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: February 1, 2012

Option Name:

Improved Groundwater Management

Description of Option:

Groundwater throughout the Basin and in adjacent areas served by the Colorado River is managed to (1) control overdraft or "mining" of groundwater resources to promote long-term sustainability; (2) prevent groundwater pumping from depleting rivers, streams, springs, and other groundwater-dependent resources in the Basin, reducing long-term conflicts between surface water users and groundwater users and preventing degradation of environmental values (such as riparian vegetation and base flows); and (3) allow for underground storage of water supplies and/or strategic recharge of groundwater where appropriate.

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

Basin-wide and in areas adjacent to the Basin served by Colorado River water.

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.

In the short term, better management of groundwater resources in and adjacent to the Basin may actually increase demands for Colorado River diversions. In the long run, however, it is important to develop strategies to control unsustainable withdrawals of groundwater, particularly where such use is supplying hardened demands for which replacement supplies will ultimately be needed, where it is generating conflicts among water users, and where it is leading to environmental degradation. Developing strategies to reduce ongoing reliance on unsustainable water supplies and prevent increased reliance on unreliable supplies would help

prevent existing supply-demand imbalances in the Basin from getting worse. Efforts to control or mitigate environmental degradation resulting from groundwater use through groundwater management or strategic recharge efforts could potentially reduce environmental impacts and long-term mitigation costs. In addition, underground storage of water in appropriate locations and circumstances could decrease evaporative losses from reservoir storage and increase the reliability of local supplies in the face of water supply shortfalls.

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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.

Technically feasible; groundwater resources are already intensively managed in some areas of the Basin. Underground storage and recharge projects are also already common in some areas of the Basin, although expanded storage would require new infrastructure in many areas.

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.

Costs would depend on the management activity, but could include state or local costs for new institutional frameworks and/or technical capacity to allow for expanded modeling, monitoring, or enforcement. No direct infrastructure costs would be likely except for underground storage/recharge projects, although there could be substantial indirect infrastructure costs associated with new Colorado River diversions (in the event that enhanced groundwater management leads to the need for new diversions to replace existing groundwater use).

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

This proposal would primarily involve a regulatory change; as such, permitting or environmental compliance would likely not be required except in the case of new underground storage/recharge projects, where permitting and environmental compliance requirements will depend on the location of the project and the requirements of state law.

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.

Groundwater management is largely a function of state law, and the Basin states' approaches to groundwater use and management vary widely. Management improvements might require changes to state and local law and policy that could affect existing groundwater uses.

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

Because groundwater management is largely a function of state law, successful implementation would depend on the capacity of individual states to undertake needed reforms. Federal coordination of management activities, technical assistance, or other incentives could be provided.

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.

Risk for improved management is low; rather, improved management could address existing risks associated with declining aquifer levels, degradation of resources, and/or intensifying potential for conflict among water users. Risks inherent in underground storage include potential water quality effects depending on the design of the project.

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

Difficult to assess.

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
If management changes resulted in decreased groundwater withdrawals, energy needs associated with pumping would decrease; increased Colorado River diversions resulting from changes in groundwater management could have indirect energy needs, depending on the source of replacement water.	

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
	No direct increases or decreases in hydroelectric energy generation are anticipated.

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

Location(s)	Anticipate Benefits or Impacts
	Decreased negative impacts of groundwater pumping on stream flow could benefit recreation in affected reaches.

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

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Location(s)	Anticipated Benefits or Impacts
	Aquifer levels may be stabilized or increased in the Basin and adjacent areas; degradation of groundwater-dependent rivers and ecosystems in the Basin may be prevented or mitigated.

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

Economic impacts will vary with the management activity and its design; activities could be designed to address how impacts are distributed among water users (e.g., so that costs fall on future users rather than existing users, or on junior rather than senior users, or so that they are otherwise distributed over time, geography, and jurisdiction). In environments where rapid, groundwater-dependent growth is occurring, or where groundwater use is already causing significant overdraft and/or environmental degradation, failure to address groundwater management issues in the near term will likely lead to intensified socioeconomic disturbances in the future (as the difficulty and cost of solutions are likely to increase over time in such environments).

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

New limitations on access to local groundwater resources could result in an enhanced "market" for existing water entitlements due to efforts to obtain replacement supplies, with resulting impacts on Basin resources varying depending on the shape and operation of that market.