Title:	Municipal Well Aquifer Storage and Recovery Retrofit Project for Drought Resiliency
Applicant:	Truckee Meadows Water Authority
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Date:	4/8/2016
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	for Drought Resiliency
Applicant:	Truckee Meadows Water Authority
	1355 Capital Blvd
	Reno, NV 89502
Project Location:	City of Reno, Washoe County, Nevada
Project Located on a	No
Federal Facility?	NO
Start/End Date:	October 1, 2016 / September 30, 2018
Project Length:	2 years

#### **Executive Summary**

Aquifer Storage and Recovery (ASR) is an effective method to increase the reliability and flexibility of water supply delivery. It does so by allowing for conjunctive use of surface and groundwater supplies. A groundwater well with ASR capabilities allows for treated surface water to be injected into the underground aquifer (when surface water is available for such use) for later extraction (when water demands peak). ASR is a cost-effective means to reverse the trend of declining water levels and replenish groundwater reserves. ASR can also improve the quality of water that has been impacted by natural and anthropogenic contaminants, such as nitrate and arsenic. For this proposed project, Truckee Meadows Water Authority (TMWA) proposes to retrofit three groundwater production wells on the west side of Spanish Springs SSV (SSV) to ASR wells, so it can better manage surface water and groundwater supplies in the basin conjunctively, in order to be more drought resilient. Moreover, the ASR will help replenish groundwater which has been over-drawn for many decades. Finally, the proposed project will help to improve water quality in SSV, as these west side wells (Desert Springs 1, 2, & 3 wells) have been impacted by high nitrate levels from septic systems and are only used a last resort during periods of drought. Consequently, wells on the east side of the SSV, which are unaffected by such contamination, have been over-drawn to make up for the resulting loss in capacity in the west side wells. Recharging the Desert Springs wells with surface water will force contaminated water away from the wells and dilute contamination in-situ, thereby allowing the wells to be returned to service when needed most and resting wells on the east side when possible. The project will utilize the requested funds to implement the well modification projects necessary to increase ASR capacity in the SSV to better serve the 16,000 customers. Construction activities associated with this proposed project include modifying existing well house piping to allow for recharge, removing the existing pumps and motors, rehabilitating the wells to increase efficiency and capacity, modifying the pump columns with variable flow ASR valves, installing telemetry (SCADA) control systems, and restoring the area to its original condition. This proposed project is expected to: (1) immediately benefit the groundwater aquifer by replenishing water removed during drought years; (2) decrease nitrate concentrations observed at each production well; (3) provide more drought-storage and operational flexibility in the system as a whole, (4) support long-term planning efforts and drought-mitigation strategies of TMWA; and (5) move TMWA closer to its goal of having a more automated ASR program.

#### Background

#### Truckee River Basin

Originating in Lake Tahoe, California, the Truckee River flows from the northern Sierra Nevada into the Truckee Meadows and terminates in Pyramid Lake. Figure 1 provides an overview of the Truckee River system in its entirety. The river is the primary water source for the Truckee Meadows communities of Reno-Sparks, Fernley, and Fallon. Additional stakeholders for the river's water resources include commercial interests in the largest industrial park in the U.S. located on the outskirts of Sparks, agricultural producers and livestock grazers in the region, and the Pyramid Lake Paiute Tribe. The river's terminus, Pyramid Lake, is home to endangered (Cui-ui) and special status (Lahontan Cutthroat Trout) species of fish. Given its many competing stakeholders and uses, the Truckee River has been one of the most litigated rivers in the U.S., and over the last century of litigation, the water rights in the Truckee have become fully appropriated.





Similar to other communities in the western U.S., the Truckee Meadows region continues to be gripped by persistent drought. The Truckee Meadows is characterized as an arid, high desert region that depends on snow-fed water resources. On a year-to-year basis, these resources are highly variable in terms of overall quantity and form of precipitation (rainfall versus snowpack). Analysis of historical climate records and current weather trends within the Truckee River Basin indicate extreme weather events such as drought will worsen in the foreseeable future (Dettinger and Cayan 1995; Regonda et al. 2005; Cayan et al. 2008). This increased variability creates significant challenges for water sustainability planning, pushing conservation and efficiency to the forefront of water resource management in the area.

#### Truckee Meadows Water Authority

TMWA is the main purveyor that meets the demands of municipal and irrigation water service within the Truckee Meadows Service Area (TMSA). TMWA is chartered with the responsibility of managing the water resources within the TMSA. TMWA's primary supply of water resources is captured from the Truckee River, which it delivers to approximately 120,000 service connections, including residential, commercial, irrigation, fire protection, and wholesale customers. In conjunction with surface water, TMWA utilizes up to 90 groundwater production wells to meet peak time demand during the irrigation season (approximately May through September). In 2015, the total amount of water supplied to customers within the TMSA was approximately 83,000 acre feet (or 27 billion gallons). Figure 2 provides the TMSA boundaries, locations of traditional wells, ASR wells, and the three wells targeted for retrofit under this proposed project. TMWA currently has 27 groundwater wells permitted for ASR across the TMSA and recharges groundwater aquifers with treated surface water in the off-peak months. However, SSV does not yet have adequate ASR capabilities.

#### TMWA's Relationship with Bureau of Reclamation

TMWA is currently engaged in a project with Reclamation funding titled: "Developing a Dynamic Drought Contingency Support Management System that Accounts for Information on Climate Change and Institutional Constraints." This project aims to update TMWA's Drought Contingency Plan and is scheduled for completion by July 2017. If funded, this proposed project would complement the existing Drought Contingency grant by enhancing TMWA's groundwater resources.

#### Historic Drought Conditions and Planning

The water supply for the region is primarily spring runoff from the preceding winter's snowpack. TMWA uses this spring runoff, via Truckee River flows, to meet the majority of customer demands. According to historical records, the Truckee River Basin's annual snowpack and resulting river flows have always been variable. Figure 3 provides a historical record of precipitation in the Truckee River Basin with the yellow horizontal line depicting the average flow over the past century. Prolonged periods of drought that last up to eight years are not uncommon within the TMSA (e.g., 1987 to 1994 drought). Due to this variability in surface water flows, TMWA operates under a conjunctive management approach, i.e., it utilizes a combination of surface water and groundwater to meet customer demands that occur during the summer-time irrigation season.

Lake Tahoe captures the majority of the snowpack as it melts. The level of stored water in Lake Tahoe is directly affected by the variability in annual precipitation, making the elevation of Lake Tahoe a key indicator of the severity of drought cycles. Currently, the TMSA is experiencing persistent drought conditions. The past four years (2012 to 2015) have *exceeded* the previous worst dry cycle on record, and 2015 was exceptionally bad with the lowest snowpack on record. The result of this low snowpack has been consistently below-average flows in the Truckee River (Figure 4). While Lake Tahoe serves as a key indicator of drought, the lake also serves as the largest storage reservoir for the Truckee Meadows area. TMWA also stores surface water in a series of federally-operated reservoirs within the Truckee River watershed. This Privately Owned Surface Water (POSW) is utilized during times when irrigation demands are such that the combination of natural river flows and groundwater are not enough to meet peak demands (i.e., during Drought Situations).



Figure 2: Truckee Meadow Water Authority's Service Area in Washoe County, Nevada



Figure 3: Annual snowpack vs. river flow in the Truckee River Basin, 1910 - 2015

Figure 4: Average and annual Truckee River flow, 1997-2015



As the economic conditions continue to improve in the Truckee Meadows region, demands for water are expected to increase. Moreover, as stated previously, regional climate projections suggest increased volatility in future water supplies for the TMSA. Given the unpredictable nature of the area's water supply over time and increasing demand requirements anticipated by additional service connections, a flexible conjunctive use program with ASR at its core is essential toward ensuring reliability and drought resilience while managing unpredictable sources of supply. TMWA's ASR Program has been successfully implemented at its core wells at the center of the distribution system and has actively expanding ASR into the outlying areas of the TMSA to increase supply flexibility.

#### **Technical Project Description**

SSV, located at the northeastern extent of the TMSA, is an area that has undergone significant population growth and increasing demands on water supplies in that basin over the past 15 years. This rapid growth has led to increased reliance on groundwater and declining water levels over time. TMWA has successfully reversed that trend in two wells it recharges in the basin. Figure 5 depicts the recharge at the Desert Springs 4 well and the sustained rebound of water levels in the area. The remaining wells on the west side of the basin (Desert Springs 1, 2, & 3) cannot be recharged without significant wellhead modifications and new conveyance system components due to their age and type of pump (submersible). New developments in water conveyance technologies now make it possible to recharge these three wells that have submersible pumps.



Figure 5: Water level response to recharge activities at Desert Springs 4 well

For this proposed project, TMWA will retrofit Desert Springs 1, 2, & 3 wells on the west side of the SSV for use as ASR wells. Figure 6 depicts TMWA's municipal wells and two successful recharge well locations in SSV. This project will increase the recharge capacity and drought storage in the aquifer, accurately monitor and operate recharge at each well remotely, help bring the basin back into balance with respect to recharge and extraction, and help to remediate nitrate-contaminated groundwater in the area. Given these projected outcomes, this proposed project will meet the goals listed under R16-FOA-DO-006 Task A – Increasing the Reliability of Water Supplies through Infrastructure Improvements and Task B – Projects to Improve Water Management through Decision Support Tools, Modeling, and Measurement.



Figure 6: Project location map depicting existing and proposed ASR wells.

The three wells slated for rehabilitation and ASR retrofit are currently unequipped for ASR due to the nature of the original design and construction of the wells. These wells have downhole submersible pumps and motors with check-valves which prevent water from being recharged down through the pump column. These wells also have small annular spaces which include additional down-hole appurtenances that make the use of a separate recharge supply line unlikely due to lack of space. A novel method to retrofit these wells which were once unlikely to

be recharged includes installation of an inline downhole variable control flow valve which allows water to be directed down the pump column, thereby doing away with the need for a separate recharge supply line.

The first step in the retrofit process will be well rehabilitation. TMWA has a successful well rehabilitation program whereby wells of various ages and declining efficiencies are tested, brushed, bailed, developed, and treated with acid (if necessary) in order to increase the efficiency of the wells. TMWA has successfully returned wells to 100% or more of their original (as-constructed) efficiency, which reduces energy consumption, drawdown, and well interference. Under this project, TMWA will rehabilitate these three aging wells to not only improve the pumping efficiency, but also to improve the recharge efficiency of the wells. An example of efficiency gains after rehabilitation of a TMWA well is presented in Figure 7.

Figure 7: Efficiency gains at a TMWA production well after successful rehabilitation



Once rehabilitated, the wells will undergo modifications to the wellhead piping and above-ground appurtenances critical to the delivery of drought storage water into the subsurface. Modifications will include high tech metering and control valves to monitor and track recharge water deliveries and water level response via a SCADA (Supervisory Control and Data Aquisition) system. These modifications will allow the wells to be recharged remotely, thereby greatly reducing onsite management of this satellite system.

After increasing the recharge efficiency and improving the recharge delivery and measurement systems, the downhole control valve will be installed when the pump and motor are reinstalled. The BASKI Inflex<sup>TM</sup> Flow Control Valve (FCV<sup>TM</sup>) will be installed and connected to the SCADA control system to allow for remote activation and control of downhole recharge rates, which may vary seasonally and may necessitate variability depending on water level response and regional water resource needs.

All systems will be tested and approved before going online. Once online, recharge tests will confirm potential recharge rates and flows will be adjusted accordingly. A series of

groundwater monitoring wells will be used to measure the aquifer response in terms of water levels and water quality. It is anticipated that the project will increase the long-term viability of the wells by pushing nitrate-contaminated groundwater away from the production wells and reducing contaminant concentrations at the fringe of the recharge extent. Recharge at nearby Desert Springs 4 has resulted in reductions in nitrate in nearby groundwater monitoring wells. Figure 8 depicts concentrations of nitrate in groundwater since recharge began.



Figure 8: Reduction in nitrate concentrations over time near the Desert Springs 4 recharge well

Groundwater levels and water quality will be monitored from a network of monitoring wells to evaluate the benefit to the aquifer from recharge activities at the three proposed wells. Eighteen months of monitoring will help ensure the efficacy of the project to 1) replenish groundwater in the areas receiving recharge water, 2) ensure that groundwater quality is not diminished by recharge activities, and 3) look for possible reductions in nitrate concentrations. If funded, the project will have immediate benefits to the aquifer and may delay the need for a new well in the area.

#### **Evaluation Criteria A**

#### Will the project make additional supplies available and how was this estimate calculated?

Yes, the project will allow for storage of approximately 600 acre feet (AF)/year of additional water which will be available for drought supply, if needed. The estimate was based on 6 months of recharge at 300, 220, and 300 gpm for the three wells (750 gal/min x 1,440 min/day x 180 days x 325,851 gal/AF = 600 AF/year).

#### What percentage of the total water supply does the additional water supply represent?

TMWA pumped approximately 1,780 AF from the groundwater system in SSV in 2015. Recharging 600 AF of surface water accounts for approximately 34% of the total water pumped from SSV in 2015. The recharged water will remain in SSV for future use during drought years.

### *Provide a brief qualitative description of the degree/significance of the benefits associated with the additional water supplies.*

The groundwater system in SSV is over-appropriated, meaning that the water rights available for use far outnumber the actual water available for extraction from the aquifer (based on perennial yield estimates from the USGS and the Nevada Division of Water Resources). Adding an additional 600 AF of recharge water for storage into the aquifer with this project, in addition to the roughly 1,110 AF (2016 estimates) recharged in SSV at Desert Springs 4 and Hawkings wells, will lessem the effects that over-appropriation has had on SSV. Recharge will account for approximately 96% of the water that TMWA pumps from SSV; 1,710 ASR potential versus 1,782 pumped (2015 data).

### How will the project build long-term resilience to drought? How many years will the project continue to provide benefits?

As stated above, this additional recharge water will bring SSV closer into balance, leaving much needed groundwater drought reserves in the aquifer for future use. The modifications and improvements made to these three wells will allow for recharge to continue for the life of the well, projected to be another ten to twenty years.

### How will the project improve the management of water supplies? For example, will the project increase efficiency or increase operational flexibility?

Wellhead and downhole modifications of the wells will improve the management of water supplies by allowing more surface water to be stored underground when it is plentiful and relying on that stored water during drought years. Rehabilitation will increase the efficiency of the wells by reducing groundwater pumping levels and energy required for production. The rehabilitation efforts will allow the wells to more readily accept recharge water more efficiently, thereby increasing the volume of water stored over a given timeframe.

# Will the project make new information available to water managers? If so, what is that information and how will it improve water management?

The proposed SCADA improvements will allow TMWA to monitor and regulate the volume and rate of water recharged to maximize the amount of water stored in the aquifer. Given the remote location of the wells, real-time operational control will save time and money in an operational sense and may increase the amount of water stored through real-time adjustments. *Will the project have benefits to fish, wildlife, or the environment? If so, please describe those benefits.* 

Groundwater on the west side of SSV has been impacted by high concentrations of nitrate due to high-density septic systems in the area. Recharging the proposed wells will allow groundwater quality in the vicinity of the wells to recover and allow for a higher quality of water to be delivered to customers and may eliminate the need for energy-intensive treatment options necessary for nitrate removal.

### What is the estimated quantity of water that will be better managed as a result of this project? How was this estimate calculated?

In addition to the 600 AF of water recharged now being made available, there is the potential benefit of an additional 48 AF of existing contaminated water being diluted by recharge activities at the Desert Springs 3 well and made available for supply. Estimating 20% of recharge water diluting enough contaminated groundwater near Desert Springs 3, where concentrations are above the MCL of 10 mg/L, to make it potable. The estimate was based on 240 AF (recharged at DS3) x 20% = 48 AF

### What percentage of the total water supply does the water better managed represent? How was this estimate calculated?

Water recharged through this project (600 AF) accounts for approximately 34% of all the water TMWA pumps from SSV on an annual basis.

### *Provide a brief qualitative description of the degree/significance of anticipated water management benefits.*

Storing more water underground, where evaporative losses are reduced to almost zero, allows TMWA to more efficiently utilize water that is available during wet years and wet months. This stored water will offset the withdrawals from already stressed aquifers in SSV, allowing groundwater in the basin to recover during wet years so it can be relied on when needed, during drought years. This additional water will bring TMWA's net pumped versus recharged water in SSV to almost zero, further helping to bring the basin into balance. *Recharge Well Description* 

The wells are between 26 and 53 years old. Table 1 below provides a description of the well construction and associated pumping rate for each of the proposed ASR retrofit wells. *Table 1: ASR well construction specifications* 

Well	Build Date	Depth (feet)	Diameter (inches)	Specific Capacity (gpm/ft)	Screened Intervals (ft bls)	Depth to Water (ft bls)	Pumping Rate (gpm)
Desert Springs 1	1990	200	8	15	122-192	62	370
Desert Springs 2	1963	445	16	9	238-360	67	425
Desert Springs 3	1979	272	10	39	58-267	34	750

Aquifer Description and Estimated Aquifer Response

The following description of the aquifer near Desert Springs 1, 2, and 3 was taken from the report titled, "Spanish Springs Valley Analysis of Aquifer and Water Well Response (Meador, 1980) which assessed the aquifer penetrated by the Desert Springs 3 well. "While the valley is surrounded by hills and mountains dominated by igneous rocks, both intrusive and extrusive, the valley proper is occupied by geologically recent alluvium. This alluvium, as it is exposed at the surface and penetrated by drill holes below the surface, is dominated by sand and gravel formations interbedded with clay and clay-silts strata. Driller's logs and electrical resistivity logs in the immediate area of this study illustrate the lenticular nature of all these recent sedimentary formations. It is particularly noticeable that the clay and clay-silt formations thicken toward the center of the valley, while the sand and gravel members dominate in the edges and near the foothills" and "All of this seems to illustrate that at various periods during the recent geologic past, this area…was largely occupied by lake waters."

The Spanish Springs Basin summary report from the TMWA's 2035 Water Resource Plan (2035 WRP) is attached to this proposal to help understand SSV's water resources, challenges, and potential solutions (of which this project is a critical component). Table 2 describes the estimated ASR parameters at the proposed ASR wells.

Well	Estimated Recharge (gpm)	Max Recharge (gpm)	Depth to Water (ft bls)	Estimated Recharge Volume (AF/yr)	Estimated Extraction Volume* (AF/yr)
Desert Springs 1	250	400	62	200	250
Desert Springs 2	200	300	67	160	225
Desert Springs 3	300	400	34	240	220

 Table 2: Estimated ASR parameters for each of the proposed wells

\*Based on highest extraction volume from the past 5 years.

Simulations have been completed to estimate the water level response at each proposed recharge well. As an example of one of those simulations, Figure 9 below indicates that the estimated recharge rates and annual recharge volumes will benefit water levels in the area. Each well will be closely monitored and flow adjusted accordingly to keep water levels approximately ten feet below land surface at the wellhead. Figure 10 below indicates that water levels at MW02, located approximately 2,700' from both Desert Springs 1 and Desert Springs 2 ASR wells, respond favorably to the proposed recharge activities.





DS3 Mounding at 300 gpm/Drawdown at 400 gpm



Figure 10. Estimated response approximately 2,700 feet from recharge activities

Groundwater Monitoring Plan

The proposed project includes monitoring, measurement, and analyses to ensure that the ASR wells are operating effectively and that groundwater levels and groundwater quality response is recorded. Water levels and water quality will be monitored at each of the proposed ASR wells and from a series of existing monitoring wells nearby. Eighteen monitoring wells and one production well near the three ASR retrofit wells (Desert Springs 1, 2, & 3) will be monitored for various constituents to help track the movement of recharge water and the potential reduction of high nitrate concentrations that currently exist near these three recharge wells. The following wells will be monitored before start-up and quarterly for 18 months following start-up of the ASR wells: DSMW01, DSMW04, MW01, MW02, MW03, MW04, MW05, MW06, MW07, MW24, MW25, MW26, MW27, MW28, MW34, MW35, MW36, MW37, and Spring Creek 2 well. Each sample will be analyzed for the following constituents: nitrate, chloride, sulfate, TDS, and TTHMs at intervals outlined below. Table 3 describes the locations and frequency of monitoring and sampling events as well as the analyses to be performed on each sample.

				Samp	Sample Constituent and Frequency						
		Tupo	of Wall		Field Parameters	NO <sub>3</sub> -N, Cl-,	Screened Interval				
Sample Location	Matrix	MW	Muni	Water Level	(pH, EC, Turbidity,	Sulfate, TDS,	(feet below land				
		101 00	Wium		DO, Temp, ORP)	TTHM	surface)				
DS1	AQ		Х	Continuous	Quarterly	Quarterly	122 - 192				
DS2	AQ		Х	Continuous	Quarterly	Quarterly	238 - 360				
DS3	AQ		Х	Continuous	Quarterly	Quarterly	58 - 267				
SC2	AQ		Х	Continuous	Quarterly	Quarterly	120 - 220				
DSMW01	AQ	Х		Continuous	Quarterly	Quarterly	110 - 190				
DSMW04	AQ	Х		Continuous	Quarterly	Quarterly	70 - 200				
MW01	AQ	Х		Continuous	Quarterly	Quarterly	60 - 120				
MW02	AQ	Х		Continuous	Quarterly	Quarterly	50 - 90*				
MW03	AQ	Х		Continuous	Quarterly	Quarterly	37 - 77				
MW04	AQ	Х		Continuous	Quarterly	Quarterly	30 - 70				
MW05	AQ	Х		Monthly	Quarterly	Quarterly	43 - 93				
MW06	AQ	Х		Monthly	Quarterly	Quarterly	30 - 70				
MW07	AQ	Х		Monthly	Quarterly	Quarterly	30 - 70				
MW24	AQ	Х		Monthly	Quarterly	Quarterly	130 - 145				
MW25	AQ	Х		Monthly	Quarterly	Quarterly	6 - 26				
MW26	AQ	Х		Monthly	Quarterly	Quarterly	153 - 158				
MW27	AQ	Х		Continuous	Quarterly	Quarterly	142 - 147				
MW28	AQ	Х		Monthly	Quarterly	Quarterly	131 - 136				
MW34	AQ	X		Continuous	Quarterly	Quarterly	35 - 55				
MW35	AQ	X		Continuous	Quarterly	Quarterly	126 - 136				
MW36	AQ	X		Continuous	Quarterly	Quarterly	41 - 61				
MW37	AQ	Χ		Continuous	Quarterly	Quarterly	131 - 141				

Table 3: Well, analyses, and sampling intervals

\*estimated

#### **Metering/Water Measurement Projects**

### Explain why this is a necessary sub-component of another eligible Drought Resiliency Project as described in Tasks A-D.

The water meters and SCADA controls included in the proposed project are critical in order to ensure the safe and efficient operation and monitoring of the recharge activities included in this project. Water meters will measure and report the flow rate and quantity of water being injected, while downhole transducers will measure and report the depth of recharged water in the well. SCADA controls will allow remote adjustment of flow in order to prevent water from surfacing, and can be configured to automatically stop recharge if a dangerous situation (such as water surfacing) were about to occur.

#### To what extent are the methods tested/proven?

TMWA operates all of its wells with water meters and SCADA controls that are standard in the industry.

# To what degree will the project improve the ability to predict the onset of drought earlier and/or with more certainty? To what degree will the project improve the ability to anticipate the severity and magnitude of drought?

The metering and monitoring included in this project do not have the ability to predict the onset, severity, or magnitude of drought, but will allow TMWA to react to initiate, control, and terminate recharge events more quickly when weather dictates favorable or unfavorable

conditions (excess water available for recharge or wells are required to pump due to water shortages).

### To what degree will the project improve the likelihood/timing of detecting mitigation action triggers?

The proposed metering, monitoring, and SCADA controls will be able to detect high water conditions within the wells and allow for automated flow responses to mitigate the situation.

#### **Evaluation Criteria B**

#### Explain how the applicable plan addresses drought.

In general, TMWA's ongoing ASR program enhances local groundwater supplies and directly benefits drought resiliency. This proposed project would expand the capacity of TMWA's ASR system into SSV. This proposed project's benefits to drought resiliency are two-fold. First, the project would allow surface water to be stored during the winter months, increasing the overall amount of groundwater TMWA can extract in SSV, thus reducing the total amount of POSW needed during times of drought. Second, bolstering groundwater supplies in this outlying area of the TMSA provides more flexibility in the delivery system of POSW during times of drought by offsetting the need for additional surface water to be diverted to SSV.

In order to provide sustainable water resources, TMWA produces a 20-year Water Resource Plan every 5 years. The ASR program is supported by TMWA's 2035 WRP, of which the relevant sections are attached to this proposal. The 2035 WRP is TMWA's management plan for securing and delivering water resources to its customers during both drought and non-drought years. Further chapters of the 2035 WRP identify projects TMWA can and will implement to address climate change and drought. TMWA's proposed well retrofit project directly supports resiliency toward drought by increasing TMWA's ASR capabilities and utilization of groundwater resources.

## Describe how your proposed drought resiliency project is supported by an existing drought plan. Does the proposed project implement a goal or need identified in the drought plan?

Having ASR capabilities across the TMSA is the lynchpin to TMWA's conjunctive use management approach to drought. TMWA's 2035 WRP defining the importance ASR as a mitigation action for drought resiliency as "TMWA's ongoing ASR projects have improved or stabilized groundwater levels in and around the injection sites thereby preserving TMWA's ability to utilize its groundwater resources to meet the peaking and/or Drought Situation pumping requirements without degrading groundwater quality in the process. ASR is one element of TMWA's integrated management strategy to augment drought reserve supplies for later use during a Drought Situation. ASR, together with TMWA's POSW and credit water releases and increased groundwater pumping, create opportunity to maximize and expand service commitments while meeting critical-year-water-supply requirements during drought periods; this is a primary purpose of water resource planning for the Truckee Meadows (page 81)." *Describe how the proposed project is prioritized in the referenced drought plan? Does the drought plan identify the proposed project as a potential mitigation or response action?* 

The proposed project is explicitly supported by the 2035 WRP. Chapter 6 of the 2035 WRP identifies equipping the wells in SSV with ASR as a **priority** project for future water resources. The 2035 WRP states "An additional ASR opportunity may exist with using … well facilities in Spanish Springs for recharge; there may be sufficient capacity that could be used during drought years to extract additional groundwater (pages 140 and 141)."

### *Explain whether the drought plan was developed with input from multiple stakeholders. Was the drought plan developed through a collaborative process?*

The 2035 WRP is a collaborative effort between TMWA and relevant stakeholders. Comments, concerns, and questions by various interest groups and customers were gathered during a series of public workshops and a month-long commenting period. All comments were addressed and revisions were made to the 2035 WRP based on feedback from stakeholder input.

### Does the drought plan include consideration of climate change impacts to water resources or drought?

Chapter 2 of the 2035 WRP outlines how climate change could impact water resources and how it is likely to affect the persistence of drought in the Truckee Meadows. A copy of all relevant chapters of the 2035 WRP is attached at the end of this proposal.

#### **Evaluation Criteria C**

# What are the ongoing or potential drought impacts to specific sectors in the project area if no action is taken and how severe are those impacts? Impacts should be quantified and documented to the extent possible.

To meet demands of the 16,000 customers within SSV, TMWA's primary source of supply is surface water. However, groundwater pumping in SSV is required to meet peak demands in some, if not all, of the summer months (May through September), or during emergency conditions when surface water delivery is curtailed. The amount of groundwater required to offset the delivery of surface water has a direct relationship to surface water availability, which is a function of drought conditions. There are potential impacts to the quantity and quality of water available for municipal use. Moreover there are impacts to the groundwater environment itself. Each of these issues is described in more detail in the sections below.

# Are there public health concerns / social concerns associated with current or potential drought?

SSV has an alternative source of supply given that it is connected to the greater distribution system that serves the area depicted in Figure 2 in the Background Information section. Although there is an alternative source of supply, those supplies come from two main sources: surface water and groundwater. Within the TMSA, surface water provides for approximately 80% of total demands, while groundwater makes up the remaining 20%. These quantities vary both regionally and seasonally. When available, surface water makes up 100% of the supply year-round. During drought periods, surface water may not be available for up to 5 months of the year, meaning groundwater is required. During droughts, groundwater wells in SSV supply up to 100% of the demand, putting additional stress on an already stressed aquifer. Historically, groundwater wells in SSV supplied all demand in SSV, which led to continuous water level declines over time. However, since 2009, surface water supplied most of SSV's demand and groundwater was a supplement during high-demand month and drought periods. Due to nitrate contamination on the west side of SSV, wells from the east side of SSV were pumped heavily to make up this shortfall.

The proposed project will address public health and environmental concerns associated with the existing drought and future drought situations in four major ways. Surface water recharged in the west side wells during wet months and wet years will: (1) reduce nitrate concentrations near the recharged wells and prevent potential violations of drinking water standards; (2) decrease net groundwater withdrawals from the basin, leaving more water

available in the aquifer to help stabilize groundwater; (3) allow west side wells to be pumped in the summer and drought years when they were avoided in the past due to nitrate concerns; and (4) allow east side wells to be rested and water levels in that area to recover as more water comes from west side wells.

#### *Whether there are ongoing or potential environmental impacts?* Refer to Evaluation Criteria A.

#### Are there any local, or economic losses associated with current drought conditions?

TMWA is not aware of any past or ongoing local economic losses associated with current drought conditions in SSV. However, should the drought persist and pumping continue as the sole source of water supply during the summer months, the 140 domestic well owners in the area could be faced with a situation where their wells can no longer draw adequate water to meet their needs. Should this happen, these well owners would be forced to drill deeper into the aquifer, causing them significant economic hardship.

#### Are there other drought-related impacts not identified above?

The primary challenge in SSV is bringing groundwater back into balance with consideration of customer demands during drought periods and of maintaining a high standard of water quality in the SSV area. If water levels in SSV continue to decline, it could create tension among the customers in SSV over reductions in water quality. Furthermore, tension could arise among the domestic well owners should they be forced to drill deeper wells.

#### Is the project in an area that is currently suffering from drought?

As stated in Background section of this proposal, the Truckee Meadows area is currently experiencing its fourth consecutive year of drought, with the winter of 2015 being the worst in recorded history.

## Describe any projected increases to the severity or duration of drought in the project area resulting from climate change.

According to USBR Truckee Basin Study, the Truckee Meadows region is likely to experience hotter temperatures and potentially drier conditions in the future. Details on the Truckee Basin Study, can be found online at:

http://www.usbr.gov/watersmart/bsp/docs/finalreport/truckee/tbsbasinstudyexecutivesummary.pdf.

Should this dismal outlook hold true, it will have increased adverse effects to natural recharge on the already depleted groundwater supplies in SSV. Increased reliance on pumping during times of drought increases water quality concerns associated with nitrate and arsenic. Given this climate forecast for the region, increasing the amount of ARS in SSV is of upmost importance. Current municipal well recharge taking place on the west side and southeast side of SSV has shown marked improvement on the groundwater levels. Furthermore, water quality in those areas has improved.

#### **Evaluation Criteria D**

#### Describe the implementation plan of the proposed project.

The project can begin as soon as grant funds are approved. The project will begin with development of bid documents for open-bidding purposes. Once contracts are received and contractors selected, the proposed work schedule can be finalized and work can commence. Included below is an estimated schedule of work, with a timeline for each stage of work, broken down by task, including major milestones, by month (see Table 4).

#### Describe any permits that will be required, along with the process for obtaining such permits.

Retrofit construction activities are anticipated to take place on private property. Should the construction work take place on municipal property, TMWA will obtain all necessary permits through the Cities of Reno or Sparks, or Washoe County on an as needed basis.

Discharges related to the rehabilitation and testing of the wells are permitted through the Nevada Division of Environmental Protection (NDEP). TMWA is authorized under Permit # NV0024031 to discharge system-wide for operation and maintenance activities (included well testing and rehabilitation as proposed herein). The Permit Fact Sheet is included as an attachment.

The NDEP requires an Underground Injection Control (UIC) Permit in order to inject water with the State of Nevada to prevent the degradation of all potential and current underground sources of drinking water. TMWA has already applied for and received the UIC Permit for all potential ASR wells in Spanish Springs SSV. UIC Permit UNEV2009202 covering Desert Springs wells 1, 2, and 3 is attached.

The NDWR through the Nevada State Engineer (NSE) requires a permit for any project to recharge, store, and recover water underground. TMWA actively operates one well under permit approval of the NSE on the east side of the SSV, and dozens of other NSE-approved wells throughout the water service territory. TMWA is currently finalizing application to recharge, store, and recover water in 4 wells on the west side of the SSV (which includes Desert Springs 1, 2, and 3) and plans to submit the permit application by the end of May 2016. *Identify and describe any engineering or design work performed specifically in support of the* 

### Identify and describe any engineering or design work performed specifically in support of the proposed project.

The flow control valves will require engineering and design work. This work is anticipated to be performed by Baski, Inc., out of Denver, Colorado; the developer and manufacturers of the FCV downhole control valves. Each valve has to be hand-made to meet the individual well constraints and flow requirements for the proposed application. These costs are included in the cost estimate provided by Baski, Inc. and are included as attachments to the budget.

#### Describe any new policies or administrative actions required to implement the project.

No new policies or administrative actions are required to implement the project.

#### **Evaluation Criteria E**

#### How is the proposed project connected to a Reclamation project or activity?

This proposed project is not directly related to a Reclamation project or activity, however the proposed project is consistent with the Reclamation's suggested steps to mitigate future drought. Page 45 of the Reclamation's Truckee Basin Study – Executive Summary Report recommends incorporating future risks into existing water user plans.

#### Does the applicant receive Reclamation project water?

This proposed project using TMWA existing water rights and does not rely on Reclamation project water.

#### Is the project on Reclamation project lands or involving Reclamation facilities?

While the proposed project is not located on Reclamation project lands, TMWA receives surface water from reservoirs operated by Reclamation.

#### Is the project in the same basin as a Reclamation project or activity?

The proposed project will take place in SSV, which is part of the Truckee River Basin. The Truckee River Basin was a study area for the Reclamation's Basin Study Program.

#### Will the proposed work contribute water to a basin where a Reclamation project is located?

The proposed project will contribute water to the Truckee River Basin, which is part of the Reclamation's Basin Study Program.

#### Will the project help Reclamation meet trust responsibilities to any tribe(s)?

This proposed project is not anticipated to help Reclamation meet trust responsibilities with the local Pyramid Lake Paiute Tribe.

#### **Performance Measures**

Wells targeted for ASR are older assets that (1) have reduced efficiencies, (2) are unable to be recharged, and (3) are impacted by nitrogen from septic tanks in the area. The performance measures for the proposed project will address the efficacy of each solution to these three problems in a quantitative manner.

- 1. Each well will be tested to determine a baseline efficiency rating, which will be determined with a three- to four-step pumping test whereby the well is subjected to increasing flow rates over discrete 100-minute intervals for a total of four steps. Once the baseline efficiency is determined, the well will be rehabilitated as described in the Technical section. After rehabilitation, the well will be step-tested again, in the same manner and with the same pumping rates and time intervals, to determine the post-rehabilitation efficiency. The increase in efficiency gained, after rehabilitation efforts, is calculated by subtracting the baseline rating from the post-rehab rating.
- 2. The performance criteria for successful conversion to an ASR well is fairly straight-forward. Since these wells are unable to be converted through traditional methods (downhole recharge lines), the addition of an in-line flow control valve to allow the well to be recharged will be considered a successful conversion. Successful conversion will also be determined by 1) the amount of water recharged to the aquifer and 2) the water level response in the area. The wellhead piping and SCADA control modifications will allow the amount of water recharged to be metered, measured, and controlled. The flow rate, total flow volume, and water level within each recharge well will be transmitted, via SCADA telemetry, and the data is tracked, plotted, and stored on redundant servers. Additionly, surrounding wells will be monitored with dedicated transducers which measure and record water levels on an hourly basis. Water level data will be verified bi-monthly with hand-measurements and downloaded at that time. Successful recharge with respect to the volume of water recharged will be determined by the ratio of recharged water to pumped water on a seasonal basis. The goal is to have greater than 50% of the water pumped during the summer season coming from water recharged through the ASR wells. Successful recharge with respect to water level response will be measured by comparing the pre-pumping water level before recharge start-up to a water level 12 months later (or before pumping starts again, whichever comes first). An increase in water levels in the ASR well and surrounding monitoring wells will be indicative of successful recharge.
- 3. The final performance measure will quantify the spin-off benefit of reduced nitrogen concentrations at each ASR well. Baseline samples, as described in the monitoring plan, will be collected from each ASR well and the subset of monitoring wells nearby for nitrate and other constituents. These wells will be monitored quarterly for the same constituents. Although it is uncertain when the recharge water will reach each monitoring point, it is

anticipated that a reduced nitrate values within each ASR well will occur almost immediately and at surrounding monitoring locations over time. It is assumed that the nearest monitoring points will see reduced nitrate concentrations quicker than monitoring points further away. Water quality improvement will be calculated by comparing end-of-project nitrate concentrations with baseline pre-project nitrate values at all wells. Success will be determined by any reduction in nitrate over time within the ASR wells and the aquifer.

#### Table 4: Estimated Project Schedule of Major Tasks and Milestones by Month

Project Schedule

Municipal Well Aquifer Storage and Recovery Retrofit Project for Drought Resiliency

	2016						2017						2018											
Oct	Nov	Dec	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	
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Milestones:

- (1) All pre-Rehab well efficiency testing completed and data analyzed.
- 2 Desert Springs 1 Well Rehabilitated
- 3 Desert Springs 2 Well Rehabilitated
- (4) Desert Springs 3 Well Rehabilitated
- 5 Desert Springs 1 Well Flow Control Valve Installed and Tested
- 6 Desert Springs 2 Well Flow Control Valve Installed and Tested
- (7) Desert Springs 3 Well Flow Control Valve Installed and Tested
- (a) All wellhouse piping mods completed
- 9 All post-Rehab well efficiency test completed and data analyzed.
- (10) Recharge begins in all new retrofit wells.
- (1) Project monitoring begins with collection of baseline water quality sampling and water level measurements.
- Water levels measured continuously if not monthly hereafter. Groundwater water quality sampling occurs quarterly hereafter.
- (12) Bi-Annual Reporting culminates in a Final Report upon prject completion.

#### **Environmental and Cultural Resources Compliance**

*Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)?* 

The proposed project will not negatively impact the surrounding environment. As part of the project, each of the three wells will have a small shallow trench constructed to connect control components from the well house to each well (trench details below). Trenching will occur in a suburban environment within the well yard, which has soils that were previously-disturbed when the wells were originally constructed. Trenching work will not affect the air, water, or animal habitat in the project area. If dust becomes an issue, the area will be wetted for dust control. Recharged water will remain underground and will not be allowed to surface.

Well	Width	Depth (feet)	Length
Desert Springs 1	1	1.5	6
Desert Springs 2	1	1.5	13
Desert Springs 3	1	1.5	5

Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area?

We are not aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area.

Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States?"

There are no wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction.

When was the water delivery system constructed?

TMWA's water main system components can date back as far as the 1920's. This proposed project will retrofit water main components constructed in 1990, 1963, and 1979 (Desert Springs 1, Desert Springs 2, and Desert Springs 3, respectively).

Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)?

No, the proposed project will not result in any modification of or effects to individual features of an irrigation system.

Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places?

No, there are no buildings, structures, or features in the project area that are listed or eligible for listing on the National Register of Historic Places.

#### Are there any known archeological sites in the proposed project area?

No, there are no known archaeological sites in the proposed project area as each well occurs on previously-disturbed sites.

Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?

No, the proposed project will not have a disproportionately high and adverse effect on low income or minority populations. The project will modify and improve water system components that help serve the diverse population of Spanish Springs Valley.

Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

No, the proposed project will not limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands. The project occurs within TMWA-owned parcels.

Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

No, the proposed project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area.

# WETLAB

WESTERN ENVIRONMENTAL TESTING LABORATORY

Summary of Services									
Turnaround Time: Sample Arrival Date:	Standard		Shipped Via: Quote Expires:	12/31/16					
Verbal Results:	Standard turn-around time is 10 working days from date of sample re								
Hardcopy Report:	Standard turn-around time is 15 working days from date of sample r								
RUSH Analyses:	Must be scheduled with t	he laboratory prior t	o sample submittal.						
Reporting:									
WET Lab maintains a policy of pe sample analysis (10%), method b and continuing calibration proced	erforming substantial qualit blanks (matrix dependent), lures as part of the method	y control with all an surrogate spike an dologies performed	alyses. Duplicate alysis (when applicab routinely.	le),					
The report will include the Labora with units.	atory and Client ID, parame	eter, method referer	nce and analytical res	ults					
COMMENTS:									
Rush Schedule (% Surcharge): 5-Day	<sup>,</sup> RUSH = 25%, 3-Day RUSH =	= 50%, 1 or 2 day RUSI	H = 100%,						
Same Day RUSH = 200%									
<sup>1</sup> Analysis to be performed by Ass	et Laboratories out of Las	Vegas, NV.							
<sup>2</sup> Quote reflects scan for all 29 col	mmon ICP metals.								
<sup>3</sup> Quote refliects scan for all 7 con	nmon ICP-MS metals.								
Terms: Terms are 30 days from date of ir within that period. Payment for se established.	voice. All discounts are v ervices is expected at the	oid if payment is no time of submission,	t received by WETLA unless an account ha	B as been					
AUTHORIZATION TO PROCEED AS	S QUOTED AND AGREE TO	WETLAB TERMS &	CONDITIONS						
NAME:									
COMPANY:									
WETLAB Acceptance:									
		475 E	Greg St, #119, Sparks,	NV 89431					
		775-3	55-0202 TEL 775-355	-0817 FAX					

We propose to provide the following equipment *for each well*:

#### **Flow Control Valve**

1) <u>Well SSV DS1</u>-One Baski patented<sup>1</sup> Flow Control Valve (FCV<sup>™</sup>); Model FCV-6.63-3.0-4.5-316SS (4" nominal column pipe), see drawing 'injection\_33755-1'. The overall length is 96". Baski will thread the FCV<sup>™</sup> with threads to match the column pipe.

**Wells SSV DS2 and SSV DS3**-One Baski patented<sup>1</sup> Flow Control Valve (FCV<sup>™</sup>); Model FCV-8.63-4.5-6.63-316SS (6" nominal column pipe), see drawing 'injection\_33755-2'. The overall length is 120". Baski will thread the FCV<sup>™</sup> with threads to match the column pipe.

#### 2 Control Lines to the FCV™

2) Each Flow Control Valve has two control lines, running from the control panel to the ports on the top of the Flow Control Valve. These stainless steel tubes are Duplex 2205, 1/4" OD, and hydrostatic tested to 15,000 psi. The control panel is assumed to be within 50 feet of the wellhead.

#### **Control Panel and Nitrogen Regulator**

3) One control panel for manual or SCADA-controlled automatic operation, with a mechanical pressure gauge (dwg 24362) is supplied. The control panel allows a single person to manually operate the valve. The control panel valves are brass, with soft seats for positive shutoff. The blocks are aluminum. The control panel valves, blocks and gauges are mounted to a NEMA back panel for attachment to a wall or in an enclosure (not supplied). A nitrogen regulator will also be supplied.

#### **Field Services**

4) Up to four trips to the field by a Baski representative; up to two 8-hour days on site for installation for each valve, and up to two 8-hour days on site for start-up and training. While on site, the Baski representative would act only in an advisory capacity. Conditions causing unsatisfactory operation, or inability to operate the Flow Control Valve, which are not associated with the Flow Control Valve itself, shall relieve manufacturer of any extra on-site / on-call duties. The Contractor must request and schedule these on-site services at least <u>7 full calendar days</u> in advance. It is the Contractor's responsibility to have nitrogen on site for these services.

#### Specific equipment and services <u>not</u> supplied includes, but not limited to, the following:

- Pumps, column piping (unless order as an additional line item), and water meters
- PLC controller / SCADA system; hardware, software, and testing
- Transmitters and/or transducers, their cable and dataloggers, either uphole or downhole
- $\circ$  Installation of the FCV<sup>TM</sup>, control lines, and control panel
- Enclosure for the Control Panel
- Conduits or other protective enclosure for the control lines from the well head to the control panel
- Well head seals for the control lines coming out of the well
- Nitrogen cylinders
- Downhole Check Valves

#### **Pricing and Payment Terms**

Unit Pricing for items 1, 2 and 3 is \$50,000 for Well SSV DS1 and \$55,000 for Well SSV DS2 and SSV DS3 (total of \$160,000 for all three wells). Pricing is lump sum and is FOB Destination. Before we start work on this made to order equipment, we would need to review and accept your purchase order (PO) and its terms and conditions; get approval of our submittal (if necessary) and receive a non-refundable payment equal to 25% of the total PO. After we start work, we estimate that we can have the equipment ready to ship in 2-3 months. When the equipment is ready to ship, the remaining 75% of the balance is due. Before shipment, the balance of the invoice must be paid.

All schematics are for conceptual purposes and do not necessarily represent the exact design details of equipment which will be supplied. This pricing is based upon the terms and conditions, equipment, and/or services, of this quotation. Other terms, conditions, equipment, and/or services required by Buyer may be cause for withdrawal of this quotation, which is an Offer for Sale. Pricing is valid for 120 days.

Thank you for the opportunity to present our equipment for your review. If you have any questions, please feel free to give me a call or email me.

Sincerely, Nick Hemenway

NCH encl Warranty, p. 5 of 8; and drawings injection\_33755-1, injection\_33755-2, 24362

#### NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

#### **AUTHORIZATION TO DISCHARGE**

In compliance with the provisions of the Federal Water Pollution Control Act as amended, (33 U.S.C. 1251 et. seq.; the "Act") and Chapter 445A of the Nevada Revised Statutes, the Permittee,

#### Truckee Meadows Water Authority (TMWA) PO Box 30013 Reno, NV 89520

is authorized to discharge surface water and groundwater generated during various TMWA system operations, maintenance and emergency activities. Discharge is directed to groundwater, surface water, or stormdrain systems, located within the City of Reno, City of Sparks or unincorporated Washoe County, with system extents defined by the following coordinates:

Northern Extent: Latitude 39° 40' 59.07" N, Longitude 119° 53' 53.01" W Section 18, T21N R19E MDB&M Southern Extent: Latitude 39° 24' 40.56" N, Longitude 119° 46' 13.68" W Section 20, T18N R20E MDB&M Western Extent: Latitude 39° 31' 17.57" N, Longitude 119° 57' 37.63" W Section 09, T19N R18E MDB&M Eastern Extent: Latitude 39° 37' 22.70" N, Longitude 119° 39' 44.15" W Section 06, T20N R21E MDB&M

to receiving waters named:

#### Waters of the State, including the Truckee River and its tributaries

in accordance with discharge limitations, monitoring requirements, and other conditions set forth in Parts I, II, and III hereof.

This permit shall become effective on August 31, 2011.

This permit shall expire at midnight August 30, 2016.

Signed this <u>30<sup>th</sup> day of August, 2011</u>.



Jeryl R. Gardner, P.E. Bureau of Water Pollution Control



### NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

STATE OF NEVADA

Department of Conservation & Natural Resources

Brian Sandoval, Governor Leo M. Drozdoff, P.E., Director David Emme, Administrator

November 9, 2015

John A. Erwin Truckee Meadows Water Authority P.O. Box 30013 Reno, NV 89510

RE: Underground Injection Control (UIC) Permit UNEV2009202 Major Modification – Increase Number of Permitted Wells Spanish Springs Valley – Basin 85 Recharge

Mr. Erwin:

The Nevada Division of Environmental Protection (NDEP) has completed the modification of UIC permit UNEV2009202 to include additional wells in the Spanish Springs area. Enclosed is a signed copy of the final renewed permit. Please review the permit carefully, and ensure all monitoring, recordkeeping, and sampling requirements are verified and updated. Note all specific monitoring and sampling requirements can now be found in the back of the permit under Attachment 1.

Please mail all UIC reports to the address found in the permit in the future to make sure it is processed correctly: Nevada Division of Environmental Protection Bureau of Water Pollution Control Attn: Injection Monitoring Report 901 S. Stewart Street, Suite 4001 Carson City, NV 89701

Note the following changes to the permit:

- 1. The number of permitted injection wells have been changed from one (1) to nine (9).
- 2. Attachment 2 has been updated.
- 3. Changed chlorine residual from limit from 4 to 2.5 mg/L.
- 4. Reporting is on an annual basis, not semi-annual due February 15<sup>th</sup> of each year.
- 5. Under Part I.B.3, an updated UIC O&M manual is due by March 31, 2016. This manual should primarily focus on procedures related to ASR activities and monitoring/sampling related to UIC permit.

If you have any specific concerns or comments regarding this issued permit, you will need to submit those in writing. Contact me with any questions at 775-687-9428 or <u>rland@ndep.nv.gov</u>.

Sincerely, Run fand

Russ Land Bureau of Water Pollution Control

Enclosure: copy - modified UIC permit UNEV2009202

ecc: Cliff Lawson P.E., Supervisor NDEP BWPC Christian Kropf, TMWA Nick Brothers, NDEP BWPC Compliance Branch cc: File UNEV2009202

Reader File

#### **STATE OF NEVADA DIVISION OF ENVIRONMENTAL PROTECTION**

### **Authorization To Inject**

In compliance with the provisions of the Nevada Revised Statutes (NRS 445A) and the Nevada Underground Injection Control Regulations (NAC 445A.810 thru 445A.925), the following Permittee is authorized to dispose from a facility described below in accordance with limitations, requirements and other conditions set forth in Parts I and II hereof.

Permit Number:	UNEV2009202	
Facility Name:	Spanish Springs Valley A	quifer Storage and Recovery (ASR) Project
Facility Address:	various locations around	Spanish Springs Valley, Washoe County
Permittee:	Truckee Meadows Water	Authority (TMWA)
Permittee Address:	1355 Capital Blvd., PO B	ox 30013 Reno, Nevada
Property Owner:	TMWA	
Owner Address:	1355 Capital Blvd. Reno	, Nevada
Legal Description:	Section 3 T20N, R20E, S R 20E MDB&M Washoe	ections 6 & 7 T20N R21E and Section 34 T21N County, Nevada
Number of Permitted Wells:	Nine (9)	subclass 5R33
Other Permits: Annual Fee Due: Reporting Frequency:	NDWR permit – R-019 July 1 <sup>st</sup> of each year Annually	(see Part I.A.6)

#### **Facility Description**

The injection wells are located in Spanish Springs Valley. Existing production wells used to store and recover treated water from the Truckee River during the non-production months of the year (fall through spring).

Any additional wells to be added to this permit or exchanged for the above well shall require approval through the UIC Program, and public notice.

NOTE: Reference the permit fact sheet for specific details on the facility and wells, and permit history.

Permit issued as temporary permit on: December 10, 2008 Permit modified on November 9, 2015 This permit shall become effective: November 9, 2015 This permit shall expire at midnight: November 9, 2020

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Russ Land Bureau of Water Pollution Control

<u>//-9-15</u> Date