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DRAFT Technical Memorandum

To: Jake Tibbitts, Natural Resources Manager, Eureka County

From: Catherine Hansford **Date:** 12 June, 2013

Subject: Diamond Valley GID Financial Model Feasibility Analysis

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Introduction and Background

On March 26th 2013 the Nevada State Engineer (NSE) issued Order 1226 curtailing new appropriations of groundwater within the Diamond Valley Hydrographic Basin. The NSE's Order 1226 follows five previous orders since 1975 when depletion of the groundwater supply in portions of the basin was first declared. As a result of over-appropriation by the NSE's office, the water table in the Diamond Valley Hydrographic Basin (Basin 153) has declined at a rate of 1 to 3 feet per year[1]. The NSE Diamond Valley Crop Inventory consistently shows pumping of Basin 153 groundwater to be in excess of the perennial yield.

The only practical solution to the basin over draft is to reduce groundwater consumption. Reducing irrigation pumping requires implementation of a water management program. The NSE has the authority to declare Basin 153 a Critical Management Area (CMA). Under a CMA designation the users of the basin would have ten years to formulate and start to implement a water management program. Alternatively, the NSE can curtail pumping by priority. In an effort to take local action to protect the aquifer, agricultural interests formed the Diamond Natural Resource Protection and Conservation Association (DNRPCA).

Eureka County (County) and the DNRPCA are exploring creation of a locally-owned water management program to retire water rights in Basin 153. The DNRPCA proposed that the feasibility analysis of a Diamond Valley General Improvement District (GID) to manage execution of a water management program that enhances the sustainability of the underground water supply and storage for Basin 153 be conducted. The Diamond Valley GID would provide a financing vehicle to implement the water management program.

Purpose

In March 2013 the Eureka County Board of Commissioners approved a contract with Hansford Economic Consulting (HEC) to conduct a financial feasibility analysis of creation of a Diamond Valley GID. The purpose of this memorandum is to present the draft financial analysis. This memorandum includes a summary of findings, discussion and quantification of the issue,

[1] Source: Dale Bugenig, Eureka County hydrologist.

economic value of the Diamond Valley hay industry, key assumptions and methodology used in the analysis, and identification of available financial resources to implement a water management program. One of the reasons for creating the financial model is to be able to test key assumptions and various water management scenarios. HEC has developed four scenarios as a starting point to test parameters of the potential program. These scenarios are:

Model Scenarios

- **BASE CASE - Scenario A:** Agricultural Users Only, Pay as You Go, No Set Aside
- **Scenario B:** Agricultural Users Only, Pay as You Go, Set Aside Program
- **Scenario C:** Agricultural Users Only, Debt Service, No Set Aside
- **Scenario D:** Agricultural Users Only, Debt Service, Set Aside Program

Agricultural Users Only - Under each of these scenarios it is assumed that only agricultural property with water rights participates in funding the GID. The GID legal boundary could include the whole Diamond Valley hydrographic basin but all other land uses would be exempt from participating financially. Including all property within the GID would allow flexibility for changes in the future (for example having domestic well users also participate). The GID would specify parcels subject to financial participation by passing a resolution adopting a schedule of rates, tolls, charges, liens, penalties, and rules and regulations for service.

Pay as You Go or Debt Financing - Scenarios A and B assume no debt financing for the water retirement program; Scenarios C and D include debt financing. For illustration purposes in this first draft of the model it was assumed that the GID purchases water rights for twelve pivots (1500 acres total) in the first year of the model, fiscal year 2013-14.

Set Aside or No Set Aside Program – Under Scenarios A and C the only water management program in place is a water right retirement program. Scenarios B and D assume a set aside program is in place in addition to the water right retirement program until pumping reaches a sustainable level. A set aside program is a program under which portions of land are not irrigated for a specified period of time (3 years or 5 years for example) and then are returned to irrigated crop production while other portions of land are not irrigated. Thus, land is rotated through irrigated and dry cycles.

The model also incorporates two different methodologies for revenue collection:

- **Method 1: Parcel Charges –**an annual parcel charge per acre.
- **Method 2: Ad Valorem Taxes –** an annual tax calculated by applying a tax rate per $100 of assessed valuation.
- The scenarios (A through D above) are the same for both methodologies.

Base Case - Scenario A is the Base Case scenario under which only agricultural properties with water rights pay into the GID, there is no debt financing of the program, and only a water right retirement program (no concurrent set aside program). The model results and tables accompanying this memorandum are for the Base Case. The following findings section

discusses how the model results change with the different scenarios and revenue collection mechanisms.

Findings

Financial feasibility of a GID to retire water rights in Diamond Valley is subject to acceptability of the timeframe to complete the program, level of County commitment to assist with funding the program (or obtaining other sources of contributions), the prices paid to farmers to purchase their water rights and the farmers' willingness to participate in the program.

The financial model is designed to test the parameters of feasibility. The results of the model scenarios presented in this memorandum represent a starting point from which the key assumptions of the model can be tested. For example, in this memorandum the County's financial commitment to the program is 75% of total program cost (made in equal payments over 50 years). This key assumption can be changed to test the feasibility of the program with a higher or lower commitment.

A summary of the water issue is presented in **Table A** below. Total irrigation pumping in the valley would have to decrease approximately 60% from 77,790 acre-feet to 30,260 acre-feet to keep water withdrawals within the estimated perennial yield of 30,000 acre feet.

Table A
Diamond Valley GID Financial Feasibility *DRAFT*
Summary of the Water Issue in Diamond Valley

Item	Number
Water Rights and Pumping	***acre-feet***
Total Irrigation Rights (pumped and unexercised) [1]	126,120
Sustainable Number of Irrigation Rights [2]	37,660
Necessary Retirement of Water Rights	**88,460**
Current Irrigation Pumping	77,790
Sustainable Irrigation Pumpage	30,260
Necessary Reduction in Pumping	**47,530**
Agricultural Land	***acres***
Agricultural Property Irrigating	24,310
Sustainable Irrigated Acres	9,456
Agricultural Property to be Stripped of Water Rights	**14,854**
Agricultural Land with Water Rights	31,670
Agricultural Property to be Compensated for Loss of Water Rights	**22,214**

Source: HEC. *"problem"*

[1] Permitted and Certificated groundwater rights as of April 10, 2013.

[2] Since a portion of water returns to the aquifer as secondary recharge the total sustainable number or irrigation rights is greater than perennial yield available for irrigation purposes.

The target for the water retirement program is to reduce annual pumping by 47,530 acre-feet by retiring approximately 88,460 acre-feet of water rights (by relinquishing them to the NSE). To do this, irrigation rights would have to be removed from approximately 22,214 acres of agricultural property, of which 14,854 acres are currently actively irrigated. Farmers would be compensated for their loss of water rights and correlating potential for crop production. This draft model assumes a timeframe of 50 years to achieve these targets; this timeframe could be tested in subsequent runs of the model.

Total cost of the water rights retirement program managed by the GID is estimated at $420 per acre over 50 years under the Base Case (or $8.41 per acre per year) assuming a County financial contribution of 75% of total program cost, as shown in **Table B**.

Table B
Diamond Valley GID Financial Feasibility *DRAFT*
Summary Estimated Total GID Cost *BASE CASE - Scenario A: Agricultural Users Only, Pay as You Go, No Set Aside*

		Estimated Cost over 50 Years		
Item		**Total**	**Per Acre**	**Per Acre per Year**
			[1]	[1]
Estimated Water Rights Program Cost	**a**	**$42,207,000**	**$1,333**	**$26.65**
Plus Estimated GID Operating Cost	b	$1,550,000	$49	$0.98
Set Aside Program Cost	c	$0	$0	$0.00
Total GID Cost	**d = a+b+c**	**$43,757,000**	**$1,382**	**$27.63**
County Contribution	**e**	**$31,655,000**	**$1,000**	**$19.99**
GID Participant Cost	**f = d-e**	**$12,102,000**	**$382**	**$7.64**
Delinquency and Administrative Charges	g = f*10%	$1,210,000	$38	$0.76
Total Burden per GID Participant	**h = f+g**	**$13,312,000**	**$420**	**$8.41**

Source: HEC. *"burden"*

[1] Per acre with water rights attached.

Total costs of the GID vary depending on the level of debt financing required and whether a set-aside program is incorporated. **Table C** shows total cost per acre of $420 under the Base Case; it increases to $611 under Scenario B, $486 under Scenario C, and $677 under Scenario D.

Table C also summarizes the reduction in annual pumping after 50 years by revenue collection methodology. The model considers two alternative revenue collection mechanisms, ad valorem taxes and parcel charges. Using annual parcel charges the program targets can always be achieved mathematically; however, the level of parcel charges may become unacceptably high.

Collection of revenue via an ad valorem tax rate is limited by the statutory tax cap of $3.64 per $100 of net assessed valuation. The current unincorporated County tax rate is $1.77 per $100 of assessed value. The Diamond Valley GID tax rate would have to be at almost the maximum available to achieve the target goal of annual reduced pumping of 47,530 acre-

feet[2] within a 50-year timeframe under the Base Case. The County will need to reserve some portion of the available tax rate for future unknown County facilities and services costs therefore it is unlikely that an ad valorem tax rate will be able to achieve the targets stated above within 50 years. The amount of water rights that can be retired and pumping reduced is further diminished with debt financing and/or a set aside program under the ad valorem tax revenue collection.

Table C
Diamond Valley GID Financial Feasibility *DRAFT*
Summary of Estimated Reduction in Pumpage by Scenario

Scenario	Cost per Acre [1]	**Reduced Annual Pumpage in 50 Years**	
		Parcel Charges	Ad Valorem Tax
			Maximum Tax Rate
		acre-feet	*acre-feet*
BASE CASE - Scenario A: Agricultural Users Only, Pay as You Go, No Set Aside	**$420**	**47,530**	**48,133**
Scenario B: Agricultural Users Only, Pay as You Go, Set Aside	$611	47,530	41,945
Scenario C: Agricultural Users Only, Debt Service, No Set Aside	$486	47,530	47,063
Scenario D: Agricultural Users Only, Debt Service, Set Aside	$677	47,530	40,875

Source: HEC. *"pump"*

[1] Total program cost is the same regardless of revenue collection methodology.

Discussion

All of the tables referred to in the Discussion are for the Base Case and they are provided in **Appendix A** to this memorandum.

Water Rights

For many reasons, Basin 153 has been over-appropriated. **Table 1** summarizes committed water rights as of April 10, 2013. In total there are 132,088 acre-feet of permitted and certificated underground water rights in Diamond Valley. Of this total, 126,121 acre-feet are irrigation rights (Desert Land Entry and other irrigation rights). Irrigation rights represent over 95% of total committed water rights.

Of the total irrigation rights, 56,034 acre-feet are stand-alone rights, meaning those rights are sufficient to irrigate the specified properties, and 70,088 acre-feet are primary rights. Primary rights are the original rights to irrigate a specified property, but for various reasons have had to be supplemented over time (for example because a new well had to be drilled) to achieve sufficient water quantity to irrigate the specified property. Supplementary rights are tied to primary rights. If a primary right is relinquished, the supplementary right will automatically be relinquished with it. There are 41,302 acre-feet of supplementary water rights that are not included in the financial feasibility analysis because they are tied to primary rights. Supplementary rights are of value to an irrigator; however, this value is removed with the loss of primary water rights. Additional perceived value associated with supplementary rights by

[2] Due to rounding some tables show 47,540 acre-feet.

farmers is accounted for in the analysis (see discussion of subjective discount rates beginning page 9).

Table 2 summarizes historical use of permitted acreage. Permitted acreage is land that holds permitted or certificated irrigation water rights. Between 2006 and 2012, inclusive, approximately 9% of acreage was not irrigated, or not in crop production. Of the agricultural land in crop production, some portions were irrigated and some portions were dry. A dry irrigated acre of land is land that has a water right associated with it that is exercised; however, some portion of the land does not receive water. Typically, a dry portion of an irrigated property includes the corners of quarter sections with pivot irrigation. On average, between 2006 and 2012, 77% of land with permitted and certificated water rights received water.

The majority (at least 75%) of agricultural land grows alfalfa hay in Diamond Valley. The established water need is 3.20 acre-feet per acre of alfalfa per year for Basin 153. Net water requirements of alfalfa, or consumptive use, is 2.50 acre-feet per acre per year. While alfalfa water needs and consumption will likely vary across the valley, and from year to year due to land features and weather, these values have been established as the average annual for the basin by the NSE[3]. Any water right change applications filed with the NSE are now processed using only the consumptive use of water, at 2.50 acre-feet per acre per year.

In **Table 3** average historical irrigation of land was applied to the April 10, 2013 water rights inventory to establish an estimated 2013 use of irrigation water rights. The financial feasibility analysis is based on 31,670 acres of permitted land, of which 24,310 acres receive water, 4,660 acres are under irrigation management but dry, and 2,700 acres are out of crop production.

In summary, of the 126,120 acre-feet of committed irrigation rights, 29,300 acre-feet (or 23%) are assumed in the model to be 'dry' (i.e. associated with land that is either out of crop production or under irrigation management but not receiving water, such as the corners of pivot fields), and 96,820 acre-feet (or 77%) are assumed to be 'wet' (i.e. associated with land that is receiving water). **Table 4** estimates the number of irrigation rights that need to be retired (or relinquished) to stabilize drawdown of the aquifer over time.

The perennial yield of the basin is currently established at 30,000 acre-feet per year. The perennial yield remaining for irrigation is 23,640 acre-feet after accounting for all other uses of water such as municipal, mining, and stock-water (but not domestic wells). Total irrigation pumping can be greater than 23,640 acre-feet because a portion of water is returned to the aquifer. The consumptive use of water (amount of water applied that is used by the plant or evapo-transpires) is approximately 78% of the water that need be applied (2.5 acre-feet of total 3.20 acre-feet). After accounting for the consumptive use of water the sustainable

[3] In 2009 the NSE estimated water use between 3.01 and 3.19 acre-feet per acre using three different methodologies to establish water use. Currently the NSE uses satellite imagery and data to calculate evapotranspiration and net irrigation water requirements for each basin in the State and has established 3.2 acre-feet total water application with 2.5 acre-feet consumption for alfalfa hay in Basin 153.

annual irrigation pumping is 30,260 acre-feet. This figure is not equivalent to total number of water rights. Since average duty per acre is 3.98 acre-feet but only 3.20 acre-feet is pumped, the number of sustainable total water rights is 37,660 acre-feet per year. Note that if irrigators pump their full duty, the sustainable total water rights would be less.

There are 96,820 acre-feet of wet rights (attached to land currently being irrigated). If 37,660 acre-feet of pumping is sustainable then 59,160 acre-feet of wet rights must be retired. In addition, 29,300 acre-feet of dry water rights (attached to land not currently in production or attached to corners of quarter sections irrigated by center pivots) must be retired. In total, there are 88,460 acre-feet of irrigation rights that would have to be relinquished because although not all of these rights are currently being exercised, all have the potential to be used in crop production.

Given the estimate of 77,790 acre-feet pumped in 2013 (based on the historical average use in the basin) and estimate of 30,260 acre-feet sustainable pumping, agricultural irrigation pumping would have to be reduced by 47,530 acre-feet per year. Approximately 60% of current pumping would have to be curtailed to make the basin sustainable. This reduction in pumping is equivalent to taking 14,854 acres out of current crop production (assuming all production is alfalfa hay). As described above, because all the agricultural land with permitted and/or certificated water rights has the ability to produce, 22,214 acres would have to be removed from actual and potential crop production in perpetuity in order to ensure that irrigation water use remained within the perennial yield. Calculations of reduction in irrigation pumping and land in crop production are shown in **Table 5**.

Economic Value of Hay Industry in Diamond Valley

The Diamond Valley hay industry is a profitable one. As noted in the 1994 hay processing facility feasibility study for Diamond Valley[4], "The Diamond Valley area of north central Nevada is well known for the production of premium quality hay." Hay is primarily sold for dairy, horses, alpacas, small herbivores, range and dry cows within the U.S. Diamond Valley hay is also exported across the globe.

Per the 2013 Nevada Agriculture Analysis and Opportunities report produced by the Governor's Office of Economic Development, "Alfalfa hay is grown more than any other hay in Nevada. The United States Department of Agriculture of Nevada reported 280,000 acres of hay were harvested in 2010, up 15,000 acres from 2008. The cash receipts totaled over $143.2 million, an increase of approximately $2.5 million from 2009. The demand for hay is continuing to drive up the price for the commodity. Alfalfa and other hays are the number three commodity in the state and the expansion of this product is an opportunity for Nevada".

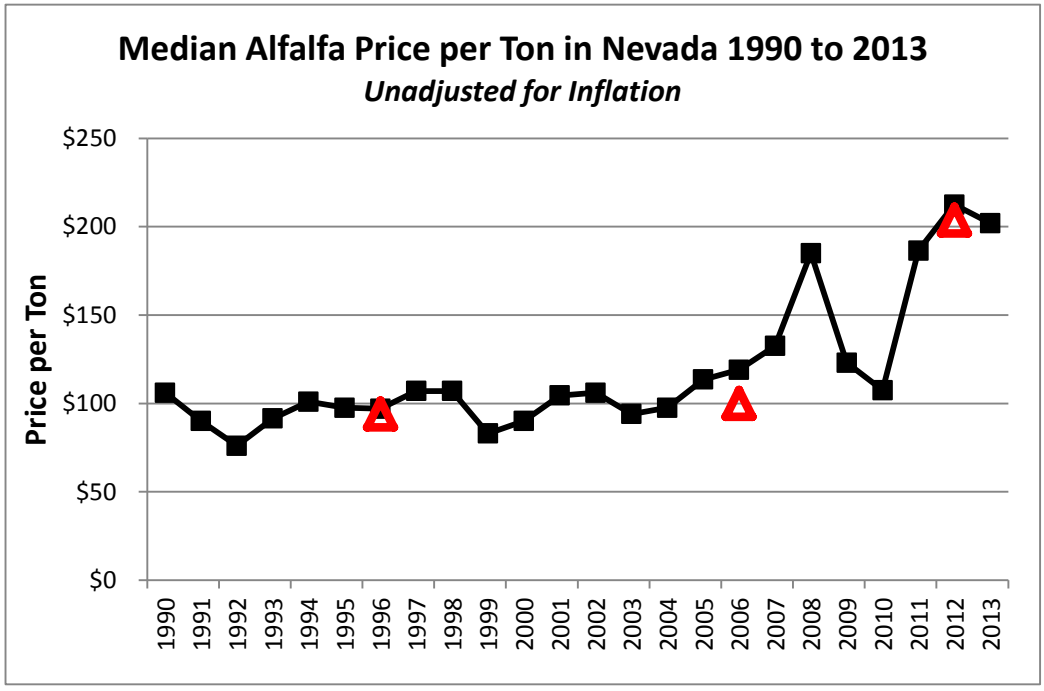
Table 6 presents annual production and yield statistics for alfalfa hay in Eureka County from 1992 to 2012 as reported by the USDA National Agricultural Statistics Service (NASS). The data suggests that the yield (per acre) ranges from 3.85 to 5.50 tons per year in Diamond

[4] Estimation of Feasibility Parameters to Establish and Operate a Hay Processing Facility in Diamond Valley, Eureka County, Nevada, University of Nevada, Reno Technical Report UCED 94-10.

Valley. For purposes of the financial feasibility analysis, an average annual yield of 4.52 is used.

The historical and estimated price per ton of alfalfa is shown in **Table 7**. The median annual price of alfalfa in Nevada increased from $106 in 1990 to $213 in 2012; however, the increase in price was not smooth. **Figure 1** below shows the increase in median price, unadjusted for inflation. In 1996 the observed Diamond Valley hay price was $94 per ton[5]. In 2006 the University of Nevada Cooperative Extension estimated Eureka County's price per ton of alfalfa hay at $100. The Eureka County /Diamond Valley average annual hay price (shown by triangles in **Figure 1**) was slightly lower than the Nevada median price as reported by the USDA/NASS QuickStats database in 1996, 2006 and 2012. This observation has no bearing on the analysis. In some months Diamond Valley hay prices will be greater than the state average, and in some months it will be lower. The financial feasibility analysis uses the average 2012 Diamond Valley observed hay price of $204 per ton.

Figure 1



Yield and price assumptions as well as other key feasibility model assumptions are shown in **Table 8**. Annual income is estimated at $920 per acre (yield of 4.52 tons per acre multiplied by price of $204 per ton). Typically alfalfa is grown in quarter sections of 160 acres, of which 125 acres is irrigated. The analysis assumes 24,310 acres are under 'wet' irrigation (see discussion for **Table 4**) therefore there are 194 equivalent 125-acre pivots. These key assumptions are used to estimate the water management program total cost.

[5] UNR Cooperative Extension Fact Sheet 97-03.

Approximately 109,800 tons of hay are produced annually in Diamond Valley for a total farming income of approximately $22.4 million in 2013 dollars. Total farming expenses are estimated at approximately $18.9 million, resulting in net farming income of approximately $3.5 million annually in the valley. Average expenses per acre are estimated based on the ratio of expenses to income using University of Nevada Cooperative Extension Fact Sheets 97-03 and 07-09. The Fact Sheets indicate that costs as a percentage of annual income will vary year to year. While the percentage will in reality not only vary year to year but also farm to farm, the average percentage (84%) from these two data sources has been used for purposes of the analysis. While NASS provide some production expenses statistics they are not specific enough for local conditions to use in this analysis. If the Cooperative Extension updates the Fact Sheets using surveys in Diamond Valley this key assumption must be reviewed. Net farming income is calculated at $144 per acre, as shown in **Table 9.**

Water Management Program Cost

The total water management program cost will depend on the strategies employed to carry out the program. For this feasibility analysis, two strategies are modeled. The first strategy includes a water rights retirement program only. The second strategy includes a water rights retirement program and a land set-aside program carried out in conjunction with one another.

Water Rights Retirement Program

The total cost of the water management program is determined by quantity of land and price paid to take land out of irrigated crop production. Quantity of land to be taken out of irrigated crop production was established in **Table 5** at 22,214 acres. There is no collective market for water rights that establishes the value of water per acre, and therefore the price to be paid to cease irrigation, in Diamond Valley. The price per acre will vary from farm to farm and it will likely increase over time as those remaining irrigators place greater value on the ability to irrigate. For purposes of the analysis it is necessary to determine an average price across all farms in the hydrographic basin for the duration of the program (in 2013 dollars); however it is helpful to bracket a range of prices that might be expected.

A methodology was used to establish the price a farmer would have to be paid to cease irrigated crop growing operations and relinquish water rights. The methodology is based on the present value of crop production, at $144 per wet acre, for another 5, 10, 15, 20, 25, 50 years or perpetuity using a range of discount factors. Discount factors reflect how the individual farmer values their ability to irrigate. Discount factors are objective and subjective. The objective portion of a discount factor is the rate the farmer's money could be earning in some alternative activity, such as the return it would get in a bank account, or internal re-vestment in the enterprise (additional returns from deepening a well for example). It is an external factor in that the farmer is not in control of the rate.

The subjective portion of a discount factor reflects the farming family's rate of time-preference for present versus future income. Different farmers will have different subjective discount factors for many reasons including age of the family, seniority of their water rights,

marginal rates of return, expectations of reaching water with existing wells, and other reasons. Below are four examples to illustrate different subjective discount factors:

> *Example 1:* Junior water rights holders understand that without any local water management plan for the basin the NSE may curtail their pumping by order of seniority. These farmers will have a higher subjective discount factor than neighboring farmers who own more senior water rights. The junior water right holders will have a shorter expected timeframe to use their water rights and they will place a lower present value on their junior water rights.
>
> *Example 2:* Established farming families who expect to pass their land on to future generations will place a low discount factor on their ability to farm and their timeframe will be perpetuity. These farmers will place a high present value on their water rights.
>
> *Example 3:* Farming enterprises anticipating the water table to decline within the next ten years such that significant investment in well deepening will have to be made, which may make farming no longer economically viable, will have a high discount factor and short timeframe and will place a lower present value on their water rights.
>
> *Example 4:* More efficiently managed farming enterprises with greater marginal rates of return (lower costs per additional acre irrigated) can plan for long-term production needs better than farming enterprises with lower marginal rates of return. Other things held equal (the same timeframe as another farm assuming both have junior water rights for example), the more efficiently managed farming enterprises will place greater value in long-term sustainability of the farm operations and less value on immediate returns in the next few years; they will therefore have a lower discount factor.

In **Table 10** the analysis estimates a range of value from $575 per acre to $4,803 per acre to irrigate depending on the timeframe and discount factor selected. The range is large because each farmer will value their ability to grow crops with water (and therefore their water rights) differently. The derived value of irrigation per acre based on the weighted average[6] of median values of present net farming income using a 5-year, 10-year, 15-year, 25-year, 50-year, and perpetuity timeframe is $2,150 per acre. With an average duty of 3.98 acre-feet per acre this is equivalent to $540 per acre-foot.

Although the value per acre is calculated for irrigated land, this value has to be applied to all agricultural land with appurtenant water rights whether it is currently irrigated or not. Thus, land that is out of crop production currently would have to be paid the same as land currently in crop production because of the potential economic gain of growing alfalfa on the property. The derived value in **Table 10** represents the high range of price paid per acre because it assumes that the land ceases to be cultivated once it has been stripped of its water rights.

[6] Eureka County Forage Establishment, Production Costs and Returns, 2006, University of Nevada Cooperative Extension Fact Sheet 07-09.

Some property may be well suited to continued crop production, or other agricultural activities that yield positive net income without irrigation. Crested wheat is one example of such a crop. Given the uncertainty of the success rate growing other non-irrigated crops in Diamond Valley, and lack of publicly available data to model these crops it is difficult to calculate the net value of loss of irrigation per acre. One input that would change with alternate farming practices is the value of land. Under irrigated farming the market value of land is assumed to be $800 per acre[7]. The market value of land without irrigation is calculated using the same ratio of value between first and fourth class cultivated land as established by the Nevada Department of Taxation. Fourth class cultivated land is assessed approximately 40% the value of first class cultivated land. Applying this ratio an un-irrigated acre has a market value of approximately $300 per acre. This calculation is shown in **Table 11**.

Assuming that the farmer can retain a portion of the value of the land the price per acre of land is $500 less, or $1,650 per acre. This value is used to bracket a low range of price paid per acre to cease irrigating by retiring water rights. The range of price paid per acre of land stripped of water rights is $1,650 to $2,150 per acre. While this range is used for the financial feasibility model there would likely be circumstances under which certain properties would be paid more or less than this range.

Table 12 estimates the cost of the program to range between $36.6 million and $47.8 million**.** The mean price using the two methodologies is $1,900 per acre. The total cost of the water rights retirement program is estimated at $42.2 million (average price multiplied by total acres with water rights to be retired).

The total cost of the program calculated using the mean price values all water rights equally, regardless of priority date, and regardless whether they are currently used in crop production or not. Priority date of water rights is accounted for in the discount rate[8] and all acres must be included because all have the potential for irrigated crop production.

Set-Aside Program

This feasibility analysis primarily focuses of the water rights retirement water management strategy; however, the model scenarios B and D include an example set-aside program.

Under a set-aside program, a pre-determined acreage is taken out of irrigated crop production each year. The acreage would be based on achieving a target reduction in pumping each year that would have to be determined by the GID Board of Trustees. In order to keep water rights the land taken out of irrigated crop production would have to be rotated, and the time duration would have to be relatively short (3 to 5 years for example).

[7] Eureka County Forage Establishment, Production Costs and Returns, 2006, University of Nevada Cooperative Extension Fact Sheet 07-09.

[8] Note, however, that if the water table declines such that well deepening becomes prohibitively expensive, or water quality is no longer sufficient, the ability to irrigate no longer exists regardless if one water right is senior to another.

To restrict use of the land, a forbearance agreement (i.e. a contract with a water user not to exercise water rights) would be entered into between the farmer and the GID for a set time period[9].

Farmers would receive payment from the GID for each acre not irrigated that year. The payment amount would be determined each year by the GID Board of Trustees. To incentivize a farmer to take land out of irrigated crop production, the farmer would have to be paid the difference between his/her costs to keep the land fit for irrigated crop production and the unearned income from irrigated crop production. This payment calculation assumes the dry land is not used to grow a crop that doesn't require irrigation, or conduct other agricultural activities. This annual payment would equal fixed costs plus expected profit per acre which is estimated at $461 per acre, as shown in **Table 9**. At this level of payment per acre a set-aside program that disallowed other agricultural activities would be expensive and would discourage testing of alternative crops and other farming practices. A set-aside program that pays farmers to cease irrigating for a period of time but that encourages alternative agricultural uses of the land is likely to be more financially feasible and conducive to long-term sustainable farming strategies in Diamond Valley.

A set-aside program has benefits and challenges. Benefits of such a program include social stability, ability to keep population in Diamond Valley, support for local infrastructure and services such as schools and social programs, maintain tax base within the County, potentially encourage alternative farming practices, and so forth[10].

Challenges of a set-aside program include:

- A set-aside program raises equity issues. Who should participate? It may be difficult to implement a policy such as equal percentage of set-aside for all farmers because of irrigation techniques.

[9] As part of this analysis another approach, restriction of the water right, was discussed with the State Engineer. Under NRS 533.0243 temporary conversion of agricultural water is permitted; however, this legislation was written specifically for the Walker River Basin. It is unlikely that this statute would be applied by the State Engineer anytime in the near future for any other purposes.

NRS 533.0243 Temporary conversion of agricultural water for certain purposes: Legislative declaration; requirements; duration.

1. The Legislature hereby finds and declares that it is the policy of this State to allow the temporary conversion of agricultural water rights for wildlife purposes or to improve the quality or flow of water.

2. If a person or entity proposes to temporarily convert agricultural water rights for wildlife purposes or to improve the quality or flow of water, such temporary conversion:

(a) Must not be carried out unless the person or entity first applies for and receives from the State Engineer any necessary permits or approvals required pursuant to:

(1) The provisions of this chapter; and

(2) Any applicable decisions, orders, procedures and regulations of the State Engineer.

(b) Except as otherwise provided in this paragraph, must not exceed 3 years in duration. A temporary conversion of agricultural water rights for wildlife purposes or to improve the quality or flow of water may be extended in increments not to exceed 3 years in duration each, provided that the person or entity seeking the extension first applies for and receives from the State Engineer any necessary permits or approvals, as described in paragraph (a).

[10] Quantification of benefits of a set-aside program is not part of the scope of work presented herein.

- Who qualifies for the program? For example, should only land that has been actively irrigated within the past five years qualify?

- A set-aside program requires greater management and enforcement which increases total GID operating costs.

- A set-aside program requires legal work, which also increases GID operating costs.

A set-aside program run in conjunction with a water rights retirement program either increases the total cost of basin water management or reduces the number of water rights that can be relinquished within a target timeframe.

An example of a set aside program is shown in **Table 13**. The example is based on set-aside of 1% of the acreage associated with 194 equivalent pivots; however, a set-aside program is flexible and the number of acres set-aside would likely be changed periodically. This example program would cost $112,187 in 2013 dollars to cease irrigating 243 acres each year until the water rights retirement program is complete. This example is based on payment per acre per year of $461 which represents a high end bracket of cost per acre, as noted above.

Estimated GID Costs

Start-up costs (or formation costs) of the GID are estimated at $25,000, as provided in **Table 14**. Other costs incurred by the County for attorney and natural resources staff time are unknown at this time. All start-up costs are anticipated to be absorbed by the County in this analysis.

Estimated annual operating expenses of the GID are estimated at $31,000 in 2013 dollars. The GID would have an interlocal agreement with the County for services provided, including County attorney, assessor, auditor, natural resources, and other services. At this point the analysis assumes that the County will absorb all of these costs at no expense to the GID. In addition to the interlocal agreement, the GID will incur small direct expenses and professional services expenses. Professional services include outside legal services (such as necessary with a set-aside program), water rights and monitoring management to coordinate relinquishing rights with the State Engineer's office, planning, hydrology and other services as may be needed to support the program. The GID may also have annual expenses to service debt. Total ongoing expenses are estimated in **Table 15**.

Note that this analysis does not attempt to quantify other costs that would likely be incurred by the County if agricultural land is taken out of crop production. Other costs may be direct (increased rodent control or weed control for example) or indirect (increased cost to remaining County population to run costs of facilities and services).

Debt

The water management program may be financed either on a pay as you go (available cash) basis, it may be debt financed, or it may use a combination of pay as you go and debt. In reality the GID will likely have to take out a loan or several loans or issue debt to pay for the

program because payments to farmers will not follow a smooth, average cost each year. It is much more likely that one year an entire farm will apply for the program, or several farms may apply, and in other years there may be no applications for the program. Least-cost, quick access to financing is preferable.

The County can sell general obligation (GO) bonds to finance large payments to farmers when the GID cash flow is insufficient. GO bonds are backed by the pledge and faith of the County; the repayment of bonds would be secured by an ad valorem tax on the properties in the GID. While this option is feasible it is not very flexible and it is a relatively expensive way to raise capital. Each bond sale requires bond counsel, legal counsel, and other costs that reduce total proceeds.

Another option to raise capital is to take out loans with a bank that is in the rural community and agriculture business. A good example of such a bank is the CoBANK, a mission-based bank that assists agricultural communities and municipal rural communities with water funding needs. CoBANK has experience with lending capital for purchasing water rights in Texas, and has clients in Nevada. Loans are relatively inexpensive and quick to process[11].

Table 16 compares the costs of financing the entire $42.2 million program cost with CoBANK and a County GO Bond. Note that bond term assumptions can vary. **Table 17** illustrates an example of obtaining a loan with CoBANK to take twelve pivots out of production in the first year of the program. The total cost of water rights retirement is $2.85 million. The estimated loan size is $3.09 million because of loan fees and a required one year of debt service placed in a reserve fund. Debt service payments would be $237,500 for 20 years. Over the term of the loan $1.90 million interest (financing charges) would be paid. These debt assumptions are used in the financial feasibility model in scenarios C and D.

One alternative that might be available to avoid financing costs is application of mining proceeds to the program above typical year contributions.

Estimated GID Revenues

A GID is a separate legal entity from the County. GIDs can set rates, tolls and charges for services of the district within its service territory to collect GID participant revenue. As a separate legal identity, a GID can also accept donations or grants from other agencies. Sources of revenues may include ad valorem taxes, direct charges, donations from mining net proceeds (from the County), and other sources. The pros and cons of four different revenue collecting mechanisms from GID participants are summarized on the following page.

As will be demonstrated in this memorandum, collection of revenues by irrigation water right holder GID participants alone is insufficient to reach the target reduction in groundwater pumping. Other revenue sources could include County financial support with net mining proceeds (as modeled), or asking the State Engineer to use annual assessments (per acre foot) to pay for relinquishing water rights application fees, or to waive the fees. Federal and State grants and Revolving Fund programs might also be applicable now or in the future.

[11] HEC personal interview with CoBANK, April 2013.

The financial model estimates costs, revenues, and reduced pumping under the two most favorable potential revenue collecting mechanisms given above, parcel charges and ad valorem taxes.

Revenue Collection Method	Pros	Cons
Pumping	Direct linkage to aquifer level. All irrigation water right holders on equal footing regardless of priority date of water right. Only farmers actively irrigating pay for the program.	Must have meters on each well (not the current case). Highly variable revenue stream - dependent on weather, and decreases as pumping decreases, increasing the burden for remaining farmers. Poor linkage between the right to pump and actual pumpage.
Per water right held	Easy collection / administration. All irrigation water right holders on equal footing regardless of priority date of water right. All potential irrigators pay. Known revenue stream with prepayment clause.	Not all water rights have equal duty; results in inequity in payments per acre for similar farming operations. Property owners not irrigating pay for something they receive no direct benefit from.
Assessed Value	Easy collection / administration, easy to forecast revenues, ability to sell GO bonds. All potential irrigators pay. All irrigation water right holders on equal footing regardless of priority date of water right.	Weak linkage between land value and water usage (potential difference in payments per acre for similar farming operations). Property owners not irrigating pay for something they receive no direct benefit from.
Per Parcel Charge	Easy collection / administration. Direct linkage between land use and water use. Equal charge per acre of agricultural land puts all farmers on equal footing regardless of priority date of water right. All potential irrigators pay. Known revenue stream with prepayment clause.	Property owners not irrigating pay for something they receive no direct benefit from.

Method 1: Parcel Charges

Under this revenue collecting mechanism each participating acre in the GID would pay an annual charge. The charge would be collected until the participating acre is removed from irrigated crop production (water rights have been relinquished under the water rights retirement program). When the water rights are relinquished the property would make a prepayment to eliminate any remaining cost burden of the program associated with that land. The prepayment amount would be netted out of the total price paid for retiring water rights.

Table 18 demonstrates the calculation of annual parcel charges per acre. A timeframe for completion of the program must be determined. For this analysis, a timeframe of 50 years was set. There are 22,214 acres to retire, or 444 acres per year, at a cost of $1,900 per acre. The total program cost is $844,000 per year. With the addition of annual operating costs the total annual program cost is $875,000.

This model assumes that 75% of the annual cost, or $633,105 per year, will be paid for using County net mining proceeds. This represents approximately 6% of total County net mining proceeds, as shown in **Table 19**. The remaining cost would be supported by GID parcel

charges. An additional 10% cost is added for delinquencies and administrative costs associated with the water rights retirement program not captured in the estimate of annual ongoing expenses (such as NSE relinquishment fees). The estimated annual GID participants' total cost is $242,000. The parcel charge is $242,000 divided by 31,973 participating acres[12] resulting in $8.41 per acre per year. If debt financing is used, additional costs will be incurred for financing charges. The cost burden for a farm with six pivots is $8,070 per year.

Revenues, agricultural land retired, and approximate water rights relinquished are demonstrated in a 20-year projection in **Table 20**.

Method 2: Ad Valorem Taxes

Under the second methodology, an ad valorem rate per $100 assessed value is applied. The 2013-14 net assessed value of cultivated agricultural property in Diamond Valley is $9.77 million. The statutory maximum combined tax rate is $3.64 per $100 of assessed value. The unincorporated portion of Eureka County currently pays $1.77 per $100 of assessed value. Under the Base Case the ad valorem tax rate would have to be close to the available remaining rate of $1.87 per $100 assessed value. Under scenarios B, C, and D the program could not be achieved in 50 years even with the maximum available tax rate. The County would need to reserve some portion of the available tax rate for other future County needs therefore it is unlikely that program targets could be accomplished using an ad valorem tax rate within a 50-year timeframe even under the Base Case.

As calculated in **Table 21,** applying the maximum available tax rate to cultivated agricultural property in Diamond Valley yields approximately $182,300 in revenue per year. After allowing for delinquency and administrative charges, net ad valorem taxes available for GID operations are estimated at $164,000 in fiscal year 2013-14.

Assessed value generally increases over time. Historical assessed values were examined and an average annual estimated increase applied in **Table 22**. A projection of taxes using an average annual increase of 1.7% results in revenues growing from $164,000 to $224,400 over 20 years. The model assumes continual annual average increase in assessed value of 1.7% through the 50-year timeframe.

A summary of land removed from crop production, water rights relinquished and reduced annual pumping is provided in **Table 23** under both methodologies for the Base Case scenario. A projected GID cash flow using Method 1: Parcel Charges is shown in **Table 24**, and a cash flow using Method 2: Ad Valorem Taxes is shown in **Table 25**. At the end of the 50 years **Table 24** shows a surplus of just over $1.2 million. Similarly, in **Table 25**, there is an ending surplus of just over $1.4 million. These surplus amounts represent the amount collected to cover delinquencies and administrative costs that are in addition to the annual operating costs, or could be considered revenues collected for contingencies. In the event that a surplus does exist at the end of the program the remaining money should be returned to the County's general fund as reimbursement for in-kind costs and net mining proceeds contributed over the lifetime of the program.

[12] Fiscal year 2013-14 total number of cultivated agricultural acres in Diamond Valley per the Assessor's database.

Conclusions

A Diamond Valley GID water rights retirement program is financially feasible under a certain set of conditions including a high level of financial commitment by the County over an extended period of time. The model only considers funding participation by agricultural land with permitted or certificated underground water rights. Inclusion of other agricultural, domestic, or mining lands would change the results of the feasibility study.

This memorandum describes the results of the Base Case and other model scenarios that change key assumptions of the model. The model assumes a linear pattern of water rights retirement; however, this type of retirement pattern would not occur in reality. Actual timing of retirement of land from irrigated crop production and associated water rights will depend on the realized prices paid per acre to cease irrigation, and actual other costs of the program including the cost to borrow money when needed for cash flow. In practice, the water rights retirement program would need to finance purchases of water rights whenever there is insufficient GID cash flow, or alternatively receive additional net mining proceeds.

The program targets can only be achieved within 50 years using the parcel charge revenue collection methodology. The ad valorem tax rate method would take considerably longer to retire the necessary water rights to reduce pumping to the sustainable level because it is limited in ability to raise annual revenue by the statutory tax cap.

A set aside program holds appeal for the societal benefits that may be achieved such as keeping population within the valley and maintaining social stability and the County's tax base; however, it would face implementation challenges. Depending on the structure of the program, it could also encourage experimentation with alternative farming practices. A set-aside program would increase total program costs and lengthen the timeframe to complete the water rights retirement program.

This financial feasibility analysis places emphasis on the value of water to the future of irrigated crop production in Diamond Valley; however, the value of the land and potential other economic activities in Diamond Valley deserve discussion within context of this analysis. The cost to form and operate a Diamond Valley GID to retire water rights is high. Water rights retirement and/or set aside water management strategies would benefit the aquifer and remaining irrigating farmers as well as those farmers compensated for loss of their water rights, but not any other residents of the County unless the land that is stripped of its water rights is put to other economic use. Other residents of the County may benefit if some portion of the County's financial commitment to the water issue in Diamond Valley is spent on researching and supporting alternative farming practices and other economic activities that recognize value in the land as well as the water resources in Diamond Valley.

The goal would be for other farming practices or other economic activities to replace the current farming practices and current income source of families in Diamond Valley, and to continue to provide jobs and maintain the social fabric of the southern end of the County. For example, future other uses of land may include public-private partnerships to develop industrial uses, alternative energy uses, and other economic development prospects that

have potential to benefit land holders in Diamond Valley. In achieving this goal, water rights could be retired over time without negative impact to the livelihood of the residents of Diamond Valley and economic impact to the County at large.

As a follow-up to this scope of work, which was limited to the financial feasibility of a GID to retire water rights in Diamond Valley, the County may wish to consider investigating what financial resources would be needed to achieve economic development/diversification efforts in Diamond Valley that can sustain a similar income as current irrigated crop production, and dovetail this effort with the update of the Comprehensive Economic Development Strategy for Eureka County.