SUBMIT OPTION SUBMITTAL FORM BY:

1. EMAIL TO: COLORADORIVERBASINSTUDY@USBR.GOV
2. U.S. MAIL TO: BUREAU OF RECLAMATION, ATTENTION MS. PAM ADAMS, LC-2721, P.O. BOX 61470, BOULDER CITY, NV 89006-1470
3. FACSIMILE TO: 702-293-8418

Option Submittal Form

Contact Information (optional): ☐ **Keep my contact information private.**

Contact Name: ____________________ Title: ____________________

Affiliation: ____________________

Address: ____________________

Telephone: E-mail Address:

Date Option Submitted: ____________________

Option Name:

Large Scale Southern California Reuse

Description of Option:

This option includes implementing large scale water reuse projects that are above the current plans within the MWD service area. During years when MWD has Colorado River supply shortages, the first increment of this water would meet that demand. Any amount of water produced above that amount could be exchanged with other Colorado River water users (with the operational ability to make the exchanges).

Location: Describe location(s) where option could be implemented and other areas that the option would affect, if applicable. Attach a map, if applicable.

The concept includes capturing treated wastewater from Los Angeles and Orange County treatment facilities that currently discharge effluent ot the ocean, such as Hyperion, the Joint Water Pollution Control Plant, and Orange County Sanitation District Plants, and reusing the water via indirect potable reuse by delivering to large regional lakes for blending with imported supplies or delivering the water to large groundwater spreading grounds. A concept for the San Diego Point Loma WWTP includes reuse of treated water via delivery to IID for use as agricultural water in exchange for Colorado River Water.

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Quantity and Timing: Roughly quantify the range of the potential amount of water that the option could provide over the next 50 years and in what timeframe that amount could be available. If option could be implemented in phases, include quantity estimates associated with each phase. If known, specify any important seasonal (e.g., more water could be available in winter) and/or frequency (e.g., more water could likely be available during above-average hydrologic years) considerations. If known, describe any key assumptions made in order to quantify the potential amount.

City of Los Angeles averaged 400 mgd (450,000 AFY) of discharge from Hyperion WWTP in 2011.
Los Angeles County Sanitation Districts averaged approximately 260 mgd (310,000 AFY) of discharge from Joint Water Pollution Control Plant (JWPCP) in 2011
Orange County averaged 180 mgd (200,000 AFY) of discharge from OCSD WWTP in 2011.
San Diego averaged 140 mgd (150,000 AFY) of discharge from Point Loma WWTP in 2011.

These amounts will be different in the future due to already planned recycled water projects in these regions, future conservation, and future growth. Review of the MWD Integrated Resources Plan shows that after considering future planned recycled projects in the region the following amounts of water may still be available in the future.

Hyperion WWTP = 400,000 AFY
Los Angeles County Sanitation Districts remaining water available is difficult to estimate at this time due to several potential projects that are being considred that could use a large portion of the currently discharged quantities of water.
Orange County Sanitation District Plants = 150,000 AFY
Point Loma WWTP = 135,000 AFY

This water is available year round and is drought reliable.

Similar to the large scale ocean desalination concepts, the maximum quantity of water developed for this option would be limited to the amount of water needed for projected MWD Colorado River shortages plus the amount that could be operationally exchanged with other Colorado River users. It is also important to consider that this option will reduce CRA imports during some conditions and a significant percentage of the water being reused is CRA import water. Therefore, there is a limit to the amount of CRA reductions that could feasibly be possible.

Based on rough estimates, the maximum large scale reuse is estimated at 0.6 MAFY as outlined below.

a) MWD has goal of a full Colorado River Aqueduct (CRA), equal to 1.25 MAFY.
b) Estimated dry year deliveries to the CRA for MWD (without future improvements to the CR system) = 0.85 MAFY
c) Assumptions in a) and b) result in a 0.4 MAFY MWD Colorado River supply shortage
d) Existing exchange agreements between MWD and Coachella Valley Water District (CVWD) and Desert Water Agency (DWA) require MWD to import 0.15 MAFY through the CRA to facilitate the CVWD-DWA exchange.
e) Assumptions b) and d) result in an estimated 0.7 MAFY (0.85 MAFY – 0.15 MAFY) of CRA imports left for MWD in dry year
f) MWD estimates that the minimum CRA supply MWD could operate at for the benefit of MWD is 0.5 MAFY (considering operational balance between other supplies and cost effective power usage agreements).
g) Assumptions e) and f) result in an estimated 0.2 MAFY (0.7 MAFY – 0.5 MAFY) that MWD could reduce deliveries to the CRA and make that water available for other Colorado River users via exchange with a local desalter supply.
h) Assumptions c) and g) result in 0.6 MAFY (0.4 MAFY + 0.2 MAFY) as the estimated maximum usage of a large-scale Pacific Ocean desalter supply quantity.

In the above, it is assumed that 0.5 MAFY of imported CRA water plus imports from Northern California plus locally developed

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water will be sufficient to provide at least 0.6 MAFY of wastewater to the three WWTPs defined in this example.

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Additional Information

Technical Feasibility: Describe the maturity and feasibility of the concept/technology being proposed, and what research and/or technological development might first be needed.

Indirect potable reuse is currently occurring in Southern California at locations like the Orange County Groundwater Replenishment System. This system takes tertiary treated wastewater and utilizes advanced treatment processes including reverse osmosis and advanced oxidation to further treat the water. Next the water is injected or percolated into the ground where it is later extracted by a groundwater well system and used for drinking water. The same technology would be utilized with the concepts described herein, except the water may be delivered directly to open surface reservoirs for extended residence time and blending with natural supplies before being retreated with a conventional surface water treatment facility and then used as a potable water supply.

Costs: Provide cost and funding information, if available, including capital, operations, maintenance, repair, replacement, and any other costs and sources of funds (e.g., public, private, or both public and private). Identify what is and is not included in the provided cost numbers and provide references used for cost justification. Methodologies for calculating unit costs (e.g., $/acre-foot or $/million gallons) vary widely; therefore, do not provide unit costs without also providing the assumed capital and annual costs for the option, and the methodology used to calculate unit costs.

The cost for all of these alternatives would require extensive alignment evaluations and will be highly dependent on the ability to acquire easements, the need to relocate other utilities, and the ability to construct in heavily congested traffic corridors. Very rough estimates based on typical unit cost databases adjusted using engineering judgment for the more heavily congested corridors are shown below. Because these are very rough estimates, a range of unit costs are presented. Costs include the required additional treatment at the WWTPs as well as pump stations and pipelines to convey the water to target reuse locations.

- Hyperion WWTP to Diamond Valley Lake = $4.8 Billion Capital, $80 Million per Year O&M, $1,700 - $2,200 / AF Unit Cost (Financial Method)
- OCSD WWTP to DVL = $3.0 Billion Capital, $90 Million per Year O&M, $1,200 - $1,700 / AF Unit Cost (Financial Method)
- Hyperion WWTP to Whitewater Spreading Grounds = $6.7 Billion Capital, $120 Million per Year O&M, $2,300 - $2,800 / AF Unit Cost (Financial Method)
- Point Loma WWTP to All American Canal = $4.7 Billion Capital, $160 Million per Year O&M, $2,000 - $2,500 / AF Unit Cost (Financial Method)

Note, electricity costs are one of the largest uncertain cost items related to annual O&M estimates for for the additional treatment and pumping associated with reclamation facilities. Recent reports have used assumed energy costs as low as $0.08/kwh and as high as $0.12/kwh. Due to the high level nature of this concept at this time $0.10/kwh for energy costs was assumed..

Permitting: List the permits and/or approvals required and status of any permits and/or approvals received.

As described above there are already projects in S. California that allow highly treated wastewater to augment groundwater supplies. Currently, it is not permitable to augment surface water reservoirs with this type of water in California. However, it is permitable in other states and countries and within the 45 year study period it is plausible that surface water storage augmentation with highly treated wastewater would be permitable in California.

In addition to regional water quality control permits, numerous other permits would be required to site and construct the additional treatment facilities and conveyance facilities. Also the reverse osmosis process will produce a brine discharge that will have marine impacts that will require permits similar to an ocean desalter facility.

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With the above considerations, this type of project will require preparation of an Environmental Impact Report (EIR) and/or an Environmental Impact Statement (EIS), under, respectively, the California Environmental Quality Act (CEQA) and/or the National Environmental Policy Act (NEPA). Many specific permits are also required, involving a large number of federal and state agencies, and also local utilities, water stricts, health departments, and air quality districts.

Legal / Public Policy Considerations: Describe legal/public policy considerations associated with the option. Describe any agreements necessary for implementation and any potential water rights issues, if known.

The major legal consideration is related to the State of California allowing reuse water to augment surface water reservoirs. The major policy consideration includes acceptability of the safety of this water supply option by some public officials as well as some members of the general public.

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Implementation Risk / Uncertainty: Describe any aspects of the option that involves risk or uncertainty related to implementing the option.

In addition to permitting and policy changes, the major implementation risk is related to acquiring the required lands for both the additional treatment facilities and the conveyance facilities.

Reliability: Describe the anticipated reliability of the option and any known risks to supply or demand, such as: drought risk, water contamination risk, risk of infrastructure failure, etc.

Reuse water is highly reliable against drought. However, it does require extensive infrastructure and could be vulnerable to at least short term outages due to infrastructure failure.

Water Quality: Identify key water quality implications (salinity and other constituents) associated with the option in all of the locations the option may affect.

Once treated with all of the proposed treatment processes, the water will exceed all drinking water standards. Because this is a supply that will not be directly delivered to the Colorado River system it will not have major impacts (positive or negative) on the water quality in the Colorado River.

Energy Needs: Describe, and quantify if known, the energy needs associated with the option. Include any energy required to obtain, treat, and deliver the water to the defined location at the defined quality.

Energy Required	Source(s) of Energy
Energy for the reverse osmosis treatment and pumping are not as significant as ocean desalination options, but still require extensive power.	The potential greenhouse gas effect is a concern. However, alternative with lower or no greenhouse gas emissions energy strategies are also possible.

Hydroelectric Energy Generation: Describe, and quantify if known, any anticipated increases or decreases in hydroelectric energy generation as a result of the option.

Location of Generation	Impact to Generation
None.	

Recreation: Describe any anticipated positive or negative effects on recreation.

Location(s)	Anticipate Benefits or Impacts
Colorado River	If these facilities result in additional water in the Colorado River due to less diversions by MWD, there could be positive impacts on recreation. However, it is likely that the water not divered by MWD would be divered by Arizona or Nevada and therefore no major positive or negative impacts on recreation are anticapted.

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Environment: Describe any anticipated positive or negative effects on ecosystems within or outside of the Colorado River Basin.

Location(s)	Anticipated Benefits or Impacts
S. Cal	Air quality could be impacted if the energy source is fossil fuels. . However, utilities which serve the region have a mix of energy sources and at this time it is unclear whether the source of energy would impact air quality.

Socioeconomics: Describe anticipated positive or negative socioeconomic (social and economic factors) effects.

There would be new employment related to constructing and operating the new facilities. Also, assisting in producing sufficient water to assist in maintaining a strong economy in the Southwest United States will have positive socioeconomic impacts.

Other Information: Provide other information as appropriate, including potential secondary benefits or considerations. Attach supporting documentation or references, if applicable.