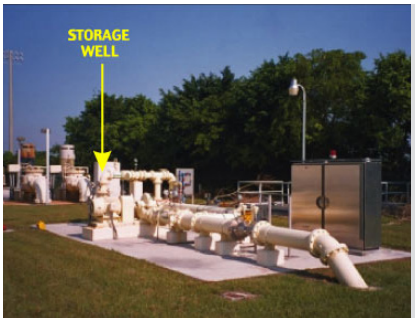
JOB AID: **AQUIFER STORAGE AND RECOVERY**



Aquifer Storage and Recovery (ASR) projects serve primarily as a drought management tool, but can also be used to reduce flood risk, mitigate salt water intrusion, and restore aquifers that have been subject to overdraft. The concept is to capture water when there is an abundant supply, store the water in subsurface aquifers, and recover water from the storage aquifer if and when there is a need. Storing water underground can help protect it from pollutants, evaporation, and weather events; and to maintain stream flow during periods of low flow.

The purpose of this Job Aid is to help communities applying for Hazard Mitigation Assistance (HMA) grants to comply with the technical feasibility and effectiveness, and environmental and historic preservation (EHP) requirements of the application. This Job Aid provides a checklist of information required by FEMA to determine grant eligibility and to complete a thorough review of the application. FEMA must review all applications to ensure that proposed activities comply with all applicable statutory, regulatory, and programmatic requirements. Therefore, certain information must be provided with the grant application for FEMA to make an eligibility determination. Early submission of accurate and complete information by the applicant will facilitate FEMA's review process and the release of HMA funds.

For more information, Applicants and Subapplicants are encouraged to refer to the Job Aid Supplements and FEMA's HMA Guidance.

PROPERTY INFORMATION	with App. Submittal	Pre-Award
Provide a vicinity map with address and project boundaries	X	
Identify project location by latitude and longitude in decimal degrees	X	
Provide site photographs	X	
Provide current property ownership information, including any easements or covenants	X	
Provide a copy of the flood insurance rate map (FIRM) showing project location	X	
Include geologic and hydrogeologic information (e.g., aquifer types, aquifer and vadose zone characteristics, subsurface homogeneity/ heterogeneity, hydrologic conductivity, transmission rates, storage coefficients, water temperatures). Include copies of investigation reports.	X	
Indicate current land use types (e.g., residential, commercial, etc.) on and near the project site	X	
Show on a map all existing surface water bodies, stormwater structures, floodplains, wetlands, woodlands, and riparian habitat information. Indicate which bodies of water (e.g., river, stream, wetland, or pond) are located within 200 feet of the project.		X
Include a state or local topographic map where available, otherwise provide a USGS topographic map of the project site		X
Include the National Resources Conservation Service soil map for the project site		X
Include copies of exploratory studies, well drilling logs, and maps showing well locations		X
Identify permitting requirements, relevant federal and local ordinances. Include status of permit applications, copies of permits obtained.		X
Include an underground utilities map or show locations of underground utilities on the project site map		X

SCOPE OF WORK	with App. Submittal	Pre-Award
Provide a narrative description of the project scope of work, including the method of recharge (e.g., injection, enhanced natural storage, multiple sources), frequency and timing of recharge, recharge rate calculations, number of proposed wells/basins	X	
Identify and show on a map the current water sources, qualities, capacities that serve the communities that could be impacted by this project. Note any users or potential users of large volumes of water, such as agricultural, public entities, or industry. Explain how the project would affect the quality or volume of water supplied to these users.	X	

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SCOPE OF WORK CONT.	with App. Submittal	Pre-Award
■ Describe the source, characteristics, and quality of water to be injected/infiltrated (e.g., river, stormwater, reclaimed, untreated and need for pre-treatment). Describe potential ecological effects due to water quality.	X	
■ Describe the amount and depth of ground disturbance associated with this project (e.g., grading; digging for buried utility lines; new, temporary, or permanent access roads or staging areas; installation of groundwater recharge trenches; new groundwater injection or extraction wells; all associated pipe routing)	X	
■ State the current total annual production (in gallons) of water per capita per day in the area affected by the project	X	
■ State the unconstrained potable water demand (in million gallons per day [mgd]) for the municipal water system serving the population in the project area	X	
■ Compare the volume of additional water supply expected in mgd to anticipated withdrawal rates. Provide the maximum volumetric production (not injection) pumping rate. Include calculations and/or models.	X	
■ State the average depth to recoverable water and the typical depth that stored water must be pumped from during production	X	
■ Describe usage of stored water (e.g., annual water supply strategy, stored for use during periods of extreme drought, etc.)	X	
■ State the length of time that the project area experiences a measurable water shortage (due to drought)	X	
■ Explain the effect on, or expected change in capacity, if any, of nearby stormwater management facilities and reservoirs after the project is implemented	X	
■ Provide characteristics (e.g., size and geographic area) of population that (1) is impacted by drought and (2) would be served by the increase in water supply	X	
■ Include conceptual plans, designs, and specifications		X
■ Describe and/or show on a map the type and location of any vegetation that will be affected by implementation of the project		X
■ If using injection wells, describe proposed compliance with EPA Underground Injection Control Program		X
■ Describe debris or other materials that will be removed and hauled off-site, and provide information on where it will be disposed (including temporary staging areas) in accordance with local and state requirements		X
■ Describe the type and source of any fill that will be imported to the project area from any off-site source (e.g., existing borrow pit)		X
■ Discuss potential impacts on any existing wells, water quality, and flow within the aquifer		X
■ State number and locations of new extraction wells planned and if they will be separate from injection wells. Include outputs from models used for design.		X

SCHEDULE, COST ESTIMATES AND BENEFIT-COST ANALYSIS	with App. Submittal	Pre-Award
■ Include a project schedule showing start and end dates, milestones, activities, and deliverables. The schedule should be no longer than 3 years.	X	
■ Provide cost information for:		
• Project development, including site selection, field testing, engineering, public outreach	X	
• Land acquisition, including site access, permitting, and source water availability	X	
• Construction, including labor, materials, equipment, and testing	X	
• Operations and maintenance, including pre-treatment and post-treatment requirements and post-project monitoring, labor, electricity, consulting services, regulatory testing, treatment, and other miscellaneous costs	X	
■ Determine the recurrence interval associated with the severity of the scenario drought events through best available data and methodology deemed appropriate by a licensed professional	X	

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SCHEDULE, COST ESTIMATES AND BENEFIT-COST ANALYSIS CONT.	with App. Submittal	Pre-Award
■ Determine type of damages and losses to be mitigated and use the Aquifer Storage and Recovery Benefit Cost Analysis Tool	X	
■ Project useful life is 30 years unless the user provides a justification for using a different value	X	
■ Additional benefits may be available depending on the project's design:		
• Reduced loss of function of roadways: provide traffic counts and detour times	X	
• Reduced damages due to subsidence: provide documentation of quantified reduction in structural damage to facilities in vicinity of project	X	

ADDITIONAL INFORMATION	with App. Submittal	Pre-Award
■ Identify at least 2 alternatives, including the Do-Nothing case, and explain why the proposed approach is the preferred option	X	
■ Describe the property history and any studies, investigations, or enforcement actions related to the property (such as pending/current litigation). Provide details or copies of the documents.		X
■ If a building(s) or outbuilding(s) is within sight of the project, provide the data when the oldest structure was originally constructed. Please note a current aerial photograph or map the year of construction of buildings and structures within sight of the project. Note FEMA is concerned with buildings and structures 50 years of age or older, not more recent ones.		X
■ Identify if the project is located within a designated coastal zone or coastal barrier resource system under the State's Coastal Management Program		X
■ Identify any known contaminated materials located on-site (e.g., asbestos, lead-based paint, underground storage tanks, chemical storage containers) that will require removal prior to construction		X
■ Identify if the project site is located on or within one mile of a site on the Federal National Priorities List or State Hazardous Waste Site list. If a Phase I Environmental Site Assessment has been completed, include a copy.		X
■ Identify any soil or groundwater contamination known to exist within a one-mile radius of the project site. Include any naturally-occurring contaminants (e.g., arsenic, selenium, brackish water) that could adversely affect the regional groundwater after the project is implemented.		X
■ Describe any known Federally- or State-listed threatened/endangered species or species of concern and their critical habitat within the project area and any special provisions or measures required to avoid, minimize, or mitigate direct and indirect species impacts		X
■ Identify if any buildings on the property have been listed or have been determined to be eligible for listing in any local, state, or national historic registers, or if the property is located within 0.5 mile radius of a local, state, or national historic district		X
■ Describe any known archaeological artifacts, cultural resources, or human remains on or located within a 0.5 mile radius of the property		X
■ Identify any Native American Tribal lands, Traditional Cultural Properties, or other Native American resources (e.g., traditional fishing areas) that are located on or adjacent to the subject property		X
■ Describe any public outreach that has occurred related to the project (e.g., public notices issued, notifications published in newspapers, public meetings held, public comments solicited)		X
■ Enclose copies of any previous coordination, correspondence, or consultation with Federal, State, Tribal, and local resource agencies (e.g., U.S. Fish and Wildlife Service, State/Tribal Historic Preservation Office, U.S. Army Corps of Engineers, State agencies)		X
■ Describe any other environmental and historic preservation requirements that the project is or will be subject to, such as State/Tribal or local environmental reviews, other agency reviews, etc.		X