US	No habitat in ROW; occurs in riparian habitat in Muddy Springs area
Fish			
Moapa Dace *(Moapa coriacea)*	Federal: Endangered BLM: Special Status State: Protected Clark County MSHCP: Evaluation	Endemic to Muddy Springs inhabiting spring pools, tributaries or spring outflows, and the main stem of the Muddy River	No habitat in ROW; occurs in springs and streams in Muddy Springs area
Moapa White River springfish *(Crenichthys baileye moapae)*	State: Protected NNHP: S2 Clark County MSHCP: Evaluation	Endemic to Muddy Springs and Muddy River	No habitat in ROW; occurs in springs and streams in Muddy Springs area
Virgin River chub *(Gila seminuda)* Muddy River Population	BLM: Sensitive State: Protected NNHP: S1 Clark County MSHCP: Evaluation	Occurs in the Virgin and Muddy Rivers, inhabiting large pools with large boulders and sandy substrate with over hanging stream banks or deep channels	No habitat in ROW; occurs in Muddy River below Moapa gauge
Moapa speckled dace *(Rhinichthys osculus moapae)*	BLM: Sensitive State: Protected NNHP: S1 Clark County MSHCP: Evaluation	Endemic to the Muddy River, inhabiting about 10 miles in the middle of the river	No habitat in ROW; occurs in Muddy River below Moapa gauge

Table 3-3 Federally Listed and Special Status Species in the Coyote Spring Project Area

Species	Status	Range and Habitat of Species	Occurrence in Project Area
Invertebrates			
MacNeil sooty-wing skipper *(Hesperopsis gracielae)*	BLM: Sensitive NNHP: S1 Clark County MSHCP: Evaluation	Occurs in desert riparian and saltbush scrub habitats including mesquite thickets	Not documented, but potential habitat in mesquite within ROW; occurs in mesquite in Muddy Springs area
Pahranagat naucorid *(Pelocoris shoshone shoshone)*	BLM: Sensitive NNHP: S1	Endemic to the Muddy Springs outflow streams	No habitat in ROW; occurs in springs and streams in Muddy Springs area
Moapa pebblesnail *(Pygulopsis avernalis)*	NNHP: S1S2	Occurs in the Muddy Springs area near water	No habitat in ROW; occurs in springs and streams in Muddy Springs area
Moapa Warm Spring riffle beetle *(Stenelmis moapa)*	BLM: Sensitive NNHP: S1	Occurs in outflow streams in swift, shallow water on pebbles, in aquatic vegetation, and in marsh habitat in the Muddy Springs area	No habitat in ROW; occurs in springs and streams in Muddy Springs area
Grated tryonia *(Tryonia clathrata)*	BLM: Sensitive NNHP: S2	Endemic to the Muddy Springs area	No habitat in ROW; occurs in springs and streams in Muddy Springs area
Mammals			
Allen's big-eared bat *(Idionycteris phyllotis)*	BLM: Sensitive State: Protected NNHP: S1 Clark County MSHCP: Watch	Occurs in variety of areas from pinyon juniper to creosote scrub including cliffs, rock crevices, exfoliating bark, large boulder piles and mine tunnels.	Possible habitat in ROW
Big free-tailed bat (*Nyctinomops macrotis*)	BLM: Sensitive NNHP: S1N Clark County MSHCP: Watch	Occurs in rugged, rocky arid landscapes associated with desert scrub	Possible habitat in ROW
Fringed myotis *(Myotis thysanodes)*	BLM: Sensitive NNHP: S2B	Occurs in desert scrub, grasslands, pinyon-juniper to deciduous and coniferous forests including rock crevices, bridges, trees, mines, buildings, caves,	Possible habitat in ROW

Table 3-3 Federally Listed and Special Status Species in the Coyote Spring Project Area

Species	Status	Range and Habitat of Species	Occurrence in Project Area
Long-legged myotis (*Myotis volans)*	BLM: Sensitive NNHP: S4B Clark County MSHCP: Covered	Occurs in riparian to desert habitats	Possible in riparian habitat in Muddy Springs area
Small-footed myotis *(Myotis ciliolabrum)*	BLM: Sensitive NNHP: S3B	Occurs in wooded mountainous, grasslands, to desert scrub including caves, rock crevices and mine tunnels	Possible habitat in ROW
Spotted Bat *(Euderma maculatum)*	BLM: Sensitive State: Protected/Threatened NNHP: S1S2 Clark County MSHCP: Watch	Occurs in a variety of habitats from deserts to montane coniferous forests with adjacent rugged canyons or cliffs, water and washes. Uses cliffs and rock crevices for roosting	Possible habitat in ROW
Yuma myotis (*Myotis yumanensis)*	BLM: Sensitive NNHP: S4B Clark County MSHCP: Watch	Occurs in riparian to desert habitats	No habitat in ROW; documented in riparian and mesquite habitat in Muddy Springs area
Desert bighorn sheep (*Ovis canadensis nelsoni)*	BLM: Sensitive State: Sensitive	Occurs in mountain ranges in Clark and Lincoln Counties	Movement corridor across ROW
Reptiles and Amphibians			
Desert tortoise *(Gopherus agassizii)*	Federal: Threatened BLM: Special Status State: Protected Clark County MSHCP: Covered	Occurs in Mojave Desert Scrub	Documented in ROW
Banded Gila monster *(Heloderma suspectum cinctum)*	BLM: Sensitive State: Protected NNHP: S2 Clark County MSHCP: Evaluation	Occurs infrequently in Mojave Desert	Not documented, but habitat available in ROW
Chuckwalla *(Sauromalus ater)*	BLM: Sensitive NNHP: S3S4 Clark County MSHCP: Covered	Occurs in rocky outcrops of lower Mojave Desert Scrub habitat	Not documented, but habitat available in ROW

NNHP: Nevada Natural Heritage Program
MSHCP: Multiple Species Habitat Conservation Program

that are used during periods of inactivity (Woodbury and Hardy, 1984). Water is acquired through forage and through drinking from puddles after spring and summer rain showers (Medica et. al., 1982). Desert tortoises mature at approximately 15 to 20 years of age (Woodbury and Hardy, 1984). One to two clutches of 2 to 14 eggs are laid during the spring or early summer. Eggs hatch in about 90 to 120 days (Luckenbach, 1982). Individual animals may live for over 100 years (Woodbury and Hardy, 1984). In recent years, populations in portions of the species' range have been declining. This decline has been attributed to habitat loss, collection of animals for the pet trade, off-road vehicle use, indiscriminate killing, habitat fragmentation attributed to paved roads, and an upper respiratory disease that has been found in many populations.

The desert tortoise is listed as a protected reptile in the State of Nevada under Section 501.110.1(d) of the Nevada Revised Statues. It is also listed as protected and rare outside the urban areas of Clark County under section 503.080.1(a) of the Nevada Administrative Code, and it is unlawful to transport animals across State lines without written permission from Nevada Department of Wildlife (NDOW). The desert tortoise was federally listed as endangered under emergency provisions of the ESA on August 4, 1989 (54 Federal Register 32326). This latter listing was modified to include only the Mojave Population and changed the listing to threatened on April 2, 1990 (55 Federal Register 12178). The Desert Tortoise (Mojave Population) Recovery Plan has been prepared (USFWS, 1994), which includes the designated Critical Habitat throughout the range of the desert tortoise. These critical habitat areas consist of large blocks of habitat that were designed to provide for the long-term protection and survival of the desert tortoise. The desert tortoise is designated by BLM as a special status species and is also a Covered species under the Clark County MSHCP.

Species surveys were conducted between February 23 and March 3, 2003 (Knight & Leavitt Associates, 2003). These inventories were conducted using the standard survey protocol for the desert tortoise, which is considered sufficient to identify most special status terrestrial wildlife and flora. Pedestrian transects were conducted at 33-foot intervals covering 100% of the requested ROWs. In addition, individual pedestrian Zone of Influence (ZOI) transects were conducted at 33, 330, 660, 1,320, and 2,640 feet from the outer edge of the 100% coverage surveys. ZOI surveys were limited in areas of private land where permission to access the property could not be obtained. The alternative alignments were not surveyed at 100% coverage, but are located within the ZOI transects.

The surveys identified the presence of desert tortoise in the Coyote Spring Project area. A single male tortoise was observed on the 2,640 feet ZOI. Within the requested pipeline ROW, only seven burrows/pallets and one scat were observed. Within 33 feet of the pipeline ROW, sign consisted of 25 additional burrows/pallets. Desert tortoise sign observed at the MX-5 and the regulating tank sites consisted of five and one burrow/pallet respectively. Caliche caves and shelter sites observed during the survey were also documented. However, without associated tortoise sign such as scat, tracks, or plastron marks the presence of caliche caves and shelter sites alone does not assist in determining potential desert tortoise densities in the Coyote Spring Project area. The number of burrows/pallets observed on the ZOI transects was greater than that observed on or within 33 feet of the requested ROWs.

Additional desert tortoise surveys were conducted in June 2006 for the three additional production well sites on private land in the northern part of Coyote Spring Valley, as described under the MOA (Chapter 2.1.1). All three sites were lightly disturbed, but still are considered potential desert tortoise habitat. Sites 210W117 and 210W122 had no tortoise sign. On site 210W124, a Class 2 desert tortoise burrow was found, but it had no evidence of recent use.

3.3.2.2 Moapa Dace

The Moapa dace is a member of the North American minnow family *Cyprinidae*. They can be distinguished from other species by the black spot at the base of the tail and their leathery appearance, which is a result of tiny embedded scales. They are olive yellow above with side blotches, white belly, and in some individuals a golden-brown stripe may be present. They reach up to 4.7 inches in size.

The Moapa dace was federally listed as endangered on March 11, 1967 (32 Federal Register 4001), and has been protected under the ESA since its inception in 1973. Critical habitat has not been designated for the Moapa dace. The USFWS assigned the Moapa dace its highest recovery priority because: 1) it is the only species within the genus *Moapa*, 2) the high degree of threat to its continued existence, and 3) the high potential for its recovery (USFWS, 1996). A final recovery plan was approved by the USFWS in 1996 (USFWS, 1996). This species is designated by BLM as a special status species, is Nevada State protected, and a high priority evaluation species covered under the Clark County MSHCP.

The Moapa dace is thermophilic (temperature sensitive) and endemic to the headwaters of the Muddy Springs area. Juveniles are found almost exclusively in spring-fed tributaries, whereas adults are also found in the mainstem of the Muddy River (Scoppettone et al, 1992). Reproduction occurs year-round, and is confined to the upper, spring-fed tributaries, where the water temperatures vary from 84.2 to 89.9 degrees Fahrenheit. They currently occupy a variety of habitats in the Muddy Springs area, including spring pools, tributaries (spring outflows), and the upper 2.5 miles of the mainstem of the Muddy River.

Moapa dace surveys are conducted annually on both public and private lands in the upper Muddy River system. The 2005 survey data indicated that there are approximately 1,300 fish in the population that occur throughout 5.6 miles of habitat in the upper Muddy River system (USFWS, 2006). Approximately 95 percent of the total population occurs within one major tributary that includes 1.8 miles of spring complexes that emanate from the Pederson, Plummer and Apcar units (see Figure 1-1) on the MVNWR and their tributaries. Approximately 28 percent of the population was located on the MVNWR, and 55 percent occupied the Refuge Stream (USFWS, 2006) on private land.

No habitat for the Moapa dace occurs directly within the ROWs requested for the Coyote Spring Project. The Muddy Springs are located approximately 15 miles from the MX-5 and CSI wells.

3.3.2.3 Western Yellow-billed Cuckoo

The western yellow-billed cuckoo is a pigeon-sized bird, gray-brown above and white below with distinct barring on the underside of the tail. Its obvious distinguishing

characteristics are the cinnamon gray upper wings, long black and white tail, yellow lower bill, and distinctive calls "*ka-ka-ka-ka-kowlp-kowlp-kowlp*" or "coo-coo-coo-coo-coo" or the knocker call – a series of harsh, rattled notes. This bird winters in South America and migrates to North America and the Antilles to breed. In Nevada, the species was thought historically to breed along the lower Truckee and Carson Rivers as well as the Colorado and Virgin Rivers (66 Federal Register 38613).

The western yellow-billed cuckoo breeds in large blocks of riparian habitat, which often contain cottonwoods and willows. Large blocks of riparian habitat, particularly well-developed gallery forest, have been considered necessary for western yellow-billed cuckoo breeding habitat. However, recent surveys have documented breeding in riparian habitat consisting of a band of only one or two cottonwoods surrounded by meadow along a stream course in the Muddy Springs area (NDOW, 2001; Halterman, 2001a; Halterman, 2001b). In 2001, four nest sites were located at the Warm Springs Ranch. None were detected the year before (Halterman, 2001a; Halterman, 2001b). In 2000, horses were grazing in the Muddy Springs area, and in 2001 these horses were removed leaving only a few cattle to graze the area. NDOW hypothesizes that this lower level of grazing may have allowed more insects to survive providing the cuckoos with enough of a prey base to raise young (NDOW, 2001). The western yellow-billed cuckoo begins breeding in June and July. The breeding cycle is very rapid including egg laying to fledging young in about 17 days. The young are cared for at least a month after they are fledged. Western yellow-billed cuckoos are typically migrating back to their wintering grounds between August and October. In 2001, yellow-billed cuckoos were documented from mid-June to early August in the Muddy Springs area.

The decline of the western yellow-billed cuckoo in Clark County is thought to be due to degradation of riparian habitat, river canalization, livestock grazing, use of pesticides, non-native plant encroachment, and brown-headed cowbird parasitism (RECON, 2000). On July 18, 2001 the USFWS issued a 12-month finding on the petition to list the western yellow-billed cuckoo in the western continental United States. The USFWS determined that the petition was warranted but precluded by higher priorities, and the western yellow-billed cuckoo was therefore placed on the list of candidates. The western yellow-billed cuckoo is a BLM special status species, a Nevada State protected species, and is a Covered species under the Clark County MSHCP. No habitat for the western yellow-billed cuckoo occurs within the ROWs requested for the Coyote Spring Project.

3.3.2.4 Southwestern Willow Flycatcher

The southwestern willow flycatcher is a small, inconspicuous member of the Empidonax flycatcher family. It is a dark olive-brown bird with pale yellow belly, wingbars and approximately 5.75 inches in length. It can be distinguished from other Empidonax flycatchers by its call, often a sneezy "fitz-bew", but it can only be distinguished from other "willow" flycatchers by the geographical location of breeding activity. The southwestern willow flycatcher breeding range includes southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern portions of Nevada and Utah, as well as extreme northwestern Mexico (62 Federal Register 39129). They most likely winter in Mexico and South America.

During the breeding season this willow flycatcher is found in riparian habitats near waterbodies or saturated soils with dense growths of willows, arrowweed and tamarisk, sometimes with an overstory of cottonwood. The southwestern willow flycatcher nests in dense vegetation 13-23 feet tall and often with a canopy. In the recovery plan "suitable habitat" is defined as riparian areas with generally dense, mesic riparian shrub and tree communities 0.25 acre or greater in size within floodplains large enough to accommodate riparian patches at least 33 feet wide (USFWS, 2002). While historically this species preferred nesting in willows, it has more recently been observed nesting in tamarisk, Baccharis, and Russian olive. The males may be present on the breeding territory by mid-May, building nests from late May to early June with the young fledging in early July (58 Federal Register 39495).

Threats to this species include habitat loss through urban, recreational and agricultural development, fires, water diversion and impoundment, channelization, livestock grazing, and invasive plants (62 Federal Register 39129). On March 29, 1995 the southwestern willow flycatcher was listed as endangered by the USFWS. On July 22, 1997 the USFWS designated critical habitat for this species, which was subsequently rescinded by court order. On October 19, 2005, USFWS designated 74 miles of the Virgin River as critical habitat for the southwestern willow flycatcher (70 Federal Register 60886). There is no critical habitat in the Coyote Spring Project area. The species is designated by BLM as a special status species, is Nevada State protected, and is a Covered species under the Clark County MSHCP.

No habitat for the southwestern willow flycatcher exists within the ROWs requested for the Coyote Spring Project. However, marginal but potential habitat may exist adjacent to the MVIC diversion channel to Bowman Reservoir. This area contains 10 to 15 foot tall willow thickets. These thickets are small in size and are quite narrow and may not support southwestern willow flycatchers.

The NDOW has been conducting protocol level surveys for the southwestern willow flycatcher throughout Nevada from 2001 to 2005. Survey locations have included sites within the Moapa Valley, including the Muddy Springs area and along the Muddy River.

- Moapa Valley Pump Station. This site was first surveyed in 2000. This site is contiguous with the Warm Springs Ranch immediately adjacent to the southeast. The site is located approximately eight miles north of Glendale off of Highway 168. The survey transect begins where the Warm Springs Road crosses the Muddy River and continues upstream to the north about 0.75 mile. The vegetation along the river is dominated by tamarisk (*Tamrix sp.*) and arrowweed (*Pluchea sericea*). There is a stand of cottonwoods (*Populus fremontii*) and honey mesquite (*Prosopis glandulosa*) nearby.
- Moapa Valley Warm Springs ranch. This site was first surveyed in 2000. The site is located nine miles north of Glendale on Warm Springs Road near Highway 168. The survey transects are along two waterways, including a drainage area to the west and the Muddy River to the east. The East area has considerable surface water with dense vegetation including tamarisk. The western area has dense mesquite with tamarisk. Both areas have occurrences of willows (*Salix sp.*) and cottonwoods.

Southwestern willow flycatchers have not been identified during any of the survey years at the Moapa Valley Pump Station site. At the Moapa Valley Warm Springs Ranch site in 2002 an individual transient non-breeding southwestern willow flycatcher was observed. In 2003 one pair of breeding flycatchers were observed. In 2004 and 2005, two pairs of breeding flycatchers were observed.

3.3.2.5 Yuma Clapper Rail

The Yuma clapper rail is a secretive chicken-like bird. It is a slate brown above with white streaking, tawny breast and white to pale throat, and white undertail. It can be distinguished from other clapper rails by lighter barring on the flanks and its overall thinner appearance. The call is a clattering "kek-kek-kek" or "cha-cha-cha". The Yuma clapper rail is distributed over an area from the Colorado River delta in Mexico to the Salton Sea in California, Topock Marsh in Arizona, lower Virgin and Muddy Rivers in Nevada, and along the Gila River to near Tacna in Arizona. It may be partially migratory moving to Mexico in the winter.

It inhabits fresh water marshes with dense grasses and weeds requiring dry hummocks or small mats in cattails just above the waterline for nesting. They mate and lay eggs in March through July. The young hatch in 23-28 days, but do not fledge for another 63-70 days. The Yuma clapper rails feed on crayfish, clams, fish, and insects.

The Yuma clapper rail is threatened by loss of habitat dredging and channelization projects along the Colorado River. The Yuma clapper rail was listed as endangered by the USFWS on March 11, 1967. No critical habitat has been designated for the Yuma clapper rail. The species is designated by BLM as a special status species, is Nevada State protected, and is a Watch List species under the Clark County MSHCP.

This species has never been documented within the Coyote Spring Project area or within the Muddy Springs or Muddy River areas. Habitat for this species is not available within the Coyote Spring Project area or within the Muddy Springs or Muddy River areas.

3.3.3 Special Status Species

A search of the Nevada Natural Heritage Database and the species list provided by the USFWS identified non-federally listed special status species that may occur in the vicinity of the Coyote Spring Project. These species are described below, with the exception of three species listed on Table 3-4. These have not been documented in the area, and no suitable habitat exists in the Coyote Spring Project area (Wildland International, 2003).

Table 3-4 Special Status Species that Do Not Occur in the Coyote Spring Project Area

Category	Common Name	Species Name
Birds	least bittern	*Ixobrychus exilis hesperis*
Invertebrates	Nevada Admiral	*Limenitus weidemeyerii nevadae*
Mammals	California leaf-nosed bat	*Macrotus californicus*
	Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*
Amphibians	southwestern toad	*Bufo microscaphus*

3.3.3.1 Invertebrates

Five invertebrate special status species were included on the USFWS' species list for the Coyote Spring Project area (Wildland International, 2003). They include:

- MacNeil sooty-wing skipper - a butterfly that occurs in desert riparian and saltbush scrub habitats where the larval host plant (*Atriplex lentformes*) is present. The adult host plants are mesquite (*Prosopis* sp.) and other xeric-riparian shrubs. No individuals have been documented within the requested ROWs. However, a small number of mesquite thickets located on private lands within the project footprint may be host plants for this species.
- Pahranagat naucorid - a small aquatic bug endemic to the Muddy Springs and other outflow streams (USFWS, 1996). No habitat for this species occurs within the requested ROWs for the Coyote Spring Project.
- Moapa pebblesnail - a snail that has been documented in springs in the Muddy Springs area (USFWS, 1996). No habitat for this species occurs within the requested ROWs.
- Moapa Warm Springs riffle beetles – an invertebrate that occurs in outflow streams immediately downstream of springs in the Muddy Springs area (USFWS, 1996). No habitat for this species occurs within the requested ROWs.
- Grated tryonia - a snail that occurs in springs in the Muddy Springs area (USFWS, 1996). No habitat for this species occurs within the requested ROWs.

3.3.3.2 Reptiles

Potential habitat for the banded Gila monster and the chuckwalla occurs in the Coyote Spring Project area (Wildland International, 2003). However, field surveys conducted in 2003 did not identify any individuals of these species (Knight & Leavitt Associates, 2003).

The banded Gila monster is the largest carnivorous, and only venomous, lizard in the United States. Boulders, shrubs and trees appear to be important components of high quality Gila monster habitat (Stebbins, 1985; Brown and Carmony, 1991). For shelter it uses rocks, mammal burrows, and woodrat nests or excavates its own burrow. Since this species is rarely observed in the wild it has become highly prized by some collectors. Potential habitat for Gila monster exists in many of the deeply dissected washes and rocky canyons within the Coyote Spring Project area.

The chuckwalla is a large, bulky lizard obtaining a length of up to 16 inches. It requires rocks, boulders or rocky cliff faces, rocky outcrops, lava flows, and rocky hillsides and sometimes flat rocky ground. The chuckwalla may be threatened due to collection of individuals. Limited habitat for this species occurs between Pahranagat and McKay Washes in the western portion of the Coyote Spring Project area.

3.3.3.3 Birds

During the field surveys conducted in 2003, the only special status bird species identified were several male phainopepla (Wildland International, 2003). Phainopepla were also observed along the proposed pipeline corridor during windshield vegetation habitat

surveys conducted in 2005 by SNWA biologists. The phainopepla is a dark, crested jay-like bird that breeds in mesquite patches in southern Nevada. Within the Coyote Spring Project area, this species prefers mesquite woodlands such as those around Muddy Springs. It has been documented in all months of the year at the Muddy Springs but is much less frequent July through October (Lund, 2003). Male phainopeplas were observed within a mesquite thicket located on private land within the Coyote Springs Project pipeline ROW. No female phainopeplas were observed during the survey.

In addition to phainopepla, seven other special status bird species were included on the USFWS' species list for the Coyote Spring Project area. These species are briefly described below.

The western burrowing owl is a medium sized owl that occurs in grasslands, desert, and arid scrublands. This species uses sparsely vegetated open habitats that are or have been inhabited by desert tortoises, ground squirrels, or other small mammals. Although no individuals were documented during the field surveys, potential habitat for this species does exist within the area. In five years, only one burrowing owl has been documented in the Muddy Springs area (Lund, 2003).

The gray flycatcher is a small gray member of the Empidonax flycatcher family. The breeding range is arid slopes and foothills, starting at around 5,000 feet in elevation in sage where it intersperses with pinyon-juniper up into sub alpine habitat at 11,000 feet. A number of gray flycatchers have been documented in the Muddy Springs area within the last five years (Lund, 2003). However, no habitat for this species occurs on the Coyote Spring Project ROWs.

The blue grosbeak is 6.5 to 7 inches in length. It breeds in dense riparian habitats with shrubby growth, weedy pastures, and thickets and low trees. It is not limited to riparian habitat post breeding or during migration. Blue grosbeaks have been documented in the Muddy Springs area within the last five years (Lund, 2003). However, no habitat for this species occurs within Coyote Spring Project ROWs.

The Lucy's warbler is a small insect-eating bird that is highly associated with mesquite, often nesting in holes or under loose bark of mesquite and sometime in old verdin nests (Baicich and Harrison, 1997). The mesquite thicket located on private land within the pipeline ROW may be potential breeding and foraging habitat for Lucy's warbler.

The summer tanager is robin-sized bird that feeds on insects, small fruits, and spiders. In southern Nevada, this species breeds in desert riparian habitat often with cottonwood-willow associations (Ziener et al., 1990). Summer tanagers have been documented in the Muddy Springs area within the last five years, occurring mostly in May and June (Lund, 2003). However, no habitat for this species occurs on the requested Coyote Spring Project ROWs.

The vermillion flycatcher is approximately 5.5 to 6.5 inches in length. It breeds in trees along watercourses in arid areas. Vermillion flycatchers have been documented in the Muddy Springs area within the last five years (Lund, 2003). However, no habitat for this species occurs on the requested Coyote Spring Project ROWs.

The Arizona Bell's vireo is a small energetic bird approximately 4.5 to 5 inches in length. It typically occurs near water in dense willow or baccharis woodland or mesquite

thickets. It has been known to occur in less dense vegetation and even in tamarisk woodlands. Arizona Bell's vireo has been documented in the Muddy Springs area within the last five years, but only in very small numbers (Lund, 2003). The mesquite thicket located on private land within the pipeline ROW may be potential habitat for this species.

3.3.3.4 Fish

There is no habitat for fish directly within the ROWs for the Coyote Spring Project. However, three special status fish species are known to occur in the Muddy Springs area.

The Moapa White River springfish is endemic to the Muddy River area, and is found in the five spring systems (Apcar, Baldwin, Cardy Lamb, Muddy Spring, and MVNWR) and the Muddy River.

The Virgin River chub is currently restricted to the Virgin and Muddy Rivers. The Virgin River population has been listed as endangered, and the USFWS is currently conducting a status review of the Muddy River population to determine whether that population should be included in the listing. It seems stable in those habitats, although the species is vulnerable to impact due to its limited distribution, increase of non-native species, water diversions and other disturbances.

The Moapa speckled dace is also a Muddy River endemic. It historically occurred in low numbers, and primarily in the middle of the Muddy River. It currently inhabits approximately 10.4 miles of the upper Muddy River (USFWS, 1996).

3.3.3.5 Mammals

During the field surveys conducted in 2003, no mines or caves were found within the requested ROWs for the Coyote Spring Project (Wildland International, 2003). However, potential bat day roosts do exist in the form of cracks and crevasses in rock formations. The species of bats described below have been identified as occurring within the overall region. The California leaf-nosed bat and Pale Townsend's big-eared bat do not day roost in cracks and crevices and therefore habitat for these species do not occur within the Coyote Spring Project area.

The Allen's big-eared bat is one of the rarest bats in North America. It has been observed in habitats from desert scrub to fir forests at elevations between 2,600 feet to 9,800 feet. The Allen's big-eared bat roosts in a variety of sites including, exfoliating tree bark, large boulder piles, and mine tunnels. It is typically associated with cliffs or rocky slopes suggesting that it may roost in crevices (WBWG, 1998).

The big free-tailed bat occurs in rugged, rocky terrain throughout southwestern North America. In general, this bat is a crevice-roosting species using cracks in high rock cliffs and rocky outcrops, as well as buildings.

The fringed myotis has been observed in desert scrub, grasslands, oak and pinyon-juniper woodlands, sage-grass steppe, old-growth forest, and coniferous and deciduous forests. Hibernation has been documented only in mines and buildings (WBWG, 1998). Maternity and night roosts include a variety of habitats such as, caves, buildings, mines, rock crevices, bridges, and trees (WBWG, 1998).

The long-legged myotis is most frequently found above 4,000 feet in elevation in early successional forest and woodland habitats (Zeiner et al., 1990), however it is also known

to occur in riparian and desert habitats (WBWG, 1998). Foraging occurs in Great Basin scrub, coastal scrub, chaparral, and less commonly in arid grassland and desert habitats.

The small-footed myotis prefers habitat of wooded mountainous regions of the Great Plains and southwestern United States, but has also occasionally been found in grassland and desert scrub (Schmidly, 1991). Summer roosts have been found in buildings, loose tree bark, and beneath slabs of rock. Caves, rock crevices and mine tunnels, are used as winter hibernacula.

The spotted bat inhabits a wide variety of habitats, from deserts to montane coniferous forests and is consistently associated with the presence of nearby rugged canyons or cliffs (Easterla, 1965) and water and washes (Schmidly, 1991). Spotted bats prefer cliffs or broken canyon country for summer roosting sites (Easterla, 1965). Spotted Bats are crevice roosters and are usually solitary.

The Yuma myotis most commonly occurs in open forests and woodlands below 8,000 feet (Zeiner et al., 1990). It is always found in close association with water bodies. Williams (2001) described Yuma myotis activity in the Upper Moapa Valley as concentrated in riparian woodland with secondary use evenly distributed between riparian marsh, mesquite bosque, and riparian shrubland.

Desert bighorn sheep (*Ovis canadensis nelsoni*) occur in the mountain ranges around Coyote Spring Valley (Wildland International, 2003), and are managed by NDOW and BLM as a big game species. Five intermountain movement corridors have been identified in the region, including one between the Arrow Canyon Range and the southern Meadow Valley Mountains across Highway 168 (The Nature Conservancy), 2001).

3.3.4 Migratory Birds

The Migratory Bird Treaty Act of 1918 (MBTA), as amended was enacted to protect migratory birds and states that it is “unlawful to take, kill, or posses migratory birds” (16 U.S.C. 703-711). An Executive Order issued on January 11, 2001, further defines the responsibilities of the federal agencies to protect migratory birds. A list of bird species protected is available in 50 C.F.R. 10.13.

Migratory birds associated with habitats in the Coyote Spring Project area include Brewer’s sparrow (*Spizella breweri*), sage sparrow (*Amphispiza belli*), yellow-rumped warbler (*Dendroica coronata*), American pipit (*Anthus rubescens*) and western burrowing owl (Wildland International, 2003). However, it is anticipated that, with the exception of the previously disturbed areas, migratory birds could utilize habitat within the Coyote Spring Project area.

3.4 GEOLOGY, SOILS, AND MINERALS

3.4.1 Geology

The Coyote Spring Project area is located in the northern reaches of the Mojave Desert within the Basin and Range complex of the State of Nevada. Coyote Spring Valley is a north and south-trending valley about 50 miles north of Las Vegas, bounded by the Meadow Valley Mountains to the north and the Arrow Canyon Range to the south. Within Coyote Spring Valley, the terrain is characterized by alluvial bajadas. Between

the Meadow Valley Mountains and Arrow Canyon Range the terrain becomes moderately rugged with incised benches and up thrusts created by seismic and volcanic events. This moderately rugged terrain gives way to rolling hills and the relatively flat topography of the Moapa Valley. Elevations along the Coyote Spring Project range from 2,200 feet in the Coyote Spring Valley to 1,800 feet at the project terminus in the Moapa Valley, with a high of 2,400 feet and a low of 1,740 feet.

The Coyote Spring Project passes primarily through Quaternary age alluvial deposits derived from the weathering of the various rock units present in nearby mountain ranges. In the western portion of the Coyote Spring Project area, outcrops of the Tertiary age Muddy Creek Formation, consisting predominantly of siltstone, shale and clays of lake deposit origin, are periodically exposed. In the Meadow Valley Mountains, the Mississippian age Monte Cristo Formation, which is a series of limestone and dolomite with chert beds deposited in a shallow, off shore marine setting, are encountered. East of the Meadow Valley Mountains are exposures of the Permian age Bird Spring Formation, which is a series of interbedded sandstone, siltstone, shale and limestone/dolomite with chert beds that have formed in a shallow marine to near shore environment. At the eastern end of the Coyote Spring Project, the Muddy Creek Formation is encountered once again.

No major faults are visible at the surface within the Coyote Spring Project area. However, there is a potential that there are some minor ancient and recent faults in the area.

3.4.2 Soils

According to the soil survey for the Virgin River Area (Nevada-Arizona), the Coyote Spring Project area contains nine key soil series that range from shallow to deep (NRCS, 1980). The western end of the Coyote Spring Project area is primarily composed of the Colorock-Tonopah association, Badland, Tonopah gravelly sandy loam and Tonopah very gravelly sandy loam, Weiser cobbly sandy loam, and Rock Land and St. Thomas association. These soils are mostly located within alluvial fans and terraces, and include both shallow and deep soils. The Colorock soil is shallow and well drained. The Tonopah soil is deep and excessively drained. Runoff for both is slow to medium, and the hazard for water erosion is slight. The Badland soil unit occurs on steep slopes and consists of severely eroded and gullied land. Runoff is rapid and the hazard for water erosion is high. The Weiser cobbly sandy loam is deep and well drained, with medium runoff and a moderate hazard for water erosion.

The eastern end of the Coyote Spring Project area within the Moapa Valley is primarily composed of Gila loam and Bard gravelly fine sandy loam. The Gila soils are deep and well drained, located on flood plains and low terraces. Runoff is slow and the hazard of water erosion is slight. The Bard soil is shallow and well drained, located on alluvial fans. Runoff is slow, and the hazard for water erosion is slight.

3.4.3 Minerals

Federally owned minerals in the public domain fall into one of the following categories, depending on the kind of material: locatable minerals, leasable minerals, and salable minerals. There is a moderate potential for sodium in the Coyote Spring Project area

(BLM, 1998). There is a low to high potential for mineral material sales and a low to moderate potential for locatable minerals. There are no known active mining claims or community pits within or near the Coyote Spring Project area.

3.5 HAZARDOUS MATERIALS

No known hazardous materials or hazardous material sites have been observed within or in the immediate vicinity of the Coyote Spring Project.

3.6 LAND USE

The western portion of the Coyote Spring Project is located on privately owned lands (CSI) and lands managed by BLM. The eastern portion of the Coyote Spring Project is located predominantly on private lands and lands owned by MVWD.

3.6.1 Federal Lands

In November 2002, Congress passed and President Bush signed the "Clark County Conservation of Public Land and Natural Resources Act of 2002" PL 107-282 (Clark County Act). Since the Clark County Act was enacted by Congress, it supercedes applicable portions of the RMP (BLM, 1998) and any changes to boundary adjustments, land use designations, and or land management directions were incorporated by the BLM upon enactment of the Clark County Act. For those areas not addressed by the Clark County Act or for which nonspecific management directions were given, the lands will be managed in accordance with the RMP.

Based on land use designations identified in the Clark County Act and RMP, the Coyote Spring Project area falls outside the disposal boundary. A review of federal and county records identified the following approved land uses near the Coyote Spring Project:

- NDOT has a material site in T14S, R65E, Sections 5 and 8.
- The Overton Power District (now LCPD) has a ROW for an aerial power line in T14S, R65E, Sections 5, 6, 10, 15, and 24.
- Nevada Power Company has a ROW for a water pipeline in T14S, R65E, Section 9.
- MVWD has a ROW for a 12" water pipeline to a school in T14S, R65E, Section 24.
- MVWD has a ROW for a water pipeline, reservoir, and overhead power line in T13.5S, R64E, Sections 35 and 36, T13S, R64E, Section 35, and T13S, R65E, Sections 5, 6, 8, 24, 31.
- The U.S. Geological Survey (USGS) has a ROW for a monitoring well in T13S, R64E, Section 35.
- Lincoln Communications Inc. has a ROW for a buried fiber optic line in T13.5S, R64E, Sections 35, 36, T13S, R64E, Sections 27, 28, 29, 30, 34, and 35, and T13S, R65E, Section 31.

- Moapa Valley Telephone has a ROW for buried splice vaults along a fiber optic line in T14S, R65E, Sections 5, 6, and 24.
- LVVWD has a ROW for monitoring wells in T13S, R63E, Section 25.

3.6.1.1 Range Management

The BLM does not currently have any active grazing activity or any permitted grazing allotment within the area of the Proposed Action.

3.6.1.2 Wilderness

The Arrow Canyon Wilderness Area was designated by the Clark County Act. At its closest point, it is approximately 1/4 mile to the south of the Coyote Spring Project. This boundary was identified from the maps accompanying the Clark County Act since a legal description is not currently available. The Clark County Act directs in Section 204 that "Congress neither intends to designate protective buffers around the Wilderness Areas, nor that adjacent non-wilderness land uses should be prohibited".

3.6.2 Private Lands

Private lands within and adjacent to the Coyote Spring Project include those owned by CSI near Highways 93 and 168, and numerous private parcels in the Upper Moapa Valley along Highway 168 near its intersections with Warm Springs Road.

The CSI property is currently specified as a Planned Unit Development, under Clark County Comprehensive Planning Development Code 30.24.

3.7 NOISE

Some land uses are considered more sensitive to noise levels than others due to the amount of noise exposure (in terms of exposure time and insulation from noise) and the types of activities involved. Residences, motels and hotels, schools, libraries, religious institutions, hospitals, nursing homes, auditoriums, parks and outdoor recreation areas are generally more sensitive to noise than are commercial and industrial areas.

Three types of natural effects influence noise impacts: distance effects, atmospheric effects, and terrain effects. For point sources, sound levels drop off with distance in accordance with the "inverse square law", which yields a 6-decibel sound level reduction for each doubling of the distance from the source. A sound source can be treated as a "point source" when the distance from the source is large compared to the dimensions of the source.

In addition to the drop in noise levels as distance increases, noise also drops due to the atmospheric absorption and losses due to a barrier. Atmospheric absorption is dependent upon temperature and relative humidity. A barrier is a solid structure that intercepts the direct sound path from a source. It provides a reduction in sound level within its "shadow zone." A barrier can be a hill, earth berm, a wall, or a building.

The Coyote Spring Project would begin on private land owned by SNWA and CSI in Coyote Spring Valley. At present, there are no sensitive land uses in this area. However, the Coyote Springs Development is currently being constructed, including proposed residential and recreational facilities. Existing sensitive noise receptors include scattered

single-family residences along Highway 168 in the Moapa Valley area and a few residences in the vicinity of the Bowman Reservoir discharge pipeline adjacent to Highway 169. The closest residences are approximately 100 feet from transmission and discharge pipelines. No ambient noise measurements exist for the resource analysis area. As noted during field examinations, noise levels in the resource analysis area are relatively low, with the largest noise source being traffic noise along Highway 168.

Noise in unincorporated Clark County is regulated under the county's Unified Development Code Section 30.68.020. This code section establishes sound level standards for noise sources within residential districts, and within business and industrial districts. Noise from construction/demolition and from use-related loading/unloading operations that would impact residential areas during daytime hours are exempt from the requirements of the noise ordinance.

3.8 RECREATION

Public lands within the Las Vegas area contain ecologically diverse habitats that offer a range of recreational opportunities. Demand for such activities is increasing due to the expansion of metropolitan Las Vegas. For the area in the vicinity of the Coyote Spring Project, off-highway vehicle use destinations are limited to existing roads, trails, and dry washes. It is designated as "roaded natural" and "semi-primitive nonmotorized" (BLM, 1998). The "roaded natural" designation means "visitor use can be moderate to high with managerial controls being low to high. Specific opportunities include picnicking, hiking, off-road vehicle touring, free play and events, camping, nature study, enjoying scenery, and interpretive activities" (BLM, 1998). Recreation activities in the open desert also include off-road racing, recreational shooting, horseback riding, and off-road motorcycle riding. The following wildlife refuges also provide recreational uses.

- Desert National Wildlife Refuge - managed by the BLM, this 1.6 million acre area, located west of Highway 93, was visited by approximately 68,000 people in 2002. The Coyote Spring Project would not be located within the refuge.
- MVNWR - established September 10, 1979 to secure habitat for the endangered Moapa dace, this refuge is located on 106 acres in the upper Moapa Valley approximately 60 miles north of Las Vegas. Moapa dace habitat consists of stream channels supported by six thermal springs emerging near the center of the MVNWR. Currently, due to its small size, fragile habitats, on-going restoration work, and removal of unsafe structures, the MVNWR is closed to the general public. MVNWR may be open to the public in the future. The Coyote Spring Project would not be located within the refuge, but the springs are fed by regional groundwater.

3.9 SOCIOECONOMICS

3.9.1 Population

In 2004, the estimated population of Clark County was 1.75 million people (SNCPE, 2004). Of that total, 96 percent lives within the Las Vegas metropolitan area. The Moapa Valley area (including the Moapa Reservation) has an estimated population of about 8,100 people.

Of Clark County's population, 58 percent are white, 25 percent are Hispanic or Latino, 9 percent are black or African American, 7 percent are Asian or Pacific Islander, and less than one percent are American Indian (Nevada State Demographer, 2004).

3.9.2 Employment

The State of Nevada unemployment rate was at 4.0 percent as reported in August 2004, down 1.45 percent from August 2003 (Nevada Workforce Informer, 2003). The Las Vegas metropolitan statistical area (which includes Clark and Nye Counties, and Mohave County, Arizona) reported a slightly larger decrease in unemployment during 2004 as compared to the state; 4.0 percent unemployment in August 2004 as compared to 5.5 percent unemployment in August 2003.

3.9.3 Housing

The estimated number of total housing units in Clark County is approximately 675,000 according to data maintained on the Clark County Department of Comprehensive Planning website and collected by the Southern Nevada Consensus Population Estimate, July 2004 (SNCPE, 2004). Of the total housing units in Clark County, approximately 2,244 are located in the Moapa Valley.

3.9.4 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was signed on February 11, 1994. This order directs federal agencies to review proposals and identify, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The purpose of environmental justice is to determine whether a disproportionate share of a proposed project's adverse socioeconomic or environmental impacts are borne by minority and low-income communities.

The Coyote Spring Project area is located in a sparsely populated area, which does not encompass any minority or low-income neighborhoods. The Moapa Paiute Reservation is located approximately 1 mile southeast of the termination of the Coyote Spring pipeline.

3.10 TRANSPORTATION AND PUBLIC UTILITIES/SERVICES

3.10.1 Transportation

The Coyote Spring Project facilities would be located along Nevada Highway 168. Highway 168 begins in southern Coyote Spring Valley at its intersection with Highway 93. It extends south into Upper Moapa Valley, and terminates at Interstate Highway 15. NDOT estimated annual average daily traffic numbers for Highway 168 in the vicinity of the Coyote Spring Project during 2005 total 160 vehicles (NDOT Annual Report, 2004).

The MVWD improvements that are part of the Coyote Spring Project would be along Nevada Highway 169. Highway 169 begins at Interstate 15 and extends south through Lower Moapa Valley, Overton, and Logandale towards Lake Mead. NDOT estimated annual average daily traffic numbers for Highway 169 just south of Interstate 15 during 2005 total 4,450 vehicles (NDOT Annual Report, 2004).

3.10.2 Public Utilities/Services

There are no civilian airports in the vicinity of the Coyote Spring Project. The nearest civil airfield is North Las Vegas Airport in the City of North Las Vegas. The U.S. Air Force operates Nellis Air Force Base approximately 30 miles south of the Coyote Spring Project.

The Lincoln County Telephone System owns and operates a fiber optic telecommunications line that generally parallels Highway 168 and crosses back and forth from the north or south sides of the Highway from the MX-5 well site through Moapa Valley.

The LCPD owns and operates a 138 kV transmission line that extends from their Tortoise substation, near Moapa and along Highways 168 and 93 to Lincoln County. This transmission power line is known as LCPD Number 1 and is the only electric power service to Lincoln County. The Tortoise substation and LPCD Number 1 power line are capable of supplying the power needed for Coyote Spring Project.

The MVWD owns and operates numerous water pipelines in the Coyote Spring Project area, including 8, 14 and 20-inch pipelines located along Highway 168 from the Arrow Canyon well to their storage reservoirs. MVWD also has a 24-inch diameter pipeline that runs between the reservoirs and the vicinity of the Bowman Reservoir.

3.11 VEGETATION

3.11.1 Plant Communities

Two dominant vegetation community types have been identified in the Coyote Spring Project area, including Mojave Creosote Bush Scrub and Desert Saltbush Scrub (Wildland International, 2003). Lesser components of Desert Wash Scrub and Mesquite Woodland (Bosque) are included within these communities.

3.11.1.1 Mojave Creosote Bush Scrub

The Mojave Creosote Bush Scrub vegetation community occurs extensively throughout the Mojave Desert region, and is the dominant plant community below 4,000 feet. This community dominates the western two-thirds of the Coyote Spring Project area.

Dominant species associated with Mojave Creosote Bush Scrub communities include creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Other common species include ratany *(Krameria erecta)*, plantain *(Plantago ovata)*, cheesebush *(Hymenoclea salsola)*, indigo bush *(Psorothamnus fremontii)*, fluff grass *(Erioneuron pulchellum)*, desert trumpet *(Eriogonum inflatum)*, desert senna *(Senna armata)*, red brome *(Bromus madritensis* var. *rubens)*, desert chickory *(Rafinesquia neomexicana)*, desert dandelion *(Malacothrix glabrata)*, checker fiddleneck (*Amsinckia tesselata*), spiny-herb *(Chorizanthe rigida)*, globe mallow *(Sphaeralcea ambigua)*, and cat's claw (*Acacia greggii*). Common cacti include beavertail cactus *(Opuntia basilaris)*, pencil cholla *(Opuntia ramosissima)*, and silver or golden cholla (*Opuntia echinocarpa*). At higher elevations, Mojave yucca (*Yucca schidigera*) is co-dominant.

3.11.1.2 Desert Saltbush Scrub

The Desert Saltbush Scrub vegetation community occurs at lower elevations in valley bottoms, around playas, and on bajadas where soils are saline or alkaline, fine-textured (silts and clays), and poorly drained. This community occurs primarily in the eastern extent of the Coyote Spring Project area in the Moapa Valley.

Dominant species associated with this community are common saltbush (*Atriplex polycarpa*), four-wing saltbush *(Atriplex canescens)*, shadscale *(Atriplex confertifolia*), desert holly *(Atriplex hymenelytra)*, and cheesebush.

3.11.1.3 Mojave Desert Wash Scrub

The Mojave Desert Wash Scrub community consists of low, scrubby vegetation characterized by a diversity of species. This community typically occurs below 5,000 feet in elevation in sandy arroyos, washes, and sub-irrigated bajadas. This community occurs throughout the Coyote Spring Project area in ephemeral washes and drainages.

Dominant species of the Mojave Desert Wash Scrub community include cat's claw, desert willow *(Chilopsis linearis ssp. arcuata)*, Mormon tea, and indigo bush.

3.11.1.4 Mesquite Bosque

The Mesquite Bosque vegetation community was historically characterized as an open to fairly dense, drought-deciduous streamside thorn forest dominated by mesquite. The community typically develops on washes, stream banks, or outwash plains with substantial near-surface groundwater or on higher alluvial terraces adjacent to perennial streams. Understory species typically include perennial grasses and scattered saltbush.

This community often occurs as a relict association characterized by isolated stands of mesquite surrounded by Desert Saltbush Scrub and Tamarisk Scrub. Isolated mesquite stands occur on private lands in the Moapa area. A mesquite thicket is located within the proposed pipeline alignment, adjacent to Highway 168 on private land in Moapa.

3.11.2 Invasive and Noxious Weeds

The Nevada Legislature has declared that it is the obligation and the responsibility of the owners and occupiers of land in the State of Nevada to control all weeds designated as noxious by the Nevada Department of Agriculture. Chapter 555.005 of the NRS defines a noxious weed as "any species of plant which is, or is likely to be, detrimental of destructive and difficult to control or eradicate." To control the weeds the landowner or user shall "cut, destroy, or eradicate all weeds…before such weeds propagate and spread, and whenever required by the state quarantine officer" (NRS 555.150).

3.11.3 Cactus and Yucca

All cactus and yucca species native to the State of Nevada are protected and regulated by Nevada Revised Statutes (NRS) 527.060-120. The biological field surveys included an inventory of the cactus and yucca species occurring within the requested ROWs (Knight & Leavitt Associates, 2003). A total of approximately 1,460 individual cactus representing eight species, and nearly 1,050 Mojave yuccas were found (Table 3-5). Although, cactus and yucca species were found throughout the project area, the majority

was found between Highway 168 mile marker 13 and mile marker 19, with lower densities occurring in the areas of development in upper Moapa Valley and within wash bottoms.

Table 3-5 Cactus and Yucca Species within the Coyote Spring Project

Project Totals	Ecpo	Ecen	Feac	Nejo	Opba	Opec	Opra	Yusc	Oper
	40	132	31	240	220	625	121	1041	48

Key

Ecpo = *Echinocactus polycephalus*
Ecen = *Echinocereus engelmannii*
Feac = *Ferocactus acanthodes*
Nejo = *Neolloydia johnsonii*
Opba = *Opuntia basilaris*
Opec = *Opuntia echinocarpa*
Opra = *Opuntia ramosissima*
Yusc = *Yucca schidigera*
Oper = *Opuntia erinacea*

3.11.4 Special Status Plant Species

Surveys for special status plant species within the requested ROWs were conducted in February and March 2003 (Knight & Leavitt Associates, 2003). No federally listed threatened or endangered plant species were found during field surveys. Based upon lack of suitable habitat, no federally listed plant species are expected to occur.

Table 3-6 provides a summary of the special status plant species that potentially occur in the Coyote Spring Project area. Las Vegas bear poppy, Las Vegas buckwheat, threecorner milkvetch, halfring milkvetch, sticky buckwheat, and Virgin thistle were identified to possibly occur in the Coyote Spring Project area, but no habitat for these species was found during surveys of the ROWs.

Table 3-6 Special Status Plant Species in the Coyote Spring Project Area

Species	Status	Range and Habitat of Species	Occurrence in Project Right-of-Way
Plants			
Las Vegas bear poppy (*Arctomecon californica*)	NNHP: S3 Clark County MSHCP: Covered	Occurs in Creosote Bush, Blackbrush and saltbush habitat on gypsum soils	No habitat
Las Vegas buckwheat (*Eriogonum corymbosum var. nilesii*)	BLM: Sensitive State: Critically Endangered NNHP: S1 Clark County MSHCP: Evaluation	Occurs in Creosote Bush, Blackbrush and saltbush habitat on gypsum soils	No habitat
Meadow Valley sandwort *(Arenaria stenomeres)*	NNHP: S2 Clark County MSHCP: Evaluation	Occurs on limestone cliffs and canyon walls above creosote bush scrub	Habitat available, but not found during surveys
Threecorner milkvetch *(Astragalus geyeri var. triquetrus)*	State: Critically Endangered Clark County MSHCP: Covered NNHP: S2S3	Occurs in sand or sandy soils in flats, dunes, gullies, and washes in the Muddy Creek formation	No habitat

Table 3-6 Special Status Plant Species in the Coyote Spring Project Area

Species	Status	Range and Habitat of Species	Occurrence in Project Right-of-Way
Halfring milkvetch *(Astragalus mohavensis var. hemigyrus)*	BLM: Sensitive State: Critically Endangered NNHP: S2S3 Clark County MSHCP: Evaluation	Occurs on carbonate soils on ledges, open slopes and along washes in creosote-bursage	No habitat
Nye milkvetch *(Astragalus nyensis)*	NNHP: S3	Occurs in Creosote Bush-Blackbrush habitat	Habitat available - no plants were found during surveys
Sticky buckwheat *(Eriogonum viscidulum)*	State: Critically Endangered NNHP: S2 Clark County MSHCP: Covered	Occurs in sand or sandy soils in flats, dunes, gullies, and washes in the Muddy Creek formation	No habitat
Beaver Dam breadroot (*Pediomelum castoreum*)	NNHP: S3	Occurs in disturbed areas in Creosote Bush scrub and Joshua tree habitats	Habitat available - no plants were found during surveys
Rosy twotone beardtongue *(Penstemon bicolor ssp. roseus)*	BLM: Sensitive NNHP: S3	Occurs in washes, streams bordered by willow and cottonwoods, and adjacent uplands.	Habitat available - no plants were found during surveys
Virgin thistle *(Cirsium virginense)*	NNHP: S1 Clark County MSHCP: Watch	Occurs in open, moist, alkaline clay or gypsum soils	No habitat
Clarke phacelia *(Phacelia filiae)*	BLM: Sensitive NNHP: S2	Occurs mostly in barren areas in saltbush scrub and creosote scrub habitat	Not found during surveys, but recently documented along Highway 168

Potential habitat for the Meadow Valley sandwort, Nye milkvetch, Beaver Dam breadroot (scurfpea), and rosy twotone beardtongue, was identified during field surveys. However, no plants were observed during the field surveys. These plant species are briefly described below.

The Meadow Valley sandwort is a long-lived perennial herb, which occurs on carbonate cliffs, ledges, canyon walls, and rocky slopes, typically above the creosote bush scrub zone at an elevation of 2,900 to 3,600 feet. No plants have been documented in the Coyote Spring Project area, however rock slopes and cliff habitat in the Proposed Action area may be suitable habitat for the Meadow Valley sandwort.

The Nye milkvetch is an herbaceous annual of the Pea family, which is found in a wide elevational range (1,500 to 5,600 feet) in the foothills of desert mountains, calcareous outwash fan and gravelly flats, sometimes in sandy soil, in creosote bush scrub and higher elevational habitats. A record of this species from 1905 documents it in the village of Moapa near the Union Pacific Railroad ROW. No evidence of this plant was encountered during the field surveys, but appropriate habitat occurs in the Moapa Valley portion of the Coyote Spring Project.

The Beaver Dam breadroot (scurfpea) is a low-growing perennial herb that occurs on sandy or sandy gravel soils at elevations of 1,200 to 5,000 feet. No plants have been documented within the Coyote Spring Project area, but there are numerous location records around the Bowman Reservoir and a single record east of Glendale.

The rosy twotone beardtongue is a tall perennial plant that is known to occur in washes north of Las Vegas along Highway 93, in the general region of the Proposed Action area. Appropriate habitat for this species occurs within the Coyote Spring Project area, but no senescent stalks were observed during field inventories.

A population of *Phacelia filiae* was recently documented along Highway 168, approximately 4 miles east of the intersection with Highway 93. There are about 300 to 500 plants growing in barren, light-colored chalky loam on both sides of the highway (James Andre, pers. comm. 2006).

3.12 VISUAL RESOURCES

3.12.1 BLM VRM Classifications

The Visual Resource Management (VRM) process identifies the affected landscapes and assigns visual values based on each landscape's scenic quality, sensitivity to viewers, and distance zones. Scenic quality is determined by evaluating the overall character and diversity of landform, vegetation, water, color, and cultural features. Viewer sensitivity measures the degree of concern for change in the landscape's visual character. Distance zones categorize the landscape's relative visibility from key observation points (KOPs) or travel routes into three zones: foreground-middleground (3 to 5 miles), background (approximately 15 miles), and seldom seen. Classes are determined by evaluating three factors: 1) scenic quality; 2) viewer sensitivity; and 3) distance zones as described previously. VRM Classes I and II are most valued, Class III is moderately valued, and Class IV is the least valued.

The Coyote Spring Project would be located within VRM Classes II and III (BLM, 1998). Management direction of a Class II area (policy VS-1-a) is stated in the RMP as, "…authorized actions may not modify existing landscapes or attract the attention of casual viewers." Management direction of a Class III area (policy VS-1-b) is stated in the RMP as, "…authorized actions may alter the existing landscape, but not to the extent that they attract or focus attention of the casual viewer." In Class II and III areas, ROWs should "be relocated as necessary, buried, or painted a color compatible with their surroundings to ensure scenic integrity."

3.12.2 Existing Visual Resources

The visual conditions of portions of the Coyote Spring Project area have been modified by the Coyote Springs Development in Coyote Spring Valley, existing Highway 168, above ground power transmission facilities, and scattered single-family residences in upper Moapa Valley. Potentially sensitive viewers in the vicinity of the Coyote Spring Project include those from transportation, recreation and residential locations. Views from these areas are open and unobstructed.

To establish a visual contrast rating baseline for existing visual resources, seven KOPs were identified to determine the degree to which visual contrast may be created by the

Coyote Spring Project. The KOPs are identified in Figure 3-3. Photographs of the views from the KOPs are shown in Figures 3-4 through 3-10 and are described below.

KOP No. 1 is a view from Highway 168 approximately one half mile east of the MX-5 well site. An existing visible structure is the LCPD power line that crosses over the road. For the Coyote Spring Project, the pipeline would be located on the right side of the roadway at this location. Vegetation is sparse and predominantly tan and green colored creosote bush, white bursage, scattered yucca, and other native desert flora.

KOP No. 2 is a view from Highway 168 approximately 2,000 feet west of the second staging area. Both a dirt trail and the LCPD power line run along the south side of the paved road. For the Coyote Spring Project, the proposed pipeline would be located on the right side of the roadway at this location, generally paralleling the power line. Vegetation and background views are essentially the same as for KOP No. 1.

KOP No. 3 is a view from Highway 168 facing northwest. The proposed regulating tank would be located on an existing hillside approximately 300 feet north of Highway 168. The regulating tank access roadway would begin just northwest of this view and cut into the existing hillside adjacent to Highway 168. A majority of the access roadway would be located on top of the existing hillside and adjacent to the regulating tank. Vegetation is sparse and predominantly tan and green colored creosote bush, white bursage, scattered yucca, and other native desert flora.

KOP No. 4 is located on Highway 168 just west of the Moapa town limits. For the Coyote Spring Project, staging area 4 and the pipeline would be located on top of the hill immediately to the right of the photograph. The Coyote Spring Project pipeline would follow the roadway on the right (south) side. Existing visible structures are a Moapa town limits sign and the LCPD power line that returns to the Highway 168 corridor from the south. Vegetation and background views are similar to KOP Nos. 1 through 3.

KOP No. 5 is a view from Highway 168 just west of staging area 7. Existing visible structures include the MX-6 well located directly north (left) of the road and the LCPD power line that runs along the north side of the road. For the Proposed Action and Alternative 2, the pipeline would cross the roadway from the south (right) to the north (left) side just beyond the second power line structure and would then parallel the power line on its north side. For Alternative 1, the pipeline would parallel the power line corridor on the north (left) side of the roadway. For the Proposed Action and each alternative, the transmission pipeline would remain on the north (left) side of the roadway from this point to its connection with the MVWD storage reservoir. Vegetation and background views are similar to KOP Nos. 1 through 4.

KOP No. 6 is located on Highway 168 west of staging area 11 and the western most Warm Springs Road intersection, which enters Highway 168 from the south (right). For the Proposed Action and Alternative 2, the transmission pipeline would be located on the north (left) side of the roadway. For Alternative 1, the transmission pipeline would be located along the power line north of the roadway and would not be visible. Nearby existing visible structures include street signs and local overhead power lines. Views of landforms are more flat than previous views, and larger trees –begin to occur along with the creosote bush, white bursage, and other native desert flora.

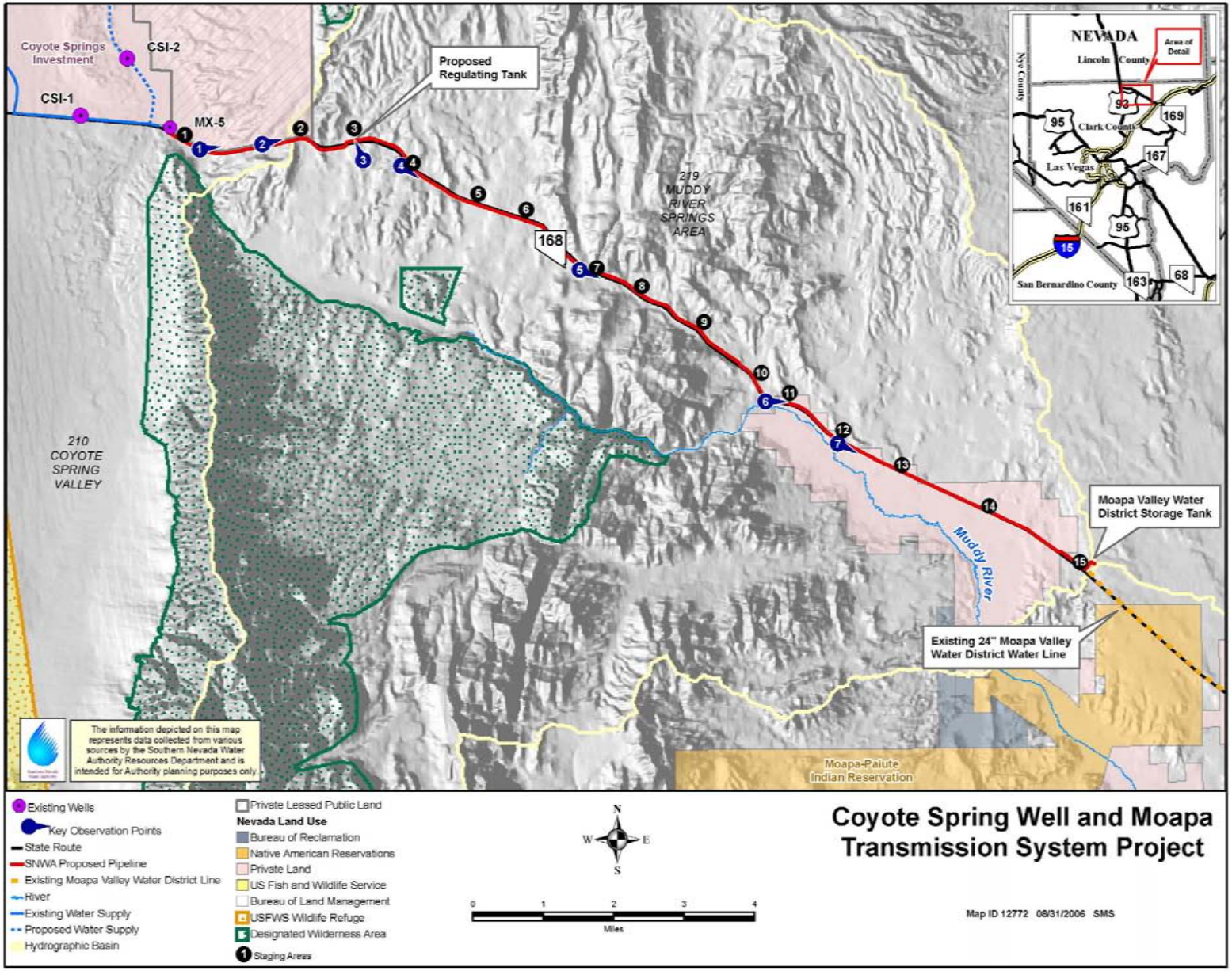

Figure 3-3 Key Observation Points

Figure 3-4 Key Observation Point 1

Figure 3-5 Key Observation Point 2

Figure 3-6 Key Observation Point 3

Figure 3-7 Key Observation Point 4

Figure 3-8 Key Observation Point 5

Figure 3-9 Key Observation Point 6

Figure 3-10 Key Observation Point 7

KOP No. 7 is a view from Highway 168 just west of staging area 12, which would be located on the north (left) side of the roadway. For the Proposed Action and Alternative 2, the pipeline would be located on the north (left) side of the roadway. For Alternative 1, the pipeline would be located along the power line north of the roadway and would not be visible. Existing visible structures include residential homes and out buildings. Views of landforms are relatively flat and vegetation is predominantly sparse tan and green colored creosote bush, white bursage, other native desert flora and large trees, including non-native palms.

3.13 WATER RESOURCES AND HYDROLOGY

3.13.1 Surface Water Resources

The Coyote Springs Project is crossed by several ephemeral washes. These washes rarely carry water except during flood events. Pahranagat Wash, near the MX-5 well site, is the main surface water drainage feature in Coyote Spring Valley. Pahranagat Wash converges with the Muddy River in the upper Moapa Valley.

The Muddy River begins in the upper Moapa Valley. Its flow is derived from regional spring discharge, groundwater seepage from both the alluvial and carbonate aquifers in the Muddy Springs area, and ephemeral flow from Pahranagat and Lower Meadow Valley Wash. Figure 3-11 is a graph of the flow in the Muddy River from the Moapa Gauge (USGS Station Number 09416000). Immediately upstream of the gauge is a

diversion for water to supply Nevada Power Company's Reid Gardner power generation station, which is one of the reasons for the declining trend in the flow record. Other debated theories for decline include climate (drought), shallow alluvial-system groundwater production which has occurred to varying degrees since the first well was drilled in the area in 1947, and more recent (post 1998) carbonate groundwater production. The average annual flow at the Moapa gauge (since records began to be collected in 1913) has been about 42 cfs (USGS, 2006). From 1999 to 2003 (the latest years of published data), the average annual flow was approximately 33 cfs. The maximum discharge that has been recorded was 5,760 cfs in August of 1990. Table 3-7 displays the monthly mean flow data based on historical records.

The Muddy River flows through the towns of Moapa, Glendale, and Overton where its water was historically and still predominantly is used for irrigation. Prior to the construction of Hoover Dam, the river flowed into the Virgin River, a tributary to the Colorado River. Now, the river flows directly into the Overton Arm of Lake Mead.

Springs in the Muddy River area are discussed below under Groundwater Resources, because of their relation to the regional groundwater system.

3.13.2 Groundwater Resources

Coyote Spring Valley is part of the White River Groundwater Flow System, a regional groundwater flow system located in southern Nevada (Eakin, 1966, Harrill et al., 1988, Prudic et al., 1993). As originally defined by Eakin (1966), the flow system encompasses thirteen hydrographic basins, extending over 400 kilometers and terminating at the Muddy Springs area and Lake Mead. These groundwater basins are underlain by carbonate rocks, which comprise the regional carbonate aquifer that transmits groundwater from basin to basin in varying amounts beneath topographic divides. This regional carbonate aquifer varies considerably in thickness, with saturated zones ranging from 4,000 to 17,000 feet thick (Dettinger et al. 1995). The identification of the regional groundwater flow system was based on: (1) the hydrologic properties of the rocks in the area; (2) the movement of groundwater inferred from hydraulic gradients; (3) the relative distribution and quantities of estimated recharge and discharge in the system; (4) the relative uniformity of the discharge of the principal springs; and (5) the chemical composition and warm temperature of the discharge from the principal springs (Eakin, 1966).

Groundwater inflow or recharge to individual basins and the regional carbonate aquifer is primarily through precipitation. Nevada is the most arid state in the United States, and precipitation is strongly dependent on elevation. Most of the precipitation that recharges the flow system occurs as snow in the higher elevations. Interbasin groundwater flow is generally south and southeast though the system. The regional movement of groundwater is influenced by impermeable geologic units and faults such as the Pahranagat Shear Zone (Menard Lake Fault) and Kane Springs fault, which act as barriers to flow. Outflow or discharge from individual basins and the flow system occurs primarily as evapotranspiration (water lost to the atmosphere by transpiration from plants and evaporation from soil). Spring discharge adds to this outflow primarily in three areas: White River Valley, Pahranagat Valley, and Upper Moapa Valley.

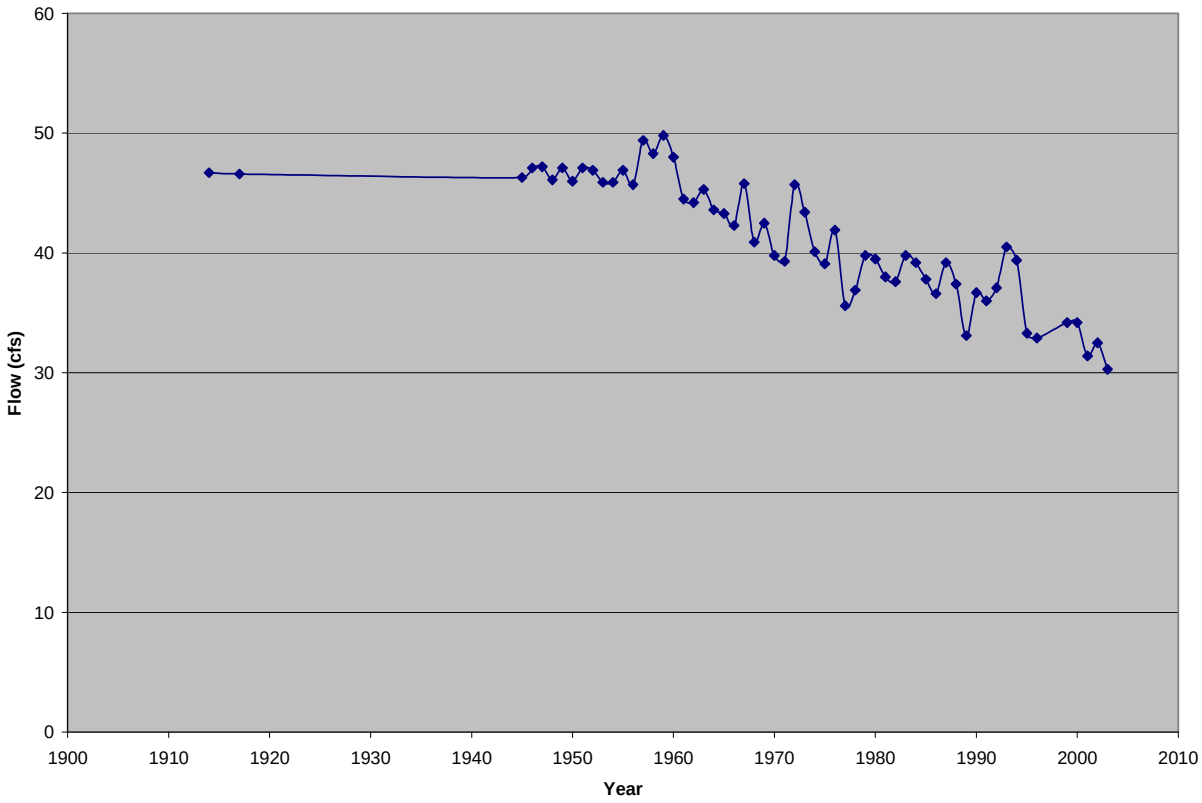

Figure 3-11 Annual Flow at the Muddy River near Moapa (USGS Site Number 09416000)

Table 3-7 Historical Average Monthly Flow Data for the Muddy River (cubic feet per second)

Month	Mean	Maximum	Minimum
January	44.0	55.4	28.6
February	44.3	58.6	30.3
March	43.4	53.5	28.9
April	41.4	52.4	31.0
May	41.1	48.5	33.1
June	38.8	46.1	29.4
July	38.4	56.5	28.7
August	39.2	61.1	27.3
September	40.2	91.2	25.3
October	39.7	61.9	22.7
November	41.9	61.6	26.9
December	43.2	54.9	28.0

Source: USGS, 2006

The Muddy Springs area, also known as the Warm Springs area, is one of the lowest discharge points and potential terminus of the White River Flow System. However, there has been speculation that a portion of the regional flow reaches the Colorado River. Eakin (1966) estimated that approximately 37,000 afy or 51 cfs of discharge occurs in the Muddy Springs area annually from about twenty springs, as well as subsurface seepage. The springs discharge at nearly a constant temperature of 89.6° F (Scoppettone et al., 1992), and occur within an approximately 1.2 mile radius, forming the headwaters of the Muddy River.

The source water for the Muddy Springs is generally accepted to be groundwater from the regional carbonate aquifer flowing beneath Coyote Spring Valley, local recharge from Coyote Spring Valley, and some contributions from Lower Meadow Valley Wash to the northeast and other adjacent basins (Eakin, 1966; Prudic et al., 1993; Thomas et al., 1996; Dettinger et al, 1995; Bassett, 2003). Down gradient of the Muddy Springs area, a normal fault juxtaposes low permeability rock of the Muddy Creek Formation against the carbonate aquifer, forming a barrier of sorts to regional subsurface flow. This low permeability barrier and faulting is likely the reason for the location of the springs (USFWS, 2006).

The carbonate aquifer in Coyote Spring Valley and the Muddy Springs area appears to be highly permeable (ability of water to pass through rock) based on measurements from MX-5 and Arrow Canyon wells (Van Liew et al., 2004). Such high permeability zones are commonly observed upgradient of areas of regional spring discharge. Dettinger et al. (1995) analyzed 39 well tests in southern Nevada and determined that the aquifer transmissivity (rate at which water flows through an aquifer) is on average about 10-20 times greater within 10 miles upgradient from regional springs, than the portion of the aquifer further away.

A shallower alluvial aquifer is also present in the Muddy Springs area. Groundwater in the alluvial aquifer is recharged by infiltration of the surface flow from the springs or subsurface leakage of the springs (Eakin, 1964).

3.13.2.1 Groundwater Rights

The Nevada State Engineer has permitted 16,300 afy of groundwater rights in the Coyote Spring Valley. SNWA currently owns 9,000 afy of these permitted rights. Other major groundwater right holders include Nevada Power Company and CSI. Table 3-8 is an abstract of the permitted rights in Coyote Spring Valley. Prior to 2005, only 200 afy of groundwater for a mine/landfill operation had been developed. CSI began pumping some of its water rights in May of 2005, and pumped approximately 258 afy in 2005.

The MVWD also produces groundwater from the carbonate aquifer in the Muddy Springs area. An understanding of their production is important when discussing the current conditions of the system. In 1990 and 1992, MVWD applied for water rights of an additional 3.0 and 5.0 cfs of groundwater for municipal purposes from the carbonate aquifer in the Muddy Springs area, based on their forecasted growth and additional water needs. The point of diversion for the additional rights was the Arrow Canyon Well (see Figure 1-1). The MVWD had existing water rights in the area, including a right for 2.0 cfs from the Arrow Canyon Well. In 1995, the Nevada State Engineer issued Ruling 4243, which phased in additional groundwater development from 1996 through

2004 along with monitoring to evaluate impacts to springs or groundwater levels (Nevada State Engineer, 1995).

In 1998, pumping at the Arrow Canyon Well was increased to about 2.7 cfs. Since 1998, groundwater pumping by MVWD has averaged 3.3 cfs or 2,400 acre feet annually (Mayer et al., 2004). Concurrent with this increased pumping were several years of below average precipitation (Smith et al., 2004).

3.13.2.2 Groundwater Levels

From 1998 to 2004, water levels in wells in the carbonate aquifer in the Muddy Springs area and Coyote Spring Valley declined up to 3 feet. Figure 3-12 shows the water-level data for three wells in Coyote Spring and Upper Moapa valleys (MX-4, EH-4, and EH-5b). These are the carbonate wells with the longest, most continuous record in the two basins.

Beginning in 2005, water levels in the carbonate wells began to increase. This increase coincided with one of the wettest years on record in southern Nevada, after approximately 6 years of below average precipitation (Temple, 2006 and Smith et al., 2004).

Researchers have debated the cause of declines, but generally attribute them to groundwater production in Muddy Springs area by MVWD (Arrow Canyon production well), climate effects including drought, changes in Lake Mead elevations, or some combination thereof. The degree to which each of these factors is individually or cumulatively responsible for observed declines has been substantially debated, but is generally unknown due to the limited period of record. The USFWS asserts that the pumping of the Arrow Canyon well is solely responsible for the declines in groundwater levels in carbonate wells (USFWS, 2006). The SNWA acknowledges that pumping has an effect on the system but asserts that climate also has a substantial effect on the system (Smith et al., 2004). Information obtained during the Order 1169 pump study will assist in determining the relationship between groundwater development and spring flow behavior.

3.13.2.3 Muddy Springs

There are six major spring groups in the Muddy Springs area: Cardy Lamb, Baldwin, Muddy, Pederson, Plummer and Apcar (Jones) (see Figure 1-1). Due to spring modifications and a lack of data for Cardy Lamb, Baldwin, and Muddy springs, these three are only briefly described below. A more detailed discussion is provided for the Pederson, Plummer and Apcar springs. Other small springs and seeps also occur in the area, including an unnamed spring adjacent to Highway 168 where flow discharges intermittently.

The USGS continuously monitors surface water flows at spring and stream sites in the area (see Figure 1-1). Data from this monitoring is included in the discussions below. The USGS, SNWA, and Nevada Division of Water Resources jointly fund this monitoring.

Table 3-8 Summary of Existing Coyote Spring Valley Water Rights

Owner	Priority Date	Change of Application Date	Application Number	Change of Application	Status	Annual Duty (afy)	Combined Not to Exceed Duty[a] (afy)	Diversion Rate (cfs)	Type of Use
Bedrock Limited	10/24/1985	10/24/1985	V04545	--	VST	4 (as per season)	--		Irrigation
CSI	3/31/1983	9/24/2003	70429	46777	Permit	2,500	4,600	5	
CSI	3/31/1983	9/24/2003	70430		Permit	2,100	0.35	4.2	Municipal
SNWA	3/31/1983	3/31/1983	46777	--	Permit	400	9,000	0.8	Industrial
SNWA	9/27/1985	9/27/1985	49414	--	Permit	4,000		6	Industrial
SNWA	1/27/1986	1/27/1986	49660 to 49662	--	Permit	300 (100 each)		0.14 each	Industrial
SNWA	7/15/1986	7/15/1986	49978 to 49987	--	Permit	10,135 (1,448 each)		2 each	Industrial
Nevada Power Company	12/30/1985	1/6/2003	69448	49608	Permit	2,500	2,500	10 each	Industrial
Bedrock, Inc.	8/11/1995	8/11/1995	61458	--	Permit	200	--	1	Mining and Milling
Bedrock Limited	9/13/1996	9/13/1996	62462	--	Permit	200	--	0.35	Mining and Milling

VST – application for vested rights
[a] The State Engineer, at its own discretion, can group numerous permits together and set a not to exceed annual duty on the set of permits

Source: NDWR, 2005

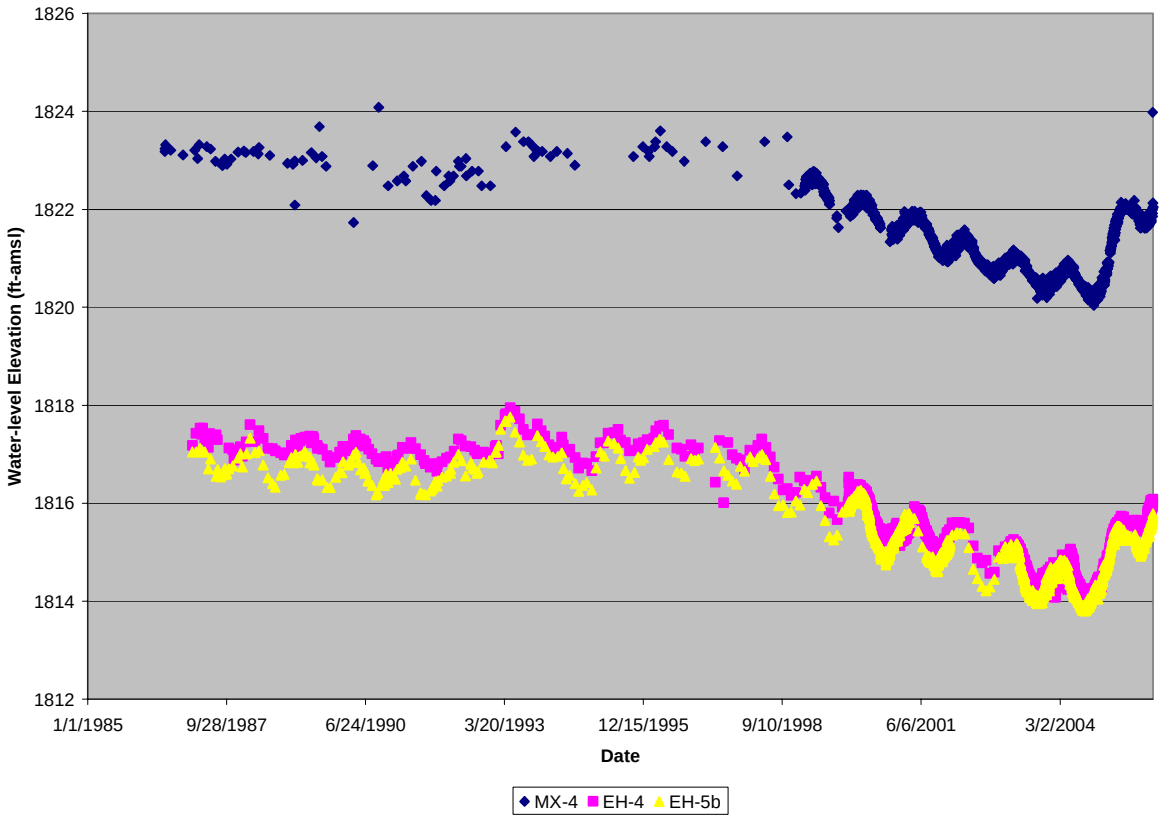

Figure 3-12 Water-levels at Wells MX-4, EH-4, and EH-5b, Coyote Spring Valley and Upper Moapa Valley

Cardy Lamb Spring

Cardy Lamb Spring is located on private property. It fills a large "U" shaped pool that is used as a regulating reservoir for flood irrigating crops. The flow from the pool can be completely cut off while the reservoir fills. The flow from this spring coalesces with the flow from Baldwin Spring to form the South Fork of the Muddy River. Due to the modifications of this spring for agriculture, there is no means of measuring the natural flow of this spring.

Baldwin Spring

Baldwin Spring is located on private property, and is used for municipal supply for MVWD. In 1974 MVWD installed a spring box and pump house at this spring, which is still operating. The orifices of the springs have been covered and a French drain diverts water into the pump house. MVWD has gauged their diversions and bypass flows at Baldwin Spring since 1996 (Susan Rose, MVWD, pers. comm. 2005). The remaining flow after the MVWD diversion forms the South Fork of the Muddy River.

Muddy Spring

Muddy Spring is located on private property. The Church of Latter Day Saints owns water rights for this spring. The USGS has operated a gauge (USGS Station Number 09415900) at the LDS Farm since 1985 (USGS, 2006). The church diversion is upstream

of the gauge and unmeasured making the gauge data problematic. Direct measurements of flow from the Muddy Spring cannot be made due to the modifications for recreation. The USGS gauge downstream of the recreation area approximates the flow of the spring.

Pederson Unit

The Pederson Unit (see Figure 1-1) is located within the MVNWR and contains five major springs or spring groups. Pederson Spring, at an elevation of 1,810 feet, is the highest elevation spring in the Muddy Springs area (Mayer et al., 2004). The other major spring groups range in elevation from 1,792 to 1,807 feet (Mayer et al., 2004).

The USFWS holds a non-consumptive water right for spring discharge on the Pederson Unit, with a priority date of 1991. The water right is for 3.5 cfs as measured at the Warm Springs West flume.

Warm Springs West: The USGS monitors the total spring discharge from the Pederson Unit of the MVNWR through a 1-foot Parshall flume at the Warm Springs West gauge (USGS Station Number 09415920) (Figure 3-13). The site has been monitored continuously since 1985, except for a data gap from October 1994 through May 1996, due to a lack of funding. Until January 1998, there was an un-metered irrigation diversion upstream of the Warm Springs West flume. The diversion was setup such that water in excess of the irrigation needs could be returned to the stream channel, but downstream of the flume. Water was probably not diverted continuously, however, there is no record of when the diversion was open or closed or how much water was diverted. The flow that was diverted for irrigation was not accounted for in the flume measurements, resulting in the periodic underestimate of the total spring discharge from the MVNWR. For this reason, the period of record prior to January 1998 is problematic. The diversion was metered by MVWD beginning in February 1998. The farmer ceased irrigating through this diversion after May 1999, and no water has been diverted since that time.

The Warm Springs West flume showed a notable decline in flow corresponding to the 1998-2004 period when groundwater level declines were also observed. In February 2001, flow was 3.8 cfs (USGS, 2006). Mayer et al. (2004) noted that flows decreased after that, attributing the decline to groundwater pumping at Arrow Canyon. However, in November 2004, flows began increasing, though Arrow Canyon pumpage remained relatively constant. Since January 2005, the average monthly flows have exceeded 3.5 cfs. In July and August 2005, flows even exceeded the February 2001 average, based upon preliminary USGS data (USGS, 2006).

Pederson and Pederson East: The USGS also monitors the total spring discharge from Pederson and Pederson East springs, individually (USGS Station Numbers 09415910 and 09415908, respectively). Pederson Spring has been monitored continuously since 1986, except for the same gap due to lack of funding mentioned above. In March 2003, the USGS reported a seep below the weir, which had previously been observed, that was now more significant and warranted replacement of the weir. A new calibrated weir and concrete retaining wall was installed cooperatively by the USGS, USFWS, and SNWA in 2004. The Pederson East weir was installed in 2002 and has been monitored continuously to date. Figure 3-14 shows the spring flow at the Pederson and Pederson East springs.

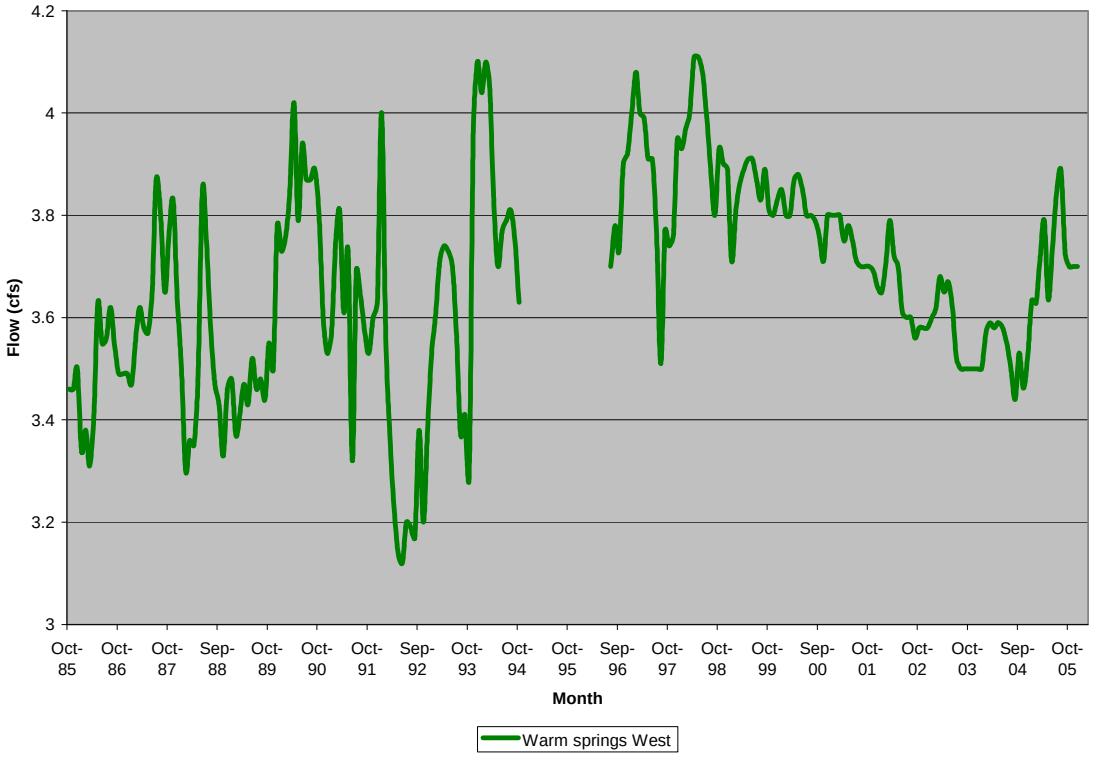

Figure 3-13 Warm Springs West Flow Data

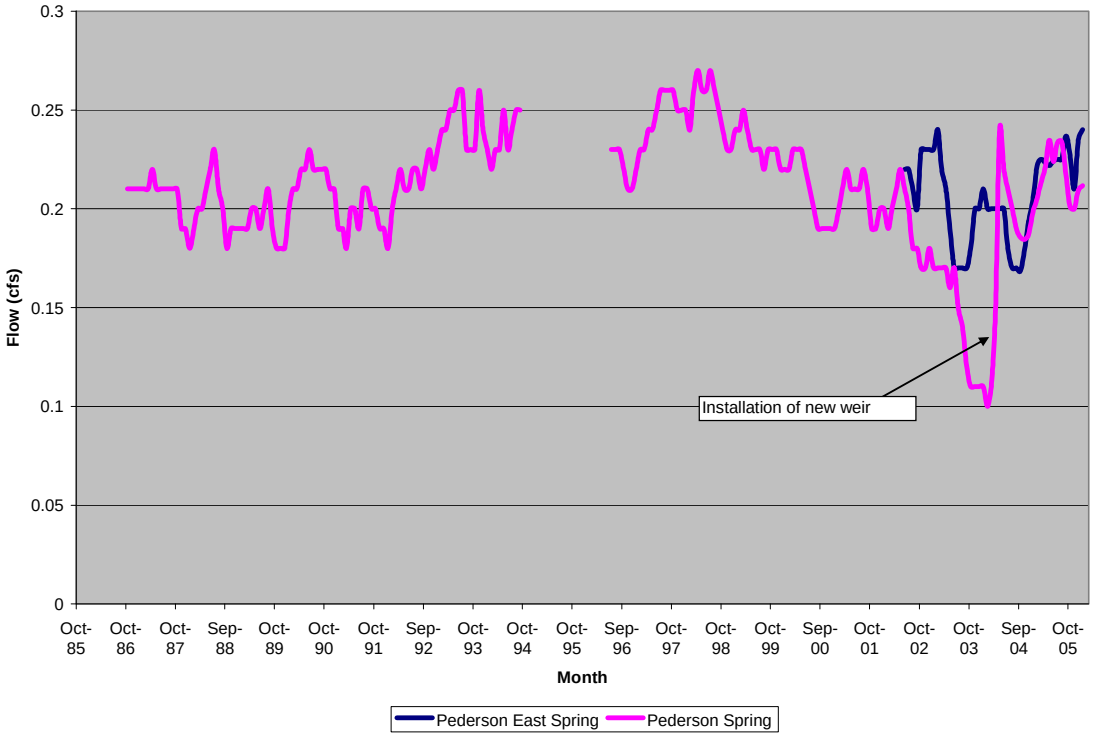

Figure 3-14 Pederson and Pederson East Spring Flow Data

Using a formula known as Darcy's law (flow rate through porous material is proportional to head loss and inversely proportional to the length of the flow path), the USFWS postulates that the higher elevation springs would respond first to a decrease in water levels. The USFWS has done detailed research using Darcy's law to predict spring flow declines based on declines in groundwater levels (Mayer, 2004; Mayer et al., 2004; USFWS, 2006). According to this theory, the higher elevation Pederson and Pederson East springs would be the first to decline due to groundwater pumping, and then declines would decrease in percentage as elevation decrease.

However, when data collected while the weir was leaking is excluded, the higher elevation Pederson spring does not show the same declines as observed at Warm Spring West during the 1998-2004 period. Since the new weir was installed, the monthly average flow at Pederson and Pederson East springs is about 0.2 cfs, which is the same as their historical average.

Plummer Unit

The Plummer Unit is located just east of the Pederson Unit, within the MVNWR (see Figure 1-1). It contains three major springs: Plummer West, Plummer Central, and Plummer East. The elevations of all three of the springs are about 1,755 to 1,760 feet, which is lower than the springs on the Pederson Unit. The total spring discharge from the Plummer Unit averages about 2.5 cfs, based on periodic measurements by the USFWS and the USGS. In February 2001, a flow of 2.4 cfs was reported (USGS, 2001).

The discharge from the Plummer and Pederson units combines to become the Refuge Stream, downstream of the MVNWR boundary (see Figure 1-1). The Iverson flume gauging station (USGS Station Number 9415927) on the Refuge Stream measures the flow leaving the MVNWR, plus any additional losses or gains between the MVNWR boundary and the gauging station. In February 2001, a flow of 8.0 cfs was reported at the flume, with an additional 1.1 cfs being diverted upstream of the flume, for a combined total of 9.1 cfs (USGS, 2001). The combined total at the Iverson flume was about 150 percent of the sum of the two flows measured upstream on the same day at Warm Springs West gauge and Plummer Unit (USGS, 2001). This increased downstream flow is assumed to result from subsurface seepage gain into the stream channel along this reach.

Apcar Unit

The Apcar Unit is located within the MVNWR (see Figure 1-1). There is just one spring emanating in this area: the Apcar Spring, which is also known as the Jones Spring. The spring has been used for municipal supply since 1960, when a spring box and pump house was installed. MVWD subsequently has installed a new pump house. This water is diverted to the south and used by businesses and residences in Moapa Valley. The elevation of the spring orifice is reported to be 1,788 feet, although the orifice is buried and the elevation may be difficult to determine accurately. Flows from Apcar Spring are measured by MVWD and have averaged about 1.5 to 1.6 cfs since January 2001 (Susan Rose, MVWD, pers. comm. 2005).

The MVWD currently continuously diverts 1.0 cfs of the total flow from Apcar Springs for municipal use (Water Right Certificate Number 10060). The remaining portion of the spring discharge flows east into Apcar Stream. The February 2001 seepage run documented that the Apcar Stream is gaining 2 to 3.3 cfs downstream of the Jones Spring

to the confluence with the Refuge Stream (USFWS, 2006). This additional flow is assumed to result from un-metered springs on private property and subsurface seepage gain into the stream channel. According to annual reports from MVWD, the flow at Apcar has decreased in the last six years from about 2 to 1.5 cfs, with a large decrease occurring in 2000 (from an average of 1.9 cfs in 1999 to 1.6 cfs in 2001) (Susan Rose, MVWD, pers. comm. 2005).

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter discusses the effects of the Proposed Action, Alternatives 1 and 2, and the No Action Alternative on the affected environment described in Chapter 3. This analysis addresses direct, indirect, and residual environmental effects. These types of effects are defined as follows:

Direct effects are those impacts associated with the granting of the proposed ROW that directly or immediately affect the environment. These effects could include temporary and permanent effects from construction and continued disturbances to the area during operation and maintenance.

Indirect effects are caused by or result from the Proposed Action or Alternatives, are uncertain in time but are reasonably certain to occur. These could include effects of groundwater pumping outside the proposed ROW.

Residual effects are those effects that would remain after the implementation of appropriate mitigation measures.

Cumulative effects are the environmental impacts of the Proposed Action or Alternatives, which when added to other past, present and reasonably foreseeable future actions, have the potential to cause incremental impacts. Cumulative impacts are addressed in Chapter 5.

Within each environmental topic area described below, the evaluation considers potential impacts within a "resource analysis area." Resource analysis areas are the spatial or temporal areas in which there is a potential for environmental effects, and can differ for each environmental resource. For example, the resource analysis area for Water Resources may extend well beyond the physical boundaries of the ROW due to the nature of subsurface groundwater flows, while the resource analysis area for Noise would be limited to the immediate vicinity of the ROW since noise levels decrease rapidly with distance.

4.1 CLIMATE AND AIR QUALITY

The air quality resource analysis area is the ROW, the immediate vicinity of the Proposed Action and Alternatives, and Basins 210 (Coyote Spring Valley), 219 (Muddy River Springs Area/Upper Moapa Valley), and 220 (Lower Moapa Valley).

4.1.1 Proposed Action

Construction of the Coyote Spring Project would generate incremental contributions to cumulative PM_{10} emissions as a result of equipment exhaust and fugitive dust generated by land disturbance such as grading and trenching. Construction is exempt from regulation under Section 12 (New Source Review) of the DAQEM rules and regulations, but is subject to Section 94 (Permitting and Dust Control for Construction Activities).

During operation, permanent facilities, including pipelines, regulating tank, and power facilities would not emit air contaminants. The Proposed Action is not a "stationary source" as defined in the DAQEM rules and regulations.

The Clean Air Act requires federal agencies to ensure that their projects conform to the provisions of State Implementation Plans. Thus, a federal agency cannot approve or

support an action which causes or contributes to new violations of any ambient air quality standard, increases the frequency or severity of existing violations of any standard, or delays the timely attainment of any standard or any required interim emission reductions or milestones. The construction and operation of the proposed facilities are not subject to a conformity determination because the action would not result in any emission increases not accounted for in the County's clean air plans.

4.1.1.1 Equipment Exhaust Emissions

Construction equipment generates exhaust emissions during use. Exhaust emissions from operation of construction equipment would not contribute substantially to any existing air quality violation or interfere with the implementation of any air quality attainment plan. Construction phase equipment exhaust emissions would cease at the end of construction. During operation, proposed facilities would be powered by electricity, and the use of emission-producing equipment is not planned. During maintenance, there would be only minor and infrequent use of equipment.

4.1.1.2 Fugitive Dust Emissions

Construction activities such as land clearing, ground excavation and backfilling, grading, and construction of structures generate fugitive dust emissions that may impact air quality, both locally and regionally. Fugitive dust emissions vary substantially from day-to-day depending upon the exact operation and mix of construction equipment utilized, soil type and moisture, and meteorological conditions.

According to the PM_{10} State Implementation Plan (Clark County Department of Air Quality and Environmental Management, 2001), general construction sites involving cut-and-fill areas can generate fugitive dust at an average of 0.42 tons per acre of ground disturbed per month of construction activity. For analytical purposes it is assumed that for construction activities to complete 0.65 miles of pipeline per month along an 80-foot wide average ROW (30 feet permanent and 50 feet temporary) about 274,400 square feet, or 6.3 acres, of ground per month would be disturbed. This results in a maximum of 2.65 tons of fugitive dust per month.

Dust control activities would be implemented in accordance with DAQEM permit requirements for construction activities under Section 94 of its rules and regulations, including implementation of an approved dust control plan. A dust control plan includes provisions for the watering of active construction sites to prevent the emissions of fugitive dust and measures to prevent track-out of soil onto paved highways, among other measures as required by the County. In accordance with the PM_{10} State Implementation Plan, a 68 percent emission control factor applies when implementing a dust control plan (Clark County Department of Air Quality and Environmental Management, 2001). This would reduce maximum dust emissions to about 0.85 tons per month, based on the most intense construction equipment and personnel mix (Appendix D). These temporary dust emissions would not result in a violation of, or interfere with attainment of, an air quality standard.

Construction emissions would cease at the completion of construction. Implementation of an approved dust control plan in accordance with the County's air quality regulations

would reduce dust impacts during construction. Project operations do not involve the use of emission-producing equipment as the facilities would be powered by electricity.

4.1.2 Alternative 1

Daily construction activity would be the same as described for the Proposed Action. Alternative 1 is approximately 4,330 feet shorter than the Proposed Action, so the overall duration of the construction period may be slightly shorter. However, an additional 30 acres would be disturbed under Alternative 1. The monthly construction characteristics and monthly emissions impacts of Alternative 1 would be the same as described for the Proposed Action (Chapter 4.1.1).

4.1.3 Alternative 2

Daily construction activity would be the same as described for the Proposed Action. Alternative 2 is approximately 1,280 feet longer than the Proposed Action, so the overall duration of the construction period may be slightly longer. An additional 43 acres would be disturbed under Alternative 2. The monthly construction characteristics and monthly emissions impacts of Alternative 2 would be the same as described for the Proposed Action (Chapter 4.1.1).

4.1.4 No Action Alternative

Under the No Action Alternative, BLM would not issue rights-of-way on federal land for construction of the Coyote Spring Pipeline, and potential impacts to air quality from construction on federal lands would not occur. However, SNWA would still need to pursue the pumping test and study required by Order 1169. As a result, for the No Action Alternative, it is anticipated that SNWA would still conduct two years of groundwater pumping on private lands in Coyote Spring Valley, which would not require federal approvals or permits.

For comparison with the Proposed Action and other alternatives in this document, it is anticipated that the No Action Alternative would involve groundwater pumping and irrigation of an agricultural crop on private land. In accordance with Eakin (1964), the agricultural use rate in the Upper Moapa Springs area is at least 5 acre-feet of water per acre per year. Approximately 1,800 acres could therefore be irrigated with 9,000 afy of pumped groundwater. A center pivot irrigation system can irrigate a 120-acre circle of a 160-acre area, thus a total agricultural area would be approximately 2,400 acres. For this analysis, an approximate location of an irrigated area on private lands in Coyote Spring Valley is shown on Figure 4-1. The crop grown on the site is assumed for this analysis to be alfalfa, cut three to four times per year, baled, and transported off-site. This area is planned for eventual development by CSI, but is part of their later development phases. It is anticipated that major drainages, including the Pahranagat Wash, would be avoided, in accordance with the terms of permits from and agreements with the COE and Environmental Protection Agency (EPA) for the Coyote Springs Development (ENTRIX et al., 2005).

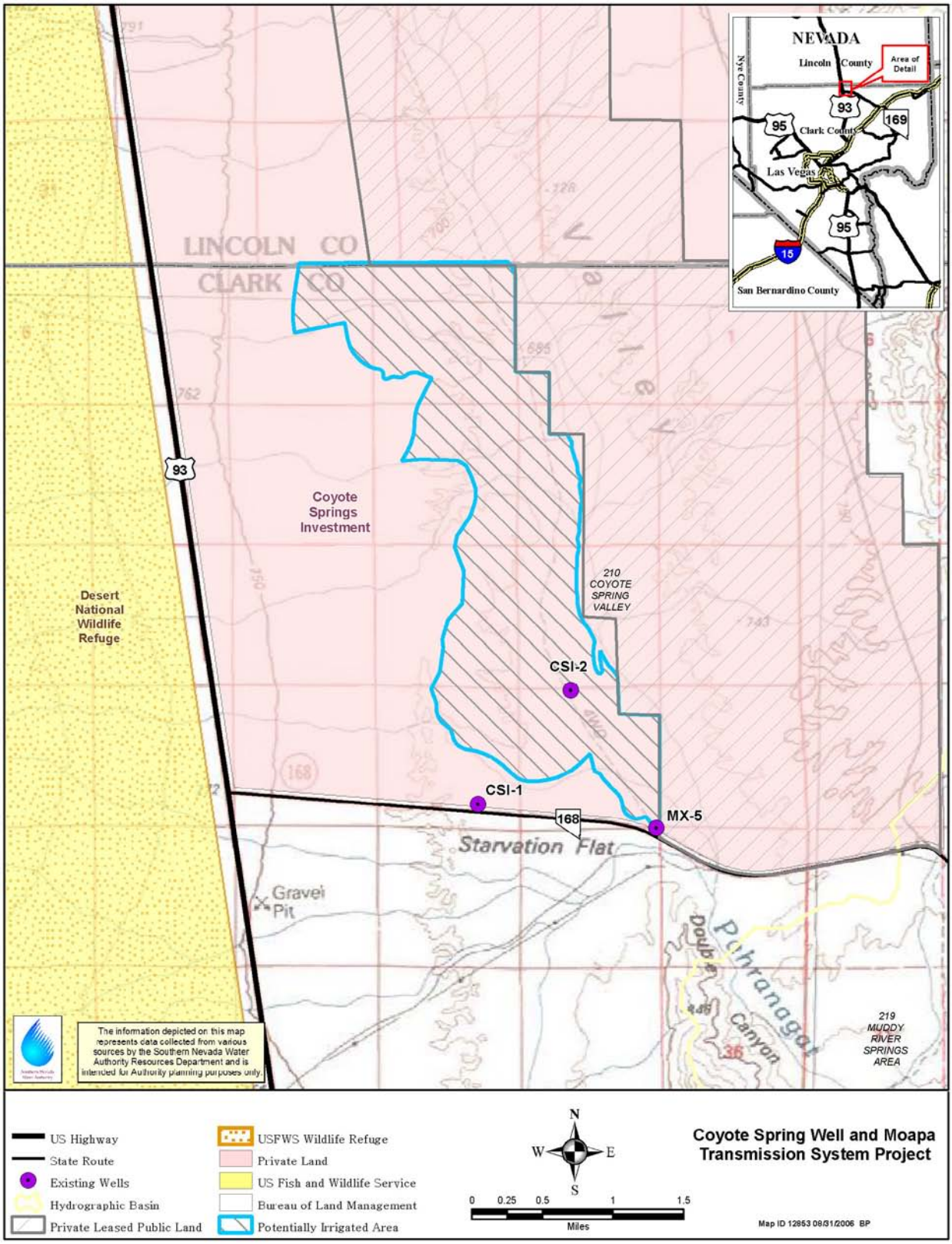

Figure 4-1 No Action Alternative

Potential air quality impacts associated with this anticipated groundwater pumping and agricultural development on private land under the No Action Alternative would include fugitive dust emissions and equipment exhaust emissions associated with clearing and grading activities. These 2,400 acres of private land have already been approved for disturbance as part of the Coyote Springs Development, but under the assumed No Action Alternative the disturbance would occur now, instead of in 14 to 20 years. Fugitive dust control measures and construction equipment control measures would be implemented as identified for the Coyote Springs Development (ENTRIX, 2005).

4.2 CULTURAL AND PALEONTOLOGICAL RESOURCES

The resource analysis area for cultural and paleontological resources is the ROW and immediate vicinity for the Proposed Action and Alternatives.

4.2.1 Proposed Action

4.2.1.1 Cultural Resources

A total of 21 cultural resource sites were identified within ½ mile of the Proposed Action alignment. In consultation with the SHPO, BLM determined that a Class III field survey of the Proposed Action area was not necessary since the Proposed Action area had been previously surveyed. However, relocation and re-evaluation of four sites (26CK1654, 26CK1692, 26CK1696, and 26CK2954) was necessary in order to determine their eligibility for nomination to the National Register of Historic Places (NRHP).

During the re-location and re-evaluation efforts, HRA determined that three of the sites were located outside of the proposed ROW (26CK1654, 26CK1692, 26CK2954). The other site (26CK1696) was re-recorded and evaluated. The site consisted of a lithic scatter, containing approximately 100 artifacts, and two shards of ceramic pottery. The site had evidence of recent disturbance associated with trenching and boring activities due to the site's close proximity to a modern trash dump.

BLM determined that, although located outside of the proposed ROW, one of the sites (26CK2954) was within the APE. The APE was determined based on the potential for the Proposed Action to increase the likelihood for damage/vandalism to occur to the site. The site consisted of numerous lithic artifacts associated with a rock shelter. Since the site appeared to be undisturbed, BLM determined that a re-recording and determination of eligibility to the NRHP of this site (26CK2954) was necessary.

Based on the site visits and re-recording of the two sites (26CK1696 and 26CK2954), the following recommendations regarding eligibility for NRHP listing were made:

- Site 26CK1696, was recommended as not eligible under any criteria for listing. Additionally, HRA, upon completion of the re-recordation of the site found no evidence that the site had any further research potential. Therefore, BLM determined that no further work was necessary at this site.
- Site 26CK2954, was recommended as eligible for listing under criteria D. During the re-recording effort, a high density of surface artifacts and indications of a sub surface component were identified that had the potential to yield more specific information about the site. Therefore, BLM determined that additional work was necessary in order to recover the potential site information.

An archeological site Treatment Plan was developed and approved for the mitigation of site 26CK2954 in consultation with BLM, SHPO, and Native Americans. In May 2003, field data recovery efforts were completed in accordance with the approved treatment plan. The final data recovery report was completed in 2006 (HRA, 2006). In a letter dated June 22, 2006, the SHPO concurred with the BLM's determination that the National Register values of 26CK2954 had been recovered. The Proposed Action would not affect any historic properties.

4.2.1.2 Paleontological Resources

No paleontological sites have been identified within or immediately adjacent to the proposed ROWs. One paleontological locality in the Muddy Creek Formation has been documented on CSI land approximately ¼ mile north of the MX-5 site. Another locality in the Muddy Creek Formation has been documented approximately ½ mile south of the proposed pipeline, on the east side of Table Mountain. However, while geologic units along the proposed ROWs are fossiliferous, diagnostic fossils are found infrequently and in localized concentrations.

Construction of the Proposed Action has the potential to disturb previously unknown fossils that may be present within the requested ROWs. In accordance with BLM's standard ROW grant stipulations, in the event that any paleontological resources are discovered on federal lands during construction, the BLM would be immediately notified. Construction activities in the immediate area of the find would cease until BLM has evaluated the find, and determined and implemented appropriate recovery actions. Potential actions may include recovery, recordation and curation of the find, depending upon the specific nature of the discovery. Construction activities in the area of the find would not resume until completion of the mitigation measures.

As geologic units in this area are known to contain fossils, the following mitigation measures are proposed:

- A qualified paleontologist would conduct a field review of the surface exposures of geologic units on the proposed ROWs prior to the initiation of construction, to determine if any fossils are visible and to identify areas with a high potential for discovery of paleontological resources.
- A qualified paleontologist would monitor excavation activities in designated areas on federal lands determined to have a high potential for discovery of paleontological resources.

In the event that paleontological resources are discovered on private lands during construction, the landowner would be notified immediately. Handling and disposition of any finds would be conducted at the discretion of the landowner.

4.2.2 Alternative 1

A total of 40 cultural resource sites were identified within ½ mile of the Alternative 1 alignment. Of those, 8 sites are located within 200 feet of this alternative. Two of those sites have been determined potentially eligible to the NRHP, one was not eligible, and the remainder are unevaluated. If this alternative were selected, additional evaluation of those sites and possibly additional site specific field surveys may be necessary. If sites

determined potentially eligible to the NRHP are located within the APE for this alternative, treatment would be required before Alternative 1 could be constructed. Archaeological treatment and consultation with SHPO would be conducted as required to meet BLM's Section 106 requirements.

As described above for the Proposed Action, no paleontological sites have been identified within or immediately adjacent to this alternative. However, there may be the potential for isolated fossils to be found within the alluvial sediments. BLM's standard ROW grant stipulations and proposed mitigation measures would be the same as described for the Proposed Action.

4.2.3 Alternative 2

A total of 21 cultural resource sites were identified within ½ mile of the Alternative 2 alignment. However, none of those sites are located within 200 feet of this alternative. If this alternative were selected, additional evaluation of those sites and possibly additional site specific field surveys may be necessary. If sites determined potentially eligible to the NRHP are located within the APE for this alternative, treatment would be required before Alternative 2 could be constructed. Archaeological treatment and consultation with SHPO would be conducted as required to meet BLM's Section 106 requirements.

As described above for the Proposed Action, no paleontological sites have been identified within or immediately adjacent to this alternative. However, there may be the potential for isolated fossils to be found within the alluvial sediments. BLM's standard ROW grant stipulations and proposed mitigation measures would be the same as described for the Proposed Action.

4.2.4 No Action Alternative

No cultural sites or paleontological resources located on federal lands would be disturbed under the No Action Alternative. However, for this No Action analysis, it is anticipated that approximately 2,400 acres of private land within Coyote Spring Valley would be disturbed from grading and production of agricultural crops (Figure 4-1). This land has already been planned for disturbance as part of the Coyote Springs Development. CSI has been implementing a Cultural Resource Management Plan, consistent with a MOU with SHPO (CSI, 2005). This plan established study methods, including level of investigation, testing, analysis, and record keeping prior to land disturbing activities. Cultural resource field surveys have been completed for the entire Coyote Springs Development area, including the lands that would be used under the No Action Alternative, and sites potentially eligible to NRHP have been identified. Treatment of six sites in a portion of the property has already been completed. Treatment of NRHP-eligible sites in the remainder of the development area will be completed prior to any disturbing activities.

The Muddy Creek Formation, and older and younger alluvium underlie the area that would be disturbed by the No Action Alternative. These units are identified as having high paleontological sensitivity, although diagnostic fossils are infrequent at best and only occasionally are localized concentrations found (BLM, 2004). Since the No Action Alternative would be conducted on private land, handling and disposition of any fossils that may be found would be at the discretion of the private landowner.

4.3 FISH AND WILDLIFE RESOURCES

The resource analysis area for Fish and Wildlife Resources includes the ROW and immediate vicinity of the Proposed Action and Alternatives, and the Muddy Springs area.

4.3.1 Proposed Action

4.3.1.1 Federally Listed and Candidate Species

The desert tortoise is the only federally listed species that may occur within the ROWs for the Proposed Action. Two other federally listed and one candidate species (Moapa dace, western yellow-billed cuckoo, and southwest willow flycatcher) are known or have the potential to occur in the Muddy Springs area, and have the potential to be affected by the proposed groundwater pumping. Potential impacts to each of these species are discussed below. The Yuma clapper rail has never been documented in the Coyote Spring Project area, or within the Muddy Springs or upper Moapa Valley area, so no impacts to this species would occur from the Proposed Action.

Desert Tortoise

Construction and operation of the Proposed Action has the potential to impact desert tortoise and desert tortoise habitat. Desert tortoise surveys have been conducted, and the area is occupied habitat for the species.

Desert tortoises may be subject to direct mortality or injury from crushing by construction equipment, being entombed in burrows during initial site grading, or vehicle strikes. Potential indirect effects to desert tortoise from construction activity include degradation of soil due to fuel contamination, harassment from human presence, and increased levels of noise and vibration due to construction equipment movement or blasting, as well as loss of cover due to crushing and/or removal of vegetation. Special status species protection measures included in the Proposed Action (Chapter 2.1.8.1) would reduce potential mortality or injury of desert tortoises during construction and operation.

A total of approximately 121.7 acres of potential desert tortoise habitat would be disturbed by construction of the Proposed Action (Table 4-1). A portion of the project within the upper Moapa Valley, along Highway 168, is located on *Atriplex* sp.-dominated silty soils that are not suitable habitat for desert tortoise (Wildland International, 2003). However, of the project total, 109.6 acres (federal and private lands) are within desert tortoise critical habitat (Mormon Mesa Critical Habitat Unit). The majority of the critical habitat disturbance would be land that is within the NDOT ROW for Highway 168. Only 9 acres of critical habitat on federal land outside of the highway ROW would be disturbed.

Habitat restoration would be conducted for all federal lands disturbed by construction of the Proposed Action, with the exception of about 3.5 acres that would be occupied by permanent above ground facilities (regulating tank, power pole sites, and power tap structure) (Chapter 2.1.8.5). Restoration on private lands would be at the discretion of the private landowner, and could be affected by the private landowners' plans for their

Table 4-1 Desert Tortoise Habitat Disturbed by the Proposed Action (acres)

	Water Facilities	Power Facilities	MVWD Improvements	Total
Within Critical Habitat				
Private Land	11.8			11.8
BLM Land within NDOT ROW	87.8	1.0		88.8
BLM Land outside NDOT ROW	5.4	3.6		9.0
Outside Critical Habitat				
Private Land				0
BLM Land within NDOT ROW	6.7			6.7
BLM Land outside NDOT ROW	5.4			5.4
Subtotal Desert Tortoise Habitat	114.1	4.6	0	**121.7**
Other				
Previously disturbed lands (public and private) [a]	15.2	0.1	4.4	19.7
Non-tortoise habitat [b]	45.0			45.0
Project Total Disturbance	177.3	4.7	4.4	**186.4**

[a] Previously disturbed lands as shown on this table refer to existing utility lines (power, fiber optic, and water lines) and roads and trails.

[b] Non-habitat areas consist of *Atriplex* sp.-dominated fine soils in the upper Moapa Valley area that are not suitable habitat for desert tortoise.

property. The Clark County MSHCP accounts for the disturbance and loss of desert tortoise habitat on private lands in the county, and the Proposed Action would comply with payment of the mitigation fee and other requirements of the MSHCP.

Moapa Dace

The major threats to the continued existence of the Moapa dace are: (1) loss of suitable habitat caused by reduced spring discharge/water flows; (2) loss of suitable habitat and direct predation resulting from the presence of non-natives species such as tilapia; (3) degradation and loss of suitable habitat resulting from habitat modification and increased occurrence of fire facilitated by non-native vegetation invasion; and (4) a restricted distribution, which increases the species' vulnerability to catastrophic and stochastic events (USFWS, 2006).

There is no habitat for Moapa dace within the ROWs for the Proposed Action. However, groundwater pumping associated with the Proposed Action has the potential to reduce spring flows in the Muddy Springs area, which is habitat for the endemic Moapa dace.

Decreased flows in the headwater spring channels of the upper Muddy River could result in a decrease in width, depth, and/or velocity, resulting in a loss of overall habitat available to the Moapa dace. Additional factors include changes in sediment transport

and the alteration of riffle and pool areas. A decrease in velocity and depth within riffles would decrease invertebrate and phytoplankton (food) production. Less water flow and available food could result in smaller fish, thus reducing overall reproductive potential. Additionally, as the area of spring channels decrease, vegetation can encroach and further obstruct the channels.

Groundwater modeling and calculations that extrapolate current groundwater trends, project that spring flows of the Muddy Springs could decline up to 1.2 cfs (Chapter 4.13.1.2). While the assumptions of the extrapolation analysis are simplified and this level of potential impact is considered uncertain, the USFWS used the assumption of a 1.2 cfs decline at the Warm Springs West flume as a boundary for potential worst-case conditions in calculations of potential effects to the species in the programmatic BO for the MOA (USFWS, 2006).

The USFWS conducted hydraulic geometry modeling of the surface water channels for the Pederson Unit to predict the effect of reduced spring flows on Moapa dace habitat (Otis Bay, Inc., 2003). The Pederson Unit was selected because, as the highest elevation spring, it is believed by USFWS to be more susceptible to decreases in groundwater levels than lower elevation springs. At 2.7 cfs, the USFWS analysis estimates a loss of 31 percent of flow on the Pederson Unit from 1998 conditions. This loss in flow is estimated to reduce available riffle habitat by 22 percent and pool habitat by 16 percent within the Pederson Unit (USFWS, 2006).

The withdrawal of 9,000 afy of groundwater under the Proposed Action is approximately 56 percent of the cumulative groundwater withdrawal evaluated by the USFWS. The USFWS has used an assumption that the amount of Moapa dace habitat loss attributable to project pumping is directly related to the amount of water that the project withdraws from the carbonate aquifer, relative to the total amount withdrawn by all parties under the MOA. Therefore, the withdrawal of 9,000 afy under the Proposed Action would equate to a loss of riffle and pool habitat from 1998 conditions of 12 percent (56 percent x 22 percent) and 9 percent (56 percent x 16 percent), respectively.

In addition to the loss of habitat, decreased flows may also result in a loss of temperature that would extend downstream, thereby reducing the thermal load in the system and thus the amount of available habitat at the appropriate spawning temperature. The loss in flow and habitat could further impact Moapa dace by restricting its reproductive potential and make it more vulnerable to catastrophic events such as wildfire.

A reduction in flow from the Pederson Unit would also decrease flow at the confluence of the Refuge Stream with the Muddy River. The USFWS (2006) predicted a 6 percent decline in flow at this location, based on the 2001 seepage run and a reduction in flow from the Pederson Unit down to 2.7 cfs. While a relatively minor reduction, the Pederson Unit is considered very important to the reproduction and recruitment of Moapa dace throughout the system. The available spawning habitat on the Plummer and Apcar Units and the Refuge Stream would not be as affected by groundwater pumping since they are lower in elevation and would continue to provide adequate spawning habitat (USFWS, 2006).

The conservation measures included as part of the Proposed Action (Chapter 2.1.7) are intended to offset the potential impacts identified above and to minimize potential effects

to the Moapa dace. These benefits, as identified by USFWS (2006), are summarized below:

- Guaranteed groundwater pumping reductions - this measure would provide certainty that, if the proposed groundwater pumping does in fact lower spring flows, the pumping would be substantially reduced.
- Dedication of the MVWD Jones Spring water right – dedication of an additional 1.0 cfs for Moapa dace recovery would provide additional water to support important spawning habitat that is currently not available to the Moapa dace, increase the habitat available to the Moapa dace both on the Apcar Unit and downstream, provide additional spawning habitat downstream by increasing the thermal load in the system. This could contribute to an increase in reproduction and distribution of Moapa dace within the Apcar system. An expanded species distribution would provide a more secure population since the species would not be as vulnerable to catastrophic events. By providing 724 afy to MVWD through the proposed facilities, SNWA is facilitating the dedication of the Jones Spring water right.
- Improve/Restore Moapa dace habitat on the Apcar Unit of MVNWR – the funding provided by SNWA would be used to restore habitat conditions on this unit, which has the potential to support a much larger number of Moapa dace. Improved habitat and the additional dedicated flows described above would allow the Moapa dace to increase its distribution and population levels.
- Eradicate non-native fishes in Muddy Springs area – the funding provided by SNWA would assist in the removal of non-native tilapia, which has had a devastating effect on the Moapa dace. Removal of tilapia from 3.8 miles of the upper Muddy River would substantially increase the Moapa dace population, and the potential for a return to previous population levels when there were over a thousand Moapa dace in this reach.
- Construct fish barriers in the Muddy River – the funding provided by SNWA, in conjunction with funding already secured by BLM and the USFWS, would be used to construct a set of fish barriers on the Muddy River to prevent further migration of non-native fishes, especially tilapia. Fish barriers are essential to the overall effort to remove tilapia from the system to benefit the Moapa dace.
- Development of a RIP – funding would be provided by SNWA to develop this program, to identify, prioritize, and fund recovery measures, to accomplish protection and recovery of Moapa dace.
- Development of an ecological model for the Moapa dace – funding provided by SNWA, in addition to funding that would be provided by the USFWS, would be used to assess the physiological and biological needs of the Moapa dace. This model may assist in making critical management decisions and assist in the long-term management and recovery efforts of the species.
- Hydrologic review team – participation in the hydrologic review team would establish technically sound analyses of impacts on the Muddy Springs and Muddy

River flows from regional groundwater pumping, and ensure accuracy and efficiency in data collection. Monitoring of springs and streams is a critical component that would provide early detection of effects from groundwater pumping.

These conservation measures would provide more secure habitat, should water flows decline from groundwater development. They would improve habitat throughout the range of the species, and reduce vulnerability to catastrophic events. The expansion of the species within its range and increase in population size would minimize or offset effects of potential decreased flows from the Pederson Unit (USFWS, 2006).

Western Yellow-billed Cuckoo

There is no habitat for the western yellow-billed cuckoo within the ROWs for the Proposed Action. However, this species has been documented in riparian habitat in the Muddy Springs area. This riparian habitat is supported by surface water flow from springs and along stream reaches and the shallow alluvial aquifer.

As described in Chapter 4.13.1.2 below, the Proposed Action would not impact the shallow alluvial aquifer system in the Muddy Springs area. Using the USFWS' assumptions of the worst-case conditions, if spring flow from the highest elevation Pederson springs declined to 2.7 cfs (measured at the Warm Springs West flume), which is the lowest trigger level under the MOA and Proposed Action, there would be a reduction of about 1 cfs over the historical average at that location (about 3.7 cfs). Since the Proposed Action includes the dedication of 1 cfs from the Jones Spring, there would be no net effect on stream flow in the lower portion of the Refuge Stream. The upper portion of the Refuge Stream, between the Warm Springs West and Iverson flumes, is a gaining stream, with subsurface seepage adding to the stream flow (Chapter 3.13.2.3). Therefore, only the riparian habitat in the immediate area of Pederson springs could potentially be affected by a decrease in spring flow. This area is not suitable habitat, and no western yellow-billed cuckoo have been documented in the Pederson Unit above the Warm Springs West flume. In addition, riparian habitat would be created under the Proposed Action due to the additional flows on the Apcar Stream following dedication of the Jones Spring water right. The habitat restoration measures for Moapa dace that are part of the Proposed Action may also improve habitat conditions for the western yellow-billed cuckoo in the area.

Southwestern Willow Flycatcher

There is no habitat for the southwestern willow flycatcher within the ROWs for the Proposed Action. Potential habitat exists adjacent to the MVIC diversion channel to the Bowman Reservoir. This potential habitat would not be disturbed by construction of the discharge pipeline. Construction activities in that area would not occur during the breeding/nesting season for the southwestern willow flycatcher (Chapter 2.1.8.1).

The southwestern willow flycatcher has been documented in riparian vegetation at the Moapa Valley Warm Springs ranch. This riparian habitat is supported by surface water flow from the Muddy River and shallow alluvial aquifer. As described in Chapter 4.13.1.2 below, the Proposed Action would not impact the shallow alluvial aquifer system in the Muddy Springs area, and no impact on Muddy River surface water flow is

anticipated. As described above for the western yellow-billed cuckoo, only riparian vegetation in the immediate area of the Pederson springs could potentially be affected by the Proposed Action. However, this area does not contain suitable habitat for the southwestern willow flycatcher. The riparian habitat that would be created under the Proposed Action, due to the dedication of the Jones Spring water right and Moapa dace habitat restoration measures, may also improve habitat conditions for the southwestern willow flycatcher in the area.

Yuma Clapper Rail

There is no habitat for the Yuma clapper rail within the ROWs requested for the Proposed Action. The species has been documented at Honeybee Pond on the Overton Wildlife Management Area and the Maverick Ditch near Logandale, both about 20 miles downstream of the Muddy Springs area. Maverick Ditch is supported by agricultural return flows, which would not be affected by the Proposed Action. Honeybee Pond is located off channel and is fed by an irrigation ditch operated by NDOW. Potential reductions in spring flow associated with groundwater pumping under the Proposed Action are not anticipated to be discernable on the Muddy River surface water flow (Chapter 4.13.1.2), and no impact to the pond or the Overton Wildlife Management Area diversions is anticipated. The addition of water to the Muddy River associated with the discharge of excess water during the Order 1169 pumping study would have no effect on the NDOW's existing diversion for the Wildlife Management Area.

4.3.1.2 Special Status Species

Invertebrates

Aquatic Species: The Pahranagat naucorid, Moapa pebblesnail, Moapa Warm Springs riffle beetle, and grated tryonia occur in springs or outflow streams of the Muddy Springs area. There is no habitat for these species directly within the ROWs for the Proposed Action, and direct impacts from construction would not occur. Potential reductions in spring flows associated with groundwater pumping under the Proposed Action could result in a slight degradation of habitat for these aquatic species, similar to that quantified for the Moapa dace (Chapter 4.3.1.1). The conservation measures identified for the Moapa dace, including the additional flows from the dedication of the Jones Spring water right and the restoration of habitat (Chapter 2.1.7), would also improve habitat conditions for aquatic invertebrates.

Mesquite Bosque Species: Potential direct effects to MacNeil sooty-wing skipper may occur as a result of the Proposed Action as the adult host plant is mesquite and some mesquite would be removed as part of the Proposed Action (Chapter 4.11.1). Quailbush, the host plant for the larvae, would be removed as a result of construction activities. Since a relatively small number of plants would be removed, this is not considered a significant impact. Indirect impacts on mesquite from groundwater pumping are not anticipated, since the Proposed Action would not impact the shallow alluvial aquifer system in the Muddy Springs area (Chapter 4.13.1.2).

Reptiles

Although no banded Gila monster or chuckwalla were observed during field surveys of the Proposed Action area, many of the deep dissected washes along the route contain

numerous natural cavities that may provide shelter for Gila monsters as well as boulders that may provide habitat for chuckwallas. Potential direct effects to banded Gila monsters and chuckwallas include direct mortality or injury from crushing by construction equipment and from being entombed in burrows during initial grading, blasting, or development of access roads, staging areas and facility sites. Potential indirect effects to banded Gila monsters and chuckwallas during construction activity include degradation of soil due to fuel contamination, harassment from human presence, and increased levels of noise and vibration due to construction equipment movement or blasting. Environmental protection measures included in the Proposed Action (Chapter 2.1.8), including preconstruction clearance surveys, fencing, and an education program would reduce potential impacts on reptiles.

Birds

Western Burrowing Owl: Although no burrowing owls or burrows were seen during the field surveys in and adjacent to ROWs for the Proposed Action, direct effects to Western burrowing owl may occur since suitable habitat for the species is widely distributed. Direct effects to the burrowing owl could include the potential destruction of nest burrows or other occupied satellite burrows, direct mortality or injury from crushing by construction equipment and from being entombed in burrows during initial site clearing or development of access roads, staging areas and facility sites. Indirect effects to Western burrowing owl could occur as a result of degradation to soil due to fuel contamination, harassment and potential nest abandonment from human presence, and increased levels of noise and vibration due to construction equipment movement or blasting. The avoidance and conservation measures included in the Proposed Action (Chapter 2.1.8) would reduce potential impacts.

Riparian Bird Species: There is no riparian habitat within the ROWs for the Proposed Action, and thus no direct impacts on riparian bird species, including gray flycatcher, blue grosbeak, summer tanager, vermilion flycatcher, and Arizona Bell's vireo. As described above for the western yellow-billed cuckoo, there is a potential for loss of riparian vegetation in the immediate area of the Pederson springs from groundwater pumping under the Proposed Action. However, riparian vegetation would also be created under the Proposed Action, due to the dedication of the Jones Spring water right and Moapa dace habitat restoration measures. The riparian habitat adjacent to the MVIC diversion channel described above for southwestern willow flycatcher may also be habitat for these riparian bird species. However, this habitat would not be disturbed by construction, and construction activities would not occur during the breeding/nesting season (Chapter 2.1.8.1) to avoid potential noise-related effects.

Mesquite Bosque Bird Species: Potential impacts to Lucy's warbler, phainopepla, and Arizona Bell's vireo could include loss of potential breeding habitat for the birds with the removal of mesquite habitat. No nests were observed during field surveys of the ROWs for the Proposed Action. Isolated mesquite thickets, located adjacent to Highway 168 on private lands in the upper Moapa area, would be removed as part of the Proposed Action. Environmental protection measures included in the Proposed Action to conduct surveys and avoid nests or minimize effects to the nest and fledglings (Chapter 2.1.8.4) would reduce potential impacts to bird species that utilize the mesquite bosque thicket within the ROW.

Indirect impacts on mesquite in the Muddy Springs area from groundwater pumping are not anticipated, since the Proposed Action would not impact the shallow alluvial aquifer system (Chapter 4.13.1.2).

Fish

The Moapa White River springfish, Virgin River chub, and Moapa speckled dace are known to occur in the Muddy Springs or Muddy River areas. There is no habitat for these species directly within the ROWs for the Proposed Action, and direct impacts from construction would not occur. Potential reductions in spring flows associated with groundwater pumping under the Proposed Action could result in a slight degradation of habitat for the Moapa White River springfish, similar to that quantified for the Moapa dace (Chapter 4.3.1.1). However, the conservation measures identified for the Moapa dace, including the additional flows from the dedication of the Jones Spring water right and the restoration of habitat (Chapter 2.1.7), would also improve habitat conditions for the springfish. The Virgin River chub and Moapa speckled dace occur below the Moapa gauge, and as described in Chapter 4.13.1.2 no discernable effects on Muddy River flow are anticipated.

Mammals

Direct impacts to maternal roosts or colonial roosting habitats of special status bat species are not anticipated since none have been identified within the ROWs for the Proposed Action. Impacts to individual bats may result from loss of cracks and crevices utilized by day roosting species. Preconstruction surveys included in the Proposed Action (Chapter 2.1.8.1) would ensure that occupied roosts within the ROWs are identified and impacts are reduced. Several bat species use riparian habitat in the Muddy Springs area for hydration and to forage on insects. As described above for the western yellow-billed cuckoo, there is a potential for loss of riparian vegetation in the immediate area of the Pederson springs from groundwater pumping under the Proposed Action. However, riparian vegetation would also be created under the Proposed Action, due to the dedication of the Jones Spring water right and Moapa dace habitat restoration measures.

There is a potential for construction activities along Highway 168 to temporarily disrupt movement of bighorn sheep across the highway. However, entire ROW would not all be under construction at the same time, and construction disturbance would be short-term in duration. Because the ROW would be restored at the completion of construction, and there would be no permanent fencing of the pipeline, there would be no permanent disruption of bighorn sheep movement.

4.3.1.3 Migratory Birds

The MBTA prohibits taking, killing, possessing, transporting, and importing migratory birds, their eggs, parts, and nests, unless authorized by a valid permit. Environmental protection measures for migratory birds that may be present with the project ROWs included in the Proposed Action (Chapter 2.1.8.4) minimizes the potential for effects to migratory bird nests or fledglings.

4.3.2 Alternative 1

Potential impacts to federally listed species, special status species, and migratory birds for Alternative 1 would be similar to that of the Proposed Action. Alternative 1 would have a greater acreage of disturbance of desert tortoise habitat, approximately 30 acres, than the Proposed Action. Since the pipeline alignment is shorter and more direct, there would be about 2 acres less disturbance of desert tortoise critical habitat (107.5 acres total, federal and private lands) than under the Proposed Action. However, most of the critical habitat disturbance would be outside of the NDOT ROW for Highway 168. As described for the Proposed Action (Chapter 4.3.1), the environmental protection measures that would be implemented as part of this alternative would reduce potential direct impacts to fish and wildlife species.

Since the location and volume of groundwater pumping under Alternative 1 would be the same, potential indirect effects to federally listed and other species of concern in the Muddy Springs area would be the same as described for the Proposed Action (Chapter 4.3.1). The MOA conservation measures, including reducing groundwater pumping if specified spring flow trigger levels are reached and habitat restoration activities, would be implemented under this alternative. As described for the Proposed Action (Chapter 4.3.1), these measures would reduce potential indirect impacts to federally listed and other special status species from groundwater pumping.

4.3.3 Alternative 2

Potential impacts to federally listed species, special status species, and migratory birds for Alternative 2 would be similar to that of the Proposed Action. Alternative 2 would have a greater acreage of disturbance of desert tortoise habitat, approximately 43 acres, than the Proposed Action. There would be a about 5 acres greater disturbance of desert tortoise critical habitat (114.7 acres total, federal and private lands), most of which would be outside of the NDOT ROW for Highway 168. As described for the Proposed Action (Chapter 4.3.1), the environmental protection measures that would be implemented as part of this alternative would reduce potential direct impacts to fish and wildlife species.

Since the location and volume of groundwater pumping under Alternative 2 would be the same, potential indirect effects to federally listed and other species of concern in the Muddy Springs area would be the same as described for the Proposed Action (Chapter 4.3.1). The MOA conservation measures, including groundwater pumping trigger levels and habitat restoration activities, would be implemented under this alternative. As described for the Proposed Action (Chapter 4.3.1), these measures would reduce potential indirect impacts to federally listed and other special status species from groundwater pumping.

4.3.4 No Action Alternative

Under the No Action Alternative, rights-of-way would not be granted and no federal lands would be disturbed. Potential direct impacts to desert tortoise, mesquite bosque species, reptiles, western burrowing owl, mammals, and migratory birds on federal lands would not occur.

For this No Action Alternative analysis, it is assumed that up to 2,400 acres of desert tortoise critical habitat would be graded and used for agricultural crop production (Figure

4-1). This area is proposed and permitted for development as part of the Coyote Springs Development. This land would be disturbed for the No Action Alternative earlier than it otherwise might be for the Coyote Springs Development. Following completion of the Order 1169 pumping study, it is assumed that these lands would remain fallow and eventually be developed as part of the Coyote Springs Development. Impacts to desert tortoise and other species of concern within the Coyote Springs Development have been addressed through the environmental compliance for that development (ENTRIX et al., 2005). CSI is implementing environmental measures to reduce potential impacts from their development, including:

- Protection of wash channels and installation of storm water detention facilities
- Creation of a natural Wash Buffer Zone Perpetual Conservation Easement to protect and restore desert dry wash habitat within the development area
- Payment of Clark County MSHCP development fees
- Payment of $750,000 to the USFWS to fund conservation measures for desert tortoise
- Conducting desert tortoise surveys and protection measures
- Establishment of a Resource Management Area that includes the Pahranagat Wash and CSI lands to the east of the wash.
- Conducting ground clearing surveys and measures for migratory birds.

Grading and farming activities under the No Action Alternative would comply with environmental commitments and permit requirements of the Coyote Springs Development.

Under the No Action Alternative, groundwater pumping would be initiated by SNWA on private lands. Some of the important conservation measures that SNWA would otherwise implement under the MOA could not be completed if the Coyote Spring Project were not approved. Specifically, the SNWA could not provide a replacement water supply to MVWD in exchange for its dedication of the 1 cfs Jones Spring water right. Without this replacement water supply, MVWD would be unable to dedicate this spring flow for the recovery and preservation of the Moapa dace. The purpose behind the execution of the MOA was “to make progress toward protection and recovery of the Moapa dace and its habitat concurrent with the operation and development of water projects for human use.” If the water projects cannot be completed, a basic assumption on which the parties relied in committing to conservation measures would be undermined.

Groundwater pumping on private land in Coyote Spring Valley would not require consultation with the USFWS under Section 7 of the ESA. If the groundwater pumping were likely to cause take of Moapa dace, SNWA would obtain a Section 10(a) permit for incidental take or cease groundwater pumping.

4.4 GEOLOGY, SOILS, AND MINERALS

The resource analysis area for geology, soils, and minerals is the ROW for the proposed Action and Alternatives.

4.4.1 Proposed Action

There are no special geologic, soil, or mineral units in the ROWs for the Proposed Action. Construction activities would result in disturbance of the soil surface, which can result in increased soil erosion by wind and water. Erosion control, dust control, and restoration measures implemented as part of the Proposed Action would minimize impacts.

4.4.2 Alternative 1

The geologic, soil and mineral characteristics of the Alternative 1 area are the same as for the Proposed Action. Therefore, potential impacts of Alternative 1 are the same as for the Proposed Action (Chapter 4.4.1).

4.4.3 Alternative 2

The geologic, soil and mineral characteristics of the Alternative 2 area are the same as for the Proposed Action. Therefore, potential impacts of Alternative 2 are the same as for the Proposed Action (Chapter 4.4.1).

4.4.4 No Action Alternative

Geologic units and soils on federal lands would not be disturbed under the No Action Alternative. However, it is anticipated that disturbance on private lands would likely occur. There are no special geologic units in the private lands anticipated be disturbed by the No Action Alternative (Figure 4-1). Grading activities to prepare the site for agriculture would result in disturbance of the soil surface, which could result in increased soil erosion by wind and water. Erosion control and dust control measures would be implemented in accordance with air quality and stormwater permits obtained for the Coyote Springs Development. Flood control and retention basins that are being built as part of the Coyote Springs Development would also reduce the amount of sediment transported into the Pahranagat Wash.

4.5 HAZARDOUS MATERIALS

The resource analysis area for Hazardous Materials is defined as the ROW and immediate vicinity for the Proposed Action and Alternatives, and transportation routes for hazardous materials.

4.5.1 Proposed Action

Hazardous and toxic materials such as fuels, solvents and lubricants would be used during construction and operation. During construction, these materials would be stored in designated areas with secondary containment. During operation, minor quantities of these materials may be stored at the MX-5 well site in contained structures, which would prevent any spilled material from leaving the immediate area. Cleanup kits would be available on equipment and maintenance vehicles so that spill of fuels, solvents or lubricants could be quickly cleaned up.

During the operation of the Proposed Action, sodium hypochlorite (liquid bleach) would be transported to and used at the MVWD chlorination facility. It would be contained in a storage tank with secondary containment to contain any spills in case of leak. Storage and handling would comply with federal, state, and local regulations.

Measures to minimize potential for accidental spills of hazardous materials have been included into the Proposed Action (Chapter 2.1.8). These measures, and compliance with federal and state permits which regulate the storage and handling of hazardous materials would prevent the accidental release of hazardous materials into the environment.

4.5.2 Alternative 1

The use and handling of hazardous materials under Alternative 1 are the same as for the Proposed Action. Potential impacts of Alternative 1 are the same as for the Proposed Action (Chapter 4.5.1).

4.5.3 Alternative 2

The use and handling of hazardous materials under Alternative 2 are the same as for the Proposed Action. Potential impacts of Alternative 2 are the same as for the Proposed Action (Chapter 4.5.1).

4.5.4 No Action Alternative

Under the No Action Alternative, there would be no potential for accidental spills of hazardous and toxic materials on federal lands, since the rights-of-way would not be issued. For the anticipated activities on private lands that may occur under the No Action, the use and handling of hazardous materials at the MX-5 and CSI 1 and 2 well sites are the same as described for the Proposed Action. There would be no chlorination or dechlorination facilities under the No Action Alternative, but other chemicals and fertilizers needed to raise an agricultural crop would be utilized. These materials would be stored in contained structures.

4.6 LAND USE

The resource analysis area for land use is the ROW and vicinity for the Proposed Action and Alternatives.

4.6.1 Proposed Action

The Proposed Action would be primarily located within the NDOT ROW for Highway 168. A majority of the Highway 168 corridor is on federal land and is also designated as a utility corridor in the Lincoln County Conservation, Recreation, and Development Act.

On unincorporated CSI lands where the MX-5 well would be located, the current Clark County zoning of Planned Unit Development allows use for planned public utilities within dedicated easements.

In the Moapa Valley, land uses include open lands, residential, and agriculture. There are also limited commercial and public facility lands located south of Highway 168 and outside of the Coyote Spring Project ROW. The Proposed Action would not conflict with any of the existing agricultural and residential land uses in the project area, as no permanent facilities would be located in the Moapa Valley.

The Proposed Action is intended to eventually provide a means to convey SNWA's existing Coyote Spring groundwater rights for future use as a water resource option to assist SNWA in meeting southern Nevada's projected future water demands and reduce its reliance on Nevada's Colorado River water entitlement. SNWA is not empowered as

a land use planning agency. Land use planning and regulation are the sole responsibilities of the local government agencies within the SNWA service area including Clark County and the municipalities within the county. All future land use changes associated with continuing urban growth would be required to comply with local government land use planning and development requirements. Applicable land use and related plans in effect include:

- *Clark County Comprehensive Plan,* various dates for specific plan elements
- *Northeast Clark County Land Use and Development Guide* (1994 amended 1997)
- *Clark County Multiple Species Habitat Conservation Plan (*2000)

Because the Proposed Action would not induce unplanned development, indirect land use impacts are not anticipated.

4.6.2 Alternative 1

While the Alternative 1 pipeline alignment parallels the Lincoln County powerline rather than Highway 168, the land use characteristics of the Alternative 1 pipeline route are generally the same as for the Proposed Action. There are several areas where the Alternative 1 pipeline alignment is outside of the BLM utility corridor. In these locations, the pipeline would still be allowable with the receipt of a BLM ROW permit. Therefore, the impacts of Alternative 1 are the same as for the Proposed Action (Chapter 4.6.1).

4.6.3 Alternative 2

The land use characteristics of the Alternative 2 pipeline route are the same as for the Proposed Action. Therefore, the impacts of Alternative 2 are the same as for the Proposed Action (Chapter 4.6.1).

4.6.4 No Action Alternative

No land use impacts would occur under the No Action Alternative, as no facilities would be constructed on federal lands. For the anticipated agricultural activities on private lands, no new permanent facilities would be constructed. The temporary use for agricultural production can be permitted in the Clark County Planned Use Development zoning as part of the overall Coyote Springs Development plan process. The temporary agricultural use during the pump test would not preclude the long-term development potential of the irrigated area, which is proposed for residential and recreational uses as part of future Coyote Springs Development phases.

4.7 NOISE

The resource analysis area for noise impacts is the ROW and vicinity to a distance of approximately one-quarter mile.

4.7.1 Proposed Action

Potential short-term noise impacts would occur during construction of the Proposed Action, and long-term noise impacts would occur during subsequent operation and maintenance activities. The construction equipment and personnel expected to be required during construction of the Proposed Action are shown in Appendix D.

The only sensitive noise receptors in the vicinity of the ROW are scattered residences in rural Moapa Valley. Some of these residences are within 100 feet to 200 feet of the proposed pipeline alignment. Although ambient noise levels have not been measured, the area is relatively quiet – existing local noise sources are primarily associated with vehicle traffic along Highway 168 and other local roads (e.g., Warm Springs Road). Highway 168 is also 100 to 200 feet from the nearest residences to the pipeline alignment.

Short-term increases in Moapa Valley residential noise levels would occur during construction along the pipeline alignment, including trenching, pipeline placement, backfilling, and site restoration. Construction activities would also generate noise from delivery trucks, heavy equipment operation, and other related activities. As stated in Chapter 3.7, construction and demolition noise generated during daytime hours is exempt from Clark County regulation and nighttime noise levels are subject to maximum permitted sound levels (Clark County Unified Development Code Section 30.68.020). Construction activities would comply with County noise regulations. SNWA's standard construction guidelines also require use of noise-control devices on construction equipment, avoiding or managing the use of heavy equipment in proximity to noise-sensitive land uses, use of electric tools instead of gas-powered whenever possible, and use of temporary noise barriers when close to noise sensitive land uses.

Operational phase noise impacts would be limited to the MX-5 pump station and periodic maintenance operations conducted during the daytime. Maintenance operations at the MX-5 well/pump station and regulating tank sites would occur on a scheduled basis and would not exceed the County's noise statute thresholds. The MX-5 pumping station would not be located near any sensitive noise receptors of the Coyote Springs Development.

4.7.2 Alternative 1

The construction and operational noise characteristics of Alternative 1 would be the same as described for the Proposed Action. However, the Alternative 1 pipeline alignment would parallel the existing Lincoln County powerline alignment, which is located north of Highway 168 and a greater distance from Moapa Valley residences than the Proposed Action. Therefore, the impacts of Alternative 1 would be less than those of the Proposed Action as described in Chapter 4.7.1.

4.7.3 Alternative 2

The construction and operational noise characteristics of Alternative 2 would be the same as described for the Proposed Action. Therefore, the impacts of Alternative 2 would be the same as the Proposed Action as described in Chapter 4.7.1.

4.7.4 No Action Alternative

No potential noise impacts from construction activities on federal lands would occur under the No Action Alternative, as federal rights-of-way would not be granted. The private lands that are anticipated to be graded and irrigated under the No Action Alternative would not be located in the vicinity of the earliest parts of the Coyote Springs Development. Aside from temporary noise level increases that would occur during initial

grading of the agricultural lands for irrigation, ambient noise characteristics would be relatively unchanged during irrigation and harvest operations.

4.8 RECREATION

The resource analysis area for recreation is defined as the ROW and immediate vicinity of the Proposed Action and Alternatives.

4.8.1 Proposed Action

The MVNWR is the only park or recreation land identified on the Clark County land use maps in the vicinity of the Proposed Action. The Desert National Wildlife Refuge is located west of Highway 93 and over 1 mile from the proposed MX-5 well site. The Proposed Action facilities would not be located within these Refuges.

There are no federal, state, or local or municipal parks or private recreation facilities in the vicinity of the Proposed Action. The closest Clark County designated recreation area is the MVNWR, approximately 1 mile south of the pipeline alignment. The MVNWR is designated as park and recreation land, but is not currently open to the public for recreational use.

Vacant BLM lands are used for low-density informal recreation such as hiking, picnicking, off-road driving, and driving on existing unpaved roads. Other recreation activities, such as illegal shooting, also take place, but would not be increased because of the Proposed Action.

After completion of construction, disturbed areas, with the exception of permanent aboveground facilities, would be restored. The Proposed Action would not affect the overall low-density recreation use of the surrounding vacant BLM lands.

Bowman Reservoir is informally used for recreation, but recreation is not a formal authorized use of the reservoir. During construction of the discharge pipeline, access to that portion of the reservoir would be restricted. The discharge of excess water into the reservoir may result in it holding more water for longer period than typical, but this is not anticipated to affect the informal use of this facility for recreation.

4.8.2 Alternative 1

The recreation characteristics and potential recreation impacts of Alternative 1 are similar to those of the Proposed Action (Chapter 4.8.1).

4.8.3 Alternative 2

The recreation characteristics and potential recreation impacts of Alternative 2 are similar to those of the Proposed Action (Chapter 4.8.1).

4.8.4 No Action Alternative

Under the No Action Alternative, the only anticipated land disturbance would be on private land. There would be no impact to informal recreational opportunities on federal lands. There would be no impact on the recreational features on private lands, including golf courses, being constructed as part of the Coyote Springs Development.

4.9 SOCIOECONOMICS

The resource area for socioeconomics is the ROWs and vicinity, Coyote Spring and Upper Moapa valleys, and the SNWA service area.

4.9.1 Proposed Action

4.9.1.1 Population

As described in Chapter 1.4.2, the sale of federal lands supports population growth and development of the Las Vegas Valley. Potential impacts on socioeconomics, including economy and population, from federal land disposal activities are considered by the federal government prior to authorizing land sales (BLM, 2004). The Proposed Action is responsive to previously authorized federal land disposal activities, and would not induce additional federal land disposals. As the wholesale water provider to municipal water agencies in the Las Vegas Valley and Boulder City, SNWA is responsible for acquisition and management of regional water rights and supplies and implementation of projects for the development, treatment, and transportation of regional water supplies. Governmental agencies in Clark County, including city and county governments, have sole responsibility for growth and development forecasting, land use planning, and zoning within their respective jurisdictions. These agencies prepare comprehensive planning documents to guide land use and policy decisions made by their elected councils or commissions. The SNWA has no jurisdiction, control, or authority to regulate land use, zoning, or development in the Las Vegas Valley. The Proposed Action would assist in partially meeting projected water demands based upon approved local and federal planning decisions, and would not cause direct or indirect population growth.

The water that would be conveyed through the Proposed Action for MVWD would replace the loss of its Apcar (Jones) Spring water under the MOA. Since there is no net increase in water supply to MVWD, there would be no population growth impacts in Moapa Valley.

The Coyote Springs Development is not connected to, nor reliant upon, the Proposed Action. The Proposed Action would not supply water to support the Coyote Springs Development, nor is the development necessary to construct the Proposed Action. Any population growth impacts associated with the Coyote Springs Development would be considered in the necessary federal, state, and local regulatory approvals.

The Proposed Action would not impact any existing residences or displace any existing populations. Therefore, no impacts on population are expected.

4.9.1.2 Housing

No housing would be taken for construction of the Proposed Action, and there is adequate housing in the Moapa Valley and larger Las Vegas Valley areas for the construction and operation work force.

4.9.1.3 Employment

The Proposed Action is located in undeveloped or lightly developed rural areas. No businesses would be taken by the Proposed Action facilities.

Construction and operational phase employment would have an economic benefit in the Moapa Valley and Las Vegas Valley area, from which most of the personnel, supplies, and equipment are expected to come. Local residents may fill some of the construction and operations jobs. Total construction costs are estimated at approximately $20 million, most of which would benefit the local Clark County economy.

4.9.1.4 Environmental Justice

The determining factor in evaluating environmental justice impacts is the presence of a disproportionate number of minority or low-income neighborhoods or residents in the area of influence. In the vicinity of the Proposed Action, only the Moapa Paiute Indian reservation has a disproportionately high minority and low-income population. However, there would be no proposed facilities on reservation lands under the Proposed Action. An existing MVWD pipeline crosses through the reservation, but no modifications to this pipeline are proposed. Therefore, there would be no environmental justice impacts.

The Moapa Band of Paiutes have also committed to conservation measures under the MOA, due to their intent to develop water rights in California Wash. These conservation measures are further described under cumulative projects, in Chapter 5.1.5.

4.9.2 Alternative 1

The socioeconomic characteristics and potential impacts of Alternative 1 are similar to those of the Proposed Action.

4.9.3 Alternative 2

The socioeconomic characteristics and potential impacts of Alternative 1 are similar to those of the Proposed Action.

4.9.4 No Action Alternative

Under the No Action Alternative, federal rights-of-way would not be granted, and there would be no potential for socioeconomic impacts associated with facilities on federal lands. The No Action Alternative would not provide a potential in-state water resource option for SNWA to use in meeting southern Nevada's projected future water demands and to reduce its reliance on the State of Nevada's Colorado River water entitlement. Nor would the No Action provide a means to convey a portion of SNWA's existing Coyote Spring groundwater rights that under the MOA would be transferred to MVWD. As a result, the No Action Alternative would not fully meet the purpose and need for the Coyote Spring Project. The No Action would also not be incompliance with the Lincoln County Conservation, Recreation, and Development Act, which directed the Secretary of the Interior to grant ROWs to SNWA for water conveyance facilities within the identified utility corridors.

Under the No Action Alternative, SNWA would continue to meet southern Nevada's projected future water demands through its existing and other planned water resource options. Due to the timing associated with development of those other options, SNWA would continue to rely almost exclusively on its Colorado River water resources to meet near term demands. Under this scenario, SNWA's water resource supply would continue to be vulnerable to prolonged drought conditions persisting in the Colorado River basin, and SNWA would not achieve increased drought protection.

For the activities anticipated to occur on private lands under the No Action Alternative, there would be temporary agricultural jobs associated with crop production, but no increase in population is anticipated. No additional housing is anticipated to be required, nor would existing housing be impacted. The private lands to be utilized for temporary agricultural use are not presently occupied by minority or low-income neighborhoods, and no environmental justice impacts would occur.

4.10 TRANSPORTATION AND PUBLIC UTILITIES/SERVICES

The resource analysis area for transportation and public utilities/services is the ROW and access roads for the Proposed Action and Alternatives.

4.10.1 Proposed Action

Construction of proposed facilities would require use of the existing Highway 168 and the existing LCPD transmission line maintenance road for access. The only new road construction would be an upgraded access roadway to the MX-5 well site and the new access roadway to the regulating tank on the north side of Highway 168. These 20-foot wide paved access roads would be placed within the planned permanent ROW connecting the facilities to Highway 168.

Pipeline construction would require boring under Highway 168 at four locations. This construction activity is not expected to close the roadway or otherwise adversely affect traffic movements.

Access to work areas would require movement of equipment and construction personnel along public roads and highways. In addition to Highway 168, US 93 and I-15 would serve as primary access routes for heavy construction equipment and personnel. Equipment and personnel movements would result in temporary localized impacts to transportation resources. However, there are currently low levels of traffic in the vicinity. Construction traffic impacts would cease at the end of construction activity. Periodic maintenance trips are not expected to impact traffic movement.

Existing water supply pipelines, sewerage pipelines, above ground electric power distribution lines, and buried fiber optic lines would not be impacted by the Proposed Action. These facilities occupy ROWs separate from that of the Proposed Action and only intersect with the water transmission pipeline in a few locations. Where existing ROW crossing is required, crossing permits would be obtained from the appropriate agency.

4.10.2 Alternative 1

The transportation and public utilities/services characteristics of Alternative 1 are similar to the Proposed Action. However, differences include the location of the new access roadway for the regulating tank and several access roadways that would be needed to access the pipeline corridor. Under this alternative, the regulating tank location would be located south of Highway 168 rather than north. The access roadway would intersect Highway 168 in approximately the same location as the Proposed Action, but would be located on the opposite side of the Highway. In three locations of the Alternative 1 pipeline corridor, the alignment deviates from the Highway 168 ROW. In these locations, temporary access roadways would be required to access the pipeline

construction. However, each of these access points would be temporary and would not affect long-term traffic levels along Highway 168.

4.10.3 Alternative 2

The transportation and public utilities/services characteristics of Alternative 1 are similar to the Proposed Action. The pipeline corridor would be located farther away from Highway 168, but access locations and staging areas would be placed in the same locations as the Proposed Action. Potential impacts are the same as described for the Proposed Action (Chapter 4.10.1).

4.10.4 No Action Alternative

Under the No Action Alternative, there would be no construction activities on federal lands, thus no potential transportation or public utilities/services impacts associated with those construction activities. The anticipated agricultural development on private lands would require equipment and personnel movements that would result in temporary localized impacts on transportation. This traffic would likely be less than that generated by construction traffic for the Proposed Action. There would be an increase in truck traffic during the two years of operation, to transport the crop (presumed alfalfa) from the site. However, there are currently relatively low levels of traffic on highways in the area. No use of public utilities or services would be required for this agricultural development.

4.11 VEGETATION

The resource analysis area for vegetation is the ROW and immediate vicinity of the Proposed Action and Alternatives, and the Muddy Springs area.

4.11.1 Proposed Action

The Proposed Action would result in disturbance of Mojave Creosote Bush Scrub, Mojave Desert Wash Scrub, and Desert Saltbush Scrub habitats, and some isolated mesquite trees on private lands.

As noted in Chapter 2.1.8.5, a BLM-approved Restoration Plan would be implemented to restore federal lands disturbed by construction of the Proposed Action. Restoration would be applied to all federal lands, except for approximately 3 acres occupied by permanent above ground facilities (e.g., regulating tank and LCPD powerline tap structure). Restoration on private lands would be as approved by the individual landowners. These restoration measures would reduce vegetation impacts.

Construction may create dust that may temporarily coat the leaves of the plants in the vicinity of the ROW, and thus reduce photosynthesis. This impact would be temporary, and only occur during the construction period. Active dust suppression would be implemented during construction, and any areas near access roads and other facilities would be periodically washed as identified by the environmental monitors. These measures would reduce potential impacts to vegetation from reduced photosynthesis.

No direct impacts to riparian or aquatic plant species would occur from the Proposed Action. However, as described in Chapter 4.3.1.1, groundwater pumping related to the Proposed Action could effect riparian and aquatic vegetation in the immediate area of Pederson spring. However, this potential loss would be offset by the additional riparian

habitat that would be created by the additional flows from the dedication of the Jones Spring water right and the Moapa dace habitat restoration activities on the Apcar unit that are part of the Proposed Action (Chapter 2.1.7).

4.11.1.1 Invasive and Noxious Weeds

Noxious weeds have not been documented within the ROWs for the Proposed Action. Construction activities associated with the Proposed Action have the potential to introduce non-native species considered invasive and noxious due to their abilities to spread and out-compete the native species. Invasive and noxious weeds may be introduced by construction equipment carrying soils with weed seeds to the site. Disturbance of native vegetation and related disturbance of soil crust could also foster the development of noxious weeds. The proposed restoration and weed control measures incorporated into the Proposed Action (Chapter 2.1.8.5) reduce potential impacts.

4.11.1.2 Cactus and Yucca

Construction activities associated with the Proposed Action would result in the removal of cactus and yucca within the ROWs. Salvage and restoration of cactus and yucca would be implemented as part of the Proposed Action (Chapter 2.1.8.5).

4.11.1.3 Special Status Plant Species

No federally listed or special status plant species were identified within the requested ROWs during field surveys (Knight and Leavitt, 2003). However, potentially suitable habitat for the Meadow Valley sandwort, Nye milkvetch, Beaver Dam breadroot, and rosy twotone beardtongue was identified (Wildlands International 2003). Potential effects could include crushing and damaging or destroying individuals, exposing the seed bed in the topsoil to sunlight and heat, thereby destroying or damaging the seeds, damaging the soils through exposure to fuel leaks, and restructuring the land contours and soil composition so as to be unsuitable for the germination or growth of special status plant species. The following mitigation measures are proposed to minimize potential impacts:

- A qualified botanist approved by the BLM would conduct field surveys during the spring blooming season in the areas of potentially suitable habitat for special status plant species, prior to the initiation of construction.
- If special status plant species are found, SNWA would revise the Restoration Plan for the Coyote Spring Project and consult with the BLM; plant salvage would be conducted for special status perennials and seed salvage would be conducted for special status annuals that are located within areas that would be disturbed by project construction.

A portion of the *Phacelia filiae* population recently documented along Highway 168 would be disturbed by construction of the Proposed Action. The habitat restoration measures included in the Proposed Action (Chapter 2.1.8.5), which include seed salvage and reseeding, would reduce potential impacts to this plant species.

4.11.2 Alternative 1

The vegetation characteristics for the Alternative 1 area are similar to those of the Proposed Action. However, an additional approximately 30 acres of vegetation would be disturbed under Alternative 1. Habitat restoration would be implemented as outlined for the Proposed Action (Chapter 2.1.8.5). Potential impacts associated with invasive and noxious weeds, cactus and yucca, and special status plant species would be the same as described for the Proposed Action (Chapter 4.11.1).

4.11.3 Alternative 2

The vegetation characteristics for the Alternative 2 area are similar to those of the Proposed Action. However, an additional approximately 43 acres of vegetation would be disturbed under Alternative 2. Habitat restoration would be implemented as outlined for the Proposed Action (Chapter 2.1.8.5). Potential impacts associated with invasive and noxious weeds, cactus and yucca, and special status plant species would be the same as described for the Proposed Action (Chapter 4.11.1).

4.11.4 No Action

Under the No Action Alternative, there would be no disturbance of native vegetation, cactus and yucca, or special status species on federal lands. However, up to 2,400 acres of Mojave Creosote Bush Scrub, Mojave Desert Wash Scrub, Desert Saltbush Scrub habitat on private lands are anticipated to be disturbed under the No Action Alternative. This area is proposed and permitted for development as part of the Coyote Springs Development. This private land would be disturbed for the No Action Alternative earlier than it otherwise might be for the Coyote Springs Development. Following completion of the Order 1169 pumping study, it is assumed that these lands would remain fallow and eventually be developed as part of the Coyote Springs Development. Impacts to vegetation, including special status plant species, within the Coyote Springs Development have been addressed through the environmental compliance for that development (ENTRIX et al., 2005). CSI is implementing vegetation mitigation as part of its development, including salvage of native plants and restoration of washes and drainages.

The Coyote Springs Development area has been determined to be within the range of and containing potential habitat for two state-listed critically endangered species: three-corner milkvetch and sticky buckwheat. During field surveys conducted in spring of 2005, no populations of either plant were identified within the development area (ENTRIX et al., 2005), which includes the land that would be disturbed by the Proposed Action. Plant surveys did locate two occurrences of Las Vegas buckwheat, a rare and threatened species that is currently proposed for state listing, with a combined total of approximately 3,830 individuals on 25.4 acres. One of the Las Vegas buckwheat populations is located adjacent to the area proposed for the No Action Alternative. As required by the Coyote Springs Development plan, this population would not be disturbed, and it would not be impacted by the No Action Alternative. Grading and farming activities under the No Action Alternative would comply with environmental commitments and permit requirements applicable to the Coyote Springs Development lands.

The agricultural use of the land would increase the chances of introducing invasive and noxious weed species to the area, if these species were inadvertently included in the seed mix used under the Proposed Action. Grading and farming activities under the No Action Alternative would comply with environmental commitments and permit requirements applicable to the Coyote Springs Development to control noxious and invasive weeds.

Under the No Action Alternative, groundwater pumping would be initiated by SNWA on private lands. Groundwater pumping may have an effect on groundwater levels and spring flows in the Muddy River area, including associated impacts on riparian or aquatic vegetation. The MOA conservation measure associated with dedication of the Jones Spring water right, and its associated riparian and aquatic habitat benefits, could not be implemented without the replacement water supply provided through the Coyote Spring Project.

4.12 VISUAL RESOURCES

The resource analysis area for visual resources is defined as the viewshed at and surrounding the Proposed Action and Alternatives.

4.12.1 Proposed Action

Visual impacts may result from the construction, operation and/or maintenance of the Proposed Action. The measure of potential adverse impacts on visual resources is typically the degree of perceived change that would occur in the landscape as a result of project implementation as seen from sensitive viewpoints, and from the effects to the aesthetic values of the landscape. Visual contrast usually results from:

- Landform modifications associated with new access road, pipeline and facility construction;
- Removal of vegetation required by project construction and operation; and/or
- Introduction of new structures to the landscape.

A visual contrast rating evaluation was conducted to determine the degree of contrast that the Proposed Action would have on the landscape (Appendix E). Visual impact assessment results are discussed below.

4.12.1.1 Landscape Scenery

No project-related alterations to the landscape would be out-of-character with existing landscape or scenery. Table 4-2 summarizes the potential visual impacts from the KOPs previously identified.

4.12.1.2 BLM VRM Classes and Objectives

The Proposed Action would be located in an area identified as VRM Class II and III (BLM, 1998). Management direction of a Class II area is retention and Class III area is partial retention.

The majority of the proposed facilities would be located within Class III areas, and would be compatible with the BLM's Class III designation based on the existing settings. The

Table 4-2 Visual Impacts Summary

KOP No.	Sensitive Viewpoint	Visual Impacts
1	From Highway 168 near planned Coyote Springs Development	The characteristic landscape would be altered; the alteration is an introduced line from the temporary clearing of the pipeline alignment, but it is already seen throughout the characteristic landscape, including the adjacent power line and access road.
2	From Highway 168	The characteristic landscape would be altered; the alteration is an introduced line from the temporary clearing of the pipeline alignment, but it is already seen throughout the characteristic landscape, including the adjacent power line and access road.
3	From Highway 168 near proposed regulating tank site	The characteristic landscape would be altered; the alteration is an introduced form or line from the temporary clearing of the pipeline alignment and permanent clearing for the proposed regulating tank and regulating tank access road. The temporary clearing of the pipeline alignment is already seen throughout the characteristic landscape, including the adjacent roadway and dirt trail. The permanent clearing for the proposed regulating tank would be located within a utility corridor designated by Congress, partially screened by existing topography and painted to match existing adjacent landscape. The permanent clearing for the regulating tank access road is already seen throughout the characteristic landscape, including the adjacent roadway and dirt trail.
4	From Highway 168 at Moapa Town Limits	The characteristic landscape would be altered; the alteration is an introduced line from the temporary clearing of the pipeline alignment, but it is already seen throughout the characteristic landscape, including the adjacent power line and access road.
5	From Highway 168 adjacent to MX-6 well electrical substation	The characteristic landscape would be altered; the alteration is an introduced line from the temporary clearing of the pipeline alignment and cleared area for staging area 7, but it is already seen throughout the characteristic landscape, including the adjacent power substation, power line and access road.
6	From Highway 168 near beginning of private land ownership	The characteristic landscape would be altered; the alteration is an introduced line from the clearing of the pipeline alignment and cleared area for staging area 11. Vegetation within the pipeline alignment and staging area boundary would be removed and would take several years to return to pre-construction conditions following completion of construction activities. The surrounding area is a transition area from undeveloped rural to low-density residential in visual character.
7	From Highway 168 near residential units	The characteristic landscape would be altered; the alteration is an introduced line from the clearing of the pipeline alignment and cleared area for staging area 12. Vegetation within the pipeline alignment and staging area boundary would be removed and would take several years to return to pre-construction conditions following completion of construction activities. The surrounding area is a transition area from undeveloped rural to low-density residential in visual character.

level of change to the characteristic landscape would be moderated based on the presence of existing power transmission lines and maintenance roads, other urban-type infrastructure, and scattered urban development. The pipeline would be underground and ROWs would be restored. Aboveground facilities would be fenced and painted to blend in with the landscape. As a result, the VRM Class III requirement that project facilities not focus the attention of the casual view would be fulfilled.

The regulating tank is the only proposed facility located within a Class II area. In Class II areas, ROWs should "be relocated as necessary, buried, or painted a color compatible with their surroundings to ensure scenic integrity." The tank would be partially screened from view by existing topography along the Highway 168, and would be painted to blend into the adjacent landscape. As a result, placement of the regulating tank would be compatible with the Class II requirement that it not modify the existing landscapes or attract the attention of the casual viewer.

4.12.2 Alternative 1

The visual resource characteristics of Alternative 1 would be similar to those described for the Proposed Action. The pipeline corridor would be located farther away from Highway 168, and in many locations would not be visible from the Highway. The proposed regulating tank would also be located farther from Highway 168 than under the Proposed Action, but would still be within the federally designated utility corridor.

4.12.3 Alternative 2

The visual resource characteristics of Alternative 2 would be similar to those described for the Proposed Action. The proposed pipeline and facilities would be located farther away from Highway 168, but still within the federally designated utility corridor.

4.12.4 No Action Alternative

Under the No Action Alternative, there would be no visual impact on federal lands, as rights-of-way would not be granted and the Coyote Spring Project would not be constructed. Activities that may occur on private land in Coyote Spring Valley, including irrigation of up to 2,400 acres of land within the privately owned Coyote Springs Development property, would temporarily change the appearance of the landscape as viewed from public and private roadways. However, the changes would be consistent with the type of landform changes and introduction of non-native vegetation that will occur as part of the Coyote Springs Development. Since this area will be developed as part of the Coyote Springs Development, visual impacts of the No Action alternative will occur but will be limited and short term in nature.

4.13 WATER RESOURCES AND HYDROLOGY

The resource analysis area for water resources and hydrology is the ROW and immediate vicinity, and the Coyote Spring Valley and Upper Moapa Valley hydrographic basins.

4.13.1 Proposed Action

4.13.1.1 Surface Water Resources

Construction of the Proposed Action would disrupt the ground surface within the ROWs, including several ephemeral washes. These washes are dry, and only carry water during

periods of heavy rainfall, most often associated with heavy summer thunderstorms. The pipeline would be buried at sufficient depth in washes to prevent damage to the pipelines from scour. These wash crossings would be restored at the completion of pipeline construction, and no changes in drainage patterns would occur. The MX-5 site, which is partially located within the Pahranagat Wash, would be raised above the 100-year floodplain level, and would not be subjected to surface flooding.

Erosion may occur during or after construction in the event of heavy rains. The Proposed Action would be permitted under the National Pollutant Discharge Elimination System General Permit for construction projects and would implement a Stormwater Pollution Prevention Plan. Best management practices implemented under that authorization, including use of silt fences and straw bales, would minimize erosion due to runoff during construction activities. Since the original drainages would be restored, and the surface stabilized after construction, sedimentation would not exceed current levels typical of desert wash systems.

Water used for hydrostatic testing of the pipeline and other facilities would be discharged into area washes, and has the potential to result in erosion and sedimentation. These discharges would be permitted by the Nevada Department of Environmental Protection, and best management practices would be implemented to reduce erosion and sedimentation. These best management practices would include use of a diffuser or other energy dissipater to control and reduce the flow of water, straw bales to contain water flow, and minor earthwork impoundments (within the project ROWs) if needed to control and contain the water.

Excess water not used by MVWD during the two years of the Order 1169 pumping study would be discharged into Bowman Reservoir or a Muddy River irrigation diversion ditch, as permitted under a Nevada Department of Environmental Protection discharge permit. The quantity of the discharge would depend upon a number of factors, including the volume of water CSI is pumping and using on-site for their development during the period of the test; whether the Arrow Canyon well is turned off as part of the Order 1169 pumping study; the quantity of water actually used by MVWD; and whether MVIC temporarily increases their agricultural production and water usage during the two years excess pump test water is available. Since those factors cannot currently be quantified, for this analysis it is conservatively assumed that up to the full 9,000 afy of water may need to be discharged during the two years of the Order 1169 pumping study.

MVWD would construct the discharge pipeline into Bowman Reservoir, which would include armoring of the area below the discharge outfall with rip-rap material. Discharges would be coordinated with the MVIC, which operates the reservoir, to ensure that the discharged water would not affect reservoir operations. If the reservoir nears its full capacity during the discharges for the Order 1169 pumping study, water would be diverted to the secondary discharge location, which drains to the Muddy River.

During the two years of the Order 1169 pumping study, if the excess water is not fully utilized by MVWD and MVIC, there would be additional water in the Muddy River below Wells Siding Diversion. Assuming the full 9,000 afy of water were discharged, there would be an increase in Muddy River flow below the Wells Siding Diversion of about 12.4 cfs (based on an annual average). The river below Wells Siding Diversion has

historically accommodated flood flows of greater than 3,000 cfs; thus, no structural changes to increase the river's carrying capacity would be needed.

During high rainfall events, SNWA would temporarily reduce or cease groundwater pumping to prevent additional discharges into the Muddy River. This would reduce the potential for an increased risk of flooding associated with the proposed discharges. Potential impact of reduced flow in the Muddy River from groundwater pumping in Coyote Spring Valley is discussed below under Groundwater Resources.

4.13.1.2 Groundwater Resources

Pumping of groundwater through a well typically results in a decline in groundwater levels around the well. This is called the "cone of depression" or "drawdown cone". The extent and depth of the declines depends upon a number of factors, including how the well is constructed, the rate of pumping, permeability and transmissivity of the rock, and other factors. An area of high transmissivity, such as that in Coyote Spring Valley, will generally develop a shallow drawdown cone of a wide extent. Barriers to flow, such as faults or rock units with low permeability, also affect the extent of the drawdown.

The potential effect of groundwater pumping can be predicted using groundwater models. Modeling analyses are combinations of computer-based calculations and the professional judgment of hydrologists experienced in the region, which are used to predict effects of groundwater pumping. However, a model is only a tool and depends upon the accuracy of the conceptualization of the geology and hydrology. The results of models will vary, depending upon the geologic and hydrologic assumptions that are used.

Two groundwater flow models covering Coyote Spring Valley and the Muddy Springs area were prepared in 2001, for the Nevada State Engineer's water rights process for pending applications in Coyote Spring Valley:

- SNWA/LVVWD developed a three-dimensional groundwater flow model (LVVWD, 2001) using the USGS computer program FEMFLOW3D (Durbin and Bond, 1998). This program solves the governing equations of groundwater flow using the finite element method, which is one of several mathematical techniques used in groundwater modeling. It incorporates the effects of spatially varying recharge and groundwater inflow, and spatially and temporally varying groundwater pumpage, discharge from the springs into the Muddy River, and outflow into the Colorado River.
- A model developed by Department of Interior agencies (BLM, NPS, and USFWS) (GeoTrans, 2001) used MODFLOW-96 (Harbaugh and McDonald, 1996), a three-dimensional groundwater flow model that simulates groundwater movement through grid-layered cell blocks by solving a series of finite difference equations. Several elements of the model were recently modified, including updated pumping and water-level information and updated spring elevation and discharge data (GeoTrans, 2003).

Both models were initially run to examine full development of all existing permitted, permanent groundwater rights in Coyote Spring Valley, in combination with existing and future groundwater pumping in the region. The federal agencies' model was also

subsequently run to evaluate pumping of only 10,000 afy from Coyote Spring Valley and 2,400 afy from the MVWD Arrow Canyon well in Moapa Valley.

The results of these models, along with an additional analysis conducted by the USFWS, are summarized below. However, actual groundwater level declines as a result of pumping, although predicted with the groundwater model, would not be known with any degree of certainty until actual pumping through the Order 1169 pumping study begins.

Coyote Spring Valley

The SNWA/LVVWD model predicted that maximum groundwater level declines in the carbonate aquifer within Coyote Spring Valley, from pumping of all existing permitted water rights after 60 years, would be about 30 feet (LVVWD, 2001). The only groundwater production wells in the carbonate aquifer in Coyote Spring Valley are the MX-5, and CSI-1 and CSI-2 wells. Since these wells were drilled to approximately 1,000 feet, a lowered water level of about 30 feet would not affect the use of these wells for groundwater production.

The alluvium in Coyote Spring Valley is not continuously saturated, due to the presence of areas of caliche. The water level elevations between the alluvial and carbonate systems are between 10 and 50 feet apart, based upon water level measurements from existing monitoring wells. Currently, the only alluvial groundwater pumping in Coyote Spring Valley is done by the mine/landfill operation at the Coyote Spring (200 afy), which is located approximately 13 miles from the groundwater production wells for the Proposed Action. The SNWA/LVVWD model predicted a potential groundwater elevation change of less than 10 feet at Coyote Spring (LVVWD, 2001). The alluvial well being used by the mine/landfill operation was drilled to 213 feet in depth, with a depth to water at 63 feet (NDWR, 2006). Thus, a potential water level decline of less than 10 feet would not affect the use of this well for groundwater production.

Muddy Springs

Carbonate Aquifer: The three existing production wells that would be used for the Proposed Action are located approximately 10 to 12 miles northwest of the Muddy Springs area. However, the carbonate aquifer in the Coyote Spring Valley appears to be highly permeable and transmissive, and as a result groundwater pumping in Coyote Spring Valley has the potential to affect water levels in the adjacent Muddy Springs area. Since there has been only minor groundwater pumping to date in Coyote Spring Valley (see Chapter 3.13.2.2), the exact magnitude and timing of potential impacts from groundwater pumping remains unknown. One of the primary purposes of the Order 1169 pumping study to provide vital information regarding potential effects of groundwater pumping in Coyote Spring Valley on the Muddy Springs area.

Currently, not all of the springs are trending similarly, and the expected response patterns in the springs do not appear to be uniform. Some springs show an increasing trend, not a decreasing trend. This suggests that not all of the springs are connected with the same portions of the aquifer, and those springs not responding to pumping and/or drought may not be connected to the upper portions of the carbonate aquifer where the Arrow Canyon pumping and drought effects are most likely occurring.

Both the SNWA/LVVWD and federal agencies' models predicted a decrease in discharge in the Muddy Springs area as pumping increases, but differed on the magnitude of the projected decrease. The difference in the change of flow predicted by both models may be due to the wide range of values in the hydrologic parameters used in the modeling. These parameters include the estimated water budget, the uncertainty and heterogeneity of the aquifer properties, and boundary conditions established for the modeled area. The results of the Order 1169 pump study will be useful in testing the assumptions employed in the modeling process and making subsequent modeling more accurate and reliable.

The SNWA/LVVWD model analysis of all existing permitted water rights over a 61 year period predicted a decrease of about 4 cfs overall in the Muddy Springs area (LVVWD, 2001). In order to estimate a level of potential effect for the Proposed Action, a unit effect was calculated (dividing the total change in discharge by the total increase in pumpage, then multiplying it by the proposed pumping of 9,000 afy). Since groundwater impacts are typically not linear, this sort of calculation overestimates the modeled potential effects of pumping, rendering the projected response conservative in identifying potential effects. As identified in Table 4-3, using this calculation on SNWA/LVVWD's model identifies that spring flow could decline 1.0 cfs from the groundwater pumping under the Proposed Action.

Table 4-3 Potential Decline in Muddy Springs Flow

Model projection timeframe	Projected full use of existing rights in the model area (including 16,100 afy in Coyote Spring Valley)[a] A	Existing pumping in model area in 2000[a] B	Increase in pumping for full use of existing rights in model area[a] A-B	Change in spring flow for full use of existing rights in model area[b] C	Change in spring flow for Proposed Action (9,000 afy of additional pumping) (C x 9,000 afy) / (A-B)
2001 to 2061	50,000 afy	15,000 afy	35,000 afy	4 cfs	1.0 cfs

[a] Based on Figure 8-39 from LVVWD, 2001
[b] Based on Figure 8-57 from LVVWD, 2001

The federal agencies' model analyzed pumping effects from 2001 to 2050 and did not directly calculate effects to spring discharge, but instead estimated drawdowns in monitoring wells EH-4 and EH-5b in Upper Moapa Valley and predicted change in flow in the Muddy River at the Warm Springs West flume. With an assumption of 10,000 afy pumping from Coyote Spring Valley (1,000 afy more than the Proposed Action), in addition to continued MVWD pumping from the Arrow Canyon well in Upper Moapa Valley (approximately 2,400 afy), the model predicted about a 1-foot drawdown in well EH4 and 1.5-foot drawdown in well EH-5b after two years of pumping (USFWS, 2006). While it is difficult to use modeled drawdown to estimate spring discharge, a head loss of 1.0 to 1.5 feet is estimated to equate to a reduction of about 0.25 to 0.37 cfs in flow at the Warm Springs West flume (Mayer, 2004).

The USFWS also used an approach of extrapolating current groundwater level trends, where the groundwater system is assumed to respond proportionally to increased pumping, in their analysis in the Programmatic BO for the MOA (USFWS, 2006). This approach assumes that all groundwater level declines in the carbonate aquifer in the Muddy Springs area and Coyote Spring Valley seen from 1998 to 2004 were solely attributable to pumping of the Arrow Canyon well by MVWD (on average, 2,400 afy for the last 5 years). It also assumes that because of the high transmissivity of the carbonate aquifer, the location of future pumping does not matter. This assumption is simplified, and may tend to overestimate the effects because of different boundary conditions in Coyote Spring Valley and because proposed pumping in Coyote Spring Valley is further away from the Muddy Springs area (USFWS, 2006). It also does not consider that groundwater levels have increased since 2005, despite the continued pumping of the Arrow Canyon well. However, using those assumptions, increased groundwater pumping from the Proposed Action (9,000 afy) in addition to pumping of other existing permitted rights in the region (4,600 afy in Coyote Spring Valley and 2,500 afy in California Wash) was projected to decrease flows 1.2 cfs at the Warm Springs West flume (USFWS, 2006). Since this analysis approach is very simplified and the pumping assumptions do not match current or proposed conditions, this level of projected impact is considered unlikely.

Regardless of the differing opinions on groundwater modeling or extrapolation analysis methodologies, groundwater pumping is predicted to cause declines in carbonate groundwater levels in the Muddy Springs area, which could result in a reduction in spring flows. However, under the terms of the MOA, which are incorporated into the Proposed Action, the potential effects of groundwater production would be managed to protect in-stream flow levels, as measured at the Warm Springs West flume (Chapter 2.1.7). Groundwater pumping under the Proposed Action would begin to be restricted if the average flow level declined to below 3.0 cfs. Pumping would cease if the average flow level decreased to 2.7 cfs, with the exception of 724 afy which is to be conveyed to MVWD in exchange for their Jones Spring water that is dedicated to enhance in-stream flows. These restrictions would occur regardless of whether the two years of groundwater pumping under the Order 1169 study were completed or not, and regardless of whether climatic conditions such as drought were causing reductions in spring flow.

The response of the carbonate groundwater aquifer to an increase, reduction or cessation of pumping is not known and has not been tested. Although the Order 1169 pumping study will verify aquifer behavior, reducing or ceasing pumping is expected to slow, stop, or reverse groundwater level declines. Declines attributable to drought or other causes may persist. While the time for this recovery cannot currently be predicted, the system has shown a fairly rapid response to recent wet weather conditions, despite continued groundwater pumping by MVWD and others at historic levels (Figures 3-12 and 3-13). It is anticipated that a similarly rapid response to any reduction or cessation of groundwater pumping would occur, and that the trigger levels of the MOA would therefore be effective to reduce potential effects of groundwater production.

Alluvial Aquifer: The alluvial aquifer in the Muddy Springs area is recharged by surface flow from springs or subsurface leakage of springs (Eakin, 1964). As described in Chapter 4.3.1.1 and USFWS (2006), a decline in spring flow could result in a

reduction in the cross-sectional area of stream channels. However, infiltration into the alluvial aquifer would continue as long as there continues to be water flowing in the stream channels. As described above, groundwater modeling and calculations that extrapolate current groundwater trends, predicted that spring flows could decline up to 1.2 cfs from groundwater pumping under the Proposed Action. However, because the Proposed Action includes the dedication of 1 cfs from the Jones Spring, there would be no substantive change in overall stream flow in the Muddy Springs area. As a result, no discernable impact to the alluvial aquifer in the Muddy Springs area is anticipated.

Muddy River

The proposed groundwater pumping could result in a reduction of spring flow of up to 1.2 cfs, as described above. However, under the Proposed Action groundwater pumping would be restricted if spring flows decrease to specified levels. If spring flow at the Warm Springs West flume decreased to 2.7 cfs, the lowest trigger level under the MOA, it would be a reduction of about 1 cfs over the historical average at that location (about 3.7 cfs). A 1 cfs reduction would represent about 2 percent of the historical average annual flow of the Muddy River (about 42 cfs as measured at the Moapa gauge). This decrease may be difficult to discern based on other system influences including alluvial groundwater production and surface water diversions. Additionally, the Proposed Action includes the dedication of 1 cfs of flow from the Jones Spring, which would enter the river system through the Apcar Stream. As a result, no impact on Muddy River flow from the proposed groundwater pumping would occur.

Potential impacts on the Muddy River system from the discharge of excess water during the Order 1169 pumping study were described above under Chapter 4.13.1.

4.13.2 Alternative 1

The water resources and hydrology characteristics of Alternative 1 are the same as described for the Proposed Action (Chapter 4.13.1). Potential water resources and hydrology impacts from construction and operation of Alternative 1 would be the same as described for the Proposed Action.

4.13.3 Alternative 2

The water resources and hydrology characteristics of Alternative 2 are the same as described for the Proposed Action (Chapter 4.13.1). Potential water resources and hydrology impacts from construction and operation of Alternative 2 would be the same as described for the Proposed Action.

4.13.4 No Action Alternative

Under the No Action Alternative, there would be no disturbance of ephemeral washes on federal lands, as rights-of-way would not be granted. There would be no discharges to Bowman Reservoir or the Muddy River. However, it is anticipated that ground disturbance would occur on private land as a result of the No Action. The Coyote Springs Development area is crossed by several drainages designated as waters of the United States. Evaluation of potential impact to these drainages has been addressed in the environmental compliance for the development (ENTRIX et al., 2005). The agricultural development that would occur would avoid major drainages, including

Pahranagat Wash, as designated under the Coyote Springs Development Clean Water Act Section 404 permit and other authorizations. The Coyote Springs Development is incorporating drainage control features, and offsite drainage impacts from temporary use of these lands for agriculture are not anticipated.

Groundwater effects under the No Action Alternative may be similar to the Proposed Action, as similar quantities of groundwater would be pumped under this alternative. The difference is that under the No Action Alternative, the pumped groundwater would remain in the Coyote Spring hydrographic basin and used to irrigate up to 2,400 acres of land within the Coyote Springs Development area. Due to re-infiltration of the pumped groundwater to the local alluvial aquifer, potential effects to groundwater and spring levels in the upper Moapa Valley may be lessened under the No Action as compared to the Proposed Action. Groundwater pumping under the No Action Alternative is only anticipated to for a two-year period to meet the requirements of the Order 1169 pumping study. However, since the pumped groundwater would remain within Coyote Spring Valley, the pumping study may not fully replicate potential effects of pumping and removal of groundwater from the hydrographic basin.

Some MOA conservation measures, including the dedication of the Jones Spring water right, which is contingent on SNWA's ability to provide an alternate water supply to MVWD, could not be implemented under the No Action Alternative. If the ROWs are not issued and the Coyote Spring Project is not constructed, the provision of these additional stream flows for the recovery and protection of the Moapa dace would not be feasible. SNWA would remain committed to implementing a monitoring program and providing reports to the Nevada State Engineer. However, beneficial impacts associated with the other conservation measures may be limited.

Under the No Action Alternative, SNWA would not be able to convey its existing Coyote Spring groundwater rights as a future water resource option. The No Action Alternative would not fully meet the purpose and need for the Coyote Spring Project.

5.0 CUMULATIVE IMPACTS

NEPA and its implementing regulations require that BLM consider the cumulative environmental impacts that result from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions [40 CFR § 1508.7 and 1508.25(c)]. A cumulative impact analysis is limited to those past, present, and reasonably foreseeable future actions that involve effects on a resource value that overlaps with the Proposed Action's effects on that same resource value. For purposes of the cumulative impacts analysis for the Proposed Action, proposals for future actions were evaluated to determine if they were reasonably foreseeable based the concreteness of the proposal and the likelihood that the proposal could be accomplished.

5.1 CUMULATIVE PROJECTS CONSIDERED

Cumulative impacts associated with the Coyote Springs Project were considered with other projects in the Coyote Spring Valley and Upper Moapa Valley areas. The following projects were considered past, present, and reasonably foreseeable future actions, and were evaluated, as appropriate, for cumulative impacts to specific resources.

5.1.1 Coyote Springs Development

The CSI is developing a residential community on private lands in Coyote Spring Valley. In 2005, CSI began development on approximately 6,900 acres of their land within Clark County. Construction is currently planned to occur in four phases, spanning a 25-year period. Eventually, the community would include approximately 29,000 residential units with up to 72,500 residents. The first phase, including mixed-use residential, commercial, and public facilities on over 3,100 acres is anticipated to be completed in 2 to 7 years (ENTRIX et al., 2005).

Conservation measures have been incorporated into the proposed development, including a perpetual conservation easement on 6,200-acres, desert tortoise conservation measures, and natural wash buffer zone conservation easements. The COE prepared an Environmental Assessment (ENTRIX et al., 2005) and issued a 404 permit for this development in 2006.

To supply this development, CSI intends to pump their existing permitted groundwater rights in Coyote Spring Valley (4,600 afy), phased in over a 5-year period. CSI is a signatory to the MOA for this groundwater development. Under that MOA, CSI has made the following commitments:

- Dedication of 10% (460 afy) of the CSI water rights to the survival and recovery of the Moapa dace and its habitat;
- Dedication of an additional 5% of any water rights above 4,600 afy that CSI may in the future be entitled to withdraw from Coyote Spring Valley or import into the basin;
- Provide $50,000.00 annually for four (4) years to be used for habitat restoration to promote the recovery of the Moapa dace.

In addition, the minimum in-stream flow levels established under the MOA would also trigger actions by CSI. If flow levels, as measured at the Warm Springs West flume, reach:

- 3.0 cfs during the Order 1169 pumping study, CSI will take necessary actions to geographically redistribute groundwater pumping in Coyote Spring Valley;
- 3.0 cfs or less but greater than 2.9 cfs, CSI and SNWA will restrict groundwater pumping in combination to 8,050 afy;
- 2.9 cfs or less but greater than 2.8 cfs, CSI and SNWA will restrict groundwater pumping in combination to 6,000 afy;
- 2.8 cfs or less but greater than 2.7 cfs, CSI and SNWA will restrict groundwater pumping in combination to 4,000 afy;
- 2.7 cfs or less, CSI and SNWA will restrict groundwater pumping in combination to 724 afy.

The resource areas potentially cumulatively affected include air quality, cultural and paleontological resources, fish and wildlife resources, geology and soils, hazardous materials, noise, recreation, transportation and utilities, visual resources, and water resources and hydrology.

5.1.2 Clark, Lincoln, and White Pine Counties Groundwater Development Project

The SNWA applied to the BLM in August 2004 for ROWs necessary to construct and operate groundwater production, conveyance, and treatment facilities, and power conveyance facilities. The Clark, Lincoln, and White Pine Counties Groundwater Development (GWD) Project would convey approximately 200,000 afy of groundwater from northern Clark, central Lincoln, and eastern White Pine Counties.

The GWD Project would convey groundwater for which water rights will be issued by the Nevada Division of Water Resources, (Office of the State Engineer), based upon existing groundwater applications. Additionally, the GWD Project may convey groundwater for which water rights have already been issued. SNWA holds groundwater applications for approximately 168,000 afy in Spring, Snake, Cave, Dry Lake, Delamar, and Coyote Spring Valleys. These applications will be adjudicated through the Nevada water rights process. Furthermore, under the terms of a cooperative agreement with Lincoln County, SNWA is reserving capacity in the GWD Project conveyance system (pipelines) for future use by Lincoln County. Lincoln County does not currently have any specific plans or proposals for this capacity. SNWA anticipates that the County may acquire groundwater rights in Lake and Spring Valleys for conveyance through the GWD Project for use in Lincoln County.

The proposed GWD Project facilities include approximately 285 miles of pipeline, three pumping stations, six regulating tanks, a buried storage reservoir, a water treatment facility, 315 miles of overhead power lines, two electrical substations, and two hydroturbine energy recovery facilities. None of these facilities would physically connect with any of the facilities of the Coyote Spring Project. However, the GWD Project would include construction of facilities in Coyote Spring Valley and

possible withdrawal of additional groundwater from Coyote Spring Valley. The BLM is currently completing scoping in anticipation of preparing an Environmental Impact Statement for the proposed GWD Project. Regional groundwater model(s) of varying geographic scope are currently being prepared by various agencies in support of environmental compliance and water rights processes. SNWA anticipates major facility construction between 2009 and 2014. The GWD Project is anticipated to be operational and conveying water by 2014.

Water that would be developed and conveyed by SNWA through the GWD Project could potentially include future water rights granted to SNWA in Coyote Spring Valley. The LVVWD/SNWA hold groundwater applications for 27,512 afy of groundwater rights in Coyote Spring Valley; under an agreement with MVWD, approximately half of any future water rights that are granted to SNWA in Coyote Spring Valley will be transferred to MVWD. The volume of any future Coyote Spring Valley rights that might be permitted to SNWA and transported through the GWD Project, as well as potential points of diversion, are unknown. The Nevada State Engineer will not rule on these LVVWD/SNWA and other water right applications in Coyote Spring Valley until following completion of the Order 1169 pumping study, as the results of the study are essential to an understanding of the nature and extent of potential effects of groundwater pumping. BLM's EIS for the GWD Project will contain a detailed analysis of the project and its effects, including its cumulative effects.

The resource areas potentially cumulatively affected with the Coyote Spring Project include air quality, cultural and paleontological resources, fish and wildlife resources, geology and soils, hazardous materials, noise, recreation, transportation and utilities, visual resources, and water resources and hydrology.

5.1.3 Implementation of Other MOA Conservation Measures

In addition to the conservation measures that would be implemented by SNWA as part of the Proposed Action (Chapter 2.1.7), by CSI as part of its Coyote Springs Development (Chapter 5.1.1), and by the Moapa Band of Paiutes as part of development in California Wash (Chapter 5.1.5), additional conservation measures will be implemented by other parties to the MOA. These include:

- Establishment by all parties of a RIP, for the protection and recovery of Moapa dace (SNWA is providing funding for this action);
- Dedication by MVWD of its entire 1.0 cfs Jones Spring water right to provide in-stream flows beneficial to Moapa dace;
- Funding provided by the USFWS ($125,000) to develop an ecological model for the Moapa dace (SNWA is also partially funding this activity);
- Construction of a set of fish barriers on the Muddy River by BLM and USFWS to prevent further migration of non-native fishes (SNWA is also providing additional funding for this activity);
- Establishment of a Hydrologic Review Team by all parties;
- Operational coordination among USFWS, SNWA, CSI, and MVWD;

- Carrying out adaptive management measures by the parties, including funding preparation, and implementation of biological and hydrological studies and activities supporting recovery of Moapa dace, establishing a regional monitoring and management plan, assessing the feasibility of augmenting and/or restoring in-stream flows, and continuing to re-evaluate necessary measures to protect and recover Moapa dace;
- If flow levels, as measured at the Warm Springs West flume, reach 3.0 cfs during the Order 1169 pumping study, MVWD will shut down the Arrow Canyon well.

For this cumulative analysis, it is assumed that all of the conservation measures agreed to by all the parties to the MOA will be implemented. The resource areas potentially cumulatively affected with the Coyote Spring Project include fish and wildlife resources, and water resources and hydrology.

5.1.4 Pumping of Other Existing Undeveloped Coyote Spring Valley Groundwater Rights

In addition to the water rights held by SNWA and CSI, Nevada Power Company holds 2,500 afy of existing permitted water rights in Coyote Spring Valley. Although these are existing permitted rights, Nevada Power Company has not currently identified any projects or proposals to develop these rights. Federal rights-of-way would likely be required for Nevada Power Company to develop and convey these rights to their facilities in the Upper Moapa Valley.

Since there is no proposed project to develop these water rights, there is no information to analyze potential cumulative effects of construction of facilities. However, because these are existing permitted rights, the potential hydrologic effects of pumping of this groundwater are considered in the cumulative impact analysis. The resource area potentially cumulatively affected with the Coyote Spring Project is water resources and hydrology.

5.1.5 California Wash Groundwater Development

Under a water supply agreement, LVVWD has transferred 2,500 afy of existing permitted groundwater rights in the California Wash hydrographic basin to the Moapa Band of Paiutes. Although the Paiutes have indicated potential use of 500 afy of that 2,500 afy right for commercial development within the next two years, no formal projects have been identified.

California Wash is part of the White River flow system. There is limited information regarding the hydrologic properties of the carbonate aquifer underlying California Wash. Some areas of the basin appear to be highly transmissive (Johnson et al., 2001). The California Wash basin may be connected to the Muddy Springs area based on monitoring well data (USFWS, 2006). However, Johnson and Mifflin (2003, 2005) have suggested that there may also be a hydraulic barrier between California Wash and the Muddy Springs area.

Given the uncertainties regarding potential hydrologic connection between the two basins, and the potential for propagation of effects from groundwater pumping, the

Moapa Band of Paiutes have committed to conservation actions under the terms of the MOA. These include:

- Use of tribal greenhouse to cultivate native plants for restoration actions in the Muddy River area; and
- Access to tribal lands for construction and maintenance of at least one fish barrier;

In addition, the minimum in-stream flow levels established under the MOA would also trigger actions by the Moapa Band of Paiutes. If flow levels, as measured at the Warm Springs West flume, reach:

- 2.9 cfs or less but greater than 2.8 cfs, the Paiutes will restrict their pumping in California Wash basin to 2,000 afy;
- 2.8 cfs or less but greater than 2.7 cfs, the Paiutes will restrict their pumping to 1,700 afy;
- 2.7 cfs or less, the Paiutes will restrict their pumping to 1,250 afy.

Since there are no formal groundwater development project proposals by the Moapa Band of Paiutes in California Wash, there is no information to analyze potential cumulative effects associated with facility construction to develop these existing permitted rights. However, because these are existing permitted rights, the pumping of this groundwater is considered in the cumulative impact analysis. The resource area potentially cumulatively affected with the Coyote Spring Project is water resources and hydrology.

5.1.6 Additional MVWD Groundwater Pumping in Upper Moapa Valley

The MVWD's existing water right permit allows for phased increases in groundwater pumping from the Arrow Canyon and MX-6 wells in the Upper Moapa Valley. Current pumping by MVWD is approximately 2,400 afy. Increases in pumping would be approved by the State Engineer after reviewing annual pumping and monitoring data. The maximum permitted pumping rate at the Arrow Canyon Well is about 7,200 afy or 10 cfs (USFWS, 2006). Since these are existing permitted water rights, they are included in the cumulative impact analysis.

MVWD, as a signatory to the MOA, has agreed to comply with the conservation measures for the protection and recovery of the Moapa dace. This includes a restriction in groundwater pumping from the Arrow Canyon well to 2,400 afy if the 2.7 cfs "trigger level" at the Warm Springs West flume is reached. The dedication of the MVWD Jones Spring 1.0 cfs water right for Moapa dace is included in the Proposed Action, since the dedication is facilitated by the conveyance of 724 afy of SNWA water rights in Coyote Spring Valley through the Coyote Spring Project as replacement water supply.

5.1.7 Kane Springs Groundwater Development Project

Lincoln County has proposed a project to construct up to seven groundwater production wells and 10 miles of pipeline to develop up to 5,000 afy from Kane Springs Valley. Kane Springs Valley is part of the White River Flow System, and groundwater may flow from Kane Springs Valley into Coyote Spring Valley (Dettinger et al., 1995).

Lincoln County Water District/Vidler Water Company hold groundwater applications in Kane Springs Valley, and have proposed to develop this groundwater and convey it to Coyote Spring Valley for the Coyote Springs Development. In April, 2006, Lincoln County Water District/Vidler Water Company entered into a stipulation with the USFWS pursuant to which USFWS agreed to withdraw its groundwater application protests. The stipulation included the following measures which would be implemented by Lincoln County Water District/Vidler Water Company:

- Monitoring of water levels in groundwater wells in the Kane Spring and Coyote Spring Valleys;
- A reduction in groundwater pumping of 50% if the average flow levels at the Warm Springs West flume decrease to 3.15 cfs or less; and
- Complete cessation of pumping if the average flow levels decrease to 3.0 cfs or less.

The Nevada State Engineer held water right hearings for these applications in April 2006. A decision is still pending. The BLM is currently preparing an Environmental Impact Statement for the Kane Springs project.

Since a specific project for development of these future water rights has been identified, it is included in this cumulative analysis. The resource area potentially cumulatively affected with the Coyote Spring Project is water resources and hydrology.

5.1.8 Riverview Development

The Glendale Holding Company owns approximately 2,600 acres of land in Upper Moapa Valley near Interstate 15, and is in the early planning stages for development of that property. A draft concept plan has been prepared to initiate the Major Projects review and approval process with Clark County. However, since this development proposal is in such an early stage, the proposal is still general and vague. A mixed-use town center near Interstate 15, higher medium density residential uses located farther out from the town center area, and single family residential designations located toward the periphery of the development have been proposed. There would also be two industrial areas, one being the existing Nevada Power Plant and surrounding properties and the other location being along Highway 168. An approximately 550 acre area would be reserved for public facilities, including schools, civic area, and possible governmental facilities along with parks and open space. The projected maximum for this development is 43,500 units, which equates to a population of 116,833. A water supply for this proposed development has not been identified. Construction timeframes for this development have not yet been identified, but buildout is estimated to occur over a 25 to 30 year period. Since final development plans have not been completed, and permits and approvals have not yet been obtained, for the purposes of this cumulative analysis it is assumed that construction activities would not begin for 5 years.

The resource areas potentially cumulatively affected with the Coyote Spring Project include air quality, noise, and transportation and utilities.

5.1.9 Warm Springs Ranch

In July 2006, SNWA agreed to purchase the 1,200-acre Warm Springs Ranch. The property is intended to be used for conservation, restoration, and public education purposes. A management plan will be developed for the property, in consultation with federal agencies and local stakeholders, to ensure the long-term ecological health of the area and the recovery of the Moapa dace. The area may also be developed as an educational, recreational and natural resource for southern Nevada, including walking/hiking trails, a field research station and other low impact recreational activities that are consistent with the overall ecology of the property.

The resource areas potentially cumulatively affected with the Coyote Spring Project include fish and wildlife resources, vegetation, and water resources and hydrology.

5.2 PROPOSED PROJECTS NOT ANALYZED FOR CUMULATIVE IMPACTS ANALYSIS

The following projects were not included in the cumulative impacts analysis, because they were not sufficiently defined for analysis, or are outside of the area of potential impacts from the Coyote Spring Project.

5.2.1 Three Lakes Valley Groundwater Development Project

The SNWA applied to BLM for ROWs to convey permitted groundwater rights from Three Lakes Valley to the Las Vegas Valley. This project is located in northwestern Clark County, approximately 40 miles from the Coyote Spring Project. The Three Lakes Valley is part of the Death Valley regional flow system, with regional groundwater flow predominantly in a west-northwest direction. There is no direct or indirect physical or hydrological connection with the Coyote Spring Project. As a result, it was not considered in the cumulative impact analysis.

5.2.2 Virgin and Muddy Rivers Surface Water Development Project

The SNWA applied to BLM for ROWs to divert and convey approximately 83,000 afy of water from the Virgin and Muddy Rivers in 2004. This project originally included withdrawal of SNWA's Muddy River water rights at the Bowman Reservoir, and construction of pipelines and associated facilities through the Moapa Valley area. However, following an agreement on Colorado River water resources reached in January 2006, SNWA agreed to halt the development of this project. There are currently no plans to re-initiate this project. Therefore, this project was not considered in the cumulative impacts analysis.

5.3 CUMULATIVE IMPACTS

The following discussions identify those resources for which specific cumulative environmental impacts may occur. A cumulative resource analysis area is defined for each resource. The cumulative resource analysis area consists of the area within which potential impacts may occur as a result of the Coyote Spring Project (both temporally and spatially) and any overlapping potential impact area of a cumulative project.

5.3.1 Climate and Air Quality

The resource analysis area for potential cumulative climate and air quality impacts is the Coyote Spring Valley (Basin 210), Muddy River Springs Area (Basin 219) and Lower Moapa Valley (Basin 210) airsheds, which are the same as hydrographic basins.

Construction of the Coyote Spring Project, in combination with other past, present, and reasonably foreseeable projects would generate incremental contributions to cumulative PM_{10} emissions as a result of fugitive dust generated by land disturbance such as grading and trenching, with small contributions from equipment exhaust. The Coyote Springs Development is the only cumulative project potentially under construction at the same time as the Coyote Spring Project. The Coyote Springs Development estimates construction emissions for PM_{10} at approximately 0.1 ton per month (ENTRIX et al., 2005). The cumulative PM_{10} emissions from both the projects would be less than 1 ton per month. Both projects would be required to implement a dust control plan, in accordance with County DAQEM regulations, which would reduce fugitive dust emissions by a minimum of 68 percent. The Coyote Springs Development has also identified additional mitigation measures to reduce fugitive dust due to construction of the development (ENTRIX et al., 2005). Coyote Spring Valley is currently in attainment for all criteria pollutants, and since both projects would be required to comply with DAQEM regulations, the area would remain in attainment. Clark County is projected to attain the PM_{10} air quality standard by 2006, and attainment would be maintained in the future through continued implementation of the PM_{10} SIP.

5.3.2 Cultural and Paleontological Resources

The resource analysis area for potential cumulative cultural and paleontological resources is the APE for the Coyote Spring Project. The only other past, present, and reasonably foreseeable future project located within the APE for the Coyote Spring Project is the Coyote Springs Development. Construction of these cumulative projects has the potential to damage cultural and paleontological resources due to surface and subsurface disturbance from construction activities.

Compliance with Section 106 of the NHPA, including cultural resource surveys and treatment of NRHP-eligible sites, has been or will be conducted for both the Coyote Spring Project and Coyote Springs Development. As a result, additional cumulative cultural resource impacts would not occur.

Surveys, monitoring, and recovery of paleontological resources would be conducted as part of the Coyote Spring Project. A known paleontological locality is present on private CSI lands within the Coyote Springs Development. That site is not within the APE for the Coyote Spring Project, and handling and disposition of any fossils at that location would be at the discretion of the landowner.

5.3.3 Fish and Wildlife Resources

The resource analysis area for potential cumulative fish and wildlife resources is the Coyote Spring Project ROW and the Muddy Springs area.

5.3.3.1 Federally Listed and Candidate Species

Desert Tortoise: Projects which could have cumulative effects on desert tortoise in the cumulative resource analysis area include the Coyote Spring and Riverview Developments and the GWD Project. Cumulative effects to desert tortoise from development on private lands in Clark County are covered by the Clark County MSHCP (Clark County Department of Comprehensive Planning, 2000). This plan includes a maximum allowable area for development (or maximum allowable area of land disturbance) of 145,000 acres over a 30-year period. The Coyote Springs Development, which is located within desert tortoise critical habitat, has included additional desert tortoise conservation commitments (ENTRIX et al., 2005). Projects on federal lands that have potential effects on desert tortoise, including the GWD Project, would be required to undergo consultation under Section 7 of the ESA, and implement reasonable and prudent measures to minimize take of desert tortoise.

Moapa Dace: Groundwater pumping under the Coyote Spring Project, in conjunction with other past, present, and reasonably foreseeable future projects could result in a decline in groundwater levels and flow at the Muddy Springs (Chapter 5.3.13), which could impact the Moapa dace. The cumulative projects with potential effects on Moapa dace include the Coyote Springs Development, GWD Project, other MOA conservation measures, other existing undeveloped Coyote Spring Valley groundwater rights, California Wash groundwater development, Kane Springs groundwater development project, additional MVWD groundwater pumping in Upper Moapa Valley, and the Warm Springs Ranch conservation and restoration.

The USFWS predicted, under the worst-case scenario of cumulative groundwater pumping for projects under the MOA (Coyote Spring Project, Coyote Springs Development, and California Wash groundwater development), a loss in available riffle habitat by 22 percent and pool habitat by 16 percent within the Pederson Unit (USFWS, 2006). In addition to the loss of habitat, decreased flows would also result in a loss of temperature that would extend downstream, thereby reducing the thermal load in the system and thus the amount of available habitat at the appropriate spawning temperature. The loss in flow and habitat could further impact Moapa dace by restricting its reproductive potential and making it more vulnerable to catastrophic events such as wildfire. The conservation measures that would be implemented under the MOA would minimize potential effects to the Moapa dace. These conservation measures would provide more secure habitat in lower elevation stream reaches, should water flows decline at higher elevation springs from groundwater development. They would improve habitat throughout the range of the species, and reduce vulnerability to catastrophic events. The expansion of the species within its range and increase in population size would minimize or off-set effects of potential decreased flows from the Pederson Unit (USFWS, 2006).

Groundwater pumping of the other cumulative projects not considered in the MOA could result in further groundwater level and spring flow declines and associated impacts on Moapa dace and their habitat (Chapter 5.3.13). Each of these projects (GWD Project, other existing undeveloped Coyote Spring Valley groundwater rights, and Kane Springs groundwater development project) are either currently undergoing or would require separate NEPA analysis and associated consultation with the USFWS under Section 7 of

the ESA. Potential effects on Moapa dace and its habitat would be considered during those environmental compliance processes, and it is anticipated that conservation measures for the Moapa dace similar to those included in the MOA would be required. The only cumulative project that potentially may not require federal action would be additional MVWD groundwater pumping in Upper Moapa Valley (existing permitted rights at the Arrow Canyon and MX-6 wells). However, if future groundwater pumping by MVWD at Arrow Canyon or MX-6 (beyond that analyzed in the programmatic BO for the MOA) were likely to cause take of Moapa dace, MVWD would obtain a Section 10(a) permit for incidental take. Groundwater pumping restrictions under existing agreements (Chapter 5.3.13) also provide protections for spring flows for the Moapa dace.

The acquisition of the Warm Springs Ranch for conservation and restoration purposes will assist in the protection and recovery of Moapa dace. Springs, tributary streams, and a portion of the upper Muddy River pass through the ranch, which are habitat for and contain Moapa dace. Because of human modifications and the presence of non-native species, such as tilapia, some portions of the upper Muddy River contain a relatively low density of Moapa dace. Detailed management plans have not yet been developed, so specific benefits to the Moapa dace resulting from this acquisition cannot yet be quantified. However, habitat improvements would contribute to the long term survival of the species by increasing food production potential, providing additional habitat types that would be available for various life stages and providing an environment that is void of predatory non-native species. The USFWS (2006) identified that removal of tilapia from the upper Muddy River would result in substantial increase in Moapa dace population, and has the potential for a return to previous population levels when there was over a thousand Moapa dace in this reach.

Yellow Billed Cuckoo and Southwestern Willow Flycatcher: Cumulative groundwater pumping has the potential to reduce spring flows in the Muddy Springs area. Reductions in flows could impact prey (invertebrate) availability and the distribution, structure, and species composition of the riparian vegetation that is habitat for these species.

The Coyote Spring Project would not impact riparian habitat for these species (see Chapter 4.3.1.1), thus the Coyote Spring Project would not result in cumulative impacts to these species. The additional flows on the Apcar Stream from dedication of the Jones Spring right and the habitat restoration measures for Moapa dace that are part of the MOA, and conservation and restoration of the Warm Springs Ranch may also improve habitat conditions for these species.

5.3.3.2 Special Status Species

Construction of the Coyote Spring Project, in addition to other cumulative projects with ground-disturbing activities within or adjacent to the proposed ROW (GWD Project, and Coyote Springs Development) would result in the loss of habitat occupied by special status species, including western burrowing owl, banded Gila monster, and chuckwalla. Cumulative loss of mesquite would affect the special status species that utilize that habitat. However, on private lands, development impacts on special status species are addressed and mitigated through implementation of the Clark County MSHCP (Clark

County Department of Comprehensive Planning, 2000). The projects requiring federal ROWs or permits would address and potentially mitigate special status species impacts through their NEPA processes.

Cumulative groundwater pumping could affect habitat for special status fish and aquatic species, or special status species that rely on riparian habitats in the Muddy Springs area. However, the conservation measures identified under the MOA for the Moapa dace, including the additional flows from the dedication of the Jones Spring water right and the restoration of habitat (Chapter 2.1.7), would also improve habitat conditions for these species. As described above for the Moapa dace (Chapter 5.3.3.1), NEPA analysis and associated consideration of potential impacts on special status species' habitats are being conducted or will be required for most of the cumulative projects involving groundwater pumping. The only possible exception would be additional MVWD groundwater pumping in Upper Moapa Valley; however, as a signatory to the MOA, MVWD would be bound by the spring flow trigger levels and conservation measures for the Moapa dace, which would also improve habitat conditions for special status fish, aquatic, and riparian species.

5.3.3.3 Migratory Birds

Construction of the Coyote Spring Project, along with other cumulative projects under construction at the same time and in the same area, has the potential to disturb or destroy migratory bird nests and fledglings. The only other cumulative project within the cumulative resource analysis area under construction at the same time as the Coyote Spring Project would be the Coyote Springs Development. Environmental protection measures for migratory birds included in the Coyote Spring Project (Chapter 2.1.8.4), and mitigation measures for migratory birds included in the Coyote Springs Development (ENTRIX et al., 2005), reduce the potential for cumulative impact to migratory birds. There is also similar habitat available on federal lands in the region, which is protected as Resource Management Areas and Areas of Critical Environmental Concern.

5.3.4 Geology and Soils

The cumulative resource analysis area for geology and soils is the ROW and immediate vicinity, including adjacent drainages, for the Coyote Spring Project. Construction activities occurring at the same time and in the same area have the potential to increase soil erosion and sediment transport into drainages. The only cumulative project within the cumulative resource analysis area under construction at the same time as the Coyote Spring Project would be the Coyote Springs Development. Both the Coyote Spring Project and the Coyote Springs Development would implement soil erosion control measures, in accordance with state permits for stormwater and temporary discharges. Restoration implemented as part of the Coyote Spring Project, and landscaping and drainage control implemented for the Coyote Springs Development would reduce the potential for erosion and sediment transport after completion of construction.

5.3.5 Hazardous Materials

The cumulative resource analysis area for hazardous materials is the ROW and immediate vicinity for the Coyote Spring Project. Construction and operation of the Coyote Spring Project, in conjunction with construction and operation of other

cumulative projects in the same area, would utilize hazardous and toxic materials. However, compliance with federal and state storage and handling permits and regulations would prevent the accidental release of hazardous materials into the environment.

5.3.6 Land Use

Since the Coyote Spring Project would not have any direct or indirect land use impacts, there would be no potential for cumulative land use impacts.

5.3.7 Noise

The cumulative resource analysis area for noise is the ROW and vicinity for the Coyote Spring Project. Construction activities occurring at the same time and in the same area could result in temporary increases in noise levels. The Coyote Springs Development is the only cumulative project potentially under construction at the same time within the cumulative resource analysis area. Although this development would still be under construction, some noise-sensitive receptors, including golf course and residences, may be completed while the Coyote Spring Project is under construction. The closest to the Coyote Spring Project construction would be a portion of the golf course, located approximately 0.5 mile away; residences other sensitive land uses would be 2 miles or more distant. Because of their distance from the Coyote Spring Project construction, and the short-term nature of the construction activity, these noise levels are not anticipated to be discernible above the noise levels of adjacent residential construction.

5.3.8 Recreation

The Coyote Spring Project would not impact formal or informal recreational opportunities, and as a result there would be no potential for cumulative recreational impacts.

5.3.9 Socioeconomics

The Coyote Spring Project would not cause population, housing, employment, or environmental justice impacts, and as a result there would be no potential for cumulative socioeconomic impacts.

5.3.10 Transportation and Utilities

The cumulative resource analysis area for transportation and utilities is the ROW for the Coyote Spring Project and primary access routes (US93, I-15, and Highway 168). Cumulative projects within this area with potential transportation and utility impacts include the Coyote Springs and Riverview Developments.

Projects that are under construction at the same time and in the same area could cumulatively result in temporary traffic impacts. The Coyote Springs Development is the only cumulative project that would be under construction at the same time as the Coyote Spring Project. The movement of equipment and personnel during construction would be temporary, and not anticipated to cumulatively impair traffic movement due to the currently low volume of traffic in the area.

A roadway capacity analysis for the Coyote Springs Development identified the need for additional traffic lanes and improvements to US 93 and SR 168 (ENTRIX et al., 2005). Additional roadway capacity on SR 168 and possible improvements to access I-15 may

also be required for the Riverview Development. The periodic maintenance visits associated with operation of the Coyote Spring Project would not be discernable among the larger traffic impacts associated with those development projects.

5.3.11 Vegetation

The cumulative resource analysis area for vegetation is the Coyote Spring Valley and the Upper Moapa Valley basins. In Coyote Springs Valley, construction of the Coyote Spring Project, in combination with other cumulative projects (Coyote Springs Development and GWD Project) would result in the loss of approximately 8,500 acres of native vegetation, removal of cactus and yucca, potential loss of special status species, and introduction of invasive and noxious weeds. This acreage represents approximately 2.1 percent of the land (both public and private) in Coyote Spring Valley. In Upper Moapa Valley, the Coyote Spring Project is located on public and private lands. Private lands in the Upper Moapa Valley encompass approximately 4,200 acres (less than 5 percent of the valley). The projects located on federal lands would include restoration as conditions of federal ROW grants. The loss of habitats on private lands is addressed and mitigated through implementation of the Clark County MSHCP (Clark County Department of Conservation Planning, 2000). Conservation and restoration of the Warm Springs Ranch would also benefit native vegetation, and improve the long-term ecological health of the area.

Construction of the Coyote Spring Project and the Coyote Springs Development, which may occur at the same time, could result in temporary increases in reduced photosynthesis from dust coating leaves in the vicinity. Measures implemented as part of each project for dust control would minimize potential effects, which would also be temporary in nature.

Cumulative groundwater pumping (Coyote Springs Development, GWD Project, other existing undeveloped Coyote Spring Valley groundwater rights, California Wash groundwater development, Kane Springs groundwater development project, and additional MVWD groundwater pumping in Upper Moapa Valley) could impact riparian vegetation in the Muddy Springs area. The conservation measures identified under the MOA, including the additional flows from the dedication of the Jones Spring water right and the restoration of habitat for the Moapa dace (Chapter 2.1.7), would also create riparian habitat in the area. NEPA analysis and associated consideration of potential impacts on riparian habitats and species that rely on riparian habitats are being conducted or will be required for most of the cumulative projects involving groundwater pumping. The only possible exception would be additional MVWD groundwater pumping in Upper Moapa Valley; however, as a signatory to the MOA, MVWD would be bound by the spring flow trigger levels and conservation measures for the Moapa dace, which would also improve habitat conditions for the special status fish, aquatic, and riparian species.

5.3.12 Visual Resources

The cumulative resource analysis area for visual resources is the ROW for the Coyote Spring Project and the immediate vicinity from which the project could be seen. The Coyote Springs Development is the only cumulative project within the cumulative resource analysis area. The Coyote Springs Development, by introducing residential, commercial, and recreational structures, is altering the previous dry desert wash habitat of

this site. Construction of the MX-5 well site would be compatible with the structures being constructed as part of the development, and would not discernibly increase the visual alteration of the area.

Because the Coyote Springs Development is occurring on private land, there would be no cumulative impact on the visual character or visual resource classifications of BLM lands.

5.3.13 Water Resources and Hydrology

The cumulative resource analysis area for water resources and hydrology is the Coyote Spring and Upper Moapa Valley hydrographic basins. Groundwater pumping under the Coyote Spring Project, in conjunction with other past, present, and reasonably foreseeable future projects could result in a decline in groundwater levels and flow at the Muddy Springs. The cumulative projects with potential effects on water resources and hydrology include the Coyote Springs Development, GWD Project, other existing undeveloped Coyote Spring Valley groundwater rights, California Wash groundwater development, Kane Springs groundwater development project, and additional MVWD groundwater pumping in Upper Moapa Valley. Table 5-1 summarizes the existing water rights and applications, which are described in this cumulative analysis in further detail below.

Table 5-1 Cumulative Water Rights Summary

Hydrographic Basin	Permitted Water Rights (acre-feet per year)	Water Right Applications (acre-feet per year)
Coyote Spring Valley	9,000 - SNWA	27,512 - SNWA
	4,600 – Coyote Springs Investments	
	2,500 – Nevada Power Company	
Kane Springs		5,000 – Lincoln County Water District/ Vidler Water Company
Upper Moapa Valley	7,200 – Moapa Valley Water District	
California Wash	2,500 – Moapa Band of Paiutes	

There have been three analyses that evaluated cumulative groundwater pumping, including the two models developed by SNWA/LVVWD and the federal agencies in 2001 as part of the Nevada State Engineer's water rights process, and a USFWS analysis extrapolating current groundwater trends (see Chapter 4.13.1.2). These cumulative analyses evaluated some of the potential cumulative projects, as described below.

The SNWA/LVVWD groundwater model examined full development of all existing permitted, permanent groundwater rights in Coyote Spring Valley, in combination with existing and future groundwater pumping in the region (LVVWD, 2001). Of the cumulative projects identified above, this included a portion of the GWD Project (the pending SNWA/LVVWD applications for 27,512 afy in Coyote Spring Valley, half of which would be developed under the GWD Project), the Coyote Springs Development

(4,600 afy of existing Coyote Spring Valley rights), other existing undeveloped Coyote Spring Valley groundwater rights (2,500 afy held by Nevada Power Company), and additional MVWD groundwater pumping in Upper Moapa Valley (up to a maximum of about 7,200 afy of existing permitted rights at Arrow Canyon and MX-6 wells). That cumulative analysis predicted a decline in the carbonate aquifer levels in the Muddy Springs area of less than 10 feet, and a decrease of about 4 cfs of flow from the Muddy Springs, after pumping over a 61-year period (LVVWD, 2001).

The federal agencies' original model also analyzed full development of all existing permitted, permanent groundwater rights in Coyote Spring Valley, in combination with existing and future groundwater pumping in the region (GeoTrans, 2001). Of the cumulative projects identified above, this included a portion of the GWD Project (the pending SNWA/LVVWD applications for 27,512 afy in Coyote Spring Valley, half of which would be developed under the GWD Project), the Coyote Springs Development (4,600 afy of existing Coyote Spring Valley rights), and other existing undeveloped Coyote Spring Valley groundwater rights (2,500 afy held by Nevada Power Company). An update conducted in 2003 evaluated groundwater pumping of only 10,000 afy from Coyote Spring Valley on top of the existing pumping of about 2,400 afy from the Arrow Canyon well (see Chapter 4.13.1.2). The federal agencies' 2001 cumulative analysis of pumping all currently permitted rights in Coyote Spring Valley plus the SNWA/LVVWD Coyote Spring Valley applications predicted a reduction in Muddy River stream flows of about 33 and 22 percent, at the Moapa gauge and Muddy River narrows, respectively, after pumping over a 50 year period (GeoTrans, 2001).

As part of the programmatic BO, the USFWS analyzed the potential cumulative effects of groundwater development of up to 16,100 afy from Coyote Spring Valley and California Wash (USFWS, 2006). Of the cumulative projects identified above, this analysis addresses the Coyote Springs Development (4,600 afy in Coyote Spring Valley) and California Wash groundwater development (2,500 afy in California Wash). The USFWS predicted that, under the worst-case scenario, after 5 years of pumping, groundwater levels would decline about 8.5 feet, there could be a loss of 31 percent of flow on the Pederson Unit, and an overall reduction in flow of the Refuge Stream at its confluence with the Muddy River of 6 percent, as compared to 1998 conditions (USFWS, 2006).

No detailed cumulative effects modeling has yet been completed for the GWD Project hydrographic basins other than Coyote Spring Valley, nor for the Kane Springs groundwater development project. Each of these is further discussed below.

The GWD Project includes development of SNWA's pending groundwater applications in Coyote Spring Valley (considered in the above model analyses), and groundwater applications from basins further north. Neither the GWD Project nor the water right applications have yet been approved. The applications in Coyote Spring Valley won't be considered by the State Engineer until the Order 1169 pumping study is completed. The results of the pumping study, including effects on groundwater levels in Coyote Spring and Upper Moapa Valleys and spring flow of the Muddy Springs, would be considered by the State Engineer in determining whether to grant all, a portion, or none of the SNWA/LVVWD applications in Coyote Spring Valley. The majority of the other groundwater applications that would be developed through the GWD Project are located in Spring and Snake Valleys, which are part of a separate flow system (Great Salt Lake

Desert flow system); thus groundwater development in those basins should not affect Coyote Spring Valley or the Muddy Springs. Groundwater flow from the remaining applications that are in the same flow system as Coyote Spring Valley (approximately 35,000 afy in Cave, Dry Lake, and Delamar Valleys) may be influenced by geologic units and faults, such as the Pahranagat Shear Zone and Kane Springs fault, which may act as barriers to flow. The precise levels of potential groundwater level and spring flow declines that may result from permitting and development of these GWD Project basins cannot be predicted until more specific project information is available and modeling analyses are completed. Cumulative impacts of the GWD Project in conjunction with existing permitted rights, including the existing rights that would be pumped under the Coyote Spring Project, will be analyzed in detail in the EIS being prepared for the GWD Project. Additionally, the Coyote Spring Valley groundwater pumping restrictions under the MOA would be triggered if spring flows decline for any reason, including groundwater pumping from other projects.

The Kane Springs Project may withdraw up to 5,000 afy from the Kane Springs Valley, which could cumulatively affect flow of the Muddy Springs. These potential effects are offset, however, by the conservation commitments in the Lincoln County Water District/Vidler Water Company stipulation with the USFWS. Lincoln County Water District/Vidler Water Company has committed to reducing pumping to 2,500 afy if flows at the Warm Springs West flume decline to 3.15 cfs or less and to completely cease pumping if flows decline to 3.0 cfs or less. Under these conditions, the Kane Springs Project would completely shut down before the trigger levels for action under the MOA for the Coyote Spring Project are reached. Thus, cumulative effect of the Kane Springs Project should be no greater than the individual effect of the Coyote Spring Project.

Regardless of which groundwater development project or whether potential future climatic conditions are the source of effects, the commitments under the MOA require the reduction or cessation of pumping the groundwater rights which are the subject of the MOA, if specified spring flow trigger levels are reached. The measures included in the MOA, including reductions in groundwater pumping and movement of groundwater production to locations more distant from the Muddy Springs, would also alleviate potential cumulative impacts of other more distant projects. Additionally, to the extent that action by the State Engineer has not yet been taken on some of the cumulative projects and may not occur until after initiation of the Order 1169 pumping study, information obtained from the pumping study would also be considered in future State Engineer's decisions.

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Appendix A –
MMM Plan

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EXHIBIT A

MONITORING, MANAGEMENT AND MITIGATION PLAN FOR EXISTING AND FUTURE PERMITTED GROUNDWATER DEVELOPMENT IN COYOTE SPRING VALLEY (BASIN 210)

The purpose of this plan is to describe LVVWD/SNWA's and the Federal Bureaus' obligations in the Area of Interest regarding monitoring, management and mitigation of SNWA's current groundwater rights and, if granted by the Nevada State Engineer, LVVWD's groundwater rights in Coyote Spring Valley. It also describes the format and scope of a Technical Review Panel (herein after referred to as TRP).

1. Monitoring Requirements

A. Production Wells

- LVVWD/SNWA will ensure that all LVVWD/SNWA production wells in Coyote Spring Valley are metered continuously for discharge. Water level data will be collected continuously as is feasible.

B. Monitoring Wells

- LVVWD/SNWA, in consultation with the TRP (see description in following section), will locate and construct dedicated monitoring wells near production well fields. These wells will be defined as "near production" monitor wells. LVVWD/SNWA, when performing initial aquifer tests in recently drilled production wells, will utilize nearby observation wells to determine aquifer characteristics.

- LVVWD/SNWA will continuously monitor water levels in all LVVWD/SNWA "near production" monitoring wells.

- LVVWD/SNWA, in consultation with the TRP will locate and drill a single, dedicated carbonate rock aquifer monitoring well approximately half-way between the production wells in Coyote Spring Valley (Hydrographic Area 210) and the principal spring discharge area in Muddy River Springs Area (Hydrographic Area 219). LVVWD/SNWA will ensure that water levels in this "midway" monitor well are measured continuously. Barometric pressure at this location will also be measured continuously.

- LVVWD/SNWA, in cooperation with Sierra Pacific (formerly Nevada Power Company), USGS, and the State Engineer, will ensure that water levels in existing, carbonate monitor wells EH-5b, EH-4, and CSV-2 will be monitored continuously.

- LVVWD/SNWA, after the completion of the elevation-control survey (see paragraph 1D), will examine available information in consultation with the TRP to (1) determine if the information is sufficient to describe the vertical hydraulic gradient between the regional carbonate aquifer, the alluvial aquifer, and spring heads in the Muddy River Springs area, and (2) characterize ground-water and surface-water interactions in the area. If LVVWD/SNWA in consultation with the TRP determines that information is insufficient to

describe the vertical hydraulic gradient, then LVVWD/SNWA will construct at least one well in the area to determine the vertical hydraulic gradient. Well design and location(s) will be based on consultation with the TRP. LVVWD/SNWA in consultation with the TRP will determine if water levels in the well(s) will be monitored continuously.

C. Streamflow and Spring flow

- LVVWD/SNWA will equip and maintain two continuous surface water measurement sites at locations selected in consultation with the TRP in the Muddy Springs Area. These sites would be in addition to surface water gaging stations 09415900 Muddy Springs at LDS Farm near Moapa, 09415910 Pederson Spring near Moapa, and 09415920 Warm Springs West near Moapa, which LVVWD/SNWA currently funds in cooperation with NDWR and USGS.

- LVVWD/SNWA, in cooperation with the Moapa Valley Water District, will equip and maintain continuous flow measurement devices located at Moapa Valley Water District's Jones Spring (Apcar) and Baldwin Spring pumping stations to determine total spring discharge.

- United States Fish and Wildlife Service (USFWS) will equip and maintain continuous temperature monitoring at Pederson Springs, and a continuous surface water measurement site at Plummer (Iverson) Spring.

- National Park Service in cooperation with USGS will equip and maintain continuous surface water measurement sites at Rogers Spring and Blue Point Spring.

D. Elevation Control

- LVVWD/SNWA will conduct a detailed elevation survey of LVVWD/SNWA wells in the Muddy Springs Area. LVVWD/SNWA in consultation with the TRP, will develop and implement a plan to determine elevation above sea level of all major spring orifices and monitoring and production wells as is feasible in the Muddy Springs Area and the Rogers and Blue Point spring complex. The TRP will determine where elevation data already exists, the accuracy of existing information, and the need for additional information.

E. Quality of Data

- The parties will make measurements and collect data according to USGS standard protocol

F. Water Quality

- LVVWD/SNWA will collect and analyze water quality samples for major ions twice annually at two surface water measurement sites at locations selected in consultation with the TRP in the Muddy Springs Area. Duplicate samples will be collected and analyzed at the two sites to ensure proper analyses.

- LVVWD/SNWA will collect and analyze water quality samples that regionally represent different water quality types at well locations determined in consultation with the TRP. Samples will be analyzed for major ions, trace elements and the stable isotopes of hydrogen and oxygen. Samples will be collected semi-annually for one and a half years, beginning

during initial aquifer testing of production wells. Long-term water quality sampling will be conducted every five years thereafter.

G. Reporting

- LVVWD/SNWA will manage an internet database in cooperation with the USGS, the Federal Bureaus, the State Engineer, Moapa Valley Water District, and other entities as feasible based on cooperation to collect and compile data (e.g. water levels, surface water flows, water quality, and ground-water pumpage) for the Area of Interest.

- All data collected by any party under or as described in this plan shall be fully and cooperatively shared among the parties.

- Data shall be posted to the internet site within 90 days of its collection by LVVWD/SNWA. LVVWD/SNWA will use its best efforts to post data to the internet site within 30 days of its submission to the LVVWD/SNWA if collected by other parties, or in the case of water quality data, within 90 days of laboratory results.

2. Management Requirements

A. Goal

- The common goal of the parties is to manage the development of the carbonate aquifer as a water resource without resulting in unreasonable adverse impacts to the state and federal water rights and water resources of the Federal Bureaus. Additionally, decisions must be based on the best scientific information available and the parties will collaborate on technical data collection and analysis.

B. Symposium

- LVVWD/SNWA, in cooperation with the Federal Bureaus and other members of the Technical Review Panel, will hold a public symposium at least every two years to solicit information on monitoring, modeling, and mitigation.

C. Technical Review Panel

- The parties will create and convene a TRP by February 1, 2002. Membership will include LVVWD, SNWA, Moapa Valley Water District, FWS, NPS, and BLM. The parties mutually agree to invite a representative of the State Engineer's Office to participate as the chair of the TRP. The parties may mutually agree to invite other entities to participate in the TRP as appropriate.

- The purpose of the TRP is to:

1) provide a forum for scientific/technical review
2) disseminate data to the public through an internet site
3) share information regarding modeling efforts and model results
4) identify needs for additional data collection and scientific investigations
5) hold a meeting at least every two years to share and discuss relevant data and to form recommendations about monitoring, modeling, and mitigation

6) discuss values for monitored variables (water levels, spring discharges, etc.) that, if exceeded, are of concern to the parties
7) develop standards and QA/QC for data collection and analysis
8) provide a forum for discussion to help develop agreement for prescribed courses of action on technical issues.

- At the biannual meeting of the TRP, LVVWD/SNWA will present to the TRP a schedule for its anticipated future pumping (testing, production) for the following two years.

- Additional meetings of the TRP will be held if requested by any party if the LVVWD/SNWA anticipated pumping schedule presented at the previous biannual or other more recent meeting changes by 50% or more or data observed within the two year period results in any party developing a reasonable scientific assessment that resources are being or could be adversely impacted.

D. Decision-Making Process

- The TRP will review all available data and attempt to determine the prescribed course of action. If there are (1) different interpretations regarding aquifer response and/or the significance of that response to the state or federal water rights or water-dependent resources of the Federal Bureaus or (2) different opinions on the prescribed course of action, the parties will jointly agree to conduct additional data collection or modeling directed at resolving the different interpretations or opinions, if feasible. If that is not successful, the parties will refer the issue to their respective managers. LVVWD/SNWA will inform the State Engineer or his representative of all agreed upon courses of action. Nothing herein limits or changes the State Engineer's authority and any party can petition the State Engineer to consider the issue.

- The parties agree that in the event of a dispute to proposed or ongoing pumping schedules, there will be no increase in groundwater withdrawals under any existing pumping schedule until such time as the State Engineer makes a decision on a petition with regard to a preferred course of action or for a period of 90 days, whichever is less. During such period, the Federal Bureaus and LVVWD agree not to commence any administrative or judicial proceedings regarding the disputed pumping schedule. The existing 7,500 acre-feet per year of permitted groundwater rights owned by SNWA are expressly excluded from the provisions of this section D.

- In the event that the parties disagree as to whether LVVWD/SNWA proposed or on going pumping schedules will result in unreasonable adverse impacts to the Federal rights and resources, any party may petition the State Engineer to request that he determine whether there is or is not unreasonable adverse impact that requires the implementation of mitigation measures by LVVWD/SNWA.

3. Mitigation Requirements

- LVVWD/SNWA will mitigate unreasonable adverse impacts either as agreed upon by the parties or after the State Engineer determines whether there are unreasonable adverse impacts due to LVVWD/SNWA pumping. LVVWD/SNWA will take the necessary steps to ensure that mitigation actions are feasible. Mitigation measures will include one or more of the following:

    - Geographic redistribution of pumpage;
    - Reduction or cessation in pumpage;
    - Restoration/modification of existing habitat;
    - Establishment of new habitat;
    - Augmentation of water resources with pumped groundwater;
    - Other measures as agreed to by the parties and/or required by the State Engineer, to the extent not inconsistent with this agreement

4. Modification of the Plan

- The parties acknowledge that the State Engineer has the authority to modify this plan, and any party shall have the right to petition the State Engineer to modify this plan upon 90 days written notice to the other parties; provided, however, that no such petitions may be filed within 2 years of the first meeting of Technical Review Panel. Any party may submit written comments to the State Engineer regarding the merits of any such petition for modification.

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Appendix B –
Order 1169

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IN THE OFFICE OF THE STATE ENGINEER

OF THE STATE OF NEVADA

1169

ORDER

HOLDING IN ABEYANCE CARBONATE-ROCK AQUIFER SYSTEM GROUNDWATER APPLICATIONS PENDING OR TO BE FILED IN COYOTE SPRINGS VALLEY (BASIN 210), BLACK MOUNTAINS AREA (BASIN 215), GARNET VALLEY (BASIN 216), HIDDEN VALLEY (BASIN 217), MUDDY RIVER SPRINGS aka UPPER MOAPA VALLEY (BASIN 219), LOWER MOAPA VALLEY (BASIN 220), AND FOR FURTHER STUDY OF THE APPROPRIATION OF WATER FROM THE CARBONATE-ROCK AQUIFER SYSTEM, LINCOLN AND CLARK COUNTIES, NEVADA.

WHEREAS, the Nevada State Engineer is designated by the Nevada Legislature to perform the duties related to the management of the water resources belonging to the people of the State of Nevada.[1]

WHEREAS, the State Engineer is empowered to make such reasonable rules and regulations as may be necessary for the proper and orderly execution of the powers conferred by law.[2]

WHEREAS, the State Engineer is empowered to conduct such studies as are necessary.[3]

WHEREAS, a large portion of the State of Nevada consisting of approximately 50,000 square miles of sparsely populated land is underlain by significant carbonate-rock sequences.[4]

WHEREAS, the carbonate-rock sequences contain groundwater aquifers, which are believed to contain significant, but undetermined, quantities of ground water.

WHEREAS, many persons or entities have filed water right applications requesting permission to appropriate substantial quantities of underground water from the carbonate-rock aquifer system.

WHEREAS, in 1984, the Water Resources Division of the United States Department of Interior, Geological Survey proposed a 10-year investigation of the entire Carbonate Terrane, which includes the carbonate-rock aquifers of the areas referenced above. This study was proposed because the water resources of the Carbonate Terrane were not well defined, the hydrology and geology of the area are complex, and data was sparse.[5]

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[1] See, Nevada Revised Statutes chapters 532, 533, 534, 535 and 536.

[2] NRS § 532.120.

[3] NRS § 532.165(1), 533.368 and 533.370(2).

[4] Michael D. Dettinger, Distribution of Carbonate-Rock Aquifers in Southern Nevada and the Potential for their Development, Summary of Findings, 1985-1988, Summary Report No. 1, United States Geological Survey, Department of Interior and Desert Research Institute, University of Nevada System, p. 3, 1989. See also, Memorandum dated August 3, 1984, from Terry Katzer, Nevada Office Chief, Water Resources Division, United States Department of Interior Geologic Survey, Carson City, Nevada, to Members of the Carbonate Terrane Study, Attachment p. 8, which indicates that the area underlain by significant carbonate-rock sequences in Nevada is over 40,000 square miles of sparsely populated land, and includes 106 hydrographic areas and basins.

[5] Memorandum dated August 3, 1984, from Terry Katzer, Nevada Office Chief, Water Resources Division, United States Department of Interior Geologic Survey, Carson City, Nevada, to

WHEREAS, it has been known since 1984 that to arrive at some reasonable understanding of the carbonate-rock aquifer system, substantial amounts of money would be required to develop the science, a significant period of study would be required, and that "unless this understanding is reached, the development of carbonate water is risky and the resultant effects may be disastrous for the developers and current users."[6]

WHEREAS, the United States Geological Survey has indicated that given the multiple possible avenues of hydrologic connection between the various aquifers and flow systems, and the uncertainties of recharge and discharge mechanisms and processes, an investigation of the hydrology of the carbonate-rock aquifer system in Nevada is undoubtedly a difficult undertaking.

WHEREAS, an investigation of the carbonate-rock aquifer system is additionally complicated by factors including:[7]

- basic hydrologic data such as groundwater levels in the basin-fill aquifers and the carbonate-rock aquifers, and reliable flow measurements for important springs and major streams are scarce or infrequently obtained in much of the area;
- secondary hydrologic and other data, such as hydraulic parameters, geophysical and geochemical, are lacking in many areas;
- the geometry, properties, and boundaries of the carbonate-rock and basin-fill reservoirs are generally unknown, and definition of these properties can be expensive and difficult;
- climatic conditions today are inadequately defined (particularly at higher altitudes) and conditions during the development of the flow paths within the deep-rock aquifers and flow paths within the carbonate-rock aquifer are even more uncertain;
- uncertainties and inaccuracies exist in current methods of estimating precipitation;
- uncertainties and inaccuracies exist in current methods of estimating groundwater inflow and recharge;
- uncertainties and inaccuracies exist in current methods of estimating groundwater outflow and evaporative discharge;
- only a small number of wells tap the deep carbonate-rock aquifer system;
- because there has been no significant historical pumping of ground water from the carbonate-rock aquifer system, groundwater models can only be used as a limited predictive tool for estimating the principle location and magnitude of the impacts of pumping ground water from the system;
- limited stresses on the water resources of the area under current development conditions allow hydrologists information only on the narrow band of system responses to natural conditions; and
- the relationship between geothermal systems and the deep carbonate-rock aquifers and groundwater flow systems is not well understood.

WHEREAS, in 1985, the Nevada Legislature authorized a program for the study and testing of the carbonate-rock aquifer system of eastern and southern Nevada. The program was a cooperative effort between the State of Nevada and the Federal Government. The overall plan for the program was to study the carbonate-rock aquifers of southern, east-central, and northeastern Nevada as separate phases of work, with a summary of findings to be prepared at the end of each

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Members of the Carbonate Terrane Study.

[6] Ibid.

[7] Id., Attachment p. 7.

phase. A report, Distribution of Carbonate-Rock Aquifers in Southern Nevada and the Potential for their Development, Summary of Findings, 1985-1988,[8] summarized the findings of the first phase of the study, which assessed the resources of the carbonate-rock aquifers of southern Nevada. The summary brought together results from more than 20 technical reports produced during the study. The summary indicated that:

> The rocks that compose the carbonate-rock aquifers are layers of limestone and dolomite that were deposited hundreds of millions of years ago in much of the eastern Great Basin. Subsequently, the carbonate rocks were much deformed; as a result, they no longer exist as continuous layers beneath the region. Instead, they have been pulled apart to form a few large areas of thick and relatively continuous carbonate rocks. Separating these areas are noncarbonate rocks, within which are isolated mountain-sized blocks of carbonate rock.
>
> Beneath southern Nevada, the thick carbonate-rock layers are continuous enough to transmit ground water at regional scales only beneath a north-south "corridor" 60-90 miles wide that extends southward from east-central Nevada to and beyond the Spring Mountains area west of Las Vegas. Within this corridor are the two major regional flow systems of southern Nevada: the Ash Meadows-Death Valley system and the White River-Muddy River Springs system. These flow systems link the ground water beneath dozens of valleys and over distances exceeding 200 miles. Flow in these systems probably is concentrated along highly transmissive zones associated with (1) recently active faults and (2) confluences of flow near major warm-water springs. Outside of the corridor, the carbonate rocks are present primarily as isolated blocks that form aquifers of limited extent, recharged mostly by local precipitation.
>
> * * *
>
> Large-scale development (sustained withdrawals) of water from the carbonate-rock aquifers would result in water-level declines and cause the depletion of large quantities of stored water. Ultimately, these declines would cause reductions in the flow of warm-water springs that discharge from the regional aquifers. Storage in other nearby aquifers also might be depleted, and water levels in those other aquifers could decline. In contrast, isolated smaller ground-water developments, or developments that withdraw ground water for only a short time, may result in water-level declines and springflow reductions of manageable or acceptable magnitude.
>
> Confidence in predictions of the effects of development, however, is low; and it will remain low until observations of the initial hydrologic results of development are analyzed. A strategy of staging developments gradually and adequately monitoring the resulting hydrologic conditions would provide information that eventually could be used to improve confidence in the predictions.[9]

WHEREAS, because assurances that the adverse effects of development will not overshadow the benefits cannot be made with a high degree of confidence, development of the carbonate-rock aquifer system must be undertaken in gradual stages together with adequate

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[8] Michael D. Dettinger, Distribution of Carbonate-Rock Aquifers in Southern Nevada and the Potential for their Development, Summary of Findings, 1985-1988, Summary Report No. 1, United States Geological Survey, Department of Interior and Desert Research Institute, University of Nevada System, Forward, 1989.

[9] Id, pp. 1-2.

monitoring in order to predict, through the use of a calibrated model, the effects of continued or increased development with a higher degree of confidence.

WHEREAS, staging development gradually means not developing the resources in one large step, but rather starting with small projects that are possibly augmented gradually if conditions and confidence warrant. This approach allows the effects of development to be observed and analyzed continually, so that the benefits and adverse effects of development can be judged and the effects reversed or mitigated if they prove to be detrimental to existing rights and the environment. This approach would hopefully avoid the havoc that could be created by the curtailment of water use by those who have come to rely on it if impacts occur requiring curtailment of the water use.

WHEREAS, the 1995 Water-Resources Investigations Report 91-4146[10] estimates the total water budget of all southern Nevada aquifers from the natural recharge to the mountains and subsurface inflow to the study area[11] to be about 160,000 acre-feet annually, and discharges from major discharge areas to be about 77,000 acre-feet annually.[12]

WHEREAS, it is believed that all of the recharge and subsurface inflow cannot be captured for use.

WHEREAS, in July and August of 2001 nearly four weeks of public administrative hearings were conducted on applications filed by the Las Vegas Valley Water District (Applications 54055 - 54059, inclusive) and Coyote Springs Investment, LLC (Applications 63272 - 63276, inclusive, and 63867 -63876, inclusive), which together request to appropriate approximately 135,000 acre-feet of water annually from the carbonate-rock aquifer system within the Coyote Springs Valley Hydrographic Basin.[13]

WHEREAS, testimony and evidence from the administrative hearing on the Las Vegas Valley Water District's applications indicates that using the standard Maxey-Eakin technique for estimation of groundwater recharge from precipitation, the recharge for the Coyote Springs Valley, Muddy River Springs, Hidden Valley, Garnet Valley, Black Mountains and Lower Moapa Valley

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[10] Michael D. Dettinger, et al., Distribution of Carbonate-Rock Aquifers and the Potential for Their Development, Southern Nevada and Adjacent Parts of California, Arizona and Utah, U.S. Geological Survey, Water-Resources Investigations Report 91-4146, p. 50, 1995.

[11] The study area is defined on p. 5 of Water-Resources Investigations Report 91-4146 to be most of southern Nevada south of Tonopah and Pioche.

[12] Discharge areas are identified as Muddy River Springs 36,000 acre-feet annually (afa) of spring flow, Blue Point Spring 240 afa of spring flow, Rogers Spring 920 afa of spring flow, Frenchman Mountain 2,100 afa of underflow toward Colorado River, Pahrump Valley 18,000 afa of underflow to California, Ash Meadows 17,000 afa of spring flow and evapotranspiration, Amargosa Desert 3,000 afa of underflow to Death Valley, and Grapevine Canyon 400 afa of underflow to Death Valley. Water-Resources Investigations Report 91-4146 at 53.

[13] It is noted that at the administrative hearing on Coyote Springs Investment, LLC Applications 63272 - 63276, inclusive, and 63867 -63876, inclusive, the applicant indicated they are requesting the State Engineer "to issue the permits as requested but limit their full use until the monitoring and mitigation program is in effect." Transcript, public administrative hearing before the State Engineer, August 20, 2001, p. 58. However, the applicant further indicated that it requested that a minimum of four permits be issued, two in each county, with the second permit in each county to be used to stress the aquifer. Two permits for a total amount of 14,478 afa would be for development, two permits for a total amount of 14,478 afa would be to stress the aquifer under some temporary development. Transcript, public administrative hearing before the State Engineer, August 20, 2001, pp. 91-96. This is after the 27,504 afa requested by the Las Vegas Valley Water District.

areas combined is approximately 3,550 acre-feet annually. Using the modified Maxey-Eakin technique introduced at the administrative hearing (known as the Donovan-Katzer 2000 technique), the recharge is estimated at approximately 6,761 acre-feet annually for the combined areas.[14]

WHEREAS, testimony and evidence from the administrative hearing on the Las Vegas Valley Water District's applications indicates that approximately 50,000 acre-feet of groundwater inflow comes into the Coyote Springs Valley from northern groundwater basins and approximately 53,000 acre-feet annually outflows[15] from Coyote Springs Valley of which a portion may be available for capture from that groundwater underflow. While testimony presented indicated a belief that significant quantities of water may be available for capture from storage, it is unknown what quantity that would be and if any underground water could be appropriated without unreasonable and irreversible impacts.[16]

WHEREAS, testimony and evidence from the administrative hearing on the Las Vegas Valley Water District's applications indicates that a portion of the ground water outflow from Coyote Springs Valley is believed to discharge at a rate of approximately 37,000 acre-feet annually at the Muddy River Springs area and approximately 16,000 to 17,000 acre-feet annually flows to groundwater basins further south.[17] This 37,000 acre-feet is counted as part of the 53,000 acre-feet outflow from Coyote Springs Valley resulting in 16,000-17,000 acre-feet annual flow that by-passes the Muddy River Springs area.

WHEREAS, these referenced large springs located near the central part of the Upper Moapa Valley, which that collectively discharge approximately 37,000 acre-feet annually of underground water, are fully appropriated pursuant to the Muddy River Decree.[18] It is believed that the source of water discharged originates mainly from the carbonate-rock aquifer system, but it is unknown if the discharge originates solely from the White River Flow System or is also influenced by discharge from the Meadow Valley Flow System or if there is influence from the alluvial aquifer.

WHEREAS, listed endangered and/or potential threatened species exist in the Muddy Springs/Muddy River area.

WHEREAS, testimony and evidence from the administrative hearing on the Las Vegas Valley Water District's applications indicates that their own expert witnesses are unable to make a suggestion to the State Engineer as to what part of the water budget could be captured without a great deal of uncertainty, and that the question cannot be resolved without stressing the system.[19]

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[14] See, testimony of Terry Katzer and David Donavan; Exhibit 54, p. 4-25, public administrative hearing before the State Engineer, July 16-24, 2001.

[15] Taking into account for 4,000 afa of in-basin recharge and 1,000 afa of evapotranspiration.

[16] See, testimony of Terry Katzer and David Donavan, public administrative hearing before the State Engineer, July 16-24, 2001.

[17] See, testimony of Terry Katzer and David Donavan, public administrative hearing before the State Engineer, July 16-24, 2001.

[18] Judgment and Decree, In the Matter of the Determination of the Relative Rights In and To the Waters of the Muddy River and Its Tributaries in Clark County, State of Nevada, March 12, 1920, Tenth Judicial District Court of the State of Nevada, In and For the County of Clark.

[19] See, testimony of Terry Katzer and David Donavan, public administrative hearing before the State Engineer, June 16-24, 2001.

WHEREAS, testimony and evidence from the administrative hearing on the Las Vegas Valley Water District's applications indicates that the State Engineer's ability to determine if development of the carbonate-rock aquifer system will impact existing rights is dependent on how the water rights are brought "on-line" and monitored.[20]

WHEREAS, testimony and evidence from the administrative hearing on the Las Vegas Valley Water District's applications indicates that little is known about the hydrologic connectivity between the groundwater basins, that virtually nothing is known about the mountain blocks, estimates of recharge to the area can vary by a factor of two, there is probably some connectivity between the water in the carbonate-rock aquifers and the alluvial groundwater basins,[21] there is still little data available and not much has changed from the information known in 1984.

WHEREAS, the State Engineer has been provided several different models, which though based on little pumping data, all provide the State Engineer with different analyses, and which all indicate that the pumping of substantial amounts of carbonate-rock aquifer water will likely impact the sources of the Muddy River.

WHEREAS, the State Engineer has previously granted groundwater permits, which authorize use of underground water in the area underlain by the carbonate-rock aquifer system or directly from the carbonate-rock aquifer system in the following quantities:

Coyote Springs Valley (Basin 210)	16,300	acre-feet
Black Mountain (Basin 215)	10,216	acre-feet
Garnet Valley (Basin 216)	3,380	acre-feet
Hidden Valley (Basin 217)	2,200	acre-feet[22]
Muddy River Springs aka Upper Moapa Valley (Basin 219)	14,756	acre-feet
Lower Moapa Valley (Basin 220)	5,813	acre-feet
	50,465	acre-feet

WHEREAS, of all the water rights issued from the carbonate-rock aquifer system, to date very few have actually been pumped.

WHEREAS, if 16,000 to 17,000 acre-feet is believed to by-pass the Muddy River Springs area, the water right permits already issued in Coyote Springs Valley alone equal the estimate of the amount of carbonate flow that by-passes the region and is not part of the flow discharged from the Muddy River Springs area.

WHEREAS, Nevada Revised Statute § 533.370(2)(b) provides that the State Engineer may postpone action on an application in areas where studies of water supplies are necessary.

WHEREAS, Nevada Revised Statute § 533.368 provides that if the State Engineer determines that a hydrological study, an environmental study or any other study is necessary before he makes a final determination on an application, and the applicant, a governmental agency or other person has not conducted such a study or the required study is not available, the State Engineer shall advise the applicant of the need for the study and the type of study required.

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[20] Ibid.

[21] Ibid.

[22] This 2,200 acre-feet is combined with 2,200 acre-feet issued in Garnet Valley for a total of 2,200 afa between the two basins.

WHEREAS, Nevada Revised Statute § 533.368(4) provides that the State Engineer shall consult with the applicant and the governing body of the county or counties in which the point of diversion and place of use are located concerning the scope and progress of the study.

WHEREAS, the State Engineer believes it is prudent to work with a model, and the appropriate model will be determined in conjunction with the parties identified below who are responsible for participating in the study.

WHEREAS, the State Engineer does not believe it is prudent to issue any additional water rights to be pumped from the identified portions of the carbonate-rock aquifer until a significant portion of the water rights which have already been issued are pumped for a substantial period of time in order to determine if the pumping of those water rights will have any detrimental impacts on existing water rights or the environment.

NOW THEREFORE, the State Engineer orders:

1. All applications pending and any new filings for the appropriation of water from the carbonate-rock aquifer system in Coyote Springs Valley (Basin 210), Black Mountains Area (Basin 215), Garnet Valley (Basin 216), Hidden Valley (Basin 217), Muddy River Springs aka as Upper Moapa Valley (Basin 219), and Lower Moapa Valley (Basin 220) will be held in abeyance until further information is obtained by stressing the aquifer by those water right permits already issued to appropriate water from the carbonate-rock aquifer system.

2. While the studies proposed in 1985 were a beginning, those studies indicated that large-scale developments with sustained withdrawals of water from the carbonate-rock aquifers would result in water-level declines and depletion of stored water, but that isolated smaller groundwater developments or developments of limited duration may result in water-level declines and springflow reductions of manageable and acceptable magnitudes. However, very little additional information based on hard science has been produced since that time. Nevada Revised Statute § 533.368 provides the State Engineer with the authority to withhold action on pending applications and to advise the applicant of the need for additional study. The State Engineer finds that further hydrological study is needed before a final determination can be made on carbonate-rock aquifer system water right applications in the referenced basins.

3. The State Engineer, in conjunction with those identified below as applying for additional water rights and already having an interest in water rights permitted from the carbonate-rock aquifer system, or their successors in interest, will conduct a study to provide information on the effect of pumpage of those water rights which have already been issued from the carbonate-rock aquifer. The entities that shall participate in the study must at a minimum include:

Las Vegas Valley Water District
Southern Nevada Water Authority
Coyote Springs Investment, LLC
Nevada Power Company
Moapa Valley Water District.

The study must cover a 5-year minimum period during which at least 50% of the water rights currently permitted in the Coyote Springs Valley groundwater basin are pumped for at least 2 consecutive years.

4. These referenced applicants or permittees shall bear the cost of the study, and a cash deposit divided pro rata among them will be required as set forth in NRS § 533.368(3) after a determination of the estimate of cost to complete the study.

5. The State Engineer will arrange meetings between the State Engineer and the Las Vegas Valley Water District, Southern Nevada Water Authority, Coyote Springs Investment, LLC, Nevada Power Company, and Moapa Valley Water District, or their successors, and the governing bodies of the counties in which there are proposed points of diversion and places of use under their pending applications concerning the scope of the study.

6. The State Engineer orders the Las Vegas Valley Water District, Southern Nevada Water Authority, Coyote Springs Investment, LLC, Nevada Power Company, Moapa Valley Water District, Dry Lake Water Company, LLC, Republic Environmental Technologies, Inc., Chemical Lime Co., Nevada Cogeneration Associates, or their successors, who presently hold water rights authorized for appropriation from the carbonate-rock aquifer, to provide the other parties to the study and the State Engineer with data on a quarterly basis as to the rate at which water was diverted under the specific water right permits issued, total acre-feet diverted per month, and monthly water level measurements

7. After the study period, the Las Vegas Valley Water District; Southern Nevada Water Authority; Coyote Springs Investment, LLC; Nevada Power Company; and Moapa Valley Water District are ordered to file with the State Engineer, within 180 days of the end of the fifth consecutive year, a report as to the information obtained and any impacts seen to the groundwater or surfacewater resources of the carbonate-rock aquifer or alluvial aquifer systems from the pumping of those rights presently permitted.

8. At the end of the study period, the Las Vegas Valley Water District/Southern Nevada Water Authority will update Exhibit 54 from the July 2001 hearings in order to show the State Engineer the effects, if any, of the water it requested for appropriation under Applications 54055 - 54059, inclusive, as they are filed. The State Engineer will then make a determination if he has sufficient information to proceed with ruling on those applications for which hearings have already been conducted, i.e., Las Vegas Valley Water District (Applications 54055 - 54059, inclusive) and Coyote Springs Investment, LLC (Applications 63272 - 63276, inclusive, and 63867 -63876, inclusive), and other applications pending for the appropriation of water from the carbonate-rock aquifer system.

HUGH RICCI, P.E.
State Engineer

Dated at Carson City, Nevada,

this 8th day of March, 2002

Appendix C –
MOA

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MEMORANDUM OF AGREEMENT

This Memorandum of Agreement ("MOA") is entered into this 20th day of April, 2006, (the "Effective Date") by and between the Southern Nevada Water Authority ("SNWA"), a political subdivision of the State of Nevada, the United States Fish and Wildlife Service ("FWS"), Coyote Springs Investment LLC, a Nevada limited liability company ("CSI"), the Moapa Band of Paiute Indians ("Tribe") and the Moapa Valley Water District ("MVWD"), a political subdivision of the State of Nevada. For convenience, SNWA, FWS, CSI, the Tribe and MVWD are at times herein referred to individually as "Party" and collectively as "Parties."

RECITALS

A. In Order No. 1169 the Nevada State Engineer held in abeyance applications for new groundwater rights in certain groundwater basins, and mandated that SNWA, MVWD and other parties conduct a regional groundwater study including the pumping of at least 50 percent of the permitted water rights within the Coyote Spring Valley hydrographic basin for a period of at least two consecutive years ("Pump Test").[1] SNWA currently owns 9,000 afy of water rights with points of diversion within the Coyote Spring Valley hydrographic basin under Permit Nos. 49414, 49660 through 49662 and 49978 through 49987 ("SNWA Water Rights").

B. To facilitate the Pump Test and delivery of SNWA Water Rights, SNWA applied to the Bureau of Land Management ("BLM") for a right-of-way across Federal land for the

[1] Currently there are 16,100 acre-feet per year ("afy") of permitted groundwater rights in the Coyote Spring Valley hydrologic basin, including the SNWA Water Rights and CSI Water Rights, defined in Recitals A and D herein, and Order No. 1169 requires the continuous diversion of 8,050 acre-feet per year during the Pump Test.

construction and operation of a pipeline to deliver groundwater from the Coyote Spring hydrographic basin to either the Muddy River System or to MVWD's service system.

C. In Ruling No. 5115 the Nevada State Engineer granted Application No. 54075, filed by the Las Vegas Valley Water District ("District") on October 17, 1989, for a total duty of 2,500 afy with a diversion rate of 5.0 cubic feet per second ("cfs") within the California Wash hydrographic basin ("Permit No. 54075"). By separate agreement, the District has transferred ownership of Permit No. 54075 to the Tribe. The Tribe plans to divert and utilize groundwater under Permit No. 54075.

D. CSI is a private landowner in the Coyote Spring Valley hydrographic basin and owns 4,600 afy of water rights with points of diversion within the basin under Permit Nos. 70429 and 70430 ("CSI Water Rights").

E. MVWD is responsible for supplying the municipal water needs of Upper and Lower Moapa Valley located in Clark County, Nevada. MVWD owns several water rights within Upper Moapa Valley including surface rights to spring flows in the Muddy Springs area and groundwater rights (Permit Nos. 52520, 55450 and 58269) with points of diversion at the Arrow Canyon well and a right to 1.0 cfs of spring flow from the Jones Spring (Certificate No. 10060) ("Jones Water Right").

F. FWS is a Federal agency within the Department of the Interior. FWS' responsibilities include implementation of the Endangered Species Act and administration of the National Wildlife Refuge System. FWS holds a Nevada State water right certificate for a flow rate of not less than 3.5 cfs as measured at the Warm Springs West flume (Permit No. 56668; Certificate No. 15097 issued subject to the terms of Permit No. 56668) for the maintenance of habitat of the Moapa dace and other wildlife purposes ("FWS Water Right").

G. The Moapa dace (*Moapa coriacea*) is an endemic fish that inhabits the upper Muddy River and tributary thermal spring systems within the Warm Springs area in Clark County, Nevada. The Moapa dace was federally listed as endangered on March 11, 1967 (32 FR 4001). FWS manages the Moapa Valley National Wildlife Refuge established in 1979 as part of the National Wildlife Refuge System.

H. Based upon its evaluation of available data, FWS postulates that current groundwater pumping by MVWD at the Arrow Canyon well is causing a decline in spring flows in the Warm Springs area and that future withdrawals of groundwater by SNWA and/or CSI in the Coyote Spring Valley hydrographic basin and/or by the Tribe in the California Wash hydrographic basin may cause spring flows to decline. SNWA, CSI, and MVWD do not believe the available hydrologic data supports these conclusions.

I. The Tribe believes that regional groundwater monitoring and scientifically valid, but conservative, regional computer modeling have demonstrated and will continue to demonstrate that on-Reservation groundwater pumping authorized under Permit No. 54075 will not cause appreciable declines in spring flows in the Warm Springs area.

J. Prior to the issuance of Order No. 1169, a stipulation was executed on July 19, 2001, between Federal agencies and SNWA regarding protests filed by Federal agencies against SNWA applications for new groundwater rights in the Coyote Spring Valley hydrographic basin. The Federal agencies and SNWA agreed to implement a monitoring study that was clarified in a Monitoring, Management, and Mitigation Plan for Existing and Future Permitted Groundwater Development in Coyote Spring Valley ("3M Plan") attached to and incorporated in that stipulation.

K. As part of the approval of the MVWD water rights at the Arrow Canyon well, the Nevada State Engineer required a monitoring plan. A monitoring plan has been developed and agreed upon jointly by MVWD, Nevada Power Company, FWS and National Park Service, with the most recent amendments to that plan being submitted to the State Engineer in September 2002 ("MVWD Monitoring Plan").

L. State Engineer Ruling No. 5115 requires that "[a] monitoring program approved by the State Engineer prior to the diversion of any water [under Permit No. 54075] be prepared in conjunction with the [Pump Test] ordered in State Engineer's Order No. 1169."[2] The Tribe will develop, in coordination with the other Parties, a monitoring plan approved by the Nevada State Engineer prior to applying any groundwater to beneficial use under Permit No. 54075 ("Tribal Monitoring Plan").

M. On March 11, 2005, the Nevada State Engineer approved a document entitled "Southern Nevada Water Authority's Monitoring Plan for Groundwater Applications and Permits in Coyote Spring Valley, Hidden and Garnet Valleys, and California Wash Hydrographic Basin, Clark and Lincoln Counties March, 2005" ("SNWA Monitoring Plan"). The State Engineer directed that the SNWA Monitoring Plan serve as the monitoring plan required by the State Engineer for the SNWA Water Rights and the CSI Water Rights.

N. The Parties share a common interest in the conservation and recovery of the Moapa dace and its habitat. Each Party also has an interest in the protection, use and enjoyment of its water rights and entitlements. To serve these interests, the Parties have identified certain conservation measures with the objective of making measurable progress toward the conservation and recovery of the Moapa dace, and have agreed to coordinate the monitoring, management and mitigation measures included and to be included in the 3M Plan, MVWD

Monitoring Plan, SNWA Monitoring Plan, and Tribal Monitoring Plan (collectively the "Regional Monitoring Plans").

O. The Parties desire that FWS engage in consultation and prepare a formal biological opinion under the provisions of Section 7 of the Endangered Species Act and its implementing regulations prior to execution of this MOA. The consultation shall consider the effects on the Moapa dace from the pumping of 9,000 afy under the SNWA Water Rights, 4,600 afy under the CSI Water Rights, and 2,500 afy by the Tribe under Permit No. 54075, together with the implementation of the monitoring, management and conservation measures identified herein.

NOW, THEREFORE, in consideration of the mutual promises and covenants contained herein, the Parties do agree as follows:

I. Conservation Measures. The Parties agree that in order to make measurable progress toward protection and recovery of the Moapa dace and its habitat concurrent with the operation and development of water projects for human use, it is beneficial to the public interest to establish the following conservation measures:

1. Establishment of Recovery Implementation Program. To effectuate the goals of this MOA the Parties agree to establish a Recovery Implementation Program ("RIP") whereby measures necessary to accomplish the protection and recovery of the Moapa dace, the operation and development of regional water facilities, and the inclusion of necessary and interested third parties are outlined and implemented. To facilitate establishment of the RIP:

a. The Parties agree to cooperate in the selection of qualified personnel and/or contractors to oversee the development of the RIP.

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[2] Ruling No. 5115 at 40.

b. SNWA agrees to provide funding in the amount of $300,000.00 to develop the RIP. SNWA agrees to execute such documents as may be necessary to ensure that these funds are available to meet the needs of those persons designated by the Parties with the task of establishing the RIP.

c. The Parties agree to seek the cooperation of other parties within the region that have an interest in the development and management of water and biological resources. To achieve the goals of the RIP, the Parties agree to employ principles of adaptive management to further the current understanding of the habitat and aquatic needs of the Moapa dace. The Parties will jointly negotiate the participation of any other party in the RIP.

2. Dedication of the Jones Water Right. The Parties agree that the recovery of the Moapa dace will be enhanced by the guarantee of additional in-stream flows in areas of historical Moapa dace habitat. One such area is the Apcar Stream down gradient of the Jones Spring. The Parties concur that the dedication of the Jones Water Right to the purpose of providing in-stream flows will be beneficial to the Moapa dace population in this area and further the recovery of the species. To effectuate the dedication of the Jones Water Right to the provision of in-stream flows in the Apcar Stream, the Parties agree as follows:

a. MVWD agrees to record an agreement between MVWD and FWS ("Jones Springs Agreement") on the Jones Water Right with both the Nevada State Engineer and the Clark County, Nevada, Recorder's Office that requires the entire 1.0 cfs flow right under the Jones Water Right to be dedicated to the purpose of maintaining in-stream flows in the Apcar Stream subject to the provisions of paragraph 7 of the Jones Springs Agreement. MVWD shall retain ownership of the Jones Water Right. The Jones Springs Agreement shall be executed and recorded promptly upon execution of this MOA. A draft of the Jones Springs Agreement is

attached hereto as "Exhibit A." The Jones Springs Agreement ultimately recorded pursuant to this paragraph shall be in substantially the same form as Exhibit A.

b. SNWA agrees to transfer to MVWD, at no cost, a portion of Permit No. 49414 equal to 724 afy. This transferred portion of Permit No. 49414 shall remain of equal priority date with that portion of Permit No. 49414 retained by SNWA.

c. MVWD agrees to transfer to SNWA, at no cost, the first 724 afy, or any portion thereof if less than 724 afy is permitted, of any permit(s) issued by the Nevada State Engineer pursuant to Application Nos. 54055 through 54059, inclusive.

d. The Parties agree to cooperate with MVWD in the filing and processing of any change applications, including applications to change the manner or place of use that are filed by MVWD with the Nevada State Engineer in order to effectuate the Jones Springs Agreement referenced in paragraph I(2)(a) above.

e. Subject to paragraph 2 of the Jones Springs Agreement, the Parties agree to cooperatively determine the best methods to ensure that the Jones Water Right accomplishes the purpose stated in paragraph I(2)(a) above, as related to the recovery of the Moapa dace and other endemic species, including the possibility of restoration of the springhead at Jones Spring.

3. Dedication of Portion of CSI Water Rights.

a. CSI agrees to record a conservation easement with both the Nevada State Engineer and the Clark County, Nevada, Recorders Office dedicating 460 afy of the CSI Water Rights to the survival and recovery of the Moapa dace and its habitat. The use of this water would be at the discretion of the FWS in consultation with the CSI and the Parties.

b. In addition, CSI agrees to dedicate 5 percent of all water rights above 4,600 afy that CSI may in the future be entitled to withdraw from Coyote Spring Valley

hydrographic basin or any water rights that CSI imports into and uses in the basin. The Parties, consistent with the RIP, will determine the most effective method for utilizing such water rights. CSI shall execute and record such documentation, including conservation easements, deeds, change applications and reports of conveyance, as may be necessary to effectuate the dedication of that portion of such water rights that is subject to the terms and conditions contained herein.

4. Habitat Restoration and Recovery Measures. To restore the habitat necessary for the Moapa dace and take other steps to protect and recover the species, the Parties agree as follows:

a. SNWA agrees to provide funding in the amount of $750,000.00 for the restoration of Moapa dace habitat under the direction of FWS on the Apcar Unit of the Moapa National Wildlife Refuge or otherwise. All tasks funded under this paragraph I(4)(a) shall be agreed to in advance by SNWA and FWS in consultation with the other Parties. SNWA agrees to execute such documents as may be necessary in order to ensure that these funds are available for such habitat restoration.

b. FWS agrees to provide funding in the amount of $125,000.00 and SNWA agrees to provide funding in the amount of $125,000.00 to develop an ecological model designed to investigate the effects of habitat change on the ecology of the Moapa dace. FWS and SNWA shall, in consultation with the other Parties, agree upon the selection of a contractor to prepare the model.

c. SNWA agrees to provide funding in the amount of $50,000.00 to construct fish barriers to help eliminate the predacious Tilapia from areas of Moapa dace habitat. FWS and SNWA shall, in consultation with the other Parties, agree upon the selection of a contractor to perform such work.

d. SNWA agrees to provide funding in the amount of $25,000.00 to implement programs related to the eradication of non-native fish species, including predacious Tilapia, in the Warm Springs area. FWS and SNWA shall, in consultation with the other Parties, agree upon the selection of a contractor to perform such work.

e. CSI agrees to provide FWS with funding on an annual basis in the amount of $50,000.00 for a period of four years following the execution of this MOA for the restoration of Moapa dace habitat outside the boundaries of the Moapa National Wildlife Refuge along the Apcar Stream, or at such other locations as CSI and FWS, in consultation with the other Parties, agree.

f. The Tribe agrees to use a reasonable portion of the existing on-Reservation greenhouse facility for a reasonable period of years, for the purpose of cultivating native vegetation for use in RIP-approved habitat restoration. The Parties understand that the greenhouse is in a state of major disrepair and that such use of the greenhouse will require repairs and a water supply. FWS will work with the Tribe to obtain the funding necessary to provide for such repairs and to identify and secure a water supply adequate for such use. The Tribe reserves the right to pursue, and if feasible implement, separate arrangements for the improvement and commercial operation of the remainder of the greenhouse.

g. The Tribe agrees to provide access to the Tribe's Reservation for the construction and subsequent maintenance of at least one fish barrier, at a mutually agreeable location, to help eliminate the predacious Tilapia from Moapa dace habitat. FWS will work with the Tribe to obtain the funding necessary for construction, maintenance and repair of such barrier(s).

h. The Tribe agrees to provide the services of the Tribe's Environmental Director for in-kind staff services and participation in the RIP.

5. Protection of In-Stream Flows. The Parties recognize that maintenance of minimum in-stream flows in the Warm Springs area is essential for the protection and recovery of the Moapa dace. Although those flows are unknown at this time, the Parties agree as follows:

a. For purposes of this paragraph I(5), all "Average Flow Levels" specified herein shall be determined by flow measurements at the Warm Springs West flume. Average Flow Levels will be determined to have reached a particular level within a range specified in paragraphs I(5)(b) through (g) ("Trigger Range"): (1) if the daily average flow for each of 45 consecutive days decreases to an amount within the Trigger Range, or if the 90 day average flow over any 90 consecutive day period decreases to an amount within the Trigger Range; or (2) if the daily average flow for each of 90 consecutive days increases to an amount within the Trigger Range, or if the 135 day average flow over any 135 consecutive day period increases to an amount within the Trigger Range. If determined to be necessary by the Parties, the Parties will cooperate in removing phreatophytes, repairing or replacing the flume or taking any other steps to ensure the accuracy of flume measurements. Any adjustment in the rating curve for the Warm Springs West flume shall result in a pro-rata adjustment of the Trigger Ranges. The remaining provisions of this paragraph I(5) apply both during and after the Pump Test, except for paragraphs I(5)(c)(i) and (ii) which apply only during the Pump Test.

b. If the Average Flow Level decreases to an amount within the Trigger Range of 3.2 cfs or less, the Parties agree to meet as soon as practicably possible to discuss and interpret all available data and plan for mitigation measures in the event flows continue to decline.

c. If the Average Flow Level decreases to an amount within the Trigger Range of 3.0 cfs or less, the following Parties agree to take the following further actions:

i. During the pendency of the Pump Test, MVWD agrees to immediately cease pumping from the Arrow Canyon well; and

ii. While the Arrow Canyon Well is shut down pursuant to paragraph I(5)(c)(i) above, SNWA agrees to supply MVWD with all necessary municipal and domestic water supplies from the MX-5 and RW-2 wells or other sources available to the SNWA. Except for the express provision contained in paragraph I(2)(b) of this MOA, nothing in this MOA will obligate SNWA to supply MVWD with any water from SNWA's existing permits in the Coyote Spring Valley following the completion of the Pump Test; and

iii. SNWA and CSI agree to take necessary actions to prepare to geographically redistribute their groundwater pumping in the Coyote Spring Valley should flow levels continue to decline; and

d. If the Average Flow Level is within the Trigger Range of 3.0 cfs or less but greater than 2.9 cfs, the pumping of SNWA from the MX-5, RW-2, CS-1 and CS-2 wells in combination with the pumping of CSI from the MX-5, RW-2, CS-1 and CS-2 and CSI's pumping from other wells within the Coyote Springs Valley ("CSV") shall be restricted to 8,050 afy.

e. If the Average Flow Level is within the Trigger Range of 2.9 cfs or less but greater than 2.8 cfs, the pumping of SNWA from the MX-5, RW-2, CS-1 and CS-2 wells in combination with the pumping of CSI from the MX-5, RW-2, CS-1 and CS-2 and CSI's

pumping from other wells in CSV shall be restricted to 6,000 afy, and the pumping of the Tribe under Permit No. 54075 shall be restricted to 2,000 afy.

f. If the Average Flow Level is within the Trigger Range of 2.8 cfs or less but greater than 2.7 cfs, the pumping of SNWA from the MX-5, RW-2, CS-1 and CS-2 wells in combination with the pumping of CSI from the MX-5, RW-2, CS-1 and CS-2 and CSI's pumping from other wells in CSV shall be restricted to 4,000 afy, and the pumping of the Tribe under Permit No. 54075 shall be restricted to 1,700 afy.

g. If the Average Flow Level is within the Trigger Range of 2.7 cfs or less, the pumping of SNWA from the MX-5, RW-2, CS-1 and CS-2 wells in combination with the pumping of CSI from the MX-5, RW-2, CS-1 and CS-2 and CSI's pumping from other wells in CSV shall be restricted to 724 afy, and the pumping of the Tribe under Permit No. 54075 shall be restricted to 1,250 afy.

h. The Parties agree that any pumping of the 460 afy of CSI Water Rights dedicated to the survival and recovery of the Moapa dace pursuant to paragraph 3.a. of this MOA shall be at the discretion of FWS and not counted against the pumping restrictions set forth in paragraphs 5(d) through 5(g) of this MOA.

6. Hydrologic Review Team. Upon execution of this MOA, the Parties shall establish a Hydrologic Review Team ("HRT") which shall be constituted and function as follows:

a. Membership. Each Party shall appoint two representatives ("HRT Representatives"), including at least one with substantial formal training and experience in hydrogeology ("Technical Representative"). Except as otherwise provided herein, the two HRT Representatives shall together have one vote on HRT matters. By consensus, the HRT

Representatives may offer voting or non-voting HRT membership to others who provide regional monitoring records and analyses to the HRT.

b. Objectives. The objectives of the HRT shall be: (1) to identify opportunities and make recommendations for the purpose of coordinating and ensuring accuracy, consistency and efficiency in monitoring, other data collection, and analytical activities performed under the Regional Monitoring Plans; (2) to establish technically sound analyses of impacts on Muddy River Springs and Muddy River flows resulting from regional groundwater pumping; (3) to assess based thereon whether the pumping restrictions, but not the Trigger Ranges, under paragraphs I(5)(c) through (g) above (or any successors thereto) should be adjusted to better reflect the extent to which regional groundwater pumping by the respective Parties causes, or is likely to cause, impacts on Muddy River Springs and Muddy River flows; and (4) to adopt by consensus appropriate adjustments to such restrictions, if warranted.

c. Regional Baseline Pumping Analysis. Within one year following the execution of this MOA, the Technical Representatives shall prepare a written analysis of regional groundwater pumping data and impacts ("Regional Baseline Pumping Analysis"). In preparing such baseline analysis, the HRT shall consider all relevant and available data and analytical materials. The Regional Baseline Pumping Analysis shall set forth all shared and dissenting analyses, interpretations and recommendations of the participating Technical Representatives. All modeling analyses contained therein shall be based on modeling codes in the public domain and data files that are available for comprehensive review by all Technical Representatives.

d. Annual Determination. Based on the Regional Baseline Pumping Analysis, and no later than one year after preparation of that analysis and annually thereafter, the HRT shall endeavor to determine by consensus ("Annual Determination") whether the

groundwater pumping restrictions, but not the Trigger Ranges, under paragraphs I(5)(c) through (g) above (or any successors thereto) should remain in place, or whether and how any of such restrictions should be adjusted ("Pumping Restriction Adjustments") to better reflect the extent to which regional groundwater pumping by the respective Parties causes, or is likely to cause, impacts on Muddy River Springs and Muddy River flows. However, no Pumping Restriction Adjustments will be made within the first five years following the Effective Date of this MOA. All Annual Determinations (including any Pumping Restriction Adjustments adopted by HRT consensus) shall be final and binding on all Parties, except that by consensus the HRT may at any time modify or vacate any Annual Determination.

e. Annual Determination Reports. Each Annual Determination shall be set forth and explained in a written Annual Determination Report which includes as appendices the Regional Baseline Pumping Analysis, all previously submitted Annual Technical Representative's Reports, and any other data or analytical materials considered by the HRT. If the Annual Determination is not made due to lack of consensus or any other reason, the positions thereon of the HRT Representatives shall be set forth and explained in the Annual Determination Report. Furthermore, if the HRT fails to adopt Pumping Restriction Adjustments recommended in a timely submitted Annual Technical Representative's Report, the Annual Determination Report shall briefly explain why such recommendation was not adopted.

f. Annual Technical Representative's Reports. Within six months after the close of the year of this MOA and annually thereafter, based on the best available scientific data and information, any Technical Representative may submit to all other HRT Representatives a written report ("Annual Technical Representative's Report") containing both: (1) a well-

documented professional analysis of monitored regional pumping and pumping impacts; and (2) recommendations, if any, for Pumping Restriction Adjustments.

g. Provision for Peer Review. If the HRT Representatives are unable to reach consensus on an Annual Determination, the Parties shall refer the matter to a qualified panel of third party reviewers ("Panel") consisting of three scientists unaffiliated with any Party and having substantial formal training and experience in hydrogeology. If the Parties cannot agree by consensus on the make-up of the Panel, one member of the Panel shall be designated by each of the following from its own ranks: U.S. Geologic Survey, Desert Research Institute and a private firm with the requisite expertise designated by a majority of the Parties ("Appointing Entities"), provided that the Parties by consensus may designate different similarly qualified Appointing Entities. If any Appointing Entity for any reason is unable or refuses to designate a member of the Panel, the Parties by majority vote shall designate a qualified replacement Appointing Entity. The purpose of the referral to the Panel will be to obtain peer review of the then-current Annual Determination Report, the data upon which it is based, all previously submitted Annual Technical Representative's Reports, and any other relevant and available data and analytical materials. The Panel will be asked to make its recommendation based on the foregoing information concerning the appropriate content of the Annual Determination. All Parties shall have a fair and reasonable opportunity to present factual and analytical submissions in person and/or in writing to the Panel. The Parties contemplate that a determination of the Panel on the Annual Determination will constitute the best available scientific information concerning the impacts on Muddy River Springs and Muddy River flows resulting from regional groundwater pumping, and the appropriateness of any proposed Pumping Restriction Adjustments. The cost of the Panel shall be borne equally by the Parties.

7. Acquisition of Additional Land and Water Rights. As a potential conservation measure, the Parties agree to work cooperatively to identify both land and water rights that, if acquired and dedicated to the recovery of the Moapa dace, will assist in making measurable progress towards the recovery of the Moapa dace. SNWA agrees to make a good faith effort to acquire land and water rights identified by the Parties. The Parties expressly agree that the reasonableness of any terms and conditions for any acquisition of land or water rights by SNWA shall be determined by SNWA at SNWA's sole discretion, and that SNWA shall have no obligation to acquire any land or water rights upon terms and conditions that SNWA finds unreasonable. When such land or water rights are acquired by SNWA, SNWA will cooperate with FWS in establishing restrictions upon the use of such lands and water rights consistent with existing laws so as to effectuate the conservation of these resources and the recovery of the Moapa dace.

8. Operational Coordination Among FWS, SNWA, CSI and MVWD. Consistent with the terms of this MOA and to accomplish the goals of protecting and recovering the Moapa dace, and accommodating the operation of municipal water supply infrastructure, FWS, SNWA, CSI and MVWD agree to examine all reasonable water operational scenarios and agree to implement feasible scenarios that will minimize impacts to the Moapa dace and its habitat, including, but not limited to the provision of water to MVWD from the Coyote Spring Valley hydrographic basin during the Pump Test or other water supplies available to SNWA and MVWD. MVWD shall have the right during the Pump Test to use the Arrow Canyon Well only in the event and to the extent SNWA is unable to supply MVWD with "all necessary municipal and domestic water supplies" pursuant to the provisions of paragraph I(5)(c)(ii) of this MOA. Except for the express provision contained in paragraph I(2)(b) of this MOA, nothing in this

MOA will obligate SNWA to supply MVWD with any water from SNWA's existing permits in the Coyote Spring Valley hydrographic basin following the completion of the Pump Test.

SNWA and CSI agree, following the execution of this MOA, and in coordination with FWS, to cooperate in locating and drilling one or more production wells in the northern part of the Coyote Spring Valley hydrographic basin. The details of this cooperative effort shall be contained in a separate agreement between CSI and SNWA.

9. Adaptive Management Measures. The Parties agree to carry out additional conservation measures that will need to be taken to protect and recover the Moapa dace following the initiation of the RIP and as more data becomes available both as to the biology of the Moapa dace and regional hydrology. Thus, the Parties agree to cooperate in carrying out the following measures as may be appropriate:

a. Funding, preparation and implementation of biological and hydrological studies and activities supporting the recovery of the Moapa Dace; and

b. Establish a regional monitoring and management plan that will include science-based management and mitigation measures for RIP participants; and

c. Assessing the feasibility of augmenting and/or restoring in-stream flows and establishing those flows as deemed feasible.

d. Continue to re-evaluate necessary measures to protect and recover the Moapa dace.

II. Current Access Agreement. SNWA currently has an access agreement with the owners of the Warm Springs Ranch, which contains Moapa dace habitat, in order to conduct biological surveys of the Moapa dace. SNWA agrees to use its best efforts to seek to amend this access

agreement so that each of the Parties to this MOA will have similar rights of access to the Warm Springs Ranch.

III. Modification of MVWD Monitoring Plan. Pursuant to the MVWD Monitoring Plan, submitted to the Nevada State Engineer in September 2002, FWS and MVWD agreed to a monitoring plan for development of MVWD's water rights at the Arrow Canyon well that contained certain management and mitigation measures that would be taken if flows at the Warm Springs West flume reached 3.17 cfs and 2.94 cfs respectively. This monitoring plan was recognized by the Nevada State Engineer in Ruling No. 5161. The Parties agree that, in order to effectuate a uniform regional monitoring and management plan, that the flow level restrictions and mitigation measures contained in this MOA shall replace the flow and water level restrictions and mitigation measures contained in the MVWD Monitoring Plan.

IV. No Assertion of FWS State Water Right. Provided that the other Parties to this MOA are in full compliance with the terms of this MOA, FWS expressly agrees not to assert a claim of injury to the FWS Water Right against either MVWD for pumping at the Arrow Canyon Well, against the Tribe for pumping within the California Wash hydrographic basin or against SNWA or CSI for any pumping in the Coyote Spring Valley for any diminution in flows at the Warm Springs West flume above 2.7 cfs. This provision shall in no way prejudice the FWS' ability and/or right to assert any and all rights inherent to the FWS Water Right for any diminution in flows at the Warm Springs West flume below 2.7 cfs.

V. No Waiver of Statutory Duties or Legal Rights. This MOA does not waive any of the authorities or duties of the FWS or the United States, nor does it relieve SNWA, CSI, the Tribe and MVWD from complying with any Federal laws, including but not limited to, the National Environmental Policy Act, Endangered Species Act, National Wildlife Refuge System

Improvement Act of 1997, and Federal Land Policy and Management Act of 1976, and any and all rules and regulations thereunder. Except as provided in paragraph IV of this MOA, it is the expressed intention of the Parties that FWS and the United States are not waiving any legal rights or obligations of any kind, including obligations to consult or re-consult under the Endangered Species Act, by entering into this MOA. Further, this agreement is entered as a good faith resolution of certain issues and is not intended to waive any party's rights in a subsequent legal proceeding regarding those issues. In addition, except for the restrictions set forth in paragraphs I(5)(e) through (g) above, this MOA does not in any respect waive, limit, or diminish any rights or claims of the Tribe to any federally-reserved or State surface or groundwater rights.

VI. No Modification of Previous Agreements. The Parties recognize that CSI, SNWA and MVWD have previously entered into multiple agreements concerning the sale, purchase and settlement of water rights within the Coyote Spring Basin including a certain *Agreement For Settlement Of All Claims To Groundwater In The Coyote Spring Basin* entered into between MVWD, CSI, SNWA and the District on March 7, 2002, and a certain *Agreement For Option, Purchase and Sale of Water Rights, Real Property and Easements* entered into between SNWA and CSI on April 16, 1998. Nothing contained herein is intended to abrogate or modify in any manner any of the provisions contained in any of those agreements except as expressly provided in paragraphs I(2)(b) and I(2)(c) of this MOA.

VII. Miscellaneous Provisions.

1. Notices. If notice is required to be sent by the Parties, the addresses are as follows:

If to FWS:

Supervisor
Nevada Fish and Wildlife Office
Fish and Wildlife Service
1340 Financial Blvd., #234
Reno, Nevada 89502

If to SNWA:

General Manager
Southern Nevada Water Authority
1001 South Valley View Boulevard
Las Vegas, Nevada 89153

If to MVWD:

General Manager
Moapa Valley Water District
Post Office Box 257
Logandale, Nevada 89021

If to CSI:

Carl Savely, General Counsel
Wingfield Nevada Group
6600 North Wingfield Parkway
Sparks, Nevada 89436

If to the Tribe:

Chairperson, Moapa Band of Paiute Indians
Post Office Box 340
Moapa, Nevada 89025
Fax: 702-865-2875

With copies to:

Steven H. Chestnut
Richard M. Berely
Ziontz, Chestnut, Varnell, Berely & Slonim
2101 Fourth Avenue, Suite 1230
Seattle, Washington 98121
Fax: 206-448-0962

2. Choice of Law. This MOA shall be governed in accordance with applicable Federal laws, and the laws of the State of Nevada to the extent not inconsistent with Federal law.

3. Funding. Any commitment of funding by FWS, MVWD or SNWA under this MOA is subject to appropriations by the respective governing bodies of those entities.

4. Amendment. This MOA may be amended in writing by mutual agreement of the Parties.

5. Integration. This MOA sets forth the entire agreement of the Parties and supercedes all prior discussions, negotiations, understandings or agreements with respect to the subject matter hereof. No alteration or variation of this MOA shall be valid or binding unless contained in an amendment in accordance with paragraph VI(4) of this MOA.

6. Binding Effect, Withdrawal From MOA. The terms and conditions of this MOA shall be binding upon and inure to the benefit of the Parties hereto and their respective personal representatives, successors, transferees and assigns. However, the Parties expressly agree that should the execution of this MOA, or any consultation held or biological opinion issued under Section 7 of the Endangered Species Act which is premised thereon, be challenged in a court of competent jurisdiction and be found in violation of the Endangered Species Act or any other law, any of the Parties may withdraw from the MOA upon thirty days written notice to the other Parties. Upon such withdrawal, the withdrawing Party shall have no further obligation to perform any commitment contained in this MOA.

7. Effective Date, Counterparts. This MOA will become effective as between the Parties upon all Parties signing this MOA. The Parties may execute this MOA in two or more counterparts, which shall, in the aggregate, be signed by all Parties; each counterpart shall be deemed an original as against any party who has signed it.

8. Additional Parties. Other entities may become Parties to this MOA by mutual written assent of the Parties.

9. Headings. The underlined paragraph headings used in this MOA are for the convenience of the Parties only, and shall not be deemed to be of substantive force in interpreting the MOA.

10. No Third Party Beneficiaries. This MOA does not create any right or benefit, substantive or procedural, enforceable by any third parties against the Parties or against any other person or entity. The terms of this MOA are not enforceable by any person or entity other than a Party.

IN WITNESS WHEREOF, the Parties have executed this Memorandum of Agreement on the 20th day of April, 2006.

MOAPA VALLEY WATER DISTRICT

By: Ivan Cooper
Title: Chairman

U.S. FISH AND WILDLIFE SERVICE

for By: Steve Thompson
Title: Manager, California/Nevada Operations Office

SOUTHERN NEVADA WATER AUTHORITY

By: Amanda M. Cyphers
Title: Chair

COYOTE SPRINGS INVESTMENT, LLC

By: Robert R. Derck
Title: General Manager

MOAPA BAND OF PAIUTE INDIANS

By: Dalton Tom
Title: Chairman

When Recorded Mail To:

_____

_____

_____

Jones Springs Agreement

This Jones Springs Agreement ("Agreement") is entered into for the purposes described herein this 20th day of April, 2006 by between Moapa Valley Water District ("MVWD"), Muddy Valley Irrigation Company ("MVIC") and the U.S. Fish and Wildlife Service ("FWS").

RECITALS

1. MVWD was created in 1983 by an act of the Nevada Legislature and is the municipal water purveyor in upper and lower Moapa Valleys and serves the communities of Moapa, Glendale, Logandale and Overton, and the surrounding areas, located in Clark County, Nevada.

2. One of MVWD's water sources is a spring known locally as Pipeline Jones Spring ("Jones Spring"). Certificate No.10060 issued by the Nevada State Engineer provides MVWD the right to divert 1 c.f.s. of flow of water from Jones Spring for municipal purposes. The waters of Jones Spring and Certificate No.10060 constitute a portion of the Muddy River Decreed water rights.

3. Water from Jones Spring, as well as numerous other springs, form small streams which make up the Muddy River ("Tributary Streams").

4. There lives in the upper reaches of the Muddy River and in the Tributary Streams, a small minnow known as the Moapa Dace ("Dace"). The Dace was listed as endangered in 1967 under the Endangered Species Preservation Act of 1966 and continues to be so listed and protected under the Endangered Species Act of 1973 as amended.

5. MVWD needs the quantity of water represented by Certificate No.10060 to serve its municipal customers.

6. As an inducement to MVWD to grant this Agreement, the Southern Nevada Water Authority ("SNWA") has agreed to furnish to MVWD a quantity of water equal to MVWD's rights under Certificate No.10060 from SNWA's wells and water rights in Coyote Spring Valley ("Coyote Spring Water"). The terms and conditions of SNWA's obligations are set forth in a separate agreement.

7. MVWD desires to help in the recovery and preservation of the Dace.

NOW THEREFORE, for the purpose of aiding in the recovery and preservation of the Dace, MVWD and FWS hereby agree as follows:

1. Effective on MVWD receiving Coyote Spring Water from Southern Nevada Water Authority, the water from Jones Spring shall not be diverted for municipal purposes pursuant to Certificate No.10060, but shall be allowed to flow down the Tributary Streams to the Muddy River.

EXHIBIT A

2. MVWD may, as soon as Coyote Spring Water is available and being furnished to MVWD for municipal purposes disconnect their existing pumping facilities from the Jones Spring diversion pipe and or otherwise affix appurtenances that will allow the entire flow of water from Jones Spring to flow down to the Muddy River, thus increasing the flow of water in one or more Tributary Streams.

3. MVWD shall file any necessary change applications with the State Engineer as may be required by Nevada Law as a result of this Agreement.

4. The Agreement herein granted shall be for a non-consumptive use of water, with no warranty as to quality or quantity of flow.

5. MVWD reserves the right to change the point of diversion for its consumptive use right to the water from Jones Spring to a point on the Muddy River below that site generally known as the White Tank Narrows and to utilize such water for any purpose permitted by the Nevada State Engineer. Any such change shall not affect the flow of water at Jones Spring for in-stream purposes.

6. This Agreement will be recorded with the Clark County Recorder and filed with the Nevada State Engineer.

7. So long as MVWD is in full compliance with the terms and conditions applicable to MVWD in the Memorandum of Agreement dated April 20, 2006 and attached hereto as Attachment 1, then, if for any reason, whether natural, man-made or otherwise, any portion of the Coyote Spring Water becomes unavailable or unusable to meet MVWD's municipal needs previously supplied by Certificate 10060 (Jones Spring), then MVWD shall have the right to utilize a like portion of water from Jones Spring to replace such portion of the Coyote Spring Water that remains unavailable to MVWD for so long as the Coyote Spring Water remains unavailable.

8. MVIC has joined in the execution of this Agreement to reflect MVIC's approval of the terms thereof.

IN WITNESS WHEREOF, MVWD, MVIC and FWS have executed this Agreement the date first above written.

MOAPA VALLEY WATER DISTRICT

By: _____
Ivan Cooper, Chairman of the Board

U.S. FISH AND WILDLIFE SERVICE

By: _____
FOR Steve Thompson, Manager
California/Nevada Operations Office

MUDDY VALLEY IRRIGATION COMPANY

By: _____
Todd Robison, Chairman of the Board

STATE OF NEVADA)
)
COUNTY OF CLARK)

This instrument was acknowledged before me on April 20, 2006, by Ivan Cooper as Chairman of the Board of MOAPA VALLEY WATER DISTRICT.

DIANNE K. WEST
Notary Public State of Nevada
No. 98-0443-1
My appt. exp. Dec. 16, 2009

Dianne K West
NOTARY PUBLIC in and for the State of Nevada
My Commission Expires: 12-16-09

[SEAL]

STATE OF NEVADA)
)
COUNTY OF CLARK)

This instrument was acknowledged before me on April 20, 2006, by Robert D. Williams as Field Supervisor of U.S. FISH AND WILDLIFE SERVICE

DIANNE K. WEST
Notary Public State of Nevada
No. 98-0443-1
My appt. exp. Dec. 16, 2009

Dianne K West
NOTARY PUBLIC in and for the State of Nevada
My Commission Expires: 12-16-09

[SEAL]

STATE OF NEVADA)
)
COUNTY OF CLARK)

This instrument was acknowledged before me on April 20, 2006, by Todd Robison as Chairman of the Board of MUDDY VALLEY IRRIGATION COMPANY.

DIANNE K. WEST
Notary Public State of Nevada
No. 98-0443-1
My appt. exp. Dec. 16, 2009

Dianne K West
NOTARY PUBLIC in and for the State of Nevada
My Commission Expires: 12-16-09

[SEAL]

Appendix D –
Construction Equipment and Personnel Mix

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Table D-1
Well/Pump Station Construction Vehicle and Personnel Mix by Construction Month

	Construction Period Months							
	1	2	3	4	5	6	7	8
	Quantity of Equipment							
Equipment								
Bulldozer 215 hp	1	1	1	1				
Water Truck 200 hp	1	1	1	1	1	1	1	1
Loader 270 hp	1	1	1	1	1	1	1	1
Drill Rig 200 hp		1	2	2	2	2	1	
Flat Bed Truck 200hp		1	2	2	2	2	1	
Generator 40 hp		1	2	3	3	3	2	1
Pick-up 200 hp	1	2	3	3	3	3	3	2
Mechanics Truck 200 hp	1	1	1	1	1	1	1	1
Cement Mixer 10 yd		1	2	2	2	2	1	
	Quantity of Personnel							
Manpower								
Operator	2	2	2	2	4	4	4	4
Grade Checker	2	2	2	2				
Driller*		6	12	12	12	12	6	
Laborer*		6	12	12	12	12	6	3
Mechanic*	1	2	2	2	2	2	2	2
Foreman*		2	3	3	3	3	3	2
General Foreman	1	1	1	1	1	1	1	1

***Note:** Manpower is for three shifts a day

D-2
Facility and Pipeline Construction Vehicle and Personnel Mix by Construction Month

	Construction Period Months																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20*
	Quantity of Equipment																			
Equipment																				
Scraper 330 hp	2	4	4	4	2															
Bulldozer 215 hp	1	2	2	2	1															
Water Truck 200 hp	1	2	2	3	3	3	3	3	3	3	3	3	3	2	2	2	2	1	1	
Loader 270 hp	1	2	2	3	3	3	3	3	3	3	3	3	2	2	1	1	1	1		
Boring Machine 200hp						1	1													
Motor Grader 200 hp			1	1	1	1	1	1	1	1	2	2	2	1			1	1	1	
Trencher 300hp					1	1														
Back Hoe 325 hp		1	2	2	2	2	2	2	2	2	1									
Dump Truck 260hp		2	4	4	4	4	4	4	4	4	2	2	2	2	2					
Welding Machine 30hp			2	6	6	6	6	6	6	6	6	6	6	6	6	2				
Compactor 100 hp				1	1	2	2	2	2	2	2	2	2	2	2	1				
Plate Vibrator 5hp				3	6	6	6	6	6	6	6	6	6	6	6	2				
Hydraulic Crane 200 hp			1	2	3	3	3	3	3	3	3	3	3	3	2	1				
Flat Bed Truck 200 hp			1	2	3	3	3	3	3	3	3	3	3	2	2	1	1			
Cement Mixer 10yd						2	2	2	2	3	3	3	4	4	4	4				
Roller Compactor 150 hp					1	2	2	3	3	3	3	3	3	2	1	1				
Generator 40 hp	1	1	2	2	2	3	3	3	3	3	3	3	2	2	1	1	1	1		
Air Compressor 200cfm					1	1	2	2	3	3	3	3	2	2	1	1				
Mechanic's Truck 200 hp	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1			
Pick-up Truck 200 hp	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	3	2	2	2	

D-2
Facility and Pipeline Construction Vehicle and Personnel Mix by Construction Month

Quantity of Personnel

Manpower																			
Operator	4	9	12	13	11	11	11	10	10	10	10	10	7	7	5	4	2	2	2
Grade Checker	2	4	4	4	2	2	2	2	2	2	2	2	1	1	1	1			
Driller						4	4												
Laborer	2	4	4	6	8	8	8	10	10	10	10	10	10	10	8	6	4	2	2
Carpenter					2	2	4	4	6	6	6	6	4	4	4	2			
Block Mason								6	6	6	10	10	10	10	10	6			
Electrician						2	4	4	6	6	6	6	4	4	2	2	2	2	1
Pipe Fitter		4	4	8	12	12	12	12	12	12	12	12	12	12	12	4	2	2	2
Millwright								2	4	4	2	2	4	4	2				
Iron Worker					2	4	6	6	6	8	10	10	6	6	4	4			
Cement Finisher						2	4	4	6	6	6	4	4	2	2	2			
Mechanic	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1
Teamster	1	7	7	8	8	10	12	12	12	12	8	8	7	9	9	7	2		
Foreman	1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	1	1	1
General Foreman	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

* Equipment and manpower utilization in month 20 would be limited to inspection and demobilization activities.

Table D-3
Electrical Power Distribution Line Construction Vehicle and Personnel Mix by Construction Month
Construction Period Months

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Quantity of Equipment																			
Equipment																			
Pole Truck 200 hp							2	2	2	2	2	2							
Water Truck 200 hp						1	1	1	1	1	1	1	1						
Loader 150 hp						1	1	1	1	1	1	1	1						
Drill Rig 200 hp						1	1	1	1	1	1								
Flat Bed Truck 200hp						1	1	1	1	1	1	1	1						
Cable Real Truck 200 hp							2	2	2	2	2	2	2	2					
Bucket Truck 200hp							2	2	2	2	2	2	2	2					
Cement Mixer 10 yd							1	1	1	1	1	1	1	1					
Hydraulic Crane							1	1	1	1	1	1	1	1					
Generator 40 hp						1	1	1	1	1	1	1	1	1					
Pick-up Truck 200 hp						1	3	3	3	3	3	3	3	2					
Quantity of Personnel																			
Manpower																			
Operator						1	5	5	5	5	5	5							
Lineman							8	8	8	8	8	8	6	6					
Driller						2	2	2	2	2	2								
Laborer						4	6	6	6	6	6	6	4	2					
Teamster						1	4	4	4	4	4	4	4	2					
Foreman						1	2	2	2	2	2	2	2	1					
General Foreman						1	1	1	1	1	1	1	1	1					

Appendix E -
Visual Contrast Rating Evaluation

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Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	February 20, 2006
District	Las Vegas
Resource Area	Las Vegas
Activity (program)	Utility

SECTION A. PROJECT INFORMATION

1. Project Name Coyote Springs Well and Moapa Transmission System Project
2. Key Observation Point #1 - Highway 168 near MX-5 well
3. VRM Class Class II (designated Utility corridor)
4. Location
   Township _____
   Range _____
   Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling to moderately sloped terrain	Simple forms created by vegetative patterns	Wooden power poles and lattice
LINE	Horizontal and diagonal (roadway)	Weak and undulating	Vertical
COLOR	Light tan to gray	Light green to dark green	Dark brown
TEX-TURE	Smooth to coarse	Coarse	Smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling to moderately sloped terrain	Geometric & linear forms created by clearing pipeline ROW. ROW to be replanted.	----------
LINE	Horizontal and diagonal (pipeline ROW)	Strong irregular lines created by edge effect in cleared ROW - to be replanted.	----------
COLOR	Light tan to gray	Light green to dark green	----------
TEX-TURE	Smooth	Patchy	----------

SECTION D. CONTRAST RATING ☐ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	☐	☐	☐	☑	☐	☐	☐	☑	☐	☐	☐	☑
Line	☐	☐	☑	☐	☐	☐	☑	☐	☐	☐	☐	☑
Color	☐	☐	☐	☑	☐	☐	☐	☑	☐	☐	☐	☑
Texture	☐	☐	☑	☐	☐	☐	☑	☐	☐	☐	☐	☑

2. Does project design meet visual resource management objectives? ☑ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Rob Brueck	2/20/2006
Southern Nevada Water Authority	

SECTION D. (Continued)

Comments from item 2.

The characteristic landscape would be altered as a result of the pipeline ROW. This alteration, however, is not an introduced form or line not already seen throughout the characteristic landscape, including the adjacent roadway and powerline.

Additional Mitigating Measures (See item 3)

Application of proposed mitigation measure to replant native species on pipeline ROW after construction. No permanent roadway will be maintained over the pipeline.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1983—481-966/33094

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	March 10, 2006
District	Las Vegas
Resource Area	Las Vegas
Activity (program)	Utility

SECTION A. PROJECT INFORMATION

1. Project Name Coyote Springs Well and Moapa Transmission System Project
2. Key Observation Point #2 - Highway 168 east of MX-5 well
3. VRM Class Class II (designated Utility corridor)
4. Location
   Township _____
   Range _____
   Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling to moderately sloped terrain	Cylindrical to spherical vegetation with simple forms created by vegetative patterns	Wooden power poles and lattice; and dirt trail
LINE	Straight horizontal with curving (roadway)	Weak and undulating	Vertical;and straight horizontal with curving
COLOR	Light tan to gray	Light green to dark green	Dark brown; and light tan
TEX-TURE	Smooth to coarse	Coarse	Smooth; and smooth to medium

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling to moderately sloped terrain	Geometric & linear forms created by clearing pipeline ROW. ROW to be replanted.	----------
LINE	Straight horizontal with curving (pipeline ROW)	Strong irregular lines created by edge effect in cleared ROW - to be replanted.	----------
COLOR	Light tan to gray	Light green to dark green	----------
TEX-TURE	Smooth	Patchy	----------

SECTION D. CONTRAST RATING ☐ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	☐	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	✓
Line	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	☐	✓
Color	☐	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	✓
Texture	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	☐	✓

2. Does project design meet visual resource management objectives? ☑ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Chiaki Brown	3/10/2006
Southern Nevada Water Authority	

SECTION D. (Continued)

Comments from item 2.

The characteristic landscape would be altered as a result of the pipeline ROW. This alteration, however, is not an introduced form or line not already seen throughout the characteristic landscape, including the adjacent roadway, dirt trail and powerline.

Additional Mitigating Measures (See item 3)

Application of proposed mitigation measure to replant native species on pipeline ROW after construction. No permanent roadway will be maintained over the pipeline.

☆U.S. GOVERNMENT PRINTING OFFICE: 1985—461-866/33094

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	May 17, 2006
District	Las Vegas
Resource Area	Las Vegas
Activity (program)	Utility

SECTION A. PROJECT INFORMATION

1. Project Name Coyote Springs Well and Moapa Transmission System Project
2. Key Observation Point #3 - Highway 168 at Regulating Tank site
3. VRM Class Class II (designated Utility corridor)
4. Location
   Township _____
   Range _____
   Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling to moderately sloped terrain	Cylindrical to spherical vegetation with simple forms created by vegetative patterns	Existing dirt trail
LINE	Straight horizontal (roadway)	Weak and undulating	Straight and angled
COLOR	Light tan to gray	Light green to dark green	Light tan
TEX-TURE	Smooth to coarse	Coarse	Smooth to coarse

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling to moderately sloped terrain; and flat	Geometric & linear forms created by clearing pipeline ROW, regulating tank site & access roadway. Pipeline ROW to be replanted.	Geometric & linear forms
LINE	Straight with curving (pipeline ROW & regulating tank access roadway); and horizontal (regulating tank)	Strong irregular lines created by edge effect in cleared areas. Pipeline ROW to be replanted.	Bold & straight; and curving
COLOR	Light tan to gray	Light green to dark green	Greens and tans
TEX-TURE	Smooth	Patchy	Smooth to coarse

SECTION D. CONTRAST RATING ☐ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	☐	☐	☐	✓	☐	☐	☐	✓	☐	☐	✓	☐
Line	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	✓	☐
Color	☐	☐	☐	✓	☐	☐	☐	✓	☐	☐	✓	☐
Texture	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	✓	☐

2. Does project design meet visual resource management objectives? ☑ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Chiaki Brown	5/17/2006
Southern Nevada Water Authority	

SECTION D. (Continued)

Comments from item 2.

The characteristic landscape would be altered as a result of the pipeline ROW. This alteration, however, is not an introduced form or line not already seen throughout the characteristic landscape, including the adjacent roadway and dirt trail.

The proposed regulating tank would permanently change the existing visual character along SR 168. However, this area was designated by Congress as a utility corridor under the Lincoln County Conservation, Recreation, and Development Act. The regulating tank would be located in this utility corridor, partially screened by existing topography along the SR 168 and painted to match the adjacent landscape.

The regulating tank access road would permanently change the existing visual character along SR 168. This alteration, however, is not an introduced form or line not already seen throughout the characteristic landscape, including the adjacent roadway and dirt trail.

Additional Mitigating Measures (See item 3)

Application of proposed mitigation measure to replant native species on pipeline ROW after construction. No permanent roadway will be maintained over the pipeline.

The proposed regulating tank would be located in the utility corridor designated under the Lincoln County Conservation, Recreation, and Development Act, partially screened by existing topography along the SR 168 and painted to match the adjacent landscape.

The regulating tank access roadway will only be visible for a short distance as travelers pass by the access roadway intersection with SR 168. The beginning of the access roadway will be cut into existing hillside adjacent to the SR 168 and therefore only visible from viewpoints immediately adjacent to the new intersection. A majority of the access roadway will be located on top of an existing hillside and adjacent to the regulating tank, which will be the dominate structure in the view. Therefore, no mitigation measures are required for the access roadway.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1988—481-966/32094

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	March 10, 2006
District	Las Vegas
Resource Area	Las Vegas
Activity (program)	Utility

SECTION A. PROJECT INFORMATION

1. Project Name Coyote Springs Well and Moapa Transmission System Project
2. Key Observation Point #4 - Highway 168 near Moapa Town limits
3. VRM Class Class II (designated Utility corridor)
4. Location
   Township _____
   Range _____
   Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling to moderately sloped terrain	Cylindrical to spherical vegetation with simple forms created by vegetative patterns	Wooden power poles and lattice; and a street sign
LINE	Straight horizontal with curving (roadway)	Weak and undulating	Vertical; and vertical
COLOR	Light tan to gray	Light green to dark green	Dark brown; and green
TEX-TURE	Smooth to coarse	Coarse to sparse	Smooth; and smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling to moderately sloped terrain	Geometric & linear forms created by clearing pipeline ROW. ROW to be replanted.	----------
LINE	Straight horizontal with curving (pipeline ROW)	Strong irregular lines created by edge effect in cleared ROW - to be replanted.	----------
COLOR	Light tan to gray	Light green to dark green	----------
TEX-TURE	Smooth	Patchy	----------

SECTION D. CONTRAST RATING ☐ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	☐	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	✓
Line	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	☐	✓
Color	☐	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	✓
Texture	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	☐	✓

2. Does project design meet visual resource management objectives? ☑ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Chiaki Brown	3/10/2006
Southern Nevada Water Authority	

SECTION D. (Continued)

Comments from item 2.

The characteristic landscape would be altered as a result of the pipeline ROW. This alteration, however, is not an introduced form or line not already seen throughout the characteristic landscape, including the adjacent roadway and powerline.

Additional Mitigating Measures (See item 3)

Application of proposed mitigation measure to replant native species on pipeline ROW after construction. No permanent roadway will be maintained over the pipeline.

☆U.S. GOVERNMENT PRINTING OFFICE: 1988—461-966/93094

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	March 10, 2006
District	Las Vegas
Resource Area	Las Vegas
Activity (program)	Utility

SECTION A. PROJECT INFORMATION

1. Project Name Coyote Springs Well and Moapa Transmission System Project
2. Key Observation Point #5-Hwy 168 near MX-6 well power substation
3. VRM Class Class II (designated Utility corridor)
4. Location
   Township _____
   Range _____
   Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling to moderately sloped terrain	Cylindrical to spherical vegetation with simple forms created by vegetative patterns	Wooden power poles and lattice; and power substation
LINE	Straight horizontal with curving (roadway)	Weak and undulating	Vertical; and geometric
COLOR	Light tan to gray	Light green to dark green	Dark brown; and gray
TEX-TURE	Smooth to coarse	Coarse to sparse	Smooth; and smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling to moderately sloped terrain	Geometric & linear forms created by clearing pipeline ROW. ROW to be replanted.	----------
LINE	Straight horizontal with curving (pipeline ROW)	Strong irregular lines created by edge effect in cleared ROW - to be replanted.	----------
COLOR	Light tan to gray	Light green to dark green	----------
TEX-TURE	Smooth	Patchy	----------

SECTION D. CONTRAST RATING ☐ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	☐	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	✓
Line	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	☐	✓
Color	☐	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	✓
Texture	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	☐	✓

2. Does project design meet visual resource management objectives? ☑ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Chiaki Brown	3/10/2006
Southern Nevada Water Authority	

SECTION D. (Continued)

Comments from item 2.

The characteristic landscape would be altered as a result of the pipeline ROW. This alteration, however, is not an introduced form or line not already seen throughout the characteristic landscape, including the adjacent roadway and powerline.

Additional Mitigating Measures (See item 3)

Application of proposed mitigation measure to replant native species on pipeline ROW after construction. No permanent roadway will be maintained over the pipeline.

☆U.S. GOVERNMENT PRINTING OFFICE: 1985—491-966/33094

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	March 10, 2006
District	Las Vegas
Resource Area	Las Vegas
Activity (program)	Utility

SECTION A. PROJECT INFORMATION

1. Project Name Coyote Springs Well and Moapa Transmission System Project

2. Key Observation Point
#6 - Hwy 168/Warm Springs Rd. intersection

3. VRM Class
Class II (designated Utility corridor)

4. Location
Township _____
Range _____
Section _____

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to moderately rolling terrain	Spherical vegetation with simple forms created by vegetative patterns	Wooden power poles and lattice; and street signs
LINE	Straight horizontal with curving (roadway)	Bold and continuous	Vertical; and vertical
COLOR	Light tan to gray	Light green to dark green	Dark brown; and yellow and red
TEX-TURE	Smooth to medium	Coarse	Smooth; and smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to moderately rolling terrain	Geometric & linear forms created by clearing pipeline ROW. ROW to be replanted.	----------
LINE	Straight horizontal with curving (pipeline ROW)	Strong irregular lines created by edge effect in cleared ROW - to be replanted.	----------
COLOR	Light tan to gray	Light green to dark green	----------
TEX-TURE	Smooth	Patchy	----------

SECTION D. CONTRAST RATING ☐ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	☐	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	✓
Line	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	☐	✓
Color	☐	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	✓
Texture	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	☐	✓

2. Does project design meet visual resource management objectives? ☑ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Chiaki Brown	3/10/2006
Southern Nevada Water Authority	

SECTION D. (Continued)

Comments from item 2.

The characteristic landscape would be altered as a result of the pipeline ROW. This alteration, however, is not an introduced form or line not already seen throughout the characteristic landscape, including the adjacent roadway and powerline.

Additional Mitigating Measures (See item 3)

Application of proposed mitigation measure to replant native species on pipeline ROW after construction. No permanent roadway will be maintained over the pipeline.

☆U.S. GOVERNMENT PRINTING OFFICE: 1985—461-966/33094

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	March 10, 2006
District	Las Vegas
Resource Area	Las Vegas
Activity (program)	Utility

SECTION A. PROJECT INFORMATION

1. Project Name: Coyote Springs Well and Moapa Transmission System Project
2. Key Observation Point: #7-Hwy 168 near Moapa/Paiute Indian Reservation
3. VRM Class: Class II (designated Utility corridor)
4. Location
   Township _____
   Range _____
   Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat with slight rolling terrain	Cylindrical to spherical vegetation with simple forms created by vegetative patterns	Residential homes
LINE	Staight horizontal (roadway)	Hard and bold	Geometric
COLOR	Light tan to gray	Light green to dark green	Light to dark brown
TEX-TURE	Smooth to coarse	Coarse and patchy	Smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat with slight rolling terrain	Geometric & linear forms created by clearing pipeline ROW. ROW to be replanted.	----------
LINE	Straight horizontal (pipeline ROW)	Strong irregular lines created by edge effect in cleared ROW - to be replanted.	----------
COLOR	Light tan to gray	Light green to dark green	----------
TEX-TURE	Smooth	Patchy	----------

SECTION D. CONTRAST RATING ☐ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	☐	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	✓
Line	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	☐	✓
Color	☐	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	✓
Texture	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	☐	✓

2. Does project design meet visual resource management objectives? ☑ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Chiaki Brown	3/10/2006
Southern Nevada Water Authority	

SECTION D. (Continued)

Comments from item 2.

The characteristic landscape would be altered as a result of the pipeline ROW. This alteration, however, is not an introduced form or line not already seen throughout the characteristic landscape, including the adjacent roadway.

Additional Mitigating Measures (See item 3)

Application of proposed mitigation measure to replant native species on pipeline ROW after construction. No permanent roadway will be maintained over the pipeline.

☆U.S. GOVERNMENT PRINTING OFFICE: 1989—461-966/33094