

Table 9-3 Required Elements for Projects and Management Actions

Project	Brief description	Circumstances under which the project will be implemented	Public notification process	Permitting and regulatory process	Benefits	Schedule	Estimated cost
9.1 Basin Recharge Projects	Agricultural Managed Aquifer Recharge is the practice of using excess surface water (when available) and applying it to agricultural fields to intentionally recharge groundwater aquifers	AgMAR will be performed during winter months during high surface flows. The nature, frequency and timing of these flows will be evaluated through a Water Availability Analysis (WAA).	Notification of available water and success of this projects will be communicated at public GSA meetings. Agreements will be made between the GSAs and interested producers.	Following development of the WAA, an AgMAR permit for surface-water diversions can be solicited from the State Water Board. Currently this permitting process can take 6-18+ months and cause significant economic burden to the applicant. An organized application for Basin-wide winter diversions by the GSAs could lessen some of the regulatory burden since they qualify for a streamlined process but a waiver of fees for extremely disadvantaged communities working to improve groundwater recharge may also be needed.	Irrigating every 5-7 days for roughly 10 weeks in the winter/spring would benefit 2-5 AF of water per acre. Previous research has quantified that over 90% of water is recharged to deep aquifers or available in the soil profile with AgMAR. The limitation to this project is available winter for recharge but a project goal of 1,000 acres per year could provide roughly 10,000 AF of water per year benefit.	Water budget planning and permitting will take 6-18 months and possibly more depending on the case load at the department of water resources. After an off-season water budget is completed, permitting can be distributed to the GSAs for winter recharge location selection. AgMAR could start being used at productive scale by 2024 if all processes go smoothly.	The cost to develop the WAA is still being developed but may be covered under existing grants from DWR. The cost of submitting a streamlined permit will also be developed, including fees .
9.2 Research and Data Development	Stream gages are scientific instruments used to collect streamflow and water quality data to decrease scientific uncertainty in order to inform water management decisions. Agri-Climate/CIMIS stations are helpful in monitoring for climatic factors such as temperature, humidity, wind speed, etc., and overall help refine estimates of ET in the Basin. Refining the water budget for the Basin will improve the accuracy with which management decisions are made because many of the assumptions used to generate the water budget stem from data gaps that need to be addressed, or other efforts to collect and analyze data submitted through other regulatory programs.	In addition to the continued use of existing stream gages which monitor many of the seasonal streams that contribute inflow to the Big Valley Basin, stream gages may be installed if locations and need are determined. Presently, Modoc County is working to install an additional stream gage where the Pit River enters the Basin. Data from Agri-Climate/CIMIS stations may be utilized in order to make water management decisions with regard for climatic factors such as wind, rain etc. Adaptive management will be employed throughout the implementation process to allow for management decisions to reflect the best available data as more information comes available. Employing adaptive management strategies will also expand our capacity to conduct research and data development. Refining the water budget will be done as more data becomes available through the combination of the data development projects described previously.	All research and data development progress will be shared at public GSA meetings. Data collected from gaging stations will be publicly available.	We will continue to work with DWR to ensure compliance with any relevant laws and to obtain any necessary permits related to stream gage installation and maintenance, as well as for other projects that fall under adaptive management strategies and the water budget.	Decreasing data gaps would decrease reliance on assumptions to govern groundwater management decisions. As more data becomes available, more accurate estimates of evapotranspiration would allow for more precise water budgeting estimates.	Gaging stations will be installed where necessary early in the planning process to decrease uncertainty related to streamflow. They will be monitored throughout. Adaptive management strategies are anticipated to be employed throughout the GSP development and implementation phases. Refining the water budget is important early on in order to create a GSP that best reflects existing conditions in the Basin and which may be referenced in the future to perform adaptive management.	Funding is available for the development of new gaging stations. Maintenance costs may vary, but one estimate projects the annual maintenance cost for a single gage to be around \$15,000. Funding for projects related to adaptive management and refining the water budget will be acquired as necessary. Presently, there is funding to maintain or install flow meters on private wells. More funding is likely available for similar projects, such as refining mapping and land-use designations within the Basin.

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9.3 Increased Surface-water Storage Capacity	Surface-water storage may be used to reduce reliance on groundwater by providing an alternative water source. Presently, Roberts Reservoir and several others, including the Inverson, Silva and BLM reservoirs, mitigate potential overdraft. As water levels in streams and other water courses diminish during the dry months, existing diversions may not adequately meet the needs of users. Expanding the capacity of these reservoirs and possibly constructing new reservoirs such as the Allen Camp Project would allow additional water from snowmelt and storm events to be stored. This would help circumvent reliance on groundwater and would provide reliable supplies of surface water for users.	Projects intended to increase surface-water storage will be implemented when it is economically advisable to do so and when they may help mitigate Basin overdraft.	Pursuant to environmental review, these projects will have opportunities for public comment and project documents will be made publicly available whenever appropriate. Both National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) compliance mandate opportunities for public comment.	Permitting for surface-water storage projects will be subject to NEPA and CEQA depending on whether the project sites are located on federal or state land respectively.	Increasing the capacity to store surface water by capturing runoff could reduce reliance on groundwater during summer months. Further, increasing surface-water storage would improve water security during dry years.	The timeframe for largescale infrastructure projects would likely be upwards of 8 years, as the regulatory and environmental review processes generally require extensive coordination between agencies and stakeholders for planning and compliance.	Large infrastructure projects can be quite expensive. \$1 in May 1981 had the same buying power as \$2.97 in April 2021. A ballpark estimate of the capital costs for the Allen Camp Project in its entirety would amount to approximately \$344,041,830, with the dam and reservoir component amounting to an additional \$174,487,500. These figures assume funding may be available from the federal government in the form of loans under the Small Reclamation Projects Act of 1956. The cost associated with expanding existing reservoirs depends on the method employed. Sediment removal typically costs between "\$8,000 and \$32,000 per acre foot," (Lund 2014) and would be done infrequently. Increasing dam height typically costs between "1,700 to \$2,700 per acre foot" (Lund 2014).
9.4 Improved Hydrologic Function and Upland Recharge	Upland forest recharge enhancement occurs in conjunction with vegetation management and forest fuels reduction by increasing snow-water content and reducing dense forest canopy and associated evapotranspiration.	Upland forest recharge will be enhanced by implementation of forest health and fuels reduction projects within the Big Valley watershed. Such projects are ongoing and in varying stages of planning and implantation. Support from GSAs and local, state, and federal partners will increase implementation rate and scope. Water availability and recharge enhancement will be realized along with fire/fuels and wildlife habitat benefits.	On federally-managed lands, public notification of projects will be conducted under NEPA by the Modoc National Forest or Applegate BLM. State funded projects will follow CEQA public notification process. Opportunities on private land be communicated by GSAs, Pit Resource Conservation District , and other state and local entities.	Projects permitting will vary by land ownership. On federal lands: NEPA and applicable federal land policies. On private lands: state forestry rules are applicable and programs such as CAL FIRE's Forest Health Program will help clarify and streamline permitting processes.	Snow-water content has been shown to increase by 33% to 44% from a dense conifer canopy to an open area. Surface runoff has also been shown to respond to treatments. Recharge figures are difficult to quantify, but even a modest increase in recharge over 10% of the potential upland recharge area could result several thousand AF of water.	The initial upland forest recharge project "Wagontire Project" is scheduled for implementation in 2022 and is expected completion in a 2- to 4-year window.	Project costs vary by site, but an estimated average is from \$500 to \$650 per acre.
9.5 Water Conservation Projects	Water conservation and water use efficiency projects would primarily be adopted by growers and homeowners on their private property. Infrastructure improvements, while requiring capital outlay, are not subject to permitting or public environmental review.	Project implementation will be voluntary with cost-share incentives. Projects will be implemented on a site-by-site basis and designed for overall production and economic efficiency, along with water use savings.	Notification of opportunity to participate will be through local agricultural organizations, extension outreach meetings, and by sponsoring agencies. Broad public notification of individual projects is not required.	Projects in this category such as upgrading irrigation infrastructure, irrigation management techniques, home landscaping, etc. are generally not subject to permitting requirements.	Some practices have been shown to result in efficiency increases in the range of 10% at the field scale. Multiplied over a number of farms, water use savings could be significant.	Irrigation infrastructure and water-use efficiency incentives are ongoing. UC Cooperative Extension has submitted a grant proposal to SWEEP to initiate an outreach education program in 2022.	Costs vary widely. New irrigation infrastructure on a field scale can exceed \$100,000. Soil moisture meters for irrigation scheduling can be in the \$100s to \$1,000s of dollars per farm. Landscaping and homeowner water efficiency projects in the \$100s to \$1000s per home.
9.6 Education and Outreach	Education and outreach efforts can drive beneficial changes in patterns of use and protect water resources. Existing efforts employed by the GSAs include outreach about funding opportunities that support water conservation methods, coordinating information sharing efforts, and facilitating informational meetings with stakeholder groups.	As an essential part of sustainability, outreach and education will be conducted throughout the development of the GSP, with many opportunities for public engagement.	Public information is available through the Big Valley GSP communication portal, accessible at bigvalleygsp.org . Informational brochures will be distributed to interested parties to make information about the GSP more accessible.	Public engagement is important to the regulatory process of SGMA and other acts that the GSP may be subject to. However, education and outreach are an incredibly important part of meeting the sustainability goals of this GSP, especially as it relates to equity and inclusion.	Public involvement in the GSP development is crucial in attaining sustainability. Research (OECD 2015) has shown that here are many social, economic, and environmental benefits to education and outreach efforts in water management. These benefits can vary widely, but generally include increased levels of social cohesion, equity and conflict avoidance, improved water use efficiency, and improved water quality.	Ongoing efforts to engage the public in outreach and education programs related to groundwater management are essential as part of the Groundwater Sustainability Plan. The anticipated timeline for outreach and education efforts is indefinite, but it is especially important throughout the planning and implementation process of the GSP.	Costs may vary depending on program type.