

ATTACHMENT 6. MONITORING, ASSESSMENT, AND PERFORMANCE MEASURES

The project includes a comprehensive monitoring and performance assessment program, which will be used to measure performance of the overall project and individual components. Our monitoring and performance plan includes completing groundwater analysis beneath the dam, collecting stormwater runoff, storage and recharge data to verify the flood benefits and water quality improvements at each basin site. The monitoring activities will help determine the benefits achieved, thereby measuring the Project’s performance in contributing to the applicable Kings Basin IRWM Plan’s goals and objectives. Table 6-1 (Goals and Objectives) below lists the Kings Basin IRWM Plan’s goals and objectives to which applies to the project and the associated performance measures that will be used to track the projects contribution to the Kings Basin IRWM Plan’s objectives. The specifics of the monitoring system and a performance measures table are provided in the Performance Measures Table (Table 6-2).

Quantifying Benefits and Objectives

The monitoring and assessment component of this project is essential to quantifying the project benefits including reducing flood risk and flood damages, improving water quality through the capture and retention of stormwater runoff before releasing water, and increasing recharge into the local groundwater aquifer. More specifically, the monitoring and performance plan will be used to verify project performance with respect to the project benefits and objectives. The performance measure table below demonstrates how the project objectives are linked to both the targets and performance measures for this project.

Consistent with State Stormwater Regulations

The Project’s purpose is to reduce risk of flooding and flood damages and also to maintain and/or improve water quality while following State Stormwater Regulations. This Project is consistent with State Stormwater Regulations in the following ways:

State Water Resources Control Board: Resolution 68-16

The policy generally restricts the disposal of wastes into the waters of the State that will reduce the water quality of surface or ground water. The goal of the policy and the project is to maintain or achieve the highest water quality to benefit the people of the State.

Nonpoint and Urban Stormwater Pollution Prevention

Water quality improvements will be accomplished by collecting stormwater runoff at Pup Creek-Enterprise Detention Basin, Big Dry Creek Detention Basin, and Dry Creek Extension Basin. System-wide water quality improvements would increase because of the additional storage capacity created by the three basins. The three basins will remove additional pollutants from stormwater runoff and flood flows captured and also increase recharge capability.

Under certain hydraulic conditions, some of the flood flows from Big Dry Creek and Pup Creek watersheds will be routed to and detained in the new basins, will receive treatment and be recharged into local groundwater aquifers under the new basins.

FMFCD participated in the 1984 National Urban Runoff Program studies and demonstrated the effectiveness of retention basins for stormwater treatment, and has developed a well-documented program that identifies the performance and benefits of capturing and removing pollutants in regional stormwater management basins.

The objective of the Clean Water Act (CWA) is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” The CWA act was amended in 1989 to include the permitting of stormwater runoff sources including discharges from large municipalities. The District is the lead agency of five Co-Permittees within the Fresno/Clovis metropolitan area that are responsible for implementing stormwater Best Management Practices (BMPs) to reduce stormwater pollutants to the Maximum Extent Practicable. The District’s regional stormwater basin system exceeds statewide standards by capturing over 92 percent of urban stormwater runoff in retention basins and removing up to 50-80 percent of typical stormwater pollutants before discharge to Waters of the U.S. or Waters of the State. On average, the regional basin system recharges between 70-85 percent of the annual rainwater that falls within the permit boundary. The grant project will increase the capacity of the regional system and thus increase the District’s operational options to store and treat more stormwater runoff, realizing additional flood control and water quality benefits.

The District will also acquire the necessary coverage under the State’s Construction General Permit which applies to construction projects resulting in land disturbance of one acre or greater. The District will ensure construction BMPs are implemented at the four grant project sites to reduce construction-generated pollutants.

Measures Performance in Meeting IRWMP Goals and Objectives

As mentioned in the Work Plan, this project addresses all five of the Kings Basin IRWMP’s goals and seven of the fifteen Kings Basin IRWMP’s objectives. The Project focuses on reducing flood risk and damages, along with improving water quality and groundwater recharge. The monitoring activities will help determine the benefits achieved, thereby measuring the Project’s performance in contributing to the applicable Kings Basin IRWMP’s goals and objectives. Table 6-1 (Goals and Objectives) below lists the Kings Basin IRWMP’s goals and objectives to which applies to the project and the associated performance measures that will be used to track the projects contribution to the Kings Basin IRWMP’s objectives.

Table 6-1: Goals and Objectives

Kings Basin IRWM Plan's Goals and Objectives	Performance Measure(s)
Goal 1: Halt, and ultimately reverse groundwater overdraft and provide for sustainable management of surface and groundwater	1) Increase groundwater recharge 2) Use of surface water in lieu of groundwater for irrigation
Goal 2: Increase the water supply reliability, enhance operational flexibility, and reduce system constraints	Increase storage capacity and construct diversion structures
Goal 3: Improve and protect water quality	Capture and retention of surface and stormwater runoff prior to release.
Goal 4: Provide additional flood protection	Reduce peak run off, increase storage capacity, and improvements to Big Dry Creek Dam
Goal 5: Protect and enhance aquatic ecosystems and wildlife habitat	Purchase new basins and expand additional existing basins
Objective 1: Increase amount of groundwater in storage with intent to eliminate the groundwater overdraft in 20 years	1) Increase groundwater recharge 2) Use of surface water in lieu of groundwater for irrigation
Objective 3: Identify DAC priority needs and promote/support solutions to DAC water issues	Improving/creating groundwater recharge capability at project sites helps reverse the service area's persistent condition of groundwater overdraft. The City of Fresno accounts for 83.8 percent of the population within FMFCD's service area, and is considered a disadvantaged community using DWR's MHI criterion. Groundwater recharge volumes at the Project sites will be recorded.
Objective 4: Increase average annual groundwater supply and reduce demand	Increase groundwater recharge and water conservation efforts through additional capture
Objective 5: Increase dry year groundwater supply	1) Increase groundwater recharge 2) Use of surface water in lieu of groundwater for irrigation
Objective 6: Increase regional conveyance capacity	1) Capture and retention of surface and stormwater runoff prior to release. 2) Increased flood routing and basin storage capacity
Objective 9: Identify sources of water quality problems and promote/support solutions to improve water quality	Capture and storage of additional surface and stormwater runoff for treatment prior to release.
Objective 10: Increase surface storage	Increase storage capacity
Objective 12: Pursue opportunities to incorporate habitat benefits into projects	Purchase new basins and expand additional existing basins
Objective 13: Increase public awareness of IRWM efforts	FMFCD will continue to publish stories periodically in its newsletter and on its web site explaining IRWM purpose and activities. Following grant award educational signs will be posted at each project location to outline DWR funding and IRWM efforts.
Objective 14: Involve local water districts and land use agencies in generating and conforming the current and future water needs to ensure compatibility and consistency with land use and water supply plans	FMFCD will continue to actively participate in several local groups to effectively address goals and objectives of applicable general plans and water management plans. These groups include: Association of Metropolitan Water Agencies, Fresno County Water Advisory Committee, and Central Valley Water Awareness Committee.

Monitoring Plan

The following are the overall components of the Monitoring Plan for this project:

1. Monitor the water surface elevation behind the dam by taking readings from the staff gage at the Big Dry Creek Outlet Structure.
2. Monitor the groundwater by collecting groundwater readings from 36 piezometers located along the center of the dam and on the downgradient side ranging from 15 to 60 feet from the toe of the earth dam. The amount of readings will vary and be based on the water surface elevation in the reservoir. With a low volume of water being stored behind the dam, FMFCD will start readings on a weekly base. As the water surface elevation behind the dam increases so will FMFCD’s monitoring and data collection. All data will be collected by an FMFCD Field Technician, reviewed and logged by an FMFCD Engineer, and when the reservoir elevation exceeds 419.0 feet, the data will be delivered to a local geotechnical consultant for seepage study and analysis. The local geotechnical consultant will prepare a report with their study and findings and submit it to DWR.
3. Evaluate reduction in pollutant loads from the additional capture and retention of stormwater runoff through monitoring the increased amount of stormwater captured and the concentration of typical stormwater runoff.
4. Monitor stormwater collection at the three new basins to calculate the volume.
5. Evaluate reduction to flood-related damages and other benefits downstream of the Enterprise Canal from the Pup Creek–Enterprise Canal intersection, any drainage areas that release water to Big Dry Creek, and any properties alongside Dry Creek, Pup Creek, and Fanning Ditch.
6. FMFCD staff will use the volume of water delivered and reported by FID and log the data every month to determine short-term and long-term surface water recharge trends at the three basins.
7. FMFCD staff will annually monitor and evaluate the effect of siltation at the three basins by monitoring the percolation rates. A declining yearly trend indicates siltation and the need for desilting. Silt removal from basins, is anticipated on average, every five years. FMFCD employs a telemetry system to monitor various conditions, including basin water level at many basins where power is available. This system allows FMFCD staff to verify that appropriate water levels are maintained. It can also be used to determine percolation rates or rate of fall of water level when delivery is stopped. The telemetry system is also useful in analyzing long term trends of the water level in a basin. This data can be exported to databases and spreadsheets where further calculations can be performed for further study. Recharge model numbers are used as a guideline. When actual delivery numbers vary greatly with those predicted by the model, District staff evaluates these discrepancies and determines if action needs to be taken, such as, accelerated silt removal inside the basins or verifying delivery capabilities from FID. The District will gather, track and analyze local groundwater quality data collected by local and State water resources agencies to identify and characterize noticeable impacts, including pollutant concentrations and groundwater levels, associated with the recharge of stormwater runoff and surface water at the project stormwater basins.

8. In regards to groundwater level monitoring, Kings River Conservation District (KRCD) publishes an annual groundwater report that includes regional groundwater contours (depth and elevation), and changes in groundwater storage for the Kings Basin. Current groundwater conditions are evaluated and compared to the past. The report uses data provided by several agencies on hundreds of wells. KRCD is also the lead agency for a local group that submits groundwater level data to the California State Groundwater Elevation Monitoring (CASGEM) program.

Performance Measures Table				
Project Goals	Desired Outcomes	Targets	Performance Indicators	Measurement Tools & Methods
Capture up to 1,057 acre-feet of annual rainfall flows	Decrease downstream flooding	Reduce peak flows downstream	Reduced storm water flows and flooding of downstream areas	Storage-depth table together with depth measurement pole in basins. Detention basin outflow recorder
Improve drainage service to Drainage Area "C"	Bring Drainage Area "C" to FMFCD's stormwater storage capacity standards	Eliminate local flooding due to improved flood control facilities	Reduction in localized flooding due to improved flood control facilities	Field verification of redirected storm runoff to retention basin
Improve Water Quality by capturing upstream storm runoff, sediment, other pollutants, etc.	Sediments and other stormwater pollutants will settle in the basins and be periodically cleaned	Reduce pollutants discharged into channels	Results from stormwater quality monitoring program	Water quantity and quality tests at urban basins
Provide 1,255 acre-feet of additional storage capacity along the Pup Creek & Dry Creek system	Increase in stormwater storage capacity and recharge capabilities	Excavate basins to ultimate design to provide additional storage to reduce flood damage and flood complaints	Storage volume readings and records. Documentation of amount of increase	Calculate total storage capacity from surveys and as-built
Recharge local groundwater to over 6,100 acre-feet annually	Increase groundwater supply	Halt current overdraft	Sustain or increase groundwater elevation. Documentation of amount of increase	Groundwater elevation readings from Kings River Conservation District
Provide non-potable water for irrigation and other outdoor uses	Reduce use of groundwater for irrigation purposes	Irrigate with non-potable water with minimal use of imported water	Use of pump to extract surface water from the basin	Water usage report
Provide and protect aquatic ecosystem and wildlife	Increase aquatic ecosystem and wildlife	Increase areas for wildlife habitat	Field inspections for increased wildlife within basin sites	Compare new findings with past results

Table 6-2: Performance Measures Table