Appendix A

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Rebuttal Comments on SNWA's Evidence Concerning Financing for the Groundwater Development Project Associated with SNWA's Water Rights Applications in Spring, Cave, Dry Lake and Delamar Valleys

Prepared for the Office of the Nevada State Engineer on behalf of the Great Basin Water Network

Submitted by Sharlene Leurig, Senior Manager, Water Infrastructure, Ceres

August 25, 2011

On the basis of my review of the materials submitted on July 1, 2011, by the Southern Nevada Water Authority relating to financing for its Groundwater Development Project in connection with the above-mentioned applications, and on the basis of my work with Ceres on water infrastructure financing, as reflected in the report titled The Ripple Effect: Water Risk in the Municipal Bond Market, I have prepared the following review and response to financing material submitted by the Southern Nevada Water Authority (SNWA). We are submitting this information to be considered in the Nevada State Engineer's review of the Southern Nevada Water Authority's applications for water rights in Spring, Cave, Dry Lake and Delamar Valleys.

Ceres leads a national coalition of investors, environmental organizations and other public interest groups working with companies to address sustainability challenges such as global climate change and water scarcity. For more on Ceres, see http://www.ceres.org.

The Investor Network on Climate Risk (INCR), a project of Ceres, supports 100 institutional investors with assets totaling $10 trillion by identifying the financial opportunities and risks in climate change and by tackling the policy and governance issues that impede investor progress toward more sustainable capital markets. For more on INCR, see http://www.ceres.org/incr.

C1 In October 2010, Ceres issued a study on water risks that may affect the valuation and performance of long-term bonds issued by public water authorities to build and maintain their capital assets. The report, *The Ripple Effect: Water Risk in the Municipal Bond Market*, can be found at www.ceres.org/resources/reports/water-bonds/view.

The report revealed trends of relevance to the long-term water security of the State of Nevada and the continued creditworthiness of the Southern Nevada Water Authority along with its members and joint issuers. Those trends are discussed below.

Key Trends

Rising regional demand for water is colliding with less reliable supplies, with the potential to make utility balance sheets more volatile. In many parts of the United States, utilities are facing water supply constrictions that create revenue challenges. Emerging risks fall into two basic categories:

- **Physical factors**, including *quantity* reductions due to drought or drawdown by other users and *quality* impairments from pollution or intrusion of salt water driven by excessive groundwater pumping, land subsidence, and sea level rise, and
- **Regulatory factors**, including changing allocations of water rights among users, preservation of environmental flows to protect endangered or threatened species, or quality standards that impose additional costs or limit use of a water resource.

Climate change is expected to exacerbate both physical extremes and regulatory responses intended to protect water supplies for human uses and threatened species.

C2 SNWA is developing its long-term plan to diversify supplies driven by awareness of these risks within its own portfolio and within the portfolios of water utilities drawing from the same water resources. Yet it is worth considering whether the Importation Project proposed by SNWA is resilient or vulnerable to these very risks.

While these emerging water risks can damage the value of investors' public utility assets, many of these risks remain invisible in the present marketplace. Increased resource competition, more intense droughts, and regulations to ensure reliable water supplies are all likely to translate into additional capital expenditures and increased operating costs for already highly-leveraged utilities. In the most extreme cases, emerging water risks may force capital assets into early retirement or saddle utilities with stranded assets. Any of these scenarios may impair a utility's liquidity, undermining its ability to honor debt obligations to investors. Yet today's utility disclosure and credit analysis fails to consistently incorporate these trends, placing investors at risk.

Investors will increasingly have access to information on water risks, including over-abstraction and legal challenges. As investors make movements to identify hidden risks in traditionally stable markets like municipal bonds,

financial intermediaries and specialized consultancies will bring more data tools to the market to enable credit risk assessment. An example is the Aqueduct Alliance, a project of the World Resources Institute with support from Goldman Sachs, Dow Chemical, Coca-Cola, General Electric, Bloomberg, and United Technologies. The Alliance will make freely available a database for users to assess water availability in stressed river basins, including the Colorado River. Its metrics incorporate hydrological data along with social, economic and governance conditions in specific regions. These sorts of tools are likely to shift investor risk perceptions in the public finance markets. In turn, more water utilities may seek to make available enhanced performance and financial data to remain competitive in a market that will increasingly price in these risks.

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SNWA's ability to implement its plan in part depends upon its ability to continue its practice of refinancing debt, which hinges on market perception of its creditworthiness. Like many systems, SNWA has managed cash flows by refinancing existing debt to take advantage of lower interest rates. This approach also allows SNWA to smooth out rate increases, yet even so water rates have increased significantly in recent years. The feasibility of the Importation Project hinges on future refinancing of SNWA's debt, as described in Appendix D of SNWA's *Ability to Finance Report*. The assumptions behind SNWA's refinancing plan include 1) preservation of current market rates, which are at all-time lows unlikely to be sustained throughout the lifetime of the required debt, and 2) sustained market perception of SNWA as a good credit. Over the lifetime of the debt that SNWA will be obligated to service for the Importation Project, it is likely that markets will more aggressively price in factors like energy intensity of water provided, legal threats from human users or endangered species, and potential conflict between wholesale providers and retail customers, trends described in more detail below. To the extent that the Importation Project disadvantages SNWA in these regards compared to other credits on the market, SNWA's cost of capital is likely to increase and the cash flow benefits of refinancing may diminish.

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Transporting water from water-rich to water-poor regions is an energy-intensive practice that makes regional economies vulnerable to energy price volatility. Beyond the high construction costs that accompany conveyance projects like the Importation Project, these systems frequently have significant operating costs through their exposure to volatile energy prices. The compounded effects of high construction and operating costs may reduce issuer liquidity, straining utility capacity to honor existing and future debt obligations. The assumed increase in energy costs over the life of the debt obligations is not clear in SNWA's *Ability to Finance Report*.

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Supply projects with high marginal costs can limit a utility's financial flexibility, leaving it unable to adjust to future changes in supply, demand, or

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governance structure. If this forces water rates past a certain point, regional economic competitiveness may be compromised. Capital projects are financed on the expectation that revenues in the service area will grow or stay fixed over the lifetime of debt service. While utilities can set rate structures that allow them to simultaneously grow revenue and suppress consumption, decoupling revenue streams from increasing gallons delivered, debt repayment for high-capital supply projects can pin utility financial health to high-population and consumption growth.

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Differences between projected and actual consumption growth can result in lower debt service coverage unless utilities increase rates. In Southern Nevada, as in other areas of the country, rates and water-related charges have had to adjust upward significantly to make up for unrealized growth stymied by the economic downturn.

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If the debt obligations incurred by the Importation Project are high enough, the pressure on water rates and charges can compromise the affordability of water, along with regional economic competitiveness.

The projected monthly water bill of $59.30 for plans not including the Importation Project (page 33 of the *Ability to Finance Report*) already far exceeds present household costs in Las Vegas or other cities. Yet as SNWA projects, the rate increase that may be required to repay even SNWA's conservative estimated total -- $7.283 billion in expected debt that would be assumed to undertake the Importation Project—to $90.62 per month for the average household—is nearly three times the average bill of a residential customer in its service area today.

SNWA has pledged to set rates to maintain debt service coverage of 1.00 times revenues. This target, along with the projected debt service coverage including obligations from implementing the plan, is considerably lower than the 10-year historic minimum of 2.69 times annual debt service (page 29 of *Ability to Finance Report)*. Such a slim ratio provides very little financial flexibility for SNWA to pursue other necessary investments if actual water delivered falls below expectations or if other pressures arise elsewhere in the system.

Relying on growth to pay for system reliability is fundamentally unsustainable. For the past decade, SNWA has depended on regional connection charges to service debt obligations. As noted in the SNWA finance report, the burst of the housing bubble caused revenue from connection charges to decline by more than 97% from its 2006 level, as measured by 2010 figures. While economic recovery may revive housing starts in Southern Nevada, such recovery is not on the near-term horizon, and there is nothing to preclude future volatility of similar magnitude. Like all water providers, it is essential that SNWA restrict capital expenditures to what can be recovered through sustainable and consistent revenue sources.

Per capita urban water demand has consistently declined for decades, a trend that is expected to persist. Per capita urban water use has consistently declined across the United States, including in Southern Nevada. In part this is due to efforts by water providers like SNWA to encourage water conservation and efficiency. Conservation and efficiency programs can actually hold total demand constant even as population increases, as shown by historical water demand in Southern California. The declining demand trend is exacerbated by increasing water rates. Declining per capita use presents a challenge to utilities such as SNWA, as it can diminish the revenue secured through water rates. Because demand for water is elastic, capital projects that significantly increase water rates can actually reduce revenues from water rates. While a number of utilities are testing rate structures that can cover fixed costs even in the face of declining water sales, cost recovery and revenue stabilization under declining demand projections remains a significant challenge across the country. Yet in developing its financing assumptions, SNWA assumes that the per capita consumption level of 69,097 gallons per year will remain constant going forward (page 37 of *Ability to Finance Report)*. This deterministic approach does not provide much insight into the range of possible rate increases that may be necessitated if water demand fails to meet SNWA's projections, nor the size of the potential burden that could be transferred to other consumers or residents who do not directly benefit from the proposed project.

Retail providers are not necessarily bound to purchase water from their wholesale provider, creating credit risk for the wholesale entity. While wholesale water providers can provide significant economies of scale for their member agencies, the confluence of increasing costs of wholesale water systems and evolving water treatment technologies can lead member agencies to develop alternative sources. When member agencies are not required to assume the debt obligations of their wholesale providers or to purchase water over the lifetime of the wholesale entity's debt obligations, this poses a credit risk to the wholesale entity. Metropolitan Water District of Southern California is a case in point. Since 2008, MWD's water sales have declined 32%, while its rates have increased by 55%. One of MWD's largest members, Los Angeles Department of Water and Power, plans to reduce its reliance on MWD's water by nearly 50%.[1] Many other member agencies are pursuing development of their own water sources.

Although SNWA is younger than its southern California counterpart, the dynamics of increasing water costs, declining demand and changing opportunities for local water production and treatment provide a view of a possible future against which the

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[1] San Diego County Water Authority, "What We Need in a Bay-Delta Fix: A Perspective by MWD's Largest Customer," Presentation, May 11, 2011, http://org2.democracyinaction.org/dia/track.jsp?v=2&c=BmTOoeS5YbMbjJ78rnEfviImzCkpt1W%2F

authority should plan. Already without necessary investments in the third Lake Mead intake pipe or other proposals advanced in the MCCP, SNWA has had to increase commodity charges six-fold from 2000-2011 (page 20 of the *Ability to Finance Report*) and water rates more than 40% since 2002 (page 19 of *Ability to Finance Report*). The anticipated rate increases are significant enough to consider whether SNWA's member agencies may seek alternative and more cost-effective sources.

Key Questions

As the State Engineer considers the feasibility of the Importation Project, several questions should be considered:

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- **Is the project adaptive?**
  - If climate variability and climate change intensify pressure on other users or endangered species, is the project adaptive to legal barriers?
- **Will the project make SNWA and its joint issuers more resilient or less?**
  - If the project falls short of its projected service delivery—whether from physical or legal pressures—what flexibility would SNWA have in pursuing other resources, given the expected debt obligations the project entails?
- **How likely is it that the project's costs will be borne by its beneficiaries?**
  - If demand declines or fails to meet the anticipated growth rate, whether from slower population growth or behavioral change, can the cost of the SNWA pipeline feasibly be internalized by the rate base? What is the possible burden that could be placed on the state as a whole to make the revenue shortfall?
  - If the cost of the project increases SNWA's costs relative to other sources, do its members have the ability to opt out? How would SNWA recover costs under such a scenario?

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As the preceding discussion indicates, the assumptions behind SNWA's financial analysis should not be taken as representing the most likely economic or market conditions. The sensitivity of the Importation Project's cash flows to water demand, refinancing conditions and the other dynamics discussed herein should be assessed in order to ensure the continued financial strength of the parties involved and the enhanced flexibility and security of Nevada's water infrastructure.

Appendix B

Rebuttal Report on Water-Use Efficiency in the Las Vegas Area

August 25, 2011

Prepared for the Office of the Nevada State Engineer
on behalf of
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August 25, 2011

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Introduction

This rebuttal report revisits the points made in my June report, taking into account the materials submitted by the Southern Nevada Water Authority (SNWA) on July 1, 2011, relating to water conservation, water use efficiency and the purported need for the groundwater development project associated with SNWA's water rights applications in Spring, Cave, Dry Lake and Delamar Valleys.

The Las Vegas Valley has been one of the fastest growing regions in the United States, although the recent economic downturn has greatly reduced growth rates. To meet projected long-term water demand, the regional water authority, SNWA, is pursuing a range of options, including the development of additional in-state resources in the form of surface water from the Muddy and Virgin Rivers and groundwater from counties north and east of Las Vegas. One such proposal consists of building a 300-mile pipeline to move groundwater from five valleys, including Snake Valley, which spans the Nevada-Utah border. Acquisition of these resources is already creating social and political tension throughout Nevada and bordering states, particularly Utah. The environmental and economic implications of these projects may also be high.

Conservation and efficiency efforts have reduced Las Vegas per-capita demand in recent years, from 315 gallons per capita per day (gpcd) in 2000 to 223 gpcd in 2010 but despite these efforts the Las Vegas Valley still has much higher than average per-capita water use than most of the western United States, suggesting that significant cost-effective conservation potential still remains. An estimated 60 percent of all water used in SNWA's service area is applied outdoors.

The Pacific Institute is one of the nation's leading independent research centers for assessing water conservation and efficiency potential. In this analysis, the Pacific Institute evaluates water demand projections and conservation and efficiency efforts in SNWA's service area. The analysis reveals the following:

- Long-term planning efforts fail to include substantial conservation improvements that have been successfully and economically implemented widely in other western arid cities, and thus appear to overestimate future demand.

C10 • Given recent economic and demographic trends, the population projections used for the water demand projections now appear too high, thereby further overestimating future demand.

C11 • Las Vegas could significantly expand efforts to reduce inefficient and wasteful water use.

C12 • Cost-effective water conservation and efficiency improvements in Las Vegas can defer or eliminate the need for new water supply facilities and investments.

C13 • Increased indoor and outdoor water-use efficiency improves the reliability of the existing supply and does not result in so-called "demand hardening."

Per Capita Water Use is Declining But More Can Be Done

Recent reductions in per capita demand suggest that while water agencies in Southern Nevada have made significant water-use efficiency improvements over the past thirty years, far more can and should be done.[1] In 1990, per capita demand was 347 gpcd. By 2000, demand had declined to 315 gpcd. By 2010, per capita water use in SNWA's service area had fallen to 223 gpcd,[2] a dramatic reduction from the extremely high rate of 1990. The current goal, which drives future water demand projections, is to reduce water demand to 199 gpcd by 2035, still substantially above average for cities in similar climates. As shown by the trend line in Figure 1, the current goal is very unambitious and suggests a significant retreat from trends over the past 20 years.

SNWA's per capita demand has declined more quickly than that most other agencies within the Colorado River Basin. However, absolute per capita demand remains significantly higher than the median per capita demand (180 gpcd in 2008) for these agencies.[3] Denver, Phoenix, and

[1] Per capita demand trends over time should be viewed with some caution, as changes in the level and type of industry, income, the mix of single-family and multi-family homes may affect per capita demand.
[2] SNWA. 2011. SNWA's Conservation Program. Presentation to the Office of the Nevada State Engineer.
[3] Cohen, MJ. 2011. *Municipal Deliveries of Colorado River Basin Water*. Pacific Institute. Oakland, California.

Tucson, for example, already have much lower per capita demand today than SNWA is projecting for its service area in 2035 – more than two decades from now.

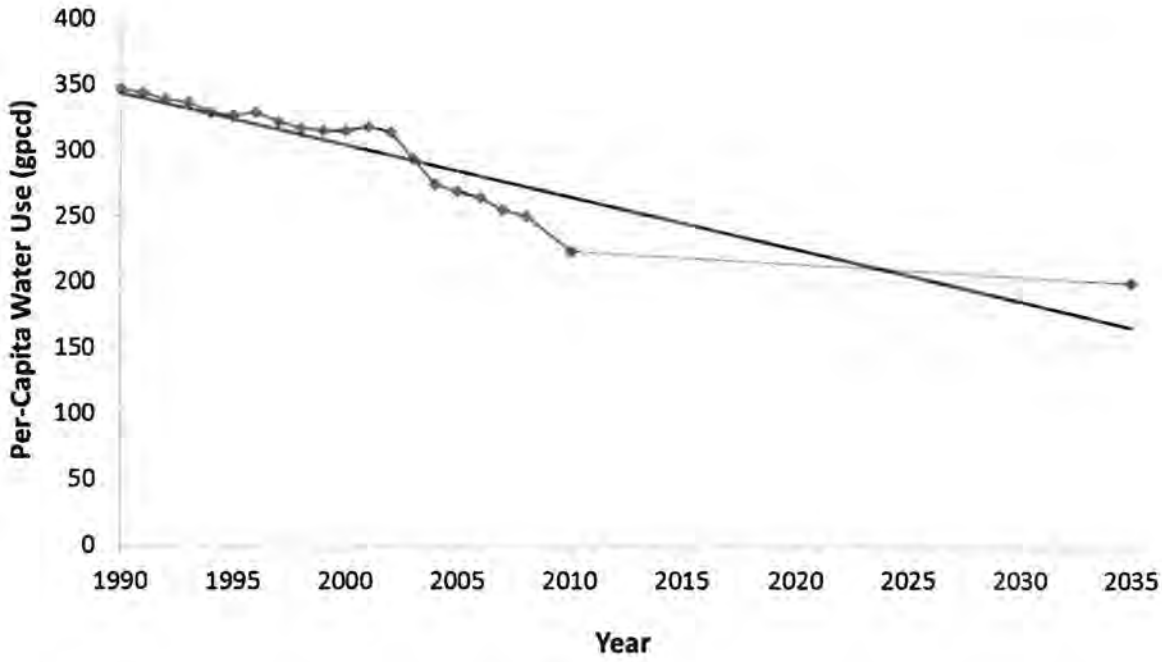

Figure 1. Per Capita Demand in the Southern Nevada Water Authority Service Area, 1990–2035.
Note: 1990 to 2010 reflect actual data. The value for 2035 represents the SNWA projections.
Source: Southern Nevada Water Authority. 2009. Appendix C in Conservation Plan: 2009-2013. Las Vegas, Nevada.

Reliance on Return Flow Credits Inflates Future Demand Projections

SNWA earns return flow credits for treated wastewater that is returned to Lake Mead via the Las Vegas Wash. These return flow credits allow SNWA to withdraw water in excess of Nevada's 300,000 acre-feet basic consumptive use apportionment from the Colorado River. Because SNWA receives credit for return flows, it has long argued that any water-efficiency improvement that reduces indoor, non-consumptive water demand reduces return flow credits and thus does not increase Southern Nevada's water resource portfolio. This argument, however, ignores six points. Increasing indoor water-use efficiency:

- permits more people to be served with the same volume of water, without affecting return flows;

- reduces dependence on water sources vulnerable to drought and political conflict;

- delays or eliminates the need for significant capital investment to expand conveyance and treatment infrastructure;

- reduces energy and chemical costs associated with pumping water from Lake Mead, treating it for use, transporting it, and treating it again as wastewater;

- reduces energy-related greenhouse gas emissions; and

- saves the customer money over the life of those improvements through reductions in energy, water, and wastewater bills.

Furthermore, SNWA projects future water demand based on total deliveries rather than consumptive use. Thus, both excessive use of water for return flow credits and projections based on delivery rather than actual consumption, inflate water demand estimates. These demand estimates are then used to justify the development of new water supplies. Reductions in indoor water demand thus represent a real savings based on SNWA's own demand projections and can help delay or defer the need to develop new, expensive water resources.

Additional Effort is Needed to Expand Indoor Conservation Efforts

According to their Water Conservation Plan, "SNWA has developed and implemented one of the most progressive and comprehensive water conservation programs in the nation."[4] Yet as noted above, water conservation efforts in Las Vegas largely ignore the potential for indoor efficiency improvements, particularly for single-family homes. Those measures targeting indoor water waste have been poorly implemented. While many water agencies in the western United States offer homeowners rebates and other incentives to replace wasteful fixtures and appliances with

[4] Southern Nevada Water Authority. 2009. Conservation Plan: 2009 – 2013. Las Vegas, Nevada.

more efficient models, these incentives are not available to many Las Vegas residents. The Water Efficient Technologies (W.E.T.) Program provides rebates for some efficient appliances to multi-family, commercial, and industrial customers, but only 29 projects are currently enrolled in the program.[5] Expanding indoor efficiency efforts and improving implementation could provide substantial water and energy savings.

Recent conservation assessments indicate that there are a substantial number of cost-effective technologies that can dramatically reduce residential water demand – both indoor and outdoor – to levels far below those projected for SNWA service area. For example, a 1997 study by the American Water Works Association (AWWA) found that conservation could reduce indoor water use from an average of 65 gpcd to 45 gpcd for single-family homes, a savings of over 30 percent.[6] The largest reductions were realized by replacing inefficient toilets and clothes washers with more efficient models and reducing leaks.

Similarly, a 2000 Seattle study found that conservation and efficiency could substantially reduce indoor water use. Installing new, water-efficient fixtures and appliances reduced single-family indoor water use from 64 gpcd to 40 gpcd, a savings of nearly 40 percent. Again, the largest reductions were achieved by installing efficient toilets and clothes washers. Further, homeowners rated the performance, maintenance, and appearance of the efficient appliances higher than the older appliances.[7] It is of note that these studies were completed 6–10 years ago and do not include newer, more efficient appliances, such as dual-flush toilets, that would reduce per capita demand even further.

Furthermore, other conservation assessments have concluded that there is significant water savings in the non-residential sector. A 2004 report by the Pacific Institute finds that existing, cost-effective technologies could reduce California's current (2000) water use for the non-residential sector by 26 percent. Savings vary by industry, but are largest for schools, office buildings, golf courses, retail stores, and restaurants. Recirculating cooling towers, x-ray water recycling units, and restaurant pre-rinse spray valves are among a few of the most promising

[5] Southern Nevada Water Authority. 2010. 2010 Annual Report. Las Vegas, Nevada.
[6] AWWA WaterWiser. 1997. Residential Water Use Summary – Typical Single Family Home.
[7] Mayer, P.W., W.B. DeOreo, and D.M. Lewis. 2000. Seattle Home Water Conservation Study: The Impacts of High Efficiency Plumbing Fixture Retrofits in Single-Family Homes. Aquacraft, Inc. Water Engineering and Management.

technologies.[8] Similarly, the Santa Clara Valley Water District , a water agency serving communities along the southern edge of the San Francisco Bay, commissioned a survey of 26 commercial, industrial, and institutional facilities and found that water conservation measures could reduce water use by 38 percent.[9]

Outdoor water savings potential is also large. While estimates for efficient outdoor water demand will vary regionally according to local climate, reducing Las Vegas' outdoor water demand to the levels achieved in Tucson or Albuquerque, e.g., 57 and 42 gpcd, respectively, could cut consumptive use substantially. While some progress has been made by SNWA in outdoor residential and commercial water efficiency improvements, far more can be done. Recent ordinances in the Las Vegas area prohibiting turf in front yards and limiting turf in backyards in new developments will help reduce overall outdoor water demand in coming years, and could be expanded to gradually apply to existing homes (upon resale, for example). Furthermore, existing, cost-effective technologies can reduce demand from the non-residential sector by 25 percent to 40 percent.[10,11] In summary, significant indoor and outdoor conservation potential exists for the Las Vegas Valley.

Population Projections Overestimate Future Water Demand

Future water demand and use depend on many factors. One of the most important and influential is the size of the population that will have to be served. Population and water demand in SNWA's service area have grown tremendously since 1990 but future population remains uncertain. The 2009 Water Resource Plan forecasts water demands based on the June 2008 Clark County Population Forecast prepared by the University of Nevada Las Vegas Center for

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[8] Gleick, P.H., D. Haasz, C. Henges-Jeck, V. Srinivasan, G. Wolff, K. Cushing, and A. Mann. 2003. Waste Not, Want Not: The Potential for Urban Water Conservation in California." Pacific Institute for Studies in Development, Environment, and Security. Oakland, California.

[9] Pollution Prevention International, Inc. 2004. Commercial, Institutional, and Industrial Water Use Survey Program: Final Report. Prepared for the Santa Clara Valley Water District. http://www.cuwcc.org/uploads/tech_docs/CII_H2OUse_Survey_Prgrm_Final_Rpt_04-05-25.pdf

[10] Gleick, P.H., D. Haasz, C. Henges-Jeck, V. Srinivasan, G. Wolff, K. Cushing, and A. Mann. 2003. Waste Not, Want Not: The Potential for Urban Water Conservation in California." Pacific Institute for Studies in Development, Environment, and Security. Oakland, California.

[11] Pollution Prevention International, Inc. 2004. Commercial, Institutional, and Industrial Water Use Survey Program: Final Report. Prepared for the Santa Clara Valley Water District. http://www.cuwcc.org/uploads/tech_docs/CII_H2OUse_Survey_Prgrm_Final_Rpt_04-05-25.pdf

Business and Economic Research (CBER). In 2007, an estimated 2.0 million people lived in Clark County. According to CBER, the population within Clark County was projected to reach an estimated 3.65 million people by 2035.[12] Based on this forecast, SNWA projects that water demand will increase by nearly 34 percent during this period, from an estimated 553,000 acre-feet per year in 2010 to 739,000 acre-feet per year in 2035.

C14 More recent analyses suggest that the population assumptions in the 2009 Water Resource Plan are significantly higher than are likely to materialize and that this assumption alone has a large influence on future water demand projections. Newer population projections released by CBER in June 2009 and again in June 2010 project that the Clark County population will reach 3.13 million people by 2035, about half a million fewer people than was the basis of the 2009 Water Resource Plan.[13,14] If we assume that per capita demand in 2035 is 199 gallons per person per day and that about 97 percent of the population in Clark County is served by SNWA and its member agencies, then 500,000 fewer people in the region would reduce water demand within SNWA's service area by about 100,000 acre-feet per year. This dramatic result alone strongly suggests the need for a re-evaluation with another, more realistic population projection.

C15 Furthermore, combining reductions in both projected population ***and*** per capita demand may completely eliminate the need for the new supplies. If SNWA reduced per capita demand to about 166 gpcd – higher than Los Angeles's *current* rate, and comparable to the *current* delivery rates of Albuquerque and Phoenix – by the year 2035, and population within Clark County grows to 3.13 million people instead of 3.65 million,[15] total water demand in SNWA's service area would be about the same as it is now.

C16 The recent economic downturn has resulted in a significant reduction in future population, and thus water demand. When and how the region will recover is not known. Rising temperatures

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[12] "Clark County Nevada Population Forecast 2008-2035," June 2008, Center for Business and Economic Research (CBER) at the University of Nevada, Las Vegas.

[13] Center for Business and Economic Research (CBER). 2009. Population Forecasts: Long-Term Projections for Clark County, Nevada: 2009 – 2050. University of Nevada, Las Vegas.

[14] Center for Business and Economic Research (CBER). 2010. Population Forecasts: Long-Term Projections for Clark County, Nevada: 2009 – 2050. University of Nevada, Las Vegas.

[15] We assume that SNWA and its member agencies provide water to about 97 percent of the population of Clark County.

C16 cont'd

and changes in precipitation patterns resulting from climate change will also affect water supplies and demand. Given this uncertainty, it is wise to consider pursuing water supplies or demand management options that can be expanded incrementally. Unlike most other water supply options, water conservation and efficiency can be expanded when water demand pressures are high and relaxed when demand pressures subside.

Significant Conservation Potential Remains in the Las Vegas Valley

While per capita demand comparisons can be extremely valuable in gauging an agency's performance in promoting water conservation and efficiency and evaluating the strengths and weaknesses of a city's water conservation efforts, they also have limitations.[16] Per capita demand, for example, is affected by a variety of factors, including the level and type of industry, income, climate, and mix of single-family and multi-family homes. Thus, a city with a high degree of water-intensive industrial or commercial development would tend to have a higher per capita demand than a largely residential city. Likewise, a city in a hot, dry climate, like Las Vegas, would likely have higher outdoor demand requirements than a city in a cool, wet climate, all other things being equal.

C17 An end-use analysis, which evaluates the potential savings for every water use within a given region, provides a means to evaluate the conservation potential. A 2007 analysis by the Pacific Institute found that water demand in Las Vegas is substantially higher than in many other western communities. While data limitations prevented a full end-use analysis of all water users in the Las Vegas Valley, our review of single-family residential customers, hotels, and casinos indicates that installing water-efficient fixtures and appliances could reduce current *indoor* water demand by 40 percent in single-family homes and nearly 30 percent in hotels and casinos. Installing water-efficient landscapes could further reduce current *outdoor* demand by 40 percent in single-family homes. In total, water conservation and efficiency improvements for just these three sectors could reduce current water diversions by more than 86,000 acre-feet per year.

C18 While behavioral changes and efforts in other water-using sectors can produce even greater reductions, these were not included in the 2007 Pacific Institute analysis, but they are often

[16] Cooley, H., T. Hutchins-Cabibi, M. Cohen, P.H. Gleick, and M. Heberger. 2007. Hidden Oasis: Water Conservation and Efficiency in Las Vegas. Pacific Institute and Western Resource Advocates.

C18 cont'd included in the conservation portfolios of western municipal water agencies and should be evaluated for SNWA.

Demand Hardening

Both the 2009 Water Resource Plan and the 2009 Conservation Plan raise concerns about demand hardening. Specifically, the report states that

> "While conservation is an important water management tool, the more aggressive and responsive a community is to calls for conservation, the more difficult it becomes to realize additional conservation gains. This phenomenon of diminishing returns is referred to as 'demand hardening.' For communities where a majority of the water supply comes from one source (such as Southern Nevada), the prospect of demand hardening requires development of additional alternative water supplies regardless of conservation levels achieved" (SNWA 2009).

Demand hardening refers to the concern that implementation of short term drought response measures may be ineffective if permanent water-use efficiency measures have previously been employed. Some water planners, including SNWA, argue that extensive conservation removes the slack in the system, hindering their ability to reduce demand in the event of a water shortage.

Demand hardening could be a concern for water providers in certain situations, but its importance has been overstated.[17,18] The demand hardening argument ignores a number of key points:

- Most providers can use a significant portion of water they conserve to serve new customers without harming reliability, provided that the overall demand does not increase during a shortage.

[17] Chesnutt, T., D. Pekelney, and D. Mitchell. (1997). Valuing Conservation. Proceedings of AWWA Annual Conference, 1997, Atlanta, GA. American Water Works Association.
[18] Howe, C.W. and C. Goemans. (2007). The Simple Analytics of Demand Hardening. Journal of the American Water Works Association, October 2007, Volume 99 Number 10.

- Customers who participate in long-term conservation measures and reduce their demand through technological improvements, such as low-flow toilets and efficient clothes washers, can still reduce their water use through behavioral changes during a shortage.[19]

- The technologies and economics of water-use efficiency are constantly changing. New, more efficient technologies are coming on to the market, and the price of those that are already on the market is dropping, thereby continuing to expand the cost-effective conservation savings potential of existing and new customers.

- For many water providers, conservation allows more water to be kept in storage (either in reservoirs or in aquifers underground), thereby reducing the risk and potential impacts of drought.

Furthermore, a recent AWWA article notes the economic pitfalls of relying upon the demand hardening concept: "to ignore long-term conservation benefits and to build excess water supply capacity simply to facilitate cutbacks during drought can be highly uneconomical."[20]

Conclusions

C19 Our analysis concludes that there are a number of flaws with current water planning efforts in the SNWA service area that overestimate future water demand and underestimate the importance of conservation and efficiency, including the failure to incorporate cost-effective conservation improvements, the use of outdated population projections, and the concern about "demand hardening." As a clear example of this, simple forecasts that use more up-to-date population projections and a per capita water demand target of 166 gpcd (lower than the current SNWA estimate but well in line with current practice in most western, arid-climate cities, total water C20 demand in SNWA's service area would be about the same as it is now. This approach would delay or even eliminate the need for new water supplies, with substantially lower economic and

[19] Mayer, P., D. Little, and A. Ward. (2006). System Reliability and Demand Hardening. Colorado Statewide Water Supply initiative, Conservation and Efficiency Technical Roundtable, March 2006.
[20] Howe, C.W. and C. Goemans. (2007). The Simple Analytics of Demand Hardening. Journal of the American Water Works Association, October 2007, Volume 99 Number 10.

C20 cont'd

political risks. These factors deserve equal consideration in any long-term water planning strategy.

Appendix C

Comments to BLM DEIS

Section 3.7 (Aquatic Biological Resources and Appendix F3.7) of the Clark, Lincoln, and White Pine Counties Groundwater Development Project DEIS completed by BLM is a thorough examination and evaluation of the probable effects of the proposed project on aquatic biological resources within the area of impact. The area of impact is defined by a groundwater model used for analysis of the project. The groundwater model used by BLM estimates impacts over a smaller geographic area than is estimated by other models that have been used to examine this problem (Elliott et al. 2006, Myers 2006, 2007, 2011a,b, Schaefer and Harrill 1995). This suggests that the very serious impacts to Aquatic Biological Resources described in the DEIS may be considerably understated. The EIS should address the issue of underestimating the geographic area over which impacts may occur. C21

The effects of the project on Aquatic Biological Resources are controversial enough, and uncertain enough to anticipate a relatively high probability of litigation under provisions of the Endangered Species Act as a consequence of the proposed action. The EIS should evaluate the consequences (i.e. construction delays, increased costs) of this kind of litigation. In addition, the EIS should evaluate the high probability that the proposed action and all the alternatives (including Alternative A) are likely to result in violations of Federal law (Endangered Species Act). C22

The DEIS recommends using Alternative A (including the mitigation and monitoring identified in Chapter 3) as a starting point in reviewing the draft EIS. Alternative A proposes somewhat reduced groundwater pumping and a Monitoring, Management, and Mitigation process representing extensive and comprehensive efforts by SNWA and federal agencies to minimize environmental effects of the groundwater project. The DEIS and numerous other studies, analyses, and scientific papers (e.g. Bredehoeft and Durbin 2009, Deacon et al. 2007, Mayer and Congdon 2007, Patten et al. 2007, Walton 2011, and others) make it obvious that there will be far-reaching, permanent and extensive adverse effects to the Aquatic Biological Resources of the region. While the MMM effort is commendable and may temporarily reduce some impacts to the Aquatic Biological Resources of the region, it is clearly incapable of avoiding or mitigating unacceptable environmental consequences to these Resources. Principal reasons for this are as follows:

C23 1. The MMM (Monitoring, Management, and Mitigation) program is structured so that an Executive Committee comprised of one manager from SNWA and one from each of the DOI (Department of Interior) Bureaus will have final decision-making authority.

This structure ensures that, over the long run decisions will be biased toward delivering water to Las Vegas. This is because the SNWA representatives' primary job responsibility is to deliver water to Las Vegas, while DOI Bureau managers have responsibilities to implement the policies of the federal administration for whom they work. One example of the effect of DOI Bureau managers attempting to discharge their primary responsibilities is that people holding these positions have, in the past, filed

protests with the Nevada State Engineer against the SNWA applications for groundwater rights, and under a different federal administration, requested withdrawal of those same protests. The EIS must propose a different final decision-making system for the MMM program, or explain how this inherent structural bias toward delivering water to Las Vegas is to be balanced in a way that will not lead to increased jeopardy for Special Status species, or increased probability that federal (ESA) and state (water law) laws and regulations will not be violated. C24

2. The Stipulated Agreements governing the MMM program include the following provision: "Any commitment to funding by the DOI bureaus or the SNWA in the stipulation, including specifically any monitoring, management, and mitigation actions provided for in Exhibit A is subject to appropriations by Congress or the governing body of the SNWA as appropriate."

C25 In the present political climate, funding from public sources is under extreme pressure. Long-term survival of the MMM program is therefore highly unlikely. The program as contemplated will make Aquatic Biological Resources in the area of impact increasingly dependent on continuation of the MMM program as the MMM program itself becomes increasingly unlikely to exist. The EIS must acknowledge that fact and explain how it is to be overcome.

C26 3. The MMM program, because of problems described as "Aquifer Response Time" (Walton 2011) or "time to full capture" (Bredehoeft and Durbin 2007), is capable of identifying groundwater supply problems that will get worse downstream in the groundwater flow system. It is not capable of preventing those problems from getting worse. The EIS must explain how the MMM program can overcome this inherent problem stemming from the physics of how groundwater flow systems function.

C27 4. The Aquatic Biology MMM program focuses on Special Status Species and game species. This approach overlooks the numerous recently described species whose status has yet to be evaluated, as well as the numerous as yet undescribed species occurring in the area of impact. Because numerous new species have recently been described from the area of impact, and biodiversity in the area is poorly known, the EIS must explain how the MMM program will deal with species yet to be evaluated or even discovered.

5. Shoshone Ponds in Spring Valley and Big Springs in Snake Valley are two habitats specifically identified as aquatic habitats likely to disappear as a consequence of the proposed action. Alternative A will not change that outcome. Mitigation measures include the possibility of creating alternative or substitute aquatic habitats intended to replace those unavoidably lost. While such a strategy could conceivably be considered appropriate for Shoshone Ponds (an artificial habitat intended to help maintain one or more specific Special Status species), it cannot be considered appropriate for Big Springs. This is because Big Springs is a natural habitat presently supporting a rich biodiversity which includes Special Status species and probably includes some species as yet unrecognized, undescribed, or whose status has yet to be evaluated. The interactions and interdependencies helping to support those Special Status species and C28

C28 cont'd

influencing the evolutionary trajectory of all species within that habitat are only incompletely known. At present it is inconceivable to even contemplate developing sufficient knowledge to permit construction of an artificial habitat that would come close to duplicating ecological conditions capable of supporting the biodiversity of any natural habitat/ecosystem. The EIS must recognize this distinction between mitigation for artificial habitats and natural habitats, including recognition of the fact that replacement of natural habitats cannot be accomplished.

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Partial Appendix D

USGS
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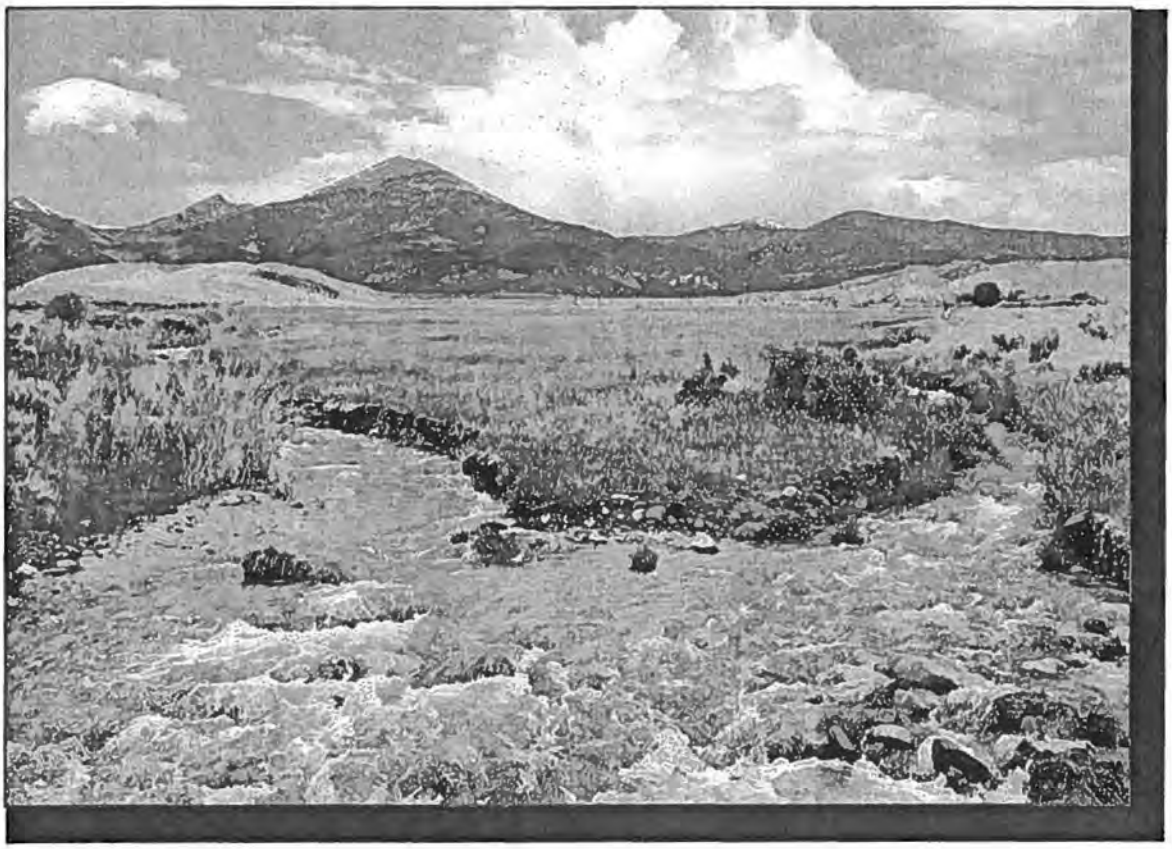
Prepared in cooperation with the National Park Service

Characterization of Surface-Water Resources in the Great Basin National Park Area and Their Susceptibility to Ground-Water Withdrawals in Adjacent Valleys, White Pine County, Nevada



Scientific Investigations Report 2006–5099

U.S. Department of the Interior
U.S. Geological Survey

Characterization of Surface-Water Resources in the Great Basin National Park Area and Their Susceptibility to Ground-Water Withdrawals in Adjacent Valleys, White Pine County, Nevada

By Peggy E. Elliott, David A. Beck, and David E. Prudic

Prepared in cooperation with the
National Park Service

Scientific Investigations Report 2006–5099

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U.S. Geological Survey

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[In pocket]

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Conversion Factors and Datums

Inch/Pound to SI

Multiply	By	To obtain
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
cubic foot per second per mile [(ft^3/s)/mi]	0.01760	cubic meter per second per kilometer [(m^3/s)/km]
cubic foot per second per square mile [(ft^3/s)/mi^2]	0.01093	cubic meter per second per square kilometer [(m^3/s)/km^2]
foot (ft)	0.3048	meter (m)
foot per second (ft/s)	0.3048	meter per second (m/s)
foot per mile (ft/mi)	0.1894	meter per kilometer (m/km)
inch (in.)	25.4	millimeter (mm)
mile (mi)	1.609	kilometer (km)
square mile (mi^2)	2.590	square kilometer (km^2)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$°F=(1.8 \times °C)+32.$$

Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows:

$$°C = 0.556(°F-32).$$

Specific conductance is given in microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25°C).

Instantaneous discharge is the discharge at a particular instant of time.

Datums

Vertical coordinate information is referenced to the North American Vertical Datum of 1988 (NAVD 88). Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD83).

Altitude, as used in this report, refers to distance above the vertical datum.

Characterization of Surface-Water Resources in the Great Basin National Park Area and Their Susceptibility to Ground-Water Withdrawals in Adjacent Valleys, White Pine County, Nevada

By Peggy E. Elliott, David A. Beck, and David E. Prudic

Abstract

Eight drainage basins and one spring within the Great Basin National Park area were monitored continually from October 2002 to September 2004 to quantify stream discharge and assess the natural variability in flow. Mean annual discharge for the stream drainages ranged from 0 cubic feet per second at Decathon Canyon to 9.08 cubic feet per second at Baker Creek. Seasonal variability in streamflow generally was uniform throughout the network. Minimum and maximum mean monthly discharges occurred in February and June, respectively, at all but one of the perennial streamflow sites. Synoptic-discharge, specific-conductance, and water- and air-temperature measurements were collected during the spring, summer, and autumn of 2003 along selected reaches of Strawberry, Shingle, Lehman, Baker, and Snake Creeks, and Big Wash to determine areas where surface-water resources would be susceptible to ground-water withdrawals in adjacent valleys. Comparison of streamflow and water-property data to the geology along each stream indicated areas where surface-water resources likely or potentially would be susceptible to ground-water withdrawals. These areas consist of reaches where streams (1) are in contact with permeable rocks or sediments, or (2) receive water from either spring discharge or ground-water inflow.

Introduction

Great Basin National Park, in east-central Nevada (fig. 1), is home to an abundance of natural resources and scenic attractions. The park encompasses Lehman Caves; Wheeler Peak, the second highest peak in Nevada at 13,063 ft; many glacial features, such as a remnant glacier, a rock glacier, cirques, and tarns; a bristlecone forest; subalpine lakes; as well as abundant wildlife (National Park Service, 1991, 2002; Miller and others, 1995a). Water from streams, springs, and seeps within Great Basin National Park is an important resource that maintains the diverse biological communities, enhances the abundance of geologic features, and provides for park operations.

The water resources of sparsely populated valleys in eastern Nevada and western Utah have received attention as potential sources of supply because of the increased demand for water in distant urban centers, in particular Las Vegas, Nevada. Several water-rights applications, including those filed by Las Vegas Valley Water District and Vidler Water Company, a private water-development firm, currently (2006) are pending before the Nevada State Engineer for large-scale ground-water withdrawals from Spring and Snake Valleys adjacent to the park. Streams, springs, and seeps in the park potentially could be affected because of the close proximity to the pending withdrawals. Any decreases in flow could adversely affect water-dependent biological and geological resources within the park as well as the park's water supply. The National Park Service (NPS) needs information on how the proposed withdrawals might affect water resources important to the park. The U.S. Geological Survey (USGS) is working, in cooperation with the NPS, to assess the park's surface-water resources and determine where the resources are most susceptible to ground-water withdrawals. The information presented in this report will assist NPS in managing and protecting the natural resources that may be affected by proposed ground-water withdrawals outside of the park's boundary.

Purpose and Scope

The purpose of this report is to document the results of a study to characterize surface-water resources in the Great Basin National Park area, and to evaluate the susceptibility of those resources to ground-water withdrawals in adjacent valleys. Characterization of surface-water resources included quantifying the discharge of streams and springs within the study area, and assessing the natural variability of their flow.

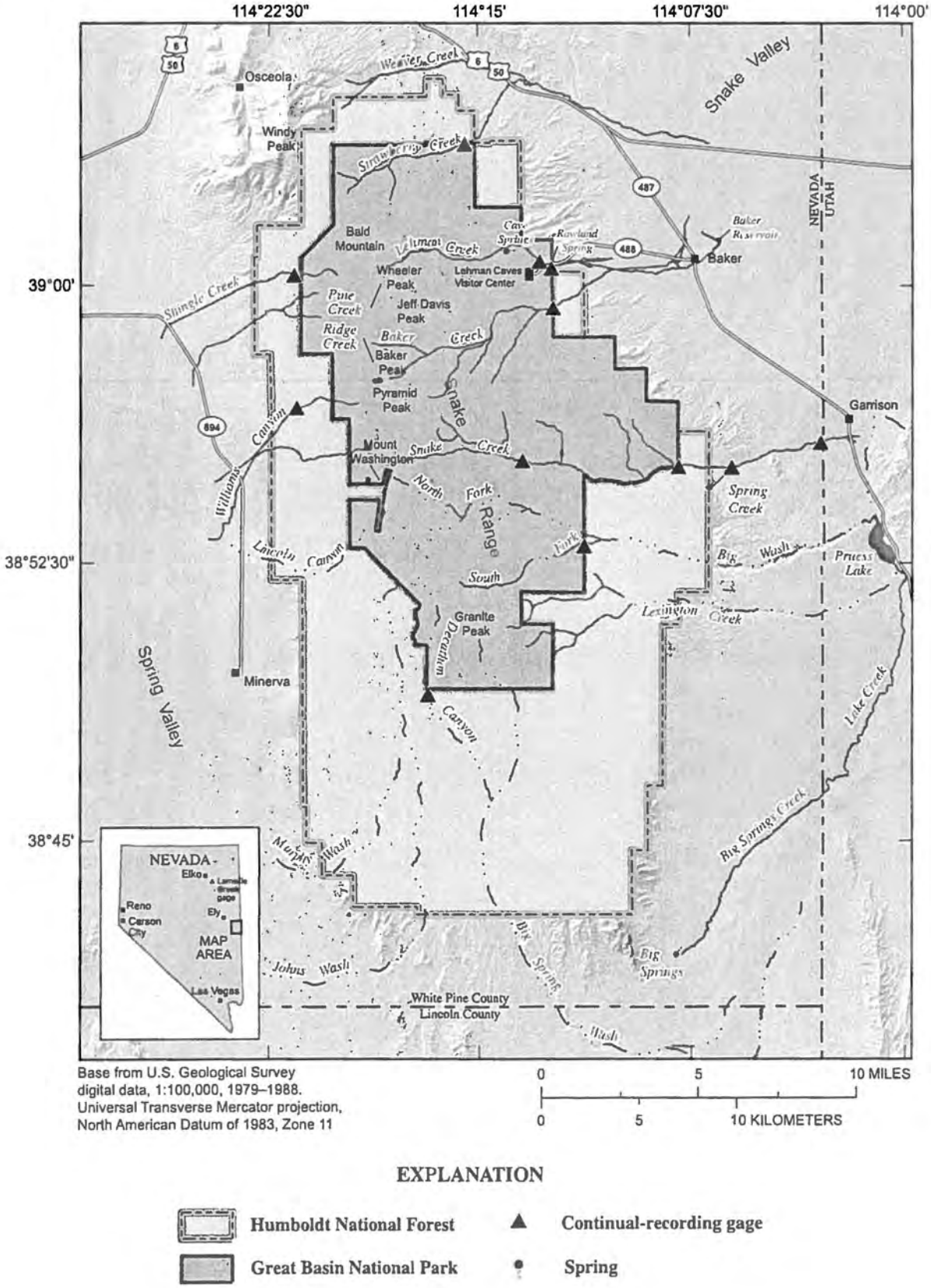

Figure 1. Location of Great Basin National Park, physiographic and geographic features, and continual-recording streamflow gages, White Pine County, Nevada, and Lamoille Creek gage near Elko, Nevada. See inset map for location of Elko, Nevada.

Appendix E

To: Terry Marasco
Silver Jack Inn & LectroLux Cafe
POB 69, Baker NV 89311
POB 69,
Baker NV 89311

From: Thomas A. Cahill
Professor of Physics and Atmospheric Sciences and
Head, DELTA Group

Re: Impacts of water withdrawals

I have considerable experience with drying lake playas and the dust they generate, and am strongly concerned that water withdrawals from existing lakes and playas will cause vast violations of US EPA air quality standards from blowing dust.

I was principal investigator of extensive studies of Owens (dry) lake and Mono Lake for the Air Resources board, 1978 – 1984, principal investigator for the CA State lands Commission at Owens lake 1991 – 1994, expert for the Mono lake Committee 1982 – 1992, and expert witness for the CA State Lands Commission (which controls Owens lake bed) in the CA Water Resources Control Board hearings, from 1992 – 1994.

In the first ARB report 1979, we documented the impact of LA Water and Power's drying up of the playa of Owens Lake in the 1920s, which was causing massive dust storms for 50 years with no hint of ever stopping. The flat dried lake bed erodes in strong desert winds, generating not just sand but inhalable fine particles that, in the cases of Owens and Mono playas, contain toxics such as arsenic.

C29 It is my expert opinion that these potential impacts be fully investigated prior to any decision to withdraw any water from desert valleys, and if as I suspect such problems will occur, withdrawals can not be tolerated without violations of federal air quality statues. Sevier Lake, in particular, causes me concern.

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Appendix F

Technical Memorandum

October 9, 2011

To: Great Basin Water Network

From: Tom Myers, Ph.D., Hydrologic Consultant

Subject: Review of the SNWA Pipeline Draft Environmental Impact Statement

The Bureau of Land Management (BLM) released the Clark, Lincoln, and White Pine Counties Groundwater Development Project Draft Environmental Impact Statement (DEIS)(BLM 2011) in early June 2011. The memorandum has five primary sections reviewing the DEIS and supporting documents. First is a Summary and Conclusion of the overall memorandum. The next three sections review the actual DEIS (BLM 2009), the Conceptual Model Report (SNWA 2009a), and the SNWA Numerical Model (SNWA 2009b, 2010a, 2010b), respectively. Additionally, the fifth section is an analysis of the DEIS proposed action and a reduced pumping option for Spring and Snake Valleys using the Myers (2011a and 2011b) numerical groundwater model.

Summary and Conclusions

This DEIS has highlighted the potentially devastating impacts that will occur to the environment of eastern Nevada and far western Utah if the pipeline project is developed and SNWA pumps groundwater at up to the full application amount. These impacts are obvious even though the models used for the BLM's DEIS are fraught with errors and assumptions which bias the model to underpredict the impacts.

C30 A major deficiency with the DEIS is that it limits impacts to those which occur within the 10-foot drawdown cone, although major impacts can occur with less drawdown, including dried springs and wetlands and effective loss of water rights for wells that depend on a few

C31 ~~productive zones~~ A second major deficiency is the DEIS considers impacts for only 200 years into the future. Groundwater model simulations do not reach equilibrium within that time frame, therefore the impacts will continue to increase after 200 years. Unless there are guarantees that the pumping will cease in 200 years, the DEIS must consider the impacts of pumping until equilibrium is reached. Based on the Myers model simulations, equilibrium requires at least 10,000 years.

C32 The groundwater model used to simulate the impacts of this project has many problems and is inappropriate for analyzing the impacts of this project. For one, it is too coarse to simulate such significant drawdown; the model cells are too large and the model layers too thick. Drawdown amounts at the wells are grossly underestimated as a result. The model is poorly conceptualized as evidenced by the fact that model simulations do not converge without the modelers having set all layers as confined. The model poorly simulates the area water

C32 cont'd balance and does not even attempt to simulate most springs. It has also placed fault barriers and conductive zones so as to minimize the predicted impacts to important spring.

The DEIS model shows that groundwater drawdown would exceed 1000 feet at the application points of diversion and the extent of drawdown would cover hundreds of square miles, drying springs and wetlands over most of that area. The distributed pumping option analyzed as the proposed action in the DEIS, would expand the extent of drawdown and dry even more springs and wetlands. The proposed action would impact 18 nearby basins, not just the five targeted for pumping. Steptoe Valley would experience drawdown up to 50 feet in its southern end and have significant amounts of water drawn toward Spring Valley.

Draft Environmental Impact Statement

The DEIS considers the impacts of the Southern Nevada Water Authority (SNWA) developing a right-of-way for its water rights applications in Snake, Spring, Cave, Dry Lake, and Delamar Valleys. This technical memorandum reviews exclusively the aspects of the DEIS that deal with pumping the groundwater. The DEIS review includes consideration of the alternatives, DEIS hydrogeology, and predicted impacts.

C33 **The DEIS fails to consider a range of pumping options that would involve pumping different amounts of water.** The DEIS considers pumping the full application amount for the five valleys, at the original application points of diversion (PODs) and at distributed pumping locations. Just one alternative (A) considers a reduced pumping amount, although another alternative considers intermittently pumping the full application amount. Considering the distributed pumping layout with a much reduced pumping rate would provide a comparison of the marginal impacts of increasing the pumping from low rates to much higher rates.

Inadequacy of Ten-Foot Drawdown Analysis

The BLM presents impacts only to the ten-foot drawdown level, for reasons described in chapter 3 (p. 3.3-87). They do this even though they acknowledge that lesser drawdowns could cause additional impacts that they are ignoring. "Drawdowns of less than 10 feet could reduce flows in perennial springs or streams that are controlled by discharge from the regional groundwater flow system, which in turn could potentially cause declines in the diversity and abundance of associate riparian flora and fauna that may only be able to tolerate water declines on the order of a few feet" (*Id.*). BLM has acknowledged that the use of 10-foot drawdowns for their analysis is a failure to disclose all potential impacts from the pumping project.

BLM makes several excuses for limiting the analysis to the 10-foot drawdown. First, the "BLM does not believe that it is reasonable or appropriate to use the regional model to quantify changes in groundwater elevation" (*Id.*) because of the model's regional scale and "unavoidable uncertainty associated with the model predictions" (*Id.*). They could have developed a more

detailed model for the targeted valleys, such as Myers (2011a and 2011b). Even so, understanding that predictions are uncertain is much better than just ignoring the impacts.

The point about uncertainty in the predictions is irrelevant. If the model has been objectively constructed, each contour line represents an expected value for that contour value. In the absence of obvious model bias, model error should be normally distributed (Hill et al 1998). There is just as much chance that the contour is ~~underestimated as overestimated~~. All predictions should be treated as though there is a confidence band around them. If the BLM has concerns about the uncertainty, they should require the modeler to put confidence bands around the contour estimates. C34

Second, the BLM is concerned that 10 feet is similar to the magnitude of natural variation. Seasonal variation in water levels at any point may exceed the predicted drawdown, but a constant drawdown would cause a new median level around which the natural changes would fluctuate. Where seasonal variability causes springs or wetlands to dry, the additional drawdown may cause them to be dry longer. The DEIS fails to disclose the impacts to those resources that have a significant natural variability. C35

Third, the BLM justifies its use of 10-foot drawdown by mentioning other DEISs in which it used similar reasoning. The fact that the BLM did it wrong in the past is not a justification for doing it wrong in this project. This is particularly important because the area between the predicted 10-foot and 1-foot drawdown may be hundreds of square miles.

The following are reasons to include lesser drawdowns.

- C36 Springs can be dried even if the water table is lowered less than 10 feet. Not identifying the springs between 10-ft and 1-ft of drawdown is a failure to present potential impacts of the proposed project.
- C37 Lowered water tables can dry or significantly change the wetland ecosystem types. The same argument as for springs can be made for wetlands. A wetland that is naturally stressed could be killed with just a few feet of drawdown.
- C38 Less than 10 feet of drawdown can affect wells with a productive zone near the top of the screens.

Halford and Plume (2011) presented drawdown contours as low as 0.3 ft, without making a detailed uncertainty analysis. They did mention the uncertainty in the placement of a contour as being equal in magnitude as the length of a side of a cell.

Inadequacy of Limiting the Analysis to 200 Years

C39 **The DEIS considers the alternatives for only 200 years, which is a failure to disclose all the potential impacts of granting this right-of-way and allowing the concomitant pumping.** This is an insufficient time period because the groundwater systems do not even approach equilibrium within 200 years. Equilibrium would occur at the time that the pumping essentially

C39 cont'd ceases to remove groundwater from storage. It is the time at which the pumping has captured an equivalent amount of natural discharge, meaning wetlands evapotranspiration (ET) and spring discharge. At this point the drawdown will have reached its maximum extent and the impacts caused by the project will be at a maximum. The DEIS does not identify these potential impacts.

Predicted water levels for various wells, for example, well 184 N11E6713B1 USBLM (DEIS, Figure 3.3.2-7), begin to decrease by the time of full build-out, but in the long-term trend almost linearly downward. Two hundred years after full build-out, the water levels are decreasing almost as rapidly as just a few years after full build-out. This demonstrates clearly that the impact will continue to worsen far beyond the time period as presented in the DEIS.

The 200-year time frame is arbitrary. The BLM in Nevada commonly analyzes the effects of open pit mines that will take more than 200 years to fill with groundwater, thereby forming a pit lake[1]. C40 Longer analyses are necessary even though the predictions become more uncertain. The choice the BLM leaves the reader is between uncertain predictions and no predictions at all. The issues regarding uncertainty beyond 200 years are similar to those discussed and rejected above regarding the use of a 10-foot drawdown cone. The uncertainty could be considered with a stochastic analysis wherein they present the drawdown contours and hydrographs with a confidence band.

Unless there is a viable plan for ending the project after 200 years, the analysis should consider a much longer pumping period.

Alternatives Analysis

The BLM presented impacts of its various alternatives and the No Action alternative as a series of drawdown maps and hydrographs of water levels and fluxes. The impacts of the project alternatives are the difference in the drawdown caused by the sum of the No Action and project alternatives and the No Action alternative. Although not stated in the DEIS, this assumes that drawdowns for No Action and the projects is additive.

The No Action alternative assumes that too many existing rights will be developed in the future. For example, No Action includes the future development of water for a power plant in Steptoe Valley, SNWA developing the 8000 af/y it has on the ranches it owns in Spring Valley, and the water rights to be transferred from Lake Valley to Coyote Springs (DEIS, chapter 2, Figure 2.2-1). The impacts caused by these projects may not occur; if SNWA is not granted water rights in Spring Valley, it may not develop the other rights it has purchased. C41 **The BLM should develop a No Action alternative that includes only existing pumping. The other options should be considered reasonably foreseeable future actions.**

[1] Examples of such pit lakes are Betze/Post, Gold Quarry, and Twin Creeks.

C42 The impacts of the action alternatives should be determined without pumping the No Action alternatives simultaneously. This would remove the potential nonlinearities which could skew the estimates of the with-project impacts. Predicted impact would be estimated with certainty that they are not potentially due to existing pumping.

C43 **The DEIS ignores too many applications that should be considered a reasonably foreseeable future action.** Applications listed as APP, RFA, or RFP in 11 basins total almost 488,000 af/y (Table 5). BLM did not adequately justify its decision regarding which to consider as reasonably foreseeable. The BLM should include more of the potential future uses, especially since some are owned by credible entities including SNWA, Vidler, and Lincoln County.

Table 1: Total duty for pending applications in eleven basins within the study area.

Basin	Basin	Duty	Comment
210	Coyote	202268	The duty was determined by converting the proposed
205	L Meadow V	14632	
204	Clover	14479	
203	Panaca	3552	
202	Patterson	54364	Includes Vidler/Lincoln Cty from 1989 and various
195	Snake V	61598	Does not include NPS instream flow application or 1977
184	Spring V	100645	Includes many irrigation applications, including many by
183	Lake V	0	Valley has many change apps for moving water to Coyote
182	Cave V	0	The database includes SNWA's applications as RFP, not as
181	Dry Lake V	2388	The database includes SNWA's applications as RFP, not as
180	Delamar V	33018	The database includes SNWA's applications as RFP, not as
	TOTAL	486944	
The duty includes applications listed as APP, RFA, or RFP; application, ready for action, or ready for action protested.			

Drawdown Effects

The DEIS presents many maps and figures showing drawdown for the various alternatives. **Even though SNWA's analysis underestimates the drawdown, the results presented in the DEIS show that any of the alternatives will cause massive drawdown and dry up much of the valleys within the 200-year analysis period.**

Alterative B, pumping the original application amounts at the original locations cause the deepest drawdowns within the targeted valleys. The drawdowns, which exceed 1000 feet at the wells, are excessive. The drawdown results from the aquifers not being able to provide 6 or 10 cfs at an original application point. The proposed action, a distributed pumping option, which would pump from 800 to 1000 gpm from as many as five times as many wells, cause a more widespread drawdown that is not as deep at specific well points.

DEIS Table 3.3.2-6 tabulates the devastation that would be caused by the proposed action. At full build-out, and 75- and 200-years after full build-out, drawdown will affect 7, 16,

and 18 basins, respectively; the proposed action clearly affects much more than the target basins. It will also affect 6, 80, and 112 miles of perennial streams and 25, 145, and 212 surface water rights, respectively. Well over a hundred springs could be affected.

DEIS Table 3.3.2-6 also demonstrates how pumping the proposal will dry up Spring Valley. At full build-out, and 75- and 200-years after full build-out, the percent reduction in ET and spring discharge is 45, 77, and 84 percent, respectively. The similar values for Snake Valley are 0, 28, and 33 percent, respectively. The Snake Valley full build-out reduction is 0 because project pumping in Snake Valley only begins at full build-out. Big Springs would be dry within 75 years of full build-out. Numerous springs in Spring Valley will be substantially dried (DEIS, Table 3.3.2-7).

C44 Predicted drawdown reaches the model boundary at Pine Valley (DEIS, p. 3.3-110). This demonstrates the BLM made an error in establishing the boundaries for the numerical groundwater model.

The maps and tables present the best estimates from the calibrated model (SNWA 2009b). Although the model has many errors and great uncertainty, if it has been calibrated objectively, the estimates may be considered an expected value (Hill et al 1998). This is similar to determining the mean where the observations around the mean are the variability but the mean may be an expected value. In general, the estimates should not be considered conservative. Drawdown and springflow reductions are as likely to have been underestimated as overestimated.

One model simplification likely causes an underestimate in the extent of drawdown. That is the assumption that groundwater flow is Darcian and that the aquifers are a homogeneous porous media. If the pumping affects a fracture or other preferential flow zone, it could draw water from much further away than the porous media simulation allows.

Monitoring and Mitigation

The primary interest of this review is the monitoring and mitigation as applied to the groundwater development activities (BLM, 2011, p. 3.3-97). The DEIS proposes most of the monitoring and mitigation as part of the stipulated agreement, for Spring Valley and Delamar, Dry Lake, and Cave Valleys (BLM, 2011, p. 3.3-113) (included in the DEIS Appendix C).

C45 The stipulated agreements do not include Snake Valley. There is no interstate agreement regarding Snake Valley. **The DEIS provides no basis for monitoring or mitigation in Snake Valley.**

C46 The stipulated agreements are intended to only protect "federal" resources, including water rights or the national park. **These stipulations are a poor basis for monitoring and mitigation for this entire project.** They do not contain mitigations for other water rights.

The DEIS presents a circular monitoring and mitigation discussion regarding the stipulate agreements and the BLM's authority. Basically, the M&M plan purportedly would allow "SNWA and the BLM to identify, avoid, minimize, and mitigate adverse effects associated with the proposed pumping in all five hydrographic basins" (DEIS, p. 3.3-116). It would "address uncertainties in predicting potential effects of SNWA's groundwater production on water dependent resources and water rights holders". The impacts could be far worse than predicted, but the DEIS does not present a plan for avoiding even the predicted impacts, such as drying up 84 percent of the discharges from Spring Valley or completely drying Big Springs, so it is unclear why the DEIS focuses on uncertainties. This could be due to the stipulated agreements occurring before the DEIS modeling predicted the valleys would be dried by the pumping.

C47

The monitoring sites shown on Figures 3.3.2-9 and -10 may or may not be adequate – it is impossible to know until the actual location of the pumping wells is known. These monitoring wells were located based on the stipulated agreement, but until the actual well locations are known, the value of these monitoring wells is unknown. The monitoring wells specified in the stipulated agreements were based in part on the location of the original applications, which are the PODs for which the stipulated agreements were developed. However, the proposed action places pumping wells across the basins far from the current PODs, so the monitoring well sites may not be in the best locations. Adaptive management must assure that new monitoring sites be established prior to pumping by a sufficient time period to establish a baseline.

C48

C49

The DEIS fails by not describing the "groundwater-dependent, early warning thresholds" (DEIS, p. 3.3-116). In the appendix, they indicate that it is necessary to collect baseline data "before specific early warning thresholds can be identified" (DEIS, p. A-49). This is simply not correct because **they should use the DEIS model to establish thresholds.** In establishing thresholds and monitoring, **BLM must consider the "time to full capture" problem.** Once a monitoring well indicates that impacts are occurring, it may be too late to stop or mitigate them. Drawdown cones expand even after pumping ceases. The BLM admits as much on p. 3.3-120, where it claims that "specific adaptive management measures … may not successfully mitigate long-term impacts to surface water resources" and a "long-term reduction in surface discharge" is likely to occur. BLM considers this an unavoidable adverse impact.

Having established early warning thresholds based on the DEIS modeling, the monitoring sites would be established as long as possible before the pumping commences. Data collection at the sites would establish the range of natural variability before any pumping effects could occur. This is essential to understanding whether a change is project induced.

The DEIS lists five adaptive management actions to reduce observed or predicted impacts, including geographic redistribution of the groundwater withdrawals, reduction or cessation, augmentation of water supplies using surface and groundwater sources, conducting recharge to offset local groundwater drawdown, and cloud seeding. These actions had been listed in the stipulated agreements. **Reducing or ceasing the pumping or significant changes in**

its location are the only potentially effective adaptive management actions. Augmentation and recharge should not be relied upon because both require additional water – using them merely transfers the impact elsewhere in the valley. There is no unused water in any of the valleys, including surface water that may reach the playas in wet years because the moisture holds together the playa soils. Cloud seeding is unproven technology which, if it works, must actually reduce precipitation somewhere downgradient.

At various points, the DEIS notes that the BLM will require the implementation of mitigation measures, which could include the cessation of pumping. "**If the BLM determines those early warning thresholds have been reached** as a result of the SNWA's groundwater withdrawal; (sic) one or more adaptive management measures may be implemented" (DEIS, p. 3.3-116, emphasis added). "If the BLM determines that SNWA groundwater withdrawals have likely caused or contributed to the adverse effect, BLM will require that one or more adaptive management measures be taken" (DEIS, App E, p. A-54). The BLM should state its authority for

C50 requiring mitigation measures that will reduce the amount of water pumped from the project, because elsewhere the BLM maintains that the NSE establishes the amount of water that may be pumped from a water right, not the BLM. Also, these statements do not purport with the stipulated agreements which indicate a technical review team will consider whether the pumping has damaged resources.

C51 The DEIS should specify an M&M plan that protects the resources in the project area. It should do so as best it can with current data and update the plan as new data and modeling becomes available. The following a basic steps that should be used:

- Identify resources to protect
- Define what it means to protect them
- Use existing modeling to establish monitoring sites
- Use existing modeling to establish triggers or early-warning thresholds.
- Use existing modeling to specify the mitigation that could be used – moving the pumping wells or reducing the amount being pumped. Predict if/when resources will be impacted.
- Every five years, use the monitoring data to verify and validate the model. if the data shows the model was poorly conceptualized, it should be reconstructed. If the data shows the basic model structure is adequate, the new data should be used to recalibrate the model.
- Use updated model and repeat # 3, 4, and 5.
- Continue through the life of the project

C52 Several additional M&M factors should be considered in the DEIS. One, the DEIS states the groundwater model "identified areas of uncertainty with regard to geologic and hydraulic characteristics" (DEIS, p. 3.3-120). These areas should be specified in the DEIS. The additional studies suggested (*Id.*) should be completed prior to finalizing the EIS.

C53 Second, the DEIS specifies that SNWA will develop a "groundwater flow system numerical model ... specific to Snake Valley" (DEIS, p. 3.3-121). This indicates the BLM has no confidence in the results of the CCRP model used for this DEIS - an admission that the DEIS is insufficient at presenting the potential impacts of this project.

Third, as part of mitigation GW-WR-5, the DEIS notes that the pumping will likely affect Shoshone Ponds, and also specifies that deepened or new wells to replace the existing source shall draw water from the same aquifer. This may not be possible if the source is a layer of highly conductive gravel with artesian pressure related to recharge uphill on the fan above the ponds.

Miscellaneous DEIS Comments

C54 The maps throughout the DEIS should show Indian reservations along with the FWS, NPS, and state lands.

C55 The DEIS should not cite the Spring Valley or the Cave, Dry Lake, and Delamar state engineer rulings for the perennial yield in those valleys (DEIS, p. 3.3-66, Table 3.3.1-20). These rulings have been rescinded by court ruling and the perennial yield values will be reconsidered. It is more appropriate to use previous PY estimates for this purpose.

C56 The DEIS considers the risks to springs based on being within a ten-foot drawdown cone and on their susceptibility. The DEIS inappropriately downplays the risk to valley margin springs (DEIS, p. 3.3-89) by considering them to have just a moderate risk due to a lack of understanding of their hydrologic control. The BLM should complete more site-specific study of these springs. Springs that are controlled by normal faults are likely connected to the regional water table but a spring near recharge zone at the top of the fan may be perched. The simple classification used in the DEIS may downplay the importance of or risk to certain springs.

Similarly, the DEIS should not specify flow reductions that would be important in modeled springs (DEIS 3.3-92). It should simply provide hydrographs of spring/stream flow so that the reader can assess the potential impacts. The DEIS correctly claims these estimates are uncertain, but uncertainty cuts both ways. Spring flow is just as likely to be decreased more than simulated as it is to be affected less.

C57 The problems highlighted in the DEIS with modeling Big Springs (DEIS, p. 3.3-93) are disturbing. The placement of a flow barrier east of the springs allowed the model to simulate the spring reasonably accurately, but the BLM requested the fault be moved west of the springs so that it would not limit the drawdown. Geologic mapping shows dual faults – a normal fault west of the springs and two of them just east of springs. The coarseness of the model discretization makes it difficult to simulate both faults because they are only one model cell apart. Another solution to the BLM's problem with the fault protecting the spring from Snake Valley pumping would be to have higher conductance on the fault to the north. A relatively

impermeable HFB may be necessary at the spring, but faults are not homogeneous along their length.

Review of Conceptual Model

A conceptual model is a description of flow paths through an aquifer or flow system, from the point of recharge to the point of discharge. This section reviews the conceptual model used as a basis for the DEIS and the numerical model (SNWA 2009a).

Water Budget Comments

SNWA estimated recharge using a water budget method wherein they set basinwide recharge equal to the measured discharge and interbasin flow from the flow system. The method they used was similar to the original Maxey-Eakin method, but they estimated new coefficients to be used with new precipitation estimate. They effectively determined a proportion of the total annual average rainfall in the basin that would become recharge. The method balanced flows among basins within individual flow systems, so that recharge equaled discharge by flow system – Goshute Valley, Great Salt Lake, Meadow Valley Wash, or White River. The estimates led to basin recharge estimates that exceeded the original reconnaissance report recharge estimates, as shown in the following table.

Table 2: Comparison of annual recharge amounts (af/y) for flow systems considered in the CMR and various reconnaissance reports.

Flow System	Goshute Valley	Great Salt Lake	Meadow V Wash	White River
SNWA Study	116,373	237,911	54,227	159,579
Recon Reports	100,000	181,900	35,900	104,500

SNWA's estimates lie near the upper range of the other estimates, as may be seen in Tables 9-2, I-5, or I-6 (SNWA 2009a). The primary reason the recharge estimates are high compared with all estimates is that the groundwater discharge estimates have increased substantially because the groundwater evapotranspiration (GWET) rates have increased, from earlier studies. This is because the system recharge must equal system discharge, and system discharge depends on spring flow and GWET estimates. Basically, increasing the discharge estimates requires that more of the estimated precipitation becomes recharge; it also means that there is more discharge for their pumping to capture.

C58 SNWA's description of the method, however, indicated they really do not understand their own estimate. Their map of recharge does not account for geology:

> It must be noted that this spatial distribution only accounts for variation of recharge rates with altitude. It does not explicitly account for the geology of the units through which precipitation infiltrates to recharge the flow system, and it does not explicitly

C58 cont'd distribute the recharge from runoff to the actual locations where it occurs. The quantity of recharge from infiltration is, however, implicitly included in the recharge estimated using the groundwater-balance method. (CMR, page 9-10)

While SNWA acknowledges the map is inaccurate, their explanation is partly wrong. The map accounts for the variation of recharge with precipitation which, while correlating with altitude, is not the same as varying with altitude. It does not account for geology, as they correctly state. The method merely describes a means of determining recharge in each basin based on the precipitation bands (volume of precipitation between two depths, such as 12 and 16 inches). It is based on balancing overall flow system recharge with flow system discharge considering only the precipitation variation around the flow system. The recharge estimate includes both mountain block and mountain front recharge. These differ due to geology because high elevation precipitation may recharge where it falls on carbonate outcrops or run off from other bedrock outcrops and recharge at the mountain front.

C59 The recharge estimates are incorrect because the groundwater discharge estimates are incorrect. SNWA used various methods to estimate the ET rates by phreatophyte type, and compiled a range of potential estimates from the literature – in fact, the CMR and appendices actually summarize almost every method and estimated rate available in the literature. Their final choice apparently is the BARCASS estimates for the basins within White Pine County.

C60 ET rates (regardless of whether the source is ground or surface water) vary within a fairly narrow range, typically within 20%. SNWA's GWET estimates are wrong because of how they allocate the source water to accommodate that ET – groundwater, precipitation, surface runon, or unsaturated zone water.

Groundwater ET emanating exclusively from the saturated zone is difficult, if not impossible, to measure separately. ET rates derived from field data (using ET towers) represent the total ET rates from the plants and the soils under and around the plants. The measured ET rates may include several sources of water: groundwater and soil moisture uptake by the plants, groundwater and soil moisture lost by evaporation, and water on the plant leaves lost by evaporation. The following simplifying assumption is usually made to derive mean annual groundwater ET rates: **all sources of water, other than groundwater, can be attributed to the mean annual precipitation.** Estimates of groundwater ET rates can then be obtained by **subtracting the local mean annual precipitation rate from the measured annual ET rate.** (CMR, page 7-6, emphases added)

C61 SNWA acknowledges the various sources but makes the "simplifying assumption" that precipitation can represent all sources other than groundwater. Most precipitation at a site with GWET does satisfy the ET demands because wetland sites are usually flat and have little runoff – most precipitation infiltrates or ponds on the surface. SNWA's assumption ignores the following sources of water:

C61 Cont'd

- Surface runon from offsite: Surrounding wetland areas are upland areas that usually have more topographic gradient than the much flatter wetland. Water runs off of that area and onto the wetland area thus satisfying more of the ET demands. If just 10% of the annual precipitation runs onto adjoining wetlands, because the surrounding upland may be larger, it could satisfy a much larger portion of the ET demand.
- Surface runoff from the mountains: Most wetland areas lie in the low portions of valleys, such as the playas and surrounding moist wetlands in Spring Valley. Most of the streams that discharge from the mountains infiltrate at the mountain front and contribute to basinwide recharge. During wet years, however, the streams flow to the valley bottoms and become another source of surface water to the wetlands, as evidenced by the playa lakes that form throughout the Great Basin.
- Mountain front springs contribute water to low-lying wetlands. An example is the regional springs in White River Valley which, predevelopment, satisfied ET demands in the wetlands below the springs.
- Lateral unsaturated zone flow: Water that infiltrates the ground surface adjacent to the wetlands will flow both vertically and laterally, and some will reach the unsaturated zone beneath the wetland areas.

Simply stated, SNWA modeled GWET as equal to the predicted ET minus predicted onsite precipitation (SNWA 2009a, pages 3-4 and 7-6) therefore estimated GWET depends on precipitation. SNWA used PRISM to estimate precipitation around the study area after rejecting other estimation methods. PRISM overestimates annual precipitation at most stations (Figure 6-4), as acknowledged and discussed by SNWA. "The comparison shows that the PRISM distribution slightly **overestimated** the period-of-record mean precipitation values for most stations" (CMR, page 6-5). Jeton et al (2005) substantially agree – **PRISM overestimates precipitation**. Yet, SNWA chose to use it for this study, claiming it would be a conservative estimate. "As precipitation is subtracted from ET to obtain groundwater ET, the larger estimates of precipitation derived from the PRISM grid will lead to smaller estimates of groundwater ET and, therefore, smaller recharge estimates. This demonstrates that the use of the PRISM precipitation distribution leads to **conservative estimates of recharge** and is appropriate in this study" (CMR, page 6-5, emphasis added).

The argument is conservative only if the other sources of water to satisfy ET listed above are ignored because they still overestimate GWET and recharge. This is understood by understanding the process through which precipitation becomes recharge (Wilson and Guan, 2004), as simulated with the BCM (Flint and Flint, 2007; Flint et al, 2004). The BCM estimates recharge using a water balance of the soil moisture zone in areas that are not wetlands; the method calculates infiltration and runoff. The infiltration either evapotranspires or becomes recharge; the runoff either recharges further downstream, at the mountain front, for example, or discharges to the playa. Up to **85% of runoff that does not become recharge goes to satisfying the ET from the wetland areas (Flint et al 2004)**. Nothing in SNWA's basinwide recharge estimate accounts for the proportion of precipitation that runs off and satisfies the ET demand – in fact, the method as used by SNWA does not require that the precipitation pass through the groundwater at all before it satisfies ET.

C62

A consideration of how much the CMR GWET estimates, by flow system, exceed the recon report estimates (Scott et al in CMR Table 6-1) demonstrates the potential for additional water in the basins to make up some of the ET demands. PRISM estimated precipitation as being substantially more than the recon reports in all of the flow systems with Meadow Valley Wash being by far the largest difference (Table 3).

C63

Table 3: Percent additional precipitation estimated in the CMR as compared with Recon Reports.

Flow System	% Increase Over Recon Estimates
Goshute Valley	9.4
Great Salt Lake	17.0
Meadow Valley Wash	59.1
White River	41.7

C64

Much of the overestimated precipitation occurs in Hamlin Valley; the overestimate was so great that SNWA had to manually lower the recharge estimate they made for the basin (see the NMR section review below). Halford and Plume (2011) also noted this problem.

Miscellaneous Comments on the Conceptual Model

Spring Types: The difference between regional and intermediate springs appears to be arbitrary, with Gandy Warm and Big Springs considered intermediate. The basis is location in the basin, temperature, flow rate and its variability, hydrogeologic setting, and geochemistry. Regional springs are warm and constant, but the actual bounds were not specified. With respect to modeling, the difference is not important.

C65

Interbasin Flows to Adjoining Flow Systems: SNWA estimated interbasin flows from the model domain to surrounding flow systems based on a probability distribution of material properties and gradient over the boundary. They assumed the gradient across the boundary equaled the gradient between mid-basin wells – "Because carbonate wells are scarce, water levels in the central parts of the basins were assumed to represent regional potentiometric levels, i.e., carbonate aquifer is connected to alluvial aquifers (CMR, 8-4)". This is an unfounded assumption. The gradient could be estimated using bedrock contours estimated in BARCASS or in chapter 5 of the CMR. The estimates are not well supported by the analysis, but are within the same orders of magnitude as should be expected (Welch et al, 2008).

C66

Depth-decay relations: SNWA estimated a conductivity/depth relationship to justify lowering the conductivity at depth, but the regression relationships barely justify it. CMR Figures C-9, C-10, and C-11 show the R^2 for Log K v depth regressions are 0.16, 0.27, and 0.43 for LC, LVF, and UVF, respectively; from the figures it is also apparent the relations would not be as good as they are, such as it is, except for a few very deep values. This spurious correlation may artificially increase the confidence in the relations.

C67 **Groundwater Contour Map:** The SNWA GW contour map includes both basin fill and carbonate water levels (CMR, Figure 5-2). This may imply a substantial connection. Also they do not show any flow into Fish Springs Flat or Tule Valley, although their geologic analysis properly notes the presence of carbonate rock. BARCASS had treated the mountains on the east side of Snake Valley as a potential flow pathway.

Review of SNWA CCRP Model

The DEIS used the Central Carbonate Rock Province (CCRP) model to simulate the proposed action and alternatives. This section reviews some of the details of that model, and shows that it is insufficient for NEPA analysis and may bias the simulations to minimize the predicted impacts.

C68 The model calibration was not based on stresses similar to that expected in the future, which far exceed anything observed to date. **The model will be used to predict drawdown that goes far beyond any drawdown observed to date so the model parameters are not representative of likely future conditions.**

C69 The SNWA model is too coarse, both horizontally and vertically, to use for predicting the impacts due to this proposed groundwater development. SNWA's model cells are **all 3281 ft square. D'Agnese (2011, p. 2) pointed out that the simulation of drawdown at a pumping well improves with improved discretization but SNWA failed to implement it in their modeling effort**.

C70 **The model layers are too thick and simulate too much of the deeper aquifer layers.** The CCRP model layer thickness varies from 328 to 984 feet over layers 2 through 5, from 328 to 6562 feet for layer 1, and 984 ft or thicker for layers 7 through 11; the total model thickness varies but the bottom is about 10,000 feet below sea level so at the center of Spring Valley, thickness would be about 16,000 ft. Halford and Plume (2011) generally did not simulate an overall model thickness more than 4000 ft because they expected little deep circulation. The lower half of the CCRP model is wasted.

C71 **SNWA's model is poorly conceptualized as demonstrated by the convergence problems** they could only solve by simulating all layers as confined, including layer 1 (SNWA, 2009, p. 4-2, 4-4). SNWA set the top of layer 1 to coincide with the top of the water table so that the layer had a constant transmissivity and did not change the layer type during transient simulation. This means that layer-1 transmissivity remains constant through the simulation even though the thickness is significantly decreasing. There are areas where the simulated drawdown exceeds 328 feet, so the layer should go dry; SNWA's assumption would maintain the transmissivity and flow even when simulating heads below the bottom of the layer.

C72 SNWA attempts to fix the problem by setting storage coefficients to represent specific yields. The valley fill storage is set at 0.015, which is higher than it should for specific storage

C72 cont'd

but lower than a specific yield; this is the value for the upper six layers. The model will therefore release more water for a given drawdown than it would had a proper specific storage had been used. The combination of high specific storage and unchanging transmissivity would cause the model **to underestimate the drawdowns.** This will dampen the predicted effect of pumping and decrease the predicted drawdown.

C73

Convergence problems during steady state simulations are typically caused by an inaccurate representation of the flow system. In this case, the model cell size may be too big to accurately simulate the details of flow in the upper layers. The model very precisely inputs the perceived geology (depths to formations and thicknesses) over a coarse grid. This requires detailed calculations in the HUF2 package and elsewhere to set the parameter values for each cell; this could cause rapid changes between cells, as formations pinch out, which also causes instability in the water balance calculations for these cells. Either the use of smaller grid cells or specifying the model layers with hydrogeologic units could obviate this problem.

C74

SNWA's model calibration is biased to look better than it actually is. SNWA presented unweighted residuals, in Figure 6-9 (SNWA, 2009), which shows extreme bias in the distribution of residuals. In the area of Dry Lake and Pahroc Valleys, six residuals are between -440 and -220; five more are between -200 and -50 (Figure 1). Just east of Dry Lake Valley, in a trend that looks very much like the PRISM precipitation overestimates in Patterson, Lake, and Cave Valleys, are at least ten residuals from 200 to 955 and another ten from 20 to 200 (Figure 1). The CCRP model ranges from gross overestimation of head in Dry Lake/Pahroc Valleys (simulated exceeds observed in a negative residual) to gross underestimation of heads 10 to 20 miles to the east.

C75

SNWA's numerical model report addresses the residual problem between Patterson and Dry Lake Valley (SNWA, 2009, p 5-8). They used two low-K horizontal flow barriers (HFBs) to force the head to drop over 1000 feet between the valleys, but just were unable to do this which resulted in the high residuals. (The steady state model simulates 1600 af/y from Patterson to Dry Lake Valley). This should have caused SNWA to reconsider the overall conceptual model for the area. Their model simulates too much recharge in Dry Lake Valley, most specifically in the mountains on the east side of the valley between Dry Lake and Patterson Valleys; this extra recharge increases the head on each side of the fault and topographic divide so that the model cannot simulate sufficient head drop between valleys.

C76

SNWA emphasizes the value of using "weighted" observations to calibrate the model. Weighting attempts to account for the accuracy of the observation measurement and may be based on many things, from the method of determining the ground surface elevation or the depths to water to the seasonal variability of a series of measurements (from which a variance for the observed values can be determined). Ultimately, setting a "weight" is as fraught with uncertainty as the observation itself. Halford and Plume (2011) set weights based on the source of the observations, but described weighting individual observations as a "fool's errand" because model-discretization error "typically dominates measurement error". In other words,

C76 cont'd **SNWA's use of weighted observations should not increase the perception of accuracy in the model.**

C77 Two other obvious problems are the high positive residuals in north Spring Valley and along the mountain front in Snake Valley (Figure 1). The model does not accurately simulate the water table in the higher elevations along the boundary of the valleys. There should be little confidence in the simulated drawdown in these areas, potentially biasing the predicted results.

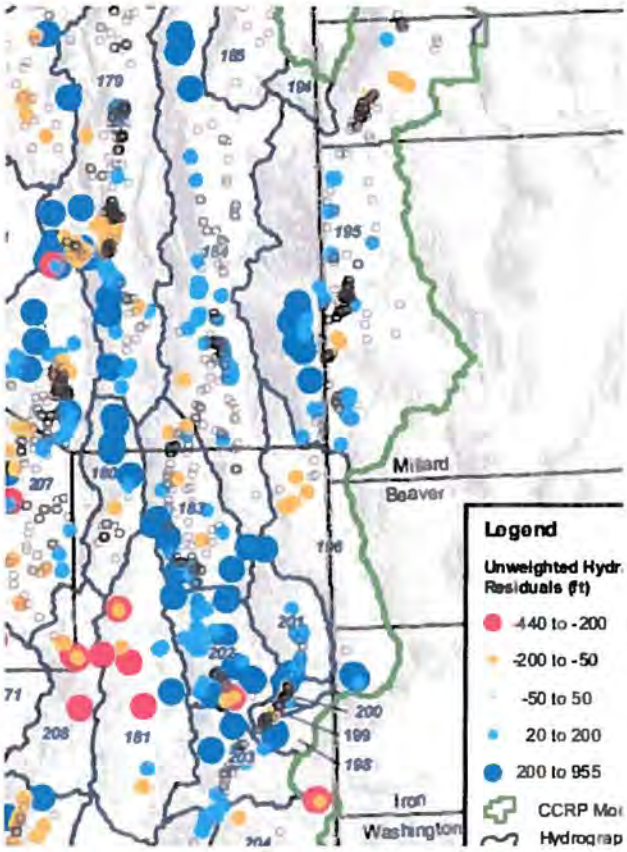

Figure 1: Snapshot from Figure 6-9 (SNWA, 2009) showing unweighted residuals.

The SNWA model handles faults in a way that may be biased because there is very little data to support their ultimate parameter choices. The following sections describe some of the problems.

Pahranagat and Coyote Spring Valleys

C78 The Pahranagat shear zone causes a head drop of about 700 feet across one model cell, as represented by the blue in the hydrogeology at column 62 (Figure 2); this is modeled with a series of HFBs. Further east (right) in column 72 is a conductive fault in LC3 (lower carbonate rock). The conductivity (K) in the fault ranges from 17 to 62 ft/d, over 3281 feet, while the

C78 cont'd

surrounding LC3 cells have K about 0.5 ft/d. The high K fault runs north/south through Coyote Spring Valley to just south of the Pahranagat Shear zone (Figure 3); the fault is shown on Figure 3 just east of the highway; it ends approximately where it intersects the shear zone. Based on K, this fault zone would transport vastly more groundwater than the surrounding rock.

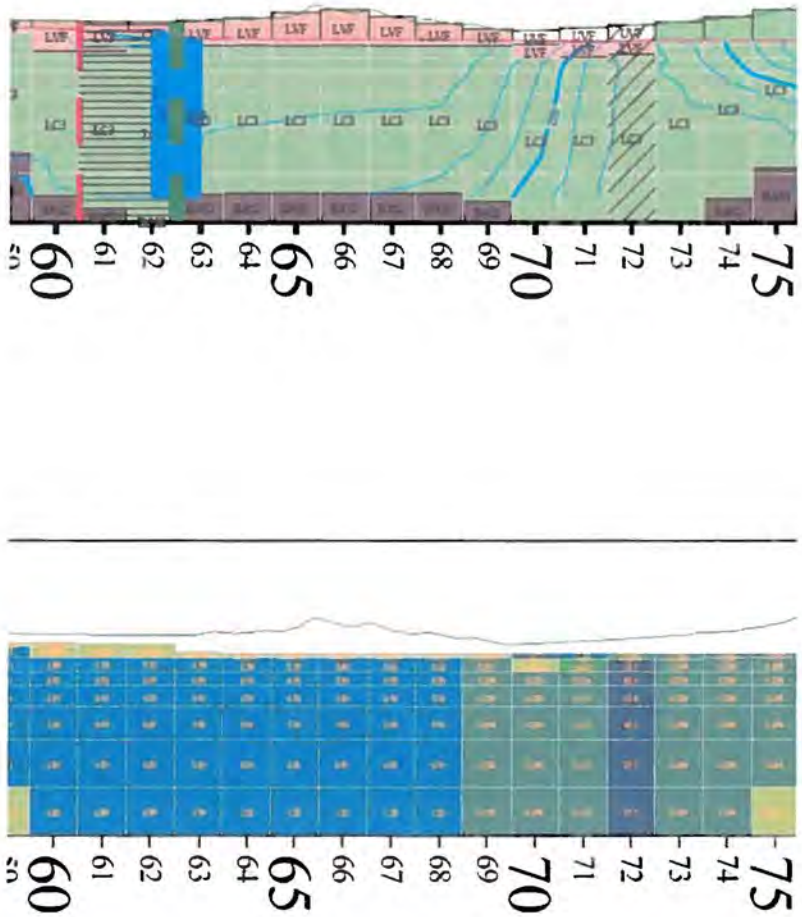

Figure 2: Snapshot of hydrogeology and calibrated K, model row 359. This section crosses Pahranagat and Coyote Spring Valley. (file xs_rum_rows-rev2-7o-map-hd-kh-s-1lay-ucth814-1-4748.pdf). The blue in the upper figure is a cluster of contours.

Figure 3: Snapshot from Plate 2, Rowley et al (2011).

C79 The source of the Pahranagat springs in SNWA's model is a highly conductive fault running down the middle of Pahranagat Valley. This fault gathers and transports groundwater from the north and west; K in the carbonate rock ranges to 30 ft/d for one or two column widths. The Pahranagat shear zone is simulated with a series of HFBs which prevent much of the flow from passing and also force groundwater to the surface to form the springs. Flow from the east to the central part of Pahranagat Valley is blocked by a normal fault that bounds the east side of the valley. The head drop across the HFB is about 300 feet (row 336); some flow occurs during steady state conditions but the HFB would be slow to respond to upgradient pumping. SNWA protects the Pahranagat Springs with an HFB that has not been proven on the ground.

C80 Further south, three faults converge in Coyote Spring Valley which allows groundwater to move to the Muddy River Springs area through a zone of very high K LC3 rock. Figure 4 shows two of the faults and high K zones right of the faults; Figure 5 shows the convergence of these faults and the fault on the east which impedes the flow causing it to surface at the springs. Figure 6 shows the three faults north of the springs near their convergence into the broad high K LC3 material. These figures demonstrate how a model simplifies complex geology but the problem with this is the broad zones with very high K cover as much as 20 model rows by 15 columns, or about 300 square kilometers. There is no geologic evidence for such a broad fractured zone in this area. Such a zone may bias the results for this area. The springs probably discharge from a narrow highly conductive fracture zone which could be drained sooner by pumping than would a 300 square km, 10,000 feet thick zone, with high K.

C81 SNWA should use different storage coefficients for the high K zones. Clearly, highly fractured areas would have different storage properties than unfractured media.

C82 SNWA added a constant head boundary between Pahranagat and Tickaboo Valleys to "allow some of the discharge to flow out of the model area" which was necessary because "discharge by groundwater ET from Pahranagat Valley tended to be larger than expected"

C82 cont'd

SNWA, 2009, p. 5-13). In other words, they needed a release valve even though the Death Valley Flow System (DVFS) analyses had not included such an outflow. **The reason a "release valve" was needed was, once again, that SNWA estimated far too much recharge in the WRFS, mostly in Dry Lake and Delamar Valleys.**

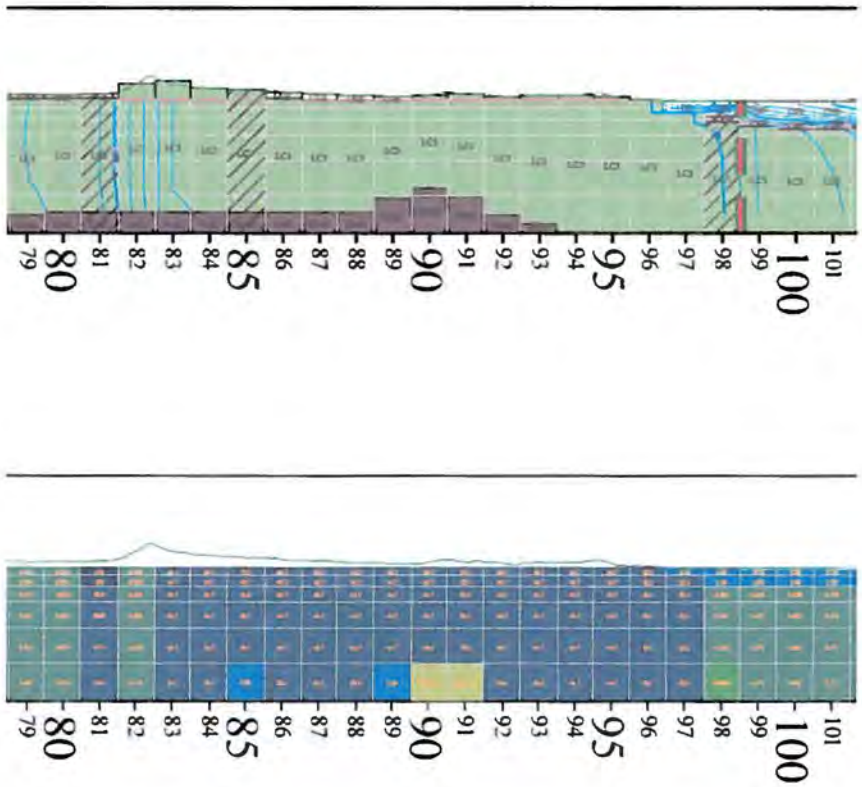

Figure 4: Hydrogeology and K values for row 407. (file xs_rum_rows-rev2-7o-map-hd-kh-s-1lay-ucth814-1-4748.pdf)

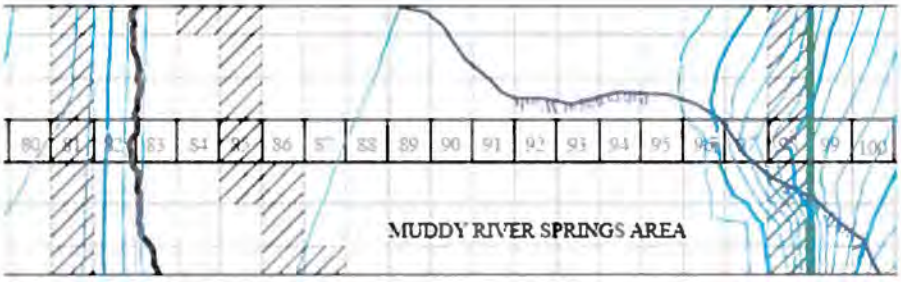

Figure 5: Model area near row 407 showing faults. (file xs_rum_rows-rev2-7o-map-hd-kh-s-1lay-ucth814-1-4748.pdf)

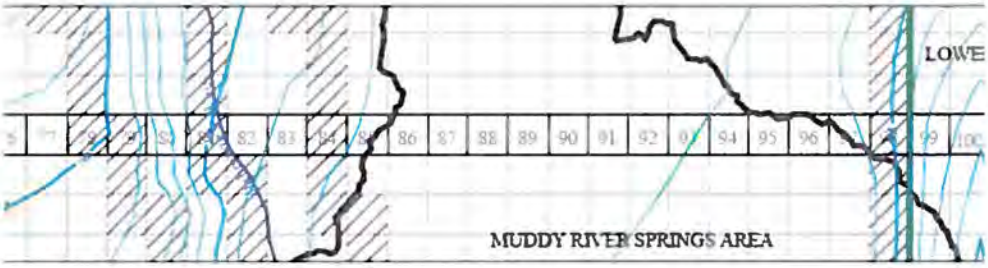

Figure 6: Model area near row 397 showing the collection of faults, all with high K but also the cells to the east have high K. (file xs_rum_rows-rev2-7o-map-hd-kh-s-1lay-ucth814-1-4748.pdf)

Spring Valley

C83 The CCRP model simulates Spring Valley with faults on each side, but only the normal fault on the west side affects the flow (Figure 7). An HFB runs between the bedrock and fill, causing a significant head drop. The bedrock is all low K, therefore the flow into the fill is probably low; the northern portion of Spring Valley has mostly mountainfront recharge. The east side fault shows as large displacement, but the K is not significantly different from the surrounding rock.

C84 The carbonate rock that underlies northern Spring Valley extends into Tippett Valley, under the Antelope Range. The K under Tippet Valley is almost two orders of magnitude higher, and the normal faults along the boundaries of Tippet Valley have high K.

C85 SNWA simulates the fill in Spring Valley as high to very high K. The primary feature is that the fill is modeled as a bowl, with high K fill surrounded by bedrock. SNWA models specific storage in lower layers of the fill, 5000 ft bgs, as 0.015. This imparts a huge bias on the predicted results because much more water is released for a unit drop in head than is realistic. Anderson and Woessner (1992, Table 3.4) specified a range of specific storage values ranging from 0.02 to 0.000049 m^{-1} for material ranging from clay through dense sandy gravel; the high range is for plastic clay, not the type of material found in Spring Valley. Halford and Plume (2011) used a specific storage of $2x10^{-6}$ ft^{-1} for their layers 2 through 4. These references support the use of a lower specific storage than was used by SNWA (2009). **SNWA's choice would improperly minimize the predicted drawdown by causing the model to release more water to pumping for a given drawdown than is realistic.** It biases the drawdown prediction to be much lower than would occur in reality.

SNWA (2009, p 3-2) notes that measured storage properties may not convert to model scale storage properties. This is similar to the scale issues for K as discussed by authors such as Schulz-Makuch et al (1999). It is reasonable that storage coefficients would increase with scale as the volume under consideration includes more connected fractures, but the issue with SNWA's choices in the previous paragraph refers to fill for which porous-media flow is more predominant and scale issues much less important.

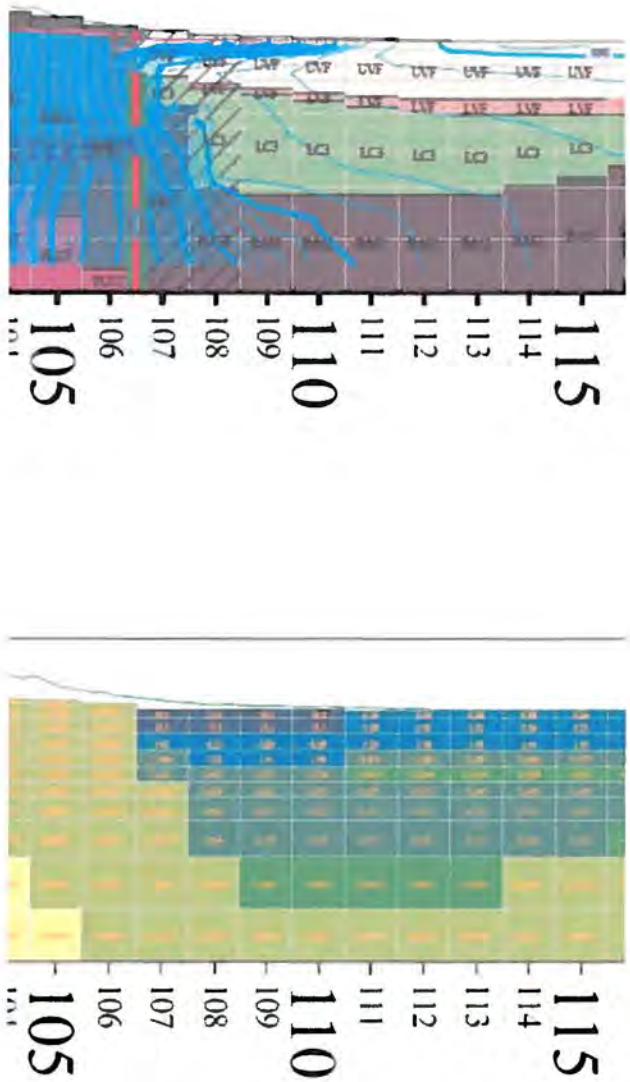

Figure 7: Snapshot of portion of row 128 in center of Spring Valley showing hydrogeology (upper) and K (lower). (file xs_rum_rows-rev2-7o-map-hd-kh-s-1lay-ucth814-1-4748.pdf)

Steptoe to Spring Valley

C86 Groundwater contours along row 160 show a gradient through carbonate rock from Steptoe to Spring Valley (Figure 8). The model includes an HFB, but no mounding of contours. This is an example of how the CCRP model allows flow from Steptoe to Spring Valley, in contradiction to their geology models. Figure 9 and 10 demonstrate how a groundwater level contour map can show a divide while there is clearly flow at depth.

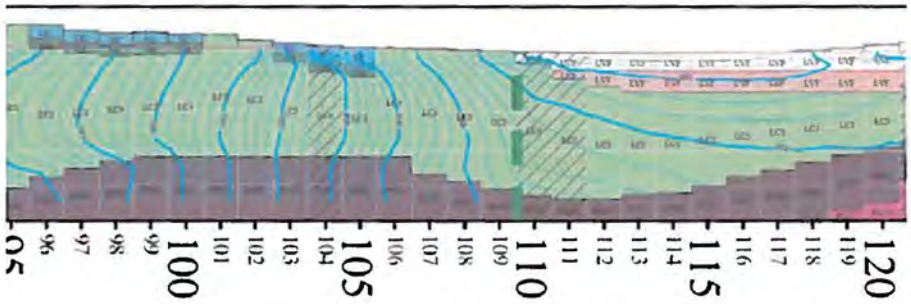

Figure 8: Snapshot of row 160 showing hydrogeology from Steptoe Valley (left) to Spring Valley. (file xs_rum_rows-rev2-7o-map-hd-kh-s-1lay-ucth814-1-4748.pdf)

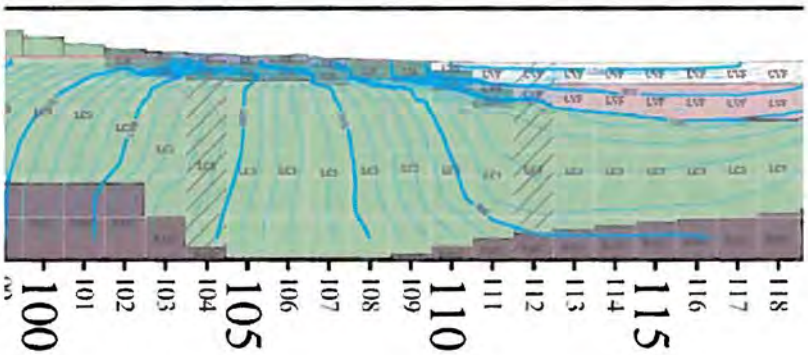

Figure 9: Snapshot of Row 166 showing hydrogeology from Steptoe Valley (left) to Spring Valley. (file xs_rum_rows-rev2-7o-map-hd-kh-s-1lay-ucth814-1-4748.pdf)

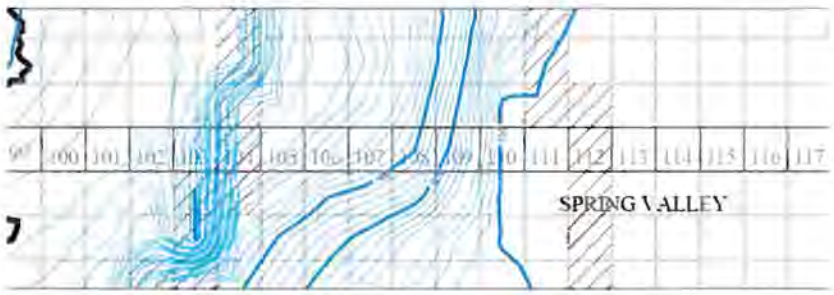

Figure 10: Snapshot of Row 166 showing groundwater contours from Steptoe Valley (left) to Spring Valley. (file xs_rum_rows-rev2-7o-map-hd-kh-s-1lay-ucth814-1-4748.pdf)

The source of Big Springs, in the model, appears to be a large expanse of carbonate rock that has K very near 0.413 ft/d. The carbonate rock extends through the thickness of the model meaning the upgradient transmissivity is very high. A fault forces groundwater to surface.

Gandy Warm Spring

C87 The simulated flow from Gandy Warm Spring is approximately one-third of the targeted flow (NMR, page 5-5), which is likely an error in the conceptual flow model. However, the simulated discharge overall from Snake Valley is within 4% of the targeted value. The valleywide discharge does not require the discharge from Gandy Warm Springs. The problem is that discharge which should be discharging from the springs is actually simulated as discharging from elsewhere in the valley, where it can be captured by the proposed pumping and *decrease the predicted impacts of pumping*. The error in simulating the spring is likely that SNWA treats the spring as intermediate rather than regional (CMR page 7-41), described as follows:

> Gandy Warm Springs is located on the western edge of Snake Valley in the northern portion of the study area (Plate 1). It discharges water from alluvial materials approximately 1.6 mi west of a normal fault. The spring was selected for inclusion in the conceptual model because of its large discharge. The average spring discharge is approximately 17 cfs. (CMR, page 7-41)

C88 SNWA misses the two most likely sources of water to the spring: the substantial carbonate rock on the northeast side of the Snake Range southwest of the spring and interbasin flow from Spring Valley. A fault diverts flow from the Snake range. SNWA discounts the idea that interbasin flow from Spring Valley could support the spring (NMR, page 5-6). This is curious because the model simulates 11,800 af/y of interbasin flow to just north of Snake Valley which is of the same order of magnitude as the approximately 16,000 af/y estimated for this region in BARCASS (Welch et al, 2008, Figure 41). If even a third of that amount combined with carbonate

C88 cont'd

recharge in the northeast portion of the Snake Range, the Gandy Warm Springs flow could be accurately reproduced.

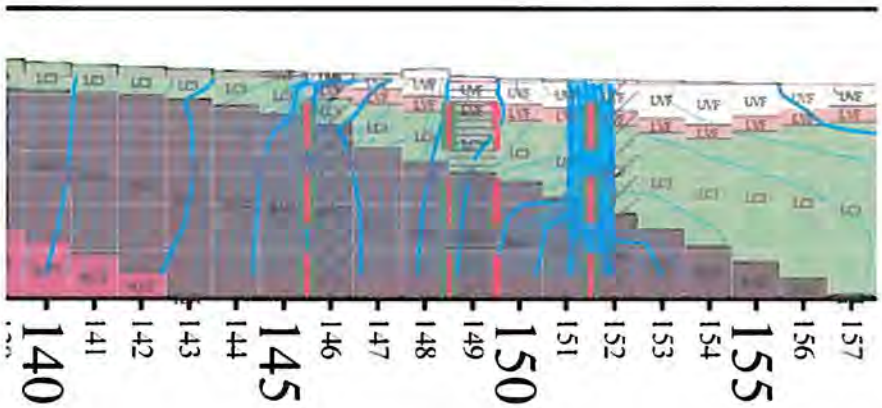

Figure 11: Snapshot for Row 100 showing groundwater contours and hydrogeologic formations near Gandy Warm Springs, near column 148.

Recharge Redistribution

C89

The recharge estimates used in SNWA's numerical model are not the same as in SNWA's conceptual model, which had estimated recharge by basin. SNWA somewhat reshuffled the recharge distribution during numerical model calibration so that the recharge can meet the discharges specified from the model (SNWA, 2009, p. 4-62 – 4-64). In other words, SNWA started the process over during their numerical model calibration but did not constrain the estimates by basin. This explains the differences in recharge by basin and difference in interbasin flow for the numerical model as compared to the conceptual model.

C90

The PRISM precipitation estimates also caused too much interbasin flow from Hamlin to Snake Valley (SNWA, 2009, p. 3-3). This was due to the PRISM precipitation estimate for that area being much too high. Halford and Plume (2011) found similar problems.

Shingle Pass

C91

The model conceptualization of Shingle Pass is as complicated as any in the model, with several formations including carbonate rock and several faults (Figure 12). The faults within Cave Valley are simulated with HFBs which prevent flow from leaving Cave Valley. The mountain front faults on the east side of White River Valley have very high K, being high displacement faults. The high K zones extending north and south along the west side of the Egan Range capture and transmit substantial recharge from the mountains to the springs. However, SNWA does not include an HFB on these faults which would force water to surface in

C91 cont'd

to the springs. Thus, the model is biased so that Cave Valley flow does not support the springs in two ways – HFBs within Cave Valley prevent flow from reaching White River Valley and high K faults along the east side of WRV bring water from the north to the springs rather than from the east.

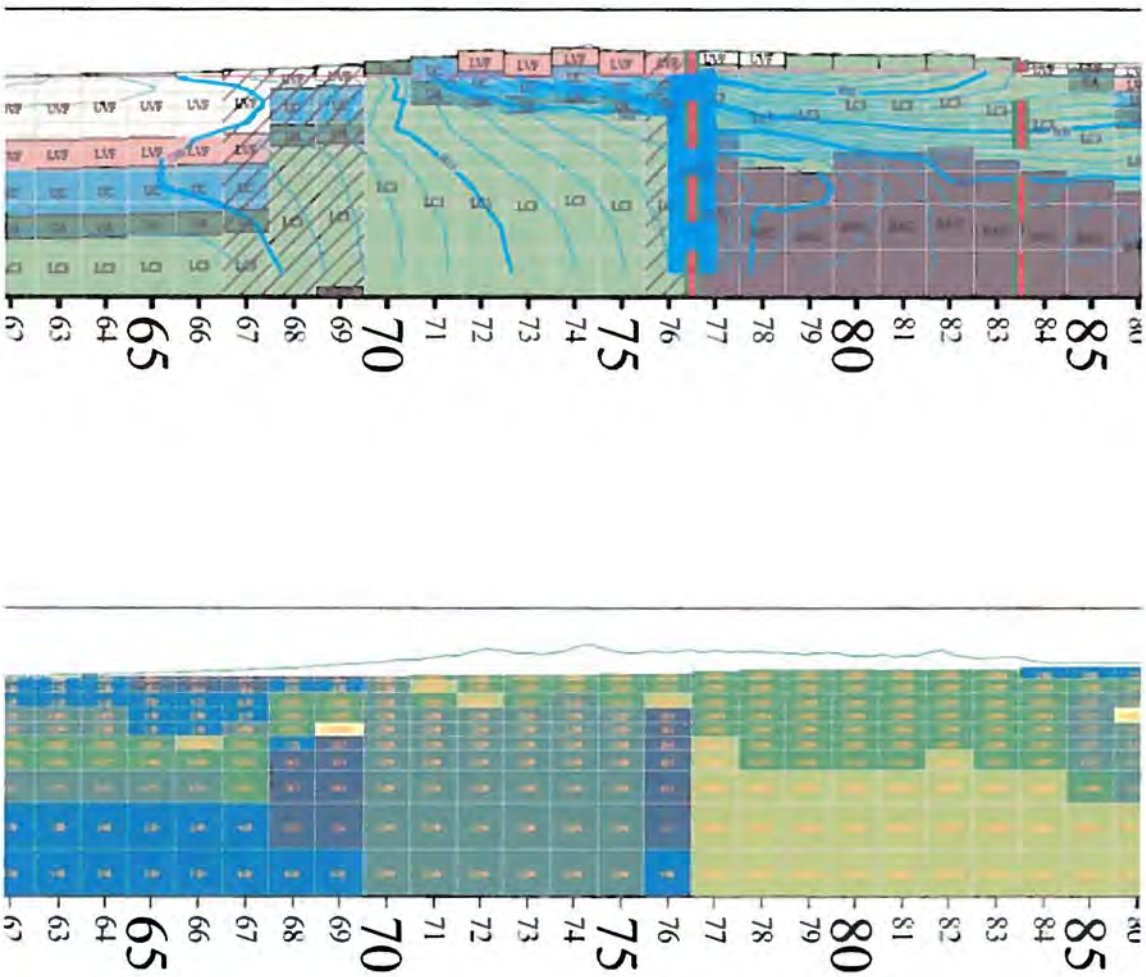

Figure 12: Snapshot of row 202 showing hydrogeology (top) and K values near Shingle Pass. (file xs_rum_rows-rev2-7o-map-hd-kh-s-1lay-ucth814-1-4748.pdf)

Combining Inappropriate Formations in One Cell

C92

The HUF2 routine (SNWA, 2009, p. 4-6) inappropriately combines grossly different media into one cell. "Although the HUF Package allows model layers to be defined independently of hydrogeologic units, **careful definition of the model layers** is important to represent properly the flow through the simulated area. Specifying model-layer boundaries that coincide with or are parallel to hydrogeologic-unit boundaries is helpful" (Anderman and Hill, 2000, emphasis added). If the HUF or HUF2 package combines significantly different

C92 cont'd

hydrogeologic units, the cell properties may be an average of significantly different flow types. SNWA does not carefully define the model layers by combining formations in one cell, which results in an average K which is a meaningless number.

C93

The east front of the Snake Range, near Baker, is a great example of inappropriately averaging formations in one cell. As may be seen (Figure 13), on column 149, the model averages UVF and LC3 properties. In column 150, the model averages LVF and LC3 properties. Considering the conductivity values by cell, the model combined values that differ by more than an order of magnitude (Figure 14). Also, the model would not allow continuous flow among columns within the LC3 unit under Snake Valley because the unit does not match in adjacent cells (Figure 13). This forces the groundwater to follow unrealistic pathways. It would essentially force water in the LC3 unit in column 149 to flow into the LVF unit in column 150.

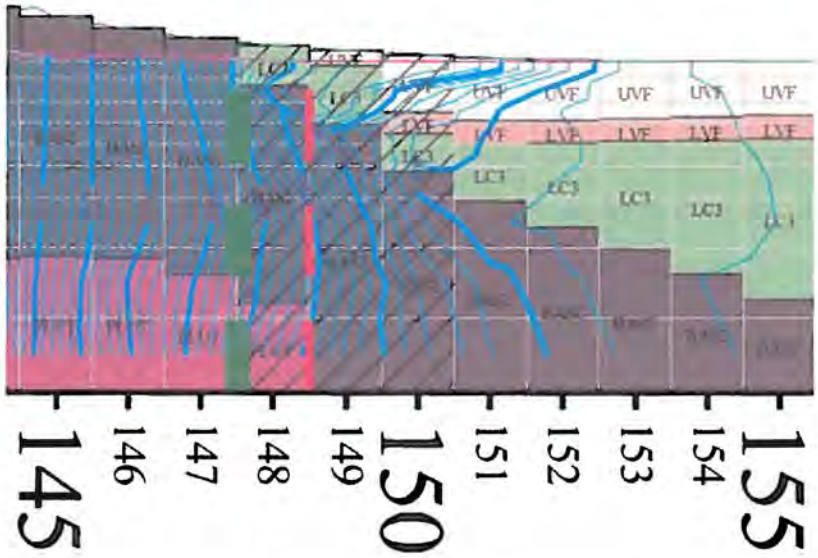

Figure 13: Portion of model row 126 near the east side of the Snake Range near Baker. White lines are cells, blue lines are groundwater head contours. Other colors represent hydrogeologic units as labeled.

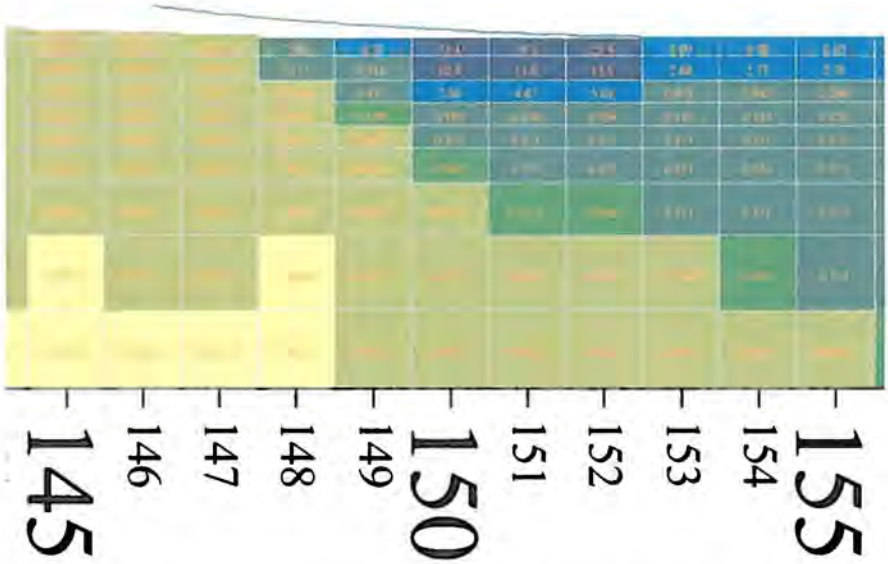

Figure 14: Portion of model row 126 near the east side of the Snake Range near Baker showing the average horizontal hydraulic conductivity values.

C94 Forcing the flow into the valley fill, as just described, would **minimize predicted drawdowns from the model**. This is because the model pumps primarily from the valley fill units where the storage coefficient is much higher than in the carbonate units. The HUF2 package, as used by SNWA in this model, forces a connection so that water flow into the LVF where it supplies SNWA's wells, in the model, and may significantly bias the model to underestimate drawdown in these locations.

C95 The numerical model simulated flow from Fish Springs Flat into Snake Valley (SNWA, 2009, p. 5-13). This goes against most other reports, which SNWA cites, showing that because of the high discharge from the springs there must be inflow from elsewhere.

C96 SNWA did not do any verification modeling for this model, although they have data to do so with. They should use 2005-2010 data to verify for a model and DEIS being released now, in 2011.

Conclusion

C97 The DEIS used a regional groundwater flow model to make predictions of drawdown to be expected from pumping the No Action and action alternatives in Snake, Spring, Cave, Dry Lake, and Delamar Valley. It is inappropriate for use in predicting detailed drawdown impacts due to pumping the alternatives for many reasons documented in this report, including the following:

1. The model cells are too coarse for detailed drawdown predictions.

C97 cont'd

2. The model layers are too thick and the model domain extends much deeper than necessary for simulating the details of pumping their applications.
3. SNWA simulated all layers, including layer 1, as confined. This assumption biases the simulation to underpredict drawdown in Spring Valley because it does not adjust the transmissivity as the water table lowers.
4. The conceptual model used for the numerical model is substantially different from the conceptual model used to develop the numerical model.
5. The numerical model structure was far too complex for the quantity and quality of hydrologic data used to calibrate it.
6. The model relies on faults to control the flow even though there is little collaborating hydrologic data.
7. In many areas, the model is poorly conceptualized which allows the model to protect certain resources and to transmit too much water to certain areas.

Simulation of Proposed Action with Myers Spring/Snake Valley Groundwater Model

C98

The review of the SNWA CCRP model has shown that it is too coarse to make sufficiently accurate predictions for the study area. To provide an alternative tool for considering the impacts in Spring and Snake Valley, I ran the Myers (2011a) model to consider two alternatives. The first is the DEIS proposed action and the second is similar to the reduced pumping option, with the Snake Valley pumping reduced to 36,000 af/y for the entire valley and in Spring Valley reduced to one-third its proposed value. This is less pumping in Spring Valley than the reduced pumping option in the DEIS to better bracket the impacts and to determine whether the drawdown extent differs substantially even for much reduced pumping.

C99

Simulations were run exactly as in Myers (2011b). Three stress periods, 75, 125, and 10,000 years long were used to simulate impacts up to 200 years and to allow the system to come to equilibrium at up to 10,200 years, if that is possible. Figure 15 shows the pumping locations, as for the DEIS, for each scenario; the difference between scenarios is the pumping rates. Pumping was drawn from model layers 4 and 5, 400 to 2000 ft bgs. Wells were not targeted to specific formations, however, as was done in the DEIS (BLM, 2011, p. 3.3-97) because water rights' applications do not limit the pumping to a given formation.

C100

Starting the pumping in each valley at the same time allows better comparisons of predicted drawdown between valleys. The DEIS simulation included pumping in some valleys during the construction period; the DEIS drawdown maps show the results of much less pumping in Snake Valley than in Spring Valley. Nothing legally binds SNWA to pumping schedules as analyzed in the DEIS which means they could begin pumping the full amount from each valley as soon as any water rights are granted.

Also, the pumping includes only the project, so there is no confusion with ongoing pumping in the valleys – the drawdowns and changes in fluxes reported are due simply to pumping SNWA's proposals.

Results

Drawdown maps for the two scenarios are presented for two different model layers, 2 and 5, at two different times, 75 and 200 years after pumping begins (Figures 15 through 22). Flux values for the proposed action are shown in Figures 23 through 25 and for the reduced pumping option in Figures 24 to 26. Appendix A contains hydrographs for various monitoring points (Figure 15) for layers 2 and 5 for both pumping scenarios. Layer 2 is for 80 to 200 ft bgs and layer 5 is from 800 to 2000 ft bgs. Differences in water level at a point between the layers represent a vertical gradient.

Drawdown predicted with the Myers model for the proposed action is similar in extent to that predicted by the DEIS, with several exceptions (Figures 15 through 18). First, the drawdown of course clusters around the pumping wells. However, the Myers model simulates numerous areas near those wells with drawdown in excess of 200 feet whereas the DEIS simulation does not (BLM, 2011, Figure 3.3.2-5). Only for pumping the full amount from the original locations does the DEIS predict drawdown near the wells to exceed 200 feet (BLM, 2011, Figure 3.3.2-18). There are even some small areas with drawdown exceeding 500 feet in layer 5 after 200 years (Figure 18).

C101 The SNWA model may underestimate drawdown at the wells because it simulates pumping to occur from 400 to 2000 ft bgs; a longer screen length may spread the impacts over a thicker aquifer section for modeling. This may bias the results because such long screens may not be feasible. Also, the SNWA model simulates all layers as confined, with specific storage too high. Such simulation maintains a constant transmissivity as the water level lowers which may minimize drawdown at the wells.

C102 The Myers model also predicts more drawdown in the middle of the north half of Spring Valley (Figures 15 through 18); the DEIS modeled drawdown did not exceed 10 feet under a broad section of the playa even after 200 years. The DEIS probably underestimated discharge reductions in this area. The reasons for the difference are probably SNWA's specific storage values being too high (releasing more water for a unit head drop).

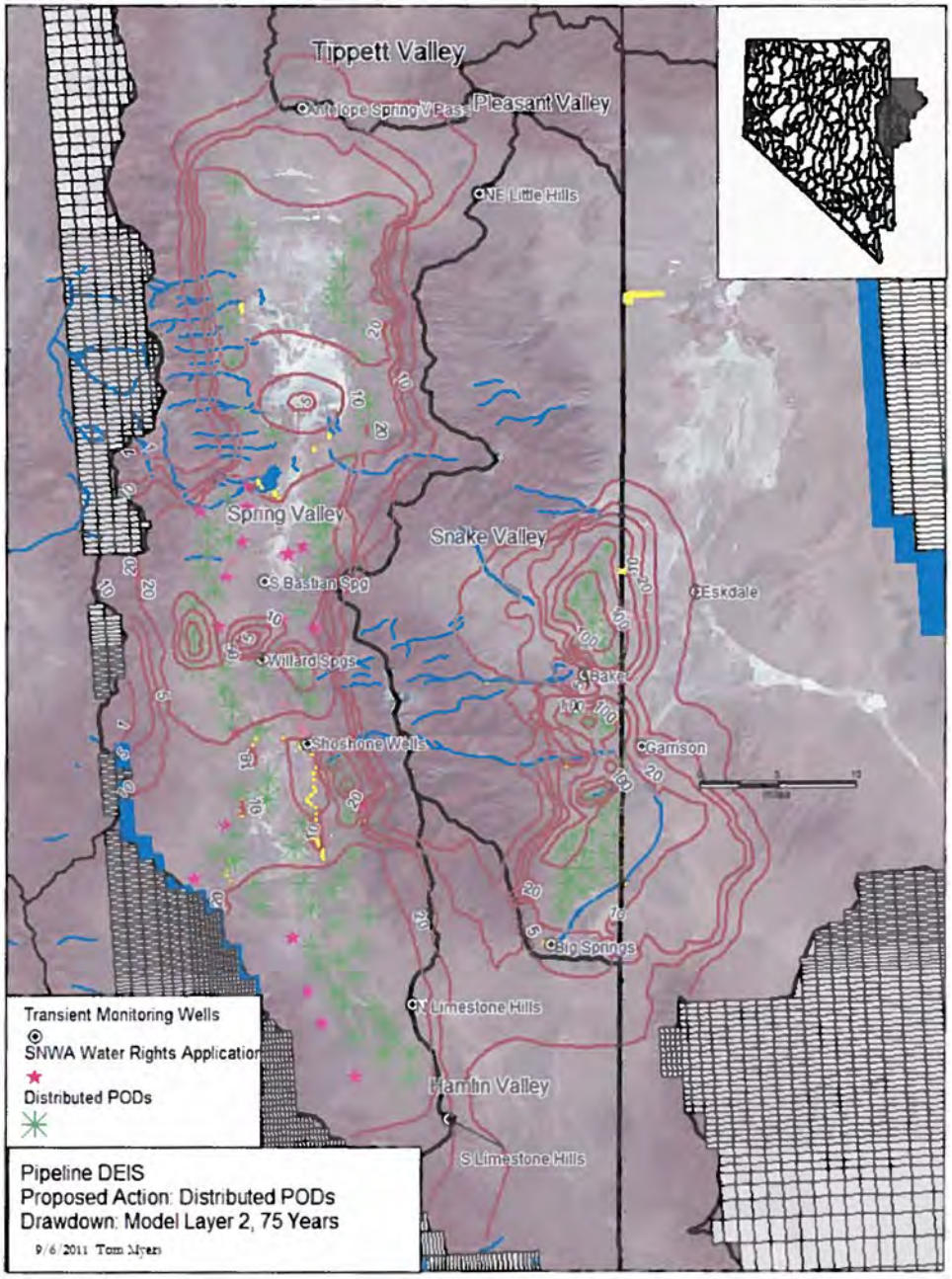

Figure 15: Drawdown for simulation of DEIS proposed action in model layer 2 after 75 years of pumping. The figure also shows pumping and monitoring well locations and the general outline of boundaries in the Myers (2011) model.

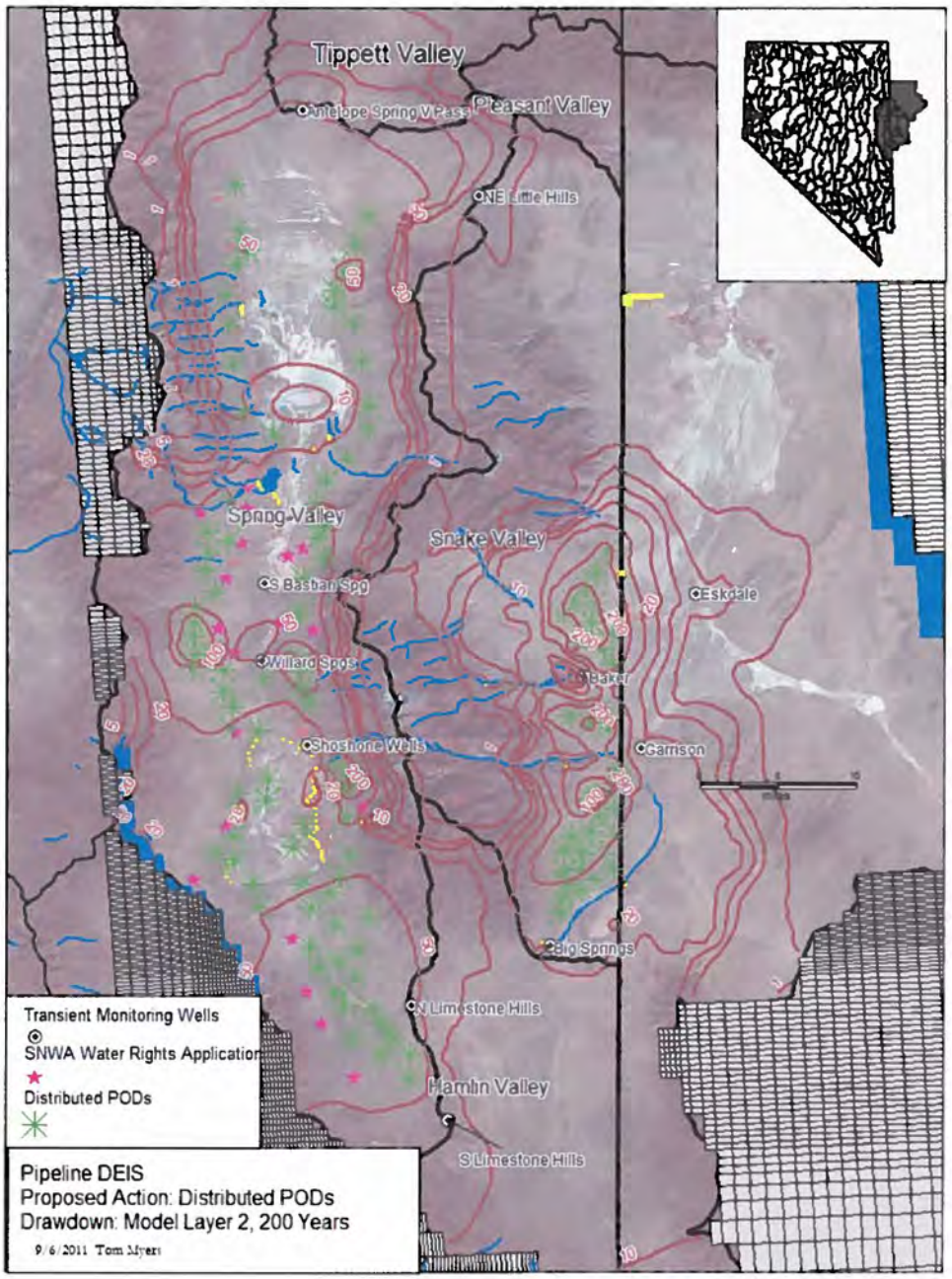

Figure 16: Drawdown for simulation of DEIS proposed action in model layer 2 after 200 years of pumping. The figure also shows pumping and monitoring well locations and the general outline of boundaries in the Myers (2011) model.

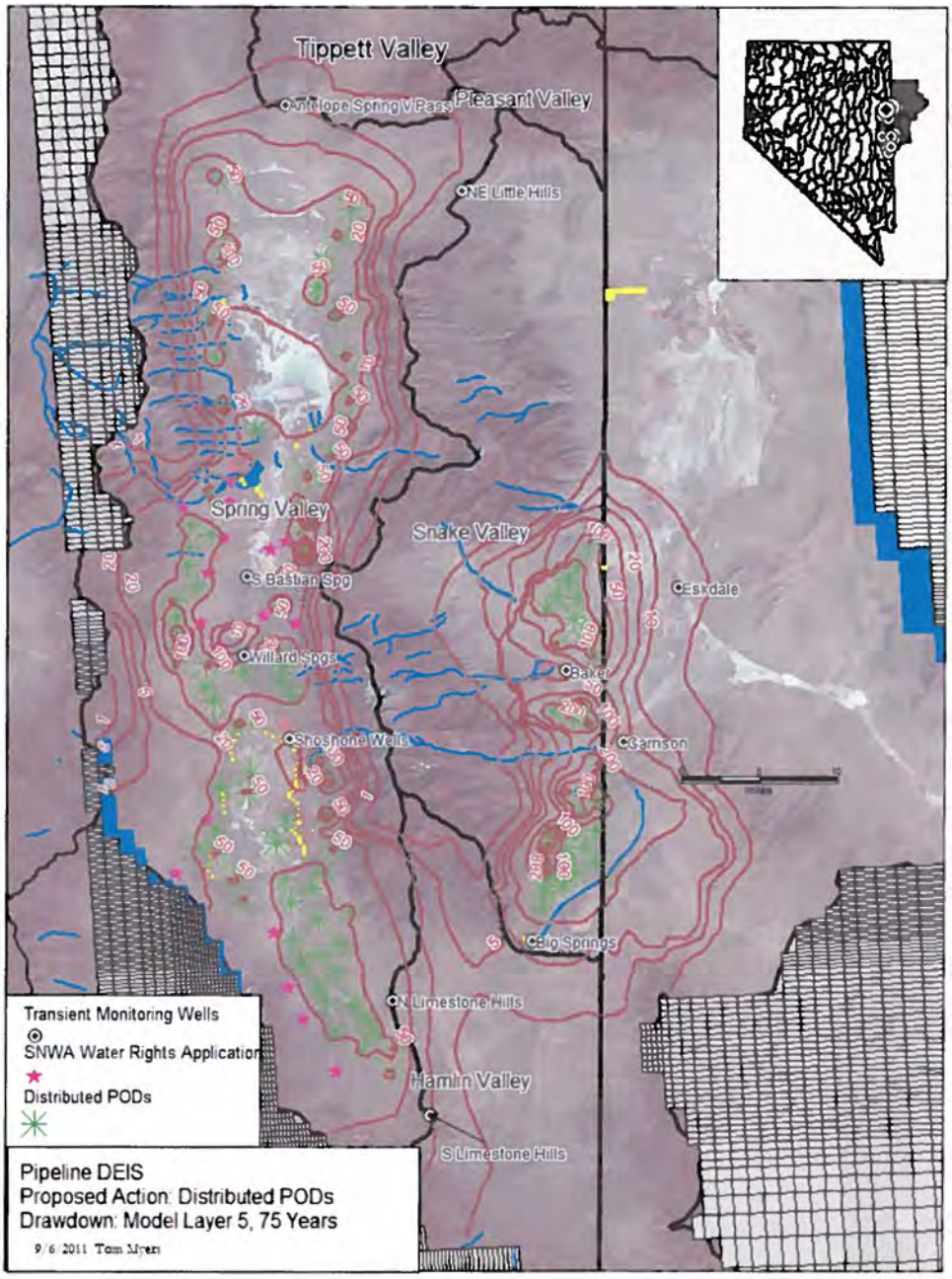

Figure 17: Drawdown for simulation of DEIS proposed action in model layer 5 after 75 years of pumping. The figure also shows pumping and monitoring well locations and the general outline of boundaries in the Myers (2011) model.

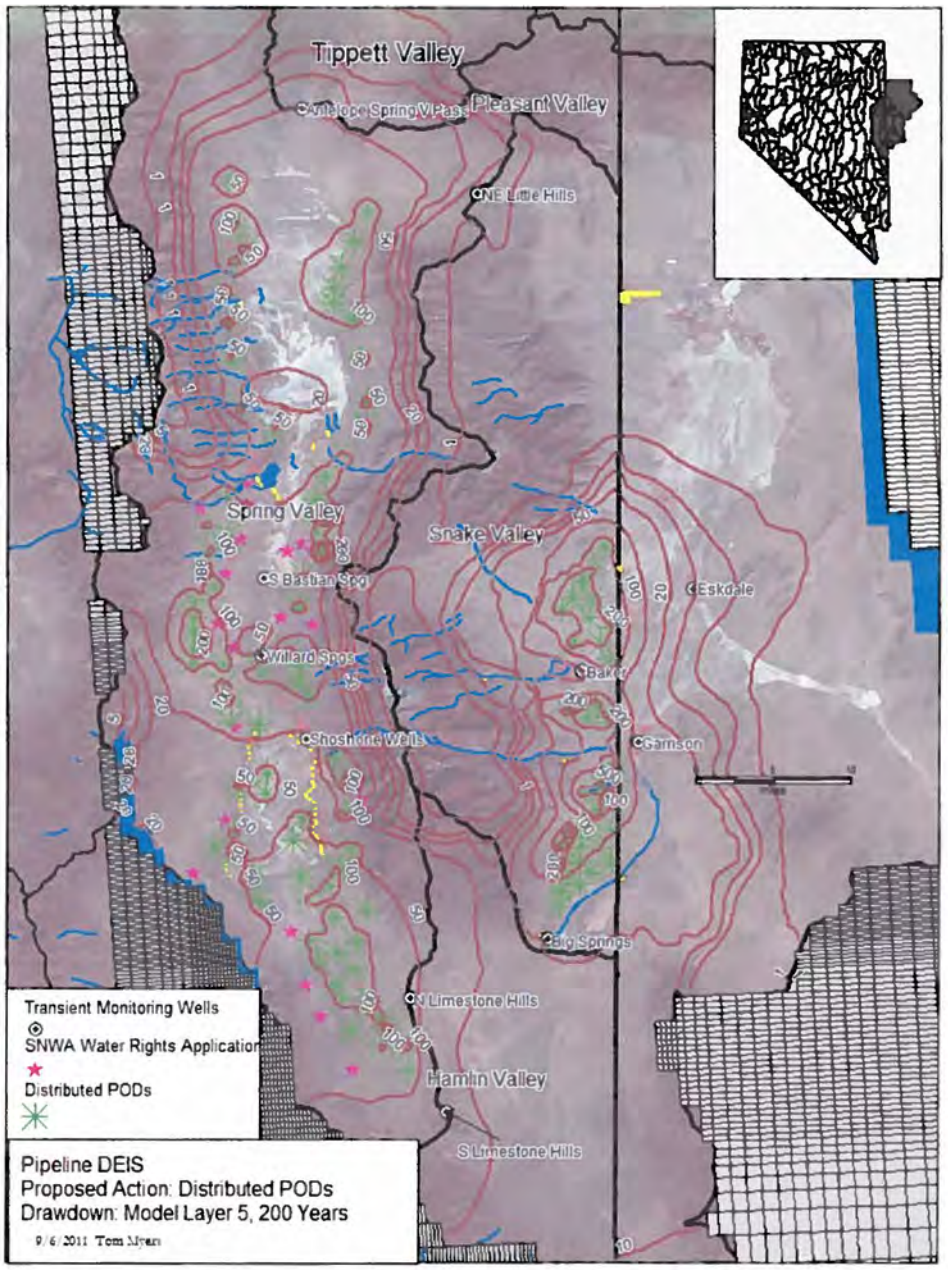

Figure 18: Drawdown for simulation of DEIS proposed action in model layer 5 after 200 years of pumping. The figure also shows pumping and monitoring well locations and the general outline of boundaries in the Myers (2011) model.

Pumping the DEIS proposed action causes most of the simulated spring flows to approach zero within 200 years (Figure 23). For example, Spring Creek and Millick Springs dry in 30 years, Big Springs in 80 years, Stateline Springs in 11 years, and discharge to Cleve Creek ceases in 120 years (Figure 24); Swallow Springs are relatively protected by the mountain-front normal fault. Flow from Steptoe Valley to Spring Valley increased by 3000 af/y within 200 years and by 10,000 af/y after 10,200 years.

The system does not come to equilibrium for over 10,000 years. Even at 10,000 years, approximately 1140 af/y continues to be removed from storage; the cumulative amount up to this time is about 100 million af. Over the 10,000 years, the total natural discharge, the sum of ET and springs, reduced from about 163,000 to 38,000 af/y, for a reduction of approximately 125,000 af/y. Total pumping is approximately 142,000 af/y, so the pumping has captured about 90 percent of its total from natural discharge. As noted, some groundwater continues to be removed from storage; the remainder is changes in flow across the model boundaries, so the pumping in Spring and Snake Valley will ultimately affect surrounding valleys with up to 17,000 af/y being drawn from or prevented from flow to those valleys.

The drawdown for reduced pumping option is nearly as extensive as the proposed action, but not as deep (Figures 19 through 22). This is due to the bounds in the model. The central and northern Schell Creek Range and the central two-thirds of the Snake Range are mostly impermeable – pumping quickly draws water from the available aquifer to those boundaries. The 1- through 10-foot drawdown contours near these boundaries are very similar between scenarios. The proposed action has deeper drawdown toward the middle of the valleys as compared to the reduced pumping scenario. Another difference is that the drawdown does not extend as far north into Tippet Valley as quickly.

Although the drawdown extents are similar, the reduced pumping option reduces the various fluxes proportional to the difference in pumping rates (Figures 26 through 28). The reduced option does not avoid impacts because even this option captures most of its pumping from discharge. Wetlands and springs will have reduced flow, but will continue to discharge groundwater. The lesser discharge is due to the decreased drawdown, but then the drawdown is less because less discharge must be captured to offset the pumping.

However, even after 10,200 years, the system has not reached equilibrium for reduced pumping, meaning that the pumping has not totally captured an equivalent amount of discharge. The change in storage flux is about 860 af/y, with a total of 39 million af being removed from storage in 10,200 years. The difference in cumulative storage between the options reflects the different drawdown depths.

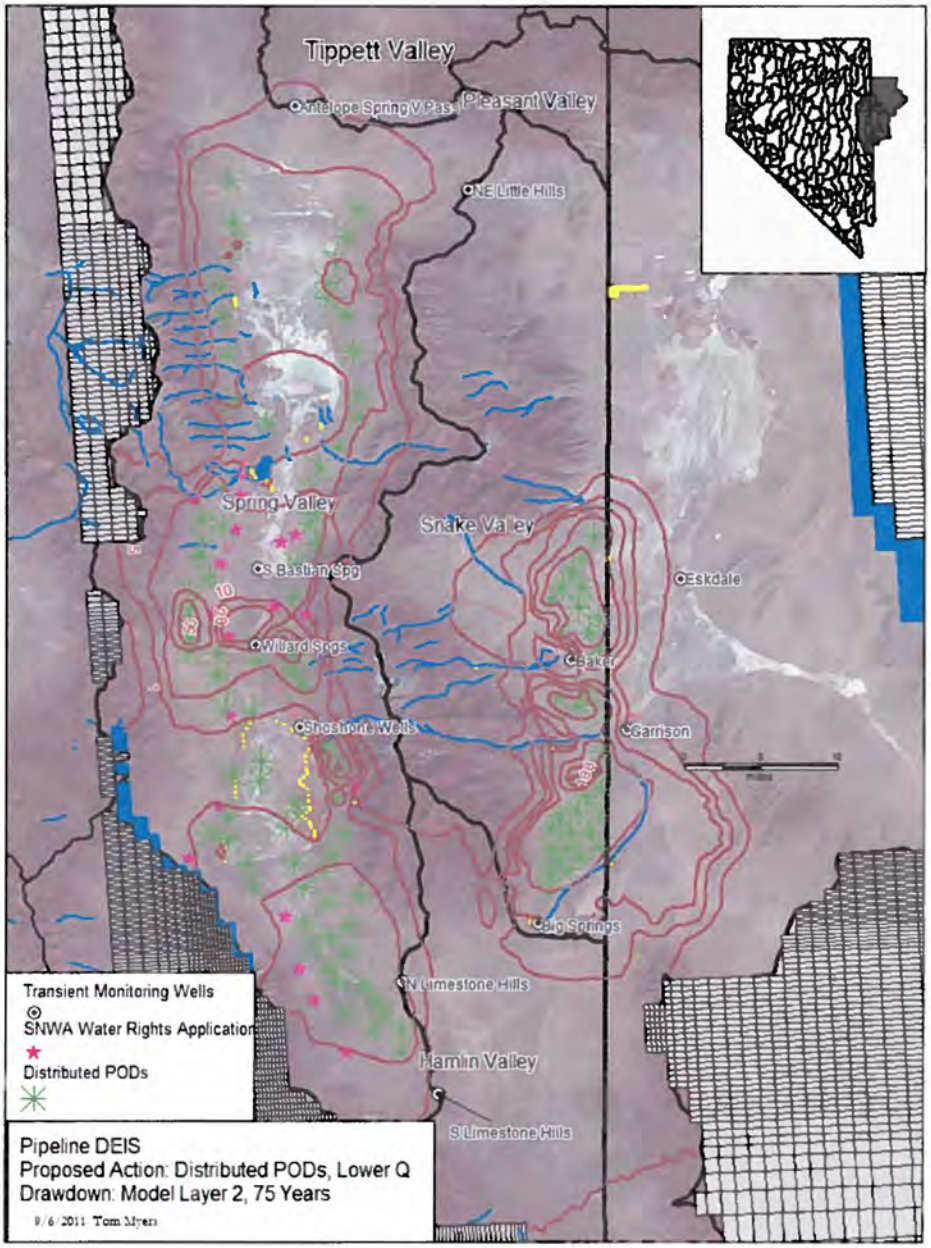

Figure 19: Drawdown for simulation of DEIS proposed action with reduced rates in model layer 2 after 75 years of pumping. The figure also shows pumping and monitoring well locations and the general outline of boundaries in the Myers (2011) model.

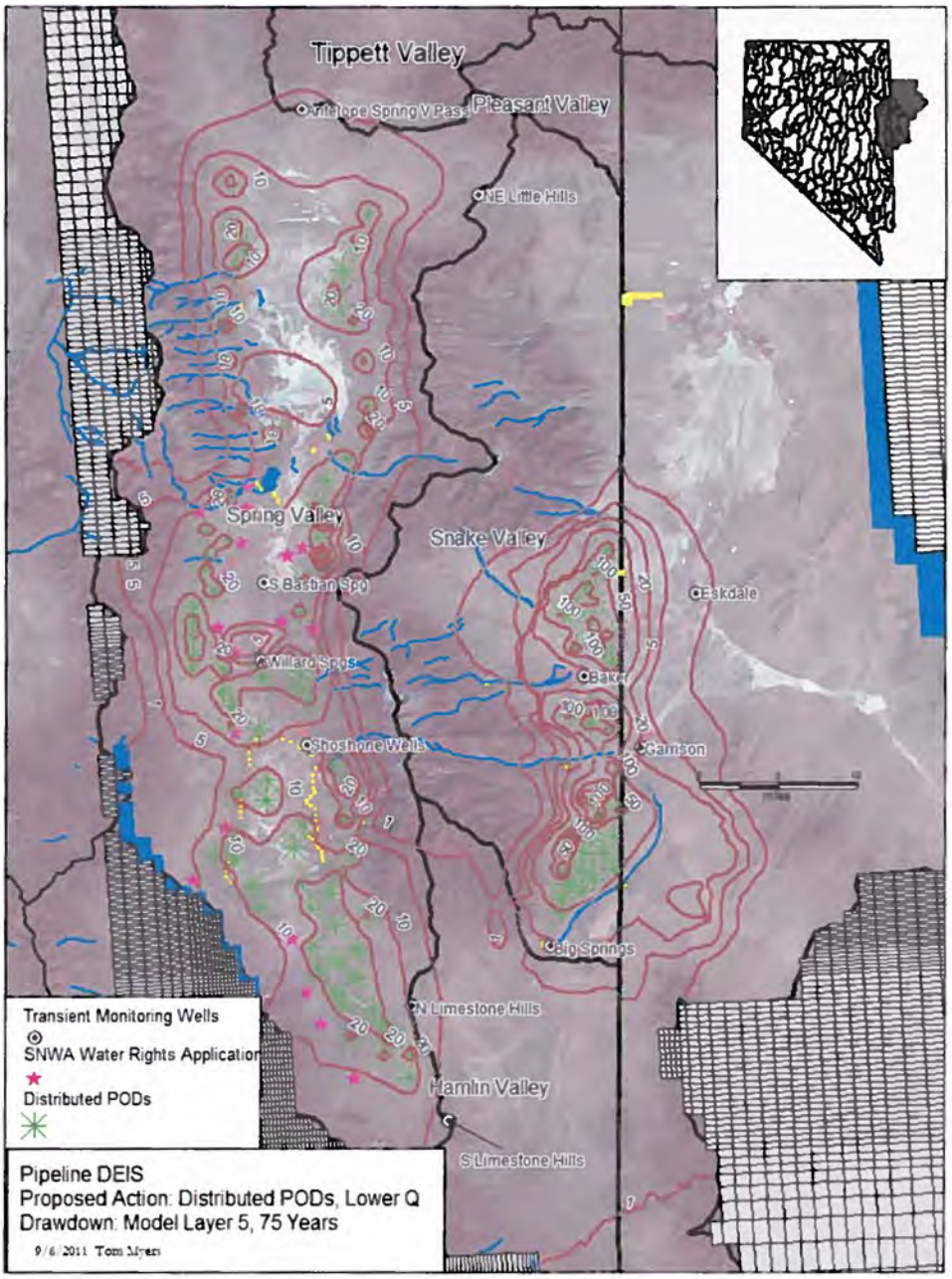

Figure 20: Drawdown for simulation of DEIS proposed action with reduced rates in model layer 5 after 75 years of pumping. The figure also shows pumping and monitoring well locations and the general outline of boundaries in the Myers (2011) model.

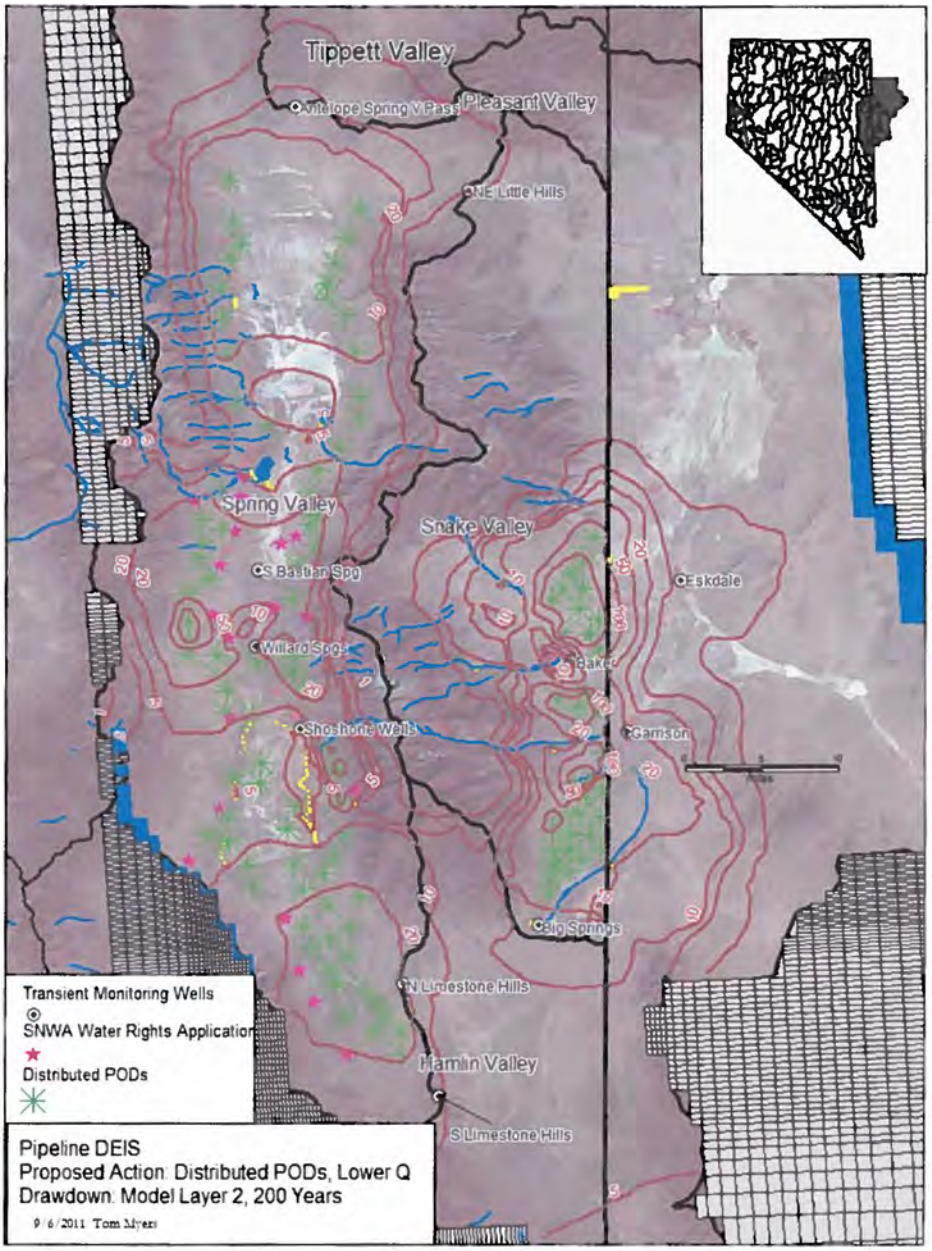

Figure 21: Drawdown for simulation of DEIS proposed action with reduced rates in model layer 2 after 200 years of pumping. The figure also shows pumping and monitoring well locations and the general outline of boundaries in the Myers (2011) model.

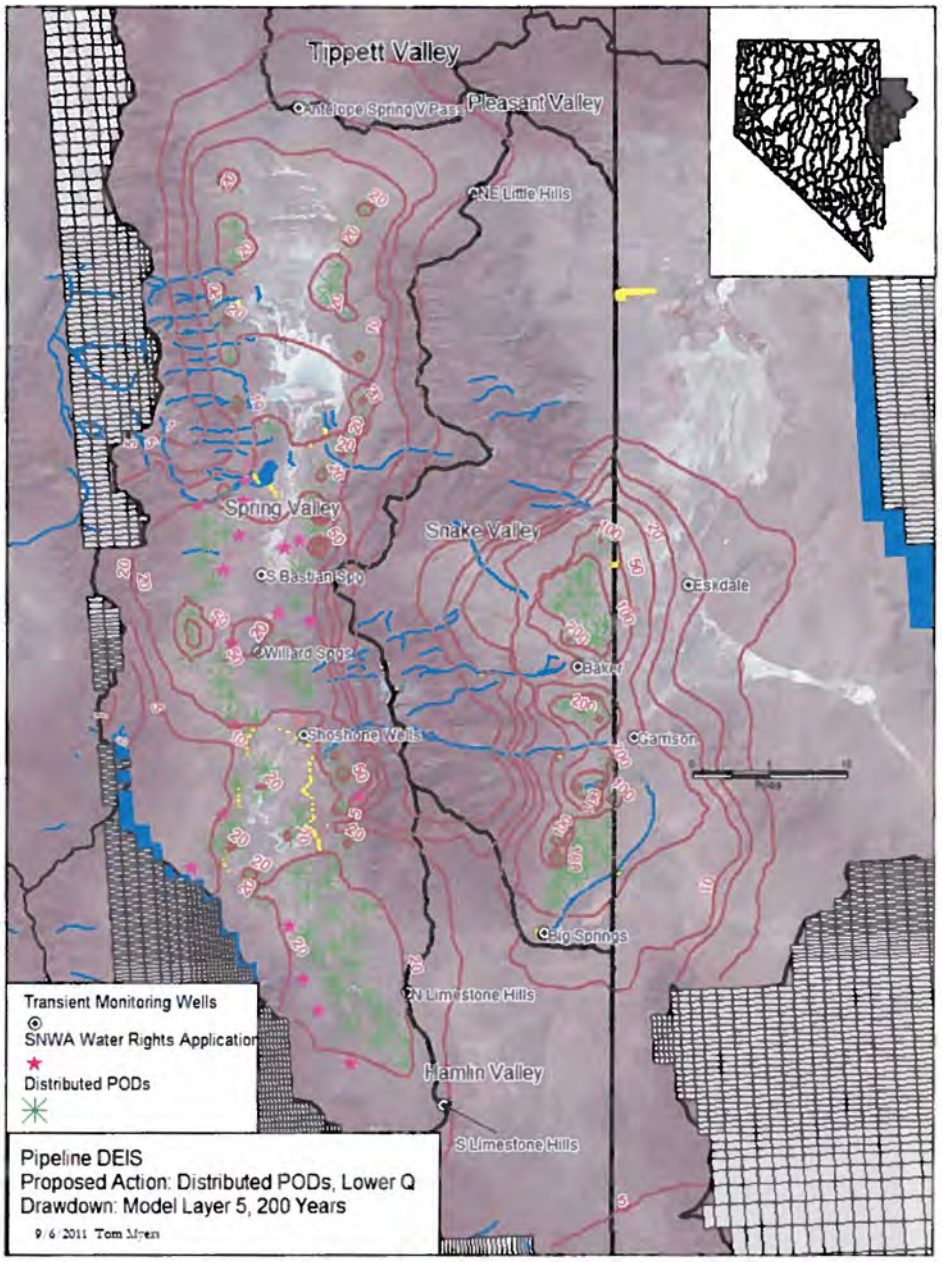

Figure 22: Drawdown for simulation of DEIS proposed action with reduced rates in model layer 5 after 200 years of pumping. The figure also shows pumping and monitoring well locations and the general outline of boundaries in the Myers (2011) model.

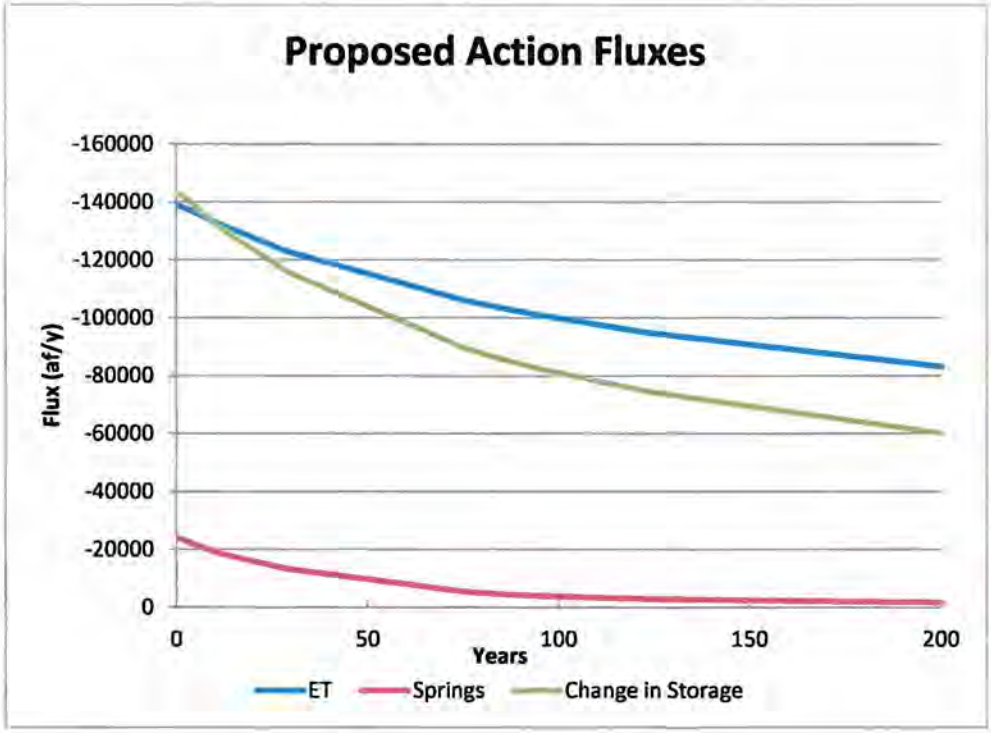

Figure 23: Simulated proposed action flux values.

The area most affected by pumping the reduced amount varies from the area most affected for pumping the full application amount. Some of the springs that dried quickly for the proposed action do not dry at all with reduced pumping – these include Millick Springs and the discharge to Cleve Creek. Pumping significantly affects the Snake Valley springs, with the time to complete drying just being increased due to reduced pumpage. The differences between the impacts to Spring and Snake Valleys reflects the fact that the pumping in Snake Valley was only reduced to 36,000 from 50,000 af/y but the pumping in Spring Valley was reduced to one-third of its original rate.

The monitoring well hydrographs (Appendix A) reveal much about the different responses to pumping around the model domain. Some areas initially have higher head in layer 5 than in layer 2; this represents an upward gradient. The Baker monitoring site demonstrates this clearly with about a 60-foot head drop between layers 5 and 2; this reflects the sub-irrigated pastures near Baker and the circulation of recharge in the carbonate in the Snake Range and at the head of the alluvial fans. Although the gradient varies, similar upward gradients occur at Garrison, both Swamp Cedar sites, Shoshone Wells, South Spring Valley Playa, Minerva, and barely at Big Springs. Pumping reduces or eliminates the vertical upward gradient, as is apparent at Baker and Shoshone Springs, which suggests the subirrigated meadows will eventually be dried and the well at Shoshone Wells will no longer be artesian.

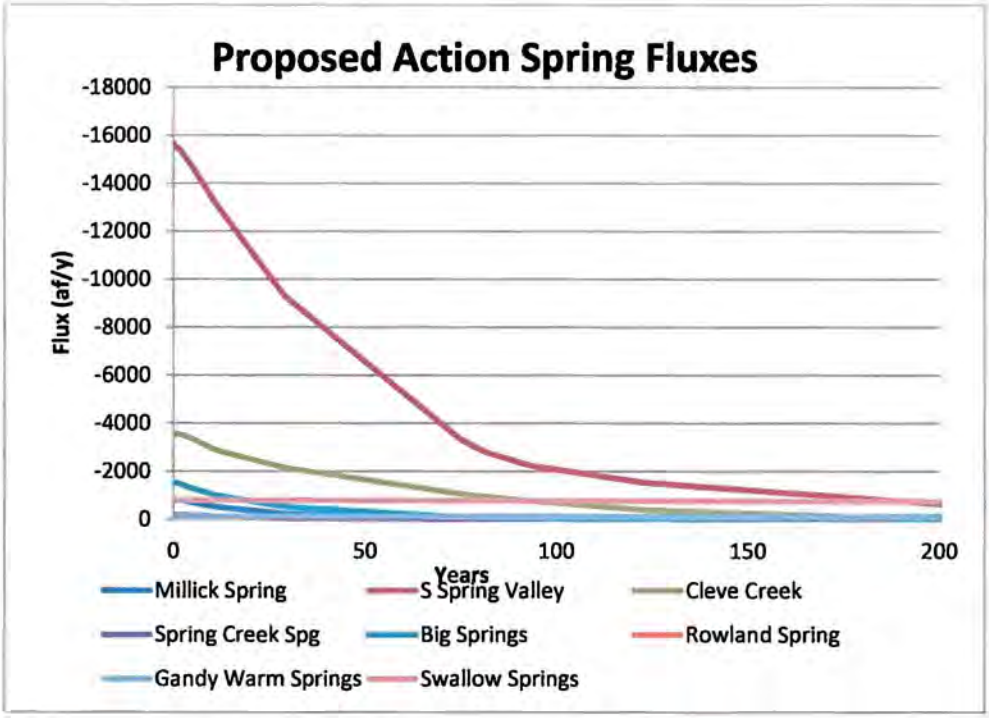

Figure 24: Simulated proposed action spring fluxes.

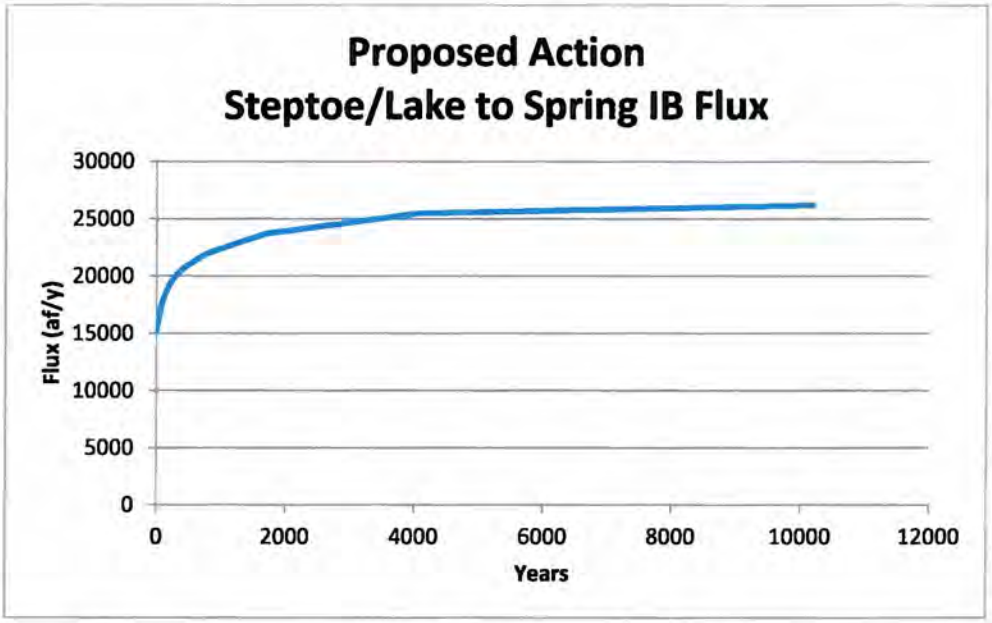

Figure 25: Simulated proposed action flux for interbasin flow from Steptoe to Spring Valley.

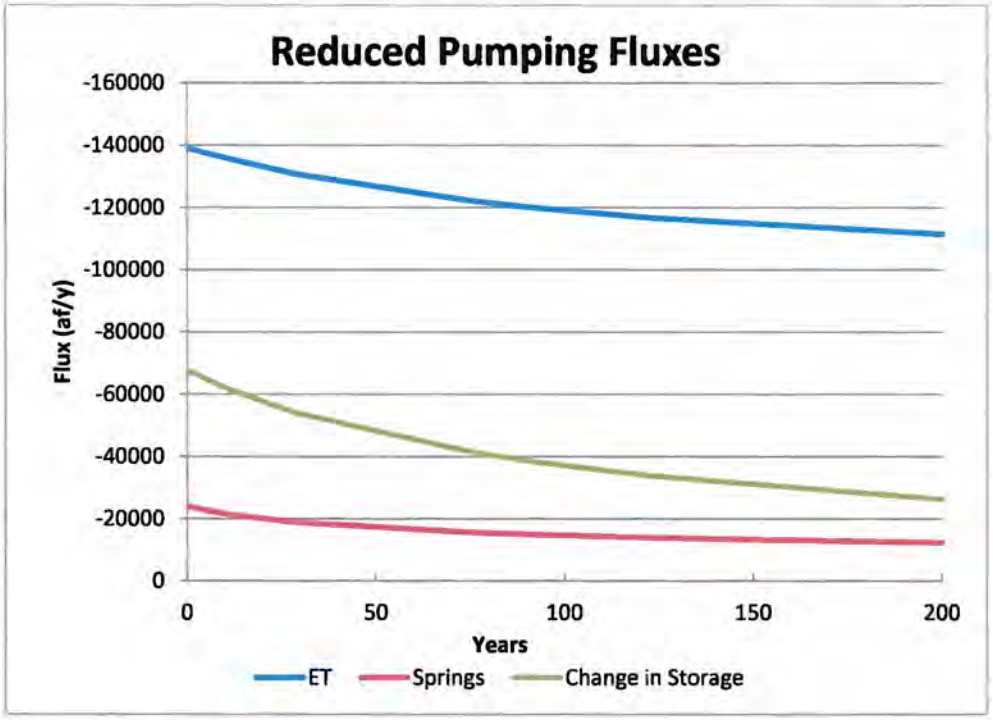

Figure 26: Simulated reduced pumping scenario fluxes.

Areas near the base of the mountains, such as Shingle Creek and Stonehouse Spring, naturally have a downward gradient. Pumping effects do not reach Stonehouse Spring for more than 200 years, but when they do, they lower the potentiometric surface in layer 5 more than in layer 2. This could increase the downward fluxes and induce recharge if any streams intersect the water table.

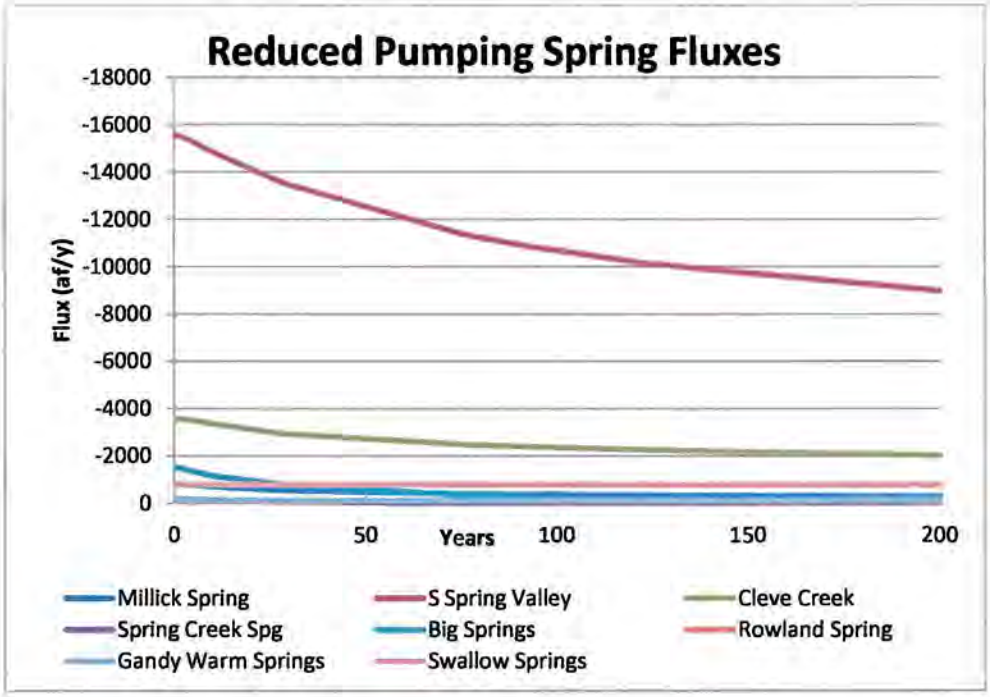

Figure 27: Simulated reduced pumping option spring fluxes.

Another obvious point from the monitoring well hydrographs is that the system is still undergoing significant change at 200 years. This may be seen by comparing the 10,200-year hydrographs with the 200 –year hydrographs. In the long-term, the drawdown will overwhelm the vertical gradient. After a few hundred years, the head level for both layers will be similar with the differences due to pumping scenario. Less drawdown at any point occurs with the reduced pumping option.

Drawdown at points near the center of the valley for the DEIS proposed action exceeds that caused by the reduced pumping option by much more than three times. At some of these points, the hydrographs suggest equilibrium has been established after several hundred years for the reduced pumping option while drawdown from the proposed action just continues to increase. The difference is that the proposed action draws the water table below the extinction depth for the ET zones; once that occurs, there is no more discharge to capture at the point. Continued water table lowering does not decrease the discharge, so at that point the system cannot come into equilibrium. The water table will continue to lower so that the drawdown extent can increase to capture more discharge. In Spring Valley, drawdown can only extend north or south to capture other discharges. This is why the water table continues to deepen after the ET discharge has ceased.

The Center South Spring playa site is a good example: the proposed action causes the water table to draw down indefinitely and completely eliminates the upward gradient; the reduced pumping option allows the upward gradient to continue.

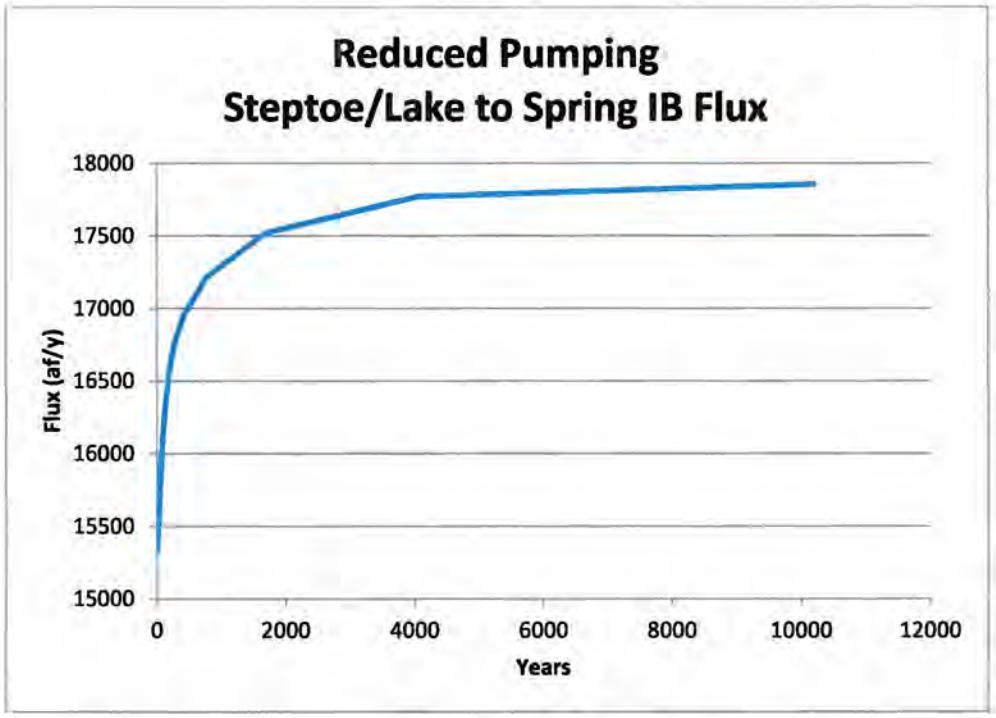

Figure 28: Simulated reduced pumping option interbasin flow from Steptoe/Lake Valleys to Spring Valley.

Summary of Alternatives Simulations

C103 Pumping either the DEIS proposed action or the reduced pumping scenario would cause widespread drawdown around both Spring and Snake Valleys. With time, either option draws groundwater from surrounding valleys, causing drawdown and intercepting discharge there. The DEIS proposed action will cause very substantial drawdown near the centers of pumping. The groundwater system does not come into equilibrium for more than 10,000 years.

C104 Reducing the pumping rate to one-third of the full application amount, or about 30,000 af/y, allows the system to almost come to equilibrium with a some wetland ET discharge and spring flow continuing. Although the valley resources would be severely damaged, they would at least still remain while the proposed action would almost completely dry the valley.

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Myers, T., 2011b. Hydrogeology of Spring Valley and Surrounding Areas, PART C: IMPACTS OF PUMPING UNDERGROUND WATER RIGHT APPLICATIONS #54003 THROUGH 54021.

Presentedto the Nevada State Engineer on behalf of Great Basin Water Network and the Confederated Tribes of the Goshute Reservation. Available at Nevada State Engineer's web site, currently (9/7/11), http://water.nv.gov/hearings/upcoming/springetal/exhibits.cfm.

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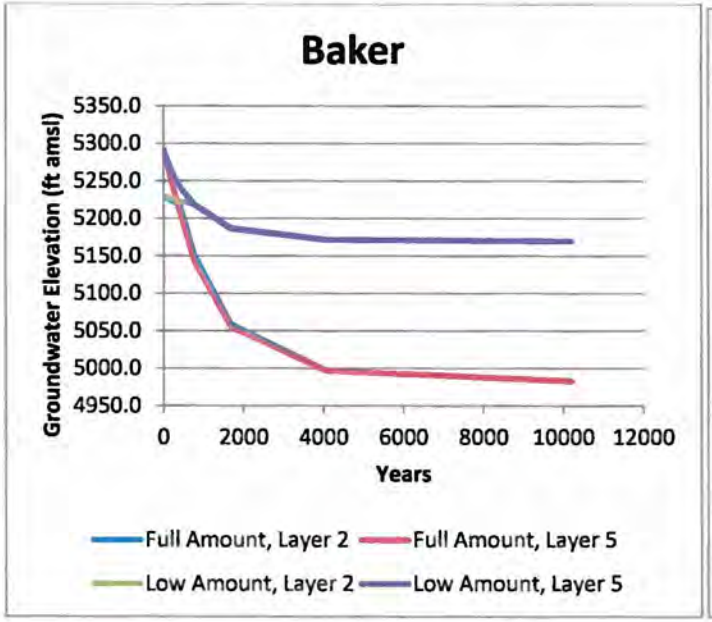
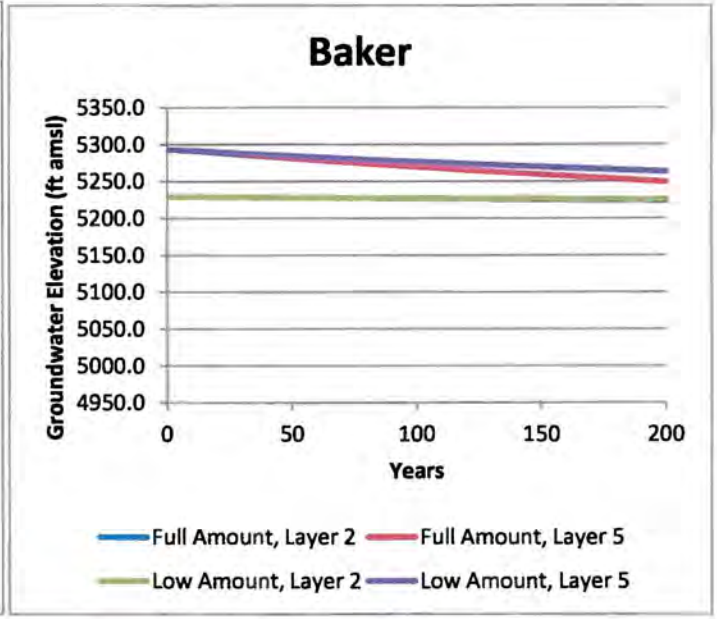
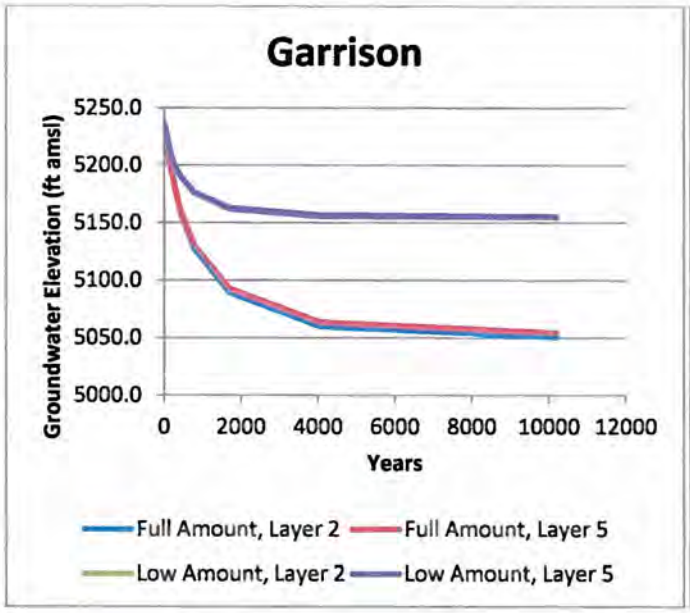
APPENDIX 1: GROUNDWATER LEVELS AT SELECT MONITORING POINTS.

EACH PAGE PRESENTS HYDROGRAPHS FOR 10,200 YEARS AND FOR 200 YEARS.



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5200.0
5150.0
5100.0
5050.0
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4000
6000
8000
10000
12000
Years
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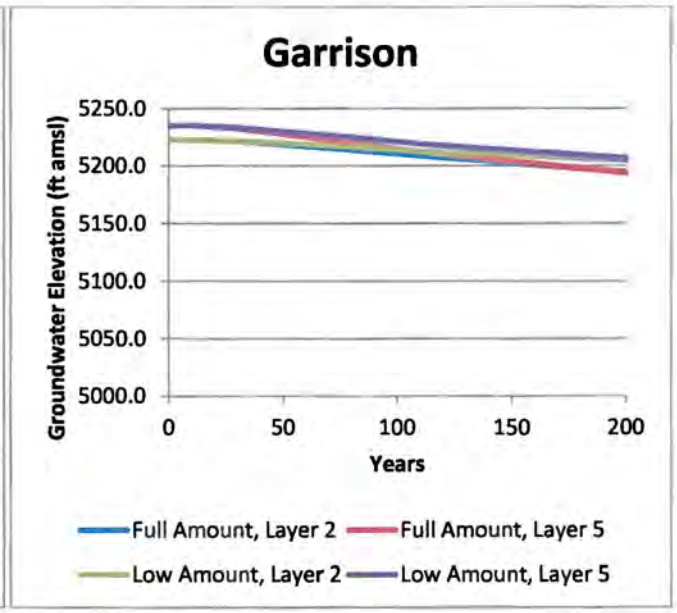
Full Amount, Layer 5
Low Amount, Layer 2
Low Amount, Layer 5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Groundwater Elevation (ft amsl)
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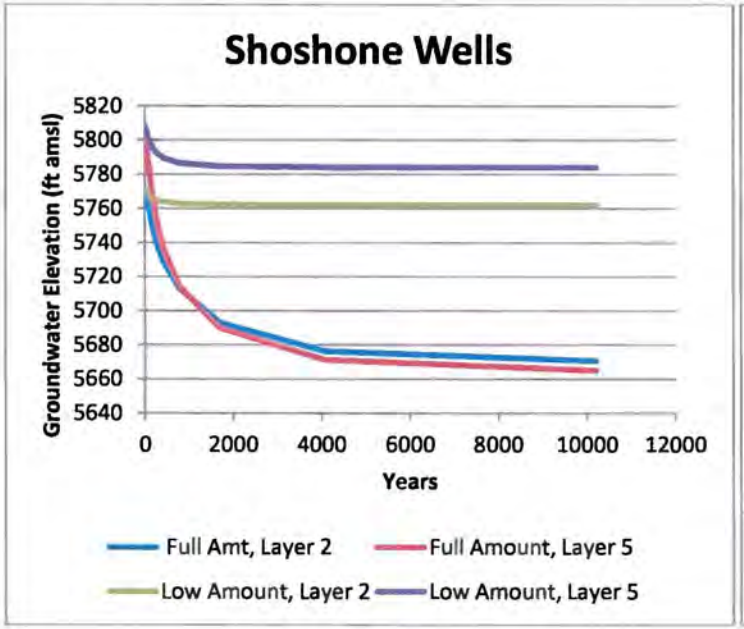
5200.0
5150.0
5100.0
5050.0
5000.0
0
50
100
150
200
Years
Full Amount, Layer 2
Full Amount, Layer 5
Low Amount, Layer 2
Low Amount, Layer 5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5760
5740
5720
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5680
5660
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4000
6000
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10000
12000
Years
Full Amt, Layer 2
Full Amount, Layer 5
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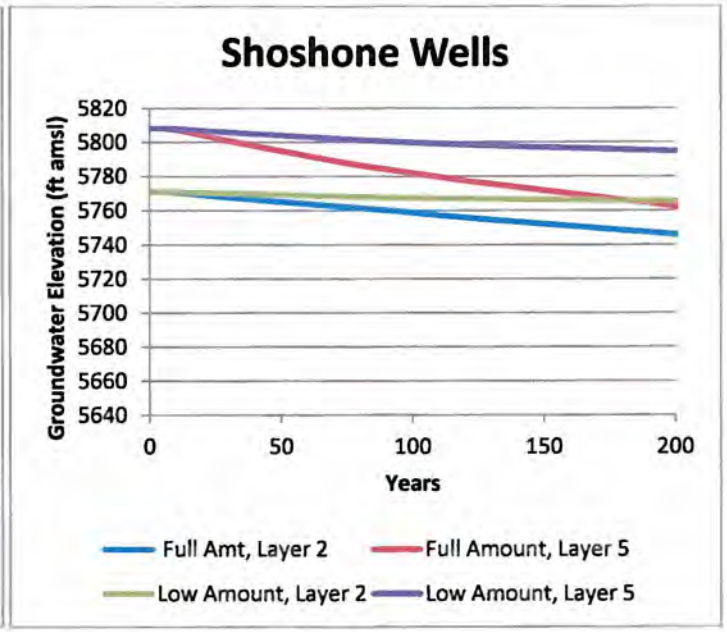
Low Amount, Layer 5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Groundwater Elevation (ft amsl)
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5740
5720
5700
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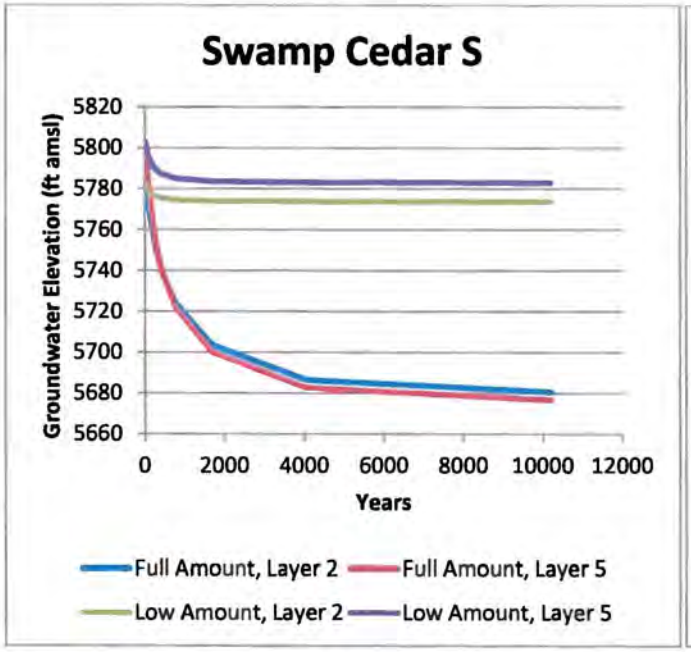
50
100
150
200
Years
Full Amt, Layer 2
Full Amount, Layer 5
Low Amount, Layer 2
Low Amount, Layer 5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5800
5780
5760
5740
5720
5700
5680
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10000
12000
Years
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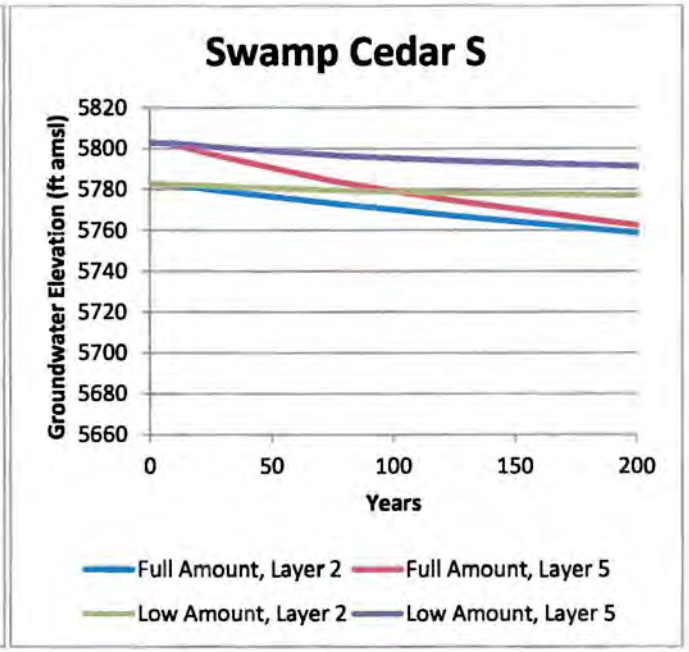
Low Amount, Layer 5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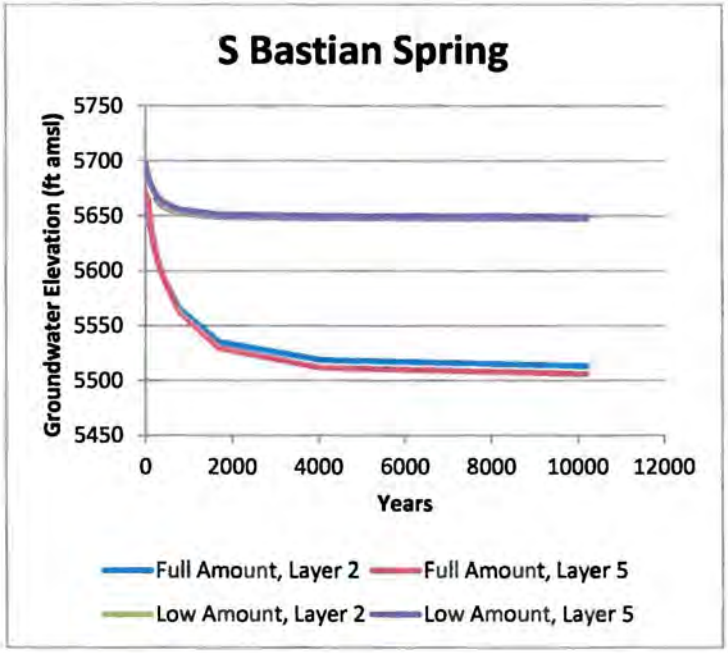
Low Amount, Layer 5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Groundwater Elevation (ft amsl)
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5550
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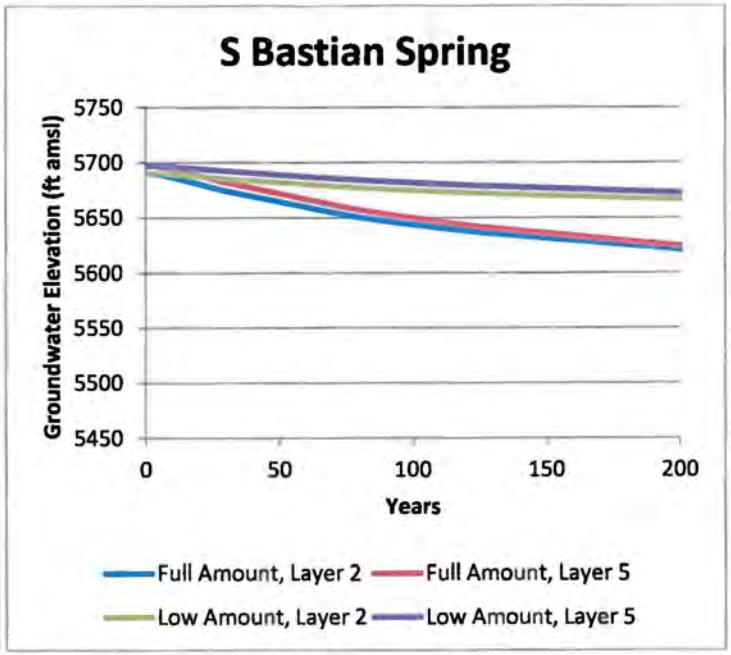
8000
10000
12000
Years
Full Amount, Layer 2
Full Amount, Layer 5
Low Amount, Layer 2
Low Amount, Layer 5


S Bastian Spring
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5650
5600
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150
200
Years
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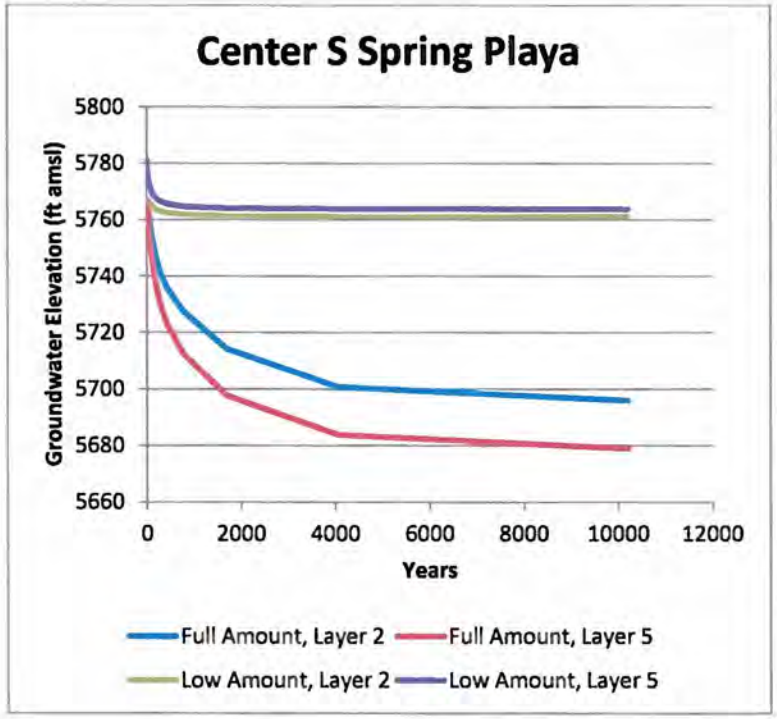
Full Amount, Layer 5
Low Amount, Layer 2
Low Amount, Layer 5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Groundwater Elevation (ft amsl)
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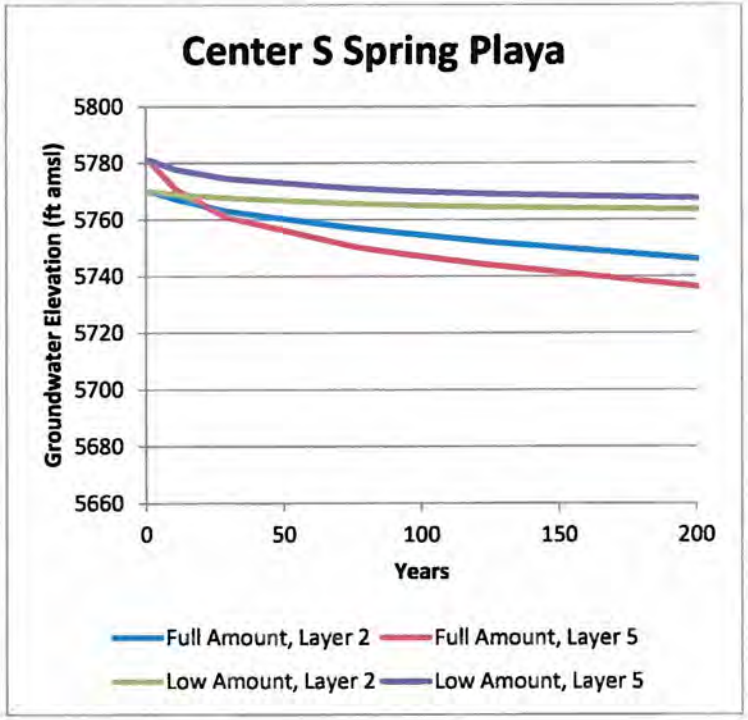
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5720
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5680
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150
200
Years
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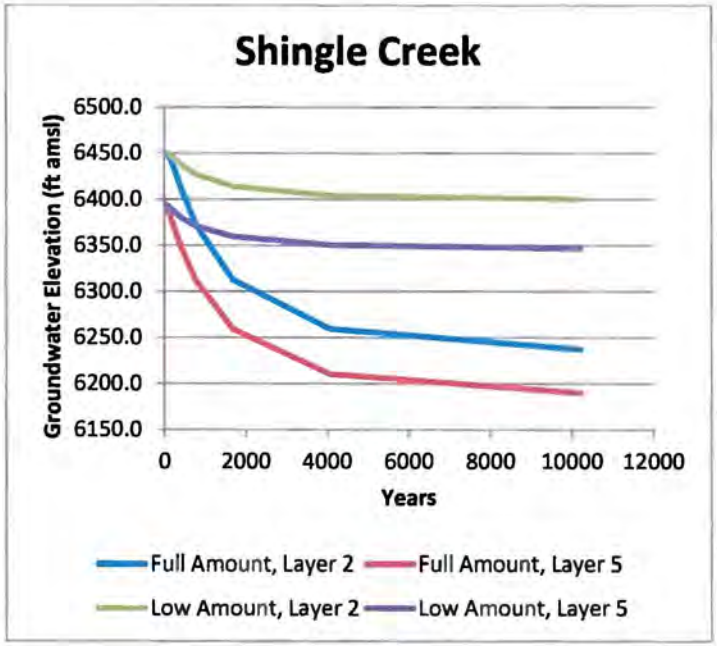
Full Amount, Layer 5
Low Amount, Layer 2
Low Amount, Layer 5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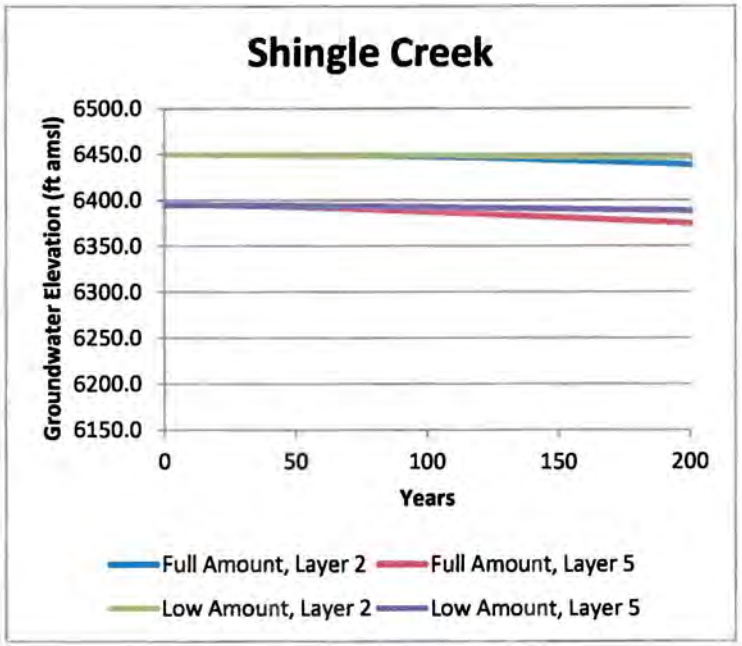
Low Amount, Layer 5


Shingle Creek
Groundwater Elevation (ft amsl)
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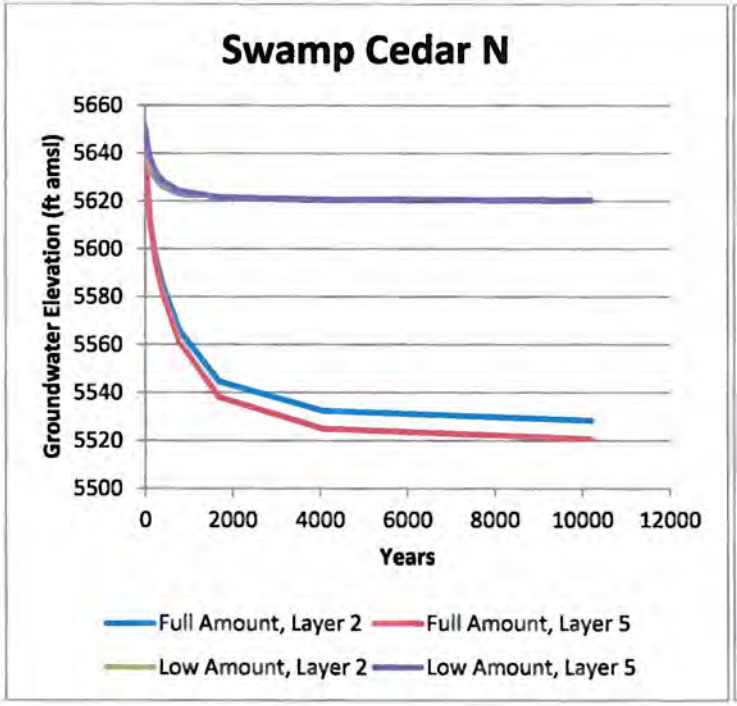
6400.0
6350.0
6300.0
6250.0
6200.0
6150.0
0
50
100
150
200
Years
Full Amount, Layer 2
Full Amount, Layer 5
Low Amount, Layer 2
Low Amount, Layer 5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Groundwater Elevation (ft amsl)
5660
5640
5620
5600
5580
5560
5540
5520
5500
0
2000
4000
6000
8000
10000
12000
Years
Full Amount, Layer 2
Full Amount, Layer 5
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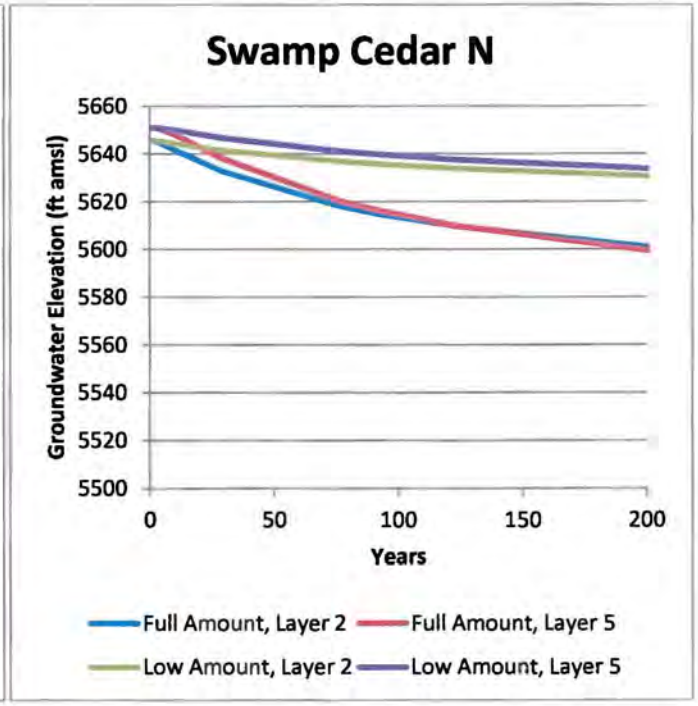
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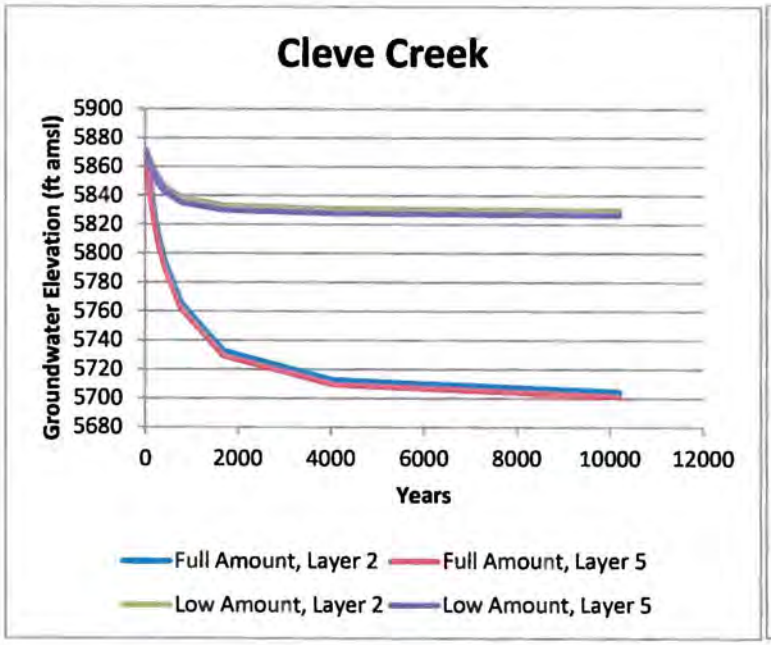
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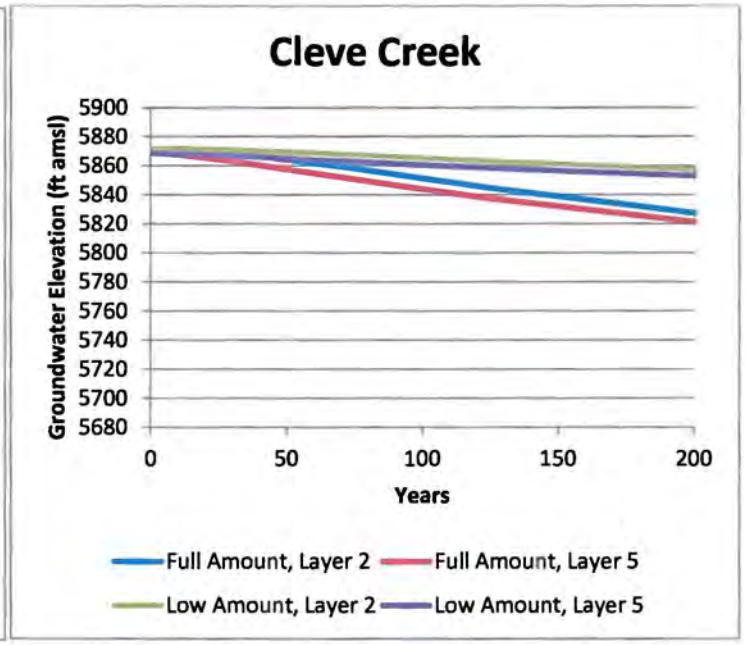
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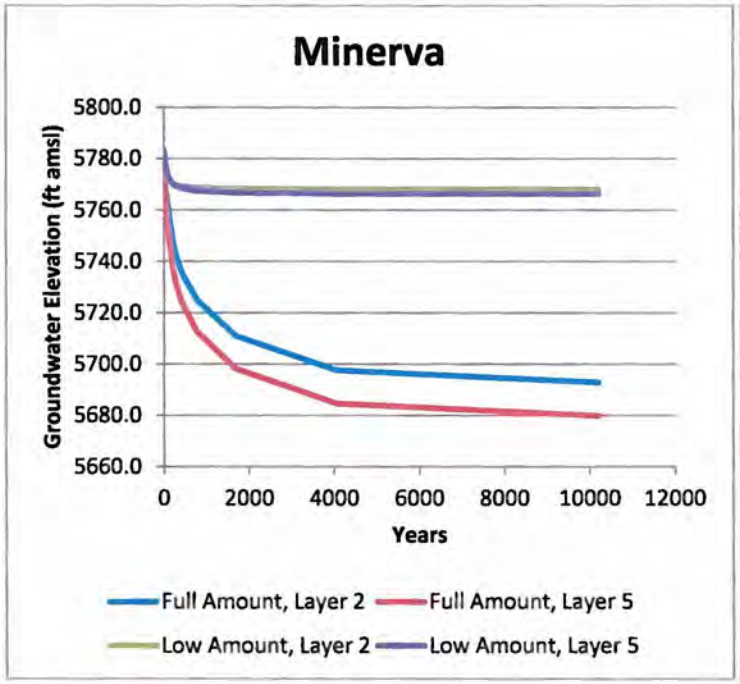
Low Amount, Layer 5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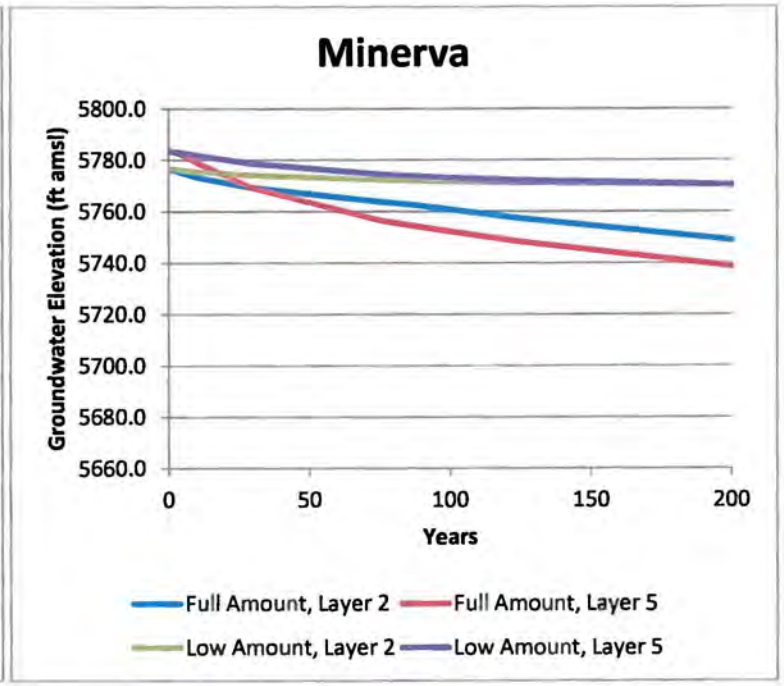
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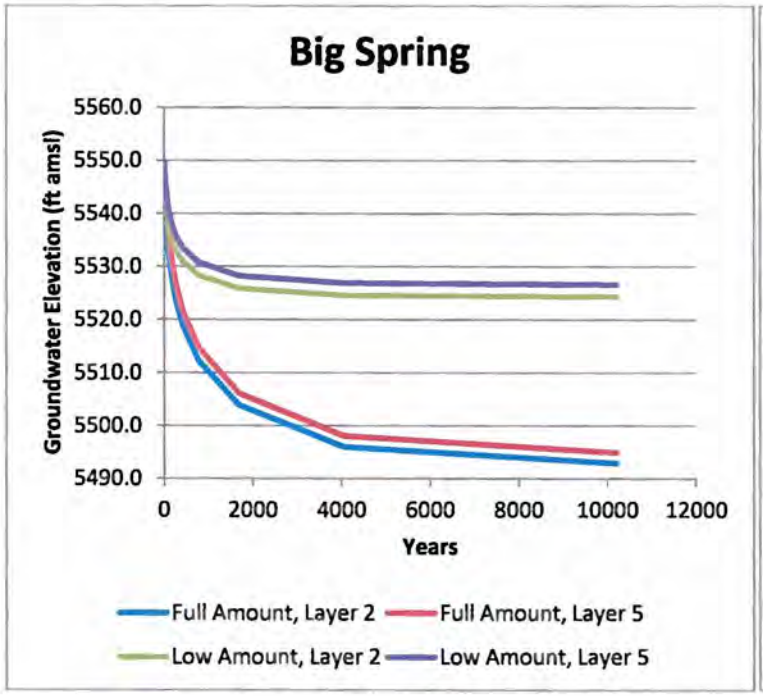
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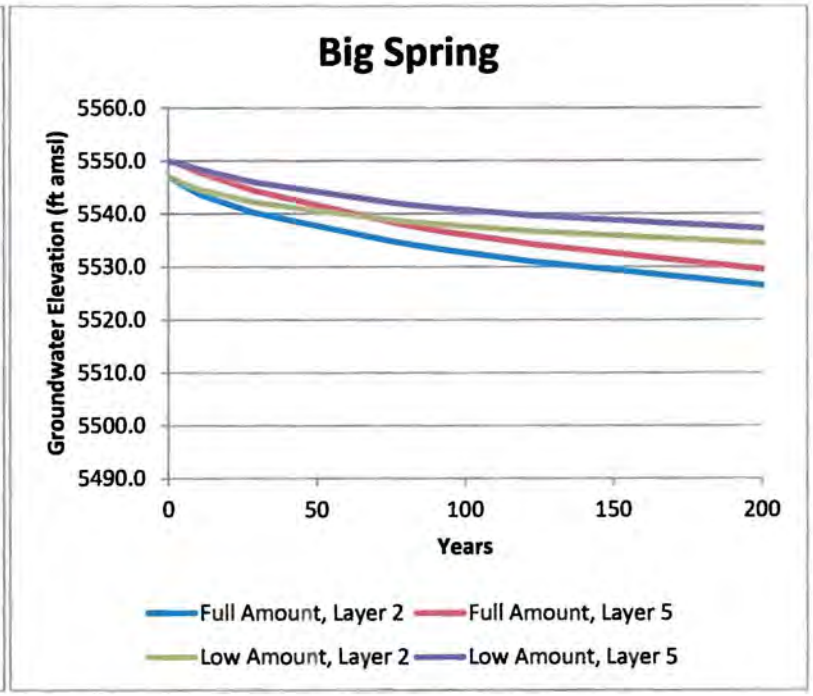
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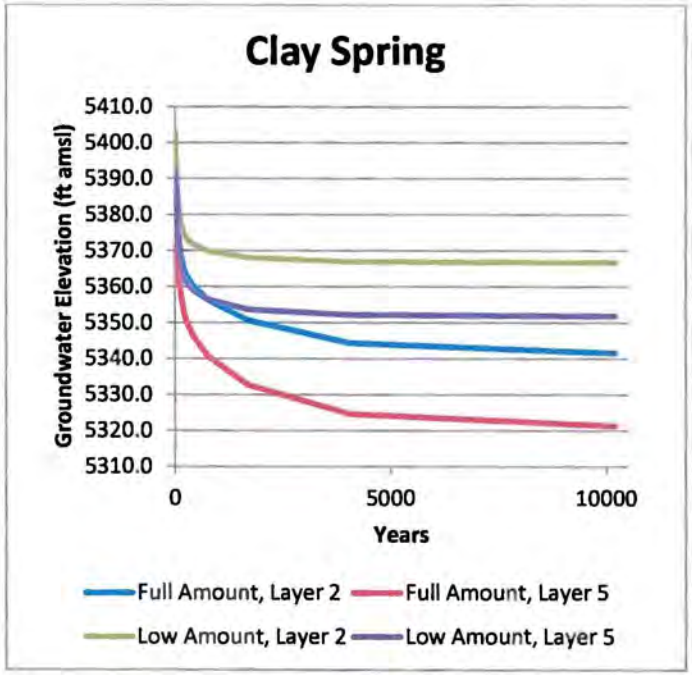
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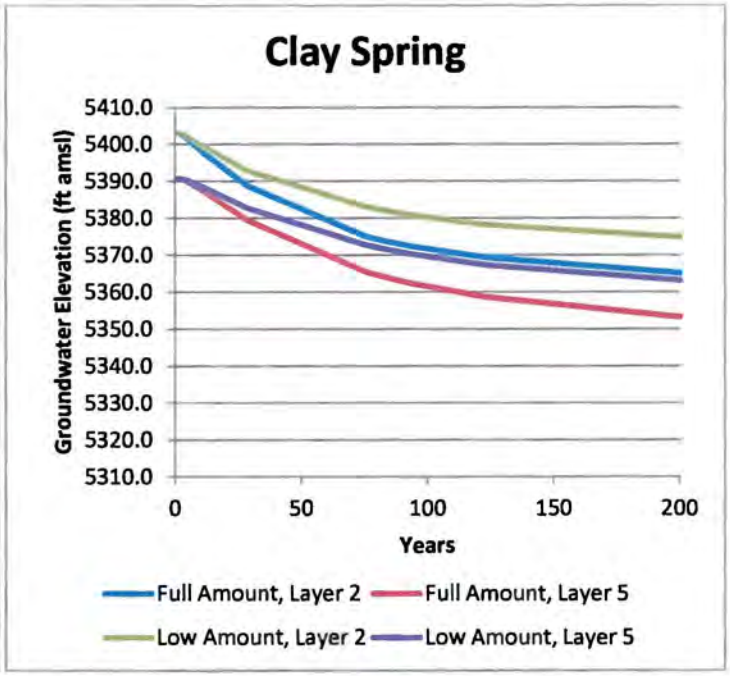
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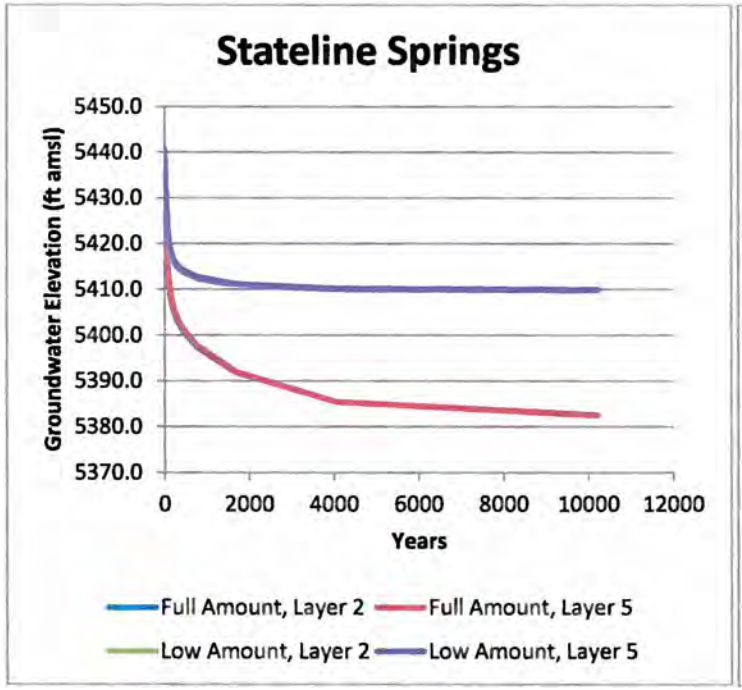
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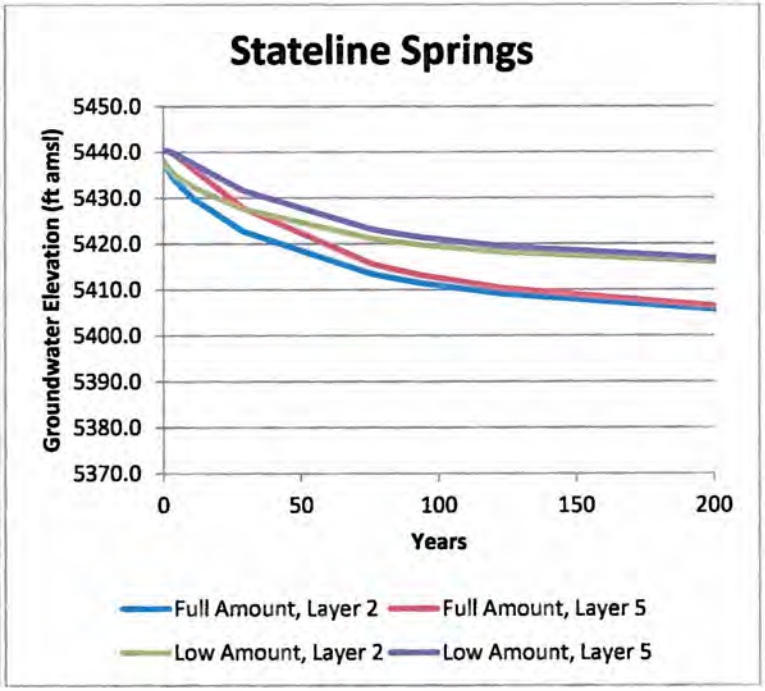
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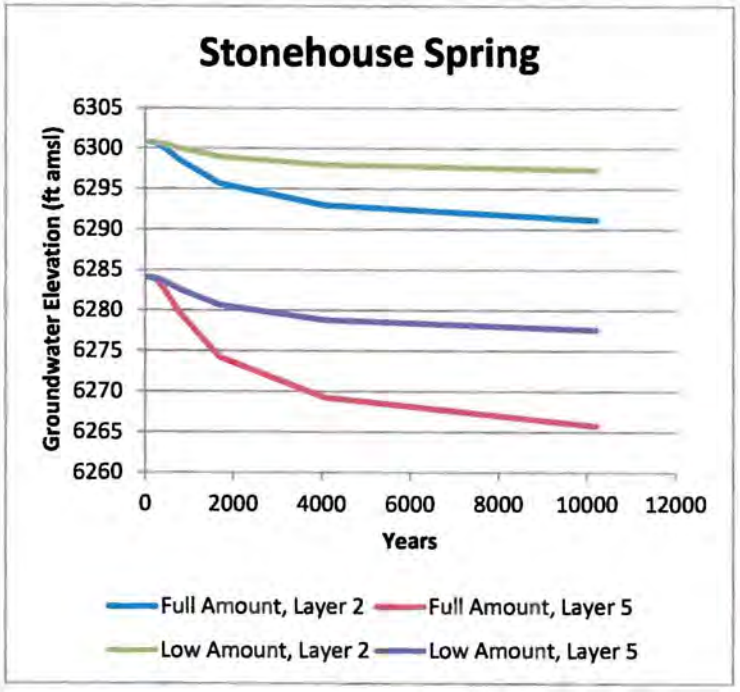
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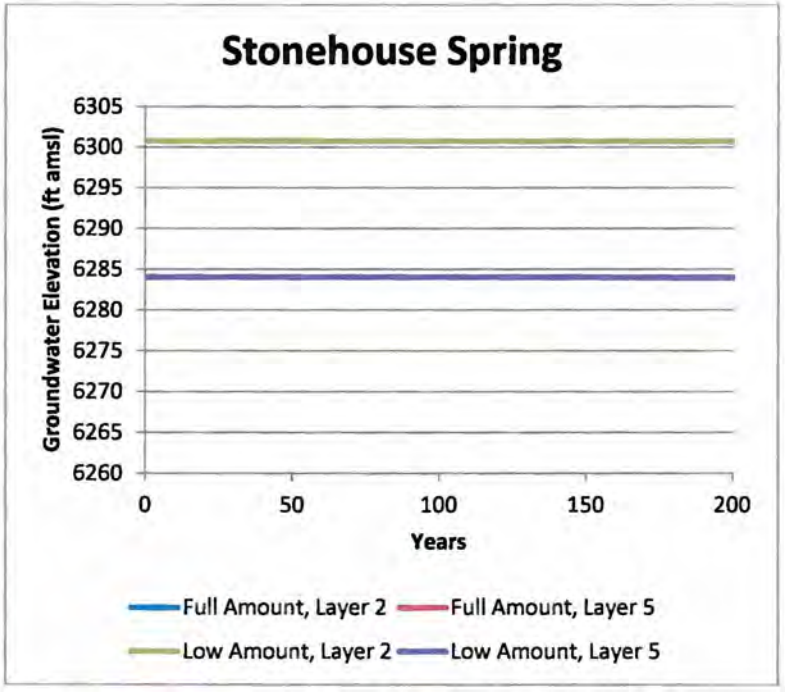
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Years
Full Amount, Layer 2
Full Amount, Layer 5
Low Amount, Layer 2
Low Amount, Layer 5

Appendix G

September 25, 2011

Penny Woods, BLM Project Manager
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nvgwprojects@blm.gov (Email)

Dear Ms. Woods:

Thank you for the opportunity to comment on the Draft EIS (DEIS) for the Groundwater Development Project.

I have been on the faculty of the University of Nevada Las Vegas since 1960, and have specialized in research on the endemic fishes of Nevada, especially those confined to isolated springs in the desert environment. During that time I have published more than 85 scientific articles or chapters in the peer-reviewed literature, have recommended numerous fish species for listing under provisions of the Endangered Species Act, have served as a consultant to nonprofit organizations, to state and federal government entities in Nevada, Utah, Arizona, and California, and served as an expert witness in administrative hearings and court cases.

I have reviewed the Draft Environmental Impact Statement, especially the chapters covering Aquatic Biological Resources (chapter 3) and Monitoring, Management, and Mitigation (Chapter 2), and wish to offer the following comments for your consideration.

C105 The Proposed Action, as well as Alternative A (or any alternative other than "no action") will produce a host of adverse environmental consequences that will be borne disproportionately by residents of the area directly affected (Eastern and Central Nevada and western Utah). Residents of the area into which water importation is proposed will, in general, be less adversely impacted. The environmental consequences borne disproportionately by residents of Eastern and Central Nevada, and western Utah, include substantial increases in atmospheric dust, vegetation change, land subsidence, spring, stream, and wetland failure, and the innumerable changes in lifestyle forced by these avoidable environmental changes. **The EIS must acknowledge this disproportionate adverse impact.**

The DEIS does an excellent job of identifying the aquatic biological resources dependent on the groundwater-dependent ecosystems that will be adversely affected by the proposed project. C106 A major failing of the DEIS lies in its assertion that permanent damage to aquatic biological resources as a consequence of proposed groundwater development can be prevented or mitigated by the proposed MMM program. In fact, removal of the quantities of water from the groundwater system as described by the Proposed Action or any of the action Alternatives (including Alternative A) will result in an unacceptable and irretrievable loss of biodiversity.

The principle driving force behind the consequences described in the previous paragraph lies in the fact that the states of Nevada and Utah had, as of February 2006, granted water rights to 102% of the estimated "perennial yield" throughout the regional groundwater flow system (Deacon et al. 2007, Table 2). As of February 2006, applications for an additional 169% of the estimated "perennial yield" had been filed in the Nevada portion of the regional groundwater flow system. These applications included the approximately 330,000 acre-feet per year requested by the Southern Nevada Water Authority (SNWA asserts they are seeking about 180,000 acre-feet per year from those applications).

Because the perennial yield was already completely allocated by early 2006, additional water rights granted within the regional groundwater flow system can only increase the rate at which springs, streams, and wetlands disappear, groundwater tables fall, and phreatophyte communities fail. In fact, because "perennial yield" is really an estimate of the quantity of water in a groundwater flow system that is discharged from springs, streams, evapotranspiration, and interbasin flow, groundwater pumping in any amount reduces those discharges. This physical reality means that any mitigation proposal depending on groundwater pumping from deeper in the aquifer can, over the long term, only serve to exacerbate the problem allegedly being mitigated. **The EIS must acknowledge this physical reality specifically as it applies to proposed mitigation for the Shoshone ponds, and generally as it applies to other proposed mitigation activities. Pumping from deeper in the aquifer, over the long term, will exacerbate surface water supply problems in the aquifer! In other words, the proposed solution (mitigation) will make the problem worse!** C107

Section 3.7 (Aquatic Biological Resources) of the Clark, Lincoln, and White Pine Counties Groundwater Development Project DEIS completed by BLM is a thorough examination and evaluation of the probable effects of the proposed project on aquatic biological resources within the area of impact. The area of impact is defined by a regional groundwater model used for analysis of the project. The groundwater model used by BLM estimates impacts over a smaller geographic area than is estimated by other models that have been used to examine this problem (Elliott et al. 2006, Myers 2006, 2007, 2011a,b, Schaefer and Harrill 1995, and others). This suggests that the very serious impacts to Aquatic Biological Resources described in the DEIS may be considerably understated. **The EIS should address the issue of underestimating the geographic area over which impacts may occur.** C108

C109 The effects of the project on Aquatic Biological Resources are controversial enough, and uncertain enough to anticipate a relatively high probability of litigation under provisions of the Endangered Species Act as a consequence of the proposed action. **The EIS should evaluate the consequences (i.e. construction delays, increased costs) of this kind of litigation, as well as the high probability that the proposed action and all the alternatives (including Alternative A) are likely to result in violations of Federal law (Endangered Species Act).**

The DEIS recommends using Alternative A (including the mitigation and monitoring identified in Chapter 2) as a starting point in reviewing the draft EIS. Alternative A proposes somewhat reduced groundwater pumping and a Monitoring, Management, and Mitigation process representing extensive and comprehensive efforts by SNWA and federal agencies to minimize environmental effects of the groundwater project. The DEIS and numerous other studies, analyses, and scientific papers (e.g. Bredehoeft and Durbin 2009, Deacon et al. 2007, Mayer and Congdon 2007, Patten et al. 2008, Walton 2011, and others) make it obvious that there will be far-reaching, permanent and extensive adverse effects to the Aquatic Biological Resources of the region. While the MMM effort is commendable and may temporarily reduce some impacts to the Aquatic Biological Resources of the region, it is clearly incapable of avoiding or mitigating unacceptable environmental consequences to these Resources. Principal reasons for this are as follows:

1. The MMM (Monitoring, Management, and Mitigation) program is structured so that an Executive Committee comprised of one manager from SNWA and one from each of the DOI (Department of Interior) Bureaus will have final decision-making authority.

This structure ensures that, over the long run decisions will be biased toward delivering water to Las Vegas. This is because the SNWA representatives' primary job responsibility is to deliver water to Las Vegas, while DOI Bureau managers have responsibilities to implement the policies of the federal administration for whom they work. One example of the sometimes contradictory effect of DOI Bureau managers attempting to discharge their primary responsibilities is that people holding these positions have, in the past, filed protests with the Nevada State Engineer against the SNWA applications for groundwater rights, and under a different federal administration, requested withdrawal of those same protests. **To even approach objectivity, the EIS must propose a different final decision-making system for the MMM program, or explain how this inherent structural bias toward delivering water to Las Vegas is to be balanced in a way that will not lead to increased jeopardy for Special Status species, increased probability that federal (ESA) and state (water law) laws and regulations will not be violated.** C110

2. The Stipulated Agreements governing the MMM program include the following provision: "Any commitment to funding by the DOI bureaus or the SNWA in the stipulation, including specifically any monitoring, management, and mitigation actions provided for in Exhibit A is subject to appropriations by Congress or the governing body of the SNWA as appropriate."

In the present (and long-term) political climate, funding from public sources is under extreme pressure. Long-term survival of the MMM program is therefore highly unlikely. The MMM program as described will, over the long term, make Aquatic Biological Resources in the area of impact increasingly dependent on continuation of the program, while the program itself becomes increasingly unlikely to exist. **The EIS must acknowledge that fact and explain how it is to be overcome.** C111

C112 3. The MMM program, because of problems described as "Aquifer Response Time" (Walton 2011) or "time to full capture" (Bredehoeft and Durbin 2009), is capable of identifying groundwater supply problems that will get worse downstream in the groundwater flow system. It is not capable of preventing those problems from getting worse. **The EIS must explain how the MMM program can overcome this inherent problem stemming from the physics of how groundwater flow systems function.**

4. The Aquatic Biology MMM program focuses especially on Special Status Species and game species. This approach tends to overlook the numerous recently described species whose status has yet to be evaluated, as well as the numerous as yet undescribed species occurring in the area of impact. C113 Because numerous new species have recently been described from the area of impact, and biodiversity in the area is poorly known, **the EIS must explain how the MMM program proposes to avoid loss of biodiversity of this large group of undescribed or uncategorized species.**

5. Shoshone Ponds in Spring Valley and Big Springs in Snake Valley are two habitats specifically identified as aquatic habitats likely to disappear as a consequence of the proposed action. Alternative A will not change that outcome. Mitigation measures suggested include the possibility of creating alternative or substitute aquatic habitats intended to replace those unavoidably lost, or maintaining the habitats by groundwater pumping from deeper in the aquifer. The latter strategy will simply exacerbate the long-term problem, as described above. Moving the habitat to an alternative, naturally maintained habitat could conceivably be considered appropriate for Shoshone Ponds (an artificial habitat intended to help maintain one or more specific Special Status species). It cannot be considered appropriate for any natural habitat such as Big Springs. This is because Big Springs presently supports a rich, largely natural biodiversity which includes Special Status species and probably includes some species as yet unrecognized, undescribed, or whose status has yet to be evaluated. The interactions and interdependencies helping to support those Special Status species and influencing the evolutionary trajectory of all species within that habitat are only C114 incompletely known. At present it is inconceivable to even contemplate developing sufficient knowledge to permit construction of an artificial habitat that would come close to duplicating ecological conditions capable of supporting the biodiversity of any natural habitat/ecosystem. **The EIS must recognize this distinction between mitigation for artificial habitats and natural habitats, including recognition of the fact that replacement of natural habitats cannot be accomplished.**

To summarize, my principal objections to the Proposed Action are:

1. The adverse effects of the Proposed Action (dust, destruction/disappearance of phreatophyte communities, spring, stream, and wetland failure, land subsidence) will be borne disproportionately by residents of eastern and central Nevada and western Utah, while the principle benefits (economic growth) will accrue predominantly to the residents of Southern Nevada. (Provided the boom and bust cycle facilitated by the water importation scheme doesn't completely wipe out the benefits from economic growth.)

2. Some proposed mitigation measures (i.e. pumping from deeper in the aquifer) will, over the long term, exacerbate problems allegedly being mitigated.

C115 3. The regional groundwater model used in the analysis of probable impacts suggests adverse impacts over a smaller geographical area than is indicated by several other recent, credible groundwater models. Yet that fact is not acknowledged in the DEIS.

4. The Proposed Action and Alternative A will produce severe environmental consequences likely to include violations of Federal and State law, as well as violation of the BLM obligation to serve its public trust responsibilities.

5. The final decision-making authority for the MMM program (the Executive Committee) is structured with a bias toward delivering water to Las Vegas.

6. Reliance on congressional appropriation or funding from SNWA to maintain the MMM program virtually guarantees a short lifespan for the program. The consequence will be to make biodiversity in the area increasingly dependent on a program increasingly likely to be eliminated.

7. Aquifer Response Time, or Time to Full Capture permit a monitoring program to identify problems in an aquifer likely to get worse. Once identified however, there is no way to reverse the situation.

8. Desiccation of surface water habitats will destroy all species dependent on those habitats. In the area of probable impact this will include not only the special status species, but also the many undescribed or unrecognized species. No mitigation program can compensate for this loss.

9. Natural habitats cannot be replaced.

10. The No Action alternative is the only one that would permit BLM to conform to its mission: "to sustain the health diversity and productivity of the public lands for the use and enjoyment of present and future generations." The Proposed Action will inevitably result in harmful irreversible and irretrievable impacts on public lands and resources.

C116 11. Total project costs and sources of funding are not described.

12. An honest analysis of the purpose and need for the project (growth and development in Las Vegas) is not described.

C117 13. The effect of a reduction in precipitation over the next hundred years as a consequence of climate change is not evaluated.

14. Approval of any alternative other than "No Action" will conflict with BLM's duties under NEPA and FLPMA.

15. Predicted land subsidence, desiccation of surface water habitats (springs, streams, wetlands), destruction of phreatophyte communities, increased atmospheric dust, adverse impacts on wildlife, encroachment on existing water rights, and devastating consequences to human and natural systems demand a recommendation for the "No Action" alternative.

16. The proposed MMM program will exacerbate some problems it claims to mitigate, identify some problems that can only get worse, establish a system biased toward delivering water to Las Vegas, and increase dependence of biodiversity on a human-dependent program increasingly likely to disappear over time.

C118 17. Effects of a decline in the water table of less than 10 feet, while potentially substantial, are largely ignored.

C119 18. The timeframe analyzed extends only 200 years into the future, while the effects will be felt throughout the life of the project -- which may extend much longer than 200 years.

19. Groundwater mining is supposedly illegal in Nevada, a major effect of the proposed project is likely to be another boom and bust cycle in Las Vegas.

20. There is no doubt about the far-reaching, extensive, irreversible and irretrievable environmental damage the project would cause.

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2011

Response to the Clark, Lincoln and White Pine Counties Groundwater Development Project DEIS

Response to the Clark, Lincoln and White Pine Counties Groundwater Development Project DEIS

September 2011

Great Basin Water Network
1755 E. Plumb Lane #170
Reno, Nevada 89502

For information on this response, contact Launce Rake, 1234 S. 17th St., Las Vegas, NV 89104. Email: launcerake@rocketmail.com.

Edited and compiled by Launce Rake for the Great Basin Water Network. DEIS Response Review Committee Members: Rose Strickland, Abigail Johnson, Susan Lynn, Ann Brauer, Dennis Ghiglieri, Jerald Anderson, Kathy Hill, Ken Hill, Rob Mrowka, Steve Erickson, and Wilda Garber.

The Great Basin Water Network was formed to protect the water resources of the Great Basin for current and future residents – human, animal and plant. Organizations, businesses and individuals have banded together to form the Network so that decisions on all water development proposals in the Great Basin are made in the open with caution, coherence and based on the best scientific information. The Great Basin Water Network also works to ensure that decisions are made without undue political and developer special interest pressure.

The Great Basin Water Network's overriding concern is that the Las Vegas metropolitan area and other large communities in the Great Basin implement an effective water conservation program including economic incentive for water smart-practices and implementation of simple, inexpensive conservation measures as opposed to multi-million projects that would burden urban taxpayers while leaving rural families high and dry.

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Introduction and Overview

C120 The environmental analysis that the Bureau of Land Management has conducted on the Groundwater Development Program of the Southern Nevada Water Authority predicts environmental impacts so widespread, long-term and severe that the federal agency – in order to fulfill its mission and public trust duty – has only two choices: Deny the requested right of way by selecting the No Action Alternative, or find that the analysis is so flawed and inadequate that the BLM must withdraw and reissue the Draft Environmental Impact Statement or produce a Supplemental EIS is in order to allow for informed decision-making.

This conclusion is based on the analysis of the DEIS by dozens of experienced analysts with the Great Basin Water Network (GBWN), including scientists, lawyers and conservationists who have worked closely with federal, state and local agencies to prepare similar documents.

GBWN was created in 2003, and incorporated three years later, in response to accelerated efforts by the Las Vegas-area municipal water supplier, the Southern Nevada Water Authority, to locate numerous wells in rural East-Central Nevada and pump water to the urban south. At the time, Las Vegas government and business officials insisted that the Groundwater Development Program was needed to sustain an annual population growth rate of more than 5 percent, while the SNWA had maxed out (in fact, over-used) its allocation from the Colorado River. The Colorado River then and now supplies more than 90 percent of the water needs of SNWA's service area, which includes the cities of Las Vegas, Henderson, Boulder City, and North Las Vegas, as well as the urbanized areas of unincorporated Clark County.

By 2005, the SNWA was confidently predicting to national media that the metropolitan area would out-consume Colorado River water resources by 2007, requiring immediate development (then) of the wells and pipelines.[1]

But the last six years have proved that SNWA's claims were profoundly wrong. Demographic trends radically undermined the justification for the groundwater program – population growth halted. Simultaneously, conservation efforts have created a huge margin against drought on the Colorado River.

For SNWA, virtually every supposition and justification for the Groundwater Development Program radically changed. In 2007, the unprecedented bubble of rising housing prices, propped up by profoundly unsustainable lending practices, "popped." Nevada and Las Vegas, with economies and government (including SNWA) revenues largely dependent on rapid growth, were hit particularly hard by the end of the housing bubble.[2,3]

The new-home water connection fees and proceeds from the sale of federal lands that once provided about half of the SNWA budget have largely evaporated. Connection fees alone dropped from $188 million in 2006 to $3.2 million in 2010.[4]

Instead of a rising population, population growth in Nevada and the Las Vegas metropolitan area is nearly static or even retrograde, and that trend could continue for the next two decades, according to the Nevada State Demographer's Office. [5] The region has an excess supply of housing units that would take years to absorb.[6]

The metropolitan area continues to be hammered by the highest foreclosure rates in the country[7] and fastest fall in wages in the country[8], and Nevada continues to struggle with the highest unemployment rate in the country[9], all stark indications that a return to the boom is unlikely. This means that the cost for any groundwater program would be shifted to ratepayers, instead of now nonexistent growth.

But another dramatic change from the situation in 2003 is the success of conservation programs in the metropolitan area. Between 2002 and 2010, water users in metro Las Vegas trimmed 100,000 acre-feet annually from their consumptive use, or one-third of the total allocation from the Colorado River.[10] The DEIS and the SNWA predicts
C121 continued success in its conservation programs. Note that the success in conservation similarly makes the financial model for the Groundwater Development Program out of date, and it needs to be recalculated in light of the new demographic and conservation information.

Simply put, the demographic trends which fueled the rationale for the SNWA pipeline no longer exist. The end of rapid population growth combined with the conservation measures in place give Southern Nevada a healthy margin to respond to drought or other needs. Once again, consumers have proved that conservation is the cheapest, safest and best mechanism to respond to resource management.

The conservation total is particularly significant because when the growth boom ended in Southern Nevada, the SNWA shifted its rationale for the Groundwater Development Program to a need to diversify its Colorado River-dependent portfolio because of the threat of drought drying up Lake Mead. However, the protocols developed by the Colorado River Basin States and the federal government call for cuts of 13,000 to 20,000 acre-feet annually (afa) in the SNWA allocation from the river in the event of extraordinary drought causing water levels in Lake Mead to fall precipitously. Other basin states would face similar percentage reductions in their allocations. Those cuts, which would preserve access to the river for all users, would be, for Southern Nevada, far smaller than the conservation measures already achieved in metropolitan Las Vegas.[11] This means that even in the event of a deepening drought, Southern Nevada water users would not be affected. They have already conserved their way out of crisis.

Either one of the two broad trends – the conservation achievements of Southern Nevada water users, along with responsible management of Colorado River resources, and the end of the rapid population and homebuilding booms of the early 2000s – make the Groundwater Development Program unnecessary. Indeed, it is difficult to ascertain the real motivation behind the SNWA's continued insistence on a project that independent

analysts hired by the SNWA now say will cost more than $15 billion, fifteen times the cost estimates provided to media just a few years ago.[12]

However, of greater concern for the contributors of this report are the significant deficiencies of the DEIS and indeed in the monitoring, management and mitigation measures proposed, suggested or hypothesized in the document. As documented in this response, the National Environmental Policy Act requires a thorough understanding of all the impacts and corrective actions before a record of decision (ROD) can be issued. We argue that the BLM and its contractors has failed to abide by this legal and administrative mandate.

The following report is a summation of various authors and perspectives that make up the Great Basin Water Network, focusing on the insights of those who would be directly affected by the removal of groundwater from East-Central Nevada and Western Utah, the work of accomplished scientists, and experts on federal responsibilities and land-management law. In some cases, contributors agree with the Bureau of Land Management's findings in the Draft Environmental Impact Statement. In other analyses, contributors have identified clear deficiencies in the DEIS that must be addressed before a ROD can be issued.

Response by Chapter

GBWN's response is detailed by chapter below. Refer to the Index for subsections.

Executive Summary

The DEIS predicts dire impacts to the resources within the project area of pumping. BLM should consider that the model may be underestimating the pumping impacts, and consider how the agency as well as the Department of Interior will protect its resources at
C122 the projected levels, and at levels greater than shown. BLM should condition the Right of Way permits to ensure that BLM has authority to set triggers and enforce pumping cessation in order to limit effects on its resources.

The Executive Summary 2.9, page 10, states, "The BLM has no legal authority over water rights in Nevada or the SNWA water resource plan." The chart on the same page attempts to sort out the BLM and State Engineer responsibilities. The blue arrow is labeled "Time" but more appropriately should be labeled "The Public" because the public is caught in the middle between two agencies playing a shell game, hiding responsibility for the destruction and defoliation of rural Nevada from the public.

In the DEIS, BLM repeatedly asserts that it only has authority over the right of way, not the water. However, it also has public water reserves in the valleys in question. BLM has inappropriately comingled its separate responsibilities as a water user and as a protector of lands and resources. They are not the same. As a water rights holder, BLM has entered into a stipulated agreement in Spring and CDD years prior to the preparation of this EIS. BLM is choosing to carry those agreements forward and "check off the box" for monitoring, management and mitigation (3M) by using agreements forged in secret
C123 between SNWA and BLM prior to SE water hearings. It is inappropriate to use agreements forged in secret prior to the release of the DEIS to address impacts disclosed for the first time in the DEIS.

BLM's DEIS demonstrates long term irreversible and destructive impacts to water resources and the ecology of the affected area. As a resource manager, it is BLM's responsibility to ensure that the proposed action and alternatives do not adversely affect BLM's claims. BLM's own studies show SNWA drawdowns will eliminate or adversely impact its public water reserves (PWRs). BLM should have similar concern for all other water rights or claims to water that are connected to resources under its jurisdiction. BLM cannot and must not disregard the stewardship of its resources.

On Page 75 of the Executive Summary, the BLM states, "BLM is particularly interested in seeing comments and suggestions for the analysis of the Snake Valley portion of the proposed project and identification of impacts to resources in the area, especially to those in GBNP."

The project as described will have irreversible impacts on Great Basin National Park. Short of selecting the No Action Alternative, any of the proposed alternatives will result in permanent adverse affects to GBNP. Parks and wilderness areas are both apart and joined with the region, ecosystem, and communities that surround and support them. Defoliating the valleys of the Great Basin that surround and support the GBNP will have profound impacts on the biology of the Park.

The DEIS admits that the source of cave waters in GBNP and in the region are unknown. The caves are at risk, the delicate ecosystem of the Park is at risk, and so are the lands that BLM has sworn to protect for present and future generations. The irreversible and irretrievable section in the DEIS should be a reason to protect Snake Valley and to reject the pipeline project.

Chapter 1 – Purpose and Need

Chapter 1.21 identifies that the purpose for the ROW action is to consider the applicant's request for use of federal land managed by the BLM for construction and operation of the proposed groundwater conveyance system which once in place could facilitate future groundwater development and production in five hydrographic basins contingent upon approval of water rights applications filed by SNWA. Section 1.2.2 identifies that the BLM's need for federal action is to fulfill its responsibilities under the FLPMA and other legislation to respond to the applicant's request. This includes provisions requiring the BLM to grant the ROW to SNWA in SNPLMA, 1998, for Clark County and provisions in the LCCRDA of 2004 for Lincoln County. There is no Congressional direction to grant the ROW in White Pine County.

C124 The Statement of Purpose and Need reflects only the BLM's need to take action on a specific application. There is nothing in the Statement of Purpose and Need to provide guidance for the reader on why the project is needed, a reasonable range of alternatives, and why the land and environmental impacts of the project are ultimately justified. There is nothing that helps the reader evaluate the costs and benefits of the project.

It is important to note that accomplished scientists and public administrators have discussed literally dozens of alternatives to the Groundwater Development Project. These alternatives need to be delineated within the DEIS.

Tiering

Chapter 1.3.3 explains the tiering process to be used. Under this section the explanation is given that tiering shows an assessment of a combination of site specific actions and broader programs and issues in the initial (Tier 1) analysis, evaluating the effects of additional and site specific proposals more comprehensively in subsequent tiered NEPA analysis. It states that tiering is appropriate when it helps the lead agency focus on those issues ready for decision, deferring detailed consideration of those issues not yet ready for analysis due to uncertainty or lack of sufficiently detailed description of the proposed development. According to this section the Tier 1 EIS will focus on the proposed alignment of the main pipeline and associated operational facilities (power transmission lines, pump stations, etc.) that are known. Details regarding future facilities for groundwater development including the number and locations of wells and the specific lengths and routes of collector pipeline and distribution power lines are unknown. The environmental effects of that future groundwater development including the long-term effects of groundwater production are the subject of programmatic analysis in Tier 1.

GBWN is concerned that Tier 1 decisions will lock-in all future decisions, despite new information and subsequent environmental analyses; further, tiering sanctions and encourages speculation (the speculative nature of this project) – water may or may not be needed or used, well locations are undetermined, indefinite, well locations are subject to change, impacts may or may not be mitigated or able to be mitigated.

After the SNWA identifies specific details of the groundwater development components it will submit additional ROW applications to the BLM and the BLM will address future site specific components in subsequent tiered NEPA documents. The hydrologic model used for Tier 1 and baseline assessments for all resources will be updated in subsequent tiered analysis on site specific groundwater development components in NEPA documents. The section further states that BLM will require initial construction of each section of the ROW within 5 years of the issuance of the ROW and that the ROD/FONSI for each will require site specific construction and operations plan, that the data, analyses, and other information used to reach a decision may change over time, and a delay in project implementation of even a few years could result in the need to supplement the NEPA process.

According to the schedule listed on Page 3.18.63, future groundwater development would not occur until 2016-2019 or Dry Lake, Delamar, and Cave valleys, 2025-2027 in southern Spring Valley, 2042-2044 in northern Spring Valley, and 2047-2049 in Snake Valley.

The tiering process and the time frames raise questions about the confidence the public can place in a ROW grant issued in 2012 and subject to so much uncertainty.

C125 1. The wells, collector lines, and distribution power lines are essential to using the main pipeline, transmission system, and pump stations to achieve the purpose of providing water resources from Central Nevada to the Las Vegas Valley. Wouldn't these facilities fall under the definition of Connected Actions since it would be unwise or not feasible to construct the pipeline without the wells to provide the water? If the wells are truly connected actions, there is a requirement to analyze them within the same NEPA document as the main pipeline.

C126 2. The discussion of the tiering process indicates that this will be a fluid process with new information and analysis taken into account as they go along. How will the new information be related to a ROD on Tier 1?

C127 3. The requirement for initial construction on each ROW within 5 years of its issuance would be within a reasonable period for a ROW for Dry Lake, Delamar, and Cave Valleys assuming a ROD is issued in 2012 and construction on the groundwater development in that area takes place from 2016 to 2019. As the project moves further north, the groundwater development would not occur for up to 37 years from the date of the initial ROD on the pipeline and the ROD for Snake Valley would not be issued for over 30 years to be in compliance with the five year requirement. On an administrative level, how will the BLM track the tiered process over this period of time? Is there any precedent for use of the tiered process over a period of decades? How will the public be assured that all of the mitigation measures identified in the Tier 1 EIS will be maintained in future actions?

Chapter 2 – Project Description and Alternatives

C128 The alternatives identified in the Project Description are all modifications of the ROW routes. All other suggested alternatives for other means to develop water resources to serve the needs of the Las Vegas Valley are discounted. The statement of Purpose and Need unduly limits the consideration of a reasonable range of reasonable alternatives to allow adequate evaluation of the irreversible and irretrievable commitment of resources that, according to Table 3.18.49, could have potentially significant adverse effects on the region's potential for economic activity.

Projects identified for Cumulative Analysis

C129 The projects identified for the cumulative analysis are limited to those that are known today and have taken steps within the EIS process to move forward. The actions identified in the Project Description are not anticipated for a period of up to 35 years and the impacts of groundwater pumping are analyzed for a period of 200 years. The document needs to state that there is no way to do an adequate analysis of cumulative impacts because of the unknown and incomplete information that is not available on potential projects within the time frame outlined.

Cost Estimates

C130 There are no cost estimates in the Project Description. SNWA provided a cost estimate of $2 billion during the State Engineer's hearings on the Spring Valley applications in 2006 and the estimate was criticized at that time for being out of date. The most recent estimates, from independent third party analysts working for the SNWA, put the cost at more than $15 billion.[16]

The DEIS includes estimates of tax revenue that would be generated by purchases made by construction contractors. SNWA would have to develop construction cost estimates in order to develop the estimates of tax revenue. Why isn't the cost estimates included in the document? To allow the public to make a fair assessment of the project, there needs to be an accounting of the costs of the project to date, the costs of compliance with NEPA and other federal and state regulations to allow the project to go forward, the costs of construction and operation of the project, the financing costs, and the estimated cost per rate payer to support the project.

Time Frames for Groundwater Development and Groundwater Pumping

C131 The time frames for the proposed groundwater development extend up to 37 years into the future and the impacts for groundwater pumping for 200 years. To put this into perspective, the EIS is asked to make an effective analysis of development that may not be started for 37 years and will have impacts beyond 2212. Can the EIS process anticipate growth patterns and economic activity based on policy, world markets, and technology for that time period? Thirty-five years ago, in 1975, there were no cell phones

or Internet. Two hundred years ago, the United States consisted of the eastern seaboard and western territories, it was fighting the War of 1812 with muskets and sailing ships, people traveled by horse drawn wagon, and communication was hand carried from one place to another. Could the BLM have done an EIS in 1812 that would predict the level of technology, growth patterns, economic activity, transportation and communication in use today? A review of the socio-economic analysis must conclude that there is no way the socio-economic analysis can adequately address the issues and potential impacts for the time period defined by the DEIS. C132

Project Size and Scope

The size and scope of the proposed project including the construction of the main pipeline and associated facilities, the groundwater development, and the groundwater pumping are on a scale not anticipated for a single EIS even with a tiered process.

Chapter 3 - Affected Environment and Environmental Consequences

C133 The division of direct from indirect impacts is flawed in the DEIS . Direct impacts should include pipeline construction impacts, well site drilling impacts, facilities impacts and pumping drawdown impacts. Indirect impacts are those related to additional water deliveries to the basins receiving the water. Defining pumping drawdowns as "indirect" does not relieve BLM of its obligation under NEPA of studying all direct and indirect impacts. The confusion and misdirection in this section is based on the piecemealing of NEPA into tiers of known and unknown project elements. In this case, the applicant has no approved water rights or well sites from which to pump water and is prematurely applying for a pipeline ROW with a huge host of unknowns. If SNWA's applications are ever approved by the NSE and if its applications to change the place of use are ever approved by the NSE, then it will have some water to put into its pipeline. But pumping effects in the DEIS "study area" are all direct impacts of the project. We note that on page 3-7, the DEIS admits "direct and indirect effects are difficult to differentiate..." and that "a specific differentiation in the EIS text has not been made," a failures to comply with NEPA. We will provide additional comments on indirect impacts (see comment #4).

C134 On page 3-1, the DEIS states that this chapter answers the question: "if impacts still occur at a higher than acceptable level of intensity after applying all avoidance and protection measures, what mitigation measures are recommended to approve additional resources?" However, the DEIS fails to disclose the "acceptable" levels of impacts. Deferring this critical information to some future process not subject to NEPA prevents the public and the BLM from making informed comments and decisions on the DEIS . What is the definition of "acceptable level of intensity" of impacts? How and who defines what is "acceptable?" For instance, are water drawdowns to 200 feet acceptable? to the BLM? to the SNWA? If not, are drawdowns to 100 feet acceptable? Is subsidence over 575 square miles acceptable? If not, then is subsidence over 300 or 100 square miles acceptable? For whom would these impacts be acceptable? We can see that there may be substantial differences of opinion among whoever is making the decision on acceptable or non-acceptable levels of impact intensities. How are differences to be resolved? Who resolves them? This critical missing information undermines the impacts analysis in the EIS.

Great Basin Water Network argues that this missing information also violates the National Environmental Policy Act.

C135 "Section 101 of NEPA declares a broad national commitment to protecting and promoting environmental quality." Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 348 (1989), citing 83 Stat. 852, 42 U.S.C. § 4331. "The sweeping policy goals announced in § 101 of NEPA are . . . realized through a set of 'action-forcing' procedures that require that agencies take a "hard look' at environmental consequences.'" Id. at 350, citing Kleppe v. Sierra Club, 427 U.S. 390, 410 n.21 (1976). NEPA's main "action-forcing" procedure comes in the form an environmental impact statement ("EIS"), a detailed statement on environmental impacts that must be prepared before an agency undertakes any "major Federal action[] significantly affecting the quality of the human environment." NEPA § 102(2)(C), 42 U.S.C. § 4332(2)(C).

C135 cont'd Thus, NEPA "ensures that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts." Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 349 (1989). See also Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, 435 U.S. 519, 553 (1978) ("NEPA places upon an agency the obligation to consider every significant aspect of the environmental impact of a proposed action"). "These procedural provisions of NEPA 'are designed to see that all federal agencies do in fact exercise the substantive discretion given them. These provisions are not highly flexible. Indeed, they establish a strict standard of compliance.'" Sierra Club v. Watkins, 808 F. Supp. 852, 859 (D.D.C. 1991), quoting Calvert Cliffs' Coordinating Comm., Inc. v. United States Atomic Energy Comm'n, 449 F.2d 1109, 1112 (D.C. Cir. 1971).

The Council on Environmental Quality ("CEQ") has promulgated regulations implementing NEPA that are binding on all federal agencies. 40 C.F.R. § 1500.3; Robertson v. Methow Valley Citizens Council, 490 U.S. at 354.

Under NEPA, an agency must honestly address the various uncertainties surrounding the scientific evidence upon which it relies in its environmental evaluations. The agency has a duty to respond to credible opposing points of view, and it may not ignore reputable scientific opinion. See, e.g., Seattle Audubon Soc'y v. Espy, 998 F.2d 699, 704 (9th Cir. 1993); Public Service Co. v. Andrus, 825 F. Supp. 1483, 1496-99 (D. Idaho 1993); see also Sierra Club v. Watkins, 808 F. Supp. 852, 864-69 (D.D.C. 1991). An agency's NEPA analysis must expose scientific uncertainty regarding the risk of a proposed action and inform decisionmakers of the full range of responsible scientific opinion on the environmental effects of the proposed action. Friends of the Earth v. Hall, 693 F.Supp. 904, 926, 934 (W.D. Wash 1988). Also, federal agencies are responsible for overseeing and ensuring the accuracy of environmental impact statements produced by contractors. 40 C.F.R. § 1506.5(c).

Chapter 3.0.3 Incomplete and Unavailable Information

C136 In light of the listed incomplete or unavailable information, Great Basin Water Network asserts that this DEIS is premature. The known and unknown unknowns confirm that this DEIS is premature and should be updated and resubmitted for full public review after the information described in this section is obtained. Note that key Visual Resource Information was omitted, and that the Visual Resource section (3.15) suffers from the lack of simulations of visual resources at 75 and 200 years of pumping.

We agree with the list of incomplete and unavailable information in the DEIS on pages 3-4 to 3-5. Project descriptions for well sites have not been provided to the BLM by the C137 applicant. Using "groundwater development areas" in the DEIS for impacts analysis purposes leaves out of the NEPA analysis large areas with SNWA water rights applications. If approved, these additional water resources would be transported through

C137 cont'd the SNWA pipeline on BLM ROW. Ignoring their impact is part of the piece-mealing of NEPA in this DEIS .

C138 Critically missing information on springs, streams, seeps, and wetlands in the "large" regional study area which may be directly affected by pumping drawdowns is a significant flaw of the DEIS . This is a massive project with massive impacts over a huge area of eastern Nevada and Utah's West Desert. However, the size of the area is not an acceptable excuse for the paucity of information in the DEIS on the affected environment, especially the desert's scarce water resources, and the impacts of the GWD project.

C139 The DEIS provides no information on how tracking of what missing information would be collected and who would collect it, and how the public would know this. The DEIS also fails to disclose the costs of collecting future information and the timeframe for collecting information. In any event, without knowing the majority of water resources to be affected by the GWD project, it seems futile for anyone to collect information on dried up springs discovered in the future. How would collecting missing information affect BLM ROW decisions which have already been made or any future decisions?

Other incomplete and unavailable information - visual resource information, soils, wildlife information, special status species, Great Basin National Park, caves, groundwater flow modeling/water resource information, and climate change - is critical for the public and the BLM to make informed comments and decisions on this DEIS . The EIS process should not proceed until this information is available to analysts and the public.

C140 The DEIS inappropriately limits the drawdown impact areas to those which appear between the estimated 1 and 10 foot drawdown contours, even though major impacts could occur in drawdown areas less than 10 feet. BLM justifies eliminating the areas affected by 1-10 foot drawdowns because that is what the agency has done in the past. However, for this project this BLM decision is inappropriate since areas affected with less than a 10 foot drawdown may cover hundreds of square miles. Potentially affected by a less than 10 foot drawdown are springs, wetlands, sub-irrigated meadows, and wells, as well as vegetation. Unanalyzed climate change impacts to the study area could also be affecting water-dependent resources. Pumping impacts could dry up already stressed water sources and vegetation.

C141 Likewise, limiting the timeframes of impacts analysis in the DEIS to only 200 years is a failure to disclose all of the potential impacts of granting the ROW request for the proposed GWD project. It is an arbitrary decision, because BLM in Nevada commonly analyzes the effects of open-pit mines that will take more than 200 years to fill with groundwater.

C142 The DEIS does not disclose when equilibrium would be reached with various pumping amounts in the Proposed Action and scenarios or the relevance of this missing information. Does the BLM hydrological model show that significant pumping impacts

C142 cont'd continue to occur beyond 200 years until equilibrium is reached? If so, the DEIS fails to show pumping will cause a large amount of undue and unnecessary damages to public lands and resources.

Chapter 3.1 Air and Atmospheric Values

The discussion in the DEIS of potential climate change impacts in eastern Nevada and west Utah is a good representation of what is currently known about climate change impacts, present and future.

C143 Unfortunately, contrary to BLM laws and regulations (and Secretarial Order 3226) on considering climate change impacts when making major decisions affecting BLM's environmental resources, the DEIS dismisses all potential climate change impacts from its impacts analysis in Chapter 3 (pages 3-5): "since the current state of climate change science prevents the association of specific actions with specific climate-related effects, the BLM can neither: (a) analyze the climate-related effects of BLM actions nor (b) ascribe any significance to these potential effects." Despite difficulties and uncertainties in predicting the exact effects of climate change, these impacts should be a part of the impacts analysis for all resources, not just air and atmospheric resources.

The 2011 Humboldt-Toiyabe National Forest Climate Change Vulnerability Report[13] (H-T Report) for much of the same area affected by the GWD project shows that climate change will increase temperatures and aridity and that warmer winters will cause earlier melting of snow with less water available overall. The study shows that "...higher temperatures will increase evapotranspiration and droughts..." and "...warmer wintertime temperatures and earlier melt dates will deplete this virtual reservoir, leaving much less available water for natural systems and human uses."

The H-T Report and the DEIS agree that climate change will affect precipitation amounts, timing and locations, thus affecting evapotranspiration, infiltration and recharge and the ultimate availability of water for human and environmental uses.

Even SNWA[14] is concerned about significant impacts of climate change on its Colorado River supplies than the DEIS : "Climate change impacts on the Colorado River and the American Southwest are expected to be significant. The majority of regional climate models project a more arid climate and reductions in Colorado River runoff in the future. These reductions are expected to be in addition to natural-flow variabilities and temporary drought conditions."

The DEIS devotes just 6 pages to the subject (3.1-49 to 55). Yet even this general and superficial review predicts that climate change will likely result in:

1. Widespread warming leading to reduced snowpack, earlier melting of snowpack, earlier spring run-off, and associated declines in river flows.

2. Decreasing and more variable precipitation, rapid landscape transformation, increased flood risk and reduced flood-buffering capacity, and more widespread drought.

3. Vegetation die-off will result in increased frequency and severity of wildfires. Impacts will be "substantial for some resources, impacting biodiversity, protected areas and agricultural lands." "Impacts on species distributions, community structure and ecosystem function may be significant."

4. "Lower soil moistures, increases in erosion, more severe droughts, altered distribution of vegetation, and types, increased water temperatures affect aquatic biological resources, modifying, shifting or eliminating habitats, altering or restricting the physical ranges of species present, more invasive species, decrease quality of rangeland, reduced livestock feed, increased ET (greater discharge).

All of this adds up to less water available for export and greatly increases the negative consequences of all the alternatives (but, of course, affects the No Action Alternative least). C144 Unfortunately, the DEIS makes no attempt to quantify any of these critically important climate change-related impacts. This is a major flaw that greatly increases the range of uncertainties of all the impacts identified or predicted – and quantified - throughout the DEIS. Almost certainly, and almost 100% across the board, climate change will worsen those effects.

While it is true that "it is impossible to link a specific greenhouse gas emission and a specific climate change" (3.1-49), it is also obvious, as the DEIS notes, that the "impact on water resources will depend in part by changes in system characteristics, changing pressures on the system, how the management of the system evolves, and what adaptations to climate change are implemented". (3.1.50) There is nothing that more dramatically fits that description than the proposed groundwater development project. C145 The BLM ducks the question of how much worse will climate change make the impacts of the Proposed Action, and evades the express policy outlined in Secretarial Order 3226, and kicks the can down the road by stating that "future NEPA documents will follow DOI and BLM policies related to climate change."

C146 BLM argues that "since the current state of climate change science prevents the association of specific actions with specific climate-related effects, the BLM can neither: a) analyze the climate related effects of BLM actions nor(b) ascribe any significance to these potential effects. For these reasons, climate change impacts could not be evaluated for the proposed action"… (3-5). But the assertion that the impacts are uncertain and non-specific should not give license to pass over the subject for another day. This "Incomplete and Unavailable Information" is just too critical to ignore for purposes of decision-making now, within the context of the granting or denying of the ROW.

C147 The EIS should use the H-T Report and the best available science for a model analysis of reduced precipitation to assess the effects of various scenarios of recharge on future water supply availability and reliability. The DEIS model could also assess the cumulative impacts of the GWD project, especially the pumping drawdowns with, for example, a 10, 20, and 30 percent reduction of recharge in the study area. Other studies are doing this for the Lower Colorado River Basin.[15]

Other questions we have on this section:

C148 1. On page 3.1-34, the DEIS states in regard to native vegetation dried up in pumping drawdown areas (40 basins): "It is expected that annual species would continuously bind the soil surface with living or dead root systems, even though the individual annual plants would not act as long-term barriers to wind." In addition, the conclusion from this "fact" is equally counterintuitive: "Therefore, 10% of the surface area composed of this ET unit and affected by groundwater drawdown would be affected." What science supports these questionable statements? What is the total surface area of this ET unit which will be affected by pumping drawdowns? To how many of the 40 basins in the project study area would this "conclusion" apply?

C149 2. On page 3.1-36, the DEIS estimates that "...up to 40 percent of the project's power requirements can be offset by the installation of hydro-turbines at the three pressure reducing stations." Please explain how this calculation was made. Does this statement imply that hydroturbine use will reduce the 327,000 tonnes of CDE per year, the estimate of total emissions, by 40 percent?

C150 3. On page 3.1-37, the DEIS refers to C.2.5 as a mitigation measure to "conduct large-scale seeding to assist with vegetation transition from phreatophytic communities in Spring and Snake Valley to benefit wildlife and reduce potential air resource impacts." What plants would be seeded? How much water would be needed for this large-scale seeding? What are the sources of this water? When would the impacts of acquiring, developing, and using water for this purpose be analyzed in a NEPA review? What are the costs of this "mitigation" measure?

C151 4. On page 3.1-38 the DEIS states: "the level and extent of these impacts (of groundwater drawdowns 10 feet or greater on windblown dust emissions) are highly uncertain." How uncertain? What is the relevance of this uncertainty? The DEIS goes on to estimate the tons of PM2.5 each year for 200 years, but these amounts still lead to this vague impact estimate: "At these levels it is possible that windblown dust emissions from groundwater drawdown could impair visibility conditions at Great Basin National Park." How much would GBNP visibility be impaired? At full build out, 75 years, and 200 years? How can the DEIS be so certain of emission estimates but so uncertain of air quality impacts on GBNP?

C152 5. On pages 3.1-52 and 53, the DEIS states: "As the seasonal variability (from climate change) increases, and the amount and form of precipitation changes,

C152 cont'd aquatic species and their habitats would likely be affected." "Climate change could affect aquatic biological resources in the Project Area by modification or alternation of aquatic habitats due to changes in precipitation; potential changes in water temperature and other water quality parameters such as dissolved oxygen, and; potential changes in aquatic species abundance, distribution, phenology, and community composition in response to habitat and water quality changes."

How can the adverse effects of climate change on aquatic species be separated out from the adverse effects of groundwater drawdowns? Without this knowledge, we do not see how any "mitigation" plan would be effective. Instead, "mitigation" discussions with no required timeframes by BLM and SNWA to reach consensus on the attributability (SNWA pumping, drought, climate change, or others' pumping) of adverse pumping impacts, while pumping continues unabated, will inevitably lead to the failures of both proposed required and voluntary mitigation measures to protect aquatic species habitat, including that of TES species.

C153 6. On page 3.1-60 in the cumulative effects discussion, the DEIS states: "It is predicted from model simulations that pumping drawdowns of 10 feet or greater would potentially lead to changes in vegetation that would increase windblown dust emissions. The level and extent of these impacts is highly uncertain." How uncertain? Could windblown dust be far worse than the predictions in the DEIS ? What is the relevance of this uncertain and missing information?

Chapter 3.2 Geologic Resources

C154 The DEIS dismisses any impacts on cave resources, including at the GBNP, with this statement on page 3.2-21: "Data do not exist to provide a connection of area caves to groundwater: therefore, caves are not anticipated to be affected by groundwater pumping." Isn't it also true that data does not exist to prove that there are no connections between area caves and groundwater? The Prudic and Glancy 2009 report suggest no connection, but with what certainty? BLM will be in violation of its legal mandates, including the Federal Cave Resources Protection Act of 1988 if it approves a project which destroys cave resources, because the applicant has not provided sufficient information to assure that pumping will not destroy caves.

C155 The DEIS provides no support for its rejection (on page 3.2-23) of incorporating climate change estimates into its impacts analysis on potential changes to future groundwater availability because specific long-term effects of climate change are not known. The draft often EIS discloses that specific long-term effects of pumping on water table drawdowns, subsidence, water sources, air quality, soils, water resources, wildlife, recreation, and socioeconomics are also "not known" because of a host of incomplete and uncertain information. BLM is arbitrary and capricious in not analyzing some impacts, while purporting to analyze other impacts, all of which are based on uncertain and incomplete information.

C156 On page 3.2-30, the DEIS presents totals of ground subsidence from pumping in the Proposed Action at full buildout plus 200 years by basin in Table 3.2-6. Totals include drawdowns by 10-20 feet to over 200 feet, with subsidence ranging from <1 to 1 foot to > 10 feet. A statement on the same page says: "As can be seen on Table 3.2-6, about 525 square miles may be at risk for 5 feet of subsidence or greater." The totals of square miles affected in the table range from 60 square miles of >200 foot drawdowns to 1,071 square miles of 50-00 feet of drawdowns. However, in Table 3.2-18 on page 3.2-48, totals of subsidence compared by alternatives states that the Proposed Action at full build out plus 200 years would total 525 square miles. How was the 525 square mile calculated? Please explain this inconsistency.

C157 On page 3.2-52, the DEIS states: "It is possible that subsidence caused by groundwater pumping could damage roadways and structures and could cause local alterations in drainage flow patterns. Because of the long time frames, there would be a long-term opportunity to monitor subsidence as it begins to appear, and to potentially alter pumping regimes to reduce the rate of subsidence...any subsidence measured at the soil surface is probably irretrievable." This may imply that the DEIS requires no mitigation for subsidence, including damages to public and private structures such as buildings and roadways.

If so, then we disagree with BLM's decision. Does the statement "there would be a long-term opportunity to monitor subsidence as it begins to appear" mean that BLM is not actually requiring long-term monitoring of subsidence? Is this a suggestion for academic research to document the adverse impacts of the GWD project on 525 square miles of public lands? What is the potential for "altering regimes to reduce the rate of subsidence" and how would this potential be realized by BLM decisions? If insurance is available to cover such damages, what is the cost of the insurance to property owners?

Chapter 3.3 Water Resources

C158 The DEIS fails to provide sufficient information on what is a "reasonable" drawdown of the water table. Is a greater-than 200 foot drawdown reasonable? Why or why not?

C159 The Executive Summary, page 5, states that "five basins are the primary source of groundwater that would be conveyed by the pipeline." What are the secondary sources? When are the impacts of groundwater development and pumping of "secondary" sources in other basins going to be analyzed?

C160 The DEIS fails to discuss the potential reliability of rural groundwater in the face of climate change induced changes in amounts and timing of precipitation, decreases in recharge to aquifers, higher temperatures and evatransporation and more extreme weather events. This missing information is critical, since water sources intended for municipal and industrial uses should be reliable.

C161 Does Figure 3.3.1-2 "conceptual groundwater flow system" show the interconnections between surface and groundwater?

C162 The DEIS fails to provide adequate information on existing and future water quality in the study area. Will pumping drawdowns exacerbate water quality problems? Will arsenic and other elements exceeding EPA drinking water standards require water treatment by SNWA? How much will the water treatment cost annually and over the life of the proposed project?

C163 Table 11 of the Executive Summary discloses substantial impacts of the GWD project on senior water rights, but the DEIS fails to provide any information on what administrative or legal remedies senior water rights owners have when faced with pumping impacts. That information should be included in the EIS.

C164 The DEIS fails to disclose the amount and location of all federal reserved water rights in the project study area. On page 3.3-65, the DEIS states: "The unknown nature of unadjudicated federal reserved water rights, regarding both locations and quantities of water, limit the ability to further describe water use of this type in the hydrologic study area." How can an analysis of GWD project impacts on federal water rights be conducted in this EIS without the complete identification of these water rights? How can the BLM protect its water rights if it cannot identify these rights? The DEIS fails to disclose the relevance of this incomplete and missing data.

Are all federal reserved water rights listed with the NSE's office? Are these all adjudicated? If federal reserved water rights are not listed on the NSE's website, does this mean that they are not valid? The DEIS also fails to disclose the location and amounts of all Public Water Reserves (PWRs) in the project study area.

C165 Does BLM have sufficient federal reserved water rights, PWRs, or other water rights to administer water-dependent BLM programs? If not, how is BLM going to secure adequate water necessary for it to comply with federal laws and mandates in protecting and managing public lands and resources, considering SNWA's proposal which would, in effect, monopolize all remaining unallocated water in five basins as well as considering the scale of the severe negative impacts of GWD project pumping on up to 12.5 million acres or 19,586 square miles of mostly public lands in eastern Nevada and Utah's West Desert?

Federal reserved water rights are usually determined in adjudication or through court actions. Asserting its reserved rights is necessary now to ensure enough groundwater remains in the five basins and the affected study area to maintain BLM programs dependent on water availability on public lands, including but not limited to: wildlife, grazing, wild horses, air quality, recreation, federally protected species, soils, and vegetation.

Chapter 3.4 Soils

C166 The analysis of pumping impacts on soils in the DEIS is weakened by incomplete and missing data. From Table 3.4-1, we found a footnote that states: "Portions of Coyote Spring, Las Vegas, Pahranagat, Spring (184), and Steptoe Valleys have no soils data or

C166 cont'd are limited to the more general STATSGO (State Soil Geographic) data. STATSGO are included in the table when more specific data are not available." GBWN is concerned that using less specific data provides a less than fully reliable analysis of soil impacts.

The DEIS should disclose the significance or relevance of the missing soil data on the impacts analysis. Does this less specific data affect the data presented in Table 3.4-6 comparing important soils parameters across alternatives, specifically revegetation potential and erodible soils disturbed? If so, then the missing data is highly relevant.

Chapter 3.5 Vegetation Resources

C167 Missing from the DEIS is information on how much groundwater BLM needs to sustain vegetation on public lands affected by groundwater pumping. Vegetation is the basis for BLM's programs including livestock grazing, maintenance of wild horse and burro populations and wildlife habitat, air and water quality protection, recreational programs, and protection of scenic values, to name some. This missing information should be presented in the EIS by categories, such as the cover types in tables for lands affected by the ROW and in groundwater development areas or "evatransporation areas" listed in Table 3.5-7 from which groundwater would be withdrawn by SNWA pumping. In addition, this information should be presented by basin, so that the public can understand vegetation water needs in areas smaller than the total study area.

Also missing is any information on how BLM will secure needed water for sustaining its vegetation resources considering the GWD project's huge water exportation targets in the five basins and also the direct impacts of pumping drawdowns in all the basins in the study area. How will the BLM retain enough water to sustain its vegetation resources?

C168 We also are concerned that the loss of groundwater, including less than the 10-foot drawdown outside the BLM's study, would lead to a corresponding increase in wildfires. Would the BLM require SNWA to cover the increased costs for state, local and federal land managers?

We additionally are concerned that the water drawdown could foster conditions amenable for the spread of invasive weeds. Again, would SNWA be financially responsible for the control of such invaders?

Chapter 3.6 Terrestrial Wildlife

C169 The DEIS drastically underestimated the impacts of SNWA's groundwater pumping not only on wildlife but also on the small subset of terrestrial wildlife which are dependent on surface water. We found that there are no quantified impacts for SNWA groundwater pumping on terrestrial wildlife, similar to those listed in Table 3.6-11 which, upon further review, only apply to impacts in groundwater development areas.

C170 Tables and figures in Appendix F3.6 do not supply acreages of habitat potentially affected by pumping drawdowns and the reader is left to guess what the impacts may or

C170 cont'd may not be. The DEIS fails to disclose specific quantified pumping impacts on acres of winter and summer habitat of pronghorn, Rocky Mountain elk and mule deer, Greater Sage Grouse, special status species, migratory and resident birds, and all other wildlife.

The DEIS fails to disclose any information about pumping drawdown impacts on predators or their prey (a critical part of ecosystem health) or to any wildlife other than a subset of animals living in the targeted basins. The DEIS also fails to disclose the relevance and significance of these incomplete and missing data.

C171 By not clearly disclosing potential pumping impacts over 200 years over a specific number of acres on specific wildlife and wildlife habitat resources, the DEIS fails to comply with explicit Congressional mandates in LCCRDA, Section 301 (b)(3) regarding wildlife: "(3) COMPLIANCE WITH NEPA.—Before granting a right-of- way under paragraph (1), the Secretary shall comply with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.), including the identification and consideration of potential impacts to fish and wildlife resources and habitat." By specifically mentioning potential impacts to fish and wildlife resources and habitat, we believe that Congress intends BLM to specifically protect these resources from adverse environmental impacts of the GWD project pumping.

C172 The DEIS also fails to disclose any information on how much groundwater and connected surface water BLM needs to sustain wildlife and wildlife habitat on public lands that would be affected by groundwater pumping.

Also missing is any information on how BLM will secure water needed for wildlife and wildlife habitat considering the GWD project's huge water exportation targets in the five basins and also the direct impacts of pumping drawdowns in all the basins in the study area. Since SNWA's GWD project would effectively monopolize any non-appropriated water over a huge area of eastern Nevada and western Utah, we want to understand how BLM will retain enough water to sustain its wildlife resources.

C173 We note that the BLM has a statutory obligation to protect rare species, including those protected by the federal Endangered Species Act. The DEIS fails to consider in detail the pumping impacts on such terrestrial species as the threatened Desert Tortoise and sensitive Greater Sage Grouse. Please note that the federally endangered Southwestern Flycatcher and Yuma Clapper Rail, and candidate species Yellow-billed Cuckoo, use riparian habitats especially in Lower Meadow Valley Wash and Pahranagat Valley which would be impacted by pumping drawdowns. Other species listed on pages 3.6-73 to 75, including pygmy rabbits, bats, gila monsters, terrestrial invertebrates and Great Basin National Park cave species (listed in Table 3.6-16) will be impacted by pumping drawdowns.

Chapter 3.7 Aquatic Biological Resources

C174 All of the alternatives in the DEIS show significant impacts to aquatic biological resources on public lands in eastern Nevada and Utah's west desert, but the DEIS fails to

C174 cont'd assess pumping impacts to aquatic biological resources over the entire area potentially affected.

The groundwater model used by BLM estimates impacts over a smaller geographic area than is estimated by other models that have been used to examine this problem.[18, 19, 20] This suggests that the very serious impacts to Aquatic Biological Resources described in the DEIS may be considerably understated. The EIS should address the issue of underestimating the geographic area over which impacts may occur.

C175 The effects of the project on Aquatic Biological Resources are controversial enough, and uncertain enough to anticipate a relatively high probability of litigation under provisions of the Endangered Species Act as a consequence of the proposed action. The EIS should evaluate the consequences (i.e. construction delays, increased costs) of this kind of litigation. In addition, the EIS should evaluate the high probability that the proposed action and all the alternatives (including Alternative A) are likely to result in violations of Federal law (Endangered Species Act).

The DEIS recommends using Alternative A (including the mitigation and monitoring identified in Chapter 3) as a starting point in reviewing the draft EIS. Alternative A proposes somewhat reduced groundwater pumping and a Monitoring, Management, and Mitigation process representing extensive and comprehensive efforts by SNWA and federal agencies to minimize environmental effects of the groundwater project. The DEIS and numerous other studies, analyses, and scientific papers (e.g. Bredehoeft and Durbin 2009, Deacon et al. 2007, Mayer and Congdon 2007, Patten et al. 2007, Walton 2011, and others) make it obvious that there will be far-reaching, permanent and extensive adverse effects to the Aquatic Biological Resources of the region. While the mitigation effort is commendable and may temporarily reduce some impacts to the Aquatic Biological Resources of the region, it is clearly incapable of avoiding or mitigating unacceptable environmental consequences to these Resources.

C176 The DEIS proposes a Monitoring, Management, and Mitigation (3M) process to avoid, minimize and mitigate groundwater pumping impacts to aquatic biological resources and special status species. However, this process is fundamentally flawed. An independent third party should be substituted for the current awkward, non-partial and non-scientific committee structure to assess monitoring results showing impacts and their intensity, what is causing the impacts, and the "mitigation" required. Triggers or thresholds for stopping pumping within short timeframes should be added to any 3M agreement, since any other "mitigation" than restoring the natural water regime would be ineffective to protect aquatic biological resources. Since the 3M agreements are all dependent on sufficient annual budgets, the DEIS should consider a lack of future funding (over 200 years) when it purports to assess the effectiveness of 3M. The over-reliance on ineffective proposed and voluntary mitigation (which may or may not be funded) in the DEIS will lead to significant violations of the Endangered Species Act.

C177 Other failings of the DEIS include the failure of inflexible mitigation "agreements" to expand their obligations to address pumping impacts on recently described species and

C177 cont'd species yet to be discovered. In addition, we know of no science-based support for the feasibility and effectiveness of the mitigation proposal by the proponent to create artificial water sources for aquatic species whose habitat is significantly impacted by SNWA pumping drawdowns.

Of particular concern is the oversight of the 3M program. The program is structured so that an Executive Committee comprised of one manager from SNWA and one from each of the DOI (Department of Interior) Bureaus will have final decision-making authority.

This structure ensures that, over the long run decisions will be biased toward delivering water to Las Vegas. This is because the SNWA representatives' primary job responsibility is to deliver water to Las Vegas, while DOI Bureau managers have responsibilities to implement the policies of the federal administration for whom they work. One example of the effect of DOI Bureau managers attempting to discharge their primary responsibilities is that people holding these positions have, in the past, filed protests with the Nevada State Engineer against the SNWA applications for groundwater rights, and under a different federal administration, requested withdrawal of those same

C178 protests. The EIS must propose a different final decision-making system for the 3M program, or explain how this inherent structural bias toward delivering water to Las Vegas is to be balanced in a way that will not lead to increased jeopardy for Special Status species, or increased probability that federal (ESA) and state (water law) laws and regulations will not be violated.

The Stipulated Agreements governing the 3M program include the following provision: "Any commitment to funding by the DOI bureaus or the SNWA in the stipulation, including specifically any monitoring, management, and mitigation actions provided for in Exhibit A is subject to appropriations by Congress or the governing body of the SNWA as appropriate."

C179 In the present political climate, funding from public sources is under extreme pressure. Long-term survival of the 3M program is therefore highly unlikely. The program as contemplated will make Aquatic Biological Resources in the area of impact increasingly dependent on continuation of the 3M program as the 3M program itself becomes increasingly unlikely to exist. The EIS must acknowledge that fact and explain how it is to be overcome.

C180 The 3M program, because of problems described as "Aquifer Response Time" (Walton 2011) or "time to full capture" (Bredehoeft and Durbin 2007), is capable of identifying groundwater supply problems that will get worse downstream in the groundwater flow system. It is not capable of preventing those problems from getting worse. The EIS must explain how the 3M program can overcome this inherent problem stemming from the physics of how groundwater flow systems function.

C181 The Aquatic Biology 3M program focuses on Special Status Species and game species. This approach overlooks the numerous recently described species whose status has yet to be evaluated, as well as the numerous as yet undescribed species occurring in the area of impact. Because numerous new species have recently been described from the area of

C181 cont'd impact, and biodiversity in the area is poorly known, the EIS must explain how the 3M program will deal with species yet to be evaluated or even discovered.

C182 Shoshone Ponds in Spring Valley and Big Springs in Snake Valley are two habitats specifically identified as aquatic habitats likely to disappear as a consequence of the proposed action. Alternative A will not change that outcome. Mitigation measures include the possibility of creating alternative or substitute aquatic habitats intended to replace those unavoidably lost. While such a strategy could conceivably be considered appropriate for Shoshone Ponds (an artificial habitat intended to help maintain one or more specific Special Status species), it cannot be considered appropriate for Big Springs. This is because Big Springs is a natural habitat presently supporting a rich biodiversity which includes Special Status species and probably includes some species as yet unrecognized, undescribed, or whose status has yet to be evaluated. The interactions and interdependencies helping to support those Special Status species and influencing the evolutionary trajectory of all species within that habitat are only incompletely known. At present it is inconceivable to even contemplate developing sufficient knowledge to permit construction of an artificial habitat that would come close to duplicating ecological conditions capable of supporting the biodiversity of any natural habitat/ecosystem. The EIS must recognize this distinction between mitigation for artificial habitats and natural habitats, including recognition of the fact that replacement of natural habitats cannot be accomplished.

C183 The Shoshone Ponds and Big Springs concerns are emblematic of a larger deficiency in the DEIS. Missing from the DEIS is any information on how much groundwater (and connected surface water) BLM needs to sustain aquatic biological resources on public lands that would be affected by groundwater pumping. Also missing is any information on how BLM will secure needed water for sustaining its aquatic biological resources considering the GWD project's huge water exportation targets in the five basins and also the direct impacts of pumping drawdowns in all the basins in the study area. Since SNWA's GWD project would effectively monopolize any non-appropriated water over a huge area of eastern Nevada and western Utah, we want to understand how BLM will retain enough water to sustain its aquatic biological resources.

Chapter 3.8 Land Use

All alternatives in the DEIS , except No Action, show environmental impacts from SNWA pumping which will undermine all existing land uses dependent on water on the public lands in the rural Nevada and Utah counties. Issuing a ROW permit to the applicant will give SNWA, in effect, a monopoly on rural land uses.

C184 Conversely, the DEIS fails to adequately assess the environmental impacts of the GWD project, including additional water deliveries of 78,755 afa to 177,655 afa on land uses in the Coyote Springs and Las Vegas Valley basins receiving the exported water.

Chapter 3.9 Recreation

All alternatives except No Action in the DEIS will have substantial negative impacts on water-dependent recreation on public lands in the project study area in Nevada and Utah. These include wildlife observation and hunting and fishing as well as the scenic values which are treasured by the public. The DEIS describes significantly transformed future landscapes after pumping drawdowns eliminate or substantially reduce phreatophytic vegetation and riparian areas in the five basins.

Even state wildlife management areas and national wildlife refuges, currently rich in springs, fish, wildlife and birds, are not immune from impacts from proposed SNWA pumping. BLM should not allow any other proposed use of the public lands to cause such undue and unnecessary degradation described in the DEIS as that caused by SNWA

C185 pumping. The DEIS fails to address GWD project drawdown impacts on state parks and state wildlife management areas. The only information we could locate on drawdowns were two springs in one state park in the moderate to high risk category in the appendices in a table F3.3.1-1A "inventoried spring list."

In a search for information on drawdown threats or estimates of declining spring flows in springs in wildlife management areas, we could find no information. These springs provide recreational fishing as well as habitat for federally protected species.

The DEIS fails to address the human loss of the special places within the more than 20,000 square miles of Nevada and Utah which would be affected by the pumping of groundwater by SNWA.

C186 Missing from the DEIS is any information on how much groundwater (and connected surface water) BLM needs to sustain recreational resources on public lands that would be affected by groundwater pumping. Also missing is any information on how BLM will secure needed water for sustaining its recreational resources considering the GWD project's huge water exportation targets in the five basins and also the direct impacts of pumping drawdowns in all the basins in the study area. Since SNWA's GWD project would effectively monopolize any non-appropriated water over a huge area of eastern Nevada and western Utah, we want to understand how BLM will retain enough water to sustain its recreation programs and resources.

Chapter 3.10 Transportation Resources

C187 The DEIS fails to adequately assess the impacts of increased short-term construction traffic on rural roads and highways and in urban areas receiving exported groundwater. It also fails to assess long-term unmitigated damages to rural roads from estimated subsidence over 525 square miles in eastern Nevada and western Utah.

Chapter 3.11 Mineral Resources

C188 The DEIS fails to assess impacts of the GWD project's on availability of water for future mining exploration, development, and ore processing. All mining operations require some amount of water, yet water availability will be decreased for future mining operations.

In effect, the DEIS fails to disclose that the GWD project will effectively preclude any future mining in the five targeted basins and in many of the other impacted basins in the project study area.

The DEIS also fails to analyze the similar effects of the GWD project on precluding future alternative energy development, especially in Dry Lake and Delamar Valleys.

Chapter 3.12 Rangelands and Grazing

C189 The DEIS fails to adequately assess the impacts of GWD project pumping on public land as native plants used for forage dry up and are replaced by invasive annuals and weeds in an area covering as many as 19,586 square miles.

C190 The DEIS fails to analyze impacts of pumping drawdowns of less than 10 feet. If adequately analyzed, these impacts could cover many hundreds of thousands more acres than disclosed in the DEIS , affecting the availability and quality of livestock forage on public lands. The DEIS should disclose how much carrying capacity would be reduced on each allotment affected by pumping drawdowns in the 40 basins in the project study area.

We note that the BLM would not allow livestock grazing to cause this amount of undue and unnecessary degradation of public lands which the Proposed Action and all scenarios in the DEIS would cause. Because of the widespread area and intensity of these estimated pumping impacts in destroying native vegetation (forage for livestock) and water sources, livestock permittees will be unlikely to comply with standards and guidelines for healthy rangelands. Apparently, the ROW applicant has no standards and guidelines for healthy public land ecosystems to meet in the GWD project.

C191 Missing from the DEIS is any information on how much groundwater and connected surface water BLM needs to sustain vegetation on public lands which is currently the basis for livestock grazing permits that would be affected by groundwater pumping. We prefer this information to be broken down by basin, so that the public can understand vegetation water needs in areas smaller than the total study area. Also missing is any information on how BLM will secure needed water for sustaining its vegetation resources considering the GWD project's huge water exportation targets in the five basins and also the direct impacts of pumping drawdowns in all the basins in the study area. Since SNWA's GWD project would effectively monopolize any non-appropriated water over a

C192 cont'd huge area of eastern Nevada and western Utah, we want to understand how BLM will retain enough water to sustain its vegetation resources.

Chapter 3.13 Wild Horse and Burro Management Areas

C192 The DEIS fails to adequately describe the summer and winter ranges and water holes which wild horses and burros use on public lands in the project study area. It also fails to disclose the extent of the impacts to wild horse and burros habitat needs by the GWD project pumping drawdown's effects on both native vegetation and water holes and springs. C193 It fails to describe current federal water rights used for wild horse water sources.

The DEIS identifies six Herd Management Areas (HMAs) in the groundwater development area, with the Eagle and Silver King herds being the most directly affected. The DEIS states that there are some 3000 acres of facility footprints, 24 miles of perennial streams and 292 springs within HMAs, and approximately 3.4 million HMA acres within the study region.

The Wild Horse and Burro Act of 1971 requires the BLM to manage horses in "thriving natural ecological balance." The Proposed Action and all the scenarios in the DEIS , except No Action Alternative, will cause undue and unnecessary degradation to public lands and water sources on which horses depend. As native rangelands desiccate and water sources dry up, the carrying capacity for wild horses will decline. Artificial water sources created by the applicants will not only not comply with WH&B Act requirements on wild horse management but also are unrealistic and unsustainable.

Negative effects upon horses from project construction include disruption on foaling, injuries, noise, and impacts to water sources. Groundwater pumping effects identified include loss of water sources, reduced forage, disruption of herd movement, and increased human conflicts (such as horse-vehicle collisions). Cumulatively, these effects will result in reduced carrying capacity of the habitat for wild horses in the region.

C194 A problem with the DEIS analysis of project impacts on wild horses is that no data is given on springs potentially affected by pumping in HMAs in Utah – Choke Cherry, Confusion, Conger, Kingtop, and Sulphur HMAs. There is no information provided on the number of springs in those areas, nor any data/analysis of the impacts upon horses if those springs are compromised by pumping. The Sulphur herd exhibits some traits and bloodlines thought to be descendent from the Spanish Barb horses brought to America by Spanish explorers in the 1600s (BLM 2009).

The DEIS should consider additional measures to assure protection and continued viability of this special herd.

C195 The DEIS notes serious impacts upon wetland/meadows areas that are typically sub-irrigated or spring-fed (8,000 acres in Siver King HMA). The forage available in these areas is important for herds. Mitigations proposed appear inadequate to address reduction or loss of this food source.

The DEIS minimizes the effects of pumping on springs that wild horses depend upon (just one verified spring in the Eagle HMA, none in Antelope or Silver King HMAs, 3.12-21) This simply does not square with other estimates in the DEIS of the number of springs being dried up or having flow greatly reduced due to pumping.

There is ample evidence from past experience in the Great Basin that when springs frequented by wild horses dry up, that the horses are at significant risk of death by dehydration (e.g. Needle Springs).

The proposed mitigation of using "artificial" water sources such as stock ponds and bubblers may not be adequate in these circumstances, as horses may not move to those new sources quickly enough. This mitigation may also prove difficult to achieve if groundwater drawdowns prove to be greater than anticipated and deeper wells must be drilled to provide artificial water. Intensive (daily) monitoring of herds should be contemplated should critical springs dry up.

C196 Missing from the DEIS is any information on how much groundwater and connected surface water BLM needs to sustain vegetation on public lands which is currently the forage basis for wild horses and burros that would be affected by groundwater pumping.

We prefer this information to be broken down by basin, so that the public can understand vegetation water needs in areas smaller than the total study area.

Also missing is any information on how BLM will secure needed water for sustaining its vegetation resources considering the GWD project's huge water exportation targets in the five basins and also the direct impacts of pumping drawdowns in all the basins in the study area. Since SNWA's GWD project would effectively monopolize any non-appropriated water over a huge area of eastern Nevada and western Utah, we want to understand how BLM will retain enough water to sustain its vegetation resources, and its wild horse and burro resources.

Chapter 3.14 Special Designations and Lands with Wilderness Characteristics

C197 The DEIS fails to identify all lands with special designations in the project study area, including state parks and wildlife management areas. The DEIS fails to include adequate information on lands with special designations in eastern Nevada and Utah's west desert and to adequately disclose the impacts of GWD project construction and pumping on these lands and their resources, including recreation and wildlife.

C198 Nothing in BLM laws and regulations would allow the BLM to sacrifice the values and management of Areas of Critical Environmental Concern to GWD project impacts. The Proposed Action and all of the scenarios in the DEIS , except the No Action Alternative, fail to comply with the mission and management of designated wildernesses and ACECs, Desert and Pahranagat NWRs, Great Basin National Park and Lake Mead NRA.

C199 What are the costs of the mitigation proposed for the Shoshone Ponds ACEC (page 3.3-121) including "improving" the existing well, drilling a new well and installing a pump to maintain flow to the ponds for the foreseeable future regardless of groundwater drawdown? What are the maintenance costs, the replacement costs, and the energy costs to run the pump for up to 200 years or more? This proposed "mitigation" appears futile since the DEIS shows significant GWD project pumping impacts on the lands and woodlands surrounding Shoshone Ponds which will eventually be surrounded only by invasive weeds and annual plants.

C200 Missing from the DEIS is any information on how much groundwater and connected surface water BLM needs to sustain water-dependent resources, vegetation, scenery, wildlife, recreation in designated areas on public lands. We prefer this information to be broken down by basin, so that the public can understand vegetation water needs in areas smaller than the total study area. Also missing is any information on how BLM will secure needed water for sustaining its vegetation and water-dependent resources in specially designated areas considering the GWD project's huge water exportation targets in the five basins and also the direct impacts of pumping in all the basins in the study area. We want to understand how BLM will retain enough water to sustain its vegetation and water-dependent resources in designated areas.

Chapter 3.15 Visual Resources

C201 The Proposed Action and all the scenarios except the No Action Alternative in the DEIS will result in a vastly changed landscape in the five basins targeted by the GWD project and many of the 35 other basins in the project study area. The DEIS fails to assess the significance of these changes. The changes violate visual resource management objectives in its Resource Management Plans as well as BLM's underlying laws and regulations regarding conserving visual resources. For example, how would (Table ES-12) an 86 percent reduction in evapotranspiration affect Snake Valley's visual resources?

C201 cont'd The visual resources analysis is deficient. The section of text and related Appendix only address the visual impacts of the right of way, roads and power lines. In order to fully and accurately disclose the impacts of the proposed action and alternatives, the EIS should provide visual simulations at 75 and 200 years of the various alternatives from Key Observation Points (KOP). Visual resources are the lifeblood of tourism in the Pony Express Territory, at Great Basin National Park, and in the region. The lack of KOPs depicting the die-off of vegetation, presence of dust, and the extent of subsidence make it appear that BLM does not want the public to see the extent of destruction (comparable to Owens Valley.)

C202 For example, the DEIS should contain a KOP visual simulation from the Wheeler Peak road over Snake Valley after 200 years of pumping for each alternative. The same approach should be taken for a view from east Snake Valley and from Garrison. Special attention should be given to views from the Great Basin National Park into Spring Valley. Similar KOP simulations should be done for the other valleys. Full disclosure in the DEIS should include what the public and the Department of Interior needs to see and consider – the treasured valley and mountain vistas after 200 years of pumping and air quality impacts.

C203 Because the visual simulations of the drying up of the project area were not done and disclosed to the public during the DEIS review, we call upon BLM to complete the simulations and including them in a new DEIS or SEIS which will be subject to full public review and hearings.

Chapter 3.16 Cultural Resources

C204 The DEIS fails to adequately describe cultural resources in the project study area and to disclose the significance of GWD project impacts to cultural resources. The DEIS fails to disclose the impacts of groundwater drawdowns and the resulting widespread subsidence and loss of vegetative cover to prevent erosion and dust storms. The DEIS fails to require effective mitigation for these impacts on cultural resources. We do not believe that the trust responsibility of the federal government to the tribes adversely impacted by the proposed GWD project can be abandoned. The DEIS shows that Proposed Action and all the scenarios, except the No Action Alternative, would result in unacceptable impacts on cultural resources. BLM cannot approve a proposed project with this level of unmitigated and undue and unnecessary impacts to cultural resources on public lands.

Chapter 3.17 Native American Traditional Values

C205 The DEIS fails to provide any mitigation, required or voluntary, for systemic changes to native vegetation caused by the GWD project's pumping and desiccation of extensive public lands in the targeted area. How will tribes who are dependent on the listed native plants carry out their traditions as the native plants are replaced by invasive annuals and weeds?

C205 cont'd The DEIS fails to identify how many potential Traditional Cultural Properties (TCPs) are located within the five targeted basins and the other 35 basins affected by pumping drawdowns. We strongly believe that BLM cannot select the Proposed Action or any of the scenarios in the DEIS which would destroy TCPs before they are designated by the federal government.

C206 Missing from the DEIS is any information on how much groundwater and connected surface water BLM needs to sustain vegetation on public lands that would be affected by groundwater pumping. Vegetation is the basis for Native American traditional uses, both of plants and also of the animals which depend on native plants. We prefer this information to be broken down by basin, so that tribal communities and the public can understand vegetation water needs in areas smaller than the total study area.

C207 The DEIS ignores the traditional Native Americans ties to the land, the plants, and the animals in their historic homelands. Once lost because of GWD project impacts, traditional values will be forever compromised.

Chapter 3.18 Socioeconomics and Environmental Justice

C208 The Socioeconomics section fails to comply with the CEQ requirement to "take a hard look" at the factors under review. (In *E.I. DuPont de Nemours & Co. v. Train*, the court interpreted "hard look" to mean that "assumptions must be spelled out, inconsistencies explained, methodologies disclosed, contradictory evidence rebuffed, record references solidly grounded, guesswork eliminated and conclusions supported in a manner capable of judicial understanding." The courts have further defined the information required for a "hard look" to mean that it does not require perfection, but should be based on information that is available and not at an exorbitant cost.

C209 The DEIS fails to adequately analyze the impacts of the GWD project on socioeconomics and environmental justice, especially the pumping drawdowns on the rural and urban communities potentially losing water and gaining water. White Pine County basins would supply 75 percent of groundwater targeted by SNWA, yet the socioeconomic impacts analysis is minimal, quite perfunctory.

C210 The DEIS has failed to supply a reasonable cost estimate of the project, even a perfunctory analysis of ability for the SNWA to pay for the cost of the project, many of the long-term costs (noted in more detail in the environmental consequences part of our response), and the impact of those costs on residential and business ratepayers in Clark County. That information was provided by the SNWA's analysts to the Nevada State Engineer in June 2011 (Hobbs, Ong 2011), and put the cost at more than $15 billion, including more than $8 billion simply to pay to finance the project. The total is notable in that previous cost estimates supplied by the SNWA to federal and state oversight agencies was in the $1 billion to $3.6 billion range.

C211 Among the conclusions of the analysts was that residential ratepayers would face a near tripling of water rates, while businesses would see their rates more than double. For an

C211 cont'd urban economy with among the highest rates of unemployment and economic distress in the country, metropolitan Las Vegas would be severely stressed by this additional costs – especially for a project that may not be necessary.

C212 The DEIS also has failed to take a hard look at the existing socioeconomic conditions and GWD project impacts in the five targeted basins as well as in many of the additional 35 basins in the project study area by not incorporating significant information that is readily available.

C213 The size and scope of the project does not negate the need for BLM to take a hard look at existing conditions and potential impacts. For instance, baseline information on recreation and tourism fails to include NDOW information on hunter days by hunt unit and species as well as angler days. The BLM and USFS provide information on recreation visitor days and local counties can provide lodging tax revenue by month land by property. Other missing available information is on agricultural impacts on local economies, published in reports and studies by the University of Nevada, Reno Agricultural Economics Department and Cooperative Extension Service. Missing is consideration of White Pine County's planning documents or Annual Comprehensive Economic Development Strategy.

C214 The DEIS also fails to disclose the effects that SNWA's water rights applications in 1989 have had on suppressing growth and development in White Pine and Lincoln Counties from 1989 to 2011.

C215 Table 3.3.2-6 discloses substantial adverse impacts to water resources of the Proposed Action. What are the economic impacts to residents and rural communities of either totally losing water rights, both surface and groundwater, because of pumping impacts? What are the estimated costs of having to deepen wells to adapt to "reasonable lowering" of groundwater tables? What are the estimated costs of senior water rights holders to legally challenge SNWA's taking of their water rights and seeking redress in the courts? How many senior water rights holders will lose their livelihoods as a result of GWD project pumping drawdowns? What are the effects on rural communities of the loss of water-dependent livelihoods? How much loss over how much time would lead to the collapse of rural communities?

C216 The DEIS fails to analyze the direct and indirect impacts to areas in Southern Nevada which may gain up to 176,655 afa of groundwater as a result of NSE and BLM actions on applications for water rights and requests for ROW permits. These include "growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems " (40 CFR 1508.7).

Our calculations show that an additional 176,655 afa would support a population increase of 1,766,550, assuming that a typical household of 2.5 persons uses an average of 1/4 afa annually.

C217 Conversely, whether one uses the varying population estimates in the SNWA Water Resources Plan cited in the DEIS, or the 2011 Hobbs, Ong Financial Feasibility Report, or the lower population growth estimates in the State Demographer's 2010 forecast, the DEIS does not disclose the costs (financial, environmental and sociocultural) associated with Southern Nevada accommodating population increases which would be supported by rural groundwater. These would include (but not be limited to): how many or much more freeways and roads, traffic and traffic accidents, schools, policy and fire protection, hospitals, parks, sewer systems, additional pollution of Lake Mead would occur as a result of the proposed GWD project?

C218 In addition, there is no information in the DEIS on either the costs of the project or the impacts of funding the project on the public, either as rate-payers or taxpayers.

C219 The DEIS fails to disclose impacts of the GWD project pumping drawdowns on agricultural, recreation and tourism, essential parts of the economies of Nevada and Utah counties and communities, including Lund, Preston, and Sunnyside in White River Valley. What mitigation is proposed for adverse impacts of the GWD project on the socioeconomics of the targeted basins?.

C220 The DEIS fails to disclose the impacts of housing and other needs of GWD project construction workers. There is very limited housing available in rural communities along the proposed ROW corridor. How much temporary and permanent housing would be needed? How long would it be needed? What are the impacts of a large, but temporary housing demand on local housing availability and pricing? Will SNWA provide food for the workers, or will they be dependent on local markets? What is the capacity for local markets to handle this demand? What are the impacts of worker demands or needs for other services, such as medical care and emergency medical service, police and fire, county health and road departments, the court system and other county and city agencies? What are the costs of the GWD project demands on these local services and how will they be paid?

C221 The Socioeconomic analysis is weak because the data used to describe social and economic conditions in each area are limited. The DEIS relies heavily on readily available published data regarding the affected counties without exploring further to understand what the data mean, and the DEIS contains several errors and omissions of information.

The socio-economic section including Appendix F is lengthy, but it is called upon to analyze five geographic areas, each with its own unique social and economic setting; a proposed action, five Alternatives A through E, and the No Action Alternative; and four distinct project elements (construction, operation of the pipeline and transmission system, construction and operation of the water development segment, and long term impacts of pumping). The time frame begins with the filing of applications for water rights in 1989 through the present to construction between 2012 and 2023 and then pumping which may be initiated in each of five hydrographic basins at some point between the completion of construction and 2049 (Snake Valley). The impacts of the pumping will extend for 200

years or more. Given the scope in geographic size and diversity, project elements, and time frames, it would be impossible to provide an in-depth analysis of each geographic area for each project element under each alternative. The size and scope of the project does not negate the need for a "hard look" at the existing conditions and potential impacts.

C222 1. The discussion does not provide an adequate baseline of existing economic conditions and contributions for White Pine County or for the Spring and Snake Valley areas.

The information needed to comply with CEQ requirements is available. For example, the discussion on Tourism and Recreation uses the Nevada Department of Wildlife statistics on hunting and fishing license sales, Great Basin National Park visitation records, and a national survey to define daily expenditures. The Nevada Department of Wildlife has substantial information readily available on hunter days by hunt unit and species as well as angler days. The BLM and Forest Service provide information on recreation visitor days, and the White Pine County Tourism and Recreation Board can provide lodging tax revenue by month and by property. All of these sources are available without cost and most are available online. In the discussion about agriculture's economic contribution, the primary source of information is the White Pine and Lincoln County tables from the 2007 Census of Agriculture. The University of Nevada Reno, and Cooperative Extension Service publish reports and studies detailing the economic contribution of agriculture by County and in-depth analysis of economic impacts of agriculture. Both outdoor recreation and agriculture were identified as key elements of the economic base for White Pine County in general and Spring and Snake Valleys yet none of the information was used to try to develop a better picture of the existing economic conditions as a baseline for analyzing the potential socioeconomic impacts of the proposed project.

2. A review of Chapter 6 and the references cited for Appendix F 3.18 shows that only two references are cited for White Pine County, an interview with the County's Economic Diversification Coordinator in 2009 and the Tourism and Recreation Board/Chamber of Commerce List of Accommodations. The Draft does not cite White Pine County's planning documents or Annual Comprehensive Economic Development Strategy which include discussions about economic history, current economic conditions, population projections, economic trends, needs and priorities, and future development.

3. The document cites published data and draws conclusions about employment, personal wealth and poverty levels, housing, and public services that do not necessarily reflect actual conditions in each of the rural counties. Follow up contacts with County personnel and community leaders could have helped to explain what the data actually mean.

C222 cont'd

4. The document omits important areas of socioeconomic discussion including impacts on traffic during construction and impacts on court systems if law enforcement activity increases. Information on these topics is readily available.

5. The Socioeconomic section makes statements and draws conclusions without citing references.

6. In some instances the document attempts to offer one explanation for factors for rural areas. Each of the areas has its own economic and social setting. What may be true for one may not help to explain conditions in another area. An example is the explanation that lower average personal wealth in rural areas is manifested in higher levels of poverty. In Lincoln County, 16.5 percent of the population is at or below poverty level. In White Pine County, wage and wealth averages are lower but the County has historically been at or below state and national poverty levels. The breakdown by income category shows the lower average wage levels indicate that the County has fewer wage earners at the highest salary levels.

C223 The Socioeconomics discussion does not adequately address unknown factors essential for analysis of potential impacts.

1. No where in the socioeconomic section is there an acknowledgement that there are unknown or incomplete data that is essential to fully understand and analyze impacts of groundwater development projects and long term ground water pumping on the socio-economic conditions in the affected areas. The time frames for the proposed project are too long and there are too many unknowns to allow adequate analysis of potential impacts. The proposed project is not "ripe for analysis."

2. The application for the Right-of-Way was received in 2004 and the Draft was released to the public in June 2011. The time period to develop the Draft includes one of the most severe economic declines in the country's history and Clark County has been one of the hardest hit areas in the nation. The socioeconomics discussion shows inconsistency in how to address the updated information available during the time it has taken to develop the draft and uncertainty in how to interpret the impact the recession will have on future growth of the Las Vegas Valley. There needs to be a stated and consistent approach to new information available since this section of the Draft was written and there needs to be an independent review of the impacts of the recession on the growth anticipated for Las Vegas Valley that is stated in the document and subject to public review and comment.

3. The NEPA process does not require speculation but it is required to make an informed judgment on estimated future impacts based on trends and the probably effect of potential decisions. The analysis of potential long term socioeconomic impacts and cumulative impacts is inconsistent between urban and rural areas.

C223 cont'd Potential rural development is limited to projects that have begun the NEPA process. The Draft does not include all probable or potential development in White Pine County. The BLM has applications for initial stages of research on wind energy projects in the Spring and Snake Valley areas and there have been a number of inquiries and applications for other types of renewable energy production throughout White Pine County including solar and pumped storage indicating further development of renewable energy development is probable; during the past two years, the White Pine County Commission received an application for a zone change to accommodate recreational development in Spring Valley, and the Spring and Snake Valley area have supported a wide range of agricultural activity in the past including orchards, livestock, and alfalfa cube production. The Draft accepts the projection of continued growth in the Las Vegas Valley based on previous population figures in spite of the impact of recent economic decline, reports of excess housing, and the fact that new industrial development, construction, and casinos, needed to support that growth have not yet been proposed. The discussions of social conditions and attitudes are subjective and not properly referenced

C224 If community attitudes are important to understand the project impacts, it would be beneficial to conduct an independent study of attitudes about the project to be included in the appendix material. The methodology for such a study is available. While it might represent an additional cost, it would be minimal compared to the costs of water modeling and other studies conducted for the State Engineer's hearings and EIS processes.

C225 The discussion regarding population projections needs further explanation of the methodology and limits of the statistical techniques used for the projections.

The document uses the State Demographer's population projections which are the official projections for all Nevada Counties. In addition, it cites the CBER population projections for 2009.and notes the 2010 census does not agree with the projections of the State Demographer. There are several projections of population growth available for Clark County as an urban area. There is disagreement among the studies in whether the growth rate experienced by Clark County during the past decade would have continued at that rate for an extended period in the future independent of the impacts of the recession since 2008 or access to water resources from Central Nevada.

The document needs to include a discussion about the methodology for the development of the projections. In the State Demographer's case, a regression analysis is used looking at the past to predict the future. The technique will predict growth for Clark County because Clark County was growing during the historical period used as the baseline. The technique will predict losses for an area like White Pine County because the County experienced a mine closure during the baseline period. The projections cannot predict emerging economic activity and changes in economic base. In White Pine County's case, for example, the projections predicted a steady decline during the period the Ely State Prison opened, there was new mining activity, and the County was growing. In recent

C225 cont'd years the State Demographer has worked to overcome this deficiency by requesting information about anticipated projects or potential changes in the County's economy and population. These have been factored in to the projections. The County worked closely with the State Demographer while doing its 2006 Water Resource Plan based on a 50 year planning period. During those discussions he acknowledged that the process used for the projections was not well suited to long term analysis.

An explanation of the techniques and the limits of population projections could be included in the appendix material and would help the reader understand the figures used. In addition, the document would benefit from an independent and comprehensive review of population growth and projections not only in Nevada but in the Southwest.

As previously noted, the DEIS inadequacies should make a ROD impossible. GBWN has identified numerous deficiencies and errors that need to be addressed.

Page-by-Page Review

Specific instances of errors and the need for improvement in the data and analysis are listed in the page by page review of the document below:

C226 **Page 3.18.2**: Discussion on communities and settlements in the study area lists "the emerging Coyote Springs development on southern Lincoln/northern Clark counties."

There needs to be an explanation of what Coyote Springs is, its history, what is there now, and what is proposed. The role of Coyote Springs and its dependence on the SNWA groundwater program to supply water has been discussed to a limited degree in the media, but SNWA has never explained how its proposed pipeline project and the plans to develop a new city of 159,000 homes are related.

C227 **Page 3.18.3:** *"Lincoln, Juab, and Millard counties all experienced long term population growth while White Pine County experienced a pattern of cyclic contraction and expansion tied to mining and the opening of a state prison."* The fluctuations in the mining industry caused fluctuations in population. The opening of the Ely State Prison in 1989 increased population and that has remained constant.

C228 **Page 3.18.5 (first paragraph):** Discussion regarding Clark County population declines due to the recession. The statement notes that the State Demographer anticipated a decline in population of 50,000 that was not reported in the 2010 Census but other statistics suggest that a substantial out-migration occurred. The statement should cite the other statistics it is referring to. As noted above, there is a need for an independent and comprehensive review of population trends and projections in light of the impacts of the economic recession on Las Vegas.

C229 **Page 3.18.9, Table 3.18.6, White Pine County population projections change from 2008 to 2010:** The change from growth to population decline is due to the fact that the State Demographer was including the population projections for both White Pine Energy

C229 cont'd Station and Ely Energy Center in the 2008 projections and subtracted them when the projects were put on hold and factored in the potential closure of the Robinson mine when Quadra published information on the projected mine life.

C230 **Page 3.18.13 and 14, 2007 Census of Agriculture**: The discussion doesn't indicate if the data for the 2007 Census of Agriculture reflect the purchases and operation of ranches in Spring Valley by SNWA.

C231 **Page 3.18.14, Last bullet point:** *"Although farming and ranching are not major income generators on an accounting basis, agriculture is an important element of the economic base of the four counties."* There are reports published by UNR and the Cooperative Extension Service on the value of agriculture by county as well as studies on various segments of the agricultural industry in Nevada that provide additional understanding and documentation of the economic benefits of agriculture. The document emphasizes the reliance of the rural areas and especially Spring and Snake valleys on agriculture. It would be a stronger discussion if it included a more in-depth review of the information and analysis that is available rather than just including the White Pine and Lincoln County tables from the 2007 Census of Agriculture.

C232 **Page 3.18.16:** The concerns listed regarding SNWA's ownership and operation of the ranches in Spring Valley do not include the concerns that the management of the ranches is not based on production but preservation of the groundwater for other uses and the concern that SNWA is unfairly competing with local ranchers. These concerns have been raised in a number of public meetings that were attended by SNWA staff and have been documented in minutes.

C233 **Pages 3.18.6, 17, and 18 Tourism and Recreation:** The discussion on tourism and recreation in rural areas is not comprehensive. The information used includes a national survey, reports of hunting and fishing licenses sold, and visitation at Great Basin National Park. Additional information available through Nevada Department of Wildlife includes reports of hunter days per species and by Hunt Unit, fishing creel census data that can identify angler days by specific location (including the creeks in Spring and Snake Valleys) and hunting activity per County by species including upland game birds, waterfowl, small game, and trapping activity. By working with the Department for access to individual results from big game hunter report cards submitted by tag recipients each year, hunter days could probably be identified for specific areas rather than hunt units. The Department enjoys a very high response rate on the report cards because hunters must pay $50 to apply for a tag the following year if they do not turn in their report card. The discussion of the seasonality of rural tourism does not acknowledge that big game hunting seasons in White Pine County span a period from early August through December. This discussion also omits revenue generating activity related to wildlife in the Spring and Snake Valley areas including hunting guide revenue, taxidermy business, and land owner tags. Historical data would probably show the revenue lost from land owner tags when SNWA purchased the ranches in Spring Valley because they are not eligible for the tags. Both the Forest Service and BLM maintain records and professional estimates of recreation visitor days and the State Parks Division has information on

C233 cont'd visitorship at its parks by county of origin. Both the NDOW and State Parks data show that the vast majority of recreation use of White Pine County facilities comes from Clark County visitors.

C234 The discussion in Section 3.18 does not include lodging tax data or attendance at special events from the Tourism and Recreation Board. Although it requires some assumptions including average room occupancy and average room rates, the lodging tax revenue can be used to determine the number of visitors per month. The discussion does not include business travel. According to the White Pine County Tourism Master Plan completed by Tom Harris at University of Nevada-Reno, business travel accounts for a substantial portion (35 to 45 percent) of the room rentals in the County and it is year round rather than seasonal.

C235 Spring and Snake Valleys play a vital role in the White Pine County's tourism and outdoor recreation and with minimal effort, many of their contributions could be quantified. This was done for Spring Valley in the report of socioeconomic activity submitted for the State Engineer's hearings in 2006 and it could be updated and expanded to improve the DEIS . Without the additional information, the economic benefit of tourism in the rural areas is understated in comparison to the wealth of information available on Clark County tourism.

C236 **Page 3.18.19 Personal Income and Poverty:** *"The consistently lower incomes in the rural counties manifest themselves in a higher incidence of poverty and low income as measured by individual or family income relative to a defined threshold."* This blanket statement about the variations in personal income and poverty levels from urban to rural areas appears to try to offer one explanation for the unique economic conditions in the various rural areas included in the study area. In fact, White Pine and Lincoln County have very different economic conditions and population characteristics that determine personal income levels. White Pine County's average weekly wage has historically been 80 to 85 percent of the statewide average and at the same time, the percentage of households living at or below the poverty level has been equal to or slightly below the state and national average. Income data from the Census includes the prison population and the impact of the low income status of inmates can be derived from isolating institutionalized populations (which also includes the residents of the White Pine Care Center) and comparing household to family data. Even with the prison population included in poverty level data, White Pine County (10.8 percent) is relatively close to Clark County (11.0 percent) and below the state and national averages while Lincoln County is much higher at 16.5 percent. White Pine has a relatively small transient population which is usually explained by the colder climate. Some Lincoln County officials (economic development and CDBG contacts) have complained in the past that part of their low income population is migrating from Clark County because of the lower cost of living. White Pine County's income data reflect a larger moderate income population with fewer in the highest and lowest income brackets reported while Lincoln County may reflect a larger incidence of low income households.

C237 **Pages 3.18.20 and 21, Housing data:** The discussion on vacancy rates acknowledges that the vacancy rate in 2000 reflects the recent BHP closure at Robinson mine. This figure needs to be updated to reflect the current tight housing market, lack of rental housing, and housing prices. The statement on Page 3.18.21, "*The limited scale of new residential development in White Pine County suggested by the net change in housing units masks population growth as many incoming households were able to find existing, affordably priced housing,*" needs to be documented and a reference cited since it is inconsistent with the understanding of the County's housing market based on the information from the County Assessor and reports from area employers. Property sales were tracked by the County's economic development program from 2005 through 2010. Based on the County Assessor's records, the single family home market was very active and prices were increasing from 2005 through 2010 and experienced a slight decline in selling price in 2010. In tracking number of housing units, the economic development program staff discussed the Annual Report of Housing Units with the County Assessor and found that the small net increase is misleading. In recent years, some previously reported housing units were taken off of the report because they were substandard and considered uninhabitable. There were actually more new housing starts than the net increase reflects because of the loss of the substandard units. In several public discussions with employers including the annual Comprehensive Economic Development Strategy (CEDS) and the Workforce Housing Assessment completed by Tom Harris, UNR, area employers including the school district, BLM, Ely State Prison and the Robinson mine reported that their recruitment of new employees was hindered by inadequate affordable housing in the area. The problem prompted Quadra to finance extension of infrastructure and a housing development in Ruth to meet the needs for their employees.

C238 **Table 3.18.13: S**hows a vacancy rate of 15 percent in Clark County in 2010. According to the Las Vegas Housing Market Conditions report from CBER, there were 31,674 vacant units listed for sale in the Greater Las Vegas area during the first quarter of 2011 reflecting an excess supply of 10,203 housing units above the estimated normal vacancy rate for the area. The number new housing starts in the area may reflect real estate speculation.

C239 **Page 3.18.21, Temporary Housing**: "*Project related needs could compete with the traditional uses and markets for those units…and in Ely due to the community's efforts to promote its tourism and convention trade.*" This is a documented impact of large construction projects including the prison and construction of the mill at Robinson mine. It impacts general tourism and convention trade but is most severe when it impacts special events. The community spends years and thousands of dollars creating special events and building the clientele for them. When participants can not get motel rooms for the events because they are full of construction workers, they tend to stop going to the event. If the impact continues for a period of years, they may not come back at all. The other issue identified with previous large construction projects is that the community does not want construction workers' RV's scattered all over public land near the construction site. This was a significant problem with the construction of the prison with the prime

C239 cont'd contractor from Utah and workers commuting on a weekly basis. This issue has been identified several times but was not addressed in the discussion.

C240 **Page 3.18.22, Section 3.18.6, Public Facilities and Services, Local Government:** Third paragraph on water providers omits the McGill Ruth GID. McGill and Ruth are part of the Ely population center and will be impacted. The McGill Ruth GID is also omitted on Table 3.18.15 (page 3.18.23).

C241 **Page 3.18.23, Table 3.18.16, Public Service Providers:** White Pine County entry should note that White Pine County now has full time fire and emergency medical service personnel supplemented by volunteer services. This also needs to be updated in the narrative discussion on Page 3.18.24.

C242 **Page 3.18.26:** "*Lincoln and White Pine Counties are more dependent on intergovernmental transfers than are the other three counties.* The intergovernmental transfers should be identified. Part of the dependence comes from federal PILT and SRS funding due to the high percentage of federal land in the rural counties, part of it comes from the state's system of CTX tax distribution and guaranteed county status to provide a base of sales tax revenue for rural counties, and part of it is from SNWA's PILT agreement on the ranches in Spring Valley.

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Pages 3.18.27-29, Social Organization and Conditions:

C243 1. The introductory paragraph references Appendix F 3.18, however, the Appendix offers little additional information or documentation of the summary statements in the narrative.

C244 2. The section identifies Baker and Ely as the two communities that may be impacted by the ROW construction. The impacts will be County-wide and the list should include Ruth and McGill as part of the Ely population center as well as Lund and Preston. The entire County will feel impacts on public services and the commercial center in Ely. The White River Valley is an important element in the County's agricultural industry to the extent that the livestock and ranching interests are impacted in the County, the White River area including Lund and Preston will be impacted. The research done for the State Engineer's hearings on Cave Valley showed that White River produces winter feed used by ranchers throughout the County.

C245 3. Snake Valley (page 28) Lehman Caves is misspelled.

C246 4. Coyote Springs (page 29) there needs to be further description of what Coyote Springs is, its history, the extent of development and population there now, and the anticipated population at full development.

C247 5. Las Vegas Valley: The discussion focuses on the benefit of tax revenues generated in Las Vegas Valley for the state as a whole and links it to the need for

C247 cont'd

other areas of the state to support growth in the Las Vegas area to generate tax revenue. This discussion may be misplaced because it is not consistent with the format and information offered in the discussion of other communities in the study area. The discussion does not relate the revenue generated to the state expenditures in the Las Vegas Valley nor does it include the concerns of Las Vegas Valley residents with the negative impacts of continued growth.

C248

Pages 3.18.30-31: The introductory paragraph for Social Conditions references the Socioeconomic Technical Report of Appendix F 3.18. The Appendix offers little additional documentation of citizen input on the project and does not itemize sources for summary statements in the section.

C249

Pages 3.18.31, Social Conditions, item 2: The discussion of perceived risks does not include concerns of Las Vegas residents about negative impacts of continued growth. Item 4 discounts the comparison to Owens Valley because of the differences between the two projects but does not explain what those differences are, and Item 6 states that the risk of water shortages and curtailment of growth is unacceptable but does not identify the interest groups.

C236 cont'd

Page 3.18.34, Discussion on poverty levels in rural areas: Same concerns as the discussion on poverty on page 3.18.19.

C250

Page 3.18.37, Facility maintenance
The fact that a staffing plan for maintenance and operation is not available at this time makes it difficult to determine the economic benefit of Alternatives A through C for rural areas.

Local governments may receive some tax benefit from the maintenance and operations activity but without sites identified and a staffing plan in place the benefit cannot be determined. Without an agreement in place, there is no guarantee that local governments will receive tax benefits or that contractors will be required to purchase and hire locally or have deliveries made in the affected counties to provide tax benefits for local governments. The tax benefit is uncertain if SNWA uses its Municipal status and purchasing power to ensure it has minimum operating costs.

Local governments will be called upon to meet short term and long term impacts but without agreements in place, it is uncertain whether the tax revenues received will cover the cost of additional services.

C239 cont'd

Page 3.18.41, Alternatives A-C: Same concerns with temporary housing as noted for 3.18.21.

C251

Page 3.18.42, Table 3.18.24: Point 5, summarizes the potential benefits of some of the workforce spending money in the area strengthening local business, adding jobs, and pressuring employers for higher wages. White Pine County's experience with large construction workforces that commute home each weekend is that expenditures locally

C252 cont'd are limited. Workers stock up on groceries, etc. when they are home for the weekend and bring it back with them. In addition, as new mining activity and other construction projects (SWIP North, wind energy projects, and other renewable energy activity) becomes a factor, additional service sector jobs may be difficult to fill and increased housing demand will increase rent and purchase prices.

C252 **Page 3.18.43, Table 3.18.24 continued:** Point 2. *Impacts on general government services such as the County Clerk and municipal utilities would be modest.* This does not account for the fact that increased law enforcement activity also increases occupancy and services needed in the jail and court activity which in turn impacts the County Clerk because in White Pine County, the Clerk's office provides the Court Clerk services.

Point 6, Law enforcement, needs discussion on the impact on county jails, court systems, and court clerks.

Points 7 and 8, Emergency Services: Makes the statement that Baker EMT's are not over taxed with current demands. This needs to be verified and documented. The demands on emergency services are understated. Demands can not be evaluated just on the basis of the number of potential calls but must include the costs of being prepared for an emergency at the construction site. A commuting workforce and an increase in over-sized load truck shipments will add to the potential for traffic accidents that require emergency services.

White Pine County has recently been involved in detailed discussions with Spring Valley Wind and Great Basin Transmission (north) to determine the needs for emergency services during their construction projects. The resulting Development Agreements can help provide an understanding of the needs for emergency services during construction. Similar discussions with county emergency services personnel are required to determine the full level of potential impacts.

Page 3.18.44, Table 3.18.24 Continued

C253 Point 2, Tax revenue for local governments. How will vendors be required to establish business licenses and points of delivery within rural counties? Who will ensure that this happens? How is this consistent with the mitigation identified in the Transportation Resources section (3.10) that local deliveries of materials will be minimized to improve highway safety?

Point 8, Same concern as Point 5.

C254 ACM 12.2, SNWA's PILT agreement with White Pine County excludes the state portion of property tax and real property transfer tax. The $10,000 annual payment was an estimate by SNWA and White Pine provided documentation showing that the $10,000 did not cover the lost revenue. SNWA refused to reconsider the amount. The PILT agreement depends on approval by the SNWA board and is not guaranteed.

C255 ACM 12.1, 3, and 4: Clark County prevailing wage rates are generally higher than prevailing wage rates for White Pine County and this would benefit White Pine residents employed on the construction project. The statement could be stronger if it added Clark County prevailing wage rates and zone rates for all portions of the construction project.

Page 3.18.47,

C256 SE-1 should include operation of the jail, court system, and court clerk costs.

SE-3 should note that the PILT agreement excludes the state portion of taxes.

SE-5 should include a provision that rural counties have input in the socio-economic monitoring report to identify and monitor impacts to local communities.

Page 3.18.55, Table 3.18.32, Summary of impacts for Construction of Alternative E: Same issues as other Alternatives.

C257 **Page 3.18.58, Table 3.18.34, Alignment Options:** Alignment Option 1 parallels the line from North Spring Valley to Gondor Substation. Is SNWA's transmission is going to use Gondor substation? If so, what impact would that have on the available transmission capacity at Gondor and its capacity to help support renewable energy projects in White Pine?

C258 **Page 3.18.61, Section 3.18.2.8, Groundwater Development/Pumping:** Identification of wells, collector pipelines, power lines, and future facilities to be studied under the tiered process. These are actually Connected Actions that need to be analyzed in the same document as the ROW.

The discussion does not include potential impacts for future renewable energy, and recreation development which could occur in White Pine County including Spring and/or Snake Valleys. These projects are not speculation but are documented in applications submitted to the BLM, an application for a zone change for recreational development in Spring Valley, and historical agricultural activity.

Page 3.18.62: If pumping is not anticipated in Snake Valley until mid-century, the project will have impacted the area for over 60 years (since the filings in 1989) before water might be used from that basin.

C259 **Page 3.18.63:** "*Potential project-related social and economic effects of groundwater drawdown are assessed based on review of projected drawdown areas and range of drawdown for each alternative* <u>*considering existing land use and economic activities within those areas*</u>*"* The project is based on projected future growth of the Las Vegas Valley including the potential for new commercial, residential, and industrial development that has not yet been proposed. The analysis should include the potential for new commercial, residential, and industrial development within rural areas that may not have been proposed to date.

C259 cont'd The discussion should provide a chart of the actual local and non-local job generation for each phase of construction. Short Term construction for development will generate 125 jobs for each of the two 3-year phases for Spring Valley, 35 percent anticipated from rural areas and 30 percent by non-locals relocating to the area, approximately 44 jobs for rural residents for each phase and 37 for non-locals relocating during construction. Of the 105 jobs for Snake Valley, 37 jobs for rural residents and 31.5 for non-locals relocating. County and community service providers should be asked to comment on how these figures might impact their ability to deliver services.

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Page 3.18.65, Table 3.18.37:

C260 Point 2, Demand on general government services, modest: This does not acknowledge that increased demand on law enforcement will also impact the Court system, District Attorney's office, and County Clerk's Office.

Point 7, Competing demands on the local business community would create conflicts: Based on the employment figures on page 62, the additional impacts would result in 30 to 32 non-local workers relocating to the area for the construction. This statement should be reviewed with Baker area business owners to determine how the added workforce might impact them and their customers.

Page 3.18.66 Table 3.18.37 continued:

C261 Point 1, impacts on law enforcement and emergency services is likely to be modest—one large incident could create a hardship for the law enforcement and emergency services personnel, equipment, and budgets. Part of the impact on law enforcement and emergency services is the need to be prepared for a major incident.

Point 2, How will construction agreements be developed with contractors to ensure that maximum tax benefits go to the state and to the local governments within the project area?

Point 5, Should be Snake Valley, not Snake River Valley

C262 **3.18.67, Introduction to Groundwater Pumping effects:** The statement shows that the impacts will be long term, even after pumping ceases and at large distance from the pumping areas, that they are not reversible and that they cannot be predicted. If the impacts could be severe with no means to correct them, the statement is in conflict with SNWA's continued reassurance that if negative impacts are observed in one area, they will stop pumping and shift to another well to minimize impacts.

Table 3.18.37:

C263 Point 1: Disincentives for future economic development in some rural areas, including development on public lands identified for potential disposal in the Ely RMP: This

C263 cont'd statement should read curtailment of future economic development potential including renewable energy projects that require water resources, recreational development, and value added agricultural development in Spring and Snake Valleys.

The public land identified for disposal in the Ely RMP is supplemented by the 45,000 acres of land for disposal identified in the White Pine Conservation, Recreation, and Development Act of 2006, The 45,000 acres exceeds the total for disposal in the Ely RMP and will require an amendment to the RMP. The additional land has not yet been identified and could include land in Spring and Snake Valleys.

Point 4: Effects on air quality, the level of impact should be quantified and not subjectively labeled as Minor.

Page 3.18.68:

C264

1. Negative impacts to the majority of agricultural land in Spring and Snake Valleys will have a significant negative impact on the economic contributions of agriculture in White Pine County. The socioeconomic report done for the State Engineer's hearings on Spring Valley in 2006 showed that Spring Valley accounts for approximately 25 percent of the County's economic output from agriculture.

2. The potential for negative impacts on BLM land for disposal could be more than the 4,918 acres identified in the RMP, it could include additional acres as identified in the 2006 White Pine County Conservation, Recreation, and Development Act.

3. The current transfer fee is based on $6 per acre foot. In the past, there have been attempts through the State Legislature to increase the fee. The statement should reflect the potential for a change in the fee based on actions of the State legislature.

4. The 8,000 afy of water from the Spring Valley Ranches will require action by the State Engineer before it can be used for the Groundwater Development Project.

Page 3.18.69 (Table 3.18.38 continued):

C265

1. Transfer fees are based on the water pumped from the basin for inter-county, inter-basin transfers and without being able to predict pumping schedules, local governments can not count on the revenue for on-going expenses.

2. The potential revenue losses based on curtailment of agricultural activity and reduced property values would potentially exceed any increased revenue due to project activity.

C265 cont'd

3. White Pine County's current agreement with SNWA for the PILT payments includes any future purchases of private property. This is not a guarantee and requires approval from the SNWA Board putting White Pine County at risk.

4. Long term impacts of subsidence on economic development could also include damage to private facilities, increased insurance costs, and could cause lack of development due to concerns about structural integrity.

5. Potential for and impacts of major accidents or structural failures of the pipeline or transmission system and required actions to minimize the potential needs to be discussed in more detail than bullet point in Table 3.18.38.

Remaining points in the chart: Same concerns about summary statements without documentation.

C266 **Pages 3.18.70-71, Discussion of indirect effects:** The project would result in loss of future development potential and population gains in Spring and Snake Valleys and White Pine County as well as declines in current population and economic activity. The groundwater pumping is not anticipated in Spring and Snake Valleys until mid-century. This is too far in the future to adequately analyze the direct, indirect, and cumulative impacts of the project. The proposed project development and implementation in northern Spring and Snake Valleys is not "ripe for analysis." If this analysis is to follow with the future tiered EIS process for well development in Spring and Snake Valley, it is too late. It would be not be feasible or wise to construct the pipeline and transmission system for Spring and Snake Valleys and then not develop the wells to use it.

C267 **Page 3.18.72:** If the water is used to replace the Colorado River water used by Las Vegas Valley, then it would not support growth and the arguments about additional tax revenues for support of the state would not be valid.

Additionally, the review of southern Nevada's planning documents shows that the assumptions for the need for additional water to support growth and avoid slowing the pace of growth are based on a variety of conditions nationally and globally for over decades in the future. At the same time, the City of Las Vegas, using the Clark County REMI population forecast for 2008-2050 and Census data projected that population growth in Clark County would slow considerably and predicted, "a return to more realistic, consistent rates of growth than that which occurred in the 1990's and continued through 2007." There needs to be an independent and comprehensive review of population data and projections for Las Vegas and the Southwest before to fully understand potential growth and water needs.

C268 **Page 3.18.73:** Key findings of LUTAQ modeling include increased growth, development, and transportation as they are currently occurring in the Las Vegas Valley will result in increased traffic congestion, air pollution, and deterioration of air quality. There is information available about the negative impacts of continued growth and

C268 cont'd development in the Las Vegas Valley that should be included in the analysis of the proposed project.

C269 **Page 3.18.72-75: Review of Clark and Lincoln County planning documents and codes:** White Pine County's planning documents should be included. The White Pine County Water Resource Plan (2006), Land Use Plan (2008), and Public Land Use Policy (2008) have all been adopted by the Regional Planning Commission and White Pine County Commission and included as components of the County's Comprehensive Master Plan by resolution. They all include long term planning direction, predictions, and guidelines. White Pine County's annual CEDS document contains a detailed analysis of socio-economic changes during the past year, development activity, and an in-depth review of needs and priorities. The full document is done every 5 years (2006, most recent) and provides a full overview of the County's economic history, current situation, and potential for the future. There is no reference to the County's planning documents or CEDS documents in the Socioeconomics section.

C270 **Page 3.18.76:** Foreseeable economic impacts should include the recognition that impacts began when the applications were filed in 1989

Mitigation Measures: Who will monitor and ensure that the mitigation measures are implemented? Rural local governments need an equal "seat at the table" to ensure that rural needs are adequately addressed. The CEQ requires that the NEPA analysis addresses the probability and effectiveness of proposed mitigation strategies.

C271 **Page 3.18.77, Residual effects:** Residual effects are assumed for 200 years of pumping and beyond. How can the DEIS begin to predict the residual effects? How can the conditions and needs be identified given the changes in technology, policy, and global conditions for that period of time? There is no mention of unavailable or incomplete data that prevents complete analysis of the residual effects at this time. Under the discussion of the tiered process (Chapter 1) it implies that the effects of groundwater pumping will be considered through the Tier 1 EIS and that the subsequent EIS processes will be directed at the location of the wells and connector pipelines and power lines. At the same time the discussion says that new information will be considered and analyzed during subsequent EIS processes. Does this include the long term impacts of groundwater pumping? The CEQ says that NEPA analysis can not be done on a piecemeal basis. The Tier 1 DEIS should be held to a standard of full analysis of the long term, residual effects of the groundwater pumping.

Point 3: The statement that residual social and economic changes in Lincoln County and the Las Vegas Valley could arise in conjunction with <u>growth enabled but not caused</u> by the water conveyed via the pipeline is "splitting hairs". It still needs to be analyzed.

Pages 3.18.78-3.18.88, Groundwater development impacts for Alternatives A, B, and C:

These sections essentially duplicate the previous discussion and the concerns noted above for pages 3.18.66 through 3.18.88 apply to the discussion for Alternatives A, B, and C.

C272 **Pages 3.18.88-92, Alternative D:** The discussion on Alternative D includes the same concerns on data and methodology as listed above. The proposal for Alternative D would be consistent with the SNPLMA and LCCRDA requirements to issue the ROW in Clark and Lincoln Counties. If selected, there would still need to be monitoring and mitigation of impacts in White Pine County due to the drawdown in south Spring Valley.

Pages 3.18.93-96, Alternative E: The discussion on Alternative E includes the same concerns on data and methodology as listed above.

C273 **Page 3.18.97, Table 3.18.49, comparison of alternatives, Socioeconomic Long Term adverse effects in the rural area**: "Yes and Potentially Significant" does not seem to be consistent with the socio-economic statements on Table 4.0-1. The statements on 4.0-1 are limited to the increased costs for irrigation.

Page 3.18.98, No Action: The introductory paragraph implies that BLM cannot select the No Action Alternative because of Congressional Action. If so, the additional discussion that denial of the ROW could result in a second ROW application from SNWA and starting over seems to be speculation.

Page 3.18.100: The quote regarding power projects is not reported accurately. The discussion was about two coal fired power projects, not several and the reasons they were put on hold did not include slowed demand due to the recession.

The long term development potential for White Pine may include the closure of the Robinson mine based on the published mine life, but it should also show the expansion of Bald Mountain Mine, and other mining and renewable energy projects that have applications in varying stages of consideration by the BLM.

Page 3.18.101: The discussion that with the No Action alternative, SNWA would have to look at other alternatives for water resources to allow the Las Vegas Valley to grow is inconsistent with the previous discussions that the water made available from the project might enable growth but not cause it so there is no need to analyze the impacts of the growth.

Long term economic development is based on current economic activity in all of the study areas even though the time frame is identified for over 200 years and is beyond the definition of reasonably foreseeable. Economic development activity in White Pine County is limited to mining, outdoor recreation, and agriculture and excludes renewable energy projects and other potential industrial activity.

C274 **Page 3.18.103-104, Cumulative Impacts:**

C274 cont'd

1. Page 104, two major US Highways, need to add State Route 318 which would have some increase in traffic.

2. The statement that unemployment rates in rural areas have been higher than those in Clark County is no longer true. During the recession, unemployment in White Pine County has been much lower than the unemployment rate in Clark County.

C275 **Page 3.18.108:** The document acknowledges that the long term time frames for the project exceed a time period of effective cumulative analysis. The cumulative analysis is limited to Spring and Snake Valley. If the entire County will be impacted, the cumulative analysis should include projects in the entire County. There is no mention of the BARCAS study conclusions that it is likely larger amounts of water flow eastward from Steptoe to Spring and Snake Valleys than previously thought. With that finding in mind, the cumulative analysis should be extended to Steptoe Valley as well.

C276 **The Socio-Economic and Environmental Justice Section, 3.18, makes statements and draws conclusions that are not quantified, thresholds for making statements are not identified, and statements are not documented as to the information, source, and reasons for the conclusions.**

C277 **Page 3.18.1, Introduction:** *" A number of hydrographic basins included in the groundwater model extend outside these five counties; small portions of these basins, such as western Beaver County are at risk for long-term drawdown. However, those areas are excluded from the socioeconomic study area due to their remoteness, sparse population, and limited areal extent of the affected areas, which together limit the potential for appreciable socioeconomic impacts."* If the basins are included in the groundwater model and may be impacted by the groundwater pumping and drawdown, what are the thresholds used to determine that there was no need to include them in the socioeconomic analysis?

C278 **Page 3.18.8, Section 3.18. 1.2, Population and Demographics:** Projected Long-Term Population Growth in the Study Area: *"The projections for the two rural Nevada counties, which portray little or no growth, are viewed with skepticism locally, particularly in Lincoln County where public land sales have created an expectation of long-term growth.* The statement needs to cite the resource, who reported skepticism in White Pine and Lincoln counties?

C279 **Page 3.18.10, Section 3.18.1.2, Population and Demographics:** Projections in Lincoln County do not include allowances for any substantial level of future development in Coyote Springs or Toquop—"*Lincoln County estimates that these developments could ultimately increase local population by 250,000 (Lincoln County, no date).* If this statement is going to be included, it needs further explanation. Is this a reputable source? What other Lincoln County document support it? Why doesn't the State Demographer include the potential for the projects in the state population projections? Both projects fit the definition identified for cumulative impacts. If the two projects could result in substantial population growth, they need to be included in the analysis of impacts and

C279 cont'd cumulative impacts. There is a brief paragraph on general potential impacts if construction on Coyote Springs moves forward but no mention of potential construction of Toquop in the Cumulative Impacts portion of 3.18.

C280 **Page 3.18.12, Section 3.18.3, Economic Overview:** *"An adjunct of the relatively small size of the rural economies is a lesser degree of diversity, which makes them more susceptible to economic distress and less resilient to adverse changes affecting one or more elements of their economic base. The lack of economic diversification and associated recognition of the limited options for expansion facing the rural counties raised concerns regarding fiscal distress from potential future cutbacks or the loss of existing employers such as the Nevada Test Site and Robinson Mine."* This statement needs to be supported with historical data regarding the economic resiliency of both urban and rural areas in the study. The statements regarding the potential closure of the Robinson Mine need to be documented. The projected mine life has been published several times and it would not be difficult to include a specific time frame for potential closure and reference for this statement. The discussion should also include current expansion and development of new mining projects which may offset the loss of the Robinson mine if and when that happened.

C281 **Page 3.18.16, Section 3.18.3, Economic Overview:** (Sales of ranches to other development interests including SNWA) *"Such sales raise economic and social concerns within the local communities including the effects of potential exportation of appropriated water rights,…"* How was this determined? The concerns about the purchase of ranches by both SNWA and NV Energy have been reported locally several times. This statement should be documented and the specific concerns identified.

C282 **Page 3.18.18, Section 3.18.3, Economic Overview (Discussion on Tourism):** *"As noted above a sense of tenuousness exists across the rural counties regarding their economic future.."* This statement needs to be quantified and documented. If this is taken from one or more interviews with residents of the area, the interviews should be cited.

C283 **Page 3.18.29, Section 3.18.7, Social Organization and Conditions:** (Discussion on Las Vegas Valley) *"as goes [Clark County/Las Vegas/the Valley] so goes Nevada." Although reaction to this perspective ranges from disdain to pride, informed observers describe it as a fundamental recognition of Nevada's economic and fiscal realities."* This statement needs to be documented. Who are the informed observers and how has the reaction from disdain to pride be identified?

C284 **Page 3.18.31 and 32, Section 3.18.7, Social Organization and Conditions, Item 2:** (Attitudes and opinions in rural areas and in the Las Vegas Valley regarding perceived risks of the project and perceived risks of inadequate water supplies in Las Vegas) the discussion in Section 3.18 references Appendix F. The discussion is a general narrative about perceived risks and concerns. The discussion in Appendix F notes that the study reviewed a number of sources including the State Engineer's hearing records, the scoping meetings, public meeting records, newspaper articles, and interviews. Appendix F notes

C284 cont'd that "*There has been no widespread public referendum on the proposed water development project in general or any proposed public funding for the project. Such a referendum promotes public dialogue about a project, identifies issues, interest groups, and stakeholders supporting and opposing a project, and produces a result that can be viewed as an affirmation or denial of a project. Given the lack of such a referendum, the only indication of attitudes and opinions about the proposed project among the general Las Vegas Valley population is limited to newspaper polls, the most recent of which indicates that slightly over half of the Clark County population supports the proposed project. The SNWA board of directors, which represents local government and water purveyors, also reaffirmed its support for the project in 2009.*" (Appendix F, 3.18.53.) The newspaper poll does not seem to be cited in the references for Appendix F. A review of the public comment at the Spring Valley hearings would show that most of the public comment made from Las Vegas in support of the project was from public officials and the real estate development and construction industries. If it is important to include social attitudes in the discussion in Section 3.18, to be accurate, there should be an independent study of community attitude about the project to support the conclusions.

C285 **Page 3.18.43, Table 3.18.24:** "*The Baker community responds to emergency services needs associated with tourists, park visitors, and other highway travelers but such needs currently do not overtax capabilities.*" This needs to be documented. Who determined this?

C286 **Page 3.18.69, Table 3.18.38**: last three items regarding community attitudes in Lincoln County and Las Vegas Valley, need to be documented somewhere in the document.

C287 **Page 3.18.82:** "*The effects on population, employment, labor force, and economic structure would result in many corollary effects on social organization and conditions in the affect communities. In the rural communities these would include continuation and potential elevation of existing project related attitudes, opinions, and associated social effects including political conflict, social dissension, community discord, and personal distress.*" The statements regarding community attitude need to be documented either in Section 3.18 or Appendix F. How has this been determined?

C288 **Page 3.18.90:** "*Not all residents of the rural areas oppose the project. For these stakeholders, implementation of Alternative D may generate mixed reactions. On the one hand it could be seen in an unfavorable light in that it provides for substantially less conveyance capacity which potentially could limit intra-county water transfers. At the same time the fact that implementation of Alternative D provides some conveyance capacity for any future intra-county water transfers could be viewed favorable.…*" This statement is footnoted but the footnote does not pertain to the statements about community attitude. The statement on Page 3.18.90 should specify that it is talking about Lincoln County residents.

C289 **White Pine County Infrastructure and Community Capacity Limitations**

Other impacts to White Pine County have been noted by GBWN associates, specifically pertaining to the county's infrastructure and community capacity. The DEIS discussion of infrastructure available in White Pine County to support the impacts of the proposed Groundwater Development Project is minimal. Section 3.18 and Appendix F regarding Socioeconomic Impacts are focused on potential impacts on law enforcement and emergency services, potential demand for classroom space within the School District, local government revenue from the project, whether the Ely area can provide the utilities and housing for construction crews, and potential impacts on the Baker water and sewer system; the transportation section devotes minimal attention to impacts to County roads; and the Public Health and Safety section is devoted to hazardous materials issues. Specific areas omitted from the Draft are discussions about solid waste disposal during the construction and operation phases of the project and adequate discussion about County roads.

The DEIS relies heavily on published data and the references cited shows a lack of effort to collect information from local sources to gain a full understanding of existing conditions and potential impacts. Appendix E, Conceptual Plan of Development defers discussion of construction and operation practices to future planning documents including the Construction Plan, Traffic Management Plan, Dust Control Plan, and Emergency Response Plan (listed in Appendix A of the Conceptual Plan of Development, Page A-2). There is no assurance that the future planning documents will adequately address the concerns with County Roads, Solid Waste Disposal, and the community's capacity to absorb the impacts of the project. Without adequate detail in the Draft EIS and Conceptual Plan of Development (Appendix E), it is not possible to determine if the existing conditions and project impact have been adequately analyzed.

A review of the availability of County infrastructure supports the overall conclusions of the socioeconomic review that the Draft and appendix material do not meet the requirement to "Take a Hard Look" at the existing conditions and potential impacts and that there is so much incomplete and unavailable information that the project in its entirety cannot be fully analyzed in a single EIS document and is not Ripe for Analysis.

It should be noted that the review of White Pine County's infrastructure as it might be impacted by the SNWA Groundwater Development Project is based on the existing conditions as of 2011 not the conditions that may exist at the time of construction. Construction, Operation, and Long Term Groundwater Pumping may not occur in White Pine County for several years and there is no way to predict what the conditions may be at the time the project is initiated in White Pine.

White Pine County, the City of Ely, and the McGill Ruth GID do not have staff and financial resources needed to monitor and respond to impacts of long term groundwater pumping.

C290 A short review indicates that the impacts of the construction and operation of the GWD would place severe strain on the White Pine County infrastructure:

1. The Baker water and sewer systems have the potential for the most direct impact from the project during construction as well as from long term groundwater pumping. The system is relatively new compared to the other systems in the County and has sufficient capacity to meet the current demands plus increased demand in Baker. The proposed project has already impacted the system's capacity to grow because applications for water rights submitted by the Baker GID water rights applications were junior to the SNWA applications in Snake Valley. The GID has since been gifted senior water rights to secure the water source for the system. The GID has devoted substantial effort to expand the system's service area. This expansion would require additional wells. The primary concerns noted by the GID are: 1) the springs identified as a backup water source are vulnerable if SNWA proceeds with the project in Snake Valley and 2) the GID's well is not deep and is susceptible to the impact of the long term ground water pumping proposed by the project.

   The Draft EIS acknowledges the potential negative impact on the Baker system due to long term ground water pumping, and the GID would have to hire someone to help monitor and respond to the impacts. The impacts of long term groundwater pumping and the additional costs of monitoring the GID's water supplies could result in increased costs for the system's rate payers.

2. The Ely Municipal Utilities System and McGill-Ruth, GID may see impacts in increased use during construction when motels and RV parks may be filled to capacity. Based on the current systems and their existing use, Ely Municipal Water System and the McGill Ruth GID have the capacity to absorb the additional temporary population during construction.

   The capacity of existing systems, especially the Ely systems, could be reduced due to system failures and inadequate funding for repairs. A Regional Water and Sewer Preliminary Engineering Report (PER) for Ely, Ruth, and McGill was completed in 2009. The study evaluated the existing water and sewer systems and provides a detailed accounting of the system deficiencies, needed repairs and improvements to meet current standards, and cost estimates. Due to the age of the Ely systems and lack of adequate revenue to implement consistent maintenance, repair, and improvement schedules, the Ely water and sewer systems are out of date and in need of repair. The City has had to rely heavily on grant funding to repair and upgrade small sections of the system each year and it does not have the resources available to make major improvements to the system as a whole. Two of the most critical issues for the Ely system are under-sized water lines and inadequate fire hydrants in portions of the city. The PER (2009) shows that the McGill-Ruth GID systems are in relatively good condition due to an aggressive program of upgrading both water and sewer systems as well as collection, and distribution lines.

C290 cont'd

3. With the conclusions reached in the BARCAS study, there is reason to believe that Steptoe Valley could be impacted. The residents of the Lund/Preston area testified in the Nevada State Engineer's hearing that they had concerns that White River Valley could be impacted by pumping in Cave Valley. The water supplies for Ely, McGill-Ruth, Cherry Creek, and the Lund-Preston area need to be monitored to determine if there are impacts from long term groundwater pumping.

4. The Draft EIS and the PER were both written during the time the City of Ely was negotiating with the Robinson Mine regarding the dewatering program, loss of Murry Springs as a primary water source for the City, and conversion to wells. Potential impacts to water supply need to evaluated based on potential impacts to the well system, the dewatering program and its impact on water resources in the vicinity, and the recovery period following completion of the dewatering program.

5. Historically, Ruth's water system relied on the Ward Mountain Springs, there was no back up water source, water supply was limited and subject to fluctuations in the springs, and residents were restricted in water use during the summer. The GID has worked diligently to provide adequate water supplies for Ruth with the construction of a water line from Ely to Ruth to provide a back up water source. In recent years Ely faced water supply issues with Murry Springs and was not able to provide water to Ruth. The GID coordinated with the Robinson mine for assistance with back up water sources.

6. McGill originally drew its water from Duck Creek Basin via a pipeline owned and operated by Kennecott. With the Kennecott closure of the smelter in McGill, the GID converted the water system to wells. McGill has sufficient water supply at this time to meet the needs of the community and the GID is exploring the potential of a pipeline from McGill to Ruth that could provide a back up water for that community. The pipeline could potentially serve residential needs in the area north of Ely. If that pipeline was developed, negative impact from long term groundwater pumping on water supplies in McGill could be detrimental to the GID system as a whole.

7. The Lund and Preston areas currently operate on private wells and septic systems. A negative impact to the water supplies due to long term groundwater pumping could impact the private wells, irrigation, and fire protection resources for the two communities.

8. The community of Cherry Creek relies on a private water system that could be vulnerable if there is a negative impact to the water supply in Steptoe Valley due to long term groundwater pumping. The system is small with relatively few rate payers and the owner is not eligible to apply for federal or state grants and loans to help finance improvements and develop new water sources.

C291 GBWN and particularly the organization's associates in White Pine County are concerned that the DEIS does not address other significant issues that will arise during construction or operation. These concerns include Solid Waste, Communications, Transportation

Solid Waste: A review of Chapter 2 and Section 3.18 shows no mention of solid waste disposal during construction or operation. Appendix E, Conceptual Plan of Development, Table 1.2, (Page 1-10) does not include state permits for Class III Landfills for construction waste. The Conceptual Plan of Development indicates that: 1) waste will be properly disposed of off-site in a state approved sanitary landfill, A 1.40, and that construction crews will be provided with portable sanitation units that will be maintained by a private sanitary service, A 1.41. (Page A-9)

White Pine County is served by a regional landfill operated by the City of Ely Municipal Utilities System and it has a franchise ordinance in place for garbage collection. The City of Ely has agreed to operate the landfill until it reaches its capacity and then development of a new landfill site and operation of the landfill will be the County's responsibility. Landfill capacity and volume has been a concern for some time and the City has taken several measures including recycling and permitting of a new Class III segment of the landfill to extend capacity. Based on current estimates the existing landfill will approach full capacity and a new site will need to be developed within the time period prior to potential construction in Spring and Snake Valleys.

The Draft should address solid waste disposal for the project during both construction and operation. The general ACM's related to waste disposal are vague and do not provide enough information to allow analysis of potential impacts. Does SNWA plan to use the County's regional landfill, permit and operate Class III landfill sites for construction waste adjacent to the construction sites, or will it be collecting and transporting the construction waste out of those areas? What is the anticipated volume of construction and operations solid waste and will it exceed the capacity of the existing regional landfill? If SNWA is going to permit and build new landfill sites for construction waste, there needs to be a plan in place for proper operation and closure of those sites. If SNWA is going to truck the waste out of the area, will the construction waste be transported as backhaul by trucks delivering materials or will there be additional traffic due to garbage trucks that needs to be included in the transportation analysis and plan. Where will be waste be taken and how will the additional construction waste impact the capacity of the eventual landfill site?

Portable Sanitation Units: For construction of linear and remote portions of the project relying on portable sanitation units, does SNWA envision using a Las Vegas based sanitation company or a local company close to the construction site? Where will the sanitation company take its trucks to dispose of the waste? If this is going into the local landfill, it will impact the capacity of the landfill. If it is going to be trucked somewhere else or back to Las Vegas, the additional traffic needs to be included in the transportation analysis.

C291 cont'd **Communications**: The draft refers to several methods of communications including radio, cell phone, and internet. It should be noted that currently there is minimal cell coverage in portions of Spring and Snake Valleys.

Transportation:

1. The only mention in the Draft of use of County Roads in White Pine County is the use of the Cave Valley Road from Ely into Cave Valley and there is discussion about construction of new, unimproved roads access roads.

2. It should be noted that streets in Baker are the responsibility of the County Road Department and increased traffic in Baker will impact the County.

3. Table 4-1, Page 4-10 of the Appendix E indicates that construction may occur in Cave Valley in 2016-2017. The Cave Valley road is gravel through south Steptoe Valley until the intersection with the road to Ward Charcoal Ovens and then it is a dirt road over Bullwhack Summit and through Cave Valley. There has been residential development of 5-acre lots south of Ely in the area served by the northern portion of Cave Valley Road and there are several parceled 5-acre residential lots that could be developed prior to construction activity. With the existing traffic there is significant dust on the gravel portion of the road. If there is increased traffic due to construction vehicles on the road, there needs to be a thorough discussion of dust control. The soil conditions on the unimproved southern portion of the road lead to extremely dusty conditions that reduce visibility during the summer. The road becomes muddy and road conditions deteriorate due to rain any time of the year and especially during the winter and spring. The Draft needs to address road conditions and the fact that increased construction traffic will encounter and create additional problems for the use of the road from November to June.

4. The County has County road specifications and an ordinance requiring a road agreement for maintenance and repair due to use of heavy equipment on County roads. (Title 7, County Code). There is no mention of coordination with County road requirements in the Draft. Appendix E, Table 1.2 does not include any mention of a permit or agreement with the County for use of heavy equipment on County roads.

5. While the construction plan may be limited to the Cave Valley Road, there is potential for increased traffic on County Roads throughout the County for incidental use by construction crews, access to materials and supplies, and use by construction workers. This additional impact is not included in the Draft discussion of transportation. The County maintains over 2,000 miles of streets and roads, its budget is inadequate to provide maintenance to all of the roads in its system, and under the current formula, the tax revenue from motor vehicle fuels tax will not increase. With increasing costs and demands for services in the outlying areas, the County does not have resources to absorb increased demands for maintenance due to the use of County roads during construction

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6. Speed Limits. Title 11 of the County Code addresses speed limits within White Pine County. Appendix E refers to construction vehicles complying with County ordinances for posted speed limits (A 1.29) and establishing a 25 mph speed limit for its vehicles on unposted, unimproved roads within the construction site (A 1.36), both on Page A-7. There are several unposted, unimproved roads throughout the County including County roads, BLM, and Forest Service roads. Title 11 identifies a maximum speed of 50 mph on unimproved roads. The Draft EIS and Conceptual Plan of Development need to address coordination speed limits and requirements for construction vehicles with County ordinances.

7. Appendix E refers to construction of 12 foot wide unimproved roads and 20 to 26 foot wide improved roads. Emergency response vehicles require adequate width, road surface, and turning radius to get into and out of a construction site for fire and emergency medical services. The Draft, Conceptual Plan of Development, and future planning documents need to address the ability of emergency vehicles to respond safely to emergencies that could occur anywhere within the construction sites and the requirement to coordinate road construction with the County Fire Chief and in compliance with state adopted fire codes.

C292 **Emergency Housing/Social Services:** White Pine County does not maintain any facilities for housing transient or homeless populations. It provides services through a voucher system to use area motel rooms for emergency housing needs. If the motel rooms are full with construction workers, it will impact the County's ability to address emergency housing needs through its Social Services Department. This concern is compounded by the fact that in the County's experience with previous large construction projects and when mines have been hiring, the County has increased unemployment rates due to the influx of people from other areas seeking jobs. Many do not have the required skills and are not able to secure jobs, but remain in the County placing an increased burden on state and local public services. This indirect impact has not been addressed in the Draft.

C293 **Land Use/Zoning:** Although not specifically infrastructure, it should be noted that nowhere in the Draft EIS or the appendix information is there any mention of the County required permits under the County's zoning ordinance. Under Land Use, Section 3.8, the Draft notes that the White Pine County zoning information was not available electronically (page 3.8-1). Throughout the section it concludes that there are no conflicts between the proposed use and existing zoning regulations. Title 17 of the County Code is devoted to the County Zoning Ordinance. The Code requires a Special Use Permit for construction of public utilities, substations, and transmission lines in the Open Space (O-5) zones, even if the project is on federal land. In addition, with the exception of transmission lines, the Code requires a variance for any structures over 35 feet tall.

C294 **General Concerns with Community Resources:** The lack of local resources cited in the references indicates that the Draft was compiled with a reliance on published data. The analysis does not include in-depth discussion about the local communities and their

C294 cont'd abilities to absorb increased demands without substantial increased revenue to offset the costs. The analysis does not include adequate discussion about the capacity of County facilities, financial stability, and administrative capacity to meet current standards and needs and it does not adequately address the County's to accommodate direct and indirect demands of a construction workforce through its public facilities.

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Public Facilities: White Pine County has operated for decades with minimal budgets that barely cover on-gong operating expenses and leave little for capital improvements. The County has had little capacity to invest in new public facilities and facilities in outlying areas are minimal. Most of White Pine County's public facilities are aging, inadequate for current use, have high costs of maintenance and operation, and are prone to major repair and maintenance needs. The electrical systems are not adequate for modern computer equipment, ADA access is difficult, and the buildings are not arranged for efficient operation.

The County Courthouse and Public Safety Building both have security problems due to location and the age and design of the facilities. The U.S. Marshal's report on the Courthouse concludes that the facility presents such a security risk to judges, court and other county personnel, and the public that the County needs to build a new, secure facility for court activity. The jail is housed in the Public Safety Building presents major security risks. The Public Safety Building is inadequate for current operation of the Sheriff's Office and county-wide dispatch services. The Courthouse and Courthouse Annex house majority of County offices and both present significant challenges for efficient operation. The County has initiated a Facilities Master Plan to document these needs but the study has not been completed to date. County facilities in outlying communities have been funded through grants and include fire and ambulance sheds and community centers in Ruth, McGill, and Baker and fire and ambulance facilities in Lund.

Equipment: Several County offices have outdated and inadequate computer equipment. The County does not have a parcel based GIS program in place which impacts the efficiency of a number of County functions including building and planning, County Assessor, and emergency services. The County has been able to equip its fire and emergency medical services through grants, tax over-rides, and the establishment of a County Fire District budget to help with local matching requirements for grants and the purchase of used equipment.

Financial Stability: In 2005, the State Tax Commission placed White Pine County under the supervision of the Nevada Department of Taxation because it was at risk of insolvency and in a severe financial emergency. After four years of work with Department of Taxation, the County was released from direct supervision by Department of Taxation but must still report to the Tax Commission on its financial status for a five year period. Controls put in place during the severe financial emergency include a Net Proceeds of Mines Mitigation Fund and a policy that Net Proceeds revenue will not be used to support on-going expenses. The current level of Net Proceeds revenue is substantial and reflects the activity in the mining industry in White Pine County. It provides a source of funding for one-time expenses including repairs and maintenance on

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county facilities, improvements to county facilities, and purchase of equipment. The Net Proceeds Mitigation Fund provides a "rainy day" fund in case the mines close and there is a substantial decline in County revenues. If either of the two policies is modified or eliminated in the future and if there is a mine closure, the County could be in a precarious financial position.

Administrative Capacity: The County's capacity to accommodate the construction, operation, and long term groundwater pumping of the proposed project is dependent on its administrative capacity. The County does not have a County Manager. The Chairman and the five member County Commission frequently act as the County Manager for administrative direction. The County is dependent on the knowledge and dedication of its elected and appointed officials, staff, and volunteers to supervise full range of County services. The outlying areas are served by Town Councils and Citizen Advisory Boards. Decision making and support for outlying areas can be a slow process working through Advisory Boards to the County Commission through open public meetings. The County does not have a County Planner, the County Building and Planning Department is currently housed in the Economic Development Program, and functions with a volunteer Planning Commission, allowing minimal staff attention to maintaining up-to-date planning documents, development codes, policies and procedures. The County does not have a Natural Resources Department or Director. The Water Advisory Committee and Public Land Users Advisory Committee are both housed in the Economic Development Department, allowing minimal staff time and attention to natural resource issues. The County and its General Improvement Districts have limited budgets and staff to carry out on-going operations and lack staff and financial resources to track long term impacts of the groundwater pumping.

White Pine County's resources for on-going operation are stretched to meet current needs and it has minimal capacity to accommodate the increased demands due to the impacts of the proposed project.

Chapter 3.19 Public Safety and Health

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Missing from this section of the DEIS is information on and a hard look at the potential for the GWD project construction and pumping impacts to release particles of dust as small as 2.5 microns which are potentially contaminated by nuclear testing conducted at the Nevada Test Site for decades. The downwind area for nuclear tests extends east to the study area in Nevada and Utah. A non-nuclear bomb blast test, called the Divine Strake, proposed in 2007 by the Bush Administration at the Nevada Test Site, was eventually cancelled in large part due to concerns about the proposed project disturbance and re-mobilization of radioactive dust. The federal government admitted the soils contain radioactivity and that they could become airborne. This unanalyzed impact could affect the health and safety of both construction workers and also of residents who live in areas downwind of construction activities and basins impacted by GWD project pumping drawdowns which would expose soils to wind erosion.

C295 cont'd Thomas Cahill, professor of Physics and Atmospheric Sciences at the University of California-Davis, is particularly concerned about the impacts of the water drawdown, based on his extensive experience studying the Owens Lake, Mono Lake and similar lakebeds. (See Appendix E: Cahill Memo on Air Quality.)

"It is my expert opinion that these potential impacts be fully investigated prior to any decision to withdraw any water from desert valleys, and if, as I suspect, such problems will occur, withdrawals cannot be tolerated without violations of federal air quality statues. Sevier Lake, in particular, causes me concern."

The DEIS also fails to disclose impacts on public safety of roads, buildings, and other infrastructure damaged by subsidence caused by GWD project pumping drawdowns, or the costs associated with necessary repair and restoration, and who would be liable for these costs.

C296 **Chapter 3.20 Monitoring and Mitigation Summary**

The monitoring, management and mitigation (3M) plans proposed will not protect BLM's public water reserves or the other water rights in the valleys; they will only document their destruction.

GBWN strongly believes that in any process involving mitigation and monitoring, local governments with the ability to act independently must have an oversight role. Furthermore, they must have the funding ability to perform that oversight. Putting the SNWA and federal and state agencies, which in the view of the GBWN may have had their independence compromised by political and financial pressures, in an exclusive oversight role is tantamount to not having oversight at all.

BLM is using the stipulated agreements it forged with SNWA to protect its water rights in Spring and Cave, Dry Lake and Delamar Valleys as the 3M plans for this EIS. This is inappropriate and unacceptable.

BLM has two primary responsibilities in this instance. One is to manage the federal lands under its jurisdiction. Separately, BLM has water rights for some of its activities on the public lands in the above mentioned valleys. By entering into stipulated agreements with SNWA prior to the first State Engineer hearings on Spring Valley and on Cave, Dry Lake and Delamar Valleys, BLM gave up its right to protest SNWA's applications for groundwater in exchange for an agreement with SNWA to monitor in an effort to "protect" those water rights, including public water reserves and other rights and claims. Now, years later, BLM's own DEIS provides much more information, insight, and data on the extent and severity of impacts on the lands BLM is supposed to be preserving for present and future generations.

Nonetheless, the real impacts are expected only *after* widespread pumping has begun and affected the Great Basin. Additionally, mitigation efforts presumably would be designed and implemented after these impacts become apparent.

C296 cont'd This is fundamentally unacceptable and contrary to federal law. The postponement of gathering essential information for an evaluation of the project's potential adverse impacts thwarts public review and also violates NEPA's fundamental commitment to "prevent or eliminate damage to the environment by focusing government and public attention of the environmental effects of proposed agency action." Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 371 (1989). NEPA requires the federal agency to "consider every significant aspect of the environmental impact of a proposed action" Vermont Yankee Power Corp. v. Natural Resources Defense Council, 435 U.S. 519, 553 (1978), and to ensure "that the agency will inform the public that it has indeed considered environmental concerns in its decision making process." Baltimore Gas and Electric Company v. NRDC, 462 U.S. 87, 97 (1983).

NEPA requires that mitigation measures be reviewed in the NEPA process -- not in some future decision shielded from public scrutiny. "[O]mission of a reasonably complete discussion of possible mitigation measures would undermine the `action-forcing' function of NEPA. Without such a discussion, neither the agency nor other interested groups and individuals can properly evaluate the severity of the adverse effects." Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 353 (1989). Appellate Courts have explicitly struck down EISs that rely on unspecified future actions to mitigate or avoid environmental impacts. Oregon Nat. Resources Council v. Marsh, 52 F.3d 1485 (9th Cir. 1995) (Elk Creek Dam III); Oregon Nat. Resources Council v. Marsh, 832 F.2d 1489, 1493 (9th Cir. 1987) (Elk Creek Dam I), rev'd on other grounds, 490 U.S. 360 (1989); California v. Block, 690 F.2d 753 (9th Cir. 1982).

BLM's stipulated agreement with SNWA cannot and must not be used to abrogate BLM's responsibilities as a land manager. These responsibilities include but are not limited to water, air, habitat, wildlife, aquatic life, and recreation.

BLM has a commitment to public involvement at the local level but there is little evidence of it in the plans attached to the EIS for monitoring, management and mitigation. The Snake Valley draft includes representation from the States of Nevada and Utah, but no involvement at the local level. We strenuously object to this top down process which excludes local involvement and participation.

The 3M process should be open rather than a secret cabal of federal agencies and the applicant, SNWA. At a minimum, the management committee and technical working group should have representation from County government officials and their technical experts from the basins of origin, and should also include representation of other affected parties including local water rights holders and representation from local agriculture.

The 3Ms for Spring and Cave Dry Lake and Delamar were forged in secret. By endorsing them as done deals, BLM is endorsing a secret process – a back room deal with SNWA – that did not have the advantage of public involvement or scrutiny. 3M plans for this project must stand the test of time, and be inclusive. If BLM does not require local representation from Counties and other affected parties in the 3M agreements for the EIS

C296 cont'd process and the Record of Decision, BLM is complicit in imposing a feudalistic structure where decisions that affect local communities are made at a distance by parties not affected by the outcome, to the detriment of local interests. We call on BLM to reopen the 3M process to including public involvement in drafting of the documents and participation in 3M. This is one of the many areas where a new DEIS or a Supplemental EIS with full public involvement will be necessary.

Additionally, GBWN is very concerned that the 3M processes described in the DEIS and elsewhere appear to apply only to public lands. Who would protect the water resources used and needed by private property owners? Again, those property owners may not have the financial ability to protest or stop to go to court to stop the destruction of their livelihoods – a fact of which, again, the SNWA is well aware.

Stipulated Agreements

C297 The DEIS includes the stipulated agreements for four of the targeted basins between federal agencies and SNWA in the appendices, apparently for public review in the NEPA process. These agreements are critically flawed, both in the process in which they were negotiated and in the actual content.

The process was a secret one, with no public input or review permitted. Besides the public, local counties and residents who depend on the use of public lands and resources and who will directly be impacted by the short and long-term effects of the GWD project were prohibited from participating in negotiations. Local tribes were also excluded, apparently with federal trust responsibilities exercised on their behalf, but with no tribal consultation, input or consent. Although the stipulated agreements could be considered major federal actions significantly affecting the environment, including private lands, because they are among the only measures in the DEIS proposed by BLM to "mitigate" the devastating effects of this groundwater mining project, no NEPA process was initiated.

Because it was a secret process, the public does not know what the parameters were or whether they were political or scientific. What is known is that the stipulated agreements were developed before the USGS BARCAS and other studies of the carbonate aquifer flow system were published and before hydrological model used by BLM in the DEIS was developed and used to estimate the widespread and devastating effects of proposed pumping drawdowns on public lands and resources.

Even though the two agreements were completed in 2006 and in 2008, the process remains a secret one, with no public notification of what work has been accomplished by the parties, what public funds have been spent, whether baseline information has been collected and its reliability, whether changes have been made in the agreements. The public cannot find out if the Spring Valley stipulated agreement will be extended to SNWA water right applications filed since 2006, including the 11,788.8 afa of surface water applications filed in 2011 to date. in Spring Valley.

C297 cont'd Other procedural problems in the stipulated agreements include (but are not limited to):

1. The agreements may limit BLM's ability to require and enforce mitigation for GWD project impacts, especially drawdown impacts, to only those explicitly a part of the agreements, and only for the four basins. BLM may not be able to require mitigation for impacts in the other 35 basins in the project study area and for all impacts to private lands and water rights.

2. The agreements may represent a conflict of interest for BLM as a party to the agreements and also the agency conducting the NEPA analysis of the GWD project.

3. Since the DEIS does not provide any information on BLM monitoring of GWD project impacts, especially pumping drawdowns on public lands and resources in the entire study area, nor on any required mitigation for those impacts, we are left with the conclusion that BLM has delegated its monitoring and mitigation obligations to SNWA to monitor changes in the quantity and quality of natural resources on the BLM-administered public lands in the four basins, and also for other public lands affected by the GWD project. If so, BLM has greatly exceeded its authority.

4. The agreements may also limit BLM's ability to protect federal reserved water rights, PWRs, and other federal water rights from GWD project impacts. If so, then BLM has effectively disposed of federal property, without Congressional authority or consent.

Other serious concerns with the stipulated agreements include:

1. The agreements set up 3 levels of "committees" to talk and achieve consensus about whether monitoring shows pumping impacts and the severity of impacts, whether SNWA's pumping is causing the impacts, and whether and what mitigation should be done by SNWA.

2. There are no explicit thresholds for what constitutes impacts or "unreasonable" impacts, what "proof" is needed to establish SNWA's pumping is responsible for impacts, nor what mitigation or its timing and duration would be for specific levels of impacts.

3. There are no triggers or thresholds in the Spring Valley stipulated agreement to stop SNWA pumping or otherwise "mitigate" pumping impacts (SNWA has not offered to restrict or stop its pumping to protect public lands and resources in Spring Valley). In the Cave, Delamar and Dry Lake Valley stipulated agreement, there is only a process to develop these critical triggers.

4. There is no time-frame for discussing and coming to consensus by any of the three committees.

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5. There is no requirement for SNWA pumping to stop while discussions continue; therefore, public lands and resources will continue to be damaged by SNWA pumping.

6. The NSE has explicitly declared that the NSE is not a party to the stipulated agreements, yet he is designated as the arbitrator of unresolved disagreements on mitigation required. The other alternative mentioned is some unnamed arbitrator to be selected by the parties.

7. There is a caveat that implementation of the stipulated agreement is dependent on sufficient annual budgets by Congress and by the SNWA board of directors.

8. There is no timeframe for how long the agreement is in effect and no mention of its implementation for 200 years or longer while pumping impacts continue to occur.

9. There is no process for evaluating the effectiveness of monitoring or mitigation in the stipulated agreements.

10. There is no process or way to track the implementation of the stipulated agreement annually or for over 200 years.

11. Only the lands and resources of the Great Basin National Park were explicitly protected from GWD project impacts with a "no effects" provision, while the protection of all other public lands and resources was limited to an undefined standard of "unreasonable" impacts.

12. There is no explicit goal to prohibit groundwater mining.

13. Monitoring wells proposed in the stipulated agreements at specific sites may or may not be adequate since the DEIS states that production wells may be located anywhere in the groundwater development areas of the five basins.

14. Proposed "mitigation" measures of augmentation and artificial recharge, both of which require additional water, merely transfer unacceptable pumping impacts from one location to elsewhere in the valleys.

15. The stipulated agreements do not require third party independent collection of data, both baseline and monitoring, nor the assessment and handling of monitoring data.

16. The DEIS makes no commitment that the stipulated agreements will be a part of the Record of Decision or required as conditions of ROW permits.

17. The DEIS does not disclose the costs of developing and implementing the stipulated agreements, nor who is responsible for these costs.

C297 cont'd On page 3.3-121 and 122 of the DEIS is the statement: "however, considering the regional scale of the predicted drawdown and number of perennial water sources identified that could be affected, it may not be feasible to effectively mitigate impacts to all the potentially affected water sources." The DEIS fails to disclose how many of impacts to potentially affected water sources would be "feasible" to effectively mitigate. The public cannot make informed comments on decisions on the DEIS when this critical information is missing, nor can policy makers make informed decisions that protect the public and natural resources without that information.

The DEIS fails to clearly state what monitoring of GWD project impacts on public lands and resources will be required, who will conduct the monitoring, the costs of monitoring, public disclosure of monitoring results, or how monitoring results will be used.

The DEIS fails to clearly state what mitigation of GWD project impacts on public lands and resources will be required, who is responsible for implementing mitigation, the costs of mitigation and who is financially responsible for mitigation, how the effectiveness of mitigation will be determined, and what will be required if mitigation fails.

This missing cost information for mitigation is very critical for the public and the BLM to make informed comments and decisions on the DEIS .

The DEIS fails to distinguish between required and voluntary monitoring and mitigation and how BLM will even know whether voluntary monitoring and mitigation has been implemented, how mitigation effectiveness has been evaluated, and how failed mitigation is to be corrected.

The only potentially effective way to stop pumping drawdown effects is for SNWA pumping to be stopped. However, even stopping pumping won't necessarily stop adverse effects immediately or a very long timeframe may be required to reverse damages. We refer BLM to two research papers which address this problem: *Ground Water Capture - The Time to Full Capture Problem*, J. Bredehoeft and T. Durbin, 2009, and *Aquifer System Response Time and Groundwater Supply Management*, William Walton, 2010.

To assist the BLM in providing missing critical information on the long-term costs of proposed monitoring and mitigation, we are providing information from the history of LADWP mitigation in Owens Valley by LADWP. Greg James, former Director of the Inyo County, Calif., Water Department estimates that LADWP has spent from $1.5 billion to $2 billion since 1980 for environmental mitigation for the impacts of its water export project in the eastern Sierra, including: c. $1 billion on the Owens Dry Lake dust abatement over the last decade; $3 million/year for the last 25 years to Inyo County for mitigation; unknown costs of replacing "mitigation" water; unknown costs of restoring Rush Creek, a tributary to Mono Lake and restoring a flow in the Owens Gorge; rewatering the Lower Owens River cost c. $25 million. [21]

In addition, LADWP has lost over one half of its water exports from the Owens Valley since 1980. [22]

C297 cont'd Owens Valley also provides an example of the difficulties local residents encountered due to the LADWP's reluctance to comply with and implement stipulated agreements on water withdrawals and aquifer management. Officials with the LADWP stated that "litigation is cheaper than water," a position that mirrors the SNWA's past and possibly future positions.[23] It is worth noting that for these water agencies, the cost of litigation is essentially irrelevant, since a vast pool of ratepayers eventually finances their legal work. For the affected communities with far fewer financial resources, such litigation may be impossible, a fact of which the SNWA is undoubtedly aware.

In the contentious history of the relationship between Inyo County and the LADWP, it is worth noting that courts issued an order to prevent to groundwater mining in 1991.[24]

Similar protections are not in place in the SNWA groundwater program, notes Dr. Robert Harrington, director of the Inyo County Water Department. Harrington finds that the hydrologic monitoring and mitigation plans for Spring Valley and for Cave, Delamar, and Dry Lake Valleys fail to provide a process to implement mitigation measures. Specific process necessary for successful managing and mitigating impacts from groundwater pumping are: sufficient technical resources, a clear process for identifying whether mitigation is necessary, quantifiable goals for mitigation measures, dispute resolution and pumping management.[25]

Chapter 4: Irreversible and Irretrievable Commitments of Resources

C298 As discussed throughout this document, the DEIS identifies numerous direct consequences. Among the impacts identified as "irreversible and irretrievable": Fugitive dust impairing air quality, visual impacts at Great Basin National Park, ground subsidence affecting structures in an area of up to 781 square miles, drying up or reductions in stream flows, substantial changes to the compositions of wetlands and wet meadows, loss of cultural resources and Native American spiritual experiences, and other significant impacts. Even if the deficiencies in the DEIS are addressed, the BLM and other federal agencies have a responsibility to protect the public lands targeted for massive groundwater extraction by the SNWA.

Chapter 5 and Chapter 6

Great Basin Water Network has no comment on Chapter 5 and Chapter 6 of the DEIS.

Conclusions

C299 As documented in this response to the DEIS, the discussion on socioeconomic conditions and impacts is inadequate to allow the BLM or public to make an informed decision. A full and accurate understanding of the social and economic structures and conditions is necessary before all impacts can be assessed. The information needed on agriculture, outdoor recreation, traffic impacts, local government impacts, and potential economic

C299 cont'd activity is readily available and fits within the definitions of “taking a hard look,” which as previously noted is a requirement for the EIS process.

The socioeconomic section should be supplemented with additional information on population projection methodology and limits as well as a comprehensive review of population projections in the Southwest. It should be supplemented with an independent study of public awareness and attitude toward the project in the Las Vegas Valley to fulfill the need for a public referendum. The study requires cost estimates of the full range of previous expenditures as well as construction, operations, financing, and compliance costs of the project and the anticipated cost to individual rate payers before the public in the Las Vegas Valley can respond with an informed opinion on the project. Also, the relationship of the SNWA pipeline project to Coyote Springs development project, and the impacts that the development of 159,000 homes on the Lincoln-Clark County line would have, needs to be fully explained and assessed.

Other sections of the DEIS should be reviewed for additional information required to fulfill the requirement for a hard look before a Record of Decision is issued. The DEIS should be reissued with the new information and the public review process should be repeated so that the public has a full review of the study of conditions and impacts and an opportunity to respond to the new document.

The DEIS uses the existing framework for NEPA analysis that does not anticipate a project of such size and scope in geographic area, potential impacts, and time frames. The DEIS is inadequate in its statement of Purpose and Need, range of alternatives, lack of adequate project description, the use of the tiering process to avoid addressing unavailable and incomplete information and analysis of Connected Actions, and the fact that the project in its entirety is not ripe for analysis.

The DEIS also fails to analyze all indirect effects. By selecting the Proposed Action of any of the scenarios in the DEIS , BLM would fail to prevent undue and unnecessary degradation to public lands from the unanalyzed and unmitigated indirect impacts of the GWD project.

The DEIS suggests that SNWA is committed to providing or augmenting water as mitigation for groundwater pumping impacts, but what are the sources of this water? If "mitigation" requires water in targeted and affected basins, SNWA will have to purchase existing water rights or apply for new water rights in specific basins, for specific mitigation purposes. Obtaining water from additional sources in the area already experiencing adverse impacts from SNWA groundwater withdrawals on both ground and surface water sources will exacerbate those problems. When will these environmental impacts on public lands and resources be analyzed in the NEPA process? What monitoring and mitigation would be required? What are the costs of the monitoring and mitigation – and will the affected regions effectively have to pay to watchdog the SNWA?

C299 cont'd

However, the available evidence from independent hydrological, biological and economic analysts shows that there will be “irreversible and irretrievable” negative impacts on a enormous area of Nevada and Utah if the pumping proposal goes forward.

In her recent submission to the Nevada State Engineer, Dr. Maureen Kilkenny notes that while the issue of Las Vegas versus rural Nevada and Utah is usually presented as a zero-sum game – one side loses if the other wins – the economic and environmental futures of the two are bound together:

“Society has created habitable cities in deserts. But we must not create uninhabitable deserts in an attempt to grow cities. It would be a futile attempt in any case. Groundwater mining is unsustainable and ultimately both the city as well as the rest of the state would lose.”[26]

Contributors

Great Basin Water Network includes dozens of individuals and organizations, all of whom, directly or indirectly, contributed to the response to the Draft Environmental Impact Statement. Some of those who contributed their time and thoughts to this effort include: The Toiyabe Chapter of the Sierra Club, the DEIS GBWN Review Committee, Dr. James Deacon, Dr. John Bredehoeft, Dr. Tom Myers, Dr. Maureen Kilkenny, Greg James, Rose Strickland, Abigail Johnson, Rob Mrowka, Rick Spilsbury, Delaine Spilsbury, Steve Erickson, Susan Lynn, Karen Rajala, Stephanie Penner, and many others.

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Appendices

Appendix A: Ceres' Rebuttal Comments on SNWA's Evidence Concerning Financing for the Groundwater Development Project Associated with SNWA's Water Rights Applications in Spring, Cave, Dry Lake and Delamar Valleys

Appendix B: Rebuttal Report on Water Use Efficiency in the Las Vegas Area

Appendix C: Dr. James Deacon's Comments to BLM DEIS on Section 3.7 – Aquatic Biological Resources

Appendix D: USGS Great Basin National Park Impacts (cited in DEIS, Vol. 1-B, References, Geologic Resources, page 1 as Elliott, P.E, D.A. Beck and D.E. Prudic, 2006, Characterization of Surface Water Resources in the Great Basin National Park Area and Their Susceptibility to Groundwater withdrawals in Adjacent Valleys, White Pine County, USGS Scientific Investigation Report 2006-5009

Appendix E: Cahill Memo on Air Quality

Appendix F: Tom Myers Memorandum on DEIS

Appendix G: Dr. James Deacon's Comments on Full DEIS