

Pahrump Basin 162

Groundwater Management Plan

Version February, 2018

Prepared for:

Nye County Water District Governing Board

Prepared by:

Nye County Water District

Abbreviations used in this plan

AF - Acre Feet
AFA - Acre Feet Annually
AR - Artificial Recharge
ASR - Aquifer Storage and Recovery
BLM - Bureau of Land Management
BOCC - Nye County Board of Commissioners
BOR - Bureau of Reclamation
DRI - Desert Research Institute
DUI - Desert Utilities Inc.
DWR - State of Nevada Division of Water Resources
GPCD - Gallons Per Capita Day (what each person uses in gallons per day)
GWMP - Groundwater Management Plan
GWMPC - Groundwater Management Plan Committee
NCC - Nye County Code
NCWD - Nye County Water District
PUCI - Pahrump Utility Company Inc.
PUCN - Public Utilities Commission of Nevada
PY - Perennial Yield
RIB - Rapid Infiltration Basin
GBU or UICN – Great Basin (formerly Utilities Inc. of Central Nevada)
USGS - Unites States Geological Survey
WSAIR - Water Supply Appraisal Investigation Report
WDGB - Nye County Water District Governing Board
WLMP - Water Level Measurement Program

INTRODUCTION

The Pahrump Hydrographic Basin is one of the most over appropriated basins in Nevada and has the highest density of domestic wells of any basin in the State. In addition, the community of Pahrump has available deeded lands in sufficient amount to support a population of 495,000. The published basin Perennial Yield of 20,000 Acre Feet could support a population of approximately 80,000 using the overall goal of 198 gallons per person/per day adopted in the 2014 Pahrump Master Plan (18,000 AFA), with the remaining Perennial Yield plus re-use waters and future recharge credits available for irrigation. This version of the Ground Water Management Plan is focused solely on priority items that have the potential to bring the water resources in the basin into balance.

There are additional items in the 2015 version of the GWMP that the NCWD will continue to work on as new information is identified and as the budget allows. Therefore the 2015 version of the GWMP and Appendices remains the primary reference document for this 2018 version of the GWMP.

Background

To address the issue of over appropriation the Nye County Board of Commissioners, in concert with the Division of Water Resources, formed an advisory committee in Jan. 2014 to make recommendations for a Ground Water Management Plan. This committee has met one to two times monthly from Jan. 2014 to Sept. 2015 to discuss the over allocation of the basin, held public meetings and workshops, considered options, collected information and made recommendations for a Ground Water Management Plan. The State Engineer and/or his staff attended most of the meetings and workshops to advise the Ground Water Management Plan Committee and Nye County Water District staff of the tools that are available under existing Nevada water law. DWR staff remains involved in the effort to assist with drafting a Ground Water Management Plan for the community of Pahrump and the larger Hydrographic Basin 162 areas.

This effort by the Ground Water Management Plan Committee was both controversial and emotional as the subject matter has implications which impact the full spectrum of water use including agriculture, industrial, commercial, municipal, domestic and all other uses. After meeting for 21 months, and after considering more than 180 items that might balance the basin with input from the public, Division of Water Resources, Nye County Commissioners and the Water District Governing Board; the Ground Water Management Plan Committee produced the 2015 version of the Ground Water Management Plan. Nye County Water District staff worked with the Advisory Committee throughout.

From 2015 to 2018 (per request from the Board of Nye County Commissioners dated January 19, 2016) the Nye County Water District in cooperation with Nevada Division of Water Resources, the Pahrump Regional Planning District and Board of County Commissioners has worked to analyze available information and/or implement sections of the 2015 version of the Ground Water Management Plan. The following list of items represents material progress. Note: This list represents a small fraction of the total effort invested on a Ground Water Management Plan for Basin 162.

- Investigation into declining water levels in basin 162 and the potential impact to domestic wells. This study was provided by John Klenke, NCWD, and was presented to the Water District Governing Board on December 12, 2016.
- Nye County Water Resources Plan Update was presented to the Water District Governing Board on April 24, 2017. This was provided by MaryEllen Giampaoli and included information and recommendations for Basin 162.

- Investigation into water rights dedicated in support of development to date. This analysis was provided by Hamilton Reed (Retired Basin 162 Water Resource Specialist, DWR) and a subsequent review of Hamilton's analysis was provided by Nevada Division of Water Resources. This was completed in April 2017.
- Adoption of a water conservation ordinance for new construction was included in Nye County Code and became effective June 5, 2017 (NCC 17.04.740).
- Analysis of projects outlined in the 2015 version of the Ground Water Management Plan. This analysis was provided by Shaw Engineering and was presented to the WDGB in June of 2017.
- Analysis of water rights not yet committed for development. This analysis was provided by NCWD General Manager, Oz Wichman, in cooperation with staff at Nevada Division of Water Resources and was presented to the WDGB in both September and again in December 2017 (Note: The current version is presented herein).
- Analysis of forfeitures and cancellations (attrition) for the last 30 years in Basin 162. This analysis was provided by NCWD General Manager, Oz Wichman, in cooperation with Nevada Division of Water Resources, and was presented to the WDGB in September 2017.
- 50 year water balance projections for Basin 162. This analysis was provided by Shaw Engineering, NCWD General Manager, Oz Wichman, in cooperation with staff at Nevada Division of Water Resources. Two versions were completed (NCWD/DWR Tables 10-4) and presented to the WDGB in September and again in December 2017. During Jan and Feb 2018 revisions and updates were completed and are presented herein as Table 3.
- Contract approved with Shaw Engineering on December 11, 2017 to pursue grant funding to further characterize the carbonate aquifer in Basin 162 and ultimately improve the DRI water model for Basin 162.
- Letter to the State Engineer with recommendations regarding four priority items (with backup) related to the Ground Water Management Plan. This letter with supporting information was provided to the WDGB by General Manager NCWD, Oz Wichman, and was approved on December 11, 2017.
- Order 1293 was issued by the State Engineer on December 19, 2017 requiring new domestic wells in Basin 162 to relinquish 2 AF of water rights. Review of the Order is necessary as there are exemptions for existing domestic wells and for lots with previously dedicated water.

Perennial Yield vs Permitted Water Rights - February 2018

Basin 162 Perennial Yield is 20,000 AF - this represents DWR's assessment of the total available water resources on an annual basis in Basin 162 and includes portions of Nye and Clark Counties.

Table 1a - February 2018, Underground Water Rights currently permitted by manner of use [Ref. DWR website]:

Commercial	1,286 AF
Construction	45 AF
Domestic	7,811 AF (Relinquished in support of parcel map applications and subdivisions)
Industrial	182 AF
Irrigation (DLE)	700 AF (Desert Land Entry)
Irrigation	9,560 AF
Mining and Milling	10 AF
Municipal	31,169 AF
Quasi-Municipal	7,915 AF
Recreation	491 AF
Stockwater	5 AF
Total Permitted	59174 AF

Table 1b – Basin 162 Pumpage by Manner of Use, [Ref. *DWR Assessment of Groundwater Pumpage 2016]:

Commercial	543 AF
Industrial and Construction	113 AF
Domestic	5,545 AF (Domestic well pumpage estimate at 0.5 AFA each)
Irrigation	4,504 AF
Mining and Milling	2 AF
Municipal	4,307 AF
Quasi-Municipal	672 AF
Recreation and Wildlife	399 AF
Total 2015 Pumpage	16,085 AF

*DWR Ver. 2016 Assessment of Groundwater Pumpage for Basin 162 is the most recent data available as of Feb. 2018.

Table 2: Perennial yield of 20,000 AF versus potential groundwater withdrawal

PAHRUMP HYDROGRAPHIC BASIN	
EXISTING PERMITTED WATER RIGHTS	59,174 AF
EXISTING + FUTURE DOMESTIC WELLS	9,390 AF
*POTENTIAL GROUNDWATER WITHDRAWAL	68,564 AF
PERENNIAL YIELD	20,000 AF
OVER ALLOCATION	48,564 AF

*Potential groundwater withdrawals are the sum of:
1.) Existing water rights 59,174 AF. (Ref. DWR website Feb. 2018)
2.) An estimate of existing and future domestic wells at 0.5 AF per domestic well (estimated at 11,280 existing + 7,500 future)

PRIORITY ITEMS

After investigation and analysis of the 2015 version of the GWMP the Nye County Water District Governing Board has identified the following items which form the foundation of the GWMP at this time. The priority items are:

- Population limitations using a 20,000 AF Perennial Yield
- Water Conservation
- Recharge - Rapid Infiltration Basins for storm water runoff and waste water treatment
- Attrition
- Order 1293
- Over dedication of water rights in support of development projects
- Improving the DRI water model
- Redistribution of pumping

Table 3: Adjustment of over allocation by crediting reuse, recharge and over dedication of water rights

Table 3 provides a 50 year projection of water rights on the books – expressed as potential pumpage. *This is the essence of the GWMP.*

Table 3: Feb. 2018 NCWD Projections - Water Rights Commitments for Future Conditions (Year 2068)			
	Water Rights	AFA	Source
1	Committed Underground Feb. 2018	51,363	NDWR, Jan. 2018 Basin Summary minus Domestic Well Relinquishments to date (7,811 AF)
2	Decreed Right for Manse Spring (Potential Mitigation Right)	2,173	Included due to potential for claim for mitigation rights
3	Committed to Domestic Wells to Date	5,640	11280 existing domestic wells at @ 0.5 AFA each
4	Domestic Wells Future	3,750	NCWD Feb. 2018 estimate of 7,500 future domestic wells using an estimate of 0.5 AFA pumped per well (150/yr for 50 years). Ref: Straight average/yr for past 16 years.
5	Subtotal: Committed Underground Water Rights, Springs, Domestic Wells	62,926	Sum Rows 1 to 4
6	Over Dedication to Date	11,000	NCWD Over Dedication Project
7	Projected Over Dedication for Subdivisions - Commercial Projects	8,174	NCWD/NDWR estimate of: Additional over dedication - 8174 AF to be over dedicated for projects (2/3 of 12,262 AF water rights held by utilities not yet dedicated by recorded file maps or for commercial projects) Feb 2018 estimate.
8	Projected Over Dedication - Future domestic wells - No previous relinquishment [by projected count]	3,000	NCWD estimate of 2000 future domestic wells relinquishing water rights as required under Order 1293 (2000 new domestic wells relinquishing 2 AF ea. with average actual use of 0.5 AF ea.) [2000 wells X 2 AF ea. = 4000 AF] [4000 AF - 1000 AF use = 3000 AF over dedication]
9	Projected Over Dedication - Portion of water currently an Ag	2,840	NCWD estimate of water remaining in Ag projected to give way to development not accounted for in Line 8. [10260 - 2000 - 4000 = 4260] [2/3 of 4260 = 2840]
10	Attrition projection due to forfeiture and cancellation of water rights over the next 50 years -	2568	Estimates a 5% reduction of water rights due to forfeitures and cancellations -or- 2568 AF
11	Adjusted Water Right Commitment	35,344	Row 5 minus rows 6,7,8,9 and 10
12	Unaccounted Septic System Return Flow	3,344	Used Section 8, of Shaw report (12,400 existing ISDS) plus 7500 future ISDS = 19,900 ISDS at 150 gpd each = 3344 AFA Recharge
13	Unaccounted Agricultural Return Flow	300	15% of AG water rights, assuming 2000 AF remains - Table 10-1 notes in the Shaw report
14	Adjusted Water Right Commitment to Consumptive Use	31,700	Row 11 minus rows 12 and 13
15	Potential Reuse Credit	1,600	Section 8, Shaw report – all WWTP effluent pump to use for urban landscaping
16	Potential Return Flow Credit from Reuse	240	Section 4 and 8, Shaw report, 15% of water used for irrigation
17	Potential AR Recharge Credit for Flood Control Basins	500	Section 7, Shaw report
18	Impact of Water Conservation over the next 50 years	2700	Assumes a 15% gain in water use efficiency on all pumpage (15% of 18,000 AF) by 2068 (except the remaining 2000 AF in Agriculture)
19	Adjusted Water Right Commitment to Consumptive Use including Water Resources Management Strategies	26,660	Row 14 minus rows 15,16,17 and 18
20	Perennial Yield	20,000	NDWR, Order 1252 adjusted PY to 20,000 AFA (2015)
21	Net Projected Deficit	6,660	Row 19 minus row 20

Population limitations using a 20,000 AF Perennial Yield

The 2014 Pahrump Master Plan Update policies (Appendix J) have the potential to reduce the full build out population to approx. 103,000 (as compared to previous versions of the Master Plan). However, a population of 80,000 at 198 gpcd, approaches a point that little water is budgeted for irrigation. It is expected that agriculture in the Pahrump basin will continue to give way to development, but there will always be a need for open space, parks, and other water uses besides housing. Re-use of water for irrigation of golf courses or other water conservation measures will certainly become more attractive as the community grows and water rights become increasingly scarce.

Table 4 presents gpcd v/s population. Notice from the table entries highlighted in gray that a future population of 80,000 in the 200 gpcd column (the conservation usage target) requires approximately 18,000 AFA of water. For a perennial yield of 20,000 AFA, this leaves 2,000 AFA of water for irrigation. Water re-use, RIBS and subsequent recharge credits could provide a buffer and improves the overall water budget outlook for irrigation uses. The dashed line in Table 4 shows what the sustainable population limit would be for gpcd usage figures other than the 200 gpcd. For example, if

we don't reduce today's average gpcd usage below 250 gpcd, that same 18,000 AFA of water pumping can only sustain 65,000 people – not 80,000.

Table 4: Water usage by population at different Gallons Per Capita Day (gpcd) Rates (W. Kuver) Ref: 2015 GWMP

Pahrump Population	Total Water Usage (in AFY) at Different Gallons Per Capita Per Day Rates													
	150 gpcd	200 gpcd	225 gpcd	250 gpcd	275 gpcd	300 gpcd	325 gpcd	350 gpcd	375 gpcd	400 gpcd	425 gpcd	450 gpcd	475 gpcd	500 gpcd
25,000	4,201	5,601	6,301	7,001	7,701	8,401	9,101	9,801	10,501	11,201	11,902	12,602	13,302	14,002
27,500	4,621	6,161	6,931	7,701	8,471	9,241	10,011	10,781	11,551	12,322	13,092	13,862	14,632	15,402
30,000	5,041	6,721	7,561	8,401	9,241	10,081	10,921	11,762	12,602	13,442	14,282	15,122	15,962	16,802
32,500	5,461	7,281	8,191	9,101	10,011	10,921	11,832	12,742	13,652	14,562	15,472	16,382	17,292	18,202
35,000	5,881	7,841	8,821	9,801	10,781	11,762	12,742	13,722	14,702	15,682	16,662	17,642	18,622	19,603
37,500	6,301	8,401	9,451	10,501	11,551	12,602	13,652	14,702	15,752	16,802	17,852	18,902	19,953	21,003
40,000	6,721	8,961	10,081	11,201	12,322	13,442	14,562	15,682	16,802	17,922	19,042	20,163	21,283	22,403
42,500	7,141	9,521	10,711	11,902	13,092	14,282	15,472	16,662	17,852	19,042	20,233	21,423	22,613	23,803
45,000	7,561	10,081	11,341	12,602	13,862	15,122	16,382	17,642	18,902	20,163	21,423	22,683	23,943	25,203
47,500	7,981	10,641	11,972	13,302	14,632	15,962	17,292	18,622	19,953	21,283	22,613	23,943	25,273	26,603
50,000	8,401	11,201	12,602	14,002	15,402	16,802	18,202	19,603	21,003	22,403	23,803	25,203	26,603	28,004
52,500	8,821	11,762	13,232	14,702	16,172	17,642	19,112	20,583	22,053	23,523	24,993	26,463	27,934	29,404
55,000	9,241	12,322	13,862	15,402	16,942	18,482	20,023	21,563	23,103	24,643	26,183	27,724	29,264	30,804
57,500	9,661	12,882	14,492	16,102	17,712	19,322	20,933	22,543	24,153	25,763	27,374	28,984	30,594	32,204
60,000	10,081	13,442	15,122	16,802	18,482	20,163	21,843	23,523	25,203	26,883	28,564	30,244	31,924	33,604
62,500	10,501	14,002	15,752	17,502	19,252	21,003	22,753	24,503	26,253	28,004	29,754	31,504	33,254	35,004
65,000	10,921	14,562	16,382	18,202	20,023	21,843	23,663	25,483	27,304	29,124	30,944	32,764	34,584	36,405
67,500	11,341	15,122	17,012	18,902	20,793	22,683	24,573	26,463	28,354	30,244	32,134	34,024	35,915	37,805
70,000	11,762	15,682	17,642	19,603	21,563	23,523	25,483	27,444	29,404	31,364	33,324	35,285	37,245	39,205
72,500	12,182	16,242	18,272	20,303	22,333	24,363	26,393	28,424	30,454	32,484	34,514	36,545	38,575	40,605
75,000	12,602	16,802	18,902	21,003	23,103	25,203	27,304	29,404	31,504	33,604	35,705	37,805	39,905	42,005
77,500	13,022	17,362	19,533	21,703	23,873	26,043	28,214	30,384	32,554	34,724	36,895	39,065	41,235	43,406
80,000	13,442	17,922	20,163	22,403	24,643	26,883	29,124	31,364	33,604	35,845	38,085	40,325	42,565	44,806
82,500	13,862	18,482	20,793	23,103	25,413	27,724	30,034	32,344	34,654	36,965	39,275	41,585	43,896	46,206
85,000	14,282	19,042	21,423	23,803	26,183	28,564	30,944	33,324	35,705	38,085	40,465	42,846	45,226	47,606
87,500	14,702	19,603	22,053	24,503	26,953	29,404	31,854	34,304	36,755	39,205	41,655	44,106	46,556	49,006
90,000	15,122	20,163	22,683	25,203	27,724	30,244	32,764	35,285	37,805	40,325	42,846	45,366	47,886	50,406
92,500	15,542	20,723	23,313	25,903	28,494	31,084	33,674	36,265	38,855	41,445	44,036	46,626	49,216	51,807
95,000	15,962	21,283	23,943	26,603	29,264	31,924	34,584	37,245	39,905	42,565	45,226	47,886	50,546	53,207
97,250	16,340	21,787	24,510	27,233	29,957	32,680	35,404	38,127	40,850	43,574	46,297	49,020	51,744	54,467
100,000	16,802	22,403	25,203	28,004	30,804	33,604	36,405	39,205	42,005	44,806	47,606	50,406	53,207	56,007
102,500	17,222	22,963	25,833	28,704	31,574	34,444	37,315	40,185	43,056	45,926	48,796	51,667	54,537	57,407
105,000	17,642	23,523	26,463	29,404	32,344	35,285	38,225	41,165	44,106	47,046	49,986	52,927	55,867	58,808
107,500	18,062	24,083	27,093	30,104	33,114	36,125	39,135	42,145	45,156	48,166	51,177	54,187	57,197	60,208
110,000	18,482	24,643	27,724	30,804	33,884	36,965	40,045	43,126	46,206	49,286	52,367	55,447	58,528	61,608
112,500	18,902	25,203	28,354	31,504	34,654	37,805	40,955	44,106	47,256	50,406	53,557	56,707	59,858	63,008
115,000	19,322	25,763	28,984	32,204	35,425	38,645	41,865	45,086	48,306	51,527	54,747	57,967	61,188	64,408
117,500	19,743	26,323	29,614	32,904	36,195	39,485	42,775	46,066	49,356	52,647	55,937	59,228	62,518	65,808
120,000	20,163	26,883	30,244	33,604	36,965	40,325	43,686	47,046	50,406	53,767	57,127	60,488	63,848	67,209
122,500	20,583	27,444	30,874	34,304	37,735	41,165	44,596	48,026	51,457	54,887	58,317	61,748	65,178	68,609
125,000	21,003	28,004	31,504	35,004	38,505	42,005	45,506	49,006	52,507	56,007	59,508	63,008	66,509	70,009
127,500	21,423	28,564	32,134	35,705	39,275	42,846	46,416	49,986	53,557	57,127	60,698	64,268	67,839	71,409
130,000	21,843	29,124	32,764	36,405	40,045	43,686	47,326	50,967	54,607	58,247	61,888	65,528	69,169	72,809

The Ground Water Management Plan Committee recommended and the Water District Governing Board affirms:

- 1.) Water-related policies within the 2014 Pahrump Master Plan (Appendix J) should be implemented and included within County Code.
- 2.) Mitigation of water at a ratio of “2 AF dedicated, relinquished or mitigated -to- 1 AF used” for future commercial and industrial development be required. (Nye County Planning and the NCWD are currently working on this item)

Water Conservation

A water conservation ordinance for new construction was included in Nye County Code and became effective June 5, 2017. Bill 2017-06 implemented portions of Water Conservation Specifications outlined within the 2014 PRPD Master Plan Update and the 2015 version Pahrump Basin 162 Ground Water Management Plan for new construction (NCC 17.04.740). Over the next 50 years this is projected to reduce pumpage by 2700 AF [assumes a 15% gain in water use efficiency on all pumpage (18,000 AF) by 2065 except 2000 AF in agriculture].

This projection is included in the 50 year water balance – Table 3.

Recharge - Rapid Infiltration Basins for storm water runoff and waste water treatment

An analysis on RIB's and recharge components of the GWMP was completed by Shaw Engineering in June of 2017. Part of this effort included an assessment of the Pahrump Master Flood Control Plan to capture what recharge values can be assigned [as opposed to evaporating the water off with “retention” basins]. Benefits of such a project are straight forward; get water in the aquifer as opposed to evaporating it off. The analysis showed an initial cost of \$39,000 per acre foot to convert flood control basins to RIB's (\$19.5 Million total) for 500 AF of recharge annually -or- 25,000 AF of recharge over 50 years. This should be further investigated as part of the engineering and bid process at such time as Nye County Public Works implements elements of the Master Flood Control Plan [the costs should be tested in a bid to construct at the time Public Works is going to build a flood retention facility – cost versus benefit]. In addition Shaw Engineering analyzed recharge from irrigation, Waste Water Treatment Plants and Individual Sewer Disposal Systems.

Recharge estimates for all of these items are outlined in Section 8 of the Shaw Engineering report. Shaw Engineering's conclusions and NCWD's updated figures are included in the 50 year water balance – Table 3.

Attrition

DWR has provided material that quantifies forfeitures and cancellations of water rights to date for Basin 162. The records indicate that over 16,000 acre feet of water rights have been canceled or forfeited in the past 30 years -or- an average of 545 AFA. The NCWD has formally requested that the State Engineer continue to provide critical review of water rights for non-use and extensions of time.

It is generally agreed that attrition rates will slow down as water rights become more scarce (and valuable) in the basin. Table 3 uses a 5% future attrition rate (over 50 years) -or- some 2,568 AF of water rights that will no longer be on the

books. Using current over dedication rates; this would account for 1,712 AF less potential pumpage and is used in the 50 year water balance – Table 3.

Order 1293

There are 11,280 existing domestic wells in Basin 162 (Ref: DWR Order 1293). Using an estimated average use of 0.5 acre feet each, the existing domestic wells account for more than 30% of the pumpage in the basin at this time (Ref: current domestic well count v/s 2016 pumpage). The 2015 version of the GWMP showed that adding 8500 new domestic wells by the year 2065 increased potential pumpage to 49% of the total perennial yield [8500 additional domestic wells equated to 4,500 acre feet of pumpage]. Should the State Engineer be forced to allow new domestic wells to be drilled without relinquishment of water rights a water balance cannot be achieved for the basin. Moreover, when considering that Nevada is a priority doctrine state and taken together with the implications of NRS 534.080 and under a potential curtailment order, propagation of domestic wells in perpetuity would potentially place the State Engineer in the position to limit withdrawals of not only new domestic wells but the majority of those currently in use. Statutes supporting this conclusion are as follows:

NRS 534.080.4: The date of priority for the use of underground water from a well for domestic purposes where the draught does not exceed 2 acre-feet per year is the date of completion of the well as:

- (a) Recorded by the well driller on the log the well driller files with the State Engineer pursuant to NRS 534.170; or
- (b) Demonstrated through any other documentation or evidence specified by the State Engineer.

On December 11, 2017 the Nye County Water District requested that the State Engineer issue an Order requiring relinquishment or dedication of water rights for new domestic wells and that existing domestic wells were expressly exempt from the Order.

On December 19, 2017 the State Engineer issued Order 1293. The Order can be summarized as follows:

First: A relinquishment of 2 Acre Feet of water rights in good standing will be required for a new domestic well in the Pahrump Basin. Note: There are parcels (lots/lands) in the Pahrump Basin that have previously had water rights dedicated or relinquished at the time the parcel was created. Property owners should first contact the Division of Water Resources (DWR) - Levi Kryder (lkryder@water.nv.gov) Phone - 775-684-2800 - and ask if their lot has previously dedicated or relinquished water rights.

Second: Excepted [excluded] from the Order are;

Any entity that has already relinquished sufficient water rights to serve a domestic well are excepted.

Existing domestic wells requiring replacement are excepted.

Existing domestic wells requiring reconditioning or rehabilitation as defined by NAC 534.188 and 534.189 are excepted.

Below are the referenced NAC's.

NAC 534.188 “Reconditioning” defined. (NRS 534.020, 534.110) “Reconditioning” means the deepening, reaming, casing, recasing, perforating, reperforating, installing of liner pipe, packers and seals or any other significant change in the design or construction of a water well.

(Added to NAC by St. Engineer, eff. 1-9-90; A 12-30-97)

NAC 534.189 "Rehabilitation" defined. (NRS 534.020, 534.110) "Rehabilitation" means the process of revitalizing an existing well by various methods that do not cause a significant change in the design or construction of the well, including, without limitation, chemical treatment, brush cleaning, surging and high-pressure jetting.

(Added to NAC by St. Engineer by R044-14, eff. 10-24-2014)

There is also language in the Order citing a condition where water can be provided by a utility. In essence, if you live in a service area and the utility has pipe in the street, you will likely be denied a domestic well -or- when your domestic well fails you will likely be required to hook up to the utility. This is not a new requirement in the basin (this has been on the books for many years). If DWR determines a parcel (lot) does not have water rights in sufficient amounts that were previously dedicated; they will require the property owner to relinquish 2 acre feet of water rights prior to drilling a domestic well.

Status of Order 1293 and impact to 50 year projections

Order 1293 has been challenged in court and will take time (potentially years) for litigation to come to a conclusion. With respect to a GWMP, the implications of Order 1293 are straight forward; no more commitments for water in Basin 162. The impact of Order 1293 on the GWMP - is a direct reduction of potential pumpage, but the most significant effect is that the community now has a set amount of water commitments to work within. As such, domestic wells going forward have an over dedication component based on the estimated 0.5 AF actual pumpage.

The effect of Order 1293 and domestic well estimates are included in the 50 year water balance – Table 3.

Over Dedication of Water Rights

Definition: Over Dedication is the amount of water dedicated in support of land division - in excess of actual use. This term also includes relinquishment.

Both the Nevada Division of Water Resources and Nye County require over dedication of water rights in support of division of lands in the community of Pahrump. Water rights are dedicated by the developer at the time that the land division map is recorded. Currently the ratio required for dedication in support of subdivision maps is approximately 3-4 AFA for each 1 AFA to be placed to use. The over dedicated water rights are primarily held by utility companies doing business in the community. These water rights are dedicated to each parcel and it is unlikely that over dedicated amounts will ever be utilized (pumped). In addition, parcel map applications require relinquishment of 3 AF water rights for each new parcel created with an estimated pumpage of 0.5 AF.

There is currently nothing in the statute that expressly prohibits the utility from moving excess dedicated water to other uses, including additional development. DWR maintains that they will not allow these excess dedications to be moved and/or used for anything other than the original purpose of the dedication. Permanent relinquishment of over dedications would put the issue to bed, but it remains to be seen exactly how this will play out between the utilities, the Public Utility Commission of Nevada and the DWR. The NCWD suspects that given the attention the Pahrump basin is receiving from DWR, and moreover the entire State, it is unlikely the over dedicated water rights will ever be pumped.

Over dedication of water rights in support of development projects [water rights dedication in excess of predicted usage] reduces expected/projected pumpage in the Pahrump basin by over 11,000 acre feet to date. On April 25, 2016 and again on December 11, 2017 the Nye County Water District sent formal requests to the State Engineer to issue an

Order for Basin 162 securing dedicated water to specified lands in perpetuity. An excerpt from the Dec. 11, 2017 request reads: *"The Nye County Water District Governing Board is formally requesting that you do not allow dedicated water rights to be moved [change of the Place of Use by Change Application] in support of new [more] development and we request your continued assistance in applying this tool to future commercial projects and other development. Please issue an Order or take other documented administrative action to clarify this important issue. Further, we are requesting that this action should include past, present and future water rights dedicated in support of development."*

In addition the WDGB passed a resolution on July 27, 2015 to require relinquishment of "2 AF for each 1 AF to be placed to use" for all commercial and industrial development within the Community of Pahrump. A copy of the resolution is included in the 2015 version of the GWMP as Appendix A. Nye County and the NCWD continue to work toward presenting proposed amendments to County Code that would provide for over dedication for commercial and industrial development.

The NCWD projections for over dedication in the 50 year water balance include over dedication for residential, commercial and industrial development - Table 3.

Improving the DRI Water Model

Groundwater flow models can be used to simulate the effects of pumping groundwater in a particular location on the wells around that location. This is potentially useful once drilling targets have been identified and water production/extraction rates are being considered. If the model shows that pumping in a certain location at a certain rate will have negative impacts on nearby wells or cause excessive drawdown, it may be necessary to seek alternative pumping locations.

In 2017 the Desert Research Institute (DRI) completed a calibrated model for the Pahrump Basin. The NCWD is currently in motion to improve the carbonate aquifer component of the DRI water model for Basin 162 and has contracted with Shaw Engineering to champion this effort. The first steps are to make application for grants to secure funding for the project which has an estimated cost of \$6 Million. The benefits of such a project include; 1.) Identifying salvageable carbonate waters to reach the full potential of a 20,000 AF Perennial Yield, 2.) Improve Perennial Yield calculations, 3.) Redistribution of [and/or strategic placement of] production wells to stabilize declining water levels.

The NCWD is currently pursuing Phases 1 through 6 of the modeling project as follows:

Phase 1: Preliminary Project Planning including development of the project Identification/Description, Schedule, Estimated Costs and prepare one to two funding applications to pursue Phases 2-6 described below.

Phase 2: Geophysics and related work to identify specific exploration well locations to be pursued.

Phase 3: Permitting/Environmental Assessment related to the exploration program (Phases 4 and 5 below).

Phase 4: Undertake exploration drilling utilizing test holes.

Phase 5: Test Wells/Pumping Tests.

Phase 6: Groundwater Modeling. Updating the numerical flow model with information acquired by the exploration and test well drilling, and possibly integrating geologic information from the USGS regional flow model.

As stated previously, NCWD is currently in motion to improve the carbonate aquifer component of the DRI water model and has contracted with Shaw Engineering to champion this effort. This effort will take years to complete and there is no guarantee that the project will qualify for grant funding.

Redistribution of Production Wells

An analysis of the benefits for redistribution of pumping was completed by Shaw Engineering in June of 2017. This item is directly tied to NCWD's ongoing efforts to improve modeling of the carbonate aquifer. The benefits include; 1.) Capture of carbonate aquifer and 2.) Stabilization of declining water levels on the valley floor. Shaw Engineering's analysis also included taking advantage of limited increases to pumping on the alluvial fan and in addition, two conceptual well fields; one south of Pahrump near the state line and one southeast of Pahrump along SR 160. Costs to establish remote well fields [to capture water that is not connected to the upper alluvial aquifer -or- alluvial water that does not increase drawdown in the more developed sections of Pahrump] are currently estimated at up to \$67 Million. Before the NCWD can assess the merit of such projects; more work is required to improve the DRI model, particularly with respect to the carbonate water.

The NCWD is currently in motion to improve the DRI water model for Basin 162 and has contracted with Shaw Engineering to assist with this effort (see previous section on Improving the DRI Water Model).

CONCLUSIONS

As stated previously, Table 3 provides a 50 year projection of water rights on the books – expressed as potential pumpage. *This is the essence of the GWMP* and summarizes our efforts to provide grounded conclusions. As with all planning documents the GWMP, and more specifically Table 3, has areas of uncertainty. The NCWD has made every effort to support the conclusions as represented herein, as demonstrated in this version of the Plan and supporting material.

With regard to areas of uncertainty and consistent with any planning document: It is recommended that the GWMP be revisited every 5 years -or- when information is received that *positively or negatively* has substantial impacts to the projected water balance as shown in Table 3. A few items that are critical to track with regard to trends and effectiveness are:

- Impacts of the Water Conservation Plan on water usage to new single family residences (Refer to NCC 17.04.740)
- Over dedication projections
- Domestic well drilling (how many per year and amount of water relinquished)
- Re-use and Recharge
- Water level decline
- Development with regard to population v/s available water resources:

It is the desire of the Nye County Water District Governing Board that this plan be adopted by both the Nye County Board of Commissioners and Nevada Division of Water Resources. This Plan is a living document and the NCWD will continue to monitor trends and pursue solutions as outlined previously and as funding allows. Also as stated previously; the 2015 version of the GWMP and Appendices remains the primary reference document.

The Water District Governing Board and NCWD staff would like to thank the countless people who have worked on this Plan.