Pahrump Basin 162

Groundwater Management Plan

STAGE ONE

Version Oct. 16, 2015

Prepared for:

Groundwater Management Plan Advisory Committee

Prepared by:

NCWD Staff and GWMPC Members

Agenda Item VIII A-2 (WATER)
Meeting Date: 07-11-16

Table of Contents: **Page:**

CHAPTER 1 – INTRODUCTION…… 4

(A) - Background

(B) - Basin 162 Groundwater Management Plan Advisory Committee

(C) - Acronyms Used in This Report

CHAPTER 2 - BASIC PAHRUMP BASIN WATER RESOURCES FACTS AND FIGURES…… 6

(A) - Perennial Yield vs Permitted Water Rights

(B) - Over Dedication of Water Rights

(C) - Domestic Well Usage Estimates

(D) - Potential Groundwater Withdrawal Overdraft

(E) - Potential Offset to the Over Allocation Figure

(F) - Projected Total Usage at Build-out

CHAPTER 3 - HISTORY AND REFERENCE TO STATUTE(S)…… 11

(A) - Historical Reports and State Engineer Orders

(B) - Statutes and Regulations Governing the Division of Water Resources

(C) - Nye County Code and Water Resources in the Pahrump Basin

CHAPTER 4 –PAHRUMP BASIN HYDROLOGY CONSIDERATIONS…….. 12

(A) - Water Level Measurement Program

(B) - Redistribution of Production Wells

(C) - Use of Groundwater Flow Models as Planning Tools

CHAPTER 5 - RECOMMENDATIONS FROM THE GROUND WATER MANAGEMENT PLAN COMMITTEE.. 16

(A) - Aggressive Water Education

(B) - Adopt a Water Conservation Plan

(C) - Water Importation to Pahrump

(D) - Require Meters on New Domestic Wells and Limit New Domestic Well Usage to 0.5 AFA

(E) - Educate New Domestic Well Owners on Supplemental Water Rights for Usage >0.5 AFA

(F) - Construct Rapid Infiltration Basins

(G) - Aquifer Storage and Recovery

(H) - Allow Utilities to put in Backbone Infrastructure

(I) - Create Incentives to Voluntarily Connect to Public Water Systems

(J) - Conservation Credit Program

(K) - Development Agreements

(L) - Growth Control

(M) - Additional Recommendations

List of Tables **Page:**

Table 1a - Underground Water Rights Permitted by Manner of Use…….. 6
Table 1b - Basin 162 Pumpage by Manner of Use…….. 6
Table 2 - Perennial Yield of 20,000 AF versus Potential Groundwater Withdrawal…… 8
Table 3 - Adjustment of Over-Allocation by Crediting Reuse, RIB Recharge and Over-Dedication of Water Rights..…… 9
Table 4 - Water Usage by Population at Different Gallons Per Capita Per Day (gcpd) Rates…… 29

List of Figures

Figure 1 - Density of Domestic Wells in Pahrump per Square Mile…… 10
Figure 2 - Distribution of wells monitored as part of the WLMP…… 13
Figure 3 - 10 year Water Level Change Map ……..14

List of Appendices

Appendix A - WDGB Resolution to Require Relinquishment of Water Rights for Future Development
Appendix B - Water Level Measurement Program - Hydrographs for the Pahrump Basin
Appendix C - Water Supply for the Future of Southern Nevada – 1970 Report
Appendix D - Order 1252 from the State Engineer
Appendix E - Information Regarding Interconnection of Utility Infrastructure
Appendix F - Report on Aquifer Storage and Recovery
Appendix G - Recommended Plant List for the GWMP Conservation Plan
Appendix H - Report on Water Importation to Pahrump
Appendix I - Information Regarding the Domestic Well Credit (County Code, NRS and Explanation)
Appendix J - Pahrump Master Plan Update Water-Related Policies
Appendix K - GWMP Workshop Ideas
Appendix L - Nye County Population Estimates (2nd Quarter 2015)
Appendix M - Groundwater Pumpage Inventory (2013) and Hydrographic Area Summary (2015)
Appendix N - All Orders from the Division of Water Resources Regarding the Pahrump Basin
Appendix O - AB 419 – Provisions Relating to Ground Water Basins
Appendix P - Pahrump Valley Water Resources Management (2012)
Appendix Q - Excerpts from the Water Supply Appraisal Investigation Report (2013)
Appendix R – Nevada Water Law 101

CHAPTER 1 – INTRODUCTION

(A) - Background

In 2011 the Nevada State Legislature passed into law Assembly Bill 419. Part of AB 419 language references the submittal and approval (by the State Engineer) of a Ground Water Management Plan. Components of the plan would be tailored to represent present and future conditions for a particular basin, which is to say: Each basin is unique in character such as available water supply versus present and future demands, physical geologic and lithologic conditions, available lands for development, existing population and growth potential, types of uses, permitted water rights, domestic well density, production well locations, water utility availability, economic factors and other conditions. Components of the plan could include a variety of actions and/or state and local regulations to have groundwater withdrawals in step with available groundwater supply.

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 of198 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.

> *Note: Utilities presently doing business in the Pahrump basin estimate average household usage within their service areas at a range of 278 to 300 gallons per day/per household (300 gal/day/household = 0.33 AFA). Using 300 gallons/day at 2.42 people per household calculates to 124 *gpcd (this includes outdoor use). DWR estimates Domestic well use at 0.5 AFA. Using the same 2.42 people per household this calculates to 184 gpcd for those households on a domestic well. All of the above estimates include both indoor and outdoor uses. (gpcd is* Gallons Per Capita Day and is simply what each person uses in gallons per day)
>
> *Overall community gpcd calculations include commercial, industrial, construction water and other uses, but exclude irrigation in the calculation. Using the 2013 pumpage inventory of 14,348 AF, less irrigation of 3,466 AF divided by a current population of 38,929, this calculates to a current 250 gpcd overall for the community of Pahrump.*

(B) – Basin 162 Groundwater Management Plan Advisory Committee

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. The Committee's mission statement is: *"To create an equitable groundwater management plan for the Pahrump Basin and the Pahrump Community that balances water supply and demand today and for the future".*

This committee has met one to two times monthly from Jan. 2014 to present (Sept. 2015) to discuss the over allocation of the basin, hold public meetings and workshops, consider options, collect information and make recommendations for a Ground Water Management Plan. The State Engineer and/or his staff attended most of the meetings and workshops to advise the GWMPC and 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. This effort by the Ground Water Management Plan Committee has been 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 the past 21

months together with input and information from the public, Division of Water Resources, Nye County Commissioners and the Water District Governing Board; the Ground Water Management Plan Committee compiled more than 180 ideas to balance available water with future growth potential for the community.

After much consideration, discussion and debate, the committee has identified the following items which form the foundation for a GWMP. The priority items in no particular order are:

- Aggressive water education
- Adopt a water conservation plan
- Water importation
- Require meters on new domestic wells
- Limit new Domestic wells to 0.5 AFA
- Educate domestic well owners regarding the option to supplement their water usage with permitted water rights
- Construct rapid infiltration basins and/or recharge basins
- Aquifer Storage and Recovery
- Allow utilities to put in backbone infrastructure with PUC approval to reach more lots
- Create incentives to voluntarily connect to public water systems
- Conservation Credit Program for water rights
- Investigate existing and future development agreements and implement changes with the goal to require water mitigation.
- Growth Control

Water District staff was instructed by the WDGB to provide support for the GWMPC and have attended all of the meetings and workshops, provided background information, and have been tasked with drafting a GWMP for WDGB, BOCC and DWR consideration. This report includes the following Chapters and is based on the GWMPC recommendations:

- CHAPTER 1 - Introduction
- CHAPTER 2 - Basic Pahrump Basin Water Resources Facts and Figures
- CHAPTER 3 - History and Reference to Statue(s)
- CHAPTER 4 - Pahrump Basin Hydrology Considerations
- CHAPTER 5 - Recommendations from the Groundwater Management Plan Advisory Committee

(C) - Acronyms Used in This Report

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 - Perineal Yield
RIB - Rapid Infiltration Basin
UICN - 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

CHAPTER 2 - BASIC PAHRUMP BASIN WATER RESOURCES FACTS AND FIGURES

(A) – Perennial Yield vs Permitted Water Rights

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 - June 2015, Underground Water Rights currently permitted by manner of use [Ref. DWR website]:

Commercial	1195 AF	
Construction	287 AF	
Domestic	7291 AF	(Relinquished in support of parcel map applications and subdivisions)
Industrial	162 AF	
Irrigation (DLE)	700 AF	(Desert Land Entry)
Irrigation	11,754 AF	
Mining and Milling	10 AF	
Municipal	30,671 AF	
Quasi-Municipal	7850 AF	
Recreation	491 AF	
Stockwater	5 AF	
Total Permitted	**60,416 AF**	

Table 1b – Basin 162 Pumpage by Manner of Use, [Ref. *DWR Assessment of Groundwater Pumpage 2013]:

Commercial	498 AF	
Industrial and Construction	67 AF	
Domestic	5,502 AF	(Includes Domestic well estimate)
Irrigation	3,466 AF	
Mining and Milling	3 AF	
Municipal	4,106 AF	
Quasi-Municipal	443 AF	
Recreation and Wildlife	263 AF	
Total 2013 Pumpage	**14,348 AF**	

*DWR Ver. 2013 Assessment of Groundwater Pumpage is the most recent data available as of Sept. 2015.

(B) – Over Dedication of Water Rights

For more than 15 years the Division of Water Resources and Nye County have required over dedication of water rights in support of subdivision of lands in the community of Pahrump. Today the ratio required for dedication 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, who have supported the over dedication requirements. These water rights are permanently dedicated to each parcel and it is unlikely that all the over dedicated amounts will ever be utilized in any manner. In addition, parcel map applications require relinquishment of water rights for each new parcel created. The exact number in acre feet of over dedication + relinquishment v/s actual use (to date) has not been quantified but these water rights *are counted* in the over appropriation of the basin. The development community has been participating to bring water used for development in balance with the available water resources by either over dedication of water rights, reuse of effluent, or outright relinquishment in support of development and through conservation and mitigation within the developments. More information is needed to quantify what the *total combination of over dedication + outright relinquishment* means to the larger water budget, but it will be a significant number.

There is 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 the subject 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. Staff suspects that given the attention the Pahrump basin is receiving from the DWR, and moreover the entire State, it is highly unlikely the over dedicated water rights will ever be pumped and will continue to lie in limbo.

The WDGB heard and 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 attached in Appendix A.

(C) – Domestic Well Usage Estimates

In addition to permitted water rights, the community of Pahrump has more than 11,000 existing domestic wells and currently has sufficient vacant parcels to drill an additional 8,500 domestic wells. It is generally accepted that *on the average* the domestic well owners in the Pahrump community are not pumping their full 2 AFA to which they are entitled under Nevada water law. The DWR acknowledges this and is currently using an estimate of 0.5 AFA per domestic well for water budgeting purposes.

Additionally, the Nye County Water District is sponsoring a voluntary domestic well metering program. Of the 13 wells in the program 7 have multiple year's data collected to date. The average use from these 7 wells indicates that the domestic well owners (to their credit) are using approximately 0.52 AFA. "Average" use takes in to consideration that some domestic wells are not used at all (zero use) while others use the full 2 AF (or more on some limited basis). The Water District hopes to add data from the remaining 6 wells within the next 12 months. Unfortunately 13 wells (of 11,000) do not provide an adequate sample size and therefore the metering program does not support a defendable conclusion at this time. More effort on the part of the Water District, DWR and the community of Pahrump is required to install a sufficient number of meters and collect more data to quantify actual average domestic use for the

community. Based upon the previous statements, and for the potential groundwater withdrawal calculation presented in Table 1, the domestic well component is calculated at [11,000 + 8,500] X 0.5 AFA = 9,750 AFA.

(D) – Potential Groundwater Withdrawal Overdraft

Potential groundwater withdrawal within the area of the Pahrump community includes two components: 1.) Permitted water rights, and 2.) Domestic wells. Table 2 places the potential groundwater withdrawals at 70,166 AFA.

Table 2 provides a breakdown of:

- The Perennial Yield of Basin 162.
- Existing water rights permits as of June, 2015 (Reference: DWR Hydrographic Area Summary).
- Estimated existing and future domestic wells with estimated usage at 0.5 AFA per domestic well.
- A total potential groundwater withdrawal which is calculated using existing water rights + domestic well pumpage.
- The estimated over allocation or potential shortfall of 50,166 AF.

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

PAHRUMP HYDROGRAPHIC BASIN	
EXISTING PERMITTED WATER RIGHTS	60,416 AF
EXISTING + FUTURE DOMESTIC WELLS	9,750 AF
*POTENTIAL GROUNDWATER WITHDRAWAL	70,166 AF
PERENNIAL YIELD	20,000 AF
OVER ALLOCATION	50,166 AF
*Potential groundwater withdrawals are the sum of: 1.) Existing water rights 60,416 AF. (Ref. DWR website Jun. 2015) 2.) An estimate of existing and future domestic wells at 0.5 AF per domestic well (estimated at 11,000 existing + 8,500 future)	

(E) - Potential Offset to the Over Allocation Figure

Pahrump presently has direct effluent reuse used for irrigation, has RIBs in use for effluent recharge (as opposed to other types of effluent management) and has RIBs in use for flood control, all of which provide usable water resources and/or a recharge component. In addition to reuse and recharge factors, over dedication of water rights further offsets the over allocation figure. The existing and potential benefits are currently not quantified but will have significant impacts to over allocation.

Utilities providing both water and sewer service collect some 40% of the overall water delivered to the home as return to the wastewater treatment facility. If the utility utilizes a RIB (as opposed to other types of effluent management), this provides a significant recharge component to the water resource and is not included in the 20,000 AF PY. In addition one utility in the community has utilized effluent for irrigation. It is predicted that future effluent reuse will become more attractive as water rights become increasingly scarce.

Rapid Infiltration Basins for flood control have the dual benefit of controlling flood water and recharging the basin water resource. It is predicted that Nye County, combined with efforts underway by the Public Works Department, will continue to encourage RIBs for development projects as part of flood control plans and water use mitigation and will ultimately construct RIBs for overall community flood control projects.

As stated previously in this report; for more than 15 years the Division of Water Resources and Nye County have required over dedication of water rights in support of development in the community of Pahrump. Today the ratio required for dedication is approximately 3-4 AFA for each 1 AFA to be placed to use. The exact number in acre feet of over dedication + relinquishment v/s actual use has not been quantified (existing or potential) but these water rights *are counted* in the over allocation of the basin in Table 1. Providing an accounting for both [existing and the potential for] reuse, recharge and over dedication is an important component of the GWMP effort.

Table 3, proposes a future reuse/recharge credit of TBD AF (to be determined) which will significantly offset the over allocation figure of 50,166 AF. Table 3 also proposes that over dedication of water rights would further offset the over allocation figure.

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

PAHRUMP HYDROGRAPHIC BASIN	
PERENNIAL YIELD	20,000 AF
OVER ALLOCATION	50,166 AF
REUSE CREDIT POTENTIAL	TBD AF
RECHARGE CREDIT POTENTIAL	TBD AF
OVER DEDICATION POTENTIAL - SUBDIVISIONS	TBD AF
OVER DEDICATION POTENTIAL - DOMESTIC WELLS	TBD AF
*ADJUSTED OVER ALLOCATION	TBD AF
*Adjusted over allocation: 1.) Credits reuse and recharge water as usable water. 2.) Significantly reduces the over allocation total by accounting for over dedicated water rights (existing + future should be included). 3.) 1 and 2 combined would be subtracted from the 50,166 over allocation figure.	

The GWMPC recommends: Reuse, recharge and over dedication should be captured, quantified and presented in report form to account for existing + future potential reduction to the over allocation total as indicated in Tables 2 and 3. This effort should include NCWD and DWR staff and will require review of information on record at the offices of Nye County, NCWD and DWR.

(F) – Projected Total Usage at Build-out

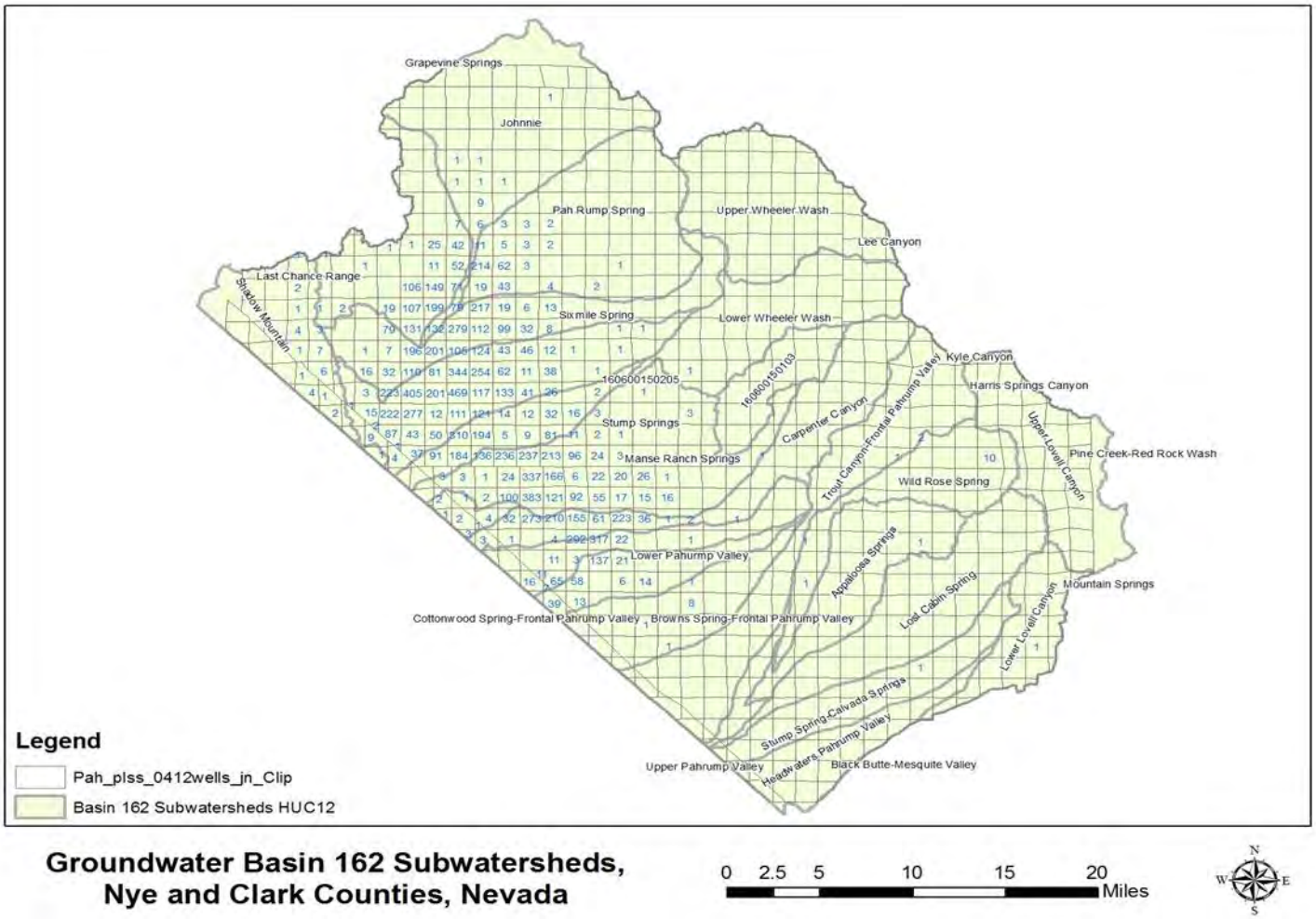
The current population estimate for the community of Pahrump is 38,929 (Nye County Planning, 1st quarter 2015). Based upon available deeded lands, previous versions of the Pahrump Master Plan have predicted it is possible to create sufficient parcels to support a population of 495,000. However, the 2014 Pahrump Master Plan Update has scenarios which, if implemented, could reduce this full build-out population to a range of 103,000 to 376,000 (Review of the 2014 Pahrump Master Plan to understand the scenarios presented and calculated therein is recommended). A fractional

portion of the higher population projections could outstrip the groundwater resources that lie beneath the community. Information on the Master Plan can be obtained from the Nye County Planning Department, Pahrump Office.

The Nye County Water District operates a Water Level Measurement Program (WLMP) in the Pahrump Basin. Water level data from the Pahrump WLMP is provided in Appendix B of this report. This water level monitoring effort indicates that water levels along portions of the alluvial fan are rising while water levels in portions of the valley floor are declining. In 2013 overall groundwater pumpage in the Pahrump Basin 162 was approximately 14,348 AFA which includes both permitted water rights and estimated use from > 11,000 domestic wells. Perennial Yield and groundwater pumpage is established and tracked by the DWR and can be found on the DWR website at www.water.nv.gov.

Although the PY for the overall basin is 20,000 AFA and 2013 pumping was published at 14,348 AFA, groundwater levels within much of the area comprising the valley floor - where 85% of the domestic wells are located - continue to decline.

Figure 1: Density of domestic wells in Pahrump per square mile shown in blue (i.e. 11)



Groundwater Basin 162 Subwatersheds, Nye and Clark Counties, Nevada

0 2.5 5 10 15 20 Miles

CHAPTER 3 - HISTORY AND REFERENCE TO STATUTE(S)

(A) – Historical Reports and State Engineer Orders

Included in Appendix C is a summary and narrative summary of a report titled "WATER SUPPLY FOR THE FUTURE OF SOUTHERN NEVADA". The report was prepared for the DWR State Engineer more than 40 years ago and provides insight to the development of southern Nevada and addresses possible solutions to looming water shortages. It is an interesting report and touches upon several items that are identical to those facing the community of Pahrump today.

Included on Page 30 of this GWMP is reference to USGS reports on Pahrump Basin geology and hydrology.

Included in Appendix D is Order 1252 from the State Engineer regarding the Pahrump Basin. This order is dated April 28, 2015 and further restricts water appropriations in the Pahrump Hydrographic Basin, removes the fan/floor designation and in part states: "*It is ordered that, with the following exceptions, any application to appropriate groundwater pursuant to NRS Chapters 533 and 534 within the designated Pahrump Valley Hydrographic Basin will be denied.*

EXCEPTIONS:

1. *Those applications for Environmental permits filed pursuant to NRS 533.437 to 533.4377, inclusive.*
2. *Those applications for temporary appropriation of groundwater for stockwater purposes during drought declarations filed pursuant to NRS 533.504.*
3. *Those applications for temporary appropriation of groundwater for establishing fire-resistant vegetative cover filed pursuant to NRS 533.436.*
4. *Those applications filed to increase diversion rate only, with no corresponding increase in duty of water.*

Nevada water law is based on priority doctrine which simply means "first in time, first in right" -or further- those holding the oldest water rights are the last to be curtailed. Portions of this report attempt to shed light on various complex and confusing issues centered upon senior water rights versus junior water rights, which includes regulation of the domestic well. Careful review of the Nevada Revised Statutes, particularly NRS 278, 532, 533, 534, 540 and 543 is recommended. Understanding the statutes and administration of the statutes by DWR [with regard to priority doctrine as it relates to a GWMP for the community of Pahrump] is the only way the reader will fully understand GWMP issues and implications.

Attached in Appendix R is a document titled Nevada Water Law 101. This document provides information on history, the application process, beneficial use and other items regarding water law as administered by the State Engineer. This document is also available on the DWR website at: dcnr.nv.gov/documents/documents/nevada-water-law-101.

An excerpt from this document reads: *"Nevada water law has the flexibility to accommodate new and growing uses of water in Nevada while protecting those who have used the water in the past. All water within the boundaries of the state, whether above or beneath the surface of the ground, belongs to the public and is subject to appropriation for beneficial uses.*

Nevada water law is based on two basic principles: prior appropriation and beneficial use. Prior appropriation – also known as "first in time, first in right" – allows for the orderly use of the state's water resources by granting priority to senior water rights in times of shortage. This concept ensures senior water users are protected, even as new uses for water are allocated. A water right permit may only be granted for beneficial uses as provided in Chapters 533 and 534 of the Nevada Revised Statutes.

Examples of beneficial uses include irrigation, mining, stock watering, recreation, commercial, industrial, and municipal uses. Beneficial use also includes the underlying principle of the appropriative rights system of water allocation, known as "use it or lose it." In the West, where water resources are scarce, water users must demonstrate an actual beneficial use of water. They cannot speculate in water rights or hold on to water rights they do not actually intend to place to a beneficial use in a timely manner. If they stop using the water, they will lose the water right."

(B) - Statutes and Regulations Governing the Division of Water Resources

NRS 532 - State Engineer
NRS 533 - Adjudication of Vested Water Rights; Appropriation of Public Waters
NRS 534 - Underground water and Wells
NRS 534A - Geothermal Resources
NRS 535 - Dams and Other Obstructions
NRS 536 - Ditches, Canals, Flumes and Other Conduits
NRS 537 - Navigable Waters
NRS 538 - Interstate Waters, Compacts and Commissions
NRS 540 - Planning and Development of Water Resources
NRS 543 - Control of Floods
NRS 278 - Planning and Zoning
NAC 532 - Fines and Penalties
NAC 533 - Practice and Procedure in Protest Hearings Before the State Engineer
NAC 534 - Regulations for Water Well and Related Drilling

Detailed information on the above can be accessed on line at: www.water.nv.gov or the Nevada Law Library at: www.leg.state.nv.us/Law1.cfm.

(C) - Nye County Code and Water Resources in the Pahrump Basin

NCC 17.04.740(F) Development standards: Establish design requirements that reduce water consumption in the portion of the Pahrump groundwater basin encompassed by the Pahrump Regional Planning District.

NCC 16.28.170(H)1.a Water Rights:
For Parcel Maps Located Outside of a Water Service District:
Because of concerns over water in the Pahrump Regional Planning District, certificated water rights in the amount of three (3) acre feet for each additional parcel created, regardless of the type of zoning or the size of the parcels created, excluding the existing parcel shall be relinquished to the Nevada State Engineer's Office, Division of Water Resources. The 1 acre-foot is a surcharge, and only 2 acre-feet of the 3 acre-feet relinquished may be used for a domestic well or "small commercial use"(equal to or less than 2 acre-feet) if permitted by the State Engineer. For example, a 20 acre parcel divided into 4 parcels would require nine (9) acre-feet of water rights, which is calculated as follows: 3 additional parcels x 3 acre-feet per additional parcel = total of nine (9) acre-feet of water rights. The costs associated with water rights transfers shall be borne by the applicant. Because of the costs involved with water rights transfers, this requirement shall be made a condition of approval of a parcel map. (Ord. 288, 2004)

CHAPTER 4 – PAHRUMP BASIN HYDROLOGY CONSIDERATIONS

(A) - Water Level Measurement Program

The Nye County Nuclear Waste Repository Project Office began a water level measurement program in 1999, to collect water level information from private and public wells in the Pahrump and Amargosa Valleys. The WLMP continues today, operating as a program of the NCWD. In Basin 162, 73 wells are measured on a bimonthly basis. Figure 2 shows the distribution of wells monitored as part of the WLMP. The data collected under the WLMP are useful for evaluating changes in water level over time and observing trends in water levels. Hydrographs for wells monitored in Basin 162 as part of the WLMP are shown in Appendix D, and a 10-year water level change map is shown on the following page in Figure 3. As shown in Figure 3, water levels are generally declining in the basin-fill aquifer, while water levels are increasing in the alluvial fan aquifer.

The GWMPC recommends: The WLMP provides crucial information with regard to overall basin health and the Committee strongly recommends this program continues to be funded.

Figure 2: Distribution of wells monitored as part of the WLMP in Basin 162.

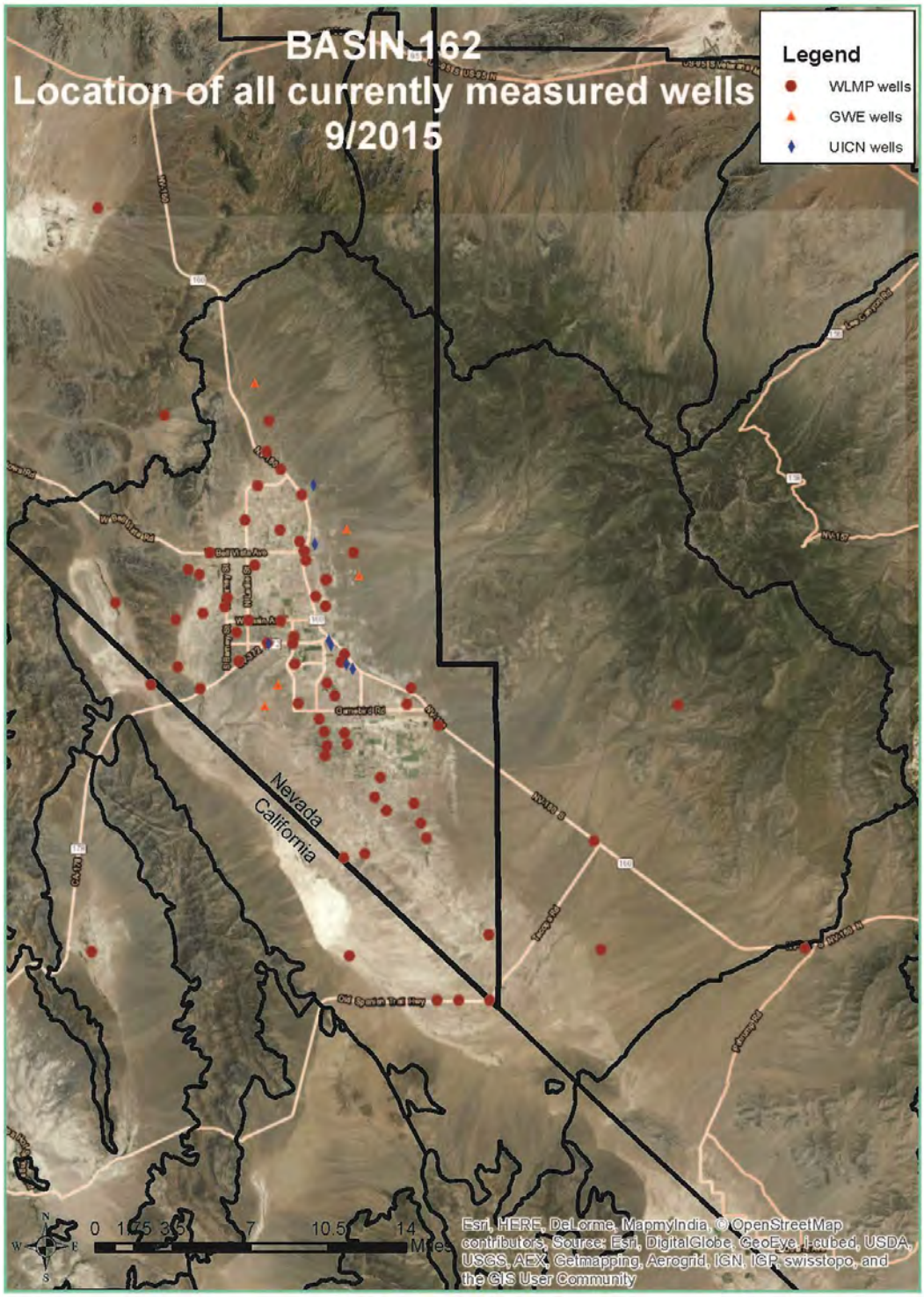
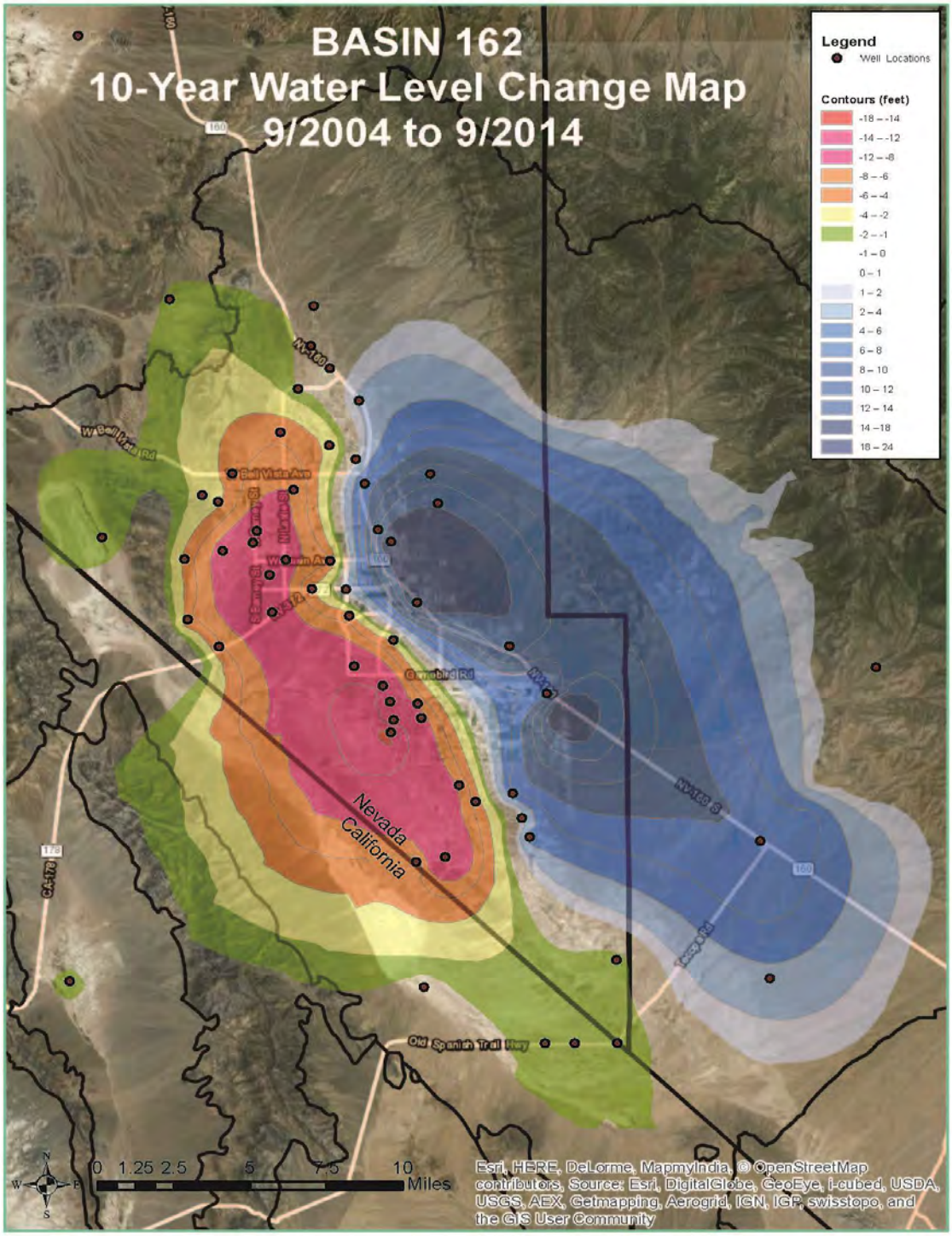


Figure 3: 10 year water level change map for Basin 162.



(B) - Redistribution of Production Wells

The concept of redistribution of production wells is to reduce groundwater withdrawals in areas with a high density of wells, or in areas where water levels are declining. Ideally, water supply wells would be placed in areas where water levels are increasing and the water distributed to users in the areas where levels are declining. Pumping in the areas of decline would be reduced, allowing water levels to recover. In order for this to work, several key changes would need to take place. Note that none of these changes are expected to be easy, or happen quickly – the time scale for development of such a system is on the order of tens of years, and may require the involvement of DWR, PUCN and local water utilities. Areas that are candidates for pumping locations include a.) The alluvial fan (water levels increasing) and b.) near the state line on the south end of the community of Pahrump.

- Interconnection of systems – Existing water supply systems would likely need to be interconnected to convey water from the pump location to end users. This item would also be required to convey water if imported from outside the Basin, as discussed in the Importation section of this document. The scope and scale of this effort is largely undefined, but several interconnection projects have either been completed or are underway. Information regarding existing and ongoing interconnection projects is provided in Appendix E.
- Consolidation of utilities – Another possibility would be to combine the three private utilities into one company who would then interconnect the systems and convey water to its customers. As with the interconnection of systems, this would not be done in the short term and would require input from DWR, PUCN and others.
- Aquifer Storage and Recovery (ASR) or artificial recharge – Water could be injected into the aquifer to increase water levels and stored there permanently (artificial recharge) or withdrawn seasonally for use (aquifer storage and recovery). This concept, as well as potential candidate locations, is discussed in more detail in the WSAIR. Information regarding a potential ASR project is included in Appendix F.
- Wholesale water purveyors (NCWD as SNWA) – The NCWD has the legal power to act as a wholesale purveyor of water. In this case, the NCWD would be responsible for identifying areas where water could be produced but has not been developed (i.e. south of the PRPD), drilling wells, working with utilities to interconnect systems for distribution, and selling the water to the utilities. Advantages of such a scenario would be the ability for the NCWD to target production areas based on the data collected as part of the WLMP, to tap into water that is not currently being captured in Basin 162, and the ability to generate revenue to increase the scope of the monitoring program (i.e., monitoring and assessing the efficiency of and impacts to the groundwater flow system from production wells).
- Another alternative is for existing utility wells to be used to supply water for ASR, AR, etc. (i.e., utilities wholesaling water to the NCWD). This requires investigation of potential effects of increased pumping at utility wells currently being pumped or not pumped on downgradient wells.
- Significant technical challenges are anticipated with any of the interconnection/consolidation scenarios described above. However, the first step in any such effort will be thorough evaluation of the physical properties of each system (e.g., pipe sizes, distribution pressures, spatial extent). Based on the results of these evaluations, engineering design and analysis will then be conducted to plan the actual interconnection/consolidation.
- It must be noted that for any of the above scenarios to take place, political fortitude on behalf of the NCWD and BOCC must exist and remain strong throughout the planning and establishment of such systems. Absent this will, these projects will not come to fruition.
- DWR Order 1252 allows movement of water rights from the valley floor to the fan. Because water levels are rising on the fan, this Order may provide opportunity to ease pumpage on the valley floor (where water levels continue to decline) under redistribution of pumping scenarios presented in this section. This Order has no impact to the drilling or use of domestic wells, other than adding a tool to stabilize water levels.

(C) - Use of Groundwater Flow Models as Planning Tools

Groundwater flow models, such as the model constructed by Glorieta Geoscience, Inc. (GGI), 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.

A hydrologic and hydrostratigraphic assessment is being conducted by Leising Geoscience for the Nye County Water District (at the request of the GWMPC) with the intention of ultimately identifying areas in the Pahrump Groundwater Basin where conditions are most favorable for groundwater development. Once specific drilling target areas have been identified as part of this assessment, they can be checked against the GGI groundwater flow model to determine potential effects of groundwater pumping on nearby wells. Likewise, as wells are installed, information gained during drilling and pumping can be used to update the flow model.

The GWMPC recommends: Groundwater modeling should be funded and utilized as a planning tool in concert with the WLMP and other studies.

CHAPTER 5 - RECOMMENDATIONS FROM THE GROUND WATER MANAGEMENT PLAN ADVISORY COMMITTEE

(A) - Aggressive Water Education

In order to educate residents of Basin 162 about current water issues, promote a conservation ethic, and create community pride in responsible management of water resources, the GWMPC has included water education as one of their top priorities. Measurements of success and progress should include (for each conservation effort) quantification of reduction in water use (gpcd) and be publicized as widely as possible to ensure community awareness. Staff has identified several possible approaches to accomplishing this priority. These approaches are, in no particular order:

- Education in schools – Efforts on this front to date have included: 1.) NCWD staff demonstrating physical aquifer material properties and a physical aquifer model for several elementary school classes in Pahrump. In addition, the climate/water cycle is part of the general elementary school science curriculum. Along with these demonstrations we included a discussion about water resources in the Basin, potential overuse, and ideas for conservation measures the students themselves could affect (e.g., taking shorter showers, turning off the faucet while brushing teeth, etc.) 2.) UICN provides water education materials to all 1st and 2nd grade classes in Nye County. These materials, developed in coordination with Nevada Rural Water Association, consist of a monthly calendar and activity book. Additional items include “Be Water Smart” pencils, wristbands, erasers, and rulers. Further efforts to pursue this education could include reaching out to all of the elementary schools in the Basin, as well as the middle and high schools. In addition to the aquifer materials and model demonstrations (and associated conservation discussions), the NCWD has a surface runoff model that could be used to demonstrate the interaction between surface activities and the groundwater supply, as well as potential contaminant transport.

- Informational brochures – UICN currently publishes information related to drinking water supply and supply protection, water treatment and distribution, and conservation tips. This information could be placed at the Pahrump Chamber of Commerce (and/or other locations as determined by the GWMPC) in the form of brochures for distribution to the community.

- Articles for the newspaper(s) – During the time the GWMPC has been meeting, significant press has been given by both of the newspapers in Pahrump. Reporters generally attend the meetings and provide coverage through articles of the activities of both the GWMPC and the WDGB. One of the challenges with this coverage is that facts surrounding water issues are often lost in the course of discussion and consequently the information published in the articles is not entirely accurate. To help remedy this issue, staff recommends a series of press releases detailing the underlying water issues, the steps being taken to define the problems, and potential solutions.

- Radio spots – The local radio station (KNYE 95.1 FM) provides a no-cost forum for discussion of local issues, which is often used by local politicians, officials, and others to discuss issues relevant to the time. The format of this forum allows the speaker time to present a topic, answer questions posed by the host, and answer questions from callers. This forum could be used to present information on water issues to the radio audience using the same materials developed for release to newspapers. One advantage of this approach would be the opportunity to clarify through discussion any of the issues that are not necessarily intuitive. In addition, 97.7 FM airs water-related information.

- Local TV spots – Similar to the radio and newspaper formats, the local television stations could be used to communicate water-related issues to the public. The advantage of using this media outlet is that images can be shown to illustrate key points in the discussion. *Community Viewpoint* is a show on Channel 41 dedicated to discussion of issues affecting the community, and as such, would serve as an ideal forum for the discussion of water issues. This show is generally hosted in a discussion format, with the guest presenting a topic and the host asking questions, providing other relevant information, etc.

- Marketing – Consideration should be given to contracting with a marketing firm to champion portions of the overall public outreach and education effort.

- Bottles of water with 10 Commandments of water use – Water bottles can be ordered from companies who also create custom labels and apply them to the bottles for a nominal cost. For example, www.personalizedbottlesofwater.com sells 16.9-ounce water bottles with 2x8-inch full color labels for $0.60 each (if ordering 25 cases). Ordering larger quantities results in a lower cost per bottle. These could advertise the “10 Commandments” of responsible water use to serve as reminders to people to conserve water. These water bottles could be distributed to community functions, to students during educational sessions, and more. Staff suggestions for the 10 Commandments include (there are many more tips available on the internet that could be substituted or incorporated):

    1. Water outside vegetation only during cooler times of day.
    2. Shut the faucet off while shaving/brushing teeth/etc.
    3. Remind your children to take shorter showers.
    4. Replace water-loving vegetation with low water-use plants.

5. Consider xeriscaping part of your yard.
6. Incorporate native vegetation into your landscaping.
7. Fix irrigation leaks promptly.
8. Install low-flow water fixtures in your home.
9. Keep a bottle of drinking water in your refrigerator (don't run the tap to cool water for drinking).
10. Place mulch around outdoor plants to reduce evaporation.

The GWMPC recommends: In order to inform residents of Basin 162 about current water issues, to promote conservation, and raise the general awareness level; water education must be a top priority. The Committee acknowledges the attention that local media has given to the subject of water issues and strongly recommends that; a.) The NCWD, Nye County the DWR view education and outreach as a priority item and b.) Consideration of the options as outlined previously in this section.

(B) – Adopt a Water Conservation Plan

Purpose

- Contribute to achieving a balance of water supply and demand in the Pahrump Valley
- Recommend fair usage restraints on all water users
  - Agriculture
  - Utility Customers
  - Domestic Wells
  - Commercial
  - Government and School District facilities

Goals

- Avoid crisis-level aquifer depletion in the long term
- Balance between quality of life and conservation
- Reach an overall gallon per day per capita (gpcd) of 198 gpcd
  - Includes Commercial, Industrial, Residential, Municipal, etc.
  - Per the December 2014 Pahrump Master Plan Update
- Recommend that this Conservation Plan immediately applies to all new construction
- Recommend staged implementation for current homes and businesses but encourage immediate conservation via outreach programs and incentives
-

Recommended Conservation Plan Implementation Approach:

- Revise NCC development codes 17.04 Articles IV (Planned Unit Development) and Article VI (Development Standards) as indicated below for more water conscious landscaping design requirements and water conservation regulations for new construction.
- Revise the three existing Utility Water Conservation Plans (UICN, PUCI, and DUI) as indicated below for consistency in their conservation mechanisms for utility-based users

- Combine and extend the conservation elements of the revised Nye County Code and Utilities Water Conservation Plan's into a basin-wide Conservation Guideline which would provide an educational document for all properties including those based on domestic wells.

New Construction Landscaping

- All landscapes must be:
  - Drought Tolerant
  - Desert Friendly
  - Water Conscious
- Recommended plants, trees, and shrubs for landscaping are included in Appendix G.

New Construction Turf Restrictions

- Grass turf consumes 41 gallons of water per square foot per year (*or 5.5 AFA) in our high-desert environment. (Ref: National Institutes for Water Resources and comments received from Nevada DWR)
- 1500 square feet is the maximum turf allowed for any single family residence
- The yearly water usage of that 1,500 sq. ft. of turf is equivalent to 169 gallons per day (**or 0.19 AFA)
- Turf in the front yard area is prohibited (can apply for a waiver)
- Turf shall be at least 3 feet from all buildings, structures and walls
- Turf shall be at least 15 feet from the pavement of all streets
- Planting cool season grass, such as Rye and Fescue, from seed is prohibited from May through August. Laying sod is permitted.
- The Water District will work with the three present golf course facilities (Mountain Falls, Lakeview Executive, and Desert Greens) to review their designs and water usage in order to establish rational conservation regulations for existing golf courses.
- All new Golf Courses should limit turf to 3-5 acres of turf per hole and watered with effluent reuse water to the extent feasible.

*Acre Feet Annually (AFA) for turf is calculated as: 41 gal./sq. ft./year [divided by] 7.48 gal/cu. ft. = 5.5 AFA

** Acre Feet Annually for 1,500 sq ft of turf is calculated as: 41 gal/sq. ft./year [multiplied by] 1,500 sq ft [divided by] 43,560 sq. ft./acre [divided by] 7.48 gal./cu. ft. = 0.19 AFA

New Water Features, Ponds, and Artificial Lakes

- Ponds, and lakes evaporate water at a rate of 49 gallons per square foot per year or 6 AFA (Ref: National Institutes for Water Resources and comments received from Nevada DWR)
- Decorative water features and ponds are limited to less than 50 square feet surface area
- Swimming pools and spas are not size-restricted; appropriate use of pool & spa covers is encouraged
- Bodies of water for recreational use larger than 250 sq ft require a Conditional Use Permit regardless of the water source.
- All ponds, water features, and newly constructed bodies of water shall be lined.

Water Application for New Construction (and encourage for existing)

- Automatic irrigation systems are required for all common area, residential, agricultural and commercial planting areas of new construction.
- Overhead spray shall be minimized and restricted to turf and flower beds.

    - All other areas of landscape must use low volume drip lines.
- If spray heads are required next to roads or paths they shall be low angle (10%) nozzles.
    - Large radius spray heads are prohibited along roads and paths.
- All spray heads are prohibited from spraying water directly onto any roads, paths, other non-turf surface or another parcel.
- All spray heads are prohibited from causing runoff onto any roads, paths, other non-turf surface or onto another parcel.
- Encourage no watering during high winds.
- Wasting water is unlawful per NRS 534.0165, 534.020(2), 534.070 and NAC 704.567

Watering Schedule for Landscaping (This applies to everyone in the community)

- All common area, residential units, and commercial areas shall comply with watering schedules issued by Nye County Water District (NCWD) which sets forth the days, time of day, and duration of time allowed for outdoor watering.
    - From November 1 through February watering is limited to one day a week.
    - From September 1 through October and from March 1 through April, watering is limited to three days a week.
    - From May 1 through August watering is allowed 7 days of the week (but see recommendation below for summer watering).

Additional Watering Restrictions:

- From May 1 until Oct. 1, sprinkler and drip system watering is prohibited from 11 a.m. to 7 p.m. Watering with a handheld hose and supervised testing of your irrigation system are allowed anytime. Watering new or reseeded landscapes daily for up to 30 days is allowed once per calendar year.
- In the summer, watering restrictions allow landscape watering any day of the week through August. We recommend watering four days per week and increasing the schedule only if your landscape needs more water.

Low flow Fixtures

- All fixtures must be Low Flow Fixtures as required by Nye County Building Code at the time of installation. (Both residential and commercial.)
- Offer Low Flow toilet rebate.

Conservation Incentives from the Water District

- Free Leak Detection Kits for toilets
- Pay to Remove (This becomes a deed restriction):
    - Turf at $0.50 per sq ft (Max $450 per year per parcel)
    - Salt cedars at $75 per mature tree (Max $450 per year per parcel)
    - Total yearly incentives are limited to the NCWD budgeted amount.

Prohibited Plants for New Landscaping

- Salt Cedars
    - Mature salt cedar trees consume as much as 200 gallons per day per tree
    - Salt Cedars of any size shall be removed from a property prior to any new development.

Notes:

1.) Salt Cedar is an invasive species. See report titled Fighting Invasive Weeds a Cooperative Extension publication. Page 71 of the report outlines eradication of Salt Cedar. This report can be found at: https://www.unce.unr.edu/publications/files/ho/2005/eb0502.pdf.
Additional assistance is available at the University of Nevada Cooperative Extension located at 1651 E. Calvada Blvd, Pahrump, NV 89048, Phone (775) 727-5532.

2.) NRS 555.202 Legislative declaration. The Legislature declares that it is primarily the responsibility of each owner or occupier of land in this State to control weeds on his or her own land, but finds that in certain areas this responsibility can best be discharged through control by organized districts.

3.) Regarding organized districts; Tri County Weed Control provides both public and private sector noxious weed control and serves Nye, Lincoln and White Pine Counties. Information regarding the organization and the services they provide can be found at: http://www.tri-countyweedcontrol.com or by calling 775-289-6341.

Enforcement

- Enforcement should be practical.
- Before a Certificate of Occupancy is issued, evidence that the Conservation Plan was followed should be included in the building inspection.
- NCWD or Nye County Code Enforcement shall enforce all conservation and watering requirements.
- Require new developments to include these water conservation standards in its Design Guidelines and CC&R's, and require the Board of Directors of the Home Owner Association or commercial association to also be responsible for enforcing all conservation and watering requirements.

  Note: Enforcement will be a combination of County Code and regulations as enforced by DWR. To report a violation, the DWR forms page can be found at water.nv.gov/forms, the form name is *Request to Investigate Alleged Violation*.

Potential Impact of Conservation Savings

- The latest available Division of Water Resources "Pumpage Inventory Report", year 2013, shows a total water usage of 14,348 AFA for all types of uses – residential, commercial, industrial, municipal, recreation and agriculture irrigation.
- With the agricultural irrigation use of 3,466 AFA subtracted out, the remaining usage of 10,882 AFA divided by today's Pahrump population of 38,929 people (Nye County Planning) shows the per-capita daily use today at that level of total pumping would be 250 gpcd.
- If conservation efforts were to reduce that gpcd figure by 21% to the 198 gpcd goal of the Pahrump Master Plan Update, about 11,000 additional people could be supported by that same amount of pumped water.

The GWMPC recommends: The conservation plan as outlined in this section should be implemented starting with required revisions to Nye County Code.

(C) - Water Importation to Pahrump

The GWMPC has identified water importation to the community of Pahrump as a priority recommendation. At the Dec. 3, 2012 meeting of the Nye County Water District Governing Board, staff was instructed to provide preliminary cost estimates for possible water importation to the Pahrump Basin. A report was completed and presented to the WDGB in February 2013. This report presents some of the challenges to identify sufficient water resources in a series of basins north of Pahrump and provides a basic cost outline. The preliminary cost estimates included in the report assume importation of 5000 AFA to the community that would serve some 30,000 people (residential only at 150 gpcd). Because the report was completed in Feb. 2013, it has been revised as follows: Update of the PY from 12,000 AF to 20,000 AF, update of the current Pahrump population estimate and update of the pumpage inventory for the Pahrump Basin. Cost updates are not included in the June 2015 revision. The Water Importation Report is included in Appendix H.

The importation report presents a scenario where water is delivered to the community of Pahrump from some 70 miles distant at a cost approaching $173,000,000. As stated previously, 20,000 AF Perineal Yield may support a population of 80,000. This begs the question; "What then, is the trigger to actively pursue water importation to Pahrump?". The short answer lies with the effort by the Southern Nevada Water Authority (SNWA) to import water to Las Vegas when, 25 years ago, they filed water rights applications in Lincoln, White Pine and Nye Counties. To date, the battle to secure the water rights and Rights of Way for the pipeline rages on. The GWMPC does not compare the scope of the Pahrump importation scenario to that of the SNWA importation project, but certainly compares the subsequent legal battle to place the water to use as an example of the challenges.

The GWMPC recommends: If the community of Pahrump wants to grow to a population exceeding *80,000 *now is the time to begin actively pursuing importation beginning with a feasibility study of actual availability of potential source water.* Any Interbasin transfer of water will take years to sort out, time and effort to secure funding, permitting requirements will become more restrictive and water rights will become increasingly expensive to secure. In short, importation may be possible but will take the political will to implement and is a lengthy and complex journey. The Importation Report is included in Appendix H.

*A population tip-over point of 80,000 does not fully consider the full potential of RIBS/recharge, effluent re-use and over dedication of water rights in support of development. This population figure v/s available water resources may exceed 100,000 should the projects and policies be implemented in a thorough manner as outlined in this GWMP.

(D) - Require Meters on New Domestic Wells and Limit New Domestic Well Usage to 0.5 AFA

The community of Pahrump has more than 11,000 existing domestic wells and has sufficient undeveloped parcels to drill an additional 8,500 domestic wells. As such, the domestic well component of the Pahrump basin water budget has the potential to consume 39,000 AFA, if all well owners were to pump the full 2 AF as entitled. However, using the estimate for an average use of 0.5 AF, the domestic well component is 9,750 AF (see Table 1 in this report) or nearly 50% of the 20,000 AF water resource.

Much of the debate surrounding the domestic well component in the Pahrump basin has been centered upon the fact that domestic wells have a priority date. The priority date of a domestic well is the date that the well is completed with the exception of wells drilled on those parcels where water rights in support of a parcel map application (through the County Planning process) were relinquished, which retain the priority date of the relinquished water right.

In Part: NRS 534.080; dates of priority.

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.

What this means to domestic well owners is that should the DWR regulate solely by priority, domestic wells in Basin 162 would in most cases be a junior right to the senior water rights issued in the basin (dating back some 65 plus years) and therefore are subject to curtailment "prior" to most of the water rights issued in Basin 162.

Limiting new domestic wells to 0.5 AF (8500 future domestic wells) would reduce the potential demand from 17,000 AF to 4,250 AF. Requiring meters on new domestic wells is recommended for tracking and reporting usage. To date, the DWR has not required metering of domestic wells, therefore has no way to quantify actual usage, or excess usage, other than observation of items such as irrigation of pasture, ponds and other high water use features. The GWMPC does not view propagation of domestic wells at 2 AF each as reasonable or responsible development.

Regarding the definition of a "new" domestic well: Existing domestic wells are not included and in addition, existing domestic wells that require any type of rehab, refurbishment or replacement are recommended to be exempt from being considered "New".

The GWMPC recommends: 1.) Limiting new domestic wells to 0.5 AFA and 2.) That meters are installed on new domestic wells and annual usage be reported to DWR.

(E) - <u>Educate New Domestic Well Owners on Supplemental Water Rights for Usage > 0.5 AFA</u>

Should the DWR limit withdrawals from future domestic wells, owners of domestic wells may acquire water rights to supplement demand (which provides the means for future domestic well owners to pump in excess of 0.5 AFA). There is currently nothing in the Statute(s) prohibiting this. The process to acquire water rights and file change applications can be found on the DWR website at www.water.nv.gov and Change Applications can be found on the DWR website at http://water.nv.gov/forms.

The GWMPC recommends: Should Nye County and/or DWR follow the recommendation to limit new domestic wells to 0.5 AFA; every effort should be made by the Water District and Nye County to educate new domestic well owners regarding the option to supplement their water usage with permitted water rights. It is also recommended that the Water District staff compile a list of water rights brokers and water rights professionals doing business in the Pahrump basin to assist those interested in acquiring water rights. Part of this education/outreach effort should include information regarding a domestic well priority date, Nevada water law, senior water rights v/s junior water rights (priority doctrine), regulation by priority, curtailment and other items.

(F) - Construct Rapid Infiltration Basins

Rapid Infiltration Basins (RIBs) have a potential dual benefit for both flood control and infiltration to the aquifer. RIBS will require a substantial amount of engineering, staff time/expense to secure the required rights of way and/or lands and budget impacts on this item could be substantial.

The GWMPC recommends: a.) Investigation into RIB recharge potential in cooperation with Nye County Public Works and utilizing the Pahrump flood control plan, b.) Investigation and qualification into successful projects such as the raceway flood control detention basin and RIB and c.) reuse, recharge and over dedication should be captured, quantified and presented in report form to account for existing + future potential reduction to the over allocation total as indicated in Table 3. This effort should include NCWD and DWR staff and utilize information on record at the offices of Nye County, NCWD and DWR.

(G) - Aquifer Storage and Recovery and Artificial Recharge

Aquifer Storage and Recovery (ASR) or artificial recharge is a project where water could be injected into the aquifer to increase water levels and stored there permanently (artificial recharge; AR) or withdrawn seasonally for use (aquifer storage and recovery). This concept, as well as potential candidate locations, is discussed in more detail in the WSAIR.

At the March 15, 2013 meeting of the Nye County Water District Governing Board staff was instructed to provide information regarding Aquifer Storage and Recovery (ASR) to be included in the Water Supply and Appraisal Investigation Report, which was funded by the Bureau of Reclamation. The preliminary examination of Aquifer Storage and Recovery was completed in April 2013, reviewed by the WDGB, BoR and was included in WSAIR.

The ASR report considers the challenge to identify water resources in areas of the basin where water levels are rising and the distribution of water through pipelines to injection well sites which target areas of the basin with the highest density of wells together with declining water levels. The preliminary cost estimates included the ASR report assumed ASR of 1000 gpm or 1613 AFA. The report also represents a basic outline of what an ASR project might consist of, some necessary steps, challenges, a possible project sequence and a basic estimate of associated costs. Construction and permitting costs in the report are dated, so the report offers a limited snapshot in time and was intended to provide information for discussion, revision and refinement. ASR may provide one piece of a larger workable solution to balance [demand -versus- recharge] in the Pahrump Hydrographic Basin and for the community of Pahrump.

The ASR project report is included in Appendix F. Note that in addition to the use of injection wells for ASR, RIBs may be used for AR. However, the permitting requirements for injection wells are more stringent than those for RIBs.

The GWMPC recommends: Further investigation into the feasibility of ASR and AR. This effort is tied to redistribution of pumping, the need for additional utility infrastructure, interconnection of utilities and other items that would stabilize water levels within areas of the valley floor, where water levels continue to decline.

(H) - Allow utilities to put in backbone infrastructure

For the purposes of this discussion, backbone infrastructure includes: pipe, pumps, flow control systems, tanks, wells, hydrants, valves and other items required to convey water. Acquisition and installation of this infrastructure is the most expensive investment made by any water utility. The Public Utilities Commission of Nevada ("PUCN") governs private

utilities and promotes the State policy that growth must pay for itself which means that utilities generally cannot install infrastructure without a development agreement or request for service by potential customers.

Backbone infrastructure provides the means for the water utilities to serve previously unserved "dry" lots and lots with owners seeking to abandon existing domestic or commercial wells. This will help reduce the drilling and re-drilling/deepening of wells and, ultimately, help to stabilize water levels in the valley floor aquifer. Previous sections of the GWMP discuss water importation, construction of RIBs, detention basins, ASR, and AR as potential ways to bring additional water into the basin, or to recharge the aquifer where water level declines are occurring. In order to implement any of those strategies, backbone infrastructure is required.

Allowing utilities to expand their existing infrastructure (without being tied to specific development agreements or requests for service) could help the community prepare to implement the strategies discussed above. Prudent backbone infrastructure planning should provide benefits to current utility customers and GWMP strategies.

The Pahrump utility companies are all regulated by the PUCN. Regulatory mechanisms for utility resource planning exist within Nevada Administrative Code ("NAC") which could be used to proffer backbone infrastructure projects before the PUCN to determine prudency of any given project (i.e., NAC 704.565–704.5688, 704.600 and 704.605). Interested parties may intervene in these dockets before the PUCN (as governed by law) which provides a mechanism for the various entities involved (RPC, DWR, NCWD, etc.) to transparently show their cooperation for any given backbone infrastructure project. As "growth pays for itself" is a policy of the State, legal action is not required for backbone infrastructure to be found prudent before the PUCN.

The GWMPC recommends: Initiation of discussions between the utilities, PUCN, NCWD, DWR, RPC and others as necessary regarding the development of prudent backbone infrastructure projects in support of future GWMP implementation strategies, including limiting the proliferation of new wells.

(I) – <u>Create Incentives to Voluntarily Connect to Public Water Systems</u>

The three utilities will discuss possible incentives and who bears cost of such incentives with PUCN. This item has a funding component. In essence: At such time as water mains are installed in the street; the domestic well owner will weigh the cost of connection to the utility -versus- replacing an existing domestic well that has failed. Utilities providing a funding mechanism to offset the cost to a domestic well owner of plugging and abandoning the well and drilling a replacement provides a.) Monetary incentive for the domestic well owner to connect to the utility and b.) Reduction in the density of domestic wells in areas where water levels are consistently declining.

Information regarding the State's domestic well credit program is attached in Appendix I.

The GWMPC recommends:

1.) The utilities investigate the possibility of creating a monetary incentive for the domestic well owner to connect to the utility (possibly including such items as payment for the cost of plugging the domestic well, waiving connection fees, or other incentives).
2.) That staff investigate other incentive options related to reduction of domestic well density through well abandonment and connection to utility systems. This item is also related to potential expansion of backbone infrastructure and must be coevaluated.

(J) - Conservation Credit Program

Water District staff at the direction of the GWMPC and WDGB was directed to pursue a conservation credit concept as outlined below in this section. Senate Bill 81 (SB 81), considered during the 2015 legislative session, included language that supported the concept. The bill was passed by the Senate Sub Committee on Governmental Affairs but did not materialize in the Assembly and therefore died at the end of the 2015 session. In addition the Nye BOCC heard an agenda item in May 2015 which proposed the BOCC support SB 81. During the BOCC meeting a petition was presented that represented 71% of the water rights holders in Basin 162, in favor of SB 81. The item died at the BOCC level for a lack of a second to a motion to support the bill.

The GWMPC, WDGB and the State Engineer see the following conservation credit concept as a useful tool to include in a GWMP for Basin 162. The conservation credit concept may (in some form) be included in the 2017 Legislative Session. For this reason the GWMPC retains this concept as a priority recommendation to be included in a GWMP for the Pahrump basin.

The following represents a defined concept of a Conservation Credit Program for the Pahrump basin:

1.) To acquire a Conservation Credit; for each 1 acre foot credited an additional 2 acre feet would be relinquished to the basin (this ratio is consistent with Pahrump basin water management strategy).
2.) 1 Conservation Credit = 1 AF of water
3.) Relinquished water rights cannot be “un-relinquished”.
4.) Participation in the Conservation Credit Program is voluntary.
5.) State of Nevada DWR manages the Conservation Credit Program.
6.) Water rights held within the Conservation Credit Program would be exempt from filing extensions of time, forfeiture and cancellation for non-use.
7.) Permitted and/or certificated water rights are allowed in the Conservation Credit Program and are encouraged (to control overall pumpage inventory).
8.) Water rights held in the Conservation Credit Program would be exempt from further over dedication. This requires revision to County code to acknowledge that water rights have been relinquished in appropriate ratios.
9.) Water rights held within the Conservation Credit Program maintain their priority date, therefore are subject to curtailment.
10.) Owners of water rights participating in the Conservation Credit Program would be required to report point of diversion, place of use and amount of use (meter readings).
11.) Water rights held within the Conservation Credit Program would be subject to all other Nevada statutes governing water.
12.) The Conservation Credit Program would not apply to overall Nevada water law, only to basins designated as Critical Management Areas or with DWR approved Ground Water Management Plans.

As part of the research on this item staff spoke with various owners of water rights in the Pahrump basin, the State Engineer and his staff, Assemblyman Oscarson and Senator Goicoechea regarding the conservation concept. Staff also participated in legislative hearings and workshops regarding SB 81. In general, the above definition has received favorable comments from DWR staff and language that would allow the concept as part of a GWMP was added to SB 81 for consideration in the 2015 legislative sessions. Due to the required change to Nevada water law and taken together

with the notion that relinquishment ratios will be tailored basin to basin to target specific goals, the April 7, 2015 version of SB 81 with regard to the conservation concept read:

> (Excerpts from SB 81)
> *"Exempt a water right from the requirements set forth in NRS 533.390, 533.395, 533.410 and 534.090 during the period that the plan is in effect so that any conservation practices that are implemented do not result in the cancellation or forfeiture of a water right."*
> …and…
> *"Authorize the voluntary relinquishment to the source of a portion of a groundwater right in exchange for granting an exemption on the unrelinquished portion of the groundwater right from any provision that requires the filing and approval of extensions to avoid the cancellation or forfeiture of the groundwater right during the period that the plan is in effect. Any right that is not voluntarily relinquished is not exempt from regulation by priority."*

Because SB 81 did not materialize in 2015, it is unknown; a.) If some form of the bill will be included in the 2017 legislative session, or b.) If the bill language will be modified for future consideration.

The GWMPC recommends: That the Conservation Credit Program be pursued in some form in the 2017 legislative session. A Conservation Credit Program as outlined previously in this section has the potential to control pumpage inventory and significantly reduce over allocation of water rights in Basin 162 through the relinquishment process.

(K) - Development Agreements

The Pahrump high growth years of the early and mid-2000's resulted in eleven approved development agreements for high-density residential subdivisions. The subsequent recession delayed the construction of most of the total of 19,895 homes planned in these agreements – less than 800 have actually been built.

At the existing lot density of the agreements, the remaining 19,000+ homes would result in a population increase of approximately 45,000 people - more than doubling our 2015 Pahrump Valley population of 38,929. Growth at that density would consume close to an additional 9,000 acre feet of water annually - most of it concentrated in the South-East portion of the Valley.

In recognition of the valley's already existing 27,000+ vacant residential building lots, the Groundwater Management Plan seeks to understand the impact that existing and potential additional subdivision development agreements would have on the basin's limited water supply.

Residential cluster development is the grouping of residential properties on a development site in order to use the extra land as open space (shared community space, parks, etc.) This type of development could potentially result in water savings over existing subdivision development agreements; however, quantification of the potential savings is required.

The GWMPC recommends:

1.) To implement the density reduction policies of the Pahrump Master Plan Update (approved in December 2014) into specific NCC code requirements for new development agreements.

2.) The Pahrump Regional Planning Commission modify the zoning category VR-8 (8,000 sq. ft. minimum lot size).
3.) Define and quantify the potential water savings from Cluster Development over existing subdivision agreements.
4.) Large developments should be required to: a.) Provide a Water Conservation Plan that commits to conservation measures and b.) Provide CC&R requirements that promote water conservation, c.) Provide an overall estimate of that development's yearly water usage.
5.) The Nye County Planning Department: a.) Update the January 2012 "Report on Status of Development Agreements" and b.) During that update, Nye County is asked to informally work with each developer to encourage them to voluntarily reduce the overall water consumption of their project's design.

(L) - Growth Control

This item as discussed by the GWMPC recommends investigation into any and all items that might improve the balance between available water resources and available lands for development. The committee sees growth to a full build out population of 495,000 or more (as presented in previous versions of the Pahrump Master Plan) as an unreasonable expectation. 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), but 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 enterprise will certainly become more attractive as the community grows and water rights become increasingly scarce. When considering the importation section of this report; importation and growth are married one to the other simply based on the vast amount of available lands in the Pahrump basin for future development.

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 improve 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)

Pahrump				Total Water Usage (in AFY) at Different Gallons Per Capita Per Day Rates										
Population	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 GWMPC recommends:

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 relinquished or mitigated -to- 1 AF to be placed to use" for future commercial and industrial development be required.

3.) Continued investigation into any and all items that might improve the balance between available water resources and available lands for development.

4.) Resolution of: a.) Current and future potential of over dedication for subdivisions and parcel map applications, b.) Current and future potential for direct effluent reuse and c.) Current and future potential for recharge credits associated with RIB's.

(M) – Additional Recommendations

This version of the Ground Water Management Plan is considered by the Committee to be a living document -or- Stage One of a long term effort to create a plan for the Pahrump Basin that balances water supply with demand for the future. It is the express desire of the Committee that the WDGB, BoCC and DWR accept this plan as presented and utilize the recommendations contained herein to implement the plan and where appropriate, amend County Code and NRS in support of the plan.

The GWMPC has considered more than 180 individual items over 20 months of public meetings. Attached in Appendix K is a spreadsheet showing the list of items considered by the committee that provides respective rankings, recommended plan Stage and includes miscellaneous comments. Items for Stage 2 of the GWMP (like Stage 1) will either be considered for implementation by the BoCC, by the WDGB, or for GWMPC consideration should the BoCC ask the committee to continue working on the plan in the future.

We need to continue to work with the State Engineer and his staff to provide an accounting for how each section of the plan will reduce over allocation of water rights and increase usable water resources. This accounting is the essence of the Plan and when completed (in report form) will provide some sense of priority for the host of projects as outlined.

This accounting (in report form) will provide the following:

1.) The potential for water conservation as outlined in the Plan, in terms of Acre Feet Annually (AFA).

2.) The potential to increase usable wet water such was re-use of effluent and/or use of RIBs for recharge as outlined in the Plan, in terms of AFA.

3.) A total for existing over-dedication of water rights and estimates of the potential for over-dedication of water rights to reduce the amount of water rights on the books as outlined in the Plan, in terms of AFA.

4.) The total potential for each section in the Plan, in terms of AFA.

GWMPC members and Water District staff have begun to work on the above 4 items.

The effective implementation of this Plan will be a measure of: a.) available funding, b.) constructive interaction with the State Engineer and his staff and c.) the desire of our community and elected/appointed officials to support this effort.

Basin 162 Historical Reports USGS

Other reports of potential interest which are not included in the appendix:

In 1982 US Geological Survey's Open-File Report 81-635 "Groundwater Storage Depletion in Pahrump Valley, Nevada-California, 1962-1975", by James R. Harrill was prepared cooperatively by the Nevada Department of Conservation and Natural Resources and the US Department of the Interior, Geological Survey. This Report is available on the USGS website at http://pubs.er.usgs.gov/publications/wsp2279 .

Geological Survey Professional Paper 712-C "Hydrogeologic and Hydrochemical Framework, South-Central Great Basin, Nevada-California, with Special Reference to the Nevada Test Site" was prepared by the US Department of the Interior, Geological Survey. This report is available in the office of the State Engineer.

Geological Survey Water-Supply Paper 1832, "Hydrology of the Valley-Fill and Carbonate-Rock Reservoirs, Pahrump Valley, Nevada-California", was prepared in cooperation with the Nevada Department of Conservation and Natural Resources and the US Department of the Interior, Geological Survey. This report is available on the USGS website at http://pubs.er.usgs.gov/publications/wsp1832 .

Water Resources Bulletin No. 5, "Geology and Water Resources of Las Vegas, Pahrump and Indian Springs Valleys, Clark and Nye Counties, Nevada", was prepared by G. B. Maxey and C. H. Jameson. This report is available for review at the office of the State Engineer.