

ATTACHMENT 5. WORK PLAN

The following sections provide a detailed description of the work plan.

SCOPE OF PROPOSAL

FMFCD's proposed project will study soil profiles and improve groundwater recharge in the Fresno-Clovis area by: 1) making physical modification to certain existing basin sites, 2) collecting underlying soil profiles from six (6) or more other basin sites in Fresno and Clovis to evaluate the potential for additional future projects, and 3) utilizing remaining funds to make physical modifications at one (1) or more of the six (6) basin sites where soil data was collected, or at Basin "CM" to install gravity drains to maximize groundwater recharge. Figure 5-1 is a Basin Location Map of Basins "P" and "CM". Figure 5-2 shows the basin sites proposed for collecting soil data.

PURPOSE FOR IMPLEMENTING THE GWMP AND IRWMP

Purpose for the Fresno-Area Regional Groundwater Management Plan: "To implement effective groundwater management that works toward maintaining a high quality and dependable water resource for the water users and landowners within the Plan Area, while minimizing negative impacts to other affected parties. The Plan documents the existing groundwater management efforts in the Plan Area that have been successful. The Plan also develops a coordinated and comprehensive approach to the future evaluation and management of groundwater resources within the Plan Area, in concert with other groundwater management activities within the groundwater basin."

As mentioned in the Fresno-Area GWMP (page 4-1), "the Plan Area is, and will continue to be, dependent on groundwater as a significant water supply source. The Plan objectives have been developed to monitor, protect, and sustain groundwater within the region.

These objectives of the ***Fresno-Area Regional Groundwater Management Plan*** include:

1. *Preserve and enhance the existing quality of the area's groundwater.*
2. *Correct the overdraft and stabilize groundwater levels at the highest practical beneficial levels.*
3. *Preserve untreated groundwater as the primary source of domestic water.*
4. *Maximize the available water supply, including conjunctive use of surface water and groundwater.*
5. *Conserve the water resource for long-term beneficial use and to assure an adequate supply for the future.*
6. *Manage groundwater resources to the extent necessary to ensure reasonable, beneficial, and continued use of the resource.*
7. *Monitor groundwater quality and quantity to provide the requisite information for establishing groundwater policies, goals, and recommended actions.*
8. *Improve coordination and consistency amongst agencies responsible for the monitoring and management of groundwater in the Plan Area."*

This proposal supports the following objectives of the Fresno Area Regional Groundwater Management Plan (GWMP). The objectives are *italicized* in the following supportive text.



Locating recharge basins next to areas with water quality problems to blend water supplies and create a hydraulic barrier to impede movement of contaminant plumes, and testing basin soils for metals will help *preserve and enhance the existing quality of the area's groundwater and preserve untreated groundwater as primary source of domestic water.*

The soil data collected in the six (6) sites will allow FMFCD staff to make more informed decisions on basin secondary use designations (recharge and/or recreation), prioritize recharge intertie locations, alter basin designs and geometry to increase infiltration rates, and to alter profile data by over-excavating and backfilling with more permeable material to maximize infiltration. This will help to *correct the overdraft and stabilize groundwater levels at the highest practical beneficial levels.*

With the conversion of some of the six (6) basins for secondary use (recharge) would assist FMFCD, the City of Fresno and Clovis and Fresno Irrigation District to *maximize the available water supply, including conjunctive use of surface water and groundwater.*

The increase to the infiltration rate of the selected basins will enhance groundwater recharge to help *conserve the water resource for long-term beneficial use and to assure an adequate supply for the future.*

FMFCD contacted other Plan participants to inform them of this proposal and to ask for their support of this proposal. Letters of support from FMFCD's three Groundwater Recharge Program partners (City of Clovis, City of Fresno, and Fresno Irrigation District) are attached. The support of all GWMP members along with regular interagency communication have and will continue to help *improve coordination and consistency amongst agencies responsible for the monitoring and management of groundwater in the Plan Area.*

Purpose for the Upper Kings Basin Integrated Regional Water Management Plan: "The Water Forum was formed by the local land and water agencies and stakeholders to improve communication, collaboration, and cooperation; to develop a consensus on the regional problems and solutions; and to resolve or avoid conflicts. A general consensus has been achieved concerning the purpose of the Upper Kings Basin IRWMP."

As stated in the Upper King Basin IRWMP (page 1-6), "The need for the IRWMP is clear. The continued groundwater overdraft is not sustainable and the urban growth pressure in the region, coupled with the need to sustain the agricultural economy, call for improved water resources management in the Kings Basin."

The Regional Goals in the Upper King Basin IRWMP (page 5-5) include:

- *Halt, and ultimately reverse, the current overdraft and provide for sustainable management of surface and groundwater;*
- *Increase the water supply reliability, enhance operational flexibility, and reduce system constraints;*
- *Improve and protect water quality;*
- *Provide additional flood protection; and*

- *Protect and enhance aquatic ecosystems and wildlife habitat.”*

This proposal supports the following goals of the Upper Kings Basin Integrated Regional Water Management Plan. The goals are *italicized* in the following supportive text.

Halt, and ultimately reverse, the current overdraft and provide for sustainable management of surface and groundwater and increase the water supply reliability, enhance operational flexibility, and reduce system constraints.

Increasing the volume of surface water and stormwater that can percolate to the local area’s aquifers allows the Cities of Fresno and Clovis to maximize the amount of surface water entitlement to be delivered to FMFCD basins via the FID canal system.

In addition, gaining information for the soil profiles of six (6) or more recharge basins and testing and monitoring physical recharge improvements at two additional sites will help build the knowledge base in the Fresno-Clovis area for GWMP member agencies. Such knowledge will assist FMFCD, the Cities of Fresno and Clovis, Fresno Irrigation District and others in individual and regional planning to meet this objective.

Improve and protect water quality

FMFCD has been a leader in studying the water quality impacts of stormwater management basins’ usage for recharging stormwater and imported surface water. One of the principle goals of the FMFCD’s Stormwater Management Program is “to protect from degradation by urban runoff the resources and beneficial uses” of the groundwater aquifer. The use of stormwater basins in drainage areas has historically served to control floods and to recharge underlying groundwater, which is necessary to maintain the existing beneficial use of ground waters.

In 1978, the U.S. Environmental Protection Agency (USEPA) established the Nationwide Urban Runoff Program (NURP) to characterize the quality of urban runoff from a number of communities across the country. Fresno was selected as a local sponsor for one of these sites to study the water quality impacts of stormwater recharge basins. The United States Geological Survey (USGS) subsequently studied the impacts of recharge from industrial drainage areas in the Fresno area on water quality.

The NURP and USGS studies included sampling and analyses to examine pollutant retention in stormwater basin soils and groundwater. The reports demonstrated that trace elements and synthetic organic were elevated above background near the surface in stormwater basins but that the concentrations decrease rapidly with increasing sediment depth and showed that concentrations of nearly all contaminants decrease to background levels at a depth of 4 cm. No contaminants generated in the urban stormwater were detected below a depth of sixteen (16) cm.

The NURP study found the concentrations were generally very low in interstitial water from the unsaturated zone in ground water beneath the basins and also found that a stormwater basin serving industrial land uses had a wide variety of inorganic and organic contaminants in the top four (4) cm of sediment and had not degraded groundwater quality beneath the basin.

The use of stormwater basins to recharge groundwater does not result in significant impacts on groundwater quality, and any uncertainty about these impacts is removed by periodic removal of contaminants in sediment that has accumulated on the bottom of retention basins.

In addition to studying water quality with respect to recharge, the FMFCD has also studied the impact of discharge of excess flood water to the San Joaquin River. No statistical difference in water quality exists in the San Joaquin River in samples taken from locations on the San Joaquin River upstream and downstream of the metropolitan area based on an analysis of monitoring data. Thus, not only has the system of urban stormwater management basins served to control flood waters, it has also protected water quality in both surface and groundwater. The use of the sand filter at the surface of the gravity drains and substantial soil remaining between the bottoms of the gravity drains will continue to protect the quality of water percolated to groundwater.

Provide additional flood protection.

The increase to the infiltration rate to the selected basins will enhance groundwater recharge efforts and allow stormwater and surface water to percolation at a rapid pace providing additional flood protection and minimizing any water losses due to evaporation.

Protect and enhance aquatic ecosystems and wildlife habitat.

Periodic standing water present in the local storm drainage system provides temporary wetland habitat. These habitats are temporary due to the limited rain season. FMFCD has implemented the wildlife program to conserve and enhance habitats in its facilities, and to provide related environmental education and awareness opportunities to the public. Basin “P”, Basin “CM” and the basins listed in Table 1-1 all provide wildlife habitat temporarily each year. Even with an increase to the infiltration rate to the selected basins for recharge improvements, the Cities of Fresno and Clovis have significant entitlements to the San Joaquin and Kings Rivers that can be used to provide additional waters for groundwater recharge of surface water and to provide aquatic ecosystems and a wildlife habitat temporarily.

WORK ITEMS TO BE PERFORMED

As mentioned in the project description, Fresno Metropolitan Flood Control District (FMFCD) proposes to improve groundwater recharge efforts at groundwater recharge basins operated by the District and acquire soils data for six (6) or more basins. Basin improvements for groundwater recharge and soil data acquisition is divided into four tasks: 1) Project Management, 2) Construction, 3) Monitor Improved Basin Sites, and 4) Reports.

Task 1: Project Management

The purpose of this task is to sign an agreement with the Department of Water Resources, prepare environmental documents, project management, and coordinate with the contractor and survey crew for the duration of the work to ensure timely and successful project completion. The work in this task includes preparing construction plans and specifications, advertising the project, and meeting to review the final report. This task also involves outreach to the stakeholders and the public, and updating FMFCD website throughout the life of the proposed project. This effort is further described to include the following discrete elements.

A. Pre-Construction Activities

The purpose of this subtask is to sign an agreement with the Department of Water Resources, prepare environmental documents, survey proposed basin sites, prepare construction plans and specifications, prepare cost estimates for improvements, establish a schedule, develop deliverables in accordance with this scope of work and advertise the project. FMFCD will initiate CEQA by performing a preliminary review of the site and make a determination of environmental impacts. FMFCD will evaluate the project site to determine if a Categorical Exemption will be sufficient since the basin sites are already excavated. It is anticipated that a Categorical Exemption will be prepared (Class 1 'Modification of Existing Structures' exemption, Section 15301), as the project involves alteration of existing FMFCD facilities. A Categorical Exemption will be prepared in (5) days and posted for review at the County of Fresno County Clerk's Office for thirty-five (35) days. Injection Wells Registration Form will be completed and submitted to the U.S. Environmental Protection Agency (U.S. EPA). This project will not require an Indirect Source Permit, 404 Permit, 401 Permit or a 1601 Permit.

FMFCD will determine if the gravity drains are required to be listed under the U.S. EPA's Underground Injection Control Program. The gravity drains could be classified as a Class V well. Most Class V wells do not require an individual permit but are required to contact U.S. EPA Region 9 and submit inventory information before construction (e.g., the name and location of the facility, a legal contact, the property owner, and information on the nature and type of injection well). The U.S. EPA Region 9 will review the information to be sure that the gravity drains will not endanger an Underground Source of Drinking Water.

FMFCD will prepare contract specifications for this proposal and will also follow the formal bidding procedure as required by law and outlined in the FMFCD's Contracting Procedures Policy and as specified in the grant agreement.

B. Project Coordination Meetings

The purpose of this subtask is to schedule and conduct project coordination meetings with FMFCD, the contractor, survey crew, and DWR. It is assumed that there will be a minimum of five meetings (Bid opening, award of the contract, pre-construction meeting, completion of work, and review of the final report). During the pre-construction meeting, the schedule will be discussed and adjusted if needed to help accommodate a productive and efficient way for the contractor to complete the project. If necessary, to ensure the project stays on schedule, additional meetings will be set up to assure the contractor stays on schedule and completes the work as planned. DWR will be invited to each of the project coordination meetings.

C. Public Outreach

The purpose of this subtask is to provide outreach to the stakeholders and basin neighbors 250 feet from each of the proposed basins. FMFCD will update the website to inform viewers on the latest information about the proposal, send out an informational mailing to stakeholders and local residents within 250 feet from the selected six (6) or more basins and the proposed basin sites for recharge improvements, and release FMFCD newsletters with updates of the project. FMFCD will consult with the California Native American Heritage Commission and listed local tribes during the public outreach to



receive any comments or concerns about the location of the project areas. FMFCD also plans to educate other agencies on the project during regularly scheduled meetings of the Technical Advisory Committee of the GWMP. Other agency updates will include the Upper Kings Basin IRWMP Group, Association of California Water Agencies, Kings River Conservation District, Fresno/Clovis Area Recharge Program, and more.

Task 2: Construction

The purpose of this task is to manage and work with the survey, contractor, and drilling crew based on the established schedule, to ensure the deliverables are developed in accordance with this scope of work, and the contractor stays on schedule and completes the work as planned. Under this task the inspector will ensure the contractor implements the Quality Assurance and Quality Control (QA/QC) plan.

A. Recharge Improvement Projects

FMFCD field personnel will dewater the basins before boring operations and ensure that nuisance flows do not interfere with the boring activities. Basins will be dewatered several weeks before the gravity drains are installed to allow the basin floor to dry and ensure the drilling rig can safely enter the basin floor area.

The ground elevations of the top of each gravity drain will be determined and the locations will be staked a minimum of two (2) days before construction begins. The timing of the survey will be such that the basin will be dewatered and dried so the survey crew can work safely and efficiently. The survey work will be conducted by an experienced staff member who holds a Professional Surveyor license or a Professional Engineer license.

Construction will be completed by the lowest responsible bidder with a valid Class C-57 or Class A license. The FMFCD Engineer and Inspector, Mr. Dwayne Farrow, will coordinate and communicate regularly with the contractor during the entire project to ensure the contractor stays on schedule. During construction, Dwayne Farrow will inspect the work day-to-day and consult with the engineer and ensure the contractor complies with QA/QC procedures. Review of material submittals, processing monthly payment requests, and negotiating and preparation of contract change orders will be performed by FMFCD staff. Mr. Farrow has over twenty-six (26) years of experience in construction and over six (6) years of inspecting for FMFCD. It is anticipated that it will take 7- 10 business days to complete the installation of twenty (20) gravity drains at each proposed basin site. Preceding the work, FMFCD will prepare record drawings. The drawings will be prepared based on Dwayne's redlines to the plans and survey of the completed work.

B. Collection of Soil Data

FMFCD field personnel will dewater the basins before boring operations and ensure that nuisance flows do not interfere with the boring activities. Basins will be dewatered several weeks before the borings are scheduled to allow the basin floor to dry and ensure the drilling rig can safely enter the basin floor area.

The ground elevations of the top of the borings will be determined and the locations will be staked a minimum of two (2) days before the borings will begin. The timing of the survey will be such that the

basin will dewatered and dried so the survey crew can work safely and efficiently. The survey work will be conducted by an experienced staff member who holds a Professional Surveyor license or a Professional Engineer license.

A geotechnical engineering firm licensed in the State of California with a valid C-57 license will drill the borings. The borings will be drilled using a hollow stem auger. Common boring diameters range from 6” to 8”.

For each basin site, two (2) holes will be drilled to a depth of approximately fifty (50) feet below the basin’s finished floor. The remaining borings will be drilled to a depth of fifteen (15) feet below the basin’s finished floor elevation. One hole will be drilled for approximately every 1.5 acres of basin floor. A minimum of four (4) borings will be done on smaller basins. A maximum of ten (10) borings will be done on larger basins. It is anticipated that the boring and log reports will be completed within ten (10) working days.

After all soils data is complete and collected the data will be reviewed by the assigned engineer, Operations Engineer, and the District Engineer to determine the next feasible basin site for recharge improvement.

During drilling, materials will be classified and logged by qualified personnel and checked by a California Registered Civil or Geotechnical engineer. Classification procedures will follow ASTM test method D2488-09a “Standard Practice for Description and Identification of Soils” (Visual – Manual Procedure). At the completion of the exploration, the boring holes will be backfilled with the soil cuttings. Specific drilling and development tasks are summarized below:

- Each boring location will be staked a minimum of 2 days prior to boring activity.
- Survey each site to determine ground elevation of the top of each boring.
- Drill two holes at each site to a depth of approximately 50 feet below the basin’s finished floor elevation.
- Drill remaining bores to a depth of 15 feet below basin’s finished floor elevation.
- Drill approximately one bore per 1.5 acres of basin floor.
- Collect soil samples and classify materials according to the ASTM test method D2488-09a “Standard Practice for Description and Identification of Soils” (Visual –Manual Procedure).
- Backfill the boring with the soil cutting.
- Determine next feasible basin site for recharge improvements.

Task 3: Monitor Improved Basin Sites

The purpose of this task is to monitor FMFCD basins improved with gravity drains. Data acquired from monitoring these sites will be used to not only to determine the effects that gravity drains have, but will also be used to predict their effects at other sites, as well as any possible performance changes (positive or negative) over time. This will enable FMFCD to alter its maintenance program for these sites, if necessary, in order to maximize groundwater recharge.

FMFCD will employ several techniques to evaluate basin sites improved with gravity drains. All data acquired will be stored in databases where it can be easily accessed.

A. Monitor and Record Data

Every month, FID provides a delivery report that lists how much surface water, in acre-feet, was diverted to each FMFCD basin. This data is collected, logged and used to determine short-term (monthly) and long-term (yearly) surface water recharge trends of the various basins.

Yearly trends help staff evaluate the effects of siltation at a particular basin. Silt is removed from basins, on average, every five years. A declining yearly trend indicates siltation and the need for desilting.

FMFCD typically documents percolation rates on its recharge basins every three (3) weeks between April and October. FMFCD has compiled a database of percolation rates conducted over the years and uses this data to model recharge efforts and determine the performance level of its basins.

FMFCD employs a telemetry system that monitors various conditions, including basin water level at many basins where power source 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.

FMFCD provides a semi-monthly report of the status of its recharge basins. This reports the observed water levels, the authorized water levels, the position of the interties that divert surface water to the basins, and any comments about a particular basin. FID is a recipient of this report and it provides them data to assist them in routing the appropriate amount of water to recharge basins.

Data provided by these reports is used to determine the efficiency of the surface water recharge program.

B. Use of Collected Data to Model Existing and Future Physically Improved Sites

Prior to each “recharge year,” FMFCD creates a surface water recharge model to predict how much surface water will be recharged at each FMFCD basin. The model considers construction, maintenance, excavation projects, and cumulative siltation between maintenance work to determine the estimate recharge of each basin in a given year. Percolation rates are known from previous year’s data of the basin operation and this data is used to calculate the estimated recharge.

Recharge model numbers are used as a guideline. When actual delivery numbers vary greatly with those predicted by the model, District staff evaluate these discrepancies and determines if action needs to be taken.

In addition to the surface recharge model, FMFCD also models stormwater recharge. This model is slightly different than its surface water counterpart. It is used to estimate how much stormwater was recharged at all FMFCD basins. Water level readings, taken throughout the winter, are used, along with basin capacity tables and known percolation rates, to estimate the amount of stormwater recharged.

Estimates provided by this model have reinforced past assumptions that surface water and stormwater recharge have a direct relationship. That is, heavy rainfall years typically reduce the time and capacity available in a basin for surface water recharge. Therefore, heavy rainfall years are, in many instances, followed by lesser surface water deliveries. Results from stormwater recharge models quantify stormwater recharge amounts and how they typically offset subsequent lesser surface water recharge deliveries. In periods of limited rainfall the reverse is true, lesser stormwater recharge, but greater volume of imported surface water is recharged.

Task 4: Reports

This task includes preparation of the monthly, quarterly, and final reports to document the progress of the project and the results from monitoring the improved basin sites completed in Tasks two (2) and three (3).

A. Progress Project Reports

During the more active time of the project, FMFCD will submit monthly reports to DWR, otherwise FMFCD will submit quarterly reports, which will include an executive summary, report description of the project operations to date, description of major accomplishments, discussion of any issues or concerns that may affect the schedule or budget, discussion of activities planned for the following month or quarter, cost, and schedule information. The monthly and quarterly reports will follow the outline specified in Exhibit E of the grant agreement. Progress reports will also be presented to the FMFCD Board, as well as the TAC of the Fresno Area Regional GWMP and the Basin Advisory Panel of the Upper Kings Basin IRWMP.

B. Inform GWMP and IRWMP Members, Local Agencies, and the Public

Upon award of the LGA grant by DWR, the District will notify the community of the award, and describe the project to be funded. The general public will be informed through submission of a news release to local media outlets, such as newspapers, television and radio stations. Interested people will be directed to the District's web site for more detailed information, to include a project area map, schedule of the work, description of the project and its goals to improve groundwater recharge in Fresno and Clovis. Neighbors within a 250-foot radius of each of the project's basin sites will be contacted to tell them of the improvements to be done in their neighborhood's basin, the purpose of the project, and when it is expected to start and end.

As GWMP and IRWMP members, the following municipalities, agencies and organizations will be an important focus of the District's information dissemination efforts, as they are most likely to have an active interest in the project outcomes. A combination of e-mailed notifications, personal distribution at GWMP, IRWMP, and other groups' meetings, posting on the District's web site, and personal contacts as needed, will be used to share information gained from the project.



Fresno Area GWMP members –

- Bakman Water Company
- City of Clovis*
- City of Fresno*
- City of Kerman*
- County of Fresno*
- Fresno Irrigation District*
- Garfield Water District
- Malaga County Water District
- Pinedale County Water District

Upper Kings Basin Integrated Water Management Authority members –

- Alta Irrigation District
- City of Clovis*
- City of Dinuba
- City of Fresno*
- City of Kerman*
- City of Kingsburg
- City of Parlier
- City of Reedley
- City of Sanger
- City of Selma
- County of Fresno*
- County of Tulare
- Consolidated Irrigation District
- Fresno Irrigation District*
- Kings County Water District
- Kings River Conservation District
- Raisin City Water District

* Overlap in membership in the GWMP and the Upper Kings Basin Integrated Water Management Authority

State and federal agencies identified for project information sharing are the California Department of Water Resources, as required by the grant, the U.S. Bureau of Reclamation (USBR), and the U.S. Geological Survey (USGS). DWR will receive required reports on projects progress and results, and USGS staff at the Western Regional Offices and staff at USBR’s Fresno office will be contacted personally and made aware of the availability of new the soils data and infiltration improvement measurements.

The District will approach industry publications such as the Association of California Water Agencies’ *ACWA News* and the Water Education Foundation’s *Western Water Magazine*, with requests to run stories about the grant project and advertise the availability of project information to their readership. The District will also publish a story about the grant project in its quarterly newsletter, which has a circulation of approximately 1,150 people and includes schools, other public agencies at the local and state level, elected officials at the local and state level, a variety businesses, local chambers of commerce, non-profit organizations, local media outlets, and private citizens.

C. *Final Project Report*

Upon completion of the project, FMFCD will prepare and submit two hard copies and one copy in electronic format of the Final Project Report. The report will include an executive summary, all data, field notes, record drawings and soil logs. The final report will be a comprehensive document that will include a comparison of the planned schedule with the actual timeline, discussion of the major problems encountered, a summary of all costs, a detailed description and analysis of project results to identify options to enhance groundwater management activities and all final deliverables as described in Exhibit A of the grant agreement. The final report will be reviewed by the assigned Engineer, Operational



Engineer and the District Engineer to assure the report is concise and complete and contains all of the information specified in the grant agreement.

INFORMATION GAINED

The improvement to the proposed basins will identify the efficiency of the gravity drains as they will be monitored by FMFCD. This will give a better understanding of how gravity drains affect not only surface water recharge, but stormwater recharge as well. Over time, data will assist in long-term studies that will assist in future design of similar projects.

The six (6) or more basin locations proposed for collecting soil data currently have limited or no data available on their soil profiles. FMFCD proposes to collect two 50 feet in depth borings at each site along with 15 foot borings per every 1.5 acres of basin floor. This will provide a representation of soil characteristics at each location. Specifically, boring results will identify:

- Soil types
- Consistency of soils within basin sites
- Locations of desirable, high permeability soils
- Locations and depths/thickness of obstructive soils
- Potential designation on basin secondary use
- Potential alteration to basin design and geometry to increase infiltration rates
- Potential alteration to profile data by over-excavating and backfilling with more permeable material to maximize infiltration

With this information, FMFCD will be better able to identify and prioritize projects at and near the basin sites to enhance recharge efforts at those locations. Data may also indicate locations where such projects would not be beneficial.