Drought Resiliency Through Additional Well Capacity

$732,684

WaterSMART Drought Response Program
Drought Resiliency Projects for Fiscal Year 2022

R22AS00020

Funding Group II

October 5, 2021

Applicant:
Las Vegas Valley Water District

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1. Technical Proposal: Executive Summary

Date: October 5, 2021
Applicant: Las Vegas Valley Water District (Category A applicant)
Location: 1001 South Valley View Boulevard, Las Vegas, Nevada 89153 (Clark County)

Project Summary:
As severe and sustained drought conditions in the Colorado River Basin continue to threaten water supplies and delivery systems, building drought resiliency is a crucial tool to ensure and increase safe and reliable water supplies. The Las Vegas Valley Water District (LVVWD) constructs new wells to maintain and add system capacity, as well as ensure availability of water supplies in times of drought or emergency. In the proposed project, the LVVWD will construct a new well at the LVVWD Fort Apache Reservoir site, adding an estimated 2,500 gallons per minute (gpm) to the system capacity. LVVWD is a member agency of the Southern Nevada Water Authority (SNWA) and the project is supported by SNWA's Water Resource Plan and Joint Conservation Plan. Both plans prioritize banking conserved water resources and developing temporary supplies to provide flexibility to meet demand or offset water-supply reductions. This project will contribute to the reliable availability of LVVWD's Las Vegas Valley groundwater rights and provide capacity for recovery of banked storage in the Las Vegas Valley. This project will foster the ability to conserve Colorado River resources in Lake Mead, bolstering Lake Mead storage and elevations. It will also defer the need to deliver additional Colorado River water or earlier development of future water resources as a replacement for this valuable permanent resource.

Length of Time and Estimated Completion Date
The proposed project encompasses activity from June 2022 through July 2023. All project work will be completed by July 2023.

Federal Facilities
The proposed project is not located on a Federal facility.

2. Technical Proposal: Project Location

The proposed project site will be at the LVVWD Fort Apache Reservoir site. A map with the location is included as Appendix A.

3. Technical Proposal: Technical Project Description

The well construction process begins with preliminary well design, regulatory permit approval, transfer of water rights, and preparation and procurement of the contract. The contractor is selected and mobilizes to the site. The well borehole is advanced using rotary drilling methods while lithologic, water-quality, and hydraulic data are collected to characterize and evaluate the subsurface properties. Upon completion of the borehole, geophysical surveys of the penetrated strata are completed to assist in the identification of water-producing intervals. The final well design, including screened intervals, is based upon lithologic properties encountered, sieve analysis of drill cuttings, geophysical logging results and observations during drilling. The well is then constructed and developed to remove any residual drilling fluids and maximize the communication between the well bore and the formation. Hydraulic testing and water-quality sampling is performed after the well is fully developed to determine the optimal production rate and characterize groundwater chemistry.

Once completed, the well will be operated by the LVVWD among dozens of others within its large water distribution system, which includes reservoirs, pumping stations, pipelines, valves, pressure reducing stations and groundwater wells. It will be maintained in accordance with LVVWD asset management activities and utilized to meet the demands of its service area.

4. Technical Proposal: Performance Measures

By completing construction of a production well, the proposed project presents two crucial performance measures, targeting both quality and quantity.

1. **Timely and effective well construction.** The well is designed and constructed to optimize well performance and longevity. The work is completed on schedule as specified in the contract.
2. **Provide additional groundwater production capacity.** The new production well is anticipated to produce up to 2,500 gpm in additional capacity to the water system and to increase system operational flexibility.

5. Technical Proposal: Evaluation Criteria

E.1.1. Evaluation Criterion A—Project Benefits

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

Water from the Colorado River and Las Vegas Valley groundwater constitute Southern Nevada's permanent water resources relied up on to provide water for more than 2.3 million residents and 40 million annual visitors. Las Vegas Valley groundwater, a perennial supply that is replenished each year by natural recharge in the surrounding mountains, is a critical component of Southern Nevada's water resources. Groundwater helps meet peak demands and provides resilience for the community's water supply as it is less susceptible to drought impacts than Colorado River resources.

LVVWD holds groundwater rights of 40,760-acre feet per year (afy) which are pumped from the Las Vegas Valley Principal Aquifer (LVVPA) through a network of production wells. In addition to the annual groundwater allocation, LVVWD production wells can recover water from the Southern Nevada Water Bank (SNWB), which was created as a temporary resource to supply future demands and address emergency water-supply conditions. SNWB was created by storing treated Colorado River water into the LVVPA using injection wells and by conducting in-lieu storage by forgoing pumping of groundwater, and currently stores 345,206 af of recoverable credits. Full use of LVVWD production wells increases the operational flexibility of the water system and overall capacity. A fully functional well network provides drought resiliency by increasing groundwater production capacity should future constraints occur on the Colorado River supply.

By constructing a new well at the Fort Apache Reservoir site, the proposed project will increase production capacity for our back-up water supplies as the region faces a prolonged, severe drought. It will also provide additional operational flexibility needed to reliably extract the annual groundwater allocation and recover water that has been stored in the SNWB during emergency conditions. Based on the lifespan of the well, this project will provide benefits for an estimated 75 years.

This project will foster the ability to conserve Colorado River in Lake Mead bolstering Lake Mead storage and elevations. It will also defer the need to deliver additional Colorado River water or earlier development of future water resources as a replacement for this valuable permanent resource.

Will the project make additional water supplies available? If so, what is the estimated quantity of additional supply the project will provide and how was this estimate calculated? Provide this quantity in acre-feet per year as the average annual benefit over ten years (e.g., if the project captures flood flows in wet years, provide the average benefit over ten years including dry years). What percentage of the total water supply does the additional water supply represent? How was this estimate calculated?
The proposed project will provide needed additional capacity for LVVWD to produce its annual groundwater allocation and draw water from the SNWB when supplies from the Colorado River are reduced due to persistent drought conditions. The current system capacity would increase by approximately 2,500 gpm and provide needed system resiliency and operational flexibility to produce the annual groundwater allocation of 40,760 afy and recover water from the SNWB.

If operated continuously throughout the year, the proposed well has an estimated annual production total of 4,000 afy. This assumption is based on historical production and permitted water-right diversion rates.

The well is not expected to be operated continuously for the entire year; however, adding system capacity is critical to providing the operational capability and flexibility needed to manage water-resource development to produce the annual groundwater allocation and recover water from the SNWB during drought or emergency conditions. There are currently 345,206 af of recoverable credits stored in SNWB.

Provide a brief qualitative description of the degree/significance of the benefits associated with the additional water supplies.
Currently, the LVVWD relies on the Colorado River for nearly 90 percent of its water supply. Increasing the well-production capacity to access additional groundwater supplies (the SNWB) decreases our reliance on the Colorado River. The ability to recover water from the SNWB to supply water more than the annual groundwater allocation is critical should the community's Colorado River water supply be reduced or disrupted.

Will the project improve the management of water supplies? For example, will the project increase efficiency, increase operational flexibility, or facilitate water marketing (e.g., improve the ability to deliver water during drought or access other sources of supply)? If so, how will the project increase efficiency or operational flexibility?
The proposed project will provide the LVVWD with additional operational capability and flexibility by increasing the number of production wells available. An increase in the operational flexibility of the production-well network allows for better management of the aquifer by

increasing the distribution of groundwater production across the region. Distributing groundwater production reduces the impacts of more focused pumping, which may lead to drawdown in localized areas. Additionally, the increased production capacity creates system redundancy and allows other wells to be taken out of service for routine maintenance without jeopardizing the continued delivery of water to meet system demands. Operational flexibility also allows for moving pumping locations should water-quality issues arise in a specific well (such as an increase in nitrate concentration). This project improves LVVWD's ability to deliver a secure and reliable water supply even during drought conditions when Colorado River deliveries are reduced or emergencies that disrupt system operations.

What is the estimated quantity of water that will be better managed as a result of this project? How was this estimate calculated? *Provide this quantity in acre-feet per year as the average annual benefit over ten years (e.g., if the project captures flood flows in wet years, provide the average benefit over ten years including dry years).*
LVVWD's annual groundwater permit allocation is 40,760 afy. The SNWB currently stores 345,206 af of net recoverable storage credits recharged through the Aquifer Storage and Recovery (ASR) Program. The availability of groundwater resources and increased production capacity allows for more operational flexibility, which is imperative for a drought-stricken community. This estimate was calculated using historical production data, allocated water rights and documented SNWB credits.

What percentage of the total water supply does the water better managed represent? How was this estimate calculated?
The proposed project will provide a well with an estimated production capacity of approximately 3.6 mgd (336 af/month if operated continuous throughout the month). This is an increase of approximately 5 percent over the current 2020 LVVWD well-system production capacity of 72 mgd (6,630 af/month). An additional well provides increased operational flexibility with the ability to pump the annual groundwater allocation and recover water from the SNWB under emergency or drought conditions. The groundwater allocation of 40,760 afy represents approximately 10 percent of the total water supply for the community. These estimates were calculated using historical pumping data and diversion rates permitted under the individual water rights assigned to each well.

Provide a brief qualitative description of the degree/significance of anticipated water management benefits. Will the project make new information available to water managers? If so, what is that information and how will it improve water management?
Expanding the number of production wells in the LVVWD water system enhances the ability to manage operations so that groundwater is produced in pressure zones where it is needed. It is anticipated that energy costs will be reduced as a result. Additionally, strategic placement of a new well at a system reservoir site where the groundwater quality is good will reduce treatment costs. Providing a safe and reliable water supply for the community is of the utmost importance.

***If the proposed project includes any of the following components, applicants need to provide the additional information requested below for the specific project type. This additional information will be used in evaluating and scoring the proposal.* Wells. —What is the estimated capacity of the new well(s), and how was the estimate calculated? How much**

water do you plan to extract through the well(s ? Will the well be used as a primary supply or supplemental supply when there is a lack of surface supplies? Please provide information documenting that proposed well(s) will not adversely impact the aquifer. At a minimum, this should include aquifer description, information on existing or planned aquifer recharge facilities, a map of the well location and other nearby surface water supplies, and physical descriptions of the proposed well(s). If available, information should be provided on nearby wells, aquifer test results, and if the area is currently experiencing aquifer overdraft or land subsidence. Please describe the groundwater monitoring plan that will be undertaken and the associated monitoring triggers for mitigation actions. Describe how the mitigation actions will respond to or help avoid any significant adverse impacts to third parties that occur due to groundwater pumping.

The proposed project would construct a well with an estimated production capacity of 2,500 gpm that will be equipped and plumbed to convey groundwater to a system reservoir. Groundwater produced by this well would be used in conjunction with 28 existing wells that are connected directly to the reservoirs where treatment occurs. These production wells are used to produce the LVVWD's annual groundwater allocation of 40,760 afy. Additionally, the SNWB stores 345,206 af of recoverable recharge credits which were created by the direct injection of treated Colorado River water into the LVVPA. The SNWB was established to store unused Colorado River water for use when Colorado River deliveries are reduced due to drought conditions and to meet future community demands. Groundwater produced from the LVVPA and Colorado River water diverted from Lake Mead compose the permanent water resources relied upon by the community for its water supply. The existing production wells are completed in the LVVPA, which has been monitored for water level trends since the 1940s, and land subsidence in the Las Vegas Valley has been monitored since 1935. The existing wells are constructed with mild or stainless steel, generally between 16-24 inches in diameter, and completed from 800 to 1,300 feet below ground surface.

Prior to 1989, declining water levels and subsidence were of concern in the Las Vegas Valley; however, Southern Nevada's water managers took action to stabilize declining groundwater levels and establish a more sustainable resource. In the early 1990s, the Nevada State Legislature established the Groundwater Management Program on behalf of well users in the valley. In addition, the SNWA also initiated the ASR Program to further stabilize the aquifer. Treated Colorado River water was injected into the local aquifer to create the SNWB, thus stabilizing declining water levels and land subsidence along with providing a reserve water supply. As a result, groundwater levels recovered by more than 100 feet in portions of the Las Vegas Valley. The ASR permits and program are kept current with an extensive monitoring program in place to observe changes in water levels across the basin.

Subsidence monitoring stations have been located throughout the Valley to measure changes in land surface elevation. Periodic measurements of these monitoring points show that the degree of subsidence in the Las Vegas Valley that was due to groundwater extraction has slowed significantly. The baseline data collected by LVVWD will allow to monitor of any reactivation of subsidence areas if when recovery from the SNWB is needed. Additionally, distributing groundwater production throughout the basin reduces the possibility of localized, significant groundwater declines and the potential subsidence.

Recent water levels in the vicinity of the production wells indicate that managing groundwater production has been successful. Subsidence monitoring indicates no current subsidence is occurring due to LVVWD production. An approved Nevada Division of Environmental Protection (NDEP groundwater monitoring plan is in place associated with ASR permits. In addition, the Nevada Department of Water Resources (NDWR) has regulatory authority over LVVWD water-right permits that allow groundwater production and recovery from the SNWB using LVVWD production wells.

E.1.2. Evaluation Criterion B—Sustainability and Supplemental Benefits

1. Climate Change: E.O. 14008 emphasizes the need to prioritize and take robust actions to reduce climate pollution, increase resilience to the impacts of climate change, protect public health, and conserve our lands, waters, oceans, and biodiversity. Examples in which proposed projects may contribute to climate change adaptation and resiliency, may include but are not limited to the following:

In addition to drought resiliency measures, does the proposed project include other natural hazard risk reductions for hazards such as wildfires or floods?

According to the Climate Science Special Report, two climatic drivers have increased the amount and intensity of fire in the western United States, namely increased flammability due to warmer, drier conditions and increased fuel availability due to extended drought. The current LVVWD distribution system delivers approximately 90 percent Colorado River water. Any large-scale system failures can reduce the ability for fire suppression. Groundwater wells constitute an independent water source for fire suppression. Generators or diesel drive units can be utilized to produce water directly into the LVVWD distribution system or water transportation system (tanker, truck, etc.) to better protect the LVV from fire dangers.

Does the proposed project include green or sustainable infrastructure to improve community climate resilience such as, but not limited to, reducing the urban heat island effect, lowering building energy demands, or reducing the energy needed to manage water? Does this infrastructure complement other green solutions being implemented throughout the region or watershed?

Studies warn that infrastructure currently designed for historical climate conditions are more vulnerable to future weather extremes and climate change, and that forward-looking infrastructure design, planning and operational measures and standards can reduce exposure and vulnerability to the impact of climate change (FOURTH NATIONAL CLIMATE ASSESSMENT, Volume II, 2018). That and because Las Vegas was recently recognized as the fastest warming metropolitan city in the U.S.(Climate Central, 2019) prompted SNWA to adopt a suite of adaptive management strategies to employ when building new or refurbishing existing facilities. An SNWA white paper, *Planning for Change: SNWA Adaptive Management Strategies for New & Existing Facilities*, is included as Appendix B. These principles may be applied to the proposed well facility if appropriate later (outside the scope of the proposed project). Some of the strategies that may be applied later include the use of light-colored hardscapes, shade structures including adding drought and heat resistant trees. These strategies have been shown to reduce heat island effect and building heat loads and improve cooling efficiency.

Will the proposed project establish and use a renewable energy source?

The proposed project does not establish a new renewable energy resource.

Does the proposed project seek to reduce or mitigate climate pollutions such as air or water pollution?
The well will be constructed following industry and regulatory standards to prevent the well from acting as a pathway for surface or shallow groundwater contaminants present to migrate to deeper zones in the aquifer system.

Will the proposed project reduce greenhouse gas emissions by sequestering carbon in soils, grasses, trees, and other vegetation?
These are not anticipated effects of this project.

Does the proposed project have a conservation or management component that will promote healthy lands and soils or serve to protect water supplies and its associated uses?
The proposed project will help protect Colorado River water supplies by fostering the ability to conserve Colorado River resources in Lake Mead, bolstering Lake Mead storage and elevations. It will also defer the need to deliver additional Colorado River water or earlier development of future water resources as a replacement for this this valuable permanent resource.

Does the proposed project contribute to climate change resiliency in other ways not described above?
The energy demand, and therefore the carbon footprint, to pump groundwater is less than the energy demand to supply from Lake Mead. Reducing the carbon footprint helps make communities more resilient to the effects of climate change.

5. Other Benefits: Will the project address water sustainability in other ways not described above? For example:

Will the project assist States and water users in complying with interstate compacts? Will the project benefit multiple sectors and/or users (e.g., agriculture, municipal and industrial, environmental, recreation, or others)? Will the project benefit a larger initiative to address sustainability of water supplies?
Additional system capacity will benefit users in multiple sectors by ensuring availability of water supplies in times of drought or emergency. The proposed project will add an estimated 2,500 gpm to the system capacity. This project supports SNWA's Water Resource and Joint Conservation Plans by banking conserved water resources and developing temporary supplies to provide flexibility to meet demand or offset water-supply reductions

E.1.3. Evaluation Criterion C—Drought Planning and Preparedness

SNWA's 2020 Water Resource Plan and Joint Conservation Plan are included as Appendix C of this application. These provide a comprehensive overview of water resources and demands in Southern Nevada.

Explain how the applicable plan addresses drought. Explain whether the drought plan was developed with input from multiple stakeholders. Was the drought plan developed through

a collaborative process? Does the drought plan include consideration of climate change impacts to water resources or drought?
LVVWD is a member agency of SNWA, the regional water agency for Southern Nevada responsible for developing and maintaining water resources on behalf of the region. SNWA's Water Resource Plan and Joint Conservation Plan are included as Appendix C of this application. These plans document SNWA's efforts to plan for and respond to drought. SNWA has developed strategies and response efforts to mitigate the extended drought affecting Southern Nevada. These plans prioritize banking conserved resources and growing temporary supplies to meet demands or offset potential supply reductions. They also outline several drought response initiatives, including the Colorado River Interim Guidelines, the Colorado River Drought Contingency Plan, adaptive management, and long-term planning with a 50-Year Water Resource Plan. Both plans were developed with stakeholder input. SNWA's establishing agreement, the Cooperative Agreement, requires preparation of a water resource plan annually. SNWA considers stakeholder input and periodically holds citizen advisory committee processes to gather input on several initiatives, including water resources.

The first Water Resource Plan was adopted in 1996. SNWA's 21-member Resource Planning Advisory Committee, comprised of a diverse group of citizens, was formed in 2012 to assist with planning efforts. The 2020 planning process involved these public stakeholders. The 2020 Plan addresses drought through adaptive management strategies employed to meet supply in our region. In addition to strong conservation strategies, the 2020 Plan includes a reliance on LVVWD's continued use of its groundwater rights, and prioritizes collaboration with interstate and Federal partners, banking resources and growing temporary supplies, preserving access to Colorado River supplies, and protecting the availability of future resources. The most recent recommendations adopted by the SNWA Board of Directors were considered in development of the 2020 Water Resource Plan.

The Joint Conservation Plan was made available to the public for review and comment, reviewed by SNWA's member agencies, and adopted by members that provide potable water services. The Joint Conservation Plan was accepted by the Nevada Division of Water Resources under Nevada Revised Statue (NRS) 540.141 and approved by Reclamation under the Reclamation Reform Act. Both plans consider the impacts of climate change to water resources.

Describe how your proposed drought resiliency project is supported by an existing drought plan. Does the drought plan identify the proposed project as a potential mitigation or response action? Does the proposed project implement a goal or need identified in the drought plan? Describe how the proposed project is prioritized in the referenced drought plan.
Both plans identify development of alternative water supplies as a goal. A priority of the Water Resource Plan is to bank conserved resources and grow temporary supplies for flexibility to meet demands and offset potential supply reductions. The increased daily production capacity would allow access to recover SNWB storage in addition to producing the annual groundwater allocation. The additional production capacity would provide an alternative water source should Colorado River supplies be limited.

E.1.4. Evaluation Criterion D—Severity of Actual or Potential Drought Impacts to be addressed by the Project

Describe the severity of the impacts that will be addressed by the project. What are the ongoing or potential drought impacts to specific sectors in the project area if no action is taken (e.g., impacts to agriculture, environment, hydropower, recreation and tourism, forestry), and how severe are those impacts? Impacts should be quantified and documented to the extent possible.

LVVWD's service area is within a region affected by drought for the past two decades. The service area is also dependent on tourism, as Las Vegas welcomes over 40 million visitors annually (pre-pandemic). Tourism supports hundreds of thousands of jobs in the area and tens of billions of dollars in spending, according to the Applied Analysis June 2019 Economic Impact of Southern Nevada's Tourism Industry and Convention Sector brief. The brief is included in Appendix D.

Are there public health concerns or social concerns associated with current or potential drought conditions (e.g., water quality concerns including past or potential violations of drinking water standards, increased risk of wildfire, or past or potential shortages of drinking water supplies? Does the community have another water source available to them if their water service is interrupted?)

The extended drought conditions in the region make long-term water supply planning critical. LVVWD's production wells provide an additional high-quality drinking water resource. Adding an additional production well in conjunction with treated Colorado River water increases operational flexibility. The production-well network provides additional system capacity to help to offset a decrease in available Colorado River supplies, which is a reality with the shortage declaration in August 2021. Since 90 percent of the water supply for southern Nevada comes from the Colorado River, the proposed project will provide flexibility to meet demand or offset reductions in Colorado River supply interruption.

Are there ongoing or potential environmental impacts (e.g., impacts to endangered, threatened or candidate species or habitat)?

No impacts are related to this project. Work will be completed on previous disturbed areas.

Are there local or economic losses associated with current drought conditions that are ongoing, occurred in the past, or could occur in the future (e.g., business, agriculture, reduced real estate values)?

LVVWD must diligently plan to meet the community's water resource needs to ensure the long-term economic health of Southern Nevada. This position is documented in "*Potential Impacts of Water Resource Uncertainty in Southern Nevada*" published by Applied Analysis in 2011, included in Appendix D. This study concluded that, "It can be stated with a reasonable degree of certainty that water resource instability, or the expectation that sufficient water resources will not be available to sustain the underlying economy, will have a material negative impact on Southern Nevada's economy and fiscal structure as well as that of the state of Nevada as a whole."

Are there other drought-related impacts not identified above (e.g., tensions over water that could result in a water-related crisis or conflict ?

It is critical for LVVWD and other SNWA member agencies to collaborate in water resource management and planning to ensure comity among members and minimize the risk of drought impacts that might result in a water-related crisis.

Describe existing or potential drought conditions in the project area. Is the project in an area that is currently suffering from drought or which has recently suffered from drought? Please describe existing or recent drought conditions, including when and the period of time that the area has experienced drought conditions (please provide supporting documentation, [e.g., Drought Monitor, droughtmonitor.unl.edu]).

The Lower Colorado River Basin has been experiencing an extended drought since the year 2000. Lake Mead has lost over 140 feet of elevation and is currently 35% full. Reduced snowpack in the Upper Basin coupled with earlier melting of the snowpack is thought to be the main driver of this ongoing drought. Further, drought conditions are expected to persist for the foreseeable future. In August 2021, a Federal shortage declaration occurred for the Lower Colorado River Basin for calendar year 2022.

Per the United States Drought Monitor (droughtmonitor.unl.edu , Clark County, Nevada (where the project is located) has been experiencing drought conditions at least some parts of the year going back to the year 2000. Because the average rainfall for the area is already a low of approximately four inches a year, even minor drought conditions can significantly impact vegetation and wildlife in the area.

The Colorado River meets approximately 90 percent of the community's water needs and the Colorado River is suffering from historic drought. The U.S. Drought Monitor dated September 7, 2021 (https://droughtmonitor.unl.edu/Maps/MapArchive.aspx) demonstrates that the much of the Upper Colorado River Basin, the source of a majority of the Colorado River inflows, is in experiencing Abnormally Dry to Extreme Drought conditions. The U.S. Seasonal Drought Outlook for the period September 1 to November 30, 2021 https://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php shows drought in the Upper Colorado River Basin persisting.

Colorado River flows during the twenty-one-year period from 2000 to 2020 were one of the lowest since record-keeping on the Colorado River began in 1906 (Water Resource Plan, Figure 2.1, Appendix C). This is demonstrated by the history of natural flow estimated by the U.S. Bureau of Reclamation for the Colorado River at Lees Ferry. The severity of the impact of drought on the Colorado River is further demonstrated by the observed changes in combined storage of the two largest reservoirs on the Colorado River system, Lake Powell and Lake Mead. The combined storage declined by more than 60 percent from 47.59 million acre-feet (maf on October 1, 1999 to 16.480 maf on September 12, 2021. As of September 12, 2020, Lake Mead storage was 9.019 maf or 35 percent full at an elevation of 1,068 feet above mean sea level. This elevation is below action levels requiring the State of Nevada to make contributions to Lake Mead to maintain lake elevations and is also below the level corresponding with shortage declaration in which Nevada's Colorado River consumptive use will be reduced by 13,000 afy.

Describe any projected increases to the severity or duration of drought in the project area resulting from changes to water supply availability. Provide support for your response (e.g., reference a recent climate informed analysis, if available .

The freezing elevation during the winter in nearby mountains has a statistically significant increasing trend over the time period of 1949-2016 (WRCC, North American Freezing Level Tracker, www.wrcc.dri.edu/cwd/products/), suggesting that snowpack in the region may already be affected by warming. Decreased snowpack would decrease regional water-supply availability.

The amount of Colorado River water estimated to be available to SNWA on an annual basis under normal water supply conditions is a consumptive use of 276,000 afy. Under existing agreements, SNWA is required to meet Nevada's combined drought and shortage obligation ranging from 8,000 afy to a maximum of 30,000 afy for Lake Mead elevations between 1,090 feet and 1,025 feet. In the event Lake Mead's elevation is projected to decline below 1,030 feet, the Secretary of the Interior will consult with Lower Basin stakeholders to determine if additional actions are needed to protect against Lake Mead declining below elevation 1,020 feet. These potential drought and shortages impacts are important to LVVWD because it provides drinking water to nearly 70 percent of the SNWA service area population.

There is a high likelihood that SNWA and its member agencies will face drought and shortage obligations over the current 50-year planning horizon ending in 2070. In August 2020, the Colorado River System Simulation Model using historical hydrology projected a Lower Basin shortage probability of between 23 and 53 percent for the period 2022 to 2025 and between 50 and 64 percent during the remainder of the planning horizon. In 2021, SNWA faced a drought obligation of 8,000 af. In August 2021, the U.S. Bureau of Reclamation projected Lake Mead's elevation will be below elevation 1,075 feet on January 1, 2022 resulting in the first ever declaration of Lower Basin shortage. As a result, SNWA will incur a combined drought and shortage obligation of 21,000 af during 2022. The U.S. Bureau of Reclamation's August 2021 projections indicate an increase in the probability of drought and shortage impacts compared to just one year earlier. As a result, the frequency and magnitude of the SNWA's obligation are expected to increase over time. In addition, drought conditions on the Colorado River are expected to exacerbate due to climate change, resulting in a greater likelihood of future shortage declarations (Water Resource Plan, Appendix C).

E.1.4. Evaluation Criterion E—Project Implementation

Describe the implementation plan of the proposed project. Please include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates.

The proposed project will involve the drilling of one borehole using rotary drilling methods to an anticipated depth of 1,200 ft bgs. The well will be constructed and completed with 20-in steel blank and perforated casing, the water-bearing zones will be screened, and gravel packed to facilitate communication with the formation. Once the well has been constructed, the well will be developed by airlifting and with a diesel-drive pumping unit. Activities to drill the borehole and construct the well may occur on a 24 hour a day, seven days a week schedule. The proposed project schedule is provided in Table 1. Additional work outside the scope of the proposed project to equip and test the new well will take place between August 2023 and June 2026.

Table 1. Project Schedule

Task	Start Date	Completion Date
Drilling Permitting and Design	Complete	Complete
Drilling Contract Procurement	June 2022	November 2022
Well Drilling	January 2023	May 2023
Well Development and Testing	May 2023	July 2023

Describe any permits that will be required, along with the process for obtaining such permits.
Water-right permits for the well have been issued and the submission and approval of preliminary engineering report and application by NDEP is complete. The water discharged to the storm drain during development, is covered under the LVVWD Stormwater National Pollutant Discharge Elimination System (NPDES) permit. Information that must be disclosed includes physical address of the well, nearest major cross streets, estimated discharge dates, duration of discharge, expected flow rate, and total volume expected to be discharged. These discharges would be covered under LVVWD's Individual Maintenance Discharge Permit. All required local construction permits from Clark County and the City of Las Vegas will be obtained.

Identify and describe any engineering or design work performed specifically in support of the proposed project.
The design work for the proposed project has been completed.

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

E.1.5. Evaluation Criterion F—Nexus to Reclamation

Does the applicant have a water service, repayment, or O&M contract with Reclamation? If the applicant is not a Reclamation contractor, does the applicant receive Reclamation water through a Reclamation contractor or by any other contractual means?
The project is in the LVVWD service area in the Colorado River Basin and receives Colorado River water diverted by SNWA through intake facilities in Lake Mead. SNWA (Contract Numbers 2-07-30-W0269 as amended and 7-07-30-W0004 as amended) and LVVWD (Contract Number 14-06-300-2130 as amended receive Colorado River water under Colorado River water delivery contracts with the Secretary of the Interior (See: https://www.usbr.gov/lc/region/g4000/contracts/entitlements/NVentitlements.pdf .

Will the proposed work benefit a Reclamation project area or activity?
The project will contribute water to LVVWD, located in the Colorado River Basin.

Is the applicant a tribe?
The applicant is not a tribe.

6. Project Budget: Funding Plan

LVVWD's key funding sources include tiered consumption charges and a variety of service charges. These revenue sources provide a mix of funding, helping to ensure the financial stability and capacity of the organization. Matching contributions for this project will be provided by LVVWD. No non-Federal funding will be provided by a source other than the applicant.

7. Project Budget: Budget Proposal

Table 1. Total Project Cost Summary

SOURCE	AMOUNT
Costs to be reimbursed with the requested Federal funding	$732,684.00
Cost to be paid by the applicant	$793,741.00
Value of third-party contributions	$0.00
TOTAL PROJECT COST	$1,526,425.00

Table 2. Non-Federal and Federal Funding Summary

FUNDING SOURCES	AMOUNT
Non-Federal Entities	
LVVWD	$793,741.00
Non-Federal Subtotal	$793,741.00
REQUESTED RECLAMATION FUNDING	$732,684.00

Table 3. Budget Proposal

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity Type	TOTALCOST
	$/Unit	Quantity		
Salaries and Wages				
N/A				
Fringe Benefits				
N/A				
Travel				
N/A				
Equipment				
N/A				
Supplies and Materials				
Pressure Transducer	$3,000.00	1	Transducer	$3,000.00
Contractual/Construction				
Contractor (to be selected				
Insurance, Bonds, Submittal Preparation, Water Source, Geophysical Logging and Site Preparation	$300,000.00	1	LS	$300,000.00

Production-Well Conductor Casing - 38-inch to 100 ft	$70,000.00	1	SITE	$70,000.00
Pilot Borehole Drilling - Maximum 17-inch	$150.00	1,120	FT	$168,000.00
Production-Well Borehole Drilling - (minimum) 28-inch	$140.00	1,120	FT	$156,800.00
Blank Casing Mild Steel - 20-inch	$175.00	340	FT	$59,500.00
Blank Casing Stainless Steel - 20-inch	$525.00	285	FT	$149,625.00
Stainless Steel Screen- 20-inch	$600.00	575	FT	$345,000.00
Type V Grout	$500.00	70	CY	$35,000.00
Gravel Pack	$400.00	90	CY	$36,000.00
Air-Lift Development	$400.00	60	HR	$24,000.00
Completion and Gravel Pack Development	$400.00	60	HR	$24,000.00
Pump Development	$375.00	60	HR	$22,500.00
Well Testing	$375.00	84	HR	$31,500.00
Install and Remove Test Pump	$35,000.00	1	SITE	$35,000.00
Stand-By Time (Not-to-Exceed $450/hr)	$250.00	250	HR	$62,500.00
Baker Tank Rental	$2,000.00	2	EA	$4,000.00
Other				
N/A				
TOTAL DIRECT COSTS				**$1,526,425.00**
Indirect Costs				
Type of Rate	**percentage**	**$base**		**$0.00**
TOTAL ESTIMATED PROJECT COSTS				**$1,526,425.00**

8. Project Budget: Budget Narrative

All costs included in this proposal are directly related to the project and necessary for its implementation. The non-federal contribution is 52 percent; the federal contribution is 48 percent.

Salaries and Wages, Fringe Benefits, Travel, and Equipment: Not applicable to the proposed project.

Supplies and Materials: Staff will purchase a pressure transducer for water level measurements. Approximate costs were calculated from vendor webpages (provided in Appendix E).

Contracts: A construction contract is required for the proposed project. Tasks to be completed by this contract include well drilling, development, and testing. This $1,523,425 contract will be procured through a formal bidding process. Costs were generated based on engineer experience with contracts on similar projects.

Third-Party In-Kind Contributions: Not applicable to the proposed project

Environmental and Regulatory Compliance Costs: Please review responses in the Environmental and Cultural Resources section. LVVWD does not anticipate additional costs associated with environmental compliance. If LVVWD receives an award, possible costs will be discussed during the development of the financial agreement.

Other Expenses: Not applicable to the proposed project.

Total Direct Costs: Reclamation is requested to contribute $732,684 toward direct costs. LVVWD will provide match of $793,741.

Indirect Costs: Not applicable. All direct costs align with eligible categories. LVVWD does not have a federally negotiated indirect cost rate agreement. No funds are requested for indirect costs.

9. Environmental and Cultural Resources Compliance

Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

The proposed project consists of constructing a new production well at the LVVWD's Fort Apache Reservoir site. The well would be used to pump an estimated 2,500 gallons per minute of LVVWD's available permitted groundwater to increase system capacity. Once drilling starts, well construction and well development would occur 24 hours a day, seven days a week for a duration of approximately 90 days. Heavy equipment would be used for well construction. Only existing paved roads would be used to access the proposed project area and no roads would be blocked. Impacts to soil and air quality would be minimal and temporary since the project area consists of compacted soil and pavement and drilling would be limited to those areas and occur during a relatively brief period. Approximately 50,000 gallons of water would be applied for dust control as required under the applicable Clark County dust control permit and an estimated 3.5 million gallons of water would be used for well drilling and development, depending on the drilling method. Water for the proposed project would be obtained onsite from LVVWD's system. All fluid discharged during drilling would be contained within above-ground storage tanks and disposed of at an authorized off-site facility. All water produced from well development would be discharged directly to the Las Vegas stormwater system and would comply with the LVVWD's well operation and maintenance stormwater permit. No runoff would occur outside the reservoir site. Therefore, minimal impacts to water quantity and no impacts to water quality would occur. The entire project area is previously disturbed, comprised of compacted soil and pavement, used year-round by LVVWD staff, and therefore does not provide animal habitat. Proposed project activities would increase ambient noise levels, but the impacts would be temporary and localized, minimized by the installation of sound panels and comply with noise ordinances. Nighttime lighting would be needed during well construction, but the impacts would be temporary and minimized by directing the lights downward on the site.

Following the well installation, LVVWD's Fort Apache Reservoir site would maintain the same purpose and look and therefore cause no visual impact to the surrounding environment.

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? If so, would they be affected by any activities associated with the proposed project?
The project area for the proposed action is LVVWD's Fort Apache Reservoir site, which is an existing facility. The perimeter of the reservoir site has security fencing and is located within a residential area where tortoise fencing is not needed. There are no known listed or proposed to be listed federally threatened or endangered species in the proposed project area. The project area is previously disturbed, comprised of compacted soil and pavement, used year-round by LVVWD staff, and does not provide or is not designated as critical habitat.

Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States?" If so, please describe and estimate any impacts the proposed project may have.
There are no wetlands or other surface waters at LVVWD's Fort Apache Reservoir site that potentially fall under Clean Water Act jurisdiction as "Waters of the United States".

When was the water delivery system constructed?
The LVVWD commenced operations in 1954 and has served the Southern Nevada region's largest municipal water provider since that time. As the region evolved so too has the LVVWD's water delivery system to meet the region's needs.

Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.
The proposed project would not result in the modification 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? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.
There are no buildings, structures, or features associated with the proposed project or within the proposed project area listed or eligible for listing on the National Register of Historic Places.

Are there any known archeological sites in the proposed project area?
There are no known archeological sites in the proposed project area. The proposed project area is entirely within a previously disturbed area.

Will the proposed project have a disproportionately high and adverse effect on low income and minority populations?
The proposed project would not have a disproportionately high or adverse effect on low income and minority populations.

Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts to tribal lands?
There would be no direct benefits or adverse effects to Indian tribes by the proposed project. There are no Indian sacred sites or tribal lands within the proposed project area. The proposed project would not limit access to and ceremonial use of Indian sacred sites and would not result in any impacts on tribal lands.

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?
The proposed project consists of drilling a well at the LVVWD's Fort Apache Reservoir site. There are no noxious weeds or non-native invasive species known to occur within the proposed project area. Equipment and vehicles would be free of noxious weeds and non-native invasive species prior to arriving at the LVVWD's Fort Apache Reservoir site and prior to departing. Therefore, the proposed project would not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species.

10. Required Permits or Approvals

Approvals described in Evaluation Criterion E will be obtained.

11. Existing Drought Contingency Plan

Attached as Appendix C and discussed in Evaluation Criterion C.

12. Letters of Support

Not applicable.

13. Official Resolution

An official resolution authorizing the submission of this proposal and confirming the subject matching requirements will go before the LVVWD Board of Directors at its November 2, 2021 meeting. (The Board will not meet in October.) A copy will be forwarded to Reclamation at that time, as communicated to the Reclamation Drought Coordinator.

14. Unique Entity Identifier

LVVWD maintains an active registration in SAM.gov. Its Cage Code is 1MY13. The LVVWD's unique entity identifier, or DUNS No., is 041670829 and its SAM Unique Identifier is FV4RRQ9B2R84

15. Supporting Documents: Appendices A - E

All appendices are included as attachments via grants.gov.