AGENDA
GROUNDWATER BANKING JOINT POWERS AUTHORITY
BOARD OF DIRECTORS
SPECIAL MEETING

December 28, 2020

Due to COVID-19, this meeting will be conducted as a teleconference pursuant to the provisions of the Governor's Executive Orders N-25-20 and N-29-20, which suspend certain requirements of the Ralph M. Brown Act. Members of the public may not attend this meeting in person.

Participation by members of the Board of Directors will be from remote locations. Public access and participation will only be available telephonically/electronically.

To virtually attend the meeting and to be able to view any presentations or additional materials provided at the meeting, please join online using the link and information below:

Via Web: https://zoom.us/j/87878804927
Meeting Number (Access Code): 878 7880 4927
Meeting Password: 198164
Telephone Dial In: (669) 900-6833

As courtesy to the other participants, please mute your phone when you are not speaking.

PLEASE NOTE: Participants joining the meeting will be placed into the lobby when the Board enters closed session. Participants who remain in the "lobby" will automatically be returned to the open session of the Board once the closed session has concluded. Participants who join the meeting while the Board is in closed session will be placed in the waiting room. When the Board has returned to open session, the participants will be automatically added to the meeting.

CALL TO ORDER 1:00 p.m.

ROLL CALL Directors Pierucci, Selvidge, Reinhart, Swan

PUBLIC COMMENT
NOTICE

If you wish to address the Board of Directors on any item, please submit a request to speak via the "chat" feature available when joining the meeting virtually. Remarks are limited to three minutes per speaker on each subject. You may also submit a public comment in advance of the meeting by emailing mmisuraca@rrbwsd.com before 5:00 pm. on December 26, 2020.

ALL VOTES SHALL BE TAKEN BY A ROLL CALL VOTE

1. COMMUNICATIONS TO THE BOARD

a) Written:
b) Oral:

2. ITEMS RECEIVEDTOO LATE TO BE AGENDIZED

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3. CONSENT ITEMS

4. JPA ADMINISTRATIVE ACTIONS

a) Consideration and possible action of Resolution No. 2020-2 - A Resolution of the Groundwater Banking Joint Powers Authority Adopting the State CEQA Guidelines as the Joint Powers Authority's CEQA Guidelines.

5. KERN FAN GROUNDWATER STORAGE PROJECT

a) Administrative Action
   i. Hearing to consider and possible action of FEIR Kern Fan Groundwater Storage Project, State Clearinghouse (SCH) No. 2020049019
      1. Resolution 2020-03 – Certifying FEIR SCH No. 2020049019 for proposed banking project;

      2. Adopt and Approve Findings of Fact and Mitigation Monitoring and Reporting Program as required by PR Code §§ 21081, 21081.6; and CEQA Guidelines 15091, 15092.

   ii. Consideration and possible action of Acknowledgment Letter to ESA

b) Engineering Update
   i. Consideration and possible action of Technical Memos 1, 2, and 3

c) Property Acquisition Update

6. GENERAL MANAGER'S REPORT

a) Funding Update
b) Groundwater JPA Tasks

7. OTHER BUSINESS

Pursuant to Government Code Section 54954.2, members of the Board of Directors or staff may ask questions for clarification, make brief announcements, and make brief reports on his/her own activities. The Board or a Board member may provide a reference to staff or other resources for factual information, request staff to report back at a subsequent meeting concerning any matter, or direct staff to place a matter of business on a future agenda. Such matters may be brought up under the General Manager's Report or Directors' Comments.

8. CLOSED SESSION

a) CLOSED SESSION CONFERENCE WITH REAL PROPERTY NEGOTIATORS – Pursuant to Government Code Section 54956.8:

Property: Parcels 103-110-02; 103-110-04; 103-110-09; 103-120-14; 103-120-15; 103-120-16; 103-120-17; 103-130-01; 103-130-03; 103-130-05; 103-130-07; 103-140-02; 103-140-05; 103-140-06; 103-140-12; 103-140-15; 103-140-16; 103-140-17; 103-140-18; 103-140-19; 103-180-01; 103-180-05; 103-180-07; 103-190-13; 103-190-14; 103-200-23; 103-200-25; 103-200-26; 103-200-27; 103-200-28; 103-200-29, County of Kern

Agency negotiators: Eric Averett

Negotiating parties: Belluomini Ranches, LP, Tech Ag Financial Group, Inc. and Rosedale-Rio Bravo Water Storage District

Under negotiation: Price and Terms of Payment

b) CLOSED SESSION CONFERENCE WITH REAL PROPERTY NEGOTIATORS – Pursuant to Government Code Section 54956.8:

Property: Various Parcels

Agency negotiators: Eric Averett

Negotiating parties: Various parties and Groundwater Banking Joint Powers Authority

Under negotiation: Price and Terms of Payment

9. OPEN SESSION

General Counsel may announce any reportable actions taken during Closed Session.

10. ADJOURN

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Availability of agenda materials: Agenda exhibits and other writings that are disclosable public records distributed to all or a majority of the members of the above-named Board in connection with a matter subject to discussion or consideration at an open meeting of the Board are available for public inspection by contacting Megan Misuraca at mmisuraca@rrbwsd.com. If such writings are distributed to members of the Board less than 72 hours prior to the meeting, they will be available to the public at the same time as they are distributed to Board Members, except that if such writings are distributed one hour prior to, or during, the meeting, they will be available electronically during the meeting.

Accommodations: Upon request, the Authority will provide for written agenda materials in appropriate alternative formats, and reasonable disability-related modification or accommodation to enable individuals with disabilities to participate in and provide comments at the meeting. Please submit a request, including your name, phone number and/or email address, and a description of the modification, accommodation, or alternative format requested at least two days before the meeting. Requests should be emailed to mmisuraca@rrbwsd.com. Requests made by mail must be received at least two days before the meeting. Requests will be granted whenever possible and resolved in favor of accessibility.

DECLARATION OF POSTING: I, Megan Misuraca, declare under penalty of perjury, that I am employed by the Rosedale-Rio Bravo Water Storage District and I posted the foregoing Agenda at the District Office on or before December 23, 2020.

December 28, 2020
Prepared by: Fiona Sanchez
Agenda Item: 4a

Adoption of California Environmental Quality Act Guidelines for the Groundwater Banking Joint Powers Authority

DISCUSSION:

Rosedale-Rio Bravo Water Storage District and Irvine Ranch Water District formed the Groundwater Banking Joint Powers Authority, a joint exercise of powers agency (Groundwater Banking JPA), pursuant to the Joint Powers Agreement Between Rosedale-Rio Bravo Water Storage District and Irvine Ranch Water District creating the Groundwater Banking Joint Powers Authority to Develop and Administer a Kern Fan Groundwater Storage Project, which took legal effect on July 1, 2020

As a public agency, one of the requirements of the Groundwater Banking JPA is to adopt, by resolution, rule, or regulation, objective, criteria, and procedures for the evaluation of environmental impacts from a proposed project pursuant to California Environmental Quality Act (CEQA) (PRC § 21082).

RECOMMENDATION:

That the Board adopt Resolution No. 2020-02 to Adopt the State California Environmental Quality Act Guidelines as the CEQA Guidelines of the Groundwater Banking Joint Powers Authority.

LIST OF EXHIBITS:

Exhibit “A” – Resolution to Adopt the State California Environmental Quality Act Guidelines as the CEQA Guidelines of the Groundwater Banking Joint Powers Authority

RESOLUTION NO. 2020-02

A RESOLUTION OF THE GROUNDWATER BANKING JOINT POWERS AUTHORITY ADOPTING THE STATE CEQA GUIDELINES AS THE JOINT POWERS AUTHORITY'S CEQA GUIDELINES

WHEREAS, in 1970 the California Legislature enacted the California Environmental Quality Act ("CEQA") (Public Resources Code, § 21000 et seq.) to require public agencies to consider the environmental impacts of their discretionary actions; and

WHEREAS, the State CEQA Guidelines (California Code of Regulations, Title 14, § 15000 et seq.) were prepared and adopted by the Secretary of the Natural Resources Agency to implement the provisions of CEQA; and

WHEREAS, pursuant to CEQA Section 21082 and State CEQA Guidelines Section 15022, all public agencies are required to adopt by ordinance, resolution, rule or regulations, objectives, criteria, and procedures for the evaluation of projects, and the preparation of environmental impact reports and negative declarations under the provisions of CEQA; and

WHEREAS, CEQA Sections 21082 and State CEQA Guidelines Section 15022 further require that the objectives, criteria, and procedures adopted by a public agency shall be consistent with the provisions of CEQA and with the State CEQA Guidelines; and

WHEREAS, the GROUNDWATER BANKING JOINT POWERS AUTHORITY (the "Authority") now desires to adopt the State CEQA Guidelines as its local guidelines; and

WHEREAS, after notice thereof having been duly, regularly and lawfully given, a public hearing on the proposed resolution was scheduled by the Authority for December 28, 2020, where all interested persons might appear and be heard; and

NOW, THEREFORE, BE IT RESOLVED, that the Authority adopt the State CEQA Guidelines, based on the following.

- Section 15022 of the State CEQA Guidelines allows a public agency to adopt the State CEQA Guidelines as its local guidelines through incorporation by reference.
- The Authority hereby adopts the State CEQA Guidelines adopted by the Secretary of the Natural Resources Agency of the State of California and codified in Title

14 of the California Code of Regulations commencing with Section 15000, as they may be amended from time to time, as its local CEQA Guidelines.

- All future revisions to the State CEQA Guidelines shall hereafter automatically be made a part of the Authority's local CEQA guidelines, without the need for any further action by the Authority.

ADOPTED by the Authority, December 28, 2020, by the following vote:

AYES:

NOES:

ABSENT:

ABSTAIN:

_____
Chair

ATTEST:

_____
Secretary

APPROVED AS TO FORM:

_____
Attorney

December 28, 2020
Prepared by F. Sanchez
Agenda Item: 5a.i

APPROVAL OF FINAL ENVIRONMENTAL IMPACT REPORT FOR
KERN FAN GROUNDWATER STORAGE PROJECT

DISCUSSION:

The Groundwater Banking Joint Powers Authority (Authority) as the Lead Agency, in consultation with Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) as Responsible Agencies, has prepared a Final Environmental Impact Report (FEIR) for the Kern Fan Groundwater Storage Project. The actions described in this item are necessary steps for the Authority to complete as required of a lead agency under the California Environmental Quality Act (CEQA) prior to taking action on the project. Staff recommends that the Board:

- Consider the attached FEIR, the Findings and Facts in Support of Findings, and the Mitigation Monitoring and Reporting program;
- Direct staff to incorporate into the findings as presented in this meeting, such revisions as may be necessary to conform the findings to any information that may be received after preparation of said findings and prior to this action, including any comments from the board at this meeting;
- Direct that the findings, as so revised, be attached to the resolution; and
- Adopt the attached resolution relative to certifying the FEIR, adopting written findings, approving the Mitigation Monitoring and Reporting Program (MMRP), approving the project and authorizing staff to file a Notice of Determination.

Pursuant to the requirements of CEQA Guidelines, a Notice of Preparation was publicly circulated for 30 days on April 8, 2020. In addition, a public scoping meeting was held on April 29, 2020. The purpose of the meeting was to provide the public and governmental agencies information on the CEQA process and to give further opportunities to identify environmental issues and alternatives for consideration in the Environmental Impact Report (EIR).

Public Review:

On October 19, 2020, Rosedale filed a Notice of Completion of the Draft EIR with the Governor's Office of Planning and Research. Pursuant to Section 21091 of the Public Resources Code, the filing initiated a 45-day public review period. A Notice of Availability of the Draft EIR was posted on October 16, 2020, with the County Clerks in Kern County and Orange County. A public meeting was held at Rosedale's office in Bakersfield on November 4, 2020. No comments were offered from the audience at the public meeting.

Nine letters providing comments on the Draft EIR were received during the public review period. The agencies that provided comments are the California Department of Water Resources, California Department of Water Resources Division of Safety of Dams, California Department of Fish and Wildlife, West Kern Water District, the Kern

County Water Agency, the Kern Water Bank Authority, the Metropolitan Water District of Southern California, the Dudley Ridge Water District and the City of Bakersfield. The Authority, in consultation with Rosedale and IRWD, reviewed all of the written comments received and prepared detailed responses to comments directed to any significant environmental issues. The comments, responses and revisions to the Draft EIR text are included in separate document comprised of additional chapters (8-11) which, together with the Draft EIR, comprise the FEIR. This FEIR is attached as Exhibit "A". The Findings and Facts in Support of Findings for the Project are attached as Exhibit "B". The Mitigation Monitoring and Reporting Program (MMRP) is presented as Exhibit "C".

The Authority's consideration must be given to the environmental effects of the Proposed Project prior to reaching a decision on the project. In addition, the Authority must approve findings related to the Proposed Project and file a Notice of Determination. The Authority has the responsibility for mitigating or avoiding only the direct or indirect environmental effects of those portions of the Proposed Project it decides to approve and/or carry out.

Staff requests that the Board consider the environmental effects, proposed mitigation measures and all findings of the Proposed Project by reviewing the attached exhibits. The resolution for adopting the findings and approving the project is presented in Exhibit "D".

RECOMMENDATION:

THAT THE BOARD DIRECT STAFF TO INCORPORATE INTO THE DRAFT FINDINGS AS PRESENTED IN THIS MEETING SUCH REVISIONS AS MAY BE NECESSARY TO CONFORM THE FINDINGS TO ANY INFORMATION THAT MAY BE RECEIVED AFTER PREPARATION OF SAID FINDINGS AND PRIOR TO THIS ACTION, INCLUDING ANY COMMENTS FROM THE BOARD AT THIS MEETING; DIRECT THAT THE FINDINGS, AS SO REVISED, BE ATTACHED TO THE BELOW-MENTIONED RESOLUTION AND CONSIDER ADOPTING THE FOLLOWING RESOLUTION BY TITLE:

RESOLUTION NO. 2020–03

RESOLUTION OF THE BOARD OF DIRECTORS OF THE GROUNDWATER BANKING JOINT POWERS AUTHORITY CERTIFYING THE ENVIRONMENTAL IMPACT REPORT FOR THE KERN FAN GROUNDWATER STORAGE PROJECT; ADOPTING WRITTEN FINDINGS PURSUANT TO THE CALIFORNIA ENVIRONMENTAL QUALITY ACT; ADOPTING A MITIGATION, MONITORING AND REPORTING PROGRAM; APPROVING THE PROJECT; AND AUTHORIZING THE FILING OF A NOTICE OF DETERMINATION TO PROCEED WITH THE PROJECT

LIST OF EXHIBITS:

Exhibit “A” – Final Environmental Impact Report for Kern Fan Groundwater Storage Project
Exhibit “B” – Draft Resolution

Findings and Facts in Support of Findings is attached as Exhibit “1” to the Draft Resolution

Mitigation Monitoring and Reporting Program is attached as Exhibit “2” to the Draft Resolution

A COPY OF EXHIBIT "A" CAN BE OBTAINED FROM THE AUTHORITY'S SECRETARY

AND IS AVAILABLE FOR DOWNLOAD AT THE FOLLOWING LINKS

https://www.rrbwsd.com/wp-content/uploads/2020/12/KernFanGroundwater-StorageProject_FEIR_Dec2020.pdf

https://www.irwd.com/images/pdf/doing-business/environmental-documents/env-documents-2020/KernFanGroundwater_StorageProject_FEIR_Dec2020.pdf

RESOLUTION NO. 2020-03

RESOLUTION OF THE BOARD OF DIRECTORS OF THE GROUNDWATER BANKING JOINT POWERS AUTHORITY RELATIVE TO ITS CONSIDERATION OF THE FINAL ENVIRONMENTAL IMPACT REPORT FOR THE KERN FAN GROUNDWATER STORAGE PROJECT; ADOPTING WRITTEN FINDINGS PURSUANT TO THE CALIFORNIA ENVIRONMENTAL QUALITY ACT; ADOPTING A MITIGATION, MONITORING AND REPORTING PROGRAM; APPROVING THE PROJECT; AND AUTHORIZING THE FILING OF A NOTICE OF DETERMINATION TO PROCEED WITH THE PROJECT

WHEREAS, the Groundwater Banking Joint Powers Authority ("Authority") propose to implement the Kern Fan Groundwater Storage Project (the "Project"), a project to develop and operate groundwater banking facilities in two phases on approximately 1,300 acres of agricultural or vacant land within or near the Rosedale-Rio Bravo Water Storage District's service area; and

WHEREAS, pursuant to the California Environmental Quality Act ("CEQA") and the State CEQA Guidelines (14 CCR § 15000 *et seq.*), The Authority is the Lead Agency for the Project in consultation with Rosedale-Rio Bravo Water Storage District ("Rosedale") and Irvine Ranch Water District ("IRWD") as Responsible Agencies; and

WHEREAS, the Authority, as the lead agency for the Project, prepared a notice of preparation of an Environmental Impact Report ("EIR") for the Project as required by CEQA and publicly circulated it for 30 days on April 8, 2020. In addition, a public scoping meeting was held on April 29, 2020; and

WHEREAS, taking into consideration the comments received during the public scoping process and other CEQA requirements relating to the contents of an EIR, a Draft Environmental Impact Report (DEIR) was prepared by the Authority; and

WHEREAS, the DEIR was circulated by the Authority from October 16, 2020 to November 30, 2020, and a notice of availability of the Draft EIR was posted on October 16, 2020, with the County Clerks in Kern County and Orange County. A public meeting was held on November 4, 2020 wherein Rosedale and IRWD provided an opportunity for attendees to submit written or verbal comments on the scope of the environmental analysis to be included in this Draft EIR facilitated using Zoom, a virtual communication program, in compliance with health-related orders of the State of California.; and

WHEREAS, during the official public review period for the DEIR, nine comment letters were received by the Authority; and

WHEREAS, the Authority reviewed all of the comments on the DEIR received from interested persons, organizations and agencies and prepared detailed responses to the comments directed to any significant environmental issues all of which were provided to commenting agencies on December 18, 2020; such items which were set forth in separate chapters, along with the DEIR, revisions to the DEIR text and other information required by CEQA to be included in the Final EIR ("FEIR"), and

WHEREAS, CEQA provides that when an EIR identifies any significant environmental effects that would occur if the project is approved or carried out, the agency must make a specified finding or findings with respect to each of the identified significant effects, and must also adopt a mitigation monitoring program for the changes to the project which it has adopted or made condition of approval in order to mitigate or avoid significant project-related impacts on the environment; and

WHEREAS, in accordance with the CEQA requirements described in the foregoing recital and proposed findings a Mitigation, Monitoring and Reporting Program ("MMRP") have been prepared and presented to this Board; and

WHEREAS, the Board of Directors has been presented with, reviewed and considered the information contained in the FEIR, the proposed findings, the MMRP, and all oral and written evidence constituting the administrative record presented to this Board during all meetings and discussions relating to the Project; and

WHEREAS, the record of proceedings on which this Resolution is based is located at the RRBWSD's office, at 849 Allen Road in Bakersfield, California, and the custodian of such record is the General Manager of said District (this information provided pursuant to Public Resources Code § 21081.6); and

WHEREAS, as contained herein, the Board of Directors has endeavored in good faith to set forth the basis for its decision on the Project; and

WHEREAS, all of the findings and conclusions made by the Board pursuant to this Resolution are based upon the oral and written evidence presented to it as a whole and not based solely on the information provided in this Resolution; and

WHEREAS, all legal prerequisites to the adoption of this Resolution have occurred.

NOW, THEREFORE, the Board of Directors of the Groundwater Banking Joint Powers Authority DOES HEREBY RESOLVE, DETERMINE AND ORDER as follows:

Section 1. All of the foregoing recitals are true and correct.

Section 2. The FEIR, the findings and the MMRP set forth in Exhibits 1 (Findings) & 2 (MMRP) to this resolution for the Project are hereby certified as being adequate, complete, and prepared in accordance with CEQA.

Section 3. The Board of Directors of Groundwater Banking Joint Powers Authority has reviewed and considered the environmental effects of the Project as shown in the FEIR, as well as all other information contained in the FEIR, prior to approving the Project.

Section 4. The FEIR, the MMRP and the Findings reflect the Groundwater Banking Joint Powers Authority's independent judgment and analysis.

Section 5. The FEIR is hereby certified as complete.

Section 6. The MMRP and the Findings are hereby adopted and approved, and Authority staff and designated persons are directed to implement and enforce the mitigation measures specified therein in the implementation of the Project.

Section 7. The Project is hereby approved.

Section 8. Authority staff and designated persons are hereby authorized and directed to take all actions necessary to effectuate the intent of this resolution, and to cause a Notice of Determination reflecting the foregoing actions to be executed and filed with the Kern County Clerk and the State Clearinghouse.

ADOPTED, SIGNED AND APPROVED by the Authority, December 28, 2020, by the following vote:

AYES:

NOES:

ABSENT:

ABSTAIN:

/ / /

I HEREBY CERTIFY that the foregoing is the resolution of the Board of Directors of the Groundwater Banking Joint Powers Authority.

_____

Board President

ATTEST:

_____

Authority Secretary

Exhibit 1

FINDINGS AND FACTS IN SUPPORT OF FINDINGS

GROUNDWATER BANKING JOINT POWERS AUTHORITY
KERN FAN GROUNDWATER STORAGE PROJECT
(State Clearinghouse No. 2020049019)

I. Description of the Project

Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) have formed the Groundwater Banking Joint Powers Authority (Authority) for the purpose of developing, constructing and operating the Kern Fan Groundwater Storage Project (proposed project) in western Kern County. The proposed project would involve the construction and operation of water conveyance, recharge and recovery facilities. The proposed recharge and recovery facilities would be constructed in two phases on approximately 1,300 acres of agricultural or vacant land within or near the Rosedale service area. The proposed project would also involve the acquisition of easements for construction, operation and maintenance of proposed Kern Fan Conveyance Facilities that would deliver water to and from the California Aqueduct and other facilities operated in Rosedale's Conjunctive Use Program. Implementation of the proposed facilities would allow Rosedale and IRWD to more effectively manage sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin.

II. Compliance with the California Environmental Quality Act

The Authority is the Lead Agency for the project under the California Environmental Quality Act ("CEQA"). Pursuant to the requirements of the State CEQA Guidelines, a Notice of Preparation was publicly circulated for a 30-day period concluding May 8, 2020. In addition, the Authority held one virtual public scoping meeting on April 29, 2020 to provide the public and governmental agencies information on the CEQA process and to give further opportunities to identify environmental issues and alternatives for consideration in the EIR.

On October 16, 2020, the Authority posted a Notice of Availability of the Draft EIR (DEIR) with the County Clerks in Kern County and Orange County. The DEIR was circulated for public review during the public review period established for the DEIR (October 16, 2020 through November 30, 2020). One virtual public meeting on the DEIR was held on November 4, 2020; no comments were received from the audience at the meeting.

Written comments were received. The Authority reviewed all of the written comments received from interested persons, organizations and agencies and prepared detailed responses on the comments directed to any significant environmental issues. The comments and responses, along with revisions to the DEIR text, are included in separate chapters, which, together with the DEIR, comprise the Final EIR.

III. Findings Regarding Potentially Significant Environmental Impacts

The EIR described the baseline environmental setting and addressed the environmental resource areas in which the proposed project could result in potentially significant effects:

aesthetics; agriculture and forestry resources; air quality; biological resources; cultural resources; energy; geology and soils; greenhouse gas emissions; hazards and hazardous materials; hydrology and water quality; land use and planning; mineral resources; noise and vibration; transportation; tribal cultural resources; utilities and service systems; and wildfire. Measures to mitigate the impacts of the proposed project were presented for each resource area where significant potential impacts were identified. Based on the results of the EIR analysis, it was concluded that the implementation of environmental commitments incorporated into the project along with proposed mitigation would insure that impacts to these environmental resources would be less than significant for the project.

The EIR reviewed combined cumulative impacts associated with the project's effects in conjunction with the effects of past, present and reasonably foreseeable future projects in the same geographic area. For this purpose, the EIR included a list of past, present and reasonably-foreseeable future capital improvement, development and other construction projects located in the vicinity of the project, as well as identified past, present and reasonably-foreseeable groundwater banking projects in the Kern Fan Area. The cumulative impact analysis was conducted for each of the same environmental resources listed above for the project impact analysis. The EIR analysis concluded that, with the implementation of the proposed mitigation measures, the project would not have any cumulatively significant impacts.

Population projections and water demands within the IRWD and Rosedale service areas were presented and the growth-inducement potential of the project was analyzed.

CEQA provides that when an EIR identifies any significant environmental effects that would occur if the project is approved or carried out, the agency must make a finding or findings for each of the identified significant effects, accompanied by a brief explanation of the rationale for each finding. The possible types of findings are:

Finding 1	Changes or alterations have been required in, or incorporated into, the project which mitigate or avoid the significant effects on the environment.
Finding 2	Those changes or alterations are within the responsibility and jurisdiction of another public agency and have been, or can and should be, adopted by that other agency.
Finding 3	Specific economic, legal, social, technological, or other considerations, including considerations for the provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or alternatives identified in the environmental impact report.

CEQA provides that when making findings, a public agency must adopt a reporting monitoring program for the changes to the project that it has adopted or made conditions of approval in order to mitigate or avoid significant project-related impacts on the environment. In accordance with CEQA, a Mitigation Monitoring and Reporting Program (MMRP) has been prepared for the proposed project. The MMRP is designed to ensure compliance during implementation of the approved project through ongoing monitoring and reporting of adopted mitigation measures as well as environmental commitments incorporated into the project. The primary goal of the MMRP is to ensure that during final design, construction, and operation, the project will avoid or reduce potentially significant environmental impacts.

The facts listed herein in support of findings summarize the basis for the findings, as set forth more fully in the DEIR, Final EIR and appendices thereto. For convenience of reference, impacts and mitigation measures are referenced by designations given in the EIR (*e.g.,* "AES-1"). A complete description of each mitigation measure is contained in the MMRP. By specific topic area, the findings and facts in support of the findings are as follows:

A. Aesthetics

POTENTIAL EFFECTS: Potential effects examined included: the potential to adversely affect a scenic vista [Impact 3.1-1]; the potential to damage scenic resources within a state scenic highway [Impact 3.1-2]; the potential to degrade existing visual character or quality of the project area and its surroundings [Impact 3.1-3]; the potential to create a new source of substantial light or glare that would adversely affect day or nighttime views [Impact 3.1-4]; and the potential to result in cumulatively considerable impacts to aesthetics [Impact 3.1-5].

FINDINGS: Adherence to the mitigation measure AES-1 listed in the EIR will reduce Impact 3.1-4 and 3.1-5 to less than significant (Finding 1). Impact 3.1-3 will be less than significant, requiring no mitigation. The remaining potential impacts will not occur.

FACTS IN SUPPORT OF THE FINDINGS:

Impacts Not Occurring: The project area is not considered a scenic vista and would not be located within a designated scenic vista or scenic highway corridor. No impacts to scenic vistas would occur as a result of the proposed project. There are no designated scenic highways in the project vicinity; therefore, the proposed project would not affect any scenic resources within a scenic highway corridor.

Impact 3.1-3: The visual character of the project area and its surroundings would not be substantially degraded by implementing recharge and recovery facilities within the area. Neighboring and surrounding properties include a mixture of agricultural, rural residential, and groundwater banking land uses and facilities. Conversion of the project area from agricultural production to include groundwater banking and water conveyance would not change the composition and character of the surrounding landscape. Impacts to visual character would be less than significant. As a result, Impact 3.1-3 would be less than significant, requiring no mitigation.

Impact 3.1-4: Nighttime construction lighting and security lighting would be shielded and directed downward, away from neighboring properties and surrounding areas, in accordance with Mitigation Measure AES-1. Construction lighting would be temporary and permanent security lighting would be connected to motion sensors. As a result, the proposed project would minimize new nighttime light sources and would protect the ability to view the night sky by restricting unnecessary upward projection of light, in support of the Kern County Dark Skies Ordinance. Impacts related to light and glare would be less than significant with mitigation.

Impact 3.1-5: The geographical extent of cumulative impacts related to aesthetics includes viewsheds in the San Joaquin Valley in which the project is visible. Significant cumulative impacts related to aesthetics could occur if the project, in conjunction with cumulative projects, could block significant scenic vistas, create cumulative light and glare, or substantially degrade the visual quality of an area. The cumulative projects are projects that either involve road improvements and extensions, and one recharge, conveyance and recovery project within the Rosedale service area. There are no scenic vistas within the general vicinity of the proposed

project, therefore cumulative projects would not combine with the proposed project to impact scenic vistas within the area. Further, there are no State Scenic Highways in the general vicinity of the area, therefore no cumulative impacts would occur in regards to degrading aesthetic resources within view corridors of State Scenic Highways.

While the cumulative projects would involve construction equipment similar to the proposed project, the machinery would only be visible for short periods of time and construction work is temporary in nature. Therefore, construction of cumulative projects in conjunction with the proposed project would not result in significant cumulative impacts to the visual character of the area during construction. Some cumulative projects would implement road improvements and extensions on existing streets and highways; therefore, implementation of these cumulative projects would not result in significant impacts to the visual character of the area once constructed. Various cumulative projects would introduce new built facilities into the project area that are similar to the proposed project. The proposed facilities would include water recharge, recovery and conveyance facilities. Similar to discussed above, the project area's existing environment consists of similar water facilities spread out amongst agricultural and rural residential areas. Because these cumulative projects would implement similar facilities that are within the existing environment of the project area, the project would not substantially alter or degrade the visual character and quality of the general vicinity of the proposed project. Cumulative projects, in conjunction with the proposed project would result in less than significant cumulative impacts to visual character and quality.

Cumulative projects that include road improvements would occur within existing roadways, and therefore would not implement new structures that would introduce new light or glare into the area. However, similar to the proposed project, other cumulative projects would include wells, which would require overnight drilling and nighttime lighting during construction. Further, new built water facilities proposed as part of the cumulative projects may contain security lighting. Implementation of cumulative projects could result in significant impacts regarding light and glare. However, the proposed project would include implementation of Mitigation Measure AES-1, which would direct and shield lighting away/from neighboring properties. Therefore, the proposed project's contribution to cumulative light and glare impacts would result in less than cumulatively considerable impacts regarding light and glare. The project would not combine together with the projects in the cumulative scenario to be cumulatively considerable, and impacts would be less than significant with mitigation.

MITIGATION MEASURES: AES-1.

B. Agricultural and Forestry Resources

POTENTIAL EFFECTS: Potential effects examined included the potential to: convert Prime Farmland, Unique Farmland or Farmland of Statewide Importance (Farmland) to non-agricultural use [Impact 3.2-1]; conflict with existing zoning for agricultural use, or a Williamson Act contract [Impact 3.2-2]; conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production [Impact 3.2-3]; result in the loss of forest land or conversion of forest land to non-forest use [Impact 3.2-4]; involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use [Impact 3.2-5]; or result in cumulatively considerable impacts to agriculture and forestry resources [Impact 3.2-6].

FINDINGS: Adherence to the Mitigation Measure AGR-1 listed in the EIR will reduce Impact 3.2-2 and 3.2-6 to less than significant (Finding 1). Impact 3.2-1 would be less than significant, requiring no mitigation. The remaining potential impacts will not occur.

FACTS IN SUPPORT OF THE FINDINGS:

Impacts Not Occurring: The proposed project does not include lands zoned as forest land, timberland, or timberland zoned Timberland Production, and does not include forest land. There would be no conflict with forest land zoning, and the proposed project would not result in the loss of forest land or conversion of forest land to non-forest use.

Impact 3.2-1: The proposed project would support agricultural resources in the region through groundwater recharge and conveyance. The proposed project would be compatible with the goals and policies of the Kern County General Plan for protecting agricultural resources through the beneficial use of percolation basins and conveyance facilities and would reduce the potential for the project sites to be converted to permanent non-agricultural land uses, such as residential, commercial, or industrial uses. The implementation of groundwater recharge, recovery, and conveyance facilities within the project area would not result in the conversion of Prime Farmland or other FMMP-designated farmland to non-agricultural uses. Agricultural land uses, such as annual farming, grazing, or fallowing, would be allowed within the basins when not operated for water recharge or water management purposes. The project sites would be managed in accordance with Kern County's rules for agricultural preserves as applicable. The Authority (or their respective lessees) shall supply any water necessary for irrigated agriculture or other overlying uses. Thus, impacts relating to the conversion of farmland to non-agricultural uses would be less than significant.

Impact 3.2-2: If a proposed project site were to be located within a County-designated agricultural preserve and/or under an existing Williamson Act contract, then Kern County's *Agricultural Preserve Standard Uniform Rules* may apply. The rules are designed to restrict land uses to those compatible with agriculture, including crop cultivation, livestock breeding, grazing operations, and dairies. The *Standard Uniform Rules* state that public water utility facilities are considered compatible uses. Therefore, the Kern Fan Conveyance Facilities would be considered compatible uses on lands under Williamson Act contract. The *Standard Uniform Rules* also state that groundwater recharge operations are compatible land uses on agricultural preserves if the preserve is used for commercial agriculture for at least seven months out of a twelve-month period. Therefore, if the proposed recharge and recovery facilities would be located on Williamson Act lands, then during periods when the basins are not operated for water recharge or water management purposes, the basins would be used for agricultural purposes, such as annual farming, grazing, or fallowing. Farming and livestock grazing are considered compatible agricultural uses. Alternatively, groundwater recharge facilities are considered compatible land uses if the Land Use Contract is amended by the County Board of Supervisors to allow water recharge as the primary purpose of an "open space" contract. Implementation of Mitigation Measure AGR-1 would require compliance with the *Standard Uniform Rules* as applicable to avoid conflict with agricultural zoning or potential Williamson Act contracts. If a proposed project site is not under a Williamson Act contract, then Mitigation Measure AGR-1 would not apply. Impacts would be less than significant with mitigation.

Impact 3.2-6: The geographic scope used to analyze cumulative impacts to agriculture is the San Joaquin Valley. As discussed above the proposed project would not involve the conversion of forested land nor would the proposed project be located on any forested land. As such, the project would have no impacts to forested land or conversion of forested land and would, in turn,

not be cumulatively considerable for impacts to forestry resources. The project would, however, potentially impact agricultural lands in the project area.

The cumulative impact of the proposed project on agricultural resources is dependent on the past, present, and reasonably-foreseeable future conditions of development and land use in the project vicinity. There is an abundance of land in the vicinity of the proposed project that is categorized as Prime Farmland, Unique Farmland, and Farmland of Statewide Importance. Other related projects in the area could result in the conversion of agricultural lands. The projects to be considered cumulatively, together with the proposed project, are listed in Table 3-2 of the EIR. The projects in Table 3-2 include road improvements, management plans and water recharge, conveyance, and diversion. Rosedale serves as the lead agency for several of the projects considered for cumulative analysis. The water recharge and water banking projects (Projects No. 3 to 10, 12 and 13) could be considered cumulative if they involve the conversion of agricultural lands in the greater San Joaquin Valley. However, similar to the proposed project, water utility infrastructure and groundwater recharge facilities are compatible with agricultural zoning and agricultural preserves.

The proposed project would not contribute to cumulative farmland conversion in conjunction with the projects discussed in Table 3-2. As discussed above, the proposed project would provide benefits to agriculture in the project vicinity by preventing the conversion of the proposed project area from farmland to residential or commercial development and preventing overdraft conditions in the underlying groundwater basin, upon which regional farmers depend for irrigation water, and supporting sustainable management of the Kern County Sub-basin in the future as part of the Kern Groundwater Authority GSP. Groundwater recharge is a compatible agricultural land use, and the proposed project would not convert agricultural lands to non-agricultural use Additionally, the implementation of Mitigation Measure AGR-1 would ensure the Kern Fan Project Properties would be managed as applicable in accordance with Kern County's *Agricultural Preserve Standard Uniform Rules*. As such, the proposed project would not cumulatively contribute to impacts on agriculture and forestry resources.

MITIGATION MEASURES: AGR-1.

C. Air Quality

POTENTIAL EFFECTS: Potential effects examined included the potential to: conflict with or obstruct implementation of the applicable air quality plan [Impact 3.3-1]; result in a cumulatively considerable net increase of any nonattainment pollutant [Impact 3.3-2]; expose sensitive receptors to substantial pollutant concentrations [Impact 3.3-3]; or result in other emissions (such as those leading to odors) adversely affecting a substantial number of people [Impact 3.3-4].

FINDINGS: Adherence to the Mitigation Measure AIR-1 listed in the EIR will reduce Impact 3.3-2 to less than significant (Finding 1). Impacts 3.3-1, 3.3-3, and 3.3-4 will be less than significant, requiring no mitigation.

FACTS IN SUPPORT OF THE FINDINGS:

Impact 3.3-1: If a City or County's General Plan is consistent with the most recently adopted clean air plan, a project that is consistent with the General Plan's land use designation is considered consistent with applicable air quality plans and policies. As stated in Chapter 3.10, Land Use and Planning, the proposed project would be consistent with the Kern County land use designations and

zoning for the project area. In addition, the County General Plan is consistent with the applicable air quality plan because data and projections from the General Plans are incorporated into the clean air plans. Development of the proposed project would not interfere with population and long-term vehicle-miles-traveled (VMT) projections used to develop the air quality plan projections as it would not increase the population of the area and operational VMT traveled would be negligible. Therefore, the proposed project would result in a less-than-significant impact because it would not conflict with the applicable air quality management plan.

Impact 3.3-2: PM10 and PM2.5 emissions from construction would vary greatly from day to day depending on the level of activity, the equipment being operated, silt content of the soil, and the prevailing weather. Therefore, unmitigated construction dust emissions could result in significant local effects. For all construction projects, implementation of all Regulation VIII fugitive dust control measures is required by law. Implementation of the Regulation VIII fugitive dust control measures and all additional feasible measures would reduce construction PM10 emissions associated with the project to a less-than-significant level, based on the short-term exposure of any single sensitive receptor to residual fugitive dust emissions. The Authority would comply with all applicable SJVAPCD rules and regulations, including Rule 8011 (fugitive dust control measures).

In addition, construction equipment, construction-worker commute vehicles, construction vendor, water, concrete and haul trucks would also generate criteria air pollutant emissions. Criteria pollutant emissions of ROG, NOX, CO, SOX from these emissions sources would incrementally add to regional atmospheric loading of ozone precursors during the construction period. In addition, the project would need to comply with SJVAPCD Rule 9510, which would reduce emissions of NOX and PM10 during project construction. As depicted in Impact 3.3-2, the estimated unmitigated emissions from construction would exceed applicable significance thresholds for NOx. However, implementation of Mitigation Measure AIR-1 would require the project to utilize off-road diesel-powered construction equipment that meet or exceed CARB and USEPA Tier 4 Interim or better off-road emissions standards for equipment rated at 50 horsepower (hp) or greater during project construction.

Long-term project operations would result in a less-than-significant individual project impacts. The project would result in less than cumulatively considerable increases of criteria air pollutants with the implementation of Mitigation Measure AIR-1 during construction.

Impact 3.3-3: Construction of the proposed project would result in short-term diesel exhaust emissions (DPM), which are TACs, from on-site heavy-duty equipment. Project construction would generate DPM emissions from the use of off-road diesel equipment required for site grading and excavation, and other construction activities, as well as from the use of on-road heavy duty trucks. The dose to which sensitive receptors are exposed is the primary factor used to determine health risk. The distribution of construction over a large area would disperse pollutants generated by construction activity as construction moves from one location to another within the Phase 1 and Phase 2 areas such that any one specific sensitive receptor location would not be exposed to prolonged periods of construction activity and would not be exposed to substantial pollutant concentrations.

The project would also utilize a construction contractor(s) that complies with required and applicable BACT and the In-Use Off-Road Diesel Vehicle Regulation that would minimize diesel particulate matter emissions from construction activities. Furthermore, compliance with the CARB anti-idling Air Toxics Control Measure, which limits idling to no more than five minutes at any location for diesel-fueled commercial vehicles, would further minimize diesel particulate matter emissions in the construction area. Because the use of mobilized equipment would be temporary and because

construction activity would move from one location to another within the Phase 1 and Phase 2 areas such that any one specific sensitive receptor location would not be exposed to prolonged periods of construction activity, DPM from construction activities would not be anticipated to result in the exposure of sensitive receptors to levels that exceed applicable standards.

The long-term operation of the project would result in minimal TAC emissions associated with routine maintenance operations including weed and pest control and triennial earthwork activities. As a result, exposure of sensitive receptors to substantial toxic air emissions from the project would be less-than-significant.

Valley Fever. The project has the potential to generate fugitive dust containing Valley Fever spores (*Coccidioides immitis* fungus) that could then reach nearby sensitive receptors during construction. The majority of the project area consists of cultivated fields, canals and ditches, recharge ponds, and paved roadways, which have a low likelihood of containing Valley Fever spores due to the past soil disturbance and turnover. As a result, the proposed project would not be anticipated to expose nearby sensitive receptors to active Valley Fever spores. Furthermore, the project would be required to implement SJVAPCD Rule 8011, fugitive dust control measures. In addition, the project would be required to comply with SJVAPCD Rule 8021 Section 6.3, which requires applicants to develop, prepare, submit, obtain approval of, and implement a Dust Control Plan, which would reduce fugitive dust emission impacts to less than significant for all construction phases of the project, which would also control the release of the *Coccidioides immitis* fungus from construction activities. Controlled construction practices to prevent fugitive dust make the spreading of Valley Fever to nearby sensitive receptors and surrounding communities unlikely.

Long-term operation of the proposed project would result in minimal fugitive dust emissions associated with routine maintenance operations including weed and pest control and triennial earthwork activities. The proposed facilities associated with the proposed project include the same kinds of water recharge, recovery and conveyance facility operations occurring under existing conditions in the project area. Therefore, the potential for the proposed project to result in an increase in the exposure of nearby sensitive receptors and onsite workers to Valley Fever spores at a greater level than in the existing condition would not be anticipated. Impacts would be less than significant.

Carbon Monoxide Hotspots. CO is a localized pollutant of concern. However, construction activities would only constitute approximately 7 percent of the total 70-year exposure period. In addition, the majority of project construction activity would occur at a substantial distance from sensitive receptors, and because the use of mobilized equipment, worker and truck vehicles would be temporary and there are no sensitive receptors located immediately adjacent to areas where construction would occur for prolonged periods, construction would not emit CO in quantities that could pose health concerns. Also, due to the existing low concentrations of CO in the area that are projected to further decline in the future, project operations would not result in or contribute substantially to an air quality. Long-term operations would result in minimal CO emissions associated with routine weed and pest control and triennial earthwork activities. Thus, operational emissions of CO would not result in or contribute substantially to an air quality violation. The short-term construction and long-term operational mobile-source impact of the project on CO concentrations would be less-than-significant and no mitigation is required.

Impact 3.3-4: Types of land uses that typically pose potential odor problems include agriculture. However, agricultural land uses are part of the baseline conditions for the project sites and surrounding area. Therefore, the proposed project would not change baseline conditions to

introduce new land uses that would create objectionable odors. Occasionally, diesel exhaust from heavy equipment used during construction activities or during operational maintenance activities can generate objectionable odors, but these dissipate very quickly. Thus, neither construction nor the operation of the project would create objectionable odors affecting a substantial number of people, and odor impacts would be less-than-significant.

MITIGATION MEASURES: AIR-1.

D. Biological Resources

POTENTIAL EFFECTS: Potential effects examined included the potential to: have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species [Impact 3.4-1]; have a substantial adverse effect on any riparian habitat or other sensitive natural community [Impact 3.4-2]; have a substantial adverse effect on federally protected wetlands [Impact 3.4-3]; interfere substantially with the movement of any native resident or migratory species or with established wildlife corridors or nursery sites [Impact 3.4-4]; conflict with any local policies or ordinances protecting biological resources [Impact 3.4-5]; conflict with the provisions of a local, regional, or state habitat conservation plan [Impact 3.4-6]; or result in cumulatively considerable impacts to biological resources [Impact 3.4-7].

FINDINGS: Adherence to the Mitigation Measures BIO-1 through BIO-11 listed in the EIR will reduce Impact 3.4-1 to less than significant, adherence to Mitigation Measures BIO-10 through BIO-12 will reduce Impact 3.4-2 to less than significant, adherence to Mitigation Measure BIO-13 will reduce Impact 3.4-3 to less than significant, and adherence to Mitigation Measures BIO-1 through BIO-13 will reduce Impact 3.4-5 to less than significant, adherence to Mitigation Measures BIO-10, BIO-11, and BIO-14 will reduce Impact 3.4-6 to less than significant, adherence to Mitigation Measures BIO-1 through BIO-14 will reduce Impact 3.4-7 to less than significant (Finding 1). Impact 3.4-4 will be less than significant, requiring no mitigation.

FACTS IN SUPPORT OF THE FINDINGS:

Impact 3.4-1: *Reptiles.* Construction activities associated with the proposed project could result in adverse impacts to blunt-nosed leopard lizard. Direct impacts to blunt-nosed leopard lizard would involve the removal of the non-native grassland, which is suitable habitat for the species. Implementation of Mitigation Measure BIO-1 would reduce potential impacts to blunt-nosed leopard lizard to a less than significant level. Mitigation Measure BIO-1 requires protocol level surveys to be conducted in accordance with the CDFW *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard* and, if necessary, subsequent surveys to determine measures for avoidance, minimization, restoration, preservation, or compensation.

Birds. Construction activities associated with the proposed project could result in adverse impacts to migratory birds protected under the MBTA and special-status bird species, including Swainson's hawk, burrowing owl, California horned-lark, and tricolored blackbird. Direct impacts to migratory birds and special-status bird species, including raptors, the Watch List species California horned-lark and the State threatened tricolored blackbird, would involve the removal/disturbance of the non-native grassland, active agricultural fields, which have the potential to provide nesting opportunities for resident birds. Removal of nesting habitat during the breeding season could result in the direct mortality of birds. Vegetation and tree removal, construction noise, vibrations, and human disturbance could cause nest abandonment, death of the young, or loss of reproductive potential at active nests located near proposed project

activities. Implementation of Mitigation Measure BIO-2 would reduce potential impacts to special-status, common nesting and migratory birds to less than significant levels.

The project areas provide potential foraging habitat for this species. To avoid impacts to the species, preconstruction surveys would be conducted as described in Mitigation Measure BIO-3, with additional measures implemented to avoid disturbance in the event the species is detected. With implementation of Mitigation Measure BIO-3, any impacts to Swainson's hawk would be less than significant.

Burrowing owl suitable habitat was observed within the project areas, which includes non-native and annual grasslands, agriculture fields and the earthen berms located adjacent to access roads. As a State Species of Special Concern, displacement of burrowing owls would be considered a significant impact. Burrowing owl surveys would be required prior to project implementation and would be conducted according to the *Staff Report on Burrowing Owl Mitigation* prepared by CDFW (2012). With implementation of Mitigation Measure BIO-4, any impacts to the burrowing owl would be less than significant.

Mammals. Construction activities associated with the proposed project could result in adverse impacts to San Joaquin kit fox. No burrows or dens were observed during the reconnaissance; however, the non-native and annual grasslands and earthen berms provide suitable habitat. With implementation of Mitigation Measure BIO-5, potential impacts to the San Joaquin kit fox would be reduced to a less than significant level. Mitigation Measure BIO-5 requires the USFWS "early evaluation" be completed in accordance with its most recent *San Joaquin Kit Fox Survey Protocol*, and, if necessary, subsequent surveys to determine measures for avoidance, minimization, restoration, preservation, or compensation. The federally and State endangered Tipton kangaroo rat and federally threatened Nelson's antelope squirrel could also be subject to adverse impacts to their habitats on-site. Implementation of Mitigation Measure BIO-6 would reduce impacts to Tipton kangaroo rat to a less than significant level. Mitigation Measure BIO-6 requires protocol level surveys to be conducted with the USFWS *Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats*, and if necessary, subsequent surveys and consultation with CDFW and USFWS to determine measures for avoidance, minimization, restoration, preservation, or compensation. Implementation of Mitigation Measure BIO-7 would reduce impacts to Nelson's antelope squirrel to a less than significant level. Mitigation Measure BIO-7 requires a qualified biologist to survey for Nelson's antelope squirrel, and if necessary, to determine measures for avoidance, minimization, restoration, preservation, or compensation. Implementation of Mitigation Measure BIO-8 would reduce impacts to American badger to a less than significant level. Mitigation Measure BIO-8 should be conducted concurrently to Mitigation Measures BIO-4 and BIO-5, as American badger share similar habitat as burrowing owl and San Joaquin kit fox.

Plants. Based on the disturbed and developed conditions of the Phase 1 and Phase 2 project areas, special-status plant species are not expected to occur. Implementation of Mitigation Measure BIO-9 would identify any special-status plants that occur within the Conveyance Facilities project area, and if necessary, require implementation of avoidance measures, or if avoidance is not feasible then implementation of a Revegetation/Restoration Mitigation Plan.

Reptiles, Birds, Mammals, and Plants. In addition to construction activities, activities associated with operations and maintenance could also pose a significant impact to special-status wildlife and plant species. Implementation of Mitigation Measure BIO-10 would reduce impacts associated with operations and maintenance to a less than significant level. Application of pesticides, rodenticides and herbicides is an additional potential operations and maintenance

impact that can be detrimental to special-status species, especially smaller special-status species such as Tipton kangaroo rat and Nelson's antelope squirrel. The need for rodenticide use will be reduced by the installation raptor boxes every 0.25 miles of berm with perching structures. Owls and hawks can help to offset harmful effects of burrowing rodents causing damage to earthen berms and the need to use rodenticide to control them. Implementation of Mitigation Measure BIO-11 would reduce impacts to a less than significant level.

Impact 3.4-2: No sensitive natural communities were observed within the Phase 1 or Phase 2 project areas; however, the Conveyance Facilities project area contains five sensitive natural communities, all with an S3 ranking. If construction impacts are anticipated to affect any sensitive natural communities, Implementation of Mitigation Measure BIO-12 would reduce impacts to a less than significant level. In addition to construction activities, activities associated with operations and maintenance activities could also pose a significant impact to sensitive natural communities. Implementation of Mitigation Measure BIO-10 would reduce impacts associated with operations and maintenance to a less than significant level. Application of pesticides, rodenticides and herbicides is an additional potential operations and maintenance impact that can affect sensitive natural communities. Implementation of Mitigation Measure BIO-11 would reduce impacts to a less than significant level.

Impact 3.4-3: There are potentially wetlands and jurisdictional features in the project areas that may be impacted by habitat modification during construction. Implementation of Mitigation Measure BIO-13 would reduce potential impacts to a less than significant level by requiring a jurisdictional delineation to be prepared for project facilities with potential to affect jurisdictional resources, and if jurisdictional features are identified, requiring mitigation and compensation requirements to be implemented prior to construction. If wetlands are present on-site, Authority would be required to obtain a Section 404 Permit from the USACE, Section 401 from the Regional Water Quality Control Board and a 1602 Streambed Alteration Agreement from the California Department of Fish and Wildlife or written documentation that one is not required.

Impact 3.4-4: The project areas boast several wildlife movement corridors; including the Pacific Flyway, Goose Lake Channel and Kern Water Bank. All three of the wildlife movement corridors could support special-status species with a medium or high potential to occur, as well as the three additional special-status species detected during the reconnaissance. The Kern Water Bank (within the Conveyance Facilities project area) connects to the southern areas of the Phase 1 and Phase 2 project areas, and thus linkage value is deemed high quality; however, the proposed project is not anticipated to affect the continued movement of any fish or wildlife species. No impact would occur, and no mitigation measures are required.

Impact 3.4-5: The proposed project is within the jurisdiction of the Kern County General Plan and the Metropolitan Bakersfield General Plan. Several biological resource ordinances and policies are required for implementation to protect special-status species. Implementation of Mitigation Measures BIO-1 through BIO-9, BIO-12, and BIO-13, would cover protecting the ordinances and policies implemented in the Kern County General Plan and the Metropolitan Bakersfield General Plan during project construction. Implementation of Mitigation Measures BIO-10 and BIO-11 would reduce impacts to a less than significant level, regarding operations and maintenance activities.

Impact 3.4-6: The proposed project has the potential to conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. The Kern Water Bank HCP/NCCP is a plan to accomplish both water conservation and environmental objectives. The primary water

conservation objective is the storage of water in aquifers during times of surplus for later recovery during times of shortage. In addition, conservation areas are established within the HCP/NCCP area. If located within the Kern Water Bank HCP/NCCP, the proposed project could result in adverse habitat modifications or vehicle collisions to sensitive species in the HCP/NCCP area. Implementation of Mitigation Measures BIO-10, BIO-11, and BIO-14 would ensure that the proposed project does not adversely impact biological resource mitigation within the HCP/NCCP.

Impact 3.4-7: As summarized in Table 3-2 of Chapter 3 of the EIR, there are cumulative projects that are located in the project area and could contribute to cumulatively considerable impacts to biological resources. The cumulative projects include groundwater storage and recharge facilities, water conveyance infrastructure, and transportation projects.

The environmental setting, biological resources, and impact mechanisms must be taken into account when evaluating the cumulative impacts on biological resources. The existing environmental setting is already largely developed with remnant native and non-native vegetation communities. The cumulative projects are occurring a matrix of developed land cover types—agriculture, urban, and recharge basins—with both patches and larger areas of native and non-native vegetation communities. This environmental setting maintains suitable habitat for special-status species and natural communities; however, the much of the habitat is already degraded. There are a number of special-status species, both plants and wildlife, that currently utilize the project area and surrounding vicinity. Those special-status species that persist have adapted to use developed land cover types as habitat or continue to persist in the remnant native and non-native vegetation communities.

The groundwater banking and recovery projects are located in existing agricultural lands which may include remnant native and nonnative vegetation communities. The transportation projects fall within the MBHCP area. This area has a similar composition, but with urban development being the dominate land use type.

It is anticipated that most of the cumulative project impacts from construction will occur in agricultural and urban lands. The cumulative projects impact mechanisms for the groundwater banking and recovery projects would be similar to the proposed project if they occur in suitable habitat for special status wildlife and plants or sensitive natural communities. The roadway projects within the City of Bakersfield and would require compliance with the MBHCP. Their impacts to biological resources would be mitigated or avoided and minimized in accordance with the MBHCP. Based on the review of the projects contributing to cumulative effects, it is anticipated that the proposed project would not have effects that are cumulatively considerable with implementation of Mitigation Measures BIO-1 through BIO-9 and BIO-12 and BIO-14. Cumulative impacts would be less than significant with mitigation.

It is anticipated that cumulative project impacts from operations and maintenance from the groundwater banking and recovery projects would be similar to the proposed project. The impacts could be evaluated as beneficial or neutral for project components implemented in agricultural lands. The cumulative projects impact mechanisms for the groundwater banking and recovery project operations and maintenance would be similar to the proposed project if they occur in suitable habitat for special status wildlife and plants or sensitive natural communities. Similar to construction, the roadway projects within the City of Bakersfield and would require compliance with the MBHCP. Their impacts to biological resources would be mitigated or avoided and minimized in accordance with the MBHCP. Based on the review of the projects contributing to cumulative effects (those projects covered by the MBHCP plus the proposed

project), it is anticipated that the proposed project would not have effects that are cumulatively considerable with implementation of Mitigation Measures BIO-10 through BIO-14. Cumulative impacts would be less than significant with mitigation.

MITIGATION MEASURES: BIO-1, BIO-2, BIO-3, BIO-4, BIO-5, BIO-6, BIO-7, BIO-8, BIO-9, BIO-10, BIO-11, BIO-12, BIO-12, and BIO-14.

E. Cultural Resources

POTENTIAL EFFECTS: Potential effects examined included the potential to cause a substantial adverse change in the significance of a historical resource [Impact 3.5-1] or an archaeological resource [Impact 3.5-2]; disturb any human remains, including those interred outside of dedicated cemeteries [Impact 3.5-3]; or result in cumulatively considerable impacts to cultural resources [Impact 3.5-4].

FINDINGS: Adherence to the Mitigation Measures CUL-1 through CUL-11 listed in the EIR will reduce Impact 3.5-1 to less than significant, adherence to Mitigation Measures CUL-3 through CUL-11 will reduce Impact 3.5-2 to less than significant, adherence to Mitigation Measure CUL-12 will reduce Impact 3.5-3 to less than significant, and adherence to Mitigation Measures CUL-1 through CUL-12 will reduce Impact 3.5-4 to less than significant (Finding 1).

FACTS IN SUPPORT OF THE FINDINGS:

Impact 3.5-1: Historic built environment resources and archaeological resources have been previously recorded within the project area. It is unknown if any of these resources would be impacted since the project components have yet to be sited. There could also be other as yet undocumented historic built environment resources or archaeological resources that could be impacted by the proposed project. The geoarchaeological review indicated that the Phase 2 area and Kern Fan Conveyance Facilities area have a higher sensitivity for buried archaeological sites, whereas the Phase 1 area has a moderate to very low sensitivity for buried archaeological resources. If known or unknown historic built environment resources or archaeological resources are impacted by the project and determined to be historical resources as defined in *CEQA Guidelines* Section 15064.5, impacts to the resources could be significant. Implementation of Mitigation Measures CUL-1 through CUL-11, which require retention of a qualified professionals, and provide for additional cultural resources studies, evaluation and treatment of resources, development of a cultural resources monitoring and mitigation program, and construction worker cultural resources sensitivity training, would ensure that impacts are reduced to a less-than-significant level.

Impact 3.5-2: Archaeological resources have been previously documented within the proposed project area and there could be as undocumented archaeological resources in the project area, including surface and subsurface resources. If known or unknown archaeological resources are impacted by the project and determined to be historical resources as defined in *CEQA Guidelines* Section 15064.5 or unique archaeological resources pursuant to as defined in *PRC* Section 21083.2, impacts to the resources could be significant. Implementation of Mitigation Measures CUL-3 through CUL-11, which include the retention of a Qualified Archaeologist, additional archaeological studies, avoidance of resources if feasible, data recovery, development of a cultural resources monitoring and mitigation program, construction worker cultural resources sensitivity training, establishment of Environmentally Sensitive Areas, treatment of inadvertent discoveries, and curation of recovered materials, would ensure that impacts are reduced to a less-than-significant level.

Impact 3.5-3: One known site within the project area was identified as containing possible human remains. Additionally, some portions of the project area are known to have been used by prehistoric Native Americans. In the event that human remains are inadvertently discovered during project construction activities, the human remains could be inadvertently damaged, which could be a significant impact. Implementation of Mitigation Measure CUL-12 would reduce impacts to human remains to a less-than-significant level.

Impact 3.5-4: The geographic area of analysis of cumulative impacts for cultural resources includes the area bounded by those projects listed in Table 3-2 of the EIR. This geographic scope of analysis is appropriate because the archaeological and historical resources within this area are expected to be similar to those that occur on the project area because of their proximity, and because the similar environments, landforms, and hydrology would result in similar land-use and thus, site types. The projects listed in Table 3-2 include water infrastructure projects that could contain cultural resources. Cumulative impacts to cultural resources could occur if other related projects, in conjunction with the proposed project, had or would have impacts on cultural resources that, when considered together, would be significant.

Construction and operation of the proposed project, in combination with other projects in the area, has the potential to contribute to a cumulatively significant cultural resources impact due to the potential loss of historical and archaeological resources unique to the region. A total of 73 resources were identified within the project area as a result of the cultural resources assessment, including 47 archaeological resources and 26 historic built environment resources. Of these, it is currently known that one historical resource will be impacted by the project (California Aqueduct [P-15-015820/CA-KER-008698H]).

The project is not anticipated to result in a substantial adverse change to the California Aqueduct (P-15-015820/CA-KER-008698H) and impacts to the California Aqueduct are less than significant. While other past and foreseeable projects have or will impact the California Aqueduct, the proposed project would result in less than significant impacts and it could not contribute to a cumulative effect when combined with other projects. Therefore, the project's incremental impact to this historical resource is not cumulatively considerable.

Potential impacts to the other known 72 historical or archaeological resources are undetermined at this time since the project components have yet to be sited. Additionally, there could be as yet undocumented in the project area, including surface and subsurface resources, that may be impacted by the project. Nevertheless, Mitigation Measures CUL-1 through CUL-11 are included in this EIR to reduce potentially significant project impacts to both known and unknown historical and archaeological resources to less than significant, which would, in turn, reduce the project's incremental contribution to cumulative impacts to less than significant. Implementation of these mitigation measures would reduce potential impacts to historical and archaeological resources to a less-than-significant level.

Although project construction has the potential to disturb human remains, Mitigation Measure CUL-12 requires compliance with state laws dictating the appropriate treatment of any unearthed human remains. With implementation of this measure, and adherence to state laws, there will be a less-than-significant impact to human remains. Therefore, the project's incremental impact to human remains is not cumulatively considerable.

With implementation of Mitigation Measures CUL-1 through CUL-12, the project would not result in significant impacts to cultural resources. Given the required mitigation for the current project

and required adherence to state and local laws for other projects in the cumulative region, cumulative impacts to cultural resources would be less than significant.

MITIGATION MEASURES: CUL-1, CUL-2, CUL-3, CUL-4, CUL-5, CUL-6, CUL- 7, CUL-8, CUL-9, CUL-10, CUL-11, and CUL-12.

F. Energy

POTENTIAL EFFECTS: Potential effects examined included the potential to: result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation [Impact 3.6-1]; conflict with or obstruct a State or local plan for renewable energy or energy efficiency [Impact 3.6-2]; or result in cumulatively considerable impacts to energy [Impact 3.6-3].

FINDINGS: Impacts 3.6-1, 3.6-2, and 3.6-3 will be less than significant, requiring no mitigation.

FACTS IN SUPPORT OF THE FINDINGS:

Impact 3.6-1: Construction of the proposed project would use fuel-efficient equipment consistent with federal and State regulations, such as fuel-efficiency regulations in accordance with CARB's Pavley Phase II standards; the anti-idling regulation in accordance with 13 *CCR* Section 2485; and fuel requirements for stationary equipment in accordance with 17 *CCR* Section 93115. Project construction would also comply with State measures to reduce the inefficient, wasteful, and unnecessary consumption of energy, such as petroleum-based transportation fuels. While these regulations are intended to reduce construction emissions, compliance with the anti-idling and emissions regulations discussed above would also result in fuel savings from the use of more fuel-efficient engines. Construction would use energy for on-site activities, for construction worker travel, and to transport construction materials and demolition debris to and from the project area. Idling restrictions and the use of cleaner, energy-efficient equipment would result in relatively less fuel combustion and energy consumption. Thus, the proposed project's construction-related energy use would be minimized. Therefore, construction of the proposed project would not result in the wasteful, inefficient, or unnecessary consumption of energy, and construction-related impacts would be less than significant.

During operations energy would primarily be consumed in the form of electricity for water management activities, such as pumping, groundwater extraction, conveyance, and treatment. The project-related net increase in annual electricity consumption, 39,000 MWh, would represent approximately 0.014 percent of Statewide electricity. The project's future energy use would represent about 0.012 percent of future State consumption and would be within projected electricity supplies. Project-related vehicle use would consume petroleum-based fuels for vehicular travel to and from the project area and off-road equipment activity for weed and pest control and earthwork operations. The project's mobile sources would result in an annual net increase in petroleum-based fuel usage of approximately 555 gallons of gasoline and 29,754 gallons of diesel. The proposed project would account for less than 0.00001 percent of Statewide consumption for gasoline, 0.0008 percent for diesel, and for 0.0001 percent and 0.01 percent of countywide consumption of gasoline and diesel, based on the available county fuel sales data for the year 2018. Fuels used for vehicle trips resulting from the proposed project would be required to comply with CAFE fuel economy standards, which would result in more efficient use of transportation fuels (lower consumption). Vehicles used for project-related vehicle trips would also comply as applicable with AB 1493 and the LCFS, which are designed to reduce vehicular GHG emissions, but would also result in additional fuel savings.

Implementation of the proposed project would intermittently increase demands on local energy providers. The demands to the electrical grid would not be as constant as residential, commercial or industrial uses due to the irregular use of the recharge and recovery facilities. In addition, it is anticipated that the proposed pump stations would utilize high-efficiency motors with variable frequency drives (VFD) that would minimize large electrical demand flickers at start up and maximize energy efficiency due to the ability to match pump speed with exact flow requirements. It is not anticipated that additional power generation facilities would be required to serve the proposed project, or that the demand would exceed capacity of energy providers. The Authority would be required to engage PG&E through the normal power service application process to ensure adequate power supplies are provided to the project sites. In addition to the normal service application process, the Authority plans to provide PG&E with an overall project feasibility design at least 6 months prior to any service requests to allow for better discussion and system planning between the Authority and PG&E's engineering and planning division. For these reasons, operation of the proposed project would not result in the wasteful, inefficient, and unnecessary consumption of energy, and the impact would be less than significant.

Impact 3.6-2: Under SB 100, PG&E would have to increase its renewable sources for electricity to 50 percent by year 2026, 52 percent by year 2027, 60 percent by year 2030 and 100 percent by year 2045. While the project would not actively be involved in the procurement of increasingly cleaner electricity through SB 100, the project would receive power from PG&E. PG&E and all utility providers are required to comply with the SB 100 mandate, thus the project would not conflict with the State's goals of more procurement of cleaner energy.

The Heavy-Duty Vehicle and Light-Duty vehicle rules have been established to reduce CO_2 emissions and, consequently, the combustion of fossil fuels. The proposed project would not involve the manufacture of vehicles or production of vehicle fuels. However, vehicles that are purchased and used within the project area would comply with any vehicle and fuel standards that the CARB adopts or has adopted. Therefore, the construction and operation of the proposed project would not conflict with these regulations, and the project would not conflict with or obstruct a State or local plan for energy efficiency. Impacts would be less than significant.

Impact 3.6-3: The geographic area for cumulative energy impacts is the state of California. Past, present, and future development projects contribute to the State's energy impacts. If a project is determined to have a significant energy impact, it is concluded that the impact would be cumulatively considerable. The proposed project would not result in significant energy impacts or conflict with or obstruct a State or local plan for energy efficiency. The proposed project, therefore, would not have a cumulatively considerable contribution to a significant cumulative energy impact. As a result, this impact would be less than significant.

MITIGATION MEASURES: None required.

G. Geology and Soils

POTENTIAL EFFECTS: Potential effects examined included the potential to: expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, including liquefaction, and/or landslides [Impact 3.7-1]; result in substantial soil erosion or the loss of topsoil [Impact 3.7-2]; be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse [Impact 3.7-3]; be located on expansive soil [Impact 3.7-4]; have soils incapable of adequately supporting the use of septic

tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater [Impact 3.7-5]; directly or indirectly destroy a unique paleontological resource or site or unique geologic feature [Impact 3.7-6]; or result in cumulatively considerable impacts to geology, soils, and paleontological resources [Impact 3.7-7].

FINDINGS: Adherence to the Mitigation Measures PALEO-1 and PALEO-2 listed in the EIR will reduce Impact 3.7-6 and Impact 3.7-7 to less than significant (Finding 1). Impacts 3.7-1, 3.7-2, 3.7-3, and 3.7-4 will be less than significant, requiring no mitigation. Impact 3.7-5 will not occur.

FACTS IN SUPPORT OF THE FINDINGS:

Impacts Not Occurring: There are no active faults that cross the project area, and the nearest active fault is more than 15 miles away. Therefore, the potential for fault rupture to affect the proposed project is very low. Furthermore, the proposed project is located within an area that is relatively flat with very little topographic relief. Therefore, there is no potential for landslides or lateral spreading. No impact would occur regarding fault rupture or landsides and lateral spreading. The proposed project does not involve the construction or use of septic tanks or alternative wastewater disposal systems. Therefore, there would be no impact associated with soils supporting septic or alternative wastewater disposal systems.

Impact 3.7-1: Construction activities would be temporary and would not involve construction of enclosed habitable structures, and thus, are not anticipated to exacerbate the exposure of people or structures to substantial adverse effects involving seismic hazards. In addition, construction of the proposed project would not exacerbate the potential for earthquakes because the placement of water in the recharge basins would not occur until after construction is complete.

The placement of recharge basins on an active fault could result in water entering the fault zone, which could activate movement along the fault and cause an earthquake. However, the project area is not located on or within at least 15 miles of an active fault. Therefore, the project could not exacerbate the potential for earthquakes. The project vicinity has experienced and would likely continue to experience strong seismic ground shaking due to its proximity to a number of active faults, including the San Andreas Fault and the Garlock fault. In the event that ground shaking caused damage to a recharge basin and/or conveyance structure, released water would likely infiltrate into the permeable soils that comprise the project area. The recharge basins would be constructed below grade with berms constructed above grade, which, coupled with the relatively flat topography, would hinder movement of water offsite. In addition, the project area and its surroundings are characterized primarily by agricultural land use with few, if any, structures. Therefore, the potential risk of loss, injury, or death from strong seismic shaking is considered low, and impacts would be less than significant.

In addition, if strong seismic ground shaking were to occur during a time of a relatively shallow depth to groundwater or otherwise saturated soil conditions from recharge activities, the project area soils could be susceptible to seismically-induced liquefaction hazards. At the proposed recharge basins, shallow depth to groundwater could cause liquefaction during a seismic event if groundwater levels were allowed to rise up to and remain within 50 feet of the ground surface beneath the basins. With operation of the proposed project, shallow depth to groundwater is not expected to rise up to within 50 feet of the ground surface as demonstrated by the results of the groundwater modeling conducted for representative recharge basin locations in and around the Phase 1 and Phase 2 areas. During periods of high groundwater levels, such as during 2012, recharge of up to approximately 117,000 AF would result in groundwater levels rising up to

approximately 64 feet below the ground surface directly beneath the recharge basins; and depth to groundwater would increase with distance from the recharge basins offsite. Therefore, the proposed project would not result in shallow groundwater within 50 feet of the ground surface and thus would not cause liquefaction during a seismic event. There would be no potential for risk of loss, injury or death from liquefaction, and impacts would be less than significant.

Impact 3.7-2: Construction activities at the project area would require excavation for the construction of the recharge basins, conveyance canals and pipelines; drilling activities for the construction of recovery wells, and the construction of a turnout at the California Aqueduct. To prevent water and wind erosion during the construction period, a Storm Water Pollution Prevention Plan (SWPPP) would be developed and implemented for the proposed project as required for all projects that disturb more than one acre. The Construction General Permit requires the preparation and implementation of a SWPPP that would specify BMPs to prevent construction pollutants, including eroded soils (such as topsoil), from moving off-site and provide erosion control measures to protect the topsoil. The recharge basins and supply canals would be designed in an effort to balance earthwork on site in which all excavated soils would be redistributed and utilized to construct the project facilities. Topsoil materials would be stripped from the ground surface and used for construction of the earthen berms of the recharge ponds. The SWPPP also requires stockpiled soils to be watered and/or covered to prevent loss due to wind erosion. As a result of these efforts, loss of topsoil and substantial soil erosion during the construction period are not anticipated.

During operation of the groundwater recharge basins, the recharge basins would contain water, which would inhibit erosion; during periods of non-recharge, the recharge basins would be subject to wind erosion. Plant cover in the basins would minimize wind erosion. Operation of the recovery wells, canals, pump stations, and pipelines would not contribute to wind erosion since these structures would not have exposed soil. To minimize soil erosion and loss of topsoil during construction, the project would be required to develop and implement a SWPPP, which would provide water and wind erosion control measures to protect the topsoil. During project operation, the groundwater recharge basins would contain water, which would inhibit erosion, and plant cover would minimize wind erosion during non-recharge periods. With implementation of the SWPPP and the operational design of the proposed project, impacts related to soil erosion and topsoil loss would be less than significant.

Impact 3.7-3: Construction activities would not include the extraction or recharge of water, and thus, would not result in any changes to soil or a geologic unit that would cause subsidence or collapse. Rosedale conducts subsidence monitoring in the project area. Subsidence has occurred historically north and south of Rosedale but not within its boundaries. Data indicates subsidence has not resulted from recovery operations during extended droughts. DWR has developed, as part of their SGMA technical assistance a statewide InSAR subsidence dataset. InSAR is a satellite-based remote sensing technique that measures vertical surface displacement changes at high degrees of measurement resolution and spatial detail. Subsidence for 2016 and 2017 in the Rosedale area was upward by about 0.01 foot per year. This increase denotes swelling rather than subsidence in the project area.

The proposed project is a groundwater banking project that would require water to be recharged prior to extraction. Groundwater banking programs generally benefit water levels in the local aquifer because the amount of water available for recovery is less than the amount recharged; this difference can raise groundwater levels. The proposed project would serve to correct declining groundwater levels, one of the primary causes of compaction and subsidence, and therefore would serve to mitigate against additional subsidence to some degree. The proposed

project would provide additional recharge capacity in excess of recovery and as such would not cause subsidence relative to existing conditions. Impacts would be less than significant, and no mitigation is required.

Impact 3.7-4: Construction activities would not include the placement of water in the recharge basins, and thus, would not cause expansion of soils. The proposed project would include the placement of water in recharge basins that would infiltrate down into the underlying aquifer. The soils within the basins would undergo alternating wetting and drying cycles. The clay content of onsite soils may be moderately susceptible to shrinkage or swelling. The wetting of soil within the basins may cause expansion but there would be no structures within the basins that could be damaged. The berms that form the basin sides may experience some effects of the alternating wetting and drying cycles. However, it is anticipated that the basins would require periodic earthwork to maintain the berms, and such maintenance would be included in the routine operations of the project. The interior of the recharge basins would not have structures that could be damaged by the expansion of soil during operation of the basins for recharge. Maintenance of the proposed project would include periodic earthwork to maintain the berms that form the recharge basins. Therefore, the proposed project would not result in damage to structures due to expansive soils, and there would be no direct or indirect risk to life or property. Impacts would be less than significant, and no mitigation is required.

Impact 3.7-6: Construction activities at the project area would require excavation for the construction of the recharge basins, conveyance canals and pipelines; drilling activities for the construction of recovery wells, and the construction of a turnout at the California Aqueduct. All of these construction activities have the potential to expose paleontological resources or unique geologic features.

The analysis of paleontological resources for the proposed project indicates that Late Holocene alluvial deposits are found within surficial deposits in the Phase 1 area. These deposits have a low paleontological sensitivity, though sensitivity increases with depth due to the age. Based on standard geological principles and similar encounters elsewhere in Kern County, there is a potential to encounter fossils at depth. Estimating the depth is difficult, but it is likely to be over 20 feet below the present surface. Any excavation below 20 feet may encounter paleontological resources, unless the depth to older facies is encountered at a shallower or deeper depth. The Phase 2 area is underlain predominantly by young lake, playa, and estuarine deposits. As these deposits are inferred to extend at depth to the Pleistocene and are composed of fine-grained sediments, there is a high potential for recovering unique paleontological resources below the agriculturally modified soils. The Kern Fan Conveyance Facilities Area spans all of these alluvial units, and excavations in this area could encounter unique paleontological resources at various depths.

The Tulare Formation underlies the project area. Excavations that penetrate below the alluvium into the underlying Tulare Formation, which has a high potential for preserving significant fossils based on the known record as well as mix of marine and non-marine, fine-grained sediments and Pleistocene tar seeps, may encounter unique paleontological resources. Since the proposed project includes ground disturbance up to 900 feet in depth for drilling and 22 feet for excavation, the proposed project could impact unique paleontological resources. Mitigation Measures PALEO-1 and PALEO-2, which include retention of a Qualified Paleontologist, development of a paleontological resources' mitigation and monitoring plan, construction worker training, monitoring, procedures to follow in the event of discovery of paleontological resources, and preparation of a paleontological monitoring report, would reduce potentially significant impacts to paleontological resources to a less than significant level.

Once constructed, the operations phase of the project would have no potential to encounter paleontological resources.

Impact 3.7-7: This section presents an analysis of the cumulative effects of the proposed project in combination with other past, present, and reasonably foreseeable future projects that could cause cumulatively considerable impacts.

The proposed project would have no impact with respect to fault rupture, landslides, lateral spreading, septic tanks and alternate wastewater disposal systems. Accordingly, the proposed project could not contribute to cumulative impacts related to these topics and are not discussed further.

The geographic area affected by the proposed project and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative geologic impacts encompasses and is limited to the project area and its immediately adjacent area. This is because impacts relative to geologic hazards and paleontological resources are generally site-specific. For example, the effect of erosion would tend to be limited to the localized area of a project and could only be cumulative if erosion occurred as the result of two or more adjacent projects that spatially overlapped.

The timeframe during which proposed project could contribute to cumulative geologic hazards includes the construction and operations phases. For the proposed project, the operations phase is permanent. However, similar to the geographic limitations discussed above, it should be noted that impacts relative to geologic hazards are generally time-specific. Geologic hazards could only be cumulative if two or more geologic hazards occurred at the same time, as well as overlapping at the same location.

Significant cumulative impacts related to geologic hazards could occur if the incremental impacts of the proposed project combined with the incremental impacts of one or more of the cumulative projects identified in Table 3-2 of the EIR to substantially increase risk that people or the environment would be exposed to geologic hazards. The only cumulative project that could be geographically adjacent or overlap components of the proposed project would be the groundwater banking and recovery Project Numbers 3 through 10, 12, and 13 being implemented by Rosedale, Kern Fan Authority, City of Bakersfield, Buena Vista Water Storage District, and the Kern Water Bank Authority. All of these cumulative projects are similar to the proposed Kern Fan Groundwater Storage Project and include recharge basins, recovery wells, pipelines and/or canals, and associated infrastructure.

If the projects are constructed at the same time, the erosion effects could be cumulatively significant. However, the state Construction General Permit would require each project to prepare and implement a SWPPP. The SWPPPs would describe BMPs to control runoff and prevent erosion for each project. Through compliance with this requirement, the potential for erosion impacts would be reduced. The Construction General Permit has been developed to address cumulative conditions arising from construction throughout the state and is intended to maintain cumulative effects of projects subject to this requirement below levels that would be considered significant. For example, two adjacent construction sites would be required to implement BMPs to reduce and control the release of sediment and/or other pollutants in any runoff leaving their respective sites. The runoff water from both sites would be required to achieve the same action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff water. Thus, even if the runoff waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at

concentrations (amount of sediment or pollutants per volume of runoff water) below action levels and would not be cumulatively considerable (less than significant).

The proposed project has the potential to encounter significant paleontological resources. To reduce the potential impact to less than significant, the proposed project would implement mitigation measures PALEO-1 and PALEO-2. Given the nearby locations of Cumulative Projects 3 through 10, 12, and 13 the cumulative projects would also have the potential to encounter significant paleontological resources. To reduce the potential impact to less than significant, the cumulative projects that include substantial depths of excavation would also be required to implement mitigation measures similar to Mitigation Measures PALEO-1 and PALEO-2. With implementation of these mitigation measures, the potential impacts to paleontological resources would be reduced to not cumulatively considerable and less than significant.

Seismically-induced groundshaking, liquefaction and lateral spreading, and expansive soils could cause structural damage or pipeline leaks or ruptures. State and local building regulations and standards have been established to address and reduce the potential for such impacts to occur. The proposed project and cumulative projects would be required to comply with applicable provisions of these laws and regulations. Through compliance with these requirements, the potential for impacts would be reduced. Therefore, based on compliance with these requirements, the incremental impacts of the proposed project combined with impacts of other projects in the area would not cause a significant cumulative impact to the risk of loss, injury or death related to seismically-induced groundshaking, liquefaction, or expansive soils. The proposed project's contribution to cumulative effects would not be cumulatively considerable, and this impact would be less than significant.

Once the proposed project and the cumulative projects have completed construction, there would be no further potential to encounter paleontological resources. There would be no potential cumulative impacts associated with paleontological resources during project operation.

MITIGATION MEASURES: PALEO-1 and PALEO-2.

H. Greenhouse Gas Emissions

POTENTIAL EFFECTS: Potential effects examined included the potential to: generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment [Impact 3.8-1]; or conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases [Impact 3.8-2].

FINDINGS: Impact 3.8-1 and Impact 3.8-2 will be less than significant, requiring no mitigation.

FACTS IN SUPPORT OF THE FINDINGS:

Impact 3.8-1: The following activities associated with the proposed project could contribute to the generation of GHG emissions: off-road equipment activities; electricity; and motor vehicle use. Construction and operational emissions due to off-road equipment activities were modeled using CalEEMod software. One-time, short-term construction GHG emissions are typically summed and amortized over the Project's lifetime (assumed to be 30 years). Project construction would continue until fall of 2026, with the project being operational in fall of 2026. However, in year 2026, while there is technically enough time for the worst-case scenario of operational maintenance activities to occur simultaneously during the few months of the project operations for

year 2026, only a portion of the project's recharge capacity and subsequent energy consumption could occur during the partial project operations of the year 2026, which is the main source of the project's total GHG emissions. Emissions for the first full year of project operations in 2027 include the amortized construction emissions in order to determine a conservative impact. Emissions from construction and operations would be below the significance threshold and the impacts would be less than significant without mitigation.

Impact 3.8-2: The proposed project would not conflict with any applicable plans, policies, or regulations adopted for the purpose of reducing GHG emissions and reaching future anticipated Statewide GHG reductions goals. CARB has outlined a number of potential strategies and regulations for achieving the 2030 reduction target of 40 percent below 1990 levels, as mandated by SB 32. These potential strategies and regulations to reduce GHGs include using renewable resources for State electricity, which the project will benefit from, as well as increasing the fuel economy of vehicles and the number of zero-emission or hybrid vehicles, supporting other alternative transportation options, reducing the rate of growth in VMT and associated GHG emissions, and use of high-efficiency appliances, water heaters, and HVAC systems that reduce or replace the use of fossil fuels with cleaner energy and reduces associated GHG emissions (Energy + Environmental Economics, 2015). Thus, as the proposed project would not conflict with any applicable plans, policies, or regulations adopted for the purpose of reducing GHG emissions and reaching future anticipated Statewide GHG reductions goals, there would be a less than significant impact.

MITIGATION MEASURES: None required.

I. Hazards & Hazardous Materials

POTENTIAL EFFECTS: Potential effects examined included the potential to: create a significant hazard to the public or the environment through the routine transport, use, disposal, or the accidental release of hazardous materials [Impact 3.9-1]; emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school [Impact 3.9-2]; be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment [Impact 3.9-3]; for a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport or a private airstrip, result in a safety hazard for people residing or working in the project area [Impact 3.9-4]; impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan [Impact 3.9-5]; expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands [Impact 3.9-6]; cause an increase in airborne insect populations [Impact 3.9-7]; or result in cumulatively considerable impacts to hazards and hazardous materials [Impact 3.9-8].

FINDINGS: Adherence to the Mitigation Measures HAZ-1, HAZ-2 and HAZ-3 listed in the EIR will reduce Impact 3.9-1 to less than significant, adherence to Mitigation Measure HAZ-4 will reduce Impact 3.9-2 to less than significant, adherence to Mitigation Measures HAZ-1 and HAZ-3 will reduce Impact 3.9-3 to less than significant, adherence to Mitigation Measure TRA-1 will reduce Impact 3.9-5 to less than significant, adherence to Mitigation Measure HAZ-5 will reduce Impact 3.9-7 to less than significant, and adherence to Mitigation Measures HAZ-1 through HAZ-5 and TRA-1 will reduce Impact 3.9-8 to less than significant (Finding 1). Impact 3.9-6 will be less than significant, requiring no mitigation. Impact 3.9-4 will not occur.

FACTS IN SUPPORT OF THE FINDINGS:

Impacts Not Occurring: The project area is outside of the ALUCP planning areas in Kern County. Therefore, the proposed project construction and operation would not result in an airport-related safety hazard or airport-related noise for people residing or working in the area. There would be no impact.

Impact 3.9-1: Construction activities would be required to comply with numerous hazardous materials regulations designed to ensure that hazardous materials are transported, used, stored, and disposed of in a safe manner to protect worker safety, and to reduce the potential for a release of construction-related fuels or other hazardous materials into the environment. Contractors would be required to prepare and implement Hazardous Materials Business Plans (HMBPs) that would require that hazardous materials used for construction would be used properly and stored in appropriate containers with secondary containment to contain a potential release. The California Fire Code would also require measures for the safe storage and handling of hazardous materials. Construction contractors would be required to prepare a SWPPP for construction activities according to the NPDES General Construction Permit requirements. The SWPPP would list the hazardous materials (including petroleum products) proposed for use during construction; describe spill prevention measures, equipment inspections, equipment and fuel storage; protocols for responding immediately to spills; and describe BMPs for controlling site runoff. In addition, the transportation of hazardous materials would be regulated by the USDOT, Caltrans, and the CHP. Together, federal and State agencies determine driver-training requirements, load labeling procedures, and container specifications designed to minimize the risk of accidental release.

Workers handling hazardous materials are required to adhere to OSHA and Cal/OSHA health and safety requirements. Hazardous materials must be transported to and from the proposed project area in accordance with RCRA and USDOT regulations, managed in accordance with the OCEHD regulations, and disposed of in accordance with RCRA and the CCR at a facility that is permitted to accept the waste. Since compliance with existing hazardous materials regulations and programs are mandatory, project construction activities are not expected to create a potentially significant hazard to construction workers, the public, or the environment.

Furthermore, in the event of a spill that releases hazardous materials at the project site, a coordinated response would occur at the federal, State, and local levels, including the KCFD, which is the local hazardous materials response team. In the event of a hazardous materials spill, the KCFD and local police department would be simultaneously notified and sent to the scene to assess and respond to the situation.

The potential for residual pesticides to be transported to the groundwater by the recharge water is minimal since the surface soils would be scrapped from the basin floors. Nonetheless, implementation of Mitigation Measure HAZ-1 would require that samples of soils onsite are analyzed and appropriately remediated or removed if soils contain hazardous quantities of contaminants. This would reduce any potential impacts to construction workers due to encounters with hazardous materials to less than significant levels and reduce impacts to groundwater due to potential transport of hazardous substances during recharge activities.

In addition, as with many former agricultural properties, it is possible that irrigation lines on the property may contain asbestos or be wrapped in asbestos. If these irrigation lines are reused or demolished, asbestos materials may pose an adverse impact to the workers and the environment. If asbestos-containing materials are uncovered during construction, Mitigation

Measure HAZ-2 would require all work at the project sites to halt so that a proper assessment can be made and proper worker protection measures can be implemented. Implementation of Mitigation Measures HAZ-1 and HAZ-2 would reduce impacts related to accidental upset or encounter of hazardous materials to less than significant levels.

In the event that facilities would be located on a site that contains an active oilfield, impacts to the environment resulting from spillage, releases, and disposal of oil associated with oilfield production and storage may have occurred in the past or could occur during construction. Active wells could have also released hazardous materials that migrated beyond the boundaries of the oilfield within the project area. This could potentially expose construction workers to potential hazardous substances or introduce hazardous substances to groundwater during recharge operations. Mitigation Measure HAZ-3 would require the completion of a Phase I ESA to ensure hazards and appropriate mitigation measures are identified within the project sites prior to construction. Implementation of these mitigation measures would reduce potential impacts to a less than significant level.

The required compliance with the numerous laws and regulations discussed above that govern the transportation, use, handling, and disposal of hazardous materials during construction of the proposed project would limit the potential for creation of hazardous conditions due to the routine use or accidental release of hazardous materials. Furthermore, implementation of Mitigation Measure HAZ-1 through HAZ-3 would reduce potential impacts to the public and the environment to less than significant levels.

The required compliance with the numerous laws and regulations discussed above that govern the transportation, use, handling, and disposal of hazardous materials during operation of the proposed project and maintenance activities would limit the potential for creation of hazardous conditions due to the routine use or accidental release of hazardous materials. The impact to the public and the environment would be less than significant.

Impact 3.9-2: The transport of the hazardous materials could use haul routes that pass by schools, particularly Del Rio Elementary School and Bakersfield Christian High School. The routine use or an accidental spill of hazardous materials could result in inadvertent releases in proximity to nearby schools, which could adversely affect students, staff, and the general public. Construction activities would be required to comply with numerous hazardous materials regulations designed to ensure that hazardous materials are transported, used, stored, and disposed of in a safe manner to protect worker safety, and to reduce the potential for a release of construction-related fuels or other hazardous materials into the environment, including in proximity to schools. The required compliance with the numerous laws and regulations discussed above that govern the transportation, use, handling, and disposal of hazardous materials during construction of the proposed project would minimize the potential risks associated with hazardous materials within one-quarter mile of a school. Nonetheless, for project facilities that will be constructed within one-quarter mile of a school, implementation of Mitigation Measure HAZ-4 would require coordination with the Rio Bravo-Greeley Union School District and any affected schools to determine a haul route that would not impact existing school safety routes. Implementation of the Mitigation Measure HAZ-4 would ensure impacts to the school facilities during construction are reduced to less than significant levels.

The required compliance with the numerous laws and regulations discussed above that govern the transportation, use, handling, and disposal of hazardous materials during operation of the proposed project would reduce the impact to schools within one-quarter mile of the project site to less than significant.

Impact 3.9-3: GeoTracker and EnviroStor database searches identified one Cleanup Program Site and one Land Disposal Site within the project area. Implementation of Mitigation Measures HAZ-1 and HAZ-3 would require preparation of a Phase I Environmental Site Assessment for the project sites once they are identified, and would require that samples of soils taken from the project sites are analyzed and appropriately remediated or removed if soils contain hazardous quantities of contaminants. This would reduce any potential impacts to construction workers due to encounters with hazardous materials to less than significant levels and reduce impacts to groundwater due to potential transport of hazardous substances during recharge activities. Implementation of these mitigation measures would reduce impacts related to hazardous material sites to a less than significant level.

Impact 3.9-5: Construction of the proposed Kern Fan Conveyance Facilities would require tunneling under Interstate 5 (I-5) so that water may be transferred to/from the Kern Fan Project Properties to the California Aqueduct, which may require short-term lane or road closures or detours. Potential road closures or detours could congest local roadways that could be used by the public and emergency responders if an emergency or disaster were to occur. To ensure that impacts to local rights-of-way do not occur as a result of the proposed project, implementation of Mitigation Measure TRA-1 would require the preparation and implementation of a Construction Traffic Control Plan. The Construction Traffic Control Plan would include, but not be limited to, signage, striping, delineated detours, flagging operations, changeable message signs, delineators, arrow boards, and K-Rails that would be used during construction to guide motorists, bicyclists, and pedestrians safely through the construction area and allow for adequate emergency access and circulation to the satisfaction of the KCFD. The Construction Traffic Control Plan would be coordinated with the City of Bakersfield, as necessary, as well as with emergency responders, which include fire departments, police departments, and ambulances that have jurisdiction within the proposed project area. Therefore, with implementation of Mitigation Measure TRA-1, impacts to circulation system within the project area during construction of the proposed project would be reduced to a less than significant level, and project construction would not impair or physically interfere with emergency response teams or an evacuation plan. Impacts would be less than significant.

Impact 3.9-6: The primary fire hazards from project construction would involve the use of vehicles and equipment. Heat or sparks from construction vehicles and equipment could ignite dry vegetation and cause a fire, particularly during the dry, hot conditions from June to September and from September to December when dry winds are more likely to occur. Additionally, construction activities that could result in sparks have a greater likelihood of creating a source of ignition. Therefore, depending on the time of year (as seasonality may affect climate conditions, prevailing winds, and vegetation/fuels) and the location of construction activities, the increase in sources of potential ignition associated with project construction could exacerbate the risk of wildfire at a project site and in surrounding areas. Project construction could increase the risk of exposure of people or structures to significant loss, injury, or death involving wildland fires, which would result in a potentially significant impact.

All personnel on a project site would have to comply with *PRC* Sections 4427, 4428, 4431, and 4442, which include regulations relating to the handling of combustible fuels and equipment that can exacerbate fire risks. During construction, strict adherence to these PRC sections would ensure that contractors are responsible for all monitoring and safety measures ensuring that any risk to exacerbate wildfire would be reduced. Additionally, all construction must comply with fire protection and prevention requirements specified by the CCR and Cal/OSHA. This includes various measures such as easy accessibility of firefighting equipment, proper storage of combustible liquids, no smoking in service and refueling areas, spark arrestors on equipment,

and worker training for firefighter extinguisher use. Implementation of all relevant PRC sections, and requirements specified by the CCR and Cal/OSHA would ensure that potential impacts regarding wildland fires would be less than significant.

Operation of the proposed project would not include any activities that would exacerbate wildfire risk relative to existing conditions. Therefore, there would be a less than significant impact due to wildland fires during operation of the proposed project.

Impact 3.9-7: The proposed recharge facilities within the project area would create new standing pools of water. If algae growth develops or insects such as midges or mosquitoes use the water as a breeding area, any standing pools of water could be considered a nuisance or a health threat to the surrounding community. Hatching midges can emerge in such tremendous numbers that they create nuisance problems. Midges often emerge simultaneously forming vast clouds of flying insects. They are especially attracted to lights. Large clouds of insects could form over local roadways creating a traffic hazard.

West Nile Virus, a disease transmitted by mosquitoes, has been detected in Kern County. The proposed project could contribute to a public health hazard if the standing water in the recharge basins contributed to an increase in the mosquito population in the project area. However, the implementation of Mitigation Measure HAZ-5 would require coordination with the Kern County Department of Public Health Services and the Kern Mosquito and Vector Control District to ensure development of appropriate insect control measures that utilize abatement methods appropriate for recharge basins, such that groundwater quality is protected. Mitigation Measure HAZ-5 would minimize the potential effects associated with airborne insect populations by minimizing population increases. Impacts would be less than significant with mitigation.

Impact 3.9-8: This section presents an analysis of the cumulative effects of the proposed project in combination with other past, present, and reasonably foreseeable future projects that could cause cumulatively considerable impacts relative to hazards and hazardous materials. The proposed project would have no impact with respect to being located within two miles of an airport. Accordingly, the proposed project could not contribute to cumulative impacts related to this topic and is not discussed further.

The geographic area affected by the proposed project and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative hazardous materials impacts encompasses and is limited to the future project sites and their immediately adjacent area. This is because impacts relative to hazardous materials are generally site-specific and depend on the nature and extent of the hazardous materials release, and existing and future soil and groundwater conditions. For example, hazardous materials incidents tend to be limited to a smaller more localized area surrounding the immediate spill location and extent of the release and could only be cumulative if two or more hazardous materials releases spatially overlapped.

The timeframe during which the proposed project could contribute to cumulative hazards and hazardous materials effects includes both the construction and operations phases. For the proposed project, the operational phases are permanent. However, similar to the geographic limitations discussed above, it should be noted that impacts relative to hazardous materials are generally time-specific. Hazardous materials events could only be cumulative if two or more hazardous materials releases occurred at the same time, as well as overlapping at the same location.

Significant cumulative impacts related to hazards and hazardous materials could occur if the incremental impacts of the project combined with the incremental impacts of one or more cumulative projects identified in Table 3-2 of the EIR substantially increase risk that people or the environment would be exposed to hazards and hazardous materials. The cumulative projects that could be geographically adjacent or overlap components of the proposed project. The cumulative projects are projects that either involve road improvements and extensions or projects similar to the proposed project, which include recharge, recovery, and conveyance facilities within the Rosedale service area.

Cumulative projects would be subject to the same regulatory requirements discussed for the project, including the implementation of HMBPs and compliance with existing regulations for the transport, use, storage, and disposal of hazardous materials. That is, cumulative projects involving releases of or encountering hazardous materials also would be required to manage their hazardous materials to the same established regulatory standards and, in the case of spills or accidents, remediate their respective sites to the same established regulatory standards.

This would be the case regardless of the number, frequency, or size of the release(s), or the residual amount of chemicals present in the soil from previous spills. While it is possible that the project and cumulative projects could result in releases of hazardous materials at the same time and in overlapping locations, the responsible party associated with each spill would be required to remediate site conditions to the same established regulatory standards. Further, implementation of Mitigation Measures HAZ-1 through HAZ-3 would require that samples of soils on various project sites are analyzed and appropriately remediated or removed if soils contain hazardous quantities of contaminants. This would reduce any potential impacts to construction workers due to encounters with hazardous materials to less than significant levels and reduce impacts to groundwater due to potential transport of hazardous substances during recharge activities. The residual less-than-significant effects of the project that would remain after remediation would not combine with the potential residual effects of cumulative projects to cause a potential significant cumulative impact because residual impacts would be highly site-specific. Accordingly, no significant cumulative impact with respect to the use or release of hazardous materials would result. For the above reasons, the combined effects of the construction of the project in combination with cumulative projects would not have a cumulatively considerable contribution to a cumulative impact relative to the use of hazardous materials.

The construction of cumulative projects could involve hazardous materials within one-quarter mile from a school. Similar to the proposed project's Mitigation Measure HAZ-1, cumulative projects near schools should coordinate with the local school district and specific schools in order to avoid locations and routes near school facilities. This would reduce any potential impacts to schools to less than significant. Implementation of this mitigation measure would reduce the cumulatively considerable contribution to a cumulative impact relative to hazardous material use within one-quarter mile of schools.

The construction of cumulative projects could potentially expose workers, structures, and the public to contaminated soils located on hazardous materials sites. Similar to Mitigation Measure HAZ-1 through HAZ-3 of the proposed project, cumulative projects would be required to sample of soils onsite appropriately remediated or removed if soils contain hazardous quantities of contaminants. This would reduce any potential impacts to construction workers due to encounters with hazardous materials to less than significant levels and reduce impacts to groundwater due to potential transport of hazardous substances during recharge activities.

Implementation of this mitigation measure would reduce the cumulatively considerable contribution to a cumulative impact relative to hazardous material sites.

The construction of the cumulative projects could require the temporary closure of traffic lanes, which could impact emergency access. Similar to the proposed project, other cumulative construction projects would be required to provide appropriate traffic control and emergency access for their projects similar to Mitigation Measure TRA-1. Implementation of traffic control plans would reduce the cumulatively considerable contribution to a cumulative impact relative to emergency access.

Finally, cumulative projects in areas susceptible to wildfires would also be required to implement wildfire prevention measures to prevent wildfire. For the above reasons, the combined effects of the project and cumulative projects would not result in a cumulatively considerable effect, and impacts would be less than significant.

Similar to the proposed project, the cumulative projects' activities involve the handling, storage, and disposal of hazardous materials, and would be required to prepare and implement an HMBP and comply with applicable regulations, including those governing the use, storage, transportation, and disposal of hazardous materials, including emergency response and notification procedures in the event of a spill or release. Specifically, the use of pesticides for cumulative projects involving recharge basins, would be required to comply with regulations enforced by the CDPR, which regulates the sale, use, and disposal of pesticides within California. Transportation and disposal of wastes would also be subject to regulations for the safe handling, transportation, and disposal of chemicals and wastes. As noted previously, such regulations include standards to which parties responsible for hazardous materials releases must return spill sites, regardless of location, frequency, or size of release, or existing background contaminant concentrations to their original conditions. Compliance with existing regulations regarding hazardous materials use would reduce the risk of environmental or human exposure to such materials would reduce the cumulatively considerable contribution to a cumulative impact relative to hazardous materials.

Cumulative projects in areas susceptible to wildfires would also be required to implement wildfire prevention measures to prevent wildfire. With compliance with existing regulations, the combined effects of the project and cumulative projects would not result in a cumulatively considerable effect, and impacts would be less than significant relative to wildfires. Lastly, cumulative projects that include recharge facilities similar to the proposed project could result in an increase in airborne insect populations. Similar to the proposed project, cumulative projects should coordinate with the Kern County Department of Public Health Services and the Kern Mosquito and Vector Control District. Potential cumulative impacts regarding vectors would be considered less than cumulatively considerable with the implementation of best practices for insect abatement that would result due to implementation of Mitigation Measure HAZ-5. Impacts would be less than significant with mitigation.

MITIGATION MEASURES: HAZ-1, HAZ-2, HAZ-3, HAZ-4, HAZ-5, and TRA-1.

J. Hydrology and Water Quality

POTENTIAL EFFECTS: Potential effects examined included the potential to: violate any water quality standards, waste discharge requirements, or otherwise degrade surface or groundwater quality [Impact 3.10-1]; substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management

of the basin [Impact 3.10-2]; substantially alter the existing drainage pattern of a site or area through the alteration of the course of a stream or river, or by other means, in a manner that would result in substantial erosion or siltation on- or off-site, substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site; create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or impede and redirect flood flows [Impact 3.10-3]; in flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation [Impact 3.10-4]; conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan [Impact 3.10-5]; or result in cumulatively considerable impacts to hydrology and water quality [Impact 3.10-6].

FINDINGS: Adherence to the Mitigation Measure HAZ-1 listed in the EIR will reduce Impact 3.10-1 to less than significant (Finding 1). Impacts 3.10-2, 3.10-3, 3.10-4, and 3.10-6 will be less than significant, requiring no mitigation. The remaining potential impacts will not occur.

FACTS IN SUPPORT OF THE FINDINGS:

Impacts Not Occurring: Until the proposed project is constructed, there would be no water recharge or recovery, and no addition of impervious surfaces. Therefore, relative to groundwater supplies and recharge during construction, there would be no impact.

The proposed project would be designed to provide infiltration of surface water within the proposed recharge basins within the project area. Storm water runoff would be captured onsite and therefore would not cause or exacerbate any potential flooding on- or off-site. The proposed conveyance canal would not cross or alter any drainages. The conveyance pipelines would be underground, and once installed there would be no change in surface runoff. Pump stations would have a minimal footprint surrounded by pervious soil into which precipitation would infiltrate, as it does now. Therefore, there would be no impact regarding flooding due to altering the existing drainage pattern of the project area. The proposed project would not create or contribute new sources of runoff or polluted runoff. The proposed project would be designed to provide infiltration of surface waters within the recharge basins at the project area and as such would capture storm water runoff onsite. No drainage system would be necessary for storm water capture. The Kern Fan Conveyance Facilities would consist of some combination of a canal or pipelines, none of which would require the use of any drainage system. Therefore, there would be no impact in regards to exceeding the capacity of drainage systems within the project area.

The proposed project is not located within a FEMA-designated 100-year flood zone and does not include the construction or renovation of any housing units. The perimeter berms of the recharge basins would be compacted and constructed to minimize any potential damage that may occur from the filling of the basins. In the event that damage occurs to the berms during times when the ponds are full, released water would infiltrate into the permeable soils that comprise the relatively flat area surrounding the recharge ponds. Therefore, there would be no impact to people or structures related to potential risk of loss, injury or death involving inundation in a flood hazard zone. The project area is not located in an area that is susceptible to the effects of a seiche or tsunami. Therefore, there would be no impact to people or structures related to potential risk of loss, injury or death involving inundation by a seiche or tsunami. Until the proposed project is constructed, there would be no potential for inundation from a dam failure, and there would be no impact.

Until the proposed project is constructed, there would be no conflicts or obstructions to the water quality control plan (basin plan) or sustainable groundwater management plan, and there would be no impact. The purpose of the proposed project is to augment the recharge, storage, and recovery capabilities of existing water supply programs and provide greater operational flexibility. By storing additional surface water underground in Kern County, the proposed project would generally benefit groundwater levels and storage in the Sub-basin and help support groundwater sustainability efforts required by SGMA. In addition, the proposed project would enhance water supply reliability by augmenting supplies for periods when other sources may be limited or unavailable. Therefore, relative to the water quality control plan (basin plan) and the sustainable groundwater management plan, the proposed project would have a beneficial impact.

Impact 3.10-1: During construction activities, soils could be become exposed to high winds or heavy precipitation causing a substantial increase in sedimentation in storm water run-off. In addition, construction activities would require the use of hazardous materials including but not limited to petroleum products. The mobilization of sediment or inadvertent spills or leaks of such pollutants could affect the quality of runoff water from the construction sites. However, because the project would disturb more than one acre, construction would be subject to the NPDES General Permit for Discharges of Storm Water Runoff Associated with Construction Activity. As part of this process, the Authority would be required to comply with the NPDES Construction General Permit. Compliance with this permit would require the preparation and implementation of a SWPPP that would identify pollutant sources that may affect the quality of storm water discharge and implement BMPs, such as erosion control and pollution prevention measures, to be used during the course of construction. The project SWPPP would include BMPs to minimize the impacts of construction activities to water quality. With implementation of the BMP requirements required by the state Construction General Permit, the potential for pollutants and sediment to affect the water quality of runoff from construction sites would be minimized to less-than-significant levels.

The transport, use, and disposal of pesticides associated with past, present and future agricultural activities would continue to be done in accordance with applicable regulatory requirements in order to protect water quality and public health. Mitigation Measure HAZ-1 would require that samples of soils at new recharge basins are analyzed and removed in accordance with all applicable federal and state regulations if soils contain hazardous quantities of contaminants. Therefore, impacts to water quality would be considered less than significant with mitigation.

During operations, recharge water would be placed in recharge basins and allowed to infiltrate into the underlying aquifer for later recovery. The quality of typical surface water sources and groundwater in the aquifer beneath the project area has been characterized through laboratory analysis and compared with drinking water parameters. The water quality of the surface water sources for groundwater banking is in general lower in constituent concentrations than that of the local groundwater. The introduction of surface water into the shallow zone would improve groundwater quality. In addition, as the water placed in the recharge basins infiltrates through the soil column down to the aquifer, the water quality would be anticipated to further improve because the soil would filter out some of the chemical constituents. Consequently, the recharge of surface water would improve the groundwater quality, resulting in a beneficial impact. Once recovered, the groundwater would be introduced into the new proposed conveyance facilities. The Authority will enter into an agreement with DWR for construction of a new turnout into the California Aqueduct. Prior to pumping extracted groundwater into the CVC and California Aqueduct, it would be the Authority's responsibility to ensure that the water quality

was sufficient to meet applicable water quality requirements of KCWA and DWR, and submit a Pump-In Proposal that identifies the water sources, planned operation, inflow water quality, and any anticipated impacts to water quality and/or operations. The operational agreement with DWR will specify that any introduction of water into the California Aqueduct must comply with DWR water quality requirements. Any water that did not meet water quality requirements or could not be blended to meet such requirements, as imposed by the conveyance facility operators, would not be conveyed within the canals.

The proposed recharge water would not have elevated concentrations of arsenic and its addition would be expected to reduce the concentrations of arsenic in the aquifer. Therefore, the addition of the recharge water would be a beneficial impact to groundwater quality. The transport, use, and disposal of pesticides associated with past, present and future agricultural activities at the proposed recharge basins would continue to be done in accordance with applicable regulatory requirements in order to protect water quality and public health. Future agricultural activities at the recharge basins would be subject to all applicable regulatory requirements of the USEPA, CDPR, and the Kern CAC. Farming operations at the proposed recharge basins could include the use of restricted or unrestricted materials. The Authority would require all contract farmers to comply with regulations pertaining to application of pesticides within recharge basins and in proximity to wellheads. All required measures pertaining to wellhead protection also would be implemented. The Authority would require the contract farmer to obtain a permit from the CAC for application of restricted materials and to comply with all conditions of the permit in order to ensure the protection of human health and the environment. Compliance with regulatory requirements pertaining to pesticide use would ensure impacts would be less than significant.

Impact 3.10-2: *Groundwater Recharge Operations*. Mounding groundwater resulting from recharging on the project sites could impact the integrity of these structures or cause cracks in sub-surface concrete panels. Groundwater modeling conducted for the proposed project evaluated the effects that proposed recharge would have during times of relatively high baseline groundwater levels. Groundwater mounding would not raise groundwater levels in any area to less than 50 feet from the ground surface, therefore, the project would not cause damage to surface and underground structures due to pressure or liquefaction. Groundwater mounding further away from the recharge basins and outside of the project site would be much less, on the order of less than 10 feet. The impact relative to recharge operations would be less than significant.

Groundwater Recovery Operations. During periods of lower groundwater levels, the pumping of groundwater to recover stored water could decrease groundwater levels to below the Minimum Thresholds established in the GSP or trigger levels established in the Operating Plans. This could damage project and nearby wells if the groundwater levels decreased below existing well pumps. Groundwater modeling conducted for the proposed project evaluated the effects of groundwater recovery operations during relatively low groundwater conditions. Groundwater levels would decrease to below baseline conditions for a brief time period but then recover to baseline conditions within 2 years. To further evaluate the effects of groundwater recovery, the groundwater model compared the lowest projected groundwater levels to the Minimum Thresholds on the baseline condition hydrographs. Groundwater levels would be expected to recover to above the minimum thresholds once recovery pumping is completed. Therefore, impacts relative to recovery operations would be less than significant.

The Long Term Operations Plan considers that project-related decreases in groundwater levels that are 30 feet or greater relative to baseline conditions are considered negative project

impacts that trigger mitigation if neighboring wells experience mechanical failure or other operational problems due to declining water levels. Given historical fluctuations in groundwater levels in the area when other nearby groundwater banking projects are recovering, it is expected that additional declines attributable to the proposed project beyond historic low groundwater levels could result in operational problems at some existing wells. However, the proposed project would not be anticipated to result in declines of groundwater levels greater than 20 feet at neighboring existing wells. Therefore, no mitigation would be required and, impacts relative to recovery operations would be less than significant.

Sustainable Groundwater Management. The proposed project is one of many projects proposed by Rosedale, as part of the Kern Groundwater Authority and its Groundwater Sustainability Plan (GSP), for implementation in its management area of the GSA. As such, the proposed project would assist Rosedale (and by extension the Kern Groundwater Authority) with the stabilization of groundwater levels and help achieve groundwater sustainability in the Kern Fan area by the SGMA-mandated date of 2040.

The proposed project would be incorporated into existing MOUs and Operations Plans. The MOUs define recharge losses as amounts of water that are non-bankable and non-recoverable that provide a benefit by increasing the volume of water in groundwater storage and supporting sustainability. The Operations Plans would ensure that any lowering of localized groundwater levels within a cone of depression around the proposed recovery wells would not have adverse effects to the operation of neighboring wells. Therefore, the proposed project would not have adverse localized effects to groundwater supplies and would support sustainable groundwater management of the basin. Impacts would be less than significant.

Impact 3.10-3: During construction activities, soils could be become exposed to high winds or heavy precipitation causing erosion. The project would be required to comply with the NPDES Construction General Permit, which would require the preparation and implementation of a SWPPP. The SWPPP would describe BMPs describing erosion control and pollution prevention measures to be used during the course of construction. The project SWPPP would include BMPs to minimize the impacts of construction to a less than significant level. Erosion control BMPs have been proven effective at minimizing erosion during construction and associated earthwork activities. With implementation of the SWPPP, the project would minimize the potential for erosion or siltation to occur during construction, and the impact would be less than significant.

The proposed project would construct recharge basins, which would also capture storm water during precipitation events. Although the drainage pattern would be altered in the immediate location of the recharge basins, the basins would not cause substantial erosion or siltation on- or off-site because rainwater would be contained within the basins. The basins also would continue to be used for agricultural purposes when not being used for recharge. Thus, with the continuation of farming, grazing, or fallowing, the existing land cover would not be substantially altered from existing conditions and would not alter the conditions that affect erosion or siltation. The conveyance canal and/or pipelines would not alter the overall drainage pattern within their alignments. Pipelines would be below ground and would not alter existing topography or drainage once construction is complete. Canals would contain rainwater, similar to recharge basins, and would be constructed as gravity flow structures to the extent feasible, aligned with the existing topography. The pump stations would have relatively small footprints. Precipitation falling on the pump stations would flow off to the surrounding unpaved soils and infiltrate into the ground, as it does now. Therefore, the addition of the recharge basins, canal, pipelines, and pump stations would not substantially alter the existing drainage pattern of the project area site

and would not result in substantial erosion or siltation on- or off-site, resulting in a less than significant impact.

Impact 3.10-4: In the event of a failure of the dam at Lake Isabella, the Phase 1 area would be located within the distal end of the inundation zone. The eastern portion of the Phase 1 area could be flooded with 0 to 5 feet of reservoir water in 14 to 24 hours. However, the flood waters would have slowed by the time they reach the Phase 1 area and would have lost velocity, reducing the potential for damage. In addition, the flood waters would be shallow relative to the heights of the recharge basin berms, further reducing the potential for damage. Finally, the flood waters would consist of surface water that would not be expected to contain pollutants other than entrained sediment. By the time the inundation flood waters reach the Phase 1 area, the flow velocity would have decreased and sediment load would be dropped out. The addition of the proposed recharge and recovery facilities would not introduce new land uses to the project area, relative to existing conditions, that would result in the introduction of new pollutants during potential inundation by flood waters. The inundation flood waters would not reach the Phase 2 area or the Kern Fan Conveyance Facilities area. In the unlikely event of a failure of the dam at Lake Isabella, the distance from the dam to the Phase 1 project area would reduce the potential for damage. Any damage to the recharge basin berms could be easily repaired. Impacts relative to flooding by inundation from the failure of the Lake Isabella dam would be less than significant.

Impact 3.10-6: This section presents an analysis of the cumulative effects of the proposed project in combination with other past, present, and reasonably foreseeable future projects that could cause cumulatively considerable impacts.

The proposed project would have no impact with respect to altered drainages, drainage system capacities, impeding flood flow in flood hazard zones, seiches, and tsunamis. Accordingly, the proposed project could not contribute to cumulative impacts related to these topics and are not discussed further.

The geographic area affected by the proposed project and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative hydrology and water quality impacts encompasses the Sub-basin. The timeframe during which proposed project could contribute to cumulative hydrology and water quality impacts includes the construction and operations phases. For the proposed project, the operations phase is permanent.

Significant cumulative impacts related to hydrology and water quality impacts could occur if the incremental impacts of the proposed project combined with the incremental impacts of one or more of the cumulative projects identified in Table 3-2 of the EIR to substantially increase risk that people or the environment would be exposed to hydrology and water quality impacts. Cumulative Projects numbers 1 and 2 are road improvement projects. Cumulative Projects number 3 through 10, 12, and 13 are water supply improvement projects, similar to the proposed project that include recharge basins, recovery wells, pipelines, and/or canals, and associated infrastructure. Cumulative Project number 11 is a maintenance project that would raise portions of existing concrete liners and would not have any impacts relative to water quality of supply. Table 3-1 lists the groundwater banking programs in Kern County. The groundwater banking programs would have routine water banking activities that could result in cumulative impacts.

Similar to the proposed project, the cumulative projects have the potential to disturb more than one acre. If the projects are constructed at the same time, the erosion effects could be

cumulatively significant and could affect water quality of nearby surface water bodies. However, the state Construction General Permit would require each project to prepare and implement a SWPPP. The SWPPPs would describe BMPs to control runoff and prevent erosion for each project. Through compliance with this requirement, the potential for erosion impacts would be reduced. The Construction General Permit has been developed to address cumulative conditions arising from construction throughout the state and is intended to maintain cumulative effects of projects subject to this requirement below levels that would be considered significant. For example, two adjacent construction sites would be required to implement BMPs to reduce and control the release of sediment and/or other pollutants in any runoff leaving their respective sites. The runoff water from both sites would be required to achieve the same action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff water. Thus, even if the runoff waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at concentrations (amount of sediment or pollutants per volume of runoff water) below action levels and would not be cumulatively considerable. Impacts would be less than significant.

Once constructed, the road improvements for Cumulative Projects numbers 1 and 2, and the concrete liner maintenance project for Cumulative Project number 11 would be complete and could no longer affect water quality. Once operational, the cumulative water supply improvement projects (i.e., Cumulative Projects 3 through 10, 12, and 13) would be subject to the same regulations and similar agreements as the proposed project relative to water quality. Similar to the proposed project, the water quality of the surface source waters would generally be better than the water quality of groundwater in the aquifer, and the recharge of surface water into the aquifer would improve groundwater quality. Once recovered, groundwater would be subject to the pump-in water quality requirements of regional water conveyance systems, similar to the proposed project. Any water that did not meet water quality requirements or could not be blended to meet such requirements, would not be conveyed within the California Aqueduct and the CVC.

Similar to the proposed project, the cumulative water supply improvement projects would be subject to the same regulations and similar agreements as the proposed project relative to water supply and groundwater levels. Similar to the proposed project, recharge and recovery operations would be subject to operating plans, MOUs, and other agreements that would require the establishment of groundwater level monitoring programs in wells at and around each of the water banking operations.

The proposed project would be operated subject to Rosedale's Operations Plans. The Operations Plans designate specific measures to be employed to "prevent, eliminate or mitigate significant adverse impacts" resulting from project operations, including effects to neighboring wells. The Operations Plans includes monitoring of groundwater conditions and the use of Rosedale's groundwater model to predict the contribution of the various water banking projects to groundwater increases or declines in the area. Consequently, the proposed project would be operated in such a way as to prevent cumulative impacts with neighboring water banking operations. Implementation of the Operations Plans would ensure that local groundwater users and neighboring well owners/operators to the proposed recharge and recovery facilities would not be adversely affected during operation of the proposed recovery wells. Therefore, the proposed project would not have adverse localized effects to groundwater supplies and would support sustainable groundwater management of the basin. With implementation of Rosedale's Operations Plans, the proposed project would be in compliance with SGMA and other regulations, MOUs, and agreements and would not have a cumulatively considerable impact to

groundwater supplies or sustainable groundwater management of the basin. Impacts would be less than significant.

Similar to the proposed project, cumulative projects that allow farming in unused recharge basins would be required to transport, use, and dispose of pesticides in accordance with applicable regulatory requirements in order to protect water quality and public health. Compliance with regulatory requirements pertaining to pesticide use would ensure cumulative impacts would be less than significant.

MITIGATION MEASURES: HAZ-1.

K. Land Use and Planning

POTENTIAL EFFECTS: Potential effects examined included the potential to: physically divide an established community [Impact 3.11-1]; cause a significant environmental impact due to a conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect [Impact 3.11-2]; or result in cumulatively considerable impacts to land use [Impact 3.11-3].

FINDINGS: Adherence with Mitigation Measures AGR-1, BIO-10, BIO-11, and BIO-14 listed in the EIR will reduce Impact 3.11-2 and 3.11-3 (Finding 1). Impact 3.11-1 will not occur.

FACTS IN SUPPORT OF THE FINDINGS:

Impacts Not Occurring: The project area is located in an agricultural and rural residential community. Construction and operation of recharge basins and associated facilities in the project area would be consistent with existing community land use and would not serve to divide an established community. The proposed recharge basins and recovery wells are anticipated to be constructed on land already used for agricultural purposes and once constructed would have roadways to allow access in and around the recharge basins. Dirt roads approximately 14 to 20 feet wide would run along the perimeter of and in between all basins to provide access to facilities during operation and maintenance activities. The proposed basins and recovery wells would not divide any established communities, and no impact would occur.

As a linear project feature, the Kern Fan Conveyance Facilities would be constructed so as to not divide existing roadways. Siphons would be installed when crossing Interstate-5, Stockdale Highway and other surface features, potentially such the East Side Canal and Kern Water Bank Main Canal. Additionally, where surface features exist, jack and bore methods would be used so that the conveyance facilities could tunnel under to avoid disruption. The proposed new turnout from the California Aqueduct would be constructed within the State of California right-of-way and subject to approval by DWR and KCWA. To avoid disruptions to the California Aqueduct operations, cofferdams would be required during turnout construction. Cofferdams are temporary watertight structures that would allow for a portion of the Aqueduct to be dewatered during construction of the turnouts and allow flows to continue passing through the Aqueduct channel. The proposed Kern Fan Conveyance Facilities would not divide any established communities, and no impact would occur.

Impact 3.11-2: Both the Phase 1 and Phase 2 project areas are largely designated as Intensive Agriculture and Rural Residential by the Kern County General Plan. The Intensive Agriculture designation allows for groundwater recharge facilities. The Phase 1 and Phase 2 areas are also largely zoned for Exclusive Agriculture and Limited Agriculture. The County Zoning Ordinance

allows groundwater recharge facilities in Exclusive Agriculture. In addition, agricultural land uses, such as annual farming, grazing, or fallowing, would be allowed within the basins at all Kern Fan Project Property sites when the properties are not needed for water recharge or water management purposes. Grazing could be used to remove or control vegetative growth. The proposed project would be compatible with the goals and policies of the Kern County General Plan for protecting agricultural resources through the beneficial use of percolation basins and conveyance facilities. The Kern County's *Agricultural Preserve Standard Uniform Rules* state that groundwater recharge operations are compatible land uses on agricultural preserves if the preserve is used for commercial agriculture for at least seven months out of a twelve-month period. For portions of the project area under a Williamson Act contract, implementation of Mitigation Measure AGR-1 would be required to ensure consistency with land uses at those areas should the recharge basins be constructed there.

The area where the Kern Fan Conveyance Facilities would be located is dominated by a land use of Intensive Agriculture. The Kern Fan Conveyance Facility area is almost entirely zoned as A (Exclusive Agriculture). Construction and operation of the Kern Fan Conveyance Facilities would require temporary and permanent easements across small portions of various properties along the canal and/or pipeline alignment. The easements would not prevent the parcels from continuing to be used for agricultural use. Also, water conveyance facilities are considered to be compatible agricultural land uses according to Kern County's *Agricultural Preserve Standard Uniform Rules*, Kern County's General Plan Land Use designation of Intensive Agriculture, and Kern County's zoning designation for Exclusive Agriculture. Therefore, implementation of the proposed Kern Fan Conveyance Facilities would not conflict with designated land uses.

The proposed project is one of more than 150 projects and management actions in the Kern Groundwater Authority GSP. The projects and management actions may be implemented as necessary to ensure the Kern County Sub-basin can achieve its sustainability goals, including maintaining groundwater use within the sustainable yield of the basin. With implementation of the projects and management actions in the GSP, during the implementation period of 2020 to 2040, the Kern County Sub-basin would have an average surplus of 85,578 AFY (KGA 2020). The proposed project would be consistent with, and would not conflict with, the local groundwater sustainability plan.
The proposed project would be compatible with the goals and policies of the Kern County General Plan for providing adequate supplies of quality water for residential, industrial, and agricultural users within Kern County, and effective groundwater resource management.

Additionally, the project area does reside within the Bakersfield Habitat Conservation Plan as well as the Kern Water Bank HCP/NCCP. Implementation of Mitigation Measures BIO-10, BIO-11, and BIO-14 would reduce any potential impacts to less than significant levels. As such impacts related to conflict with land use plans, policies or regulations with Kern County or other relevant agencies would be less than significant with the incorporation of the Mitigation Measures discussed above.

Impact 3.11-3: This section presents an analysis of the cumulative effects of the proposed project in combination with other present and reasonably foreseeable future projects that could generate cumulatively considerable impacts to land use and planning.

The geographic area addressed in the discussion of cumulative impacts varies depending on the environmental resource topic being analyzed. The geographic area for the analysis of the potential cumulative impacts of the proposed project and cumulative projects related to land use and planning is limited to the San Joaquin Valley in Kern County.

The cumulative impact of the proposed project on land use and planning is dependent on the past, present, and reasonably-foreseeable future conditions of development and land use in the project vicinity. Other related projects in the area could result in the conflict with existing land use policies, plans, or divide the existing community. The projects to be considered cumulatively with this project are discussed in Table 3-2 of the EIR and similar to the proposed project include groundwater recharge, conveyance, and water banking projects. The impacts associated with these cumulative projects would be similar to those discussed above for the proposed project. As such, these projects could also result in the permanent change of land uses in the San Joaquin Valley that could conflict with land use plans and policies and divide established communities. Other projects discussed in Table 3-2 of the EIR include road improvement projects led by the City of Bakersfield. These projects in conjunction with the proposed project could cumulatively contribute to impacts to land use and planning within the geographic scope defined above.

However, the proposed project would not contribute to any conflicts with land use designations with the implementation of the mitigation measures discussed above. Overall, the proposed project would provide benefits to agriculture and groundwater sustainability, and land uses in the project area would remain in agricultural use. Groundwater recharge and water conveyance facilities are compatible with agricultural land use in Kern County. As such the proposed project would not cumulatively contribute to impacts to land uses in the proposed project area.

MITIGATION MEASURES: AGR-1, BIO-10, BIO-11 and BIO-14.

L. Mineral Resources

POTENTIAL EFFECTS: Potential effects examined included the potential to: result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state [Impact 3.12-1]; result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan [Impact 3.12-2]; or result in cumulatively considerable impacts to mineral resources [Impact 3.10-3].

FINDINGS: Impact 3.12-1 and 3.12-3 will be less than significant. Impact 3.12-2 will not occur.

FACTS IN SUPPORT OF THE FINDINGS:

Impacts Not Occurring: The proposed project is not located within a designated mineral resource recovery site. A portion of recent alluvium deposited by the Kern River has been classified MRZ-2, but the resource is located upstream the Kern River and outside the boundaries of the project area. Kern River deposits south of the project area include sediments which are predominately fine-grained, and gravel does not occur in economic concentrations in the subsurface. Additionally, there are no sand and gravel extraction sites within the project area. Therefore, the proposed project would not result in the loss of availability of locally important mineral resources, nor would the proposed project result in the loss of availability of locally important sand and gravel resources. No impact would occur.

Impact 3.12-1: There are no MRZs located in the vicinity of the project. Therefore, the proposed project would not impact mineral resources of value to the region and residents of the State. While there are a number of active oil and gas wellfields located within the project area, the majority of the existing oil/gas wells have been plugged or cancelled as indicated by the California Department of Conservation CalGEM Well Finder GIS database. There are 6 currently active oil and gas wells within the Phase 1 area, two of which are located on Stockdale

East, which is owned by Rosedale. Mineral rights associated with and underlying the project area are not owned the Authority. In the event that construction of the proposed project would occur within an active wellfield, the Authority would be required to accommodate existing and future drill islands in the project area to ensure that access to underlying mineral rights may continue during construction and operation of the proposed project. As a result, implementation of the proposed project would not impede future access to subsurface mineral resources of regional importance. Impacts would be less than significant.

Impact 3.12-3: The geographic scope of the potential cumulative impact to mineral resources encompasses the Kern Fan area of Kern County and portions of Metropolitan Bakersfield, California. The proposed project is located on land that is primarily used for agricultural purposes. No MRZs or important sand and gravel resources have been identified within the project area. Thus, there is no potential for the project to impact the availability of important mineral resources during construction and operation. Therefore, the proposed project would not contribute to cumulatively considerable impacts to mineral resources in the project region.

Six active oil/gas wellfields are located within the project area: Strand Oil Field, Greeley Oil Field, Bellevue West Oil field, Bellevue Oil Field, McClung (ABD) Oil Field, and Canal Oil Field. In the event that construction of the proposed project would occur within an active wellfield, the Authority would be required to accommodate existing and future drill islands in the project area to ensure that access to underlying mineral rights may continue during construction and operation of the proposed project. Therefore, the proposed project would not contribute to cumulatively considerable impacts to the availability of locally important oil/gas resources in the project region.

MITIGATION MEASURES: None required.

L. Noise and Vibration

POTENTIAL EFFECTS: Potential effects examined included the potential to: generate substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies [Impact 3.13-1]; generate excessive groundborne vibration or groundborne noise levels [Impact 3.13-2]; for a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels [Impact 3.13-3]; or result in cumulatively considerable impacts to noise [Impact 3.13-4].

FINDINGS: Adherence with Mitigation Measure NOI-1 listed in the EIR will reduce Impact 3.13-1 and 3.13-4 (Finding 1). Impact 3.13-2 will be less than significant. Impact 3.13-3 will not occur.

FACTS IN SUPPORT OF THE FINDINGS:

Impacts Not Occurring: The proposed project is not located within two miles of public airport or public use airport or located within an airport land use plan area. The nearest airport to the project site is the Elk Hills-Buttonwillow Airport, located approximately 4 miles west of the BV8 Aqueduct Turnout. The nearest public commercial airport is Meadows Field Airport, approximately 4 miles northeast of the project area. Therefore, the proposed project would not expose people residing or working in the area to excessive noise levels.

Impact 3.13-1: Construction activities at the project sites would result in a temporary increase in noise levels in the project vicinity. Noise levels would be in accordance with the County noise ordinance requirements for construction during daytime hours; however, the project could violate the County's noise ordinance during 24-hour continuous well drilling. Implementation of Mitigation Measure NOI-1 would ensure that construction impacts are less than significant. Operational activities would not significantly increase noise levels and would not create noise impacts. Therefore, the proposed project would not expose sensitive receptors to noise levels in excess of established standards.

Impact 3.13-2: Proposed construction activities would occur throughout the project area and would not be concentrated at the point closest to the nearest structure. Based on the vibration levels presented in the EIR, at a distance of 50 feet from the project area, the maximum vibration level would be up to approximately 0.0361 in/sec PPV for a large bulldozer, which would not exceed the significance threshold of 0.2 in/sec PPV. Therefore, the use of all construction equipment would not result in a groundborne vibration velocity level above 0.2 inches per second at the nearest off-site structure. With respect to human annoyance, the nearest residential buildings located within 50 feet from the project site would be exposed to vibration levels below the 80 VdB threshold for human annoyance. Therefore, impacts would be less than significant and no mitigation is required.

Impact 3.13-4: *CEQA Guidelines* require a discussion of cumulative impacts of a project "when the project's incremental effect is cumulatively considerable" (2011 *CEQA Guidelines*, Section 15130). As defined by Section 15065 (a)(3) "cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (2011 *CEQA Guidelines*, Section 15065 (a)(3)). These cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (*CEQA Guidelines* Section 15355).

Cumulative projects that may be constructed within 1,000 feet of the project area are listed in Table 3-2 of the EIR. Should cumulative projects undergo construction at the same time as the proposed project, the cumulative projects would be required to comply with the construction hours allowed by the County or comply with County restrictions imposed if a variance to the allowable construction hours for these projects is issued. As previously discussed, the proposed project construction and operation would comply with the County's noise standard. However, 24-hour well drilling may result in temporary noise level increases outside of normally acceptable construction hours and within 1,000 feet of an occupied residential dwelling. With the implementation of best management practices for noise control during 24-hour well drilling activities, as required by Mitigation Measure NOI-1, impacts would be less than significant with mitigation. Therefore, the proposed project, when combined with the identified cumulative projects, would not cause a cumulatively considerable noise impact. With regard to groundborne vibration, the construction vibration levels generated by the project would be substantially below the FTA thresholds for structure damage or human annoyance. Vibration level diminish rapidly from the source and the range of vibration concern is usually limited to 50 feet from the vibration source; thus, the proposed project, when combined with the identified cumulative projects, would not cause a cumulatively considerable vibration impact. As a result, cumulative impacts would be less than significant.

MITIGATION MEASURES: NOI-1.

N. Transportation

POTENTIAL EFFECTS: Potential effects examined included the potential to: conflict with a program, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities [Impact 3.14-1]; conflict or be inconsistent with *CEQA Guidelines* Section 15064.3, subdivision (b) [Impact 3.14-2]; Substantially increases hazards due to a geometric design feature or incompatible uses [Impact 3.14-3]; result in inadequate emergency access [Impact 3.14-4]; or result in cumulatively considerable impacts to transportation [Impact 3.14-5].

FINDINGS: Adherence to the Mitigation Measure TRA-1 listed in the EIR will reduce Impact 3.14-1 to less than significant, adherence to the Mitigation Measure TRA-1 and HAZ-4 will reduce Impact 3.14-3 to less than significant, adherence to the Mitigation Measure TRA-1 will reduce Impact 3.14-4 to less than significant, and adherence to Mitigation Measure TRA-1 will reduce Impact 3.14-5 to less than significant (Finding 1). Impact 3.14-2 will be less than significant, requiring no mitigation.

FACTS IN SUPPORT OF THE FINDINGS:

Impact 3.14-1: Construction of the Kern Fan Conveyance Facilities that would convey water to/from the California Aqueduct and the Kern Fan Properties would require tunneling under I-5 to avoid surficial impacts to the operation and circulation patterns of I-5. Construction of the Kern Fan Conveyance Facilities may require short-term lane or road closures on local surface roadways or detours within the project area as conveyance facilities are constructed. Implementation of Mitigation Measure TRA-1 would require preparation and implementation of a Construction Traffic Control Plan that ensures the Authority provides signage and flagging to alert motorists of pending lane or road closures and detours. Because construction of the proposed project would not substantially increase traffic on nearby roadways, the proposed project would not conflict with any applicable plans, ordinances, or policies that establish measures of effectiveness for the performance of the circulation system around the project area. Therefore, the construction phase of the proposed project would have a less than significant impact with implementation of mitigation measures on traffic circulation.

The operations phase of the proposed project would require trip amounts that are not substantial relative to the existing AADTs of project-related roadways, and project implementation would not conflict with the goals set forth by the Kern County General Plan or any other applicable ordinance or policy that set forth to measure the effectiveness of the circulation system in the vicinity of the project area. Therefore, the operations phase of the proposed project would have a less than significant impact on traffic circulation.

Impact 3.14-2: As defined in *CEQA Guidelines* Section 15064.3(a), vehicles miles traveled (VMT) refers to the amount and distance of automobile travel attributable to a project. The Technical Guidelines explain that the automobile in Section 15064.3 “refers to on-road passenger vehicles, specifically cars and light trucks.” For this reason, the focus of the VMT analysis is on passenger vehicle (i.e., cars and light trucks) trips generated by the project. It should be noted that the EIR also includes an analysis of GHG emissions associated with heavy truck traffic generated by the project (as well as other traffic) and addresses potential significant transportation impacts of all project vehicles, including heavy trucks, related to air quality, noise, and safety. The Technical Guidelines provide a screening criterion that could be used to determine if VMT analysis is warranted for small projects, which are defined as projects that would generate fewer than 110 trips per day and may generally be assumed to cause a less

than significant transportation impact. Construction of the proposed project would generate a maximum of 40 worker round-trips per day; worker trips generated during project operation and maintenance would be substantially lower than the trips generated by project construction. Therefore, daily passenger vehicle trips generated by the project would be well below State of California Office of Planning and Research's (OPR's) recommended small-project screening criterion threshold of 110 trips per day, and the project's impact to VMT would be less than significant.

Impact 3.14-3: Project construction would require the delivery of heavy construction equipment that may require transportation by oversize vehicles on roadways. The use of oversize vehicles could create a hazard to the public by limiting views on the roadways, obstructing space, and reducing travel speed on the roadway. To ensure that construction-related oversize vehicle loads and travel are in compliance with applicable California Vehicle Code sections and California Street and Highway Codes applicable to licensing, size, weight, load, and roadway encroachment of construction vehicles, the construction contractor would prepare a Construction Traffic Control Plan that conforms to requirements of the Kern County Public Works Department and the California Department of Transportation District 6. The Construction Traffic Control Plan would identify construction delivery times and vehicle travel routes in advance to minimize construction traffic during peak a.m. and p.m. hours. The preparation and approval of the Construction Traffic Control Plan would further reduce construction-related traffic and roadway hazards in the project vicinity. Mitigation Measure TRA-1 would ensure the Construction Traffic Control Plan is developed prior to construction.

The Del Rio Elementary School, Bakersfield Christian High School, and Rio Bravo Greeley School are located near the project area. In the event that project facilities are be located within a quarter mile of the school, impacts related to the construction and operation of the proposed project could occur. Implementation of Mitigation Measure HAZ-4 would require coordination with applicable school districts to determine a construction route that would not impact existing school safety routes. With implementation of mitigation measures, project impacts related to hazards and incompatible uses would be less than significant.

Impact 3.14-4: The Kern Fan Properties are located in a rural agricultural area with adequate egress and ingress to the sites via Stockdale Highway, Rosedale Highway (SR-58), Enos Lane (SR-43), Brimhall Road, Heath Road, and Nord Avenue in the event of an emergency. During construction of the Kern Fan Conveyance Facilities, the project would utilize jack and bore and tunneling techniques to avoid disruption of surface transportation features such as I-5. However, implementation of some Kern Fan Conveyance Facilities may require temporary lane closures or a detour that could impact traffic within the project area. Construction-related traffic during installation of these facilities could affect emergency response to the project area and surrounding vicinity. To ensure emergency access is not impacted during construction in the project vicinity, the Authority would require the construction contractor to prepare a Construction Traffic Control Plan that would include assurance of access for emergency vehicles to the project area. Mitigation Measure TRA-1 would ensure the Construction Traffic Control Plan is prepared and implemented. Therefore, construction impacts would be less than significant.

Dirt roads would be constructed at the Kern Fan Project Properties along the perimeter of and in between all basins for access during operation and maintenance activities. Similar dirt roads already exist in some portions of the project area. These dirt roads would be constructed and accessible for emergency access within the project area, if necessary. Operation impacts would be less than significant.

Impact 3.14-5: The potential for cumulative transportation impacts exists where there are multiple projects proposed in an area that have overlapping construction schedule and/or project operations that could affect similar resources. Projects with overlapping construction schedules and/or operations could result in a substantial contribution to increased traffic levels throughout the surrounding roadway network. Cumulative impacts from the project, when considered with nearby, reasonably foreseeable planned projects, would occur only during project construction because project operation traffic would be minimal. As stated above in the evaluation of operational impacts, there would be minimal trip generation once construction activities have concluded. Therefore, operation of the project would result in less than significant cumulative impacts.

The proposed project would result in less than significant impacts on transportation with implementation of Mitigation Measure TRA-1. Even during construction, increased traffic associated with personnel and delivery of equipment and materials would not significantly affect road capacity or traffic volumes, given the rural location of the project and the low amount of existing traffic. Therefore, the proposed project, in conjunction with other cumulative projects in the area as identified in Table 3-2 of the EIR would not contribute to cumulative impacts on transportation. Cumulative impacts would be less than significant with implementation of Mitigation Measure TRA-1.

MITIGATION MEASURES: TRA-1 and HAZ-4.

O. Tribal Cultural Resources

POTENTIAL EFFECTS: Potential effects examined included the potential to: cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: a. listed or eligible for listing in the California Register of Historical Resources (California Register), or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k) [Impact 3.15-1a], or b. a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe [Impact 3.15-1b]; or result in cumulative impacts to tribal cultural resources [Impact 3.15-2].

FINDINGS: Impacts 3.15-1a, 3.15-1b, and 3.15-2 will not occur.

FACTS IN SUPPORT OF THE FINDINGS:

Impacts Not Occurring: The NAHC's SLF does not contain records of sacred sites within the project area. Outreach to California Native American tribes did not result in identification of tribal cultural resources that are listed in or eligible for listing in the California Register, or in a local register of historical resources as defined in *Public Resources Code* Section 5020.1(k) within or in close proximity to the proposed project area. Given that no tribal cultural resources have been identified within or immediately adjacent to the proposed project area, construction and operation of the proposed project would not cause a substantial adverse change in the significance of a tribal cultural resource, and no mitigation would be required.

No tribal cultural resources were identified as part of the Authority's outreach to Native American groups. Given that no tribal cultural resources have been identified within the proposed project area, the proposed project would not cause a substantial adverse change in the significance of a tribal cultural resource, and no mitigation would be required. Therefore, the project would not contribute to any potential significant cumulative impact to tribal cultural resources.

MITIGATION MEASURES: None required.

P. Utilities and Service Systems

POTENTIAL EFFECTS: Potential effects examined included the potential to: require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects [Impact 3.16-1]; have insufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years [Impact 3.16-2]; result in a determination by the wastewater treatment provider which serves or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments [Impact 3.16-3]; generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals [Impact 3.16-4]; not comply with federal, State, and local management and reduction statutes and regulations related to solid waste [Impact 3.16-5]; or result in cumulatively considerable impacts to utilities and service systems [Impact 3.16-6].

FINDINGS: Impacts 3.16-1, 3.16-2, 3.16-4, and 3.14-6 will be less than significant, requiring no mitigation. The remaining potential impacts will not occur.

FACTS IN SUPPORT OF THE FINDINGS:

Impacts Not Occurring: The proposed project would not require the relocation or construction of new or expanded wastewater treatment or storm water drainage, natural gas, or telecommunication facilities. No impact would occur with regard to these areas.

The proposed project would not permanently increase wastewater generation in the project area and would not require a wastewater treatment provider to serve the project. Therefore, the proposed project would have no impact on the capacity of wastewater treatment providers.

Construction, operation and maintenance of the proposed project would involve activities that would have the potential to generate solid waste. Statewide policies regarding solid waste have become progressively more stringent, reflecting Assembly Bill 939, which requires local government to develop waste reduction and recycling policies and meet mandated solid waste reduction targets. For the solid waste anticipated to be produced by the proposed project, the Authority would be required to comply with all laws and regulations related to the disposal and recycling of waste and for disposal of any hazardous materials resulting from demolition activities, as well as transport, use, and disposal of fertilizers and pesticides associated with agricultural activities at the proposed recharge basins. All construction, operation, and maintenance work would be conducted in compliance with all federal, State, and local statutes and regulations related to solid waste and its disposal. There would be no impact.

Impact 3.16-1: The proposed project would implement water recharge and recovery facilities over two phases of construction on approximately 1,300 acres of agricultural or vacant land within or near the Rosedale service area. The proposed project would also implement the Kern Fan Conveyance Facilities that would consist of canals and/or pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the project facilities and the California Aqueduct. Since the proposed project in itself is a water facilities project, the environmental impacts that would occur as a result of the proposed project are discussed throughout Chapter 3 of the EIR. No other new or expanded water facilities would be required as a result of project implementation. Therefore, impacts related to water facilities would be less than significant.

The majority of project operational activity would be passive, gravity driven movement of water through canals, pipes and basins. However, under conditions when gravity driven conveyance of water is not possible, operation of the proposed Kern Fan Conveyance Facilities would require electricity to power three pump stations along the alignment that would lift water from the California Aqueduct to the Phase 1 and Phase 2 recharge sites and other recharge facilities within Rosedale's Conjunctive Use Program. The three pump stations along the Kern Fan Conveyance Facilities would each require approximately 3,000,000 kilowatt hours per year (kwh/year), or 9,000,000-kilowatt kwh/year combined, to convey water to the recharge sites on an as-needed basis. Additionally, up to approximately 30,000,000 kwh/year would be required to operate the 12 recovery wells on the project site. Recharge and recovery operations are not expected to occur simultaneously, and during some periods neither recharge nor recovery would be occurring. Energy demand for operation the recharge and recovery facilities described above would be met by the existing PG&E electrical grid. In addition to the normal service application process, the Authority plans to provide PG&E with an overall project feasibility design at least 6 months prior to any service requests to allow for better discussion and system planning between the Authority and PG&E's engineering and planning division. The proposed project would not necessitate the construction or relocation of electric power facilities. Impacts are considered less than significant.

Impact 3.16-2: The proposed project does not require a new water supply. Water used for recharge as part of the proposed project would be conveyed between the California Aqueduct and the proposed Phase 1 and Phase 2 recharge facilities via the proposed Kern Fan Conveyance Facilities. Source recharge waters for the proposed project would include SWP Article 21 water, which is a surplus supply managed by DWR, as well as Section 215 water, which is made available at Reclamation's discretion. However, other water supplies may be secured and acquired by the Authority for the proposed project depending on availability. The other potential sources include but are not limited to the following: federal, State, and local supplies through transfers, balanced and unbalanced water exchange agreements, water purchases or temporary transfers, supplies from the CVP, and high-flow Kern River water depending on annual hydrologic availability, water rights and regulatory considerations. Agreements would be made, as necessary, in advance of any water exchanges or transfers.

The unregulated water captured under the project for recharge would consist of water that would otherwise have left Kern County or created flooding conditions. Therefore, relative to baseline conditions, the use of unregulated water for recharge would not result in significant impacts to other legal users of water. No impacts to water rights holders, other water suppliers, or other public utilities would occur from the purchase, exchange, or transfer of water from the sources identified above. Should water from other sources be acquired for recharge, additional analysis may be required subject to the discretion of the entity proposing to use such supplies for the proposed project purposes. Impacts would be less than significant.

Impact 3.16-4: Construction of the proposed project would involve activities that would have the potential to generate waste. To minimize the export of soil from the project site following construction activities, recharge basins and supply channels would be designed to balance earthwork onsite in which all excavated soils would be redistributed and utilized to construct the project facilities, requiring no imported materials and leaving no excess materials. Topsoil materials generated during construction would be stripped from the ground surface and used for construction of the earthen berms of the recharge ponds. Construction of recovery facilities would include using onsite materials to construct earthen well pads, drilling wells with a standard drill rig, constructing transformers onsite, and connecting aboveground wellheads, motor control centers, and pump houses to the transformers. These activities would not generate significant amounts of solid waste that would need to be removed from the project site. Installation of the recovery well conveyance system would require trenching to a depth about 7 feet, and Kern Fan Conveyance Facilities would require excavation of up to 22 feet and tunneling under Interstate-5. If any excess soils are generated, they will be redistributed on-site for construction of earthen berms for the recharge ponds.

Demolition and construction debris generated during implementation of the recharge facilities, recovery facilities, and/or conveyance facilities would be removed from the project site and transported to Bena Landfill and/or Shafter-Wasco Landfill, which have adequate capacity to accept construction waste that is generated during construction. Further, work would be conducted in compliance with all federal, State, and local statutes and regulations related to solid waste and its disposal. Therefore, project construction impacts related to solid waste generation would be less than significant.

During operation, periodic earthwork operations would be required at the proposed recharge basins to maintain levees, enhance soil permeability, and remove undesirable vegetative growth unrelated to the proposed intermittent wetlands. Earthwork would involve disking or scraping the basins to remove the top layer of sediment, approximately once every three years. Maintenance would redistribute soils on-site and would not require off-site soil removal or disposal. Agricultural land uses, such as annual farming, grazing, or fallowing, would be allowed within the proposed recharge basins when they are not needed for water recharge or water management purposes. Grazing could be used to remove or control vegetative growth. The transport, use, and disposal of fertilizers and pesticides associated with agricultural activities at the proposed recharge basins would be done in accordance with applicable regulatory requirements. Project impacts during operation and maintenance related to solid waste generation are considered less than significant.

Impact 3.16-6: This section presents an analysis of the cumulative effects of the proposed project in combination with other present and reasonably foreseeable future projects that could generate cumulatively considerable impacts to utilities and service systems. As previously discussed, the proposed project would have no impact with regard to wastewater treatment or solid waste management and reduction statutes. Accordingly, the proposed project could not contribute to cumulative impacts related to these topics, and these topics are not discussed further.

The geographic area affected by the proposed project and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative utilities and service systems impacts encompasses similar present and future project sites within Metropolitan Bakersfield and the Kern Fan Area, as well as the utilities and services systems that supply the project sites with water, solid waste disposal services, electricity, etc. Projects that may have cumulatively considerable impacts when

considered in combination with the proposed project are listed in Table 3-2 of the EIR. However, only Cumulative Projects 3 through 10 are considered in the cumulative impacts analysis for utilities and service systems. Cumulative Projects 1 and 2 are transportation infrastructure projects that would not require utilities services that are similar to the proposed project.

The timeframe during which the proposed project could contribute to cumulative utilities and service systems impacts includes both the construction and operations phases. For the proposed project, the operation phases are permanent. As stated previously, construction and operation of the proposed project would have less than significant impacts with regard to water supplies and solid waste generation as it relates to local infrastructure capacities and regulatory reduction goals. Thus, significant cumulative impacts related to utilities and services could occur if incremental impacts of the proposed project combined with one or more of the Cumulative Projects 3 through 10 substantially reduce water supply availability in the cumulative projects' region, or generate solid waste in amounts that exceed local infrastructure capacities or otherwise impair the attainment of solid waste reduction goals.

The proposed project and Cumulative Projects 3 through 10, 12 and 13 are, by definition, groundwater supply projects that have or will be implemented for the purpose of ensuring water supply reliability in the region. The proposed project and Cumulative Projects 3 through 10, 12 and 13 have each identified multiple recharge source waters that would be available to serve the projects, while allowing for reasonably foreseeable future variability during normal, dry and multiple dry years. Thus, cumulative impacts to water supplies would be less than significant. The proposed project would have a less-than-significant impact to landfill capacities and solid waste reduction goals, since Bena Landfill and Shafter-Wasco Landfill have adequate capacity to accept construction waste that would be generated during temporary periods of construction and scheduled maintenance, and because the proposed work would be conducted in compliance with all federal, State, and local statutes and regulations related to solid waste and its disposal. Similarly, construction and operation of Cumulative Projects 3 through 10, 12 and 13 would generate solid waste over temporary time periods in accordance with planned construction schedules and maintenance activities. Landfills in the cumulative projects' region have adequate capacity to accept wastes generated by each of the Cumulative Projects into the foreseeable future. Further, the Cumulative Projects are required comply with all federal, State, and local statutes and regulations related to solid waste and its disposal. Compliance with regulatory measures as they relate to solid waste generation would ensure that cumulative impacts remain less than significant through each project's operation schedule. Thus, impacts related to solid wastes would not be cumulatively considerable and would be less than significant.

MITIGATION MEASURES: None required.

O. Wildfire

POTENTIAL EFFECTS: Potential effects examined included the potential to: substantially impair an adopted emergency response plan or emergency evacuation plan [Impact 3.17-1]; due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire [Impact 3.17-2]; require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment [Impact 3.17-3]; expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage

changes [Impact 3.17-4]; or result in cumulatively considerable impacts to wildfire [Impact 3.17-5].

FINDINGS: Adherence to the Mitigation Measure TRA-1 listed in the EIR will reduce Impacts 3.17-1 and 3.17-5 to less than significant (Finding 1). Impacts 3.17-2, 3.17-3, and 3.17-4 will be less than significant, requiring no mitigation.

FACTS IN SUPPORT OF THE FINDINGS:

Impact 3.17-1: The Kern County Fire Department maintains the Emergency Operations Plan (EOP) for the area which includes information for the public about what to do if an emergency or disaster were to occur. The EOP does not identify any specific evacuation areas or routes within the project area; therefore, construction activities within the project area would not interfere with an emergency evacuation plan. However, during installation of the Kern Fan Conveyance Facilities tunneling under Interstate-5 would be required so that the water from the recharge basins could make its way to and from the California Aqueduct. As such, short-term lane or road closures or detours could be required. Potential road closures or detours could congest local roadways that could be used by the public and emergency responders if an emergency or disaster were to occur. However, a Construction Traffic Control Plan per Mitigation Measure TRA-1 would ensure that impacts to local rights-of-way do not occur as a result of the proposed project. The Construction Traffic Control Plan would be coordinated with the City of Bakersfield, as necessary, as well as with emergency responders, which include fire departments, police departments, and ambulances that have jurisdiction within the proposed project area. Operation and maintenance activities for the proposed project would be substantially similar to current conditions respective to emergency response and evacuation. No operation-related activities would occur within surrounding rights-of-ways that could impair or physically interfere with an adopted emergency response plan or emergency evacuation plan. Therefore, with implementation of Mitigation Measure TRA-1, impacts to circulation system within the project area during construction of the proposed project would be reduced to a less than significant level, and project construction would not impair or physically interfere with emergency response teams or an evacuation plan. Impacts would be less than significant.

Impact 3.17-2: The majority the project area does not have a fire hazard severity zone designation. The Phase 1 area and the Kern Fan Conveyance Facilities area include lands designated as a moderate fire hazard severity zone. During project construction, the operation of construction equipment and vehicles and use of combustible materials such as diesel fuel could pose a wildfire risk to people and property with possible ignition sources such as internal combustion engines, gasoline-powered tools, and equipment that could produce a spark, fire, or flame. The use of spark-producing construction machinery could expose project workers and contractors to pollutant concentrations from a wildfire resulting in a potentially significant impact. However, all personnel on the project areas would have to comply with *PRC* Sections 4427, 4428, 4431, and 4442, regulations relating to the handling of combustible fuels and equipment that can exacerbate fire risks. During construction, adherence to existing State and local fire hazard regulations would ensure that any risk to exacerbate wildfire would be reduced. Additionally, all construction activities and crews must comply with fire protection and prevention requirements specified by the California Code of Regulations (CCR) and Cal/OSHA. This includes various measures such as easy accessibility of firefighting equipment, proper storage of combustible liquids, no smoking in service and refueling areas, and worker training for firefighter extinguisher use. The risk of construction-based ignition events could also be exacerbated by Santa Ana winds, which are known to occur in the project region. However, with compliance to the regulations discussed above, this impact would be less than significant.

Once operational, the recharge basis would either act as agricultural land or be inundated with water, posing little risk to exacerbate wildfire, even during large Santa Ana wind events. As such, impacts regarding pollutant concentrations from a wildfire or uncontrolled spread of a wildfire would be less than significant.

Impact 3.17-3: The potential to exacerbate wildfire risk would be limited to construction and maintenance activities, during which all personnel would be required to comply with the regulations and policies discussed above, to limit potential for wildfire. The use of construction equipment would adhere to *CCR* Title 24, the CBC, and Kern County Safety Element discussed above in Section 3.17.2. These regulations and policies provided guidance on proper operation of diesel-fueled construction equipment that could exacerbate wildfire and proper safety equipment to extinguish a fire should one become present during construction. Adherence to applicable laws and regulations would reduce impacts to a less than significant level.

Once operational the proposed project would largely resemble the existing conditions for wildfire. The recharge basins would either be agricultural lands as they are now or would be inundated with water which would reduce the potential risk for wildfire. The conveyance facilities would be either located underground or would be constructed out of nonflammable material that would not exacerbate wildfire risk. As such, project operation would not exacerbate fire risk.

Impact 3.17-4. Due to the flat topography, the project area is not prone to landslides. The proposed project would involve the construction of berms to create recharge basins that would be approximately 3 to 6 feet above ground. In the event of a fire, the flat topographic characteristic of the proposed project area would not put structures or people at risk to post-fire landslide, flooding or slope instability. Once operational the proposed project would be designed to withstand a variety of site conditions and would be managed in a manner that would not result in runoff, post-fire slope instability, or drainage changes as a result of potential wildland fire. Impacts to structures or people due to post-fire slope or drainage changes would be less than significant.

Impact 3.17-5: The geographic area affected by the proposed project and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative wildfire impacts encompasses and is limited to the future project sites and their immediately adjacent area. This is due to the site-specific nature of projects and their impact to wildfire such as fuels (vegetation), climate conditions, and fire history.

The proposed project would only have potential impacts during construction due to construction vehicles that use fuel contributing to potential ignition sources in the project area. During operation the proposed project would largely resemble existing conditions, and as discussed above, would not exacerbate wildfire risks significantly. As such the time frame during which the project could contribute to cumulative wildfire impacts would be only during the construction phase. Given that the proposed project would not result in potentially significant environmental impacts during its operational period, only the construction period is evaluated relative to potential cumulative impacts.

Significant cumulative impacts related to wildfire could occur if the incremental impacts of the proposed project combined with the incremental impacts of one or more cumulative projects to substantially increase wildfire risk to people or the environment. Cumulative projects would be subject to the same regulatory requirements discussed for the proposed project, including the adherence to emergency planning. Cumulative projects involving activities that could

exacerbate wildfire risk would also be required to adhere to established regulatory standards for fire protection.

There are several cumulative projects currently under construction near the proposed project. Several of these cumulative projects are led by Rosedale and involve the implementation of groundwater banking, recharge, storage and conveyance. Ultimately, more access to water resources and more inundated recharge basins in and around the project area would reduce potential impacts of wildfire in the area.

Construction of the Kern Fan Conveyance Facilities could result in traffic related impacts to emergency response and evacuation plans as discussed above. This could cumulatively contribute impacts to the operation of emergency response or evacuation plans in conjunction with other cumulative projects in the proposed project area happening at the same time. With implementation of Mitigation Measure TRA-1 the proposed project would not create significant cumulative impacts to implementation of an emergency response or evacuation plan in conjunction with cumulative projects.

For the above reasons, the combined effects of the construction of the proposed project in combination with cumulative projects would not have a cumulatively considerable contribution to a cumulative impact. Similarly, other cumulative projects would be required to provide appropriate traffic control, emergency access, and fire safety for their projects. No significant cumulative impact related to wildfire would occur.

MITIGATION MEASURES: TRA-1.

P. Environmental Justice

POTENTIAL EFFECTS: Effects examined include the potential to affect the health or environment of minority or low-income populations disproportionately.

FINDINGS: The proposed project does not have the potential to affect the health or environment of low-income populations disproportionately. There would be no impact.

FACTS IN SUPPORT OF THE FINDINGS:

Implementation of the proposed project would not result in any potential significant impacts that could not be reduced to less than significant levels with the implementation of mitigation measures, as analyzed throughout Chapter 3 of the EIR. The adverse environmental effects of the proposed project that have potential to result in adverse effects to public health and environment would occur primarily during construction of the proposed project. The census tract that would be most affected by the proposed project would be Census Tract 37, which contains the vast majority of the project area. However, with the implementation of Mitigation Measure AIR-1, HAZ-1 through HAZ-4, NOI-1, TRA-1, and the other mitigation measures discussed in the EIR, the minority community of Census Tract 37 would not experience significant impacts to health or the environment due to implementation of the proposed project. Once the proposed project is operational, there would be no adverse effects to public health or the environment; rather the proposed project would have beneficial impacts to water supply sustainability, agriculture, and intermittent wetland habitat.

MITIGATION MEASURES: AIR-1, HAZ-1, HAZ-2, HAZ-3, HAZ-4, NOI-1, and TRA-1.

Q. Growth Inducement

POTENTIAL EFFECTS: Potential effects examined included: direct and/or indirect growth inducement potential of the proposed project.

FINDINGS: The proposed project would not have a direct or indirect growth-inducing effect within the IRWD service area or the Rosedale district boundaries.

FACTS IN SUPPORT OF THE FINDINGS:

The proposed project would provide additional groundwater recharge, storage and recovery capacity in the Kern Fan region to augment Rosedale's existing and future conjunctive use programs and enhance water supply reliability for Rosedale and IRWD during periods when other supplies are reduced or interrupted. The proposed project would not have a direct growth-inducing effect within the IRWD service area or the Rosedale district boundaries. Implementation of the proposed project would not have a direct growth inducement effect because it does not propose to support development of new housing, business, or industrial that would attract additional population to the area. Further, implementation of the proposed project would not result in substantial permanent employment that could indirectly induce population growth. Although construction activities would create some short-term construction employment opportunities over the approximately 5-year duration of construction, the amount of opportunities created would not require persons outside of the Kern County workforce. Further, up to 3 to 5 new permanent employees would be required to operate the proposed recharge, recovery, and Kern Fan Conveyance Facilities. These new Rosedale employees also are anticipated to come from the existing County workforce.

The proposed project provides water supply reliability to Rosedale and IRWD through redundancy and diversification of water supply options available in future years. For Rosedale, the proposed project would allow storage of surplus water that could help alleviate water supply shortfalls and work to achieve groundwater sustainability within the Kern County Sub-basin of the San Joaquin Valley Groundwater Basin.

IRWD has more than adequate water supplies (existing and under development) to meet projected demands to the year 2035. This proposed project provides a means of augmenting supplies during periods when existing sources may be temporarily reduced or interrupted and provides a cost-effective means of managing contingency and drought planning needs. The proposed project would not be capable of providing water every year and therefore could not support the continuous demands associated with population growth within IRWD's service area.

Neither IRWD nor Rosedale has authority or responsibility for approving land use designations. Neither district makes decisions about approving new development that would require connections to potable water supplies. Planning in the IRWD service area is the responsibility of all municipalities within IRWD's service area. Cities within the IRWD service area include the cities of Irvine, Tustin, Orange, Newport Beach, Lake Forest, and Costa Mesa. Some unincorporated areas of the County of Orange are also within IRWD's service area boundary. Rosedale encompasses unincorporated Kern County and the City of Bakersfield sphere of influence that dominate the growth projections. The cities and the counties are responsible for identifying and accommodating growth within their boundaries. Each city and county have prepared a General Plan that identifies growth projections specific to their areas. Each of the cities and counties acknowledge that population is increasing and each entity has identified significant impacts associated with the growth. Each entity has evaluated the environmental

effects of growth authorized by their existing, adopted general plans and if necessary has adopted overriding considerations pursuant to CEQA requirements, acknowledging that growth results in secondary impacts that may be significant and unavoidable. These impacts include increased air pollution, traffic congestion, and loss of open space and farmland. As a result, the water supply reliability improvements associated with the proposed project would support existing development and planned growth envisioned by the land use agencies with authority to approve such decisions. Land use planning, which creates water demand in a conceptual sense, must precede water planning to meet that demand (County of. Amador v. El Dorado County Water Agency (1999) 76 Cal.App.4th 931, 950-951.), which ensures land use agencies consider environmental effects of authorizing growth at general plan level before water suppliers develop the supplies needed to serve that growth.

Water banking provides for effective groundwater management within the Rosedale service area that benefits overlying groundwater users and banking entities. Water banking does not promote or induce growth within the Rosedale service area. This analysis does not evaluate growth inducing impacts of any third parties that may contract with Rosedale for eventual use in the project. That would require additional environmental analysis. Use of property for recharge basins prevents other development on the site and is compatible with existing agricultural land uses in the area.

The proposed project neither supports nor encourages growth within the IRWD or Rosedale service areas to a greater degree than presently estimated by the agencies with land use jurisdiction within their service areas. The proposed project would not remove any obstacles to growth and would not indirectly have a significant impact on growth inducement.

MITIGATION MEASURES: None required.

IV. Findings Regarding Alternatives to the Project

CEQA requires an EIR to describe a reasonable range of alternatives to the project or to the location of the project, which could feasibly attain the project objectives and to evaluate the comparative merits of the alternatives. Only alternatives that meet most of the project objectives, are feasible, and that would avoid or substantially reduce at least one of the significant impacts of the project need be considered. Five project alternatives were considered but rejected. Along with evaluation of the No Project Alternative as required by CEQA, the EIR provides a full assessment of one other additional alternative: the Water Bank Alternative.

A. Alternatives Considered but Rejected

An EIR need not consider an alternative whose impact cannot be reasonably ascertained and whose implementation is remote and speculative. Project alternatives that were considered but rejected from further consideration were location alternatives, injection wells, alternative storage in Orange County, water conservation and water recycling.

Recharge Basin Location Alternative: *CEQA Guidelines* Section 15126.6(f)(2) provides guidance regarding consideration of one or more alternative location(s) for a proposed project, stating that putting the project in another location should be considered if doing so would allow significant effects of the project to be avoided or substantially lessened. As part of the proposed project, the Authority is considering alternative locations for the proposed recharge and recovery facilities in the designated Phase 1 and Phase 2 areas. The locations of the Phase 1 and Phase

2 areas were evaluated and delineated based on a list of criteria that define the ideal conditions for implementation of the proposed project.

The criteria included the following:

- Properties are available for purchase and at an economically-feasible price;
- Development costs are reasonable and economically feasible;
- Soil permeability conditions and infiltration rates are adequate for groundwater recharge;
- There is an unconfined aquifer below the properties (i.e., no clay layers that could impede long term recharge and storage);
- There is adequate storage space in the aquifer below the properties;
- Groundwater quality is compatible with pump-in requirements of the California aqueduct;
- Existing conveyance facilities are proximate to the properties; and
- Other environmental constraints such as soil quality and existing land use are compatible with a groundwater banking project.

Based on these criteria, the Phase 1 and Phase 2 areas were selected for the proposed project. Implementing recharge and recovery facilities in other areas in and around the Rosedale service area would either be infeasible due to costs or the lack of available properties for purchase, or would result in greater environmental impacts due to construction and operation of facilities that are further from regional conveyances such as the CVC or California Aqueduct. If facilities are further from regional conveyances, the proposed Kern Fan Conveyance Facilities would be longer, resulting in greater amounts of ground disturbance, and would require more energy to move water to/from the proposed recharge and recovery facilities. The impacts associated with implementing the proposed recharge and recovery facilities in the proposed Phase 1 and Phase 2 areas are described throughout the EIR and would meet the project objectives.

Injection Well Alternative: Under the Injection Well Alternative, the Authority would construct injection wells within the Phase 1 and 2 areas to inject water into the groundwater basin rather than construct recharge basins on the surface. This proposed alternative would include construction of large water storage facilities onsite to hold water for injection. The other components of the project, including conveyance and extraction facilities, would be similar to the proposed project. The Injection Well Alternative would be cost prohibitive. In addition, the aquifer characteristics make injection at this level not practical. Due to cost limitations and operational impracticalities, this alternative was rejected from further analysis.

Orange County Storage: Water storage facilities could be constructed in Orange County to provide water supply reliability during dry years for IRWD. IRWD could develop an in-county storage program either by (a) partnering with Orange County Water District (OCWD) to develop a groundwater banking program to store water in the Orange County Groundwater Basin or (b) constructing surface storage facilities.

OCWD is not partnering with individual retail water agencies to develop groundwater banking programs at this time. Therefore, a groundwater banking program within Orange County is not feasible.

IRWD could construct surface storage facilities within its service area, such as reservoirs and tanks, to store water during wet years for use during dry years and multiple-drought years. Implementing an in-county surface storage program would require IRWD to purchase a substantial amount of land that could accommodate enough storage reservoirs and tanks with a combined maximum capacity of at least 37,500 AF. An average storage tank holds 8-million-

gallons or approximately 25 AF and is approximately 135 feet in diameter. If the groundwater storage were to be converted to aboveground storage tanks, approximately 1,500 8-million-gallon storage tanks would need to be constructed within IRWD's service area. This scale of facility construction and operation would be infeasible for IRWD to implement given open space constraints in the service area. Additionally, constructing 1,500 storage tanks would not be economically feasible for IRWD. As a result, replacement of groundwater storage with aboveground storage tanks is not considered to be a feasible project alternative and is rejected from further consideration in the EIR.

Water Conservation: In 2016, Governor Brown issued an Executive Order calling for Californians to build on the actions taken during the recent statewide drought, and to "Make Conservation a Way of Life in California."." In response, legislation requiring statewide long-term water use efficiency passed in 2018. As a result, the state will establish new long-term water efficiency objectives by June 30, 2022. IRWD has a long history of implementing cost-effective water efficiency programs, and it is well prepared to meet the future efficiency standards.

In December 2019, the District completed a Future Potential Water Efficiency Study which provided a comprehensive evaluation of IRWD's water use efficiency programs. The Study found that the water efficiency programs implemented by IRWD have been very successful, with over 150,000 devices and over 100 acres of turf replaced by IRWD customers through participation in the wide variety of water efficiency programs offered over the last ten years. Participation in these water efficiency programs coupled with natural replacement with newer more efficient devices has resulted in measurable water savings and a substantial reduction in water use. IRWD's average residential gallons per capita per day (gpcd) is one of the lowest in the state. IRWD's average fiscal year 2019-20 residential gpcd was 69, compared with a statewide average of 88 gpcd.

IRWD always has basic measures that are always in effect in its service area: inform the public consciousness in order to help reduce water demand; prevention of irrigation run-off and water waste; leak prevention; and prohibitions on water waste. This is supplemented with targeted outreach and programs to different customer sectors. In addition, IRWD has a budget-based rate structure that is based on the cost of service, which also limits the amount of water allocated to each customer to an amount that is reasonable for the customer's needs and property characteristics, reducing wasteful use of water. IRWD continues to promote new ways to conserve water and enhance urban water use efficiency, both locally and statewide, and continues to engage productively in statewide policy discussions on how to enhance urban water use efficiency while improving statewide and local drought resiliency.

Under extreme shortage scenarios, IRWD can temporarily implement further demand reduction efforts as described in IRWD's Water Shortage Contingency Plan (2018). Conservation efforts combined with supplemental supplies provided by the proposed project to augment IRWD's supply portfolio provide the most effective and reliable water supply alternative. Therefore, conservation by itself was not considered feasible to achieve the project objectives.

Recycled Water: Water recycling and reuse is a form of water conservation. In 1967, IRWD began using recycled water to supplement its potable water supply portfolio. In half a century, IRWD has created one of the most comprehensive and technologically advanced water recycling systems in the nation. Approximately 26 percent of IRWD's water demands are met through recycled water. In recent years, IRWD and its customers have reduced the use of outdoor irrigation by approximately 50 percent. However, the long-term reduction in recycled

water use can undervalue IRWD's water use efficiency programs and undercut potable water savings. IRWD treats the amount of water that flows through its recycled water treatment plants. Additional recycled water use expansion could not be implemented as an alternative to the proposed project because IRWD already extensively serves recycled water to meet non-potable demands which has reduced potable water use. When imported water supplies may be cutback due to drought or interrupted, IRWD cannot use recycled water to meet potable water demands and therefore would need to augment potable water supply. Therefore, recycled water was not considered as a feasible project alternative.

B. No Project Alternative

FINDINGS: The No Project Alternative is not environmentally superior to the proposed project.

FACTS IN SUPPORT OF THE FINDINGS:

The No Project Alternative would not meet most of the project objectives. Without the proposed project, Rosedale and IRWD would continue to capture, recharge, and store water from the SWP, CVP, and other available water supplies for later use through existing projects and facilities within Rosedale's Conjunctive Use Program. Under the No Project Alternative, greater operating flexibility would not be provided for existing and future conjunctive use programs. In addition, under the No Project Alternative, the benefits of the proposed project, which includes ecosystem public benefits, emergency water supply public benefits during extended droughts or a Delta levee failure, and water supply reliability benefits to agricultural and M&I users would not occur. Additionally, under the No Project Alternative, the benefit of the proposed project to provide operational flexibility to the CVP and Incremental Level 4 supplies to federal wildlife refuges would not occur. Finally, under the No Project Alternative, the benefit to groundwater sustainability in the Kern County Sub-basin would not occur.

The No Project Alternative would avoid all of the mitigated environmental impacts associated with the proposed project but would not meet all of the project objectives. Because the proposed project does not result in any Significant and Unavoidable impacts, the No Project Alternative does not avoid or substantially lessen significant environmental effects.

C. Water Bank Alternative

FINDINGS: The Water Bank Alternative is not environmentally superior to the proposed project.

FACTS IN SUPPORT OF THE FINDINGS:

As part of the Water Bank Alternative, the Authority would pay to buy into the developed capacities of the WSWB to store up to 100,000 AF of water. The water stored by the Authority could consist of a mix of Article 21 and non-Article 21 SWP water. The storage of CVP Section 215 water would not be possible. Only a portion of the project objectives identified as part of the proposed project would be realized with the Water Bank Alternative. Groundwater recharge and storage would occur in the Antelope Valley, and thus, the project objectives that are local to the Kern Fan area of Kern County would not be met. Participation in the WSWB would not generate ecosystem public benefits such as new intermittent wetland benefits in the Kern Fan area. Agricultural benefits resulting from crop substitution and improved groundwater levels, Incremental Level 4 water to federal wildlife refuges, and groundwater sustainability in the Kern County Sub-basin would not occur. The Water Bank Alternative would only achieve one of the project objectives, which is to provide Rosedale and IRWD customers and existing partners with

increased water supply reliability during periods when other supply sources may be reduced or interrupted.

The Water Bank Alternative would result in many similar environmental impacts to the proposed project but would not achieve all the project objectives. This alternative would implement similar storage, recovery, and conveyance facilities as the proposed project, but within a different location, in the Antelope Valley at the border of Kern County with Los Angeles County, and a different groundwater basin. Implementation of this alternative could lessen impacts to land use and mineral resources, as described above. However, the Water Bank Alternative would need to operate longer lengths of conveyance facilities in order to deliver water to/from the East Branch of the California Aqueduct and to/from the WSWB facilities. This would increase the energy demand associated with this alternative to levels above the proposed project. Further, since implementation of the Water Bank Alternative would not occur within the Kern Fan area, the local benefits to groundwater sustainability for the Kern County Sub-basin, benefits to wetland habitat, and Incremental Level 4 water for federal wildlife refuges would not take place, resulting in greater impacts to biological resources and groundwater resources.

Because the proposed project does not result in any Significant and Unavoidable impacts, the Water Bank Alternative does not avoid or substantially lessen significant environmental effects. The Water Bank Alternative would only achieve one of the project objectives, which is to provide Rosedale and IRWD customers and existing partners with increased water supply reliability during periods when other supply sources may be reduced or interrupted. Only the proposed project would fully achieve all of the project objectives.

Implementation of the Water Bank Alternative also would reduce benefits to the Delta ecosystem associated with pulse flows from Lake Oroville into the Feather River. If the Authority participates in the WSWB Conjunctive Use Project instead of constructing and operating the proposed project, DWR would forgo the availability of 18,000 to 25,000 AF of pulse flows associated with the proposed project. If the Authority proceeds with the proposed project, then other entities would participate in the WSWB Conjunctive Use Project, and together both groundwater banking projects would have to potential to provide DWR with up to 65,000 AF of water for pulse flows and benefits to fishery resources.

V. General Findings

A. The written Responses to Comments contained in the FEIR have adequately responded to the comments received on the DEIR in the public review process.

B. Recirculation of the DEIR following the preparation of the Responses to Comments is not required. The Responses to Comments and resulting revisions to the DEIR do not add significant new information to the EIR, including information showing any new significant impact from the project, any increase in the severity of any impact, or any considerably different, feasible alternative.

FACTS IN SUPPORT OF THE FINDINGS. The primary comment areas were concerns over affects to groundwater levels, groundwater quality, special status species, water supply sources for the proposed project, and adverse impacts to the City of Bakersfield's water supply and surrounding environment.

Exhibit 2

KERN FAN GROUNDWATER STORAGE PROJECT

Mitigation Monitoring and Reporting Program

CEQA Requirements

Section 15091(d) and Section 15097 of the CEQA Guidelines require a public agency to adopt a program for monitoring or reporting on the changes it has required in the project or conditions of approval to substantially lessen or avoid significant environmental effects. This Mitigation Monitoring and Reporting Program (MMRP) summarizes the mitigation commitments identified in the Kern Fan Groundwater Storage Project Final EIR (State Clearinghouse No. 2020049019). Mitigation measures are presented in the same order as they occur in the Final EIR.

The columns in the MMRP table provide the following information:

- **Mitigation Measure(s):** The action(s) that will be taken to reduce the impact to a less-than-significant level.
- **Implementation, Monitoring, and Reporting Action:** The appropriate steps to implement and document compliance with the mitigation measures.
- **Responsibility:** The agency or private entity responsible for ensuring implementation of the mitigation measure. However, until the mitigation measures are completed, the Authority, as the CEQA Lead Agency, remains responsible for ensuring that implementation of the mitigation measures occur in accordance with the MMRP (CEQA Guidelines, Section 15097(a)).
- **Monitoring Schedule:** The general schedule for conducting each task, either prior to construction, during construction and/or after construction.

MITIGATION MONITORING AND REPORTING PROGRAM
FOR THE KERN FAN GROUNDWATER STORAGE PROJECT

Mitigation Measures	Implementation, Monitoring, and Reporting Action	Responsibility	Monitoring Schedule
Aesthetics			
AES-1: All nighttime construction lighting and security lighting installed on new facilities shall be shielded and directed downward to avoid light spill onto neighboring properties and visibility from surrounding vantage points.	• Include mitigation measure in project design and construction contractor specifications. • Perform site inspections to ensure mitigation is being implemented during construction.	Authority; Construction Contractor	Before and During Construction
Agriculture and Forestry Resources			
AGR-1: For all portions of the project area under a Williamson Act contract, the use of the property would be managed as applicable in accordance with Kern County's *Agricultural Preserve Standard Uniform Rules*, which identify land uses that are compatible within agricultural preserves established under the Williamson Act.	• Include mitigation measure in project design specifications. • Perform site inspections as appropriate based on the Uniform Rules to ensure property is being managed as defined.	Authority	Before and After Construction
Air Quality			
AIR-1: The Authority shall require the construction contractor to implement construction equipment features for equipment operating at the project site. These features shall be included in applicable bid documents and successful contractor(s) must demonstrate the ability to supply such equipment. Construction features will include the following: The proposed project shall utilize off-road diesel-powered construction equipment that meet or exceed CARB and USEPA Tier 4 Interim or better off-road emissions standards for equipment rated at 50 horsepower (hp) or greater during project construction. Such equipment will be outfitted with BACT devices including a CARB certified Level 3 Diesel Particulate Filter or equivalent. Alternatively, instead of utilizing Tier 4 equipment, the construction contractor shall revise the project construction phasing and timing of equipment usage and demonstrate that implementation of the project construction schedule would not exceed the San Joaquin Valley Air Pollution Control District threshold for NOx emissions (currently 10 tons/year).	• Include mitigation measure in construction contractor specifications. • Perform site inspections to ensure mitigation is being implemented during construction.	Authority; Construction Contractor	Before and During Construction
Biological Resources			
BIO-1: Prior to commencement of project vegetation or ground disturbing construction, a qualified biologist shall conduct a habitat assessment for blunt-nosed leopard lizard to determine if the project area or its immediate vicinity contains suitable habitat for the species. If suitable habitat is present, prior to initiating any vegetation or ground disturbing activity, surveys will be conducted in accordance with CDFW *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard* (CDFW 2019). This survey protocol, designed to optimize blunt-nosed leopard lizard detection, reasonability assures CDFW that ground disturbance will not result in take of this fully protected species.	• Include mitigation measure in construction contractor specifications. • Maintain documentation of the habitat assessment results in the project file. • If required, maintain documentation of the protocol-level survey results in the project file. • If required, maintain records of project design modifications to avoid species in the project file.	Authority; Construction Contractor	Before and During Construction

MITIGATION MONITORING AND REPORTING PROGRAM
FOR THE KERN FAN GROUNDWATER STORAGE PROJECT

Mitigation Measures	Implementation, Monitoring, and Reporting Action	Responsibility	Monitoring Schedule
Blunt-nosed leopard lizard surveys will be conducted within one year prior to initiation of ground disturbance. Protocol-level surveys must be conducted on multiple dates during late spring, summer, and fall of the same calendar year, and within these time periods, there are specific protocol-level date, temperature, and time parameters that must be adhered to. Blunt-nosed leopard lizard protocol specifies different survey effort requirements based on whether the disturbance results from maintenance activities or if the disturbance results in habitat removal (CDFW 2019). Blunt-nosed leopard lizard is a State fully protected species pursuant to Fish and Game Code Section 5050 and CDFW is unable to authorize take of this species for any reason. If blunt-nosed leopard lizard is detected during protocol-level surveys, then the Authority shall modify the project design to avoid this species. If the project design cannot be modified, then the Authority shall consult with CDFW to discuss whether take of blunt-nosed leopard lizard can be avoided during ground-disturbing Project activities and during operations and maintenance of Project facilities. The USFWS will also be consulted to ensure that avoidance measure meet their standard for the avoidance of take for this species.	• Retain copies of all correspondence and documentation with wildlife agencies in the project file.		
BIO-2: If the nesting bird season cannot be avoided and construction or vegetation removal occurs between February 1 – September 15 (January 1 to July 31 for raptors), the following measures would reduce potential impacts to nesting and migratory birds and raptors to less than significant levels: • Within 10 days of site clearing, a qualified biologist shall conduct a preconstruction, migratory bird and raptor nesting survey. The biologist must be qualified to determine the status and stage of nesting by migratory birds and all locally breeding raptor species without causing intrusive disturbance. This survey shall include species protected under the Migratory Bird Treaty Act including California horned lark, which was detected during the July 2020 reconnaissance and tri-colored blackbird, which has a medium potential to occur on-site. The survey shall cover all reasonably potential nesting locations for the relevant species on or closely adjacent to the proposed project site. • The preconstruction survey shall cover all reasonably potential nesting locations on and within 300 feet of the proposed removal areas, and areas that would be occupied by ground-nesting species such as killdeer. A 500-foot radius shall be surveyed in areas containing suitable habitat for nesting raptors, such as trees, utility poles and buildings. • Nesting habitat should be removed prior to the bird breeding season (February 1 – September 15). • If an active nest is confirmed by the biologist, no construction activities shall occur within 250 feet of the nesting site for migratory birds, within 300 feet for tri-colored blackbird, and within 500 feet of the nesting site for raptors. The buffer zones	• Include mitigation measure in construction contractor specifications. • Maintain documentation of the pre-construction survey results in the project file. • If required, perform construction site inspections to ensure buffer/avoidance measures are implemented properly. An inspection log will be maintained to document results of site inspections. • If required, retain copies of all correspondence and documentation with wildlife agencies in the project file.	Authority; Construction Contractor	Before and During Construction

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Mitigation Measures	Implementation, Monitoring, and Reporting Action	Responsibility	Monitoring Schedule
around any nest within which project-related construction activities would be avoided can be reduced as determined acceptable by a qualified biologist. Construction activities may resume once the breeding season ends (February 1 – September 15), or the nest has either failed or the birds have fledged. • If buffer distances are reduced, nest monitoring shall be conducted by a qualified biologist until the birds have fledged and are no longer reliant upon the nest or parental care for survival. • If tri-colored blackbird take avoidance at a nesting colony is not feasible, acquisition of an ITP pursuant to Fish and Game Code Section 2081(b), prior to any Project activities, would be warranted to comply with CESA.			
BIO-3: If construction activities are scheduled to take place outside of the Swainson's hawk nesting season (which runs from March 1 – September 15), then no preconstruction clearance surveys or subsequent avoidance buffers are required. If construction activities are initiated within the nesting season then preconstruction nesting surveys shall be conducted by a qualified biologist prior to ground disturbance, in accordance with the guidance provided in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee 2000). The required windshield surveys shall cover the project area plus a one-half mile radius around the project sites. If an active nest site is found, a minimum ½-mile no-disturbance buffer will be maintained around each nest, until the breeding season has ended or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival, to prevent nest abandonment, other forms of take, and other potentially significant impacts to Swainson's hawk as a result of Project activities. If a known Swainson's hawk nest tree requires removal, even outside the nesting season, it shall be replaced with an appropriate native tree species planting at a ratio of 3:1 near the Project area or in another area that will be protected in perpetuity. This mitigation would offset the local and temporal impacts of Swainson's hawk nesting habitat loss. If Swainson's hawk are detected and a ½-mile no-disturbance nest buffer is not feasible, consultation with CDFW is warranted to determine if the Project can avoid take. If Swainson's hawk take cannot be avoided, issuance of an ITP prior to Project activities is warranted to comply with CESA.	• Include mitigation measure in construction contractor specifications. • If required, maintain documentation of the pre-construction survey results in the project file. • If required, perform construction site inspections to ensure buffer/avoidance measures are implemented properly. An inspection log will be maintained to document results of site inspections. • If required, retain copies of all correspondence and documentation with wildlife agencies in the project file.	Authority; Construction Contractor	Before and During Construction
BIO-4: A qualified biologist will conduct a habitat assessment in advance of project implementation to determine if the Project area or its vicinity contains suitable habitat for burrowing owl. If suitable habitat is present, a pre-construction survey shall be conducted for burrowing owls 14 to 30 days prior to clearing of the site by a qualified biologist in	• Include mitigation measure in construction contractor specifications. • Maintain documentation of the habitat assessment results in the project file.	Authority; Construction Contractor	Before and During Construction

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Mitigation Measures	Implementation, Monitoring, and Reporting Action	Responsibility	Monitoring Schedule
accordance with the most recent CDFW protocol, currently the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012). Surveys shall cover suitable burrowing owl habitat disturbed by construction including a 500-foot buffer. The survey would identify adult and juvenile burrowing owls and signs of burrowing owl occupation. This survey shall include two early morning surveys and two evening surveys to ensure that all owl pairs have been located. If occupied burrowing owl habitat is detected on the proposed project site, measures to avoid, minimize, or mitigate impacts shall be incorporated into the proposed project and shall include, but not be limited to, the following: • Construction exclusion areas shall be established around the occupied burrows in which no disturbance shall be allowed to occur while the burrows are occupied. Buffer areas shall be determined by a qualified biologist based on the recommendations outlined in the most recent *Staff Report on Burrowing Owl Mitigation* (CDFW 2012). • If occupied burrows cannot be avoided, a qualified biologist shall develop and implement a Burrowing Owl Management Plan, consistent with *Staff Report on Burrowing Owl Mitigation* (CDFW 2012). Burrow exclusion shall be conducted by qualified biologists and only during the non-breeding season, before breeding behavior is exhibited and after the burrow is confirm empty through non-invasive methods, such as surveillance. Occupied burrows shall be replaced with artificial burrows at a ratio of one burrow collapsed to one artificial burrow constructed (1:1) to mitigate for evicting burrowing owls and the loss of burrows. Periodic surveillance shall be conducted to ensure that burrowing owls do not return to the eviction site.	• If required, maintain documentation of the pre-construction survey results in the project file. • If required, perform construction site inspections to ensure buffer, avoidance and minimization measures are implemented properly. An inspection log will be maintained to document results of site inspections. • If required retain the Burrowing Owl Management Plan in the project file, as well as documentation related to implementation of the Plan. An inspection log will be maintained to document results of site inspections.		
BIO-5: Prior to commencement of project activities, a qualified biologist shall conduct a San Joaquin kit fox habitat assessment to determine if the Project area or its immediate vicinity contains suitable habitat for the species. The habitat assessment will be conducted in accordance with the most recent USFWS *San Joaquin Kit Fox Survey Protocol*. If it is determined that San Joaquin kit fox has the potential to utilize the project areas, then the following measures are required to avoid potential adverse effects to this species: • A qualified biologist will assess presence/absence of San Joaquin kit fox for all project phases and components within potentially suitable habitat. Transect surveys will be conducted of the project areas plus a 500-foot buffer to detect San Joaquin kit fox and their sign. These surveys will occur in all areas of potentially suitable habitat no less than 14 days and more than 30 days prior to beginning of ground disturbing activities. The USFWS (2011) *Standardized Recommendations for Protection of San Joaquin Kit Fox prior to or during Ground Disturbance* includes measures to be implemented if the species is detected.	• Include mitigation measure in construction contractor specifications. • Maintain documentation of the habitat assessment results in the project file. • If required, maintain documentation of the pre-construction presence/absence survey results in the project file. • If required, perform construction site inspections to ensure avoidance and minimization measures are implemented properly. An inspection log will be maintained to document results of site inspections. • If required, retain copies of all correspondence and documentation with wildlife agencies in the project file.	Authority	Before and During Construction

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Mitigation Measures	Implementation, Monitoring, and Reporting Action	Responsibility	Monitoring Schedule
If San Joaquin kit fox is detected (e.g., dens, individuals using the property), then the following measures are required to avoid potential adverse effects to this species: • The Authority will consult with CDFW and USFWS to discuss how to avoid take, or if avoidance is not feasible, to acquire a state Incidental Take Permit (ITP), pursuant to Fish and Game Code section 2081, and a federal ITP, pursuant to Section 10 of the U.S. Endangered Species Act (ESA) prior to ground disturbing activities.			
BIO-6: Prior to commencement of project activities, a qualified biologist shall conduct a habitat assessment to determine if the Project area or its immediate vicinity contains suitable habitat for Tipton kangaroo rat. If suitable habitat is present, a 50-foot minimum no-disturbance buffer around all small mammal burrow entrances of suitable size for Tipton kangaroo rat use, will be established and maintained during Project activity. If burrow avoidance is not feasible, focused protocol-level trapping surveys according to the USFWS (2013) protocol will be conducted by a qualified wildlife biologist that is permitted to do so by both CDFW and USFWS, to determine if Tipton kangaroo rat occurs in the Project area. If Tipton kangaroo rats are detected, CDFW will be consulted to discuss how to avoid take, or if avoidance is not feasible, to acquire an ITP prior to ground-disturbing activities, pursuant to Fish and Game Code Section 2081 subdivision (b).	• Include mitigation measure in construction contractor specifications. • Maintain documentation of the habitat assessment results in the project file. • If required, perform construction site inspections to ensure buffer/avoidance measures are implemented properly. An inspection log will be maintained to document results of site inspections. • If required, maintain documentation of the pre-construction protocol-level survey results in the project file. • If required, retain copies of all correspondence and documentation with wildlife agencies in the project file.	Authority	Before and During Construction
BIO-7: Prior to commencement of project activities, a qualified biologist shall conduct a habitat assessment to determine if the Project area or its immediate vicinity contains suitable habitat for Nelson's antelope squirrel. If suitable habitat is present and surveys are feasible, a qualified biologist shall conduct focused daytime visual surveys for Nelson's antelope squirrel using line transects with 10- to 30-meter spacing within Project areas and a 50-foot buffer around those areas between April 1 and September 20, during daytime temperatures between 68° and 86° F (CDFG 1990), to maximize detectability. If suitable habitat is present and surveys are not feasible, a 50-foot minimum no-disturbance buffer around all small mammal burrow entrances will be established until the completion of Project activities. If Nelson's antelope squirrels are detected, consultation with CDFW will occur to discuss how to avoid take, or if avoidance is not feasible, to acquire a State ITP prior to ground-disturbing activities, pursuant to Fish and Game Code Section 2081 subdivision (b).	• Include mitigation measure in construction contractor specifications. • Maintain documentation of the habitat assessment results in the project file. • If required, maintain documentation of the pre-construction survey results in the project file. • If required, perform construction site inspections to ensure buffer/avoidance measures are implemented properly. An inspection log will be maintained to document results of site inspections. • If required, retain copies of all correspondence and documentation with wildlife agencies in the project file.	Authority	Before and During Construction

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Mitigation Measures	Implementation, Monitoring, and Reporting Action	Responsibility	Monitoring Schedule
BIO-8: Prior to commencement of project activities, a qualified biologist shall conduct a habitat assessment for American badger to determine if the Project area contains suitable habitat for this species. If suitable habitat is present, a qualified biologist will conduct focused surveys for this species. Though there isn't a specific survey protocol for this species, American badger share similar habitat as burrowing owl and San Joaquin kit fox. Surveys shall be conducted for American badger concurrently with either burrowing owl or San Joaquin kit fox. If it is determined that American badger are detected on the project areas, a 50-foot no disturbance buffer will be established around the den site. If a 50-foot buffer is not feasible, then the buffer distance may be reduced as informed by the qualified biologist.	• Include mitigation measure in construction contractor specifications. • Maintain documentation of the habitat assessment results in the project file. • If required, maintain documentation of the pre-construction survey results in the project file. • If required, perform construction site inspections to ensure buffer/avoidance measures are implemented properly. An inspection log will be maintained to document results of site inspections.	Authority	Before and During Construction
BIO-9: Prior to the start of construction activities that could affect special-status plant species, a qualified botanist shall conduct a focused survey within the Conveyance Facilities project area for California jewelflower, Hoover's eriastrum, Kern mallow, recurved larkspur, San Joaquin woollythreads, slough thistle, and subtle orache. The survey shall be based on the survey protocols in *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFW 2018). Focused rare plant surveys shall occur during the typical blooming periods of special-status plants with the potential to occur. If a special-status plant species is found to be present, a no-disturbance buffer of at least 50 feet shall be implemented. Buffer distance many be adjusted by a qualified biologist for non-state listed species or in consultation with CDFW for state-listed species. If take of a state-listed plant species cannot be avoided, take authorization is warranted through acquisition of an ITP, pursuant to Fish and Game Code Section 2081 subdivision (b) and acquisition of a permit for rare plants pursuant to procedures set forth in the California Code of Regulations, title 14, section 783 et seq. (Cal. Code Regs., tit. 14 section 786.9). If avoidance measures are required for San Joaquin woolly threads, the USFWS will be notified of the species presence and avoidance measures that are sufficient to avoid species impacts.	• Include mitigation measure in construction contractor specifications. • Maintain documentation of the focused plant survey results in the project file. • If required, perform construction site inspections to ensure buffer/avoidance measures are implemented properly. An inspection log will be maintained to document results of site inspections. • If required, retain copies of all correspondence and documentation with wildlife agencies in the project file.	Authority	Before and During Construction

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Mitigation Measures	Implementation, Monitoring, and Reporting Action	Responsibility	Monitoring Schedule
BIO-10: Prior to commencement of project operations and maintenance activities, the Authority shall develop an Operations and Maintenance Plan that details how special-status plant and wildlife species, nesting birds and sensitive natural communities will not be impacted by operations and maintenance activities. The operations and maintenance plan will be informed by habitat assessments, species surveys, and if applicable, CDFW consultations, completed prior to project construction. A map of special status species, sensitive natural communities, and habitat features (sensitive resource map) will be developed. Workers will be provided the map and trained on how to recognize and avoid impacts to these species, natural communities and habitat features. The Operations and Maintenance Plan will require periodic species surveys to ensure the project ecosystem benefits are realized. These surveys will be used to update the sensitive resource map and inform adjustment to required avoidance and minimization measures. The Operations and Maintenance Plan will include speed limits to avoid vehicle collisions or trampling of special status species.	• Maintain copies of the Operations and Maintenance Plan with supporting maps, as defined, in the project file. • Maintain copies of periodic species surveys and updated maps as needed, in the project file. • Retain proof of worker training in the project file.	Authority	After Construction
BIO-11: If pesticides will be applied to any areas within the project areas, the Authority shall develop a Pesticide Use Plan that will detail how pesticides, rodenticides, and/or herbicides will be used and how application will not impact special-status plant and wildlife species, nesting birds, wetlands and jurisdictional features, and sensitive natural communities. The Pesticides Use Plan will be informed by the results of the species surveys and habitat assessments conducted prior to project construction. A map of special status species, sensitive natural communities, and habitat features (sensitive resource map) will be developed. Workers will be provided the map and trained on how to recognize and avoid impacts to these species, natural communities and habitat features. The Operations and Maintenance Plan will require periodic species surveys to ensure the project ecosystem benefits are realized. These surveys will be used to update the sensitive resource map and inform adjustment to required avoidance and minimization measures for the Pesticide Use Plan.	• Maintain copies of the Pesticide Use Plan with supporting maps, as defined, in the project file. • Maintain copies of periodic species surveys and updated maps as needed, in the project file. • Retain proof of worker training in the project file.	Authority	After Construction
BIO-12: If sensitive natural communities will be impacted from construction activities, a focused survey by a qualified botanist shall be conducted to assess and delineate the potential impacts. If evidence of impacts to these sensitive natural communities are observed or anticipated, compensation for the habitat loss shall be provided.	• Include mitigation measure in construction contractor specifications. • If required, maintain documentation of the pre-construction focused survey results in the project file. • If required, maintain documentation of compensation measures in the project file.	Authority	During Construction

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BIO-13: Prior to any disturbance of potential jurisdictional resources within the project areas, a jurisdictional delineation of water courses shall be conducted for the purposes of identifying features or habitats that would be impacted by project activities and subject to the jurisdiction of the USACE, RWQCB, and CDFW. The findings shall be included in a jurisdictional delineation report suitable for submittal to these agencies for obtaining a Section 404 permit and/or CDFW Streambed Alteration Agreement. Prior to project activities that would result in the discharge of fill or dredged material within waters of the U.S., a Section 404 CWA permit shall be obtained from the USACE and a Section 401 Water Quality Certification shall be obtained from the RWQCB. Prior to activities within streams, ponds, seeps or riparian habitat, or use of material from a streambed, the project applicant shall obtain Waste Discharge Requirements for impacts to waters not subject to the CWA, provide written notification to CDFW pursuant to Section 1602 of the Fish and Game Code, ensure the notification is complete as provided in Section 1602, and comply with the terms of conditions of any agreement CDFW may issue in response to the notification.	• If required, maintain copies of the jurisdictional delineation in the project file. • If required, retain copies of all correspondence, consultation, and documentation with wildlife and/or regulatory agencies in the project file.	Authority	Before Construction
BIO-14: Should facilities be located on the Kern Water Bank, the Authority shall initiate discussions with the Kern Water Bank Authority to ensure Conveyance Facilities located in the Kern Water Bank HCP/NCCP avoid impacts to covered species within the HCP/NCCP area during construction, operations, and maintenance. If the project is located within the Kern Water Bank HCP/NCCP, Mitigation Measure BIO-1 through BIO-13 will be implemented in coordination with the KWBA, and if necessary, CDFW and USFWS to ensure the project is implemented in compliance with the HCP/NCCP. If any of the project activities will conflict with the implementation of the HCP/NCCP, the Authority will consult with CDFW, USFWS, and the KWBA in advance of project implementation to ensure compliance with CESA and ESA.	• If required, retain copies of all correspondence and documentation with KWBA in the project file. • If required, retain documentation of implementation of Mitigation Measures BIO-1 through BIO-13. • If required, retain copies of all correspondence and documentation with wildlife agencies in the project file.	Authority	Before, During and After Construction
Cultural Resources			
CUL-1: The Authority shall retain a Qualified Architectural Historian (defined as an architectural historian, historic architect, or historic preservation professional who meets the Secretary of the Interior's Professional Qualification Standards for History, Architectural History, or Architecture, pursuant to 36 CFR 61) to carry out all mitigation related to historic built environment resources.	• Save documentation related to retention of a Qualified Architectural Historian in the project file.	Authority	Before Construction

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CUL-2: **Historic Resources Assessment.** Once project elements have been sited, the Qualified Architectural Historian shall conduct a historic resources assessment including: a review of pertinent archives and sources to identify historic built environment resources within or adjacent to project components; a pedestrian field survey; recordation of all identified historic built environment resources on California Department of Parks and Recreation 523 forms; evaluation of historic built environment resources that may be affected by the project for listing in the National Register and California Register under Criteria A/1-D/4; impacts analysis; development of appropriate treatment; and preparation of a technical report documenting the methods and results of the assessment. The Historic Resources Assessment Report with recommendations and shall be submitted to the Authority for review and approval prior to the its approval of project plans.	• Retain copies of the final Historic Resources Assessment Report in the project file.	Authority	Before Construction
CUL-3: **Retention of a Qualified Archaeologist.** The Authority shall retain a Qualified Archaeologist (defined as an archaeologist who meets the Secretary of the Interior's Professional Qualification Standards for Archaeology, pursuant to 36 CFR 61) to carry out all mitigation related to archaeological resources.	• Save documentation related to retention of a Qualified Archeologist in the project file.	Authority	Before Construction
CUL-4: **Archaeological Resources Assessment.** Once project elements have been sited, the Qualified Archaeologist shall conduct an archaeological resources assessment of the project area(s). This shall include an archaeological resources survey, and Extended Phase I and/or Phase II testing as determined necessary by the Qualified Archaeologist to determine if any archaeological resources qualify as historical resources or unique archaeological under CEQA. The Qualified Archaeologist shall document the results of the assessment in a technical report that follows Archaeological Resource Management Reports (ARMR): Recommended Contents and Format (OHP 1990). If more than 2 years have passed since the previous records searches, then the Qualified Archaeologist shall conduct searches of the Southern San Joaquin Valley Information Center and Native American Heritage Commission Sacred Lands File prior to conducting the survey. The assessment report shall be completed and approved by the Authority prior to its approval of project plans.	• Retain copies of the final Archaeological Resources Assessment Report in the project file.	Authority	Before Construction
CUL-5: **Avoidance and Preservation in Place of Archaeological Resources.** The Authority shall make efforts to avoid and preserve in place potentially significant or significant archaeological resources. Avoidance and preservation in place is the preferred manner of mitigating impacts to archaeological resources. Preservation in place may be accomplished by, but is not limited to, avoidance, incorporating the resource into open space, capping, or deeding the site into a permanent conservation easement. In the event that avoidance and preservation in place of a resource is determined by the Authority, in consultation with the Qualified Archaeologist, to be infeasible in light of factors such as project design, costs, and other considerations, then Mitigation Measures CUL-6 shall be implemented for that resource. If avoidance and	• Include mitigation measure in construction contractor specifications. • If required, retain documentation related to implementation of Mitigation Measures CUL-6, CUL-7, and CUL-8 in the project file.	Authority; Construction Contractor	Before and During Construction

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preservation in place of a resource is determined by the Authority to be feasible, then Mitigation Measures CUL-7 and CUL-8 shall be implemented for that resource.			
CUL-6: **Phase III Archaeological Resources Data Recovery and Treatment.** The Qualified Archaeologist shall prepare a Phase III Archaeological Resources Data Recovery and Treatment Plan for all significant resources that will be impacted by the proposed project, including those that qualify as historical resources or unique archaeological resources. When determining if data recovery is necessary, the Qualified Archaeologist shall first consider if the data potential of the impacted portion of the resource has been exhausted through previous testing. The Phase III Archaeological Resources Data Recovery and Treatment Plan shall include: research design; field and laboratory methods; other applicable treatment measures; field security measures; reporting requirements and schedule; procedures for human remains discoveries; curation requirements; and protocols for Native American input, review of documents, and monitoring. For resources that are Native American in origin, treatment shall be developed by the Qualified Archaeologist in consultation with the Authority and one or more Native American representatives listed on the California Native American Heritage Commission's contact list for the project. The Qualified Archaeologist shall submit the final Phase III Archaeological Resources Data Recovery Report to the Southern San Joaquin Valley Information Center within 30 days of its acceptance by the Authority.	• If required, retain copies of the Phase III Archaeological Resources Data Recovery and Treatment Plan as defined in the project file. • If required, retain copies of the Phase III Archaeological Resources Data Recovery Report submitted to the Southern San Joaquin Valley Information Center in the project file.	Authority	Before Construction
CUL-7: **Cultural Resources Mitigation and Monitoring Program.** The Qualified Archaeologist shall prepare a Cultural Resources Mitigation and Monitoring Program (CRMMP) based on the final approved project design plans. The CRMMP shall be submitted to the Authority at least 60 days prior to the start of any ground-disturbing activities. The CRMMP shall include: an outline of areas and maps where archaeological and Native American monitoring is required; roles and responsibilities of the monitors; procedures to follow in the event of the archaeological resources and human remains discoveries; notification and communication protocols; reporting requirements (e.g., weekly, monthly, final); curation requirements; and protocols for Native American input and review of documents. Upon completion, the Qualified Archaeologist shall submit a final Archaeological Resources Monitoring Report to the Southern San Joaquin Valley Information Center within 30 days of its acceptance by the Authority.	• If required, retain copies of the Cultural Resources Mitigation and Monitoring Program as defined, in the project file. • If required, retain copies of the final Archaeological Resources Monitoring Report submitted to the Southern San Joaquin Valley Information Center in the project file.	Authority	Before Construction
CUL-8: **Designation of Environmentally Sensitive Areas.** Prior to the start of ground disturbance, any avoided archaeological resources on the project site and within 100 feet of project-related activities shall be marked as Environmentally Sensitive Areas (this includes archaeological resources that qualify as historical resources or unique archaeological resources, or those that have not been evaluated). These areas shall not be marked as archaeological resources, but shall be designated as "exclusion zones" on project plans. The Qualified Archaeologist, or their designee, shall periodically inspect these areas for the duration of project activities in the vicinity to ensure that the area remains intact and no incursions into the exclusion zones have occurred. Upon	• Include mitigation measure in construction contractor specifications. • If required, retain copies of exclusion areas and monitoring reports in the project file.	Authority; Construction Contractor	Before and During Construction

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Mitigation Measures	Implementation, Monitoring, and Reporting Action	Responsibility	Monitoring Schedule
completion of all project-related activities in the vicinity, all protective signage shall be removed.			
CUL-9: **Construction Worker Cultural Resources Sensitivity Training**. Prior to start of any ground-disturbing activities, the Qualified Archaeologist, or his/her designee, shall conduct cultural resources sensitivity training for all construction personnel. In the event construction crews are phased, additional trainings shall be conducted for new construction personnel. Construction personnel shall be informed of the types of archaeological resources that may be encountered, the proper procedures to be enacted in the event of an inadvertent discovery of archaeological resources or human remains, confidentiality of discoveries, and safety precautions to be taken when working with archaeological and Native American monitors. The Authority shall ensure construction personnel are made available for and attend the training and retain documentation demonstrating attendance.	• Include mitigation measure in construction contractor specifications. • Retain copies of personnel attendance at the sensitivity training in the project file.	Authority; Construction Contractor	Before and During Construction
CUL-10: **Inadvertent Discovery of Archaeological Resources.** In the event that archaeological resources are encountered during ground disturbance, all activity in the vicinity of the find shall cease (within 100 feet), and the protocols and procedures for discoveries outlined in the CRMMP shall be implemented. The discovery shall be evaluated for potential significance by the Qualified Archaeologist. If the Qualified Archaeologist determines that the resource may be significant, the Qualified Archaeologist shall develop an appropriate treatment plan for the resource. When assessing significance and developing treatment for resources that are Native American in origin, the Qualified Archaeologist and the Authority shall consult with one or more Native American representatives listed on the California Native American Heritage Commission's contact list for the project. The Qualified Archaeologist shall also determine if work may proceed in other parts of the project area(s) while treatment (e.g., data recovery) for cultural resources is being carried out.	• Include mitigation measure in construction contractor specifications • If found, document and retain records regarding discovery of archaeological resources and implementation of the CRMMP in the project file. • Retain the construction monitoring report in project file.	Authority; Construction Contractor	During Construction
CUL-11: **Curation.** Disposition of Native American archaeological materials shall be determined through consultation between one or more Native American representatives listed on the California Native American Heritage Commission's contact list for the project, the Qualified Archaeologist, and the Authority. Disposition of artifacts associated with Native American human remains shall be determined through consultation between the Most Likely Descendant, landowner, and the Authority. Any significant historic-period archaeological materials that are not Native American in origin shall be curated at a repository accredited by the American Association of Museums that meets the standards outlined in 36 CFR 79.9. If no accredited repository accepts the collection, then it may be curated at a non-accredited repository as long as it meets the minimum standards set forth by 36 CFR 79.9. If neither an accredited nor a non-accredited repository accepts the collection, then it may be offered to a public, non-profit institution with a research interest in the materials, or donated to a local school or	• Include mitigation measure in construction contractor specifications. • If found, retain any correspondence or documentation related to disposition or curation of Native American archaeological materials and human remains in the project files.	Authority; Construction Contractor	During and After Construction

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Mitigation Measures	Implementation, Monitoring, and Reporting Action	Responsibility	Monitoring Schedule
historical society in the area for educational purposes, to be determined by the Qualified Archaeologist in consultation with the Authority.			
CUL-12: **Inadvertent Discovery of Human Remains**. If human remains are encountered, then the Authority shall halt work in the vicinity (within 100 feet) of the discovery and contact the County Coroner in accordance with Public Resources Code Section 5097.98 and Health and Safety Code Section 7050.5. If the County Coroner determines the remains are Native American, then the Coroner shall notify the California Native American Heritage Commission in accordance with Health and Safety Code subdivision 7050.5(c), and Public Resources Code Section 5097.98. The California Native American Heritage Commission shall designate a Most Likely Descendant for the remains pursuant to Public Resources Code Section 5097.98. Until the landowner has conferred with the Most Likely Descendant, the contractor shall ensure the immediate vicinity where the discovery occurred is not disturbed by further activity, is adequately protected according to generally accepted cultural or archaeological standards or practices, and that further activities take into account the possibility of multiple burials. If human remains are encountered, the Qualified Archaeologist, in consultation with the Most Likely Descendant shall prepare a confidential report documenting all activities and it shall be submitted to the California Native American Heritage Commission within 90 days after completion of any treatment.	• Include mitigation measure in construction contractor specifications. • If found, document and retain records regarding discovery of human remains as required in the project file.	Authority; Construction Contractor	During Construction
Geology and Soils			
PALEO-1: **Paleontological Assessment and Mitigation Plan.** Prior to the start of any ground-disturbing activities (e.g., demolition, pot-holing or auguring, boring, drilling, grubbing, construction-related vegetation removal, excavation, trenching, or any other activity that has potential to disturb soil), the Authority shall retain a Qualified Paleontologist who meets the professional criteria established by the Society of Vertebrate Paleontology (SVP) to implement the paleontological resources mitigation measures for the proposed project. Once the locations of the project components have been determined and prior to the initiation of ground disturbance, a paleontological literature, map, and museum locality review shall be conducted in order to assess the paleontological sensitivity of the project component. If the literature, map, and museum locality review identifies potentially sensitive paleontological resources, then the Qualified Paleontologist shall conduct a pedestrian survey and assessment of the project component. A report shall be prepared which summarizes the results of the survey and assessment and provides recommendations regarding implementation of mitigation, as needed. Mitigation may include preparation of a Paleontological Resources Mitigation Monitoring Plan (PRMMP), implementation of the PRMMP including construction monitoring if required, paleontological resources awareness training for construction personnel, and preparation of a paleontological monitoring report when construction is complete demonstrating compliance with the PRMMP.	• Include mitigation measure in construction contractor specifications. • Save documentation related to retention of a Qualified Paleontologist in the project file. • Retain documentation and results of the paleontological literature, map, and museum locality review in the project file. • If required, retain documentation and results of the pedestrian survey and recommended mitigation in the project file. • If required, retain copies of the Paleontological Resources Mitigation Monitoring Plan, and monitoring reports related to its implementation, in the project file.	Authority; Construction Contractor	Before and During Construction

MITIGATION MONITORING AND REPORTING PROGRAM
FOR THE KERN FAN GROUNDWATER STORAGE PROJECT

Mitigation Measures	Implementation, Monitoring, and Reporting Action	Responsibility	Monitoring Schedule
PALEO-2: Inadvertent Discoveries of Paleontological Resources. In the event that paleontological resources are discovered, the Authority will notify the Qualified Paleontologist. The paleontologist will document the discovery as needed, evaluate the potential resource, and assess the significance of the find under the criteria set forth in *CEQA Guidelines* Section 15064.5. If fossil or fossil bearing deposits are discovered during construction, excavations within 50 feet of the find will be temporarily halted or diverted until the discovery is examined by the Qualified Paleontologist. The paleontologist will notify the appropriate agencies to determine procedures that shall be followed before construction is allowed to resume at the location of the find. If the Authority determines that avoidance is not feasible, the paleontologist will prepare an excavation plan for mitigating the effect of the project on the qualities that make the resource important. The plan will be submitted to the Authority for review and approval prior to implementation.	• Include mitigation measure in construction contractor specifications. • If found, document and retain records regarding discovery of paleontological resources as required in the project file.	Authority; Construction Contractor	During Construction
Hazards and Hazardous Materials			
HAZ-1: Prior to initiating ground disturbance and construction activities, for project facilities located on lands previously used for active agriculture production, the Authority shall collect representative samples of soils to be analyzed for total petroleum hydrocarbons and pesticides. The Authority shall avoid if feasible or otherwise remove from the site soils identified as containing hazardous quantities of contaminants and dispose of such soils in accordance with applicable hazardous waste regulations.	• Include mitigation measure in construction contractor specifications. • In the event of identification of hazardous site soils, documentation of the assessment and removal or avoidance shall be prepared and retained in the project file.	Authority; Construction Contractor	Before and During Construction
HAZ-2: In the event that asbestos-containing materials are uncovered during project construction, work at the project sites shall immediately halt and a qualified hazardous materials professional shall be contacted and brought to the project sites to make a proper assessment of the suspect materials. All potentially friable asbestos-containing materials shall be removed in accordance with federal, State, and local laws and the National Emissions Standards for Hazardous Air Pollutants guidelines prior to ground disturbance that may disturb such materials. All demolition activities shall be undertaken in accordance with California Occupational Safety and Health Administration standards, as contained in Title 8 of the *CCR*, Section 1529, to protect workers from exposure to asbestos. Materials containing more than one percent asbestos shall also be subject to San Joaquin Valley Air Pollution Control District regulations. Demolition shall be performed in conformance with federal, State, and local laws and regulations so that construction workers and/or the public avoid significant exposure to asbestos-containing materials.	• Include mitigation measure in construction contractor specifications. • In the event of identification of asbestos-containing materials on site, documentation of the assessment and removal shall be prepared and retained in the project file.	Authority; Construction Contractor	During Construction

MITIGATION MONITORING AND REPORTING PROGRAM
FOR THE KERN FAN GROUNDWATER STORAGE PROJECT

Mitigation Measures	Implementation, Monitoring, and Reporting Action	Responsibility	Monitoring Schedule
HAZ-3: A Phase I Environmental Site Assessment shall be prepared for the project sites to identify potential hazards and hazardous materials located within a one-mile radius. The construction contractor shall be informed of potential hazards and shall develop appropriate plans to avoid or remediate hazards.	• Include mitigation measure in construction contractor specifications. • Results of the Phase I Environmental Site Assessment shall be documented and retained in the project file. • Construction site inspections shall be performed to ensure contractor compliance with identified plans to avoid or remediate hazards. • Retain copies of inspection logs in the project file.	Authority; Construction Contractor	Before and During Construction
HAZ-4: Prior to construction of project facilities located within one-quarter mile of a school, the contractors shall coordinate the proposed construction haul route with the impacted school district and school facility to avoid school safety routes.	• Include mitigation measure in construction contractor specifications. • Documentation of the agreed upon construction route shall be retained in the project file. • Construction site inspections shall be performed to ensure contractor compliance with identified construction route. • Retain copies of inspection logs in the project file.	Authority; Construction Contractor	Before and During Construction
HAZ-5: The Authority shall coordinate with the Kern County Department of Public Health Services and the Kern Mosquito and Vector Control District prior to project operations to develop and implement, if necessary, appropriate insect abatement methods. Such methods shall not utilize any substances that may contaminate groundwater or be harmful to wildlife.	• Include mitigation measure in project design specifications. • Coordinate with appropriate Kern County agencies and retain documentation of correspondence with such agencies in the project file. • Implementation of appropriate insect abatement methods shall be documented and retained in the project file.	Authority	Before and After Construction
Noise and Vibration			
NOI-1: The construction contractors shall consider recovery well locations prior to 24-hour drilling to ensure that no occupied residential dwelling is within 1,000 feet of any well location. In the event that recovery well drilling cannot be sited greater than 1,000 feet from any occupied residential dwelling, a Noise Control Plan shall be developed and implemented prior to construction that includes best management practices to minimize exposure to high levels of noise and ensure compliance with the Kern County Noise Ordinance. Best management practices may include, but not be limited to the following: • Place all stationary construction equipment so that emitted noise is directed away from occupied residential dwellings.	• Include mitigation measure in construction contractor specifications. • If required, retain copies of the Noise Control Plan in the project files. • If required, perform site inspections to ensure contractor is in compliance with noise mitigation measures. • Retain copies of inspection logs in the project file.	Authority; Construction Contractor	Before and During Construction

MITIGATION MONITORING AND REPORTING PROGRAM
FOR THE KERN FAN GROUNDWATER STORAGE PROJECT

Mitigation Measures	Implementation, Monitoring, and Reporting Action	Responsibility	Monitoring Schedule
• Locate equipment staging in areas that will create the greatest possible distance between construction-related noise sources and noise-sensitive residential dwellings. • Ensure proper maintenance and working order of equipment and vehicles, and that all construction equipment is equipped with manufacturers approved mufflers and baffles. • Install sound-control devices in all construction and impact equipment. Additional equipment muffling beyond standard mufflers may be implemented. • Install portable acoustic panels between the construction zone and sensitive land uses.			
Transportation			
TRA-1: Traffic Control Plan. The construction contractor, in coordination with the Authority, shall prepare a Construction Traffic Control Plan that conforms to requirements of the Kern County Public Works Department and California Department of Transportation District 6, as applicable prior to the start of construction. The Construction Traffic Control Plan shall be prepared in accordance with both the California Department of Transportation Manual on Uniform Traffic Control Devices and Work Area Traffic Control Handbook and may include, but not be limited to, the following issues: • Haul routes and timing of deliveries of heavy equipment, building materials and oversize loads; • Directing construction traffic with a flag person; • Placement of temporary signage, lighting, and traffic control devices if required; • Access for emergency vehicles to the project sites; • Temporarily closing travel lanes or delaying traffic during materials delivery; • Detours or alternative routes for bicyclists using on-street bicycle lanes as well as for pedestrians using adjacent sidewalks The Authority shall also notify local emergency responders of any planned partial or full lane closures required for project construction. Emergency responders include fire departments, police departments, and ambulances that have jurisdiction within the project area. Written notification and disclosure of lane closure location must be provided at least 30 days prior to the planned closure to allow emergency response providers adequate time to prepare for lane closures.	• Include mitigation measure in construction contractor specifications. • Retain copies of the Construction Traffic Control Plan that has been approved by the applicable local jurisdiction(s) in the project file. • Perform site inspections to routinely verify proper implementation of the approved Plan. • Retain copies of inspection logs in the project file. • Retain copies of necessary permits obtained for any work within the road right-of-way.	Authority; Construction Contractor	Before and During Construction

Each of these areas was analyzed in the DEIR, was determined not to raise significant environmental issues that are required to be analyzed in the EIR or were clarified or amplified by analysis in the Responses to Comments.

The Responses to Comments merely clarify and amplify the DEIR's discussion of the analyses. EIR text revisions were provided, to further clarify and/or strengthen measures and commitments regarding groundwater levels on neighboring properties. Other clarifying text revisions were made. Revisions made merely clarify information presented in the DEIR. Only minor technical changes or additions have been made.

December 28, 2020
Prepared by: Fiona Sanchez
Agenda Item: 5a.ii

Letter of Appreciation to ESA

DISCUSSION:

Environmental Services Associates (ESA) has worked closely with the Authority over the past eighteen months to prepare a Final Environmental Impact Report for the Kern Fan Groundwater Storage Project. The entire ESA team was highly accomplished. Under the leadership of Project Manager, Jennifer Jacobus, ESA incorporated several modifications to the document requested by the Authority, and successfully completed the complex document under a very tight deadline.

RECOMMENDATION:

That the Board authorize staff to finalize and send a letter Leslie Moulton-Post, CEO of ESA, in appreciation of ESA's outstanding efforts on the Kern Fan Groundwater Storage Project Environmental Impact Report.

LIST OF EXHIBITS:

Exhibit "A" – Letter of Appreciation to ESA

GBJPA
Groundwater Banking
Joint Powers Authority

December 28, 2020

Ms. Leslie Moulton-Post
President and CEO
Environmental Science Associates
550 Kearny St
Suite 800
San Francisco, CA 94108
Dear Ms. Moulton-Post:

On behalf of the Groundwater Banking Joint Powers Authority, we want to thank ESA for its outstanding efforts in preparing the Kern Fan Groundwater Storage Project Environmental Impact Report.

The entire ESA team, led by project manager Jennifer Jacobus, was highly accomplished. Under Jennifer's leadership, the team worked under an extremely tight timeframe to complete the document. Jennifer's excellent project management skills and attention to every critical detail helped to make the effort a great success.

We truly appreciate ESA's hard work and dedication to this project and thank you for your continued service.

Sincerely,

Roy Pierucci
Authority President

cc: Tom Barnes, ESA
Jennifer Jacobus, ESA

TO: GBJPA Board

FROM: Dan W. Bartel

DATE: December 28, 2020

RE: Kern Fan Project Construction Team

Agenda Item: 5b.i

Discussion:

The Kern Fan Project Construction Team (Ray Bennett, Curtis Skaggs, Markus Nygren, Bill Zeiders and myself) has begun weekly meetings to begin facilitation of project design and construction process. As part of the process we have developed a plan to create technical memoranda addressing various aspects of the project. The premises of the technical memoranda are to:

- Document the previously developed preliminary design work provided by Curtis Skaggs.
- Incorporate RRBWSD and IRWD design, construction, and operational experience into the design process.
- Provide a forum for agreement by the Districts on design decisions prior to hard design process.
- Perform Value Engineering as previously discussed by the Districts.
- Provide thorough project documentation for clarity of client expectation to be used for RFP and final design purposes.

Content and development priority has been established by the team. Progress to date is listed below. Technical Memoranda No. 1, 2, and 3 are attached for consideration.

Priority 1

1. Project Phasing and Design / Contractor Selection	95% Complete
2. Conveyance Capacity Requirements	95% Complete
3. Pipeline Requirements	95% Complete
4. Pump Station Requirements	75% Complete

Priority 2

5. Geotechnical Report	10% Complete
6. Canal Liner and Turnout Requirements	10% Complete
7. Well Drilling and Equipping Requirements	10% Complete
8. ROW Acquisitions	

Priority 3

9. Recharge Basin Requirements	10% Complete
10. Facility Operation and SCADA Requirements	10% Complete
11. Engineer's Estimates	10% Complete

A detail of each document is shown on page 2.

Memo #	Title	Key Elements
1	Project Phasing and Design / Contractor Selection	Project Schedule Project Phasing (Construction Bid Packages) Design Firm Selection Contractor Selection
2	Conveyance Capacity Requirements	Recharge Pond Infiltration & filling rates In-Lieu Demands Goose Lake Channel Other Opportunities Pump Stations and reach Capacities
3	Pipeline Requirements	PVC, HDPE, Wet SpunRCP & Dry Spun RCP, Cement Mortar Lined and Coated Steel Pipe for: Aqueduct Turnout Siphon Crossings Phase II Property Turnouts West Basin Turnouts Canal Extension Well Conveyance
4	Pump Station Requirements	Pump Station Design Standard Pump Configuration Discharge pipe Sizing Special Considerations (Appurtances) Modeling Requirements Voltage Requirements Utility Interface Control Building
5	Geotechnical Report	Recharge Facility Soils Work Conveyance Soils Work Pump Station Soils Work Well Pad Soils Work
6	Canal Liner and Turnout Requirements	HDPE, Earth, Shotcrete, Concrete Pipeline Extension Option Turnout Requirements
7	Well Drilling and Equipping Requirements	Impact Analysis Well Layout Requirements Well Design Requirements Well Equipping Requirements Well Site Requirements
8	ROW Acquisitions	ROW Requirements Land Valuations Crop Valuations Phase I Assessment Title Work Land Surveying
9	Recharge Basin Requirements	Basin Layout/Orientation Levee Slopes/Design Freeboard Habital Elements Interbasin Structures Fence Requirements
10	Facility Operaton and SCADA Requirements	Conveyane Canal / Pump Station Control Philosophy Conveyance / Pump Station Instrumentation Recovery Well Instrumentation Canal Turnout Instrumentation SCADA Platforms Radio Survey SCADA Monitoring and Control
11	Engineer's Estimates	Phase 1, Phase 2, …, Phase N.

Recommendations:

1. Project Committee recommends Technical Memoranda No. 1, 2, and 3 for consideration subject to finalization based on property acquisitions.

KERN FAN GROUNDWATER STORAGE PROJECT

GBJPA
Groundwater Banking Joint Powers Authority

Design, Engineering, ROW Acquisition, and Construction Team

Dan Bartel (Staff)

Ray Bennett (Staff)

Markus Nygren (Staff)

Curtis Skaggs (Consultant)

Bill Zeiders (Consultant)

On Behalf of Groundwater Banking Joint Powers Authority

849 Allen Road

Bakersfield, CA 93314

TECHNICAL MEMORANDA

GBJPA
Groundwater Banking
Joint Powers Authority

Purpose of Technical Memoranda

- Document the previously developed preliminary design work provided by Dee Jaspar & Associates, Inc. as part of the Grant Application processes.
- Incorporate RRBWSD and IRWD design, construction, and operational experience into the Design Process.
- Provide a forum for agreement by the District's on design decisions prior to the hard engineering design process.
- Perform Value Engineering as previously discussed by both District's.
- Provide thorough project documentation of JPA expectations to be used for the RFP and final design purposes.

TECHNICAL MEMORANDA

Priority 1	Status
1. Project Phasing and Design / Contractor Selection	**95% Ready for Consideration**
2. Conveyance Capacity Requirements	**95% Ready for Consideration**
3. Pipeline Requirements	**95% Ready for Consideration**
4. Pump Station Requirements	50%
Priority 2	
5. Geotechnical Report	10%
6. Canal Liner and Turnout Requirements	10%
7. Well Drilling and Equipping Requirements	10%
8. ROW Acquisitions	10%
Priority 3	
9. Recharge Basin Requirements	10%
10. Facility Operation and SCADA Requirements	10%
11. Engineer's Estimates	10%

TM#1 – PHASING & CONTRACTOR SELECTION

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Design Phasing

- Project planned for multiple phases or subsets for the design and construction of the project with the goal of lean project management.
- Project design divided into up to five phases.
- Design duration anticipated over about a 2-1/2 year timeframe.
- Project divided into up to ten construction packages.

TM#1 – DESIGN PHASING

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1. Recharge Basin Design

- Phase I Recharge Basins
- Goose Lake Channel Pump Station
- Check Structure
- Phase I Interbasin Structures
- Phase I Well Conveyance Pipelines
- Phase II Recharge Basins
- Phase II Interbasin Structures
- Phase II Well Conveyance Pipelines

2. Well Drilling & Equipping

- Phase I Well Drilling & Equipping
- Phase II Well Drilling & Equipping

3. Aqueduct Turnout Facility

- Aqueduct Turnout Facility
- Aqueduct Turnout Piping

4. Conveyance Facilities

- Conveyance Canal & Appurtenances
- Road Crossings, Cased Crossings, & Siphon Crossings
- Pump Station Facilities
- Phase II Turnout Facilities
- West Basin Turnout Facilities
- In-Lieu Farmer Turnouts
- Return Water Pump Station

5. SCADA and PLC Programming

- PLC Programming for Wells, Turnouts, & Pump Stations
- SCADA System for Wells, Turnouts, Pump Stations, and Master Headquarters

TM#1 – CONSTRUCTION PHASING

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Groundwater Banking
Joint Powers Authority

Construction Phasing

- Construction Packages let out in multiple phases.
- Anticipate potentially ten (10) contracts.
- Construction activity over about a 6-year timeframe (2022-2028).
- Technical Memorandum outlines the type of work associated with each construction package, the contractor licensing, and the framework for the bid package.

1. Phase I Recharge Basins

- Earthwork
- Property could be within current Stockdale EIR.

2. Phase I Recharge Facilities

- Goose Lake Channel Pump Station & Check Structure
- Interbasin Structures & Well Conveyance Pipelines

3. Phase I Well Drilling and Equipping

- Drilling up to Six (6) Wells
- Equipping up to Six (6) Wells approximately 5-6 cfs

4. Phase II Recharge Basins

- Earthwork
- Property potentially west of West Basins

5. Phase II Recharge Facilities

- Interbasin Structures
- Well Conveyance Pipelines

6. Phase II Well Drilling and Equipping

- Drilling up to Six (6) Wells
- Equipping up to Six (6) Wells approximately 5-6 cfs

7. Aqueduct Turnout Facility

- Aqueduct Turnout Facility
- Aqueduct Turnout Piping

8. Conveyance Facilities

- Conveyance Canal, Road Crossings, & Turnouts
- Pump Stations Structures

9. Pump Station Equipping

- Pumps, Motors, and Discharge Piping
- Pump Station Electrical and Controls

10. SCADA and PLC Programming

- PLC Programming and Control for each Facility
- SCADA System for Canal Facilities & Well Fields

FIRM SELECTION

GBJPA
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Design Firm Selection and Construction Administration Firm Selection

- Firm Selection at Discretion of JPA
- The Recharge Basins and Well Drilling/Equipping Subsets will be selected based upon a Traditional Proposal Process whereby the JPA can select the firm they believe is the best suited for the work.
- The Aqueduct Turnout, Conveyance Facilities, & SCADA and PLC Programming may be selected by a Traditional Proposal Process or a Pre-Qualification Process.

Contractor Selection

- May be made on a Competitive Bid Process or may include a combination Pre-Qualification and Competitive Bid Process.

PROJECT SCHEDULE

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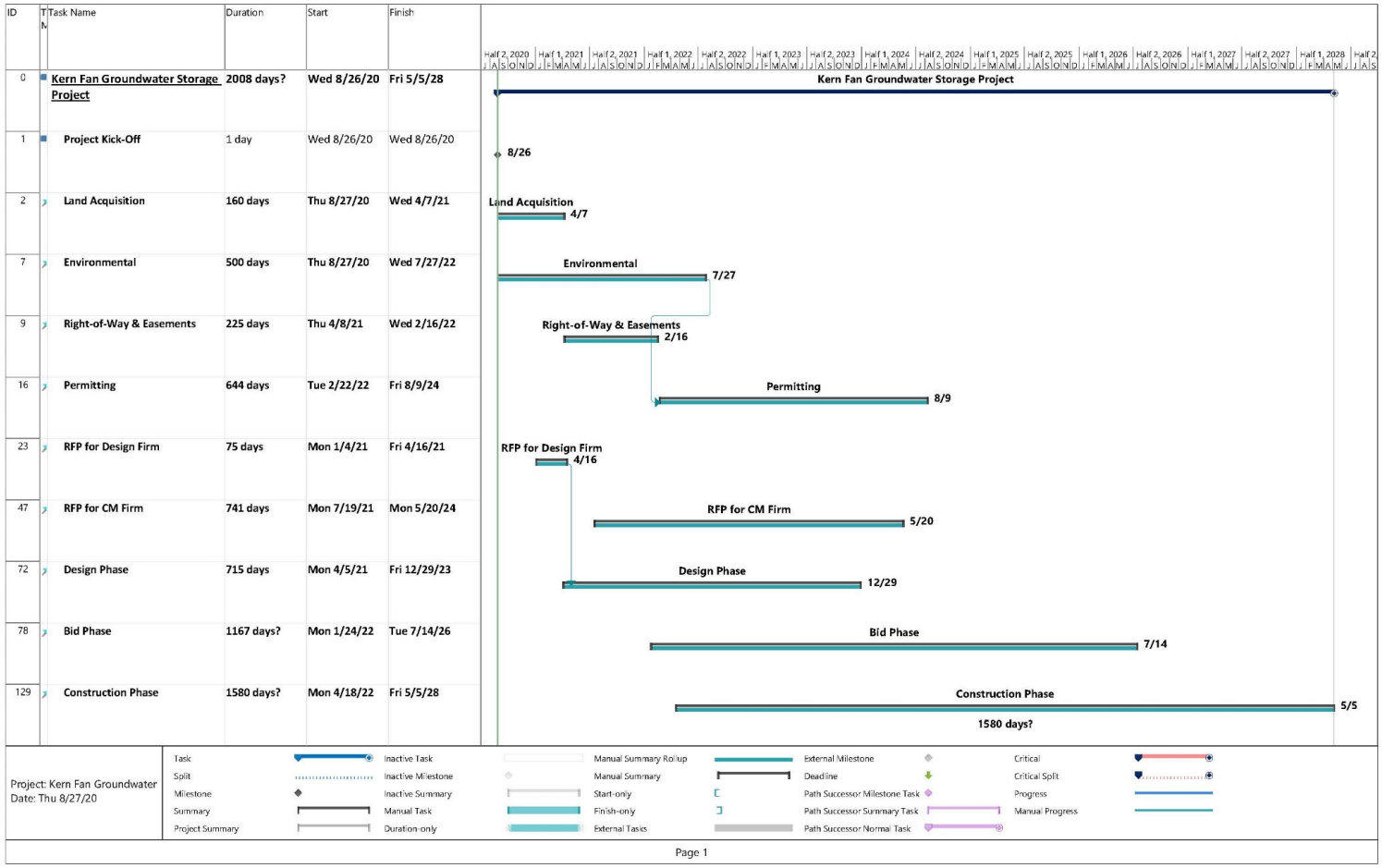

ID	Task Name	Duration	Start	Finish
0	Kern Fan Groundwater Storage Project	2008 days?	Wed 8/26/20	Fri 5/5/28
1	Project Kick-Off	1 day	Wed 8/26/20	Wed 8/26/20
2	Land Acquisition	160 days	Thu 8/27/20	Wed 4/7/21
7	Environmental	500 days	Thu 8/27/20	Wed 7/27/22
9	Right-of-Way & Easements	225 days	Thu 4/8/21	Wed 2/16/22
16	Permitting	644 days	Tue 2/22/22	Fri 8/9/24
23	RFP for Design Firm	75 days	Mon 1/4/21	Fri 4/16/21
47	RFP for CM Firm	741 days	Mon 7/19/21	Mon 5/20/24
72	Design Phase	715 days	Mon 4/5/21	Fri 12/29/23
78	Bid Phase	1167 days?	Mon 1/24/22	Tue 7/14/26
129	Construction Phase	1580 days?	Mon 4/18/22	Fri 5/5/28

Project: Kern Fan Groundwater
Date: Thu 8/27/20

Task, Split, Milestone, Summary, Project Summary, Inactive Task, Inactive Milestone, Inactive Summary, Manual Task, Duration-only, Manual Summary Rollup, Manual Summary, Start-only, Finish-only, External Tasks, External Milestone, Deadline, Path Successor Milestone Task, Path Successor Summary Task, Path Successor Normal Task, Critical, Critical Split, Progress, Manual Progress

Page 1

TM#2 – CONVEYANCE CAPACITY REQUIREMENTS

GBJPA
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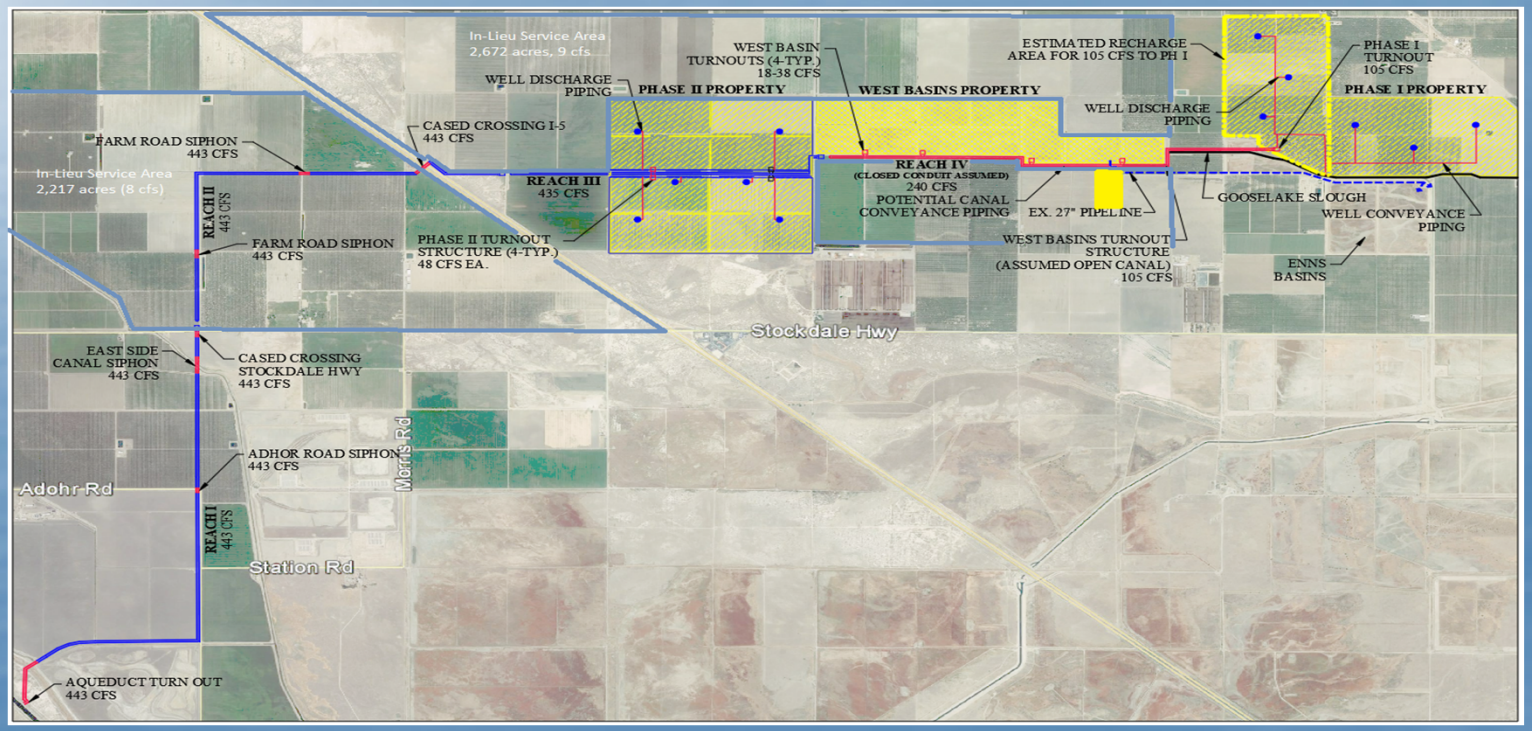
Establish Project Water Demand

- Evaluated Soil Survey Maps
- Evaluated tTEM Geophysical Survey Information
- Evaluated Historical Recharge Rates for nearby Recharge Facilities

Establish Conveyance Facility Capacities

- In-Lieu Turnouts
- Phase II Turnout
- West Basin Turnout
- Phase I Turnout



PHASE I PROPERTY

GBJPA
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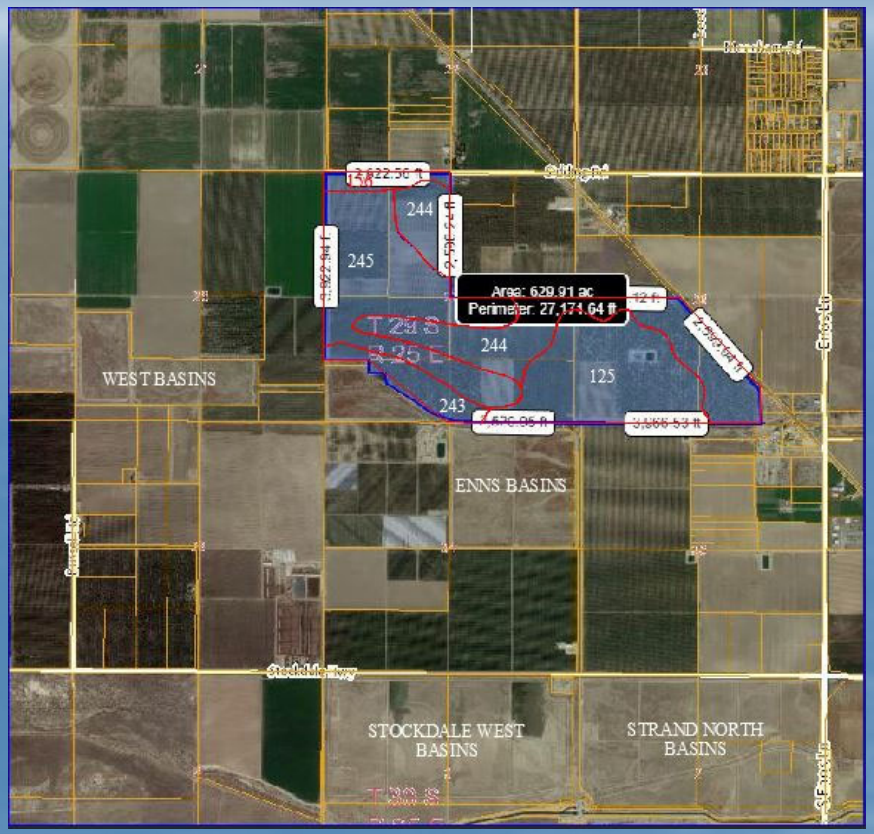
Description

- Approximately 630 Gross Acres, 530 Wetted
  - 33% Wasco Fine Sandy Loam, 33% Westhaven Fine Sandy Loam, & 27% Cajon Loamy Sand
  - tTEM Survey shows average resistivity to a 200-ft depth of 25.1 ohm-m.
  - Nearby Enns Basins average 0.6 ft/day recharge

Estimated Demand

- Average Maintenance Rate = 160 cfs
  - Based on Avg Recharge Rate = 0.6 ft/day
- Initial Fill Rate = 240 cfs
  - Based on 1.5 times the Avg Rate for filling ponds within three (3) to seven (7) days.



PHASE II PROPERTY

GBJPA
Groundwater Banking Joint Powers Authority

Description

- Approximately 640 Gross Acres, 508 Wetted
  - 30% Kimberlina Fine Sandy Loam & 60% Westhaven Fine Sandy Loam
  - tTEM Survey not available for this area
  - Nearby West Basins average 0.5 ft/day recharge

Estimated Demand

- Average Maintenance Rate = 128 cfs
  - Based on Avg Recharge Rate = 0.5 ft/day
- Initial Fill Rate = 192 cfs
  - Based on 1.5 times the Avg Rate for filling ponds within three (3) to seven (7) days.

WEST BASINS PROPERTY

GBJPA
Groundwater Banking
Joint Powers Authority

Description

- Approximately 388 Gross Acres, 280 Wetted
  - 100% Westhaven Fine Sandy Loam
  - tTEM Survey not available for this area
  - Historical Recharge rate approximately 0.5 ft/day

Estimated West Basins Demand

- Average Maintenance Rate = 70 cfs
  - Based on Avg Recharge Rate = 0.5 ft/day
- Initial Fill Rate = 105 cfs
  - Based on 1.5 times the Avg Rate for filling ponds within three (3) to seven (7) days.

IN-LIEU DEMAND

- Implementing in-lieu services areas would enable the JPA to expand its area of surface water supply and achieve the following objectives:
  - Allow the JPA to make greater use of high flow water supplies
  - Reduce groundwater pumping
  - Improve groundwater levels in the western region of the District

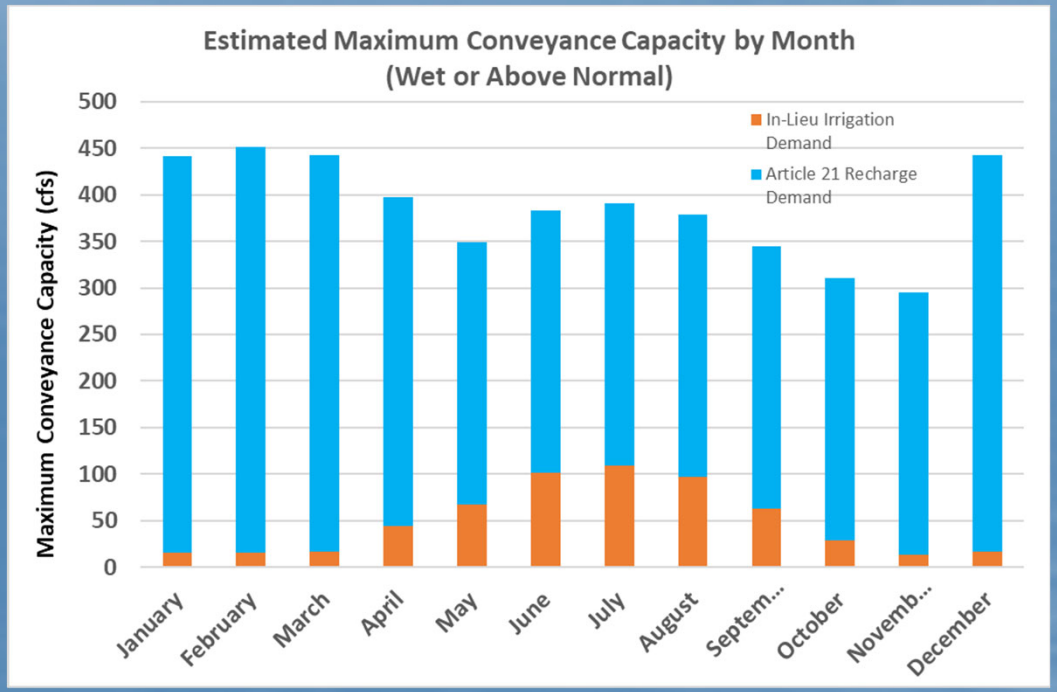
- Agricultural Demand
  - Evaluated Crop Acreages and
  - Peak Demand of 10 gpm/acre or 109 cfs
  - Considered Seasonal Irrigation Demand
  - Article 21 Fill is December – March
  - Concurrent Ag demand is 17 cfs

Month	*Totals*		*Estimate of Peak Water Demand Based on 10 gpm/ac*
	Water Use (ac-ft)	*% of Peak Month*	
Jan	400.34	13%	16 cfs
Feb	440.01	15%	17 cfs
Mar	423.16	14%	17 cfs
Apr	1,131.77	38%	44 cfs
May	1,718.48	57%	67 cfs
Jun	2,589.13	86%	101 cfs
Jul	3,014.49	100%	109 cfs
Aug	2,483.81	82%	97 cfs
Sept	1,605.95	53%	63 cfs
Oct	739.47	25%	29 cfs
Nov	341.25	11%	13 cfs
Dec	422.43	14%	17 cfs
Totals:	15,310.30		

IN-LIEU DEMAND

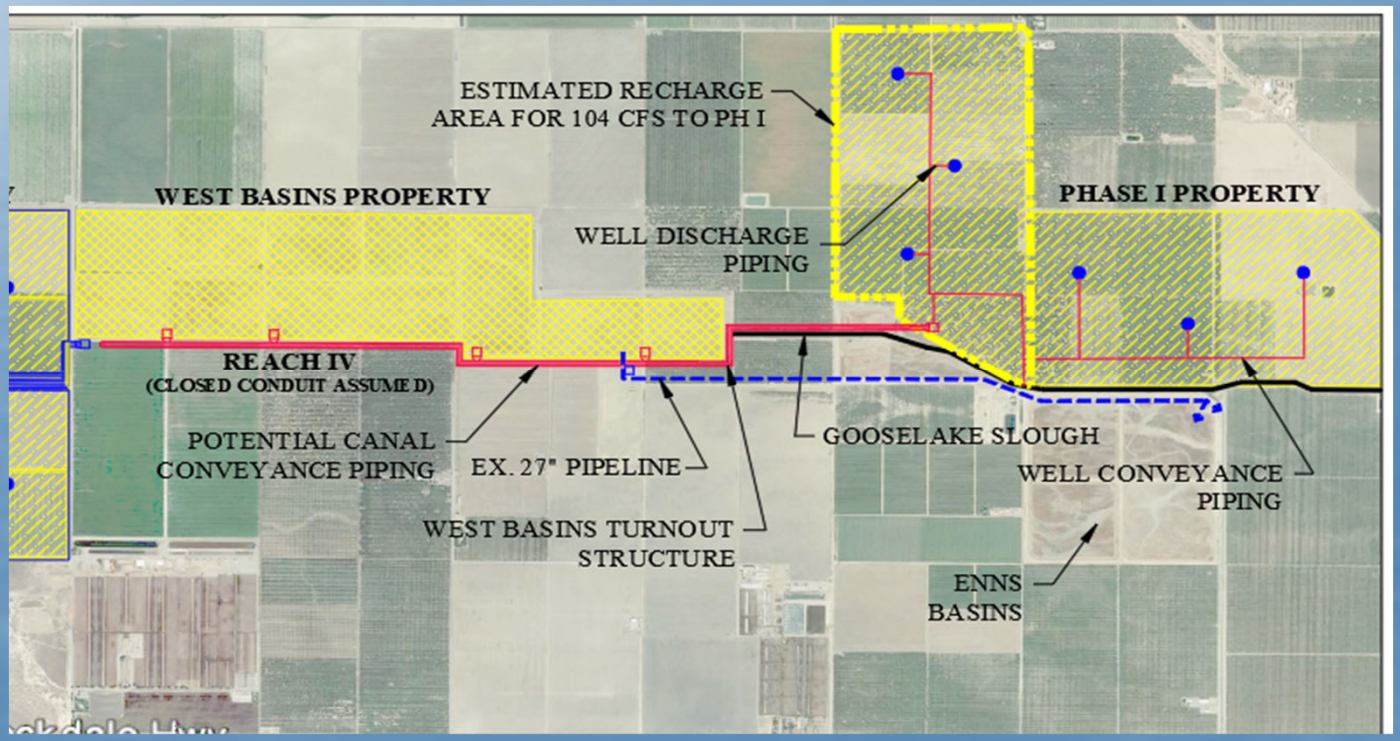
- Evaluated Crop Acreages and Peak Demand at 10 gpm/acre
- Considered Seasonal Irrigation Demand (13-109 cfs)
- Article 21 December – May (MBK)
- Filling period December - March
- Concurrent Ag demand during filling period is 17 cfs

Month	*Totals*		*Estimate of Peak Water Demand Based on 10 gpm/ac*
	Water Use (ac-ft)	*% of Peak Month*	
Jan	400.34	13%	16 cfs
Feb	440.01	15%	17 cfs
Mar	423.16	14%	17 cfs
Apr	1,131.77	38%	44 cfs
May	1,718.48	57%	67 cfs
Jun	2,589.13	86%	101 cfs
Jul	3,014.49	100%	109 cfs
Aug	2,483.81	82%	97 cfs
Sept	1,605.95	53%	63 cfs
Oct	739.47	25%	29 cfs
Nov	341.25	11%	13 cfs
Dec	422.43	14%	17 cfs
Totals:	15,310.30		



PHASE I WATER EXCHANGES

- West Basins - Fill capacity of 105 cfs and maintenance flow of 70 cfs
- In-Lieu – 6 cfs
- 27-inch pipeline to Enns Basins – 24 cfs at 6 fps
- Needed Phase I direct delivery of **105 cfs** [240 cfs (Phase I) – 105 cfs (West Basin) – 6 cfs In-Lieu – 24 cfs (Enns)]



CONVEYANCE CAPACITY SUMMARY

GBJPA

Maximum Conveyance Capacity = 443 cfs

- Consists of Four Canal Reaches.
- Reach 2 potential in-lieu recharge of 8 cfs during initial recharge basin filling.
- Reach 3 potential in-lieu recharge of 3 cfs and 192 cfs to Phase II Property.
- Reach 4 potential in-lieu recharge of 6 cfs, 24 cfs to WB Pipe Intertie, and 105 cfs to Phase I Property.

Conveyance Reach	Design Capacity	Pump Sta Capacity
Reach 1	443 cfs	
Reach 2	443 cfs	443 cfs
Reach 3	435 cfs	435 cfs
Reach 4	240 cfs	240 cfs
Reach 5, if necessary	129 cfs	105 cfs

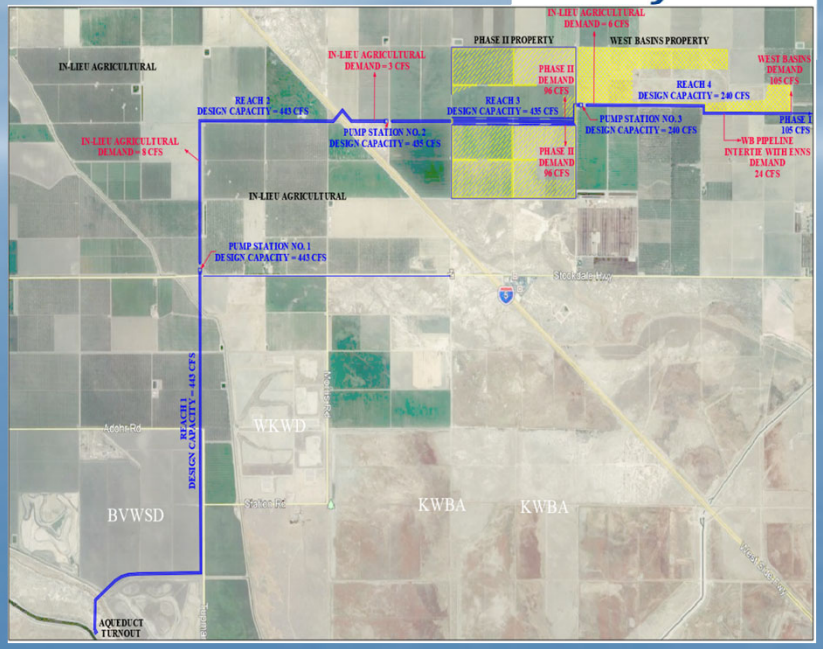


Table 1

Kern Fan Groundwater Banking Project

		Reach 1	Reach 2		Reach 3			Reach 4						
Conveyance Canal	Maximum Aqueduct Capacity	Aqueduct To Stockdale Hwy	Pump Station No. 1	Divert to In-Lieu Adjacent to Canal	Pump Station No. 2	Divert to In-Lieu Adjacent to Canal	Divert to Phase II	Pump Station No. 3	Divert to In-Lieu Adjacent to West Basins	Divert to WB Pipe Intertie with Enns	Divert to West Basins	Phase I Exchange Capacity[1]	Divert to Phase I	Balance
Conveyance Canal Demand Summary	500 cfs	443	443	8	435	3	192	240	6	24	105	105	105	57 cfs

[1]Water to Phase I is by an exchange with the West Basins and In-Lieu properties. However a disparity in demand exists whereby the demand for the West Basins, In-Lieu, and the WB Pipeline Intertie to the Enns Basins is 135 cfs (105 cfs + 6 cfs + 24 cfs Demand) and the Phase I Property is 240 cfs (240 cfs Initial Fill Rate). This is a disparity of 105 cfs to be accounted for by the Phase II conveyance canal.

TM#3 – PIPELINE REQUIREMENTS

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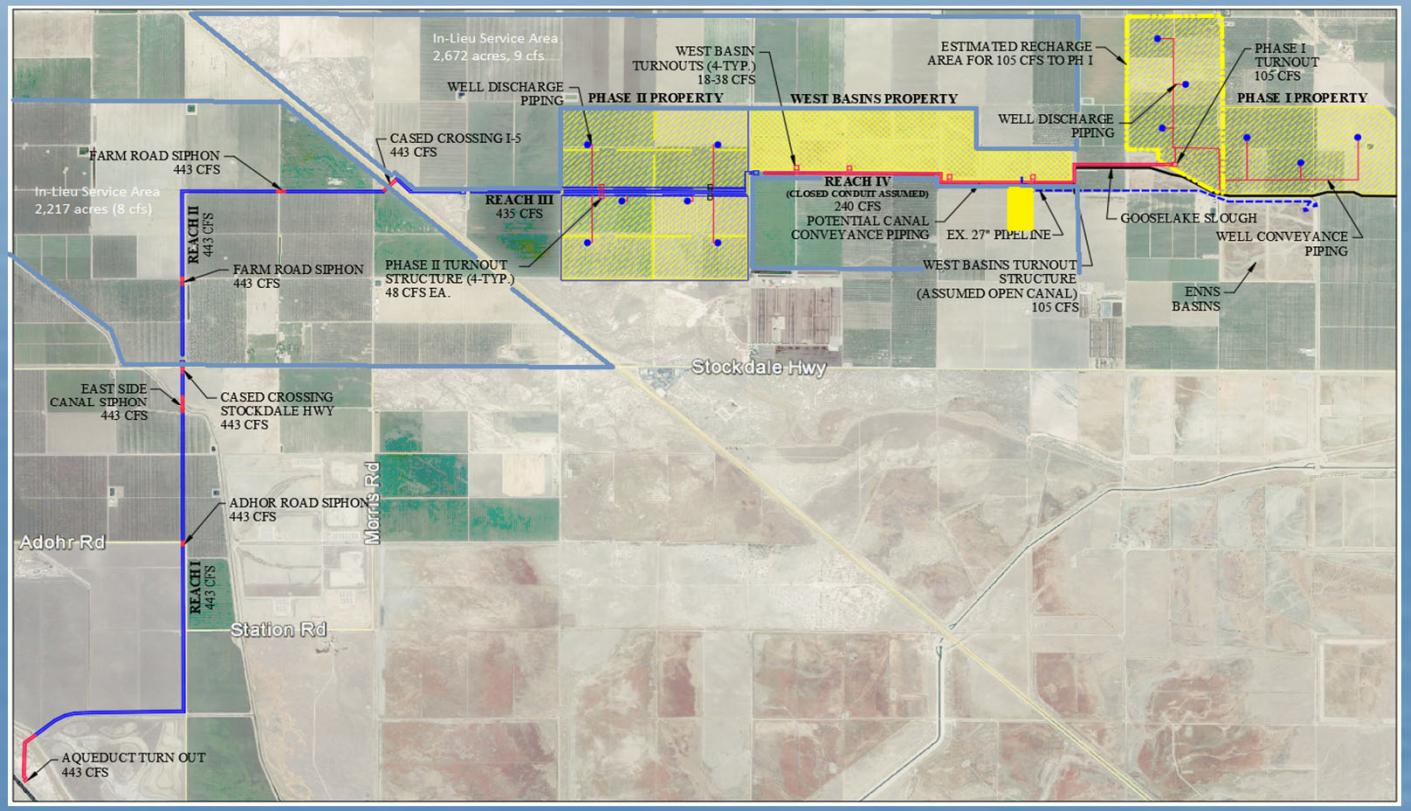
Keys to Successful Performance of Project Pipelines

- Appropriate Types of Pipe and Classes of Pipe for Project Facilities
  - PVC (PIP & C905)
  - HDPE (Solid Wall & ADS)
  - CMLC Steel Pipe
  - FBEL&C Steel Pipe
  - RCP (Wet Cast & Dry Cast)
- Sizing of Pipe for Hydraulic Conditions
- Bedding and Backfill Requirements
- Proper Installation
- Pipeline Venting
- Corrosion Protection



PIPELINE MATERIAL & INSTALLATION COSTS

GBJPA
Groundwater Banking Joint Powers Authority

Estimated Pipe Material Costs & Material plus Installation Costs as of October 2020

- Yellow highlights represent most economical pipe for the capacity shown in far left.
- Orange highlights represent alternative material that could easily be most economical depending on project timing.
- ADS N-12 HDPE recommended for turnouts and interbasin structures.

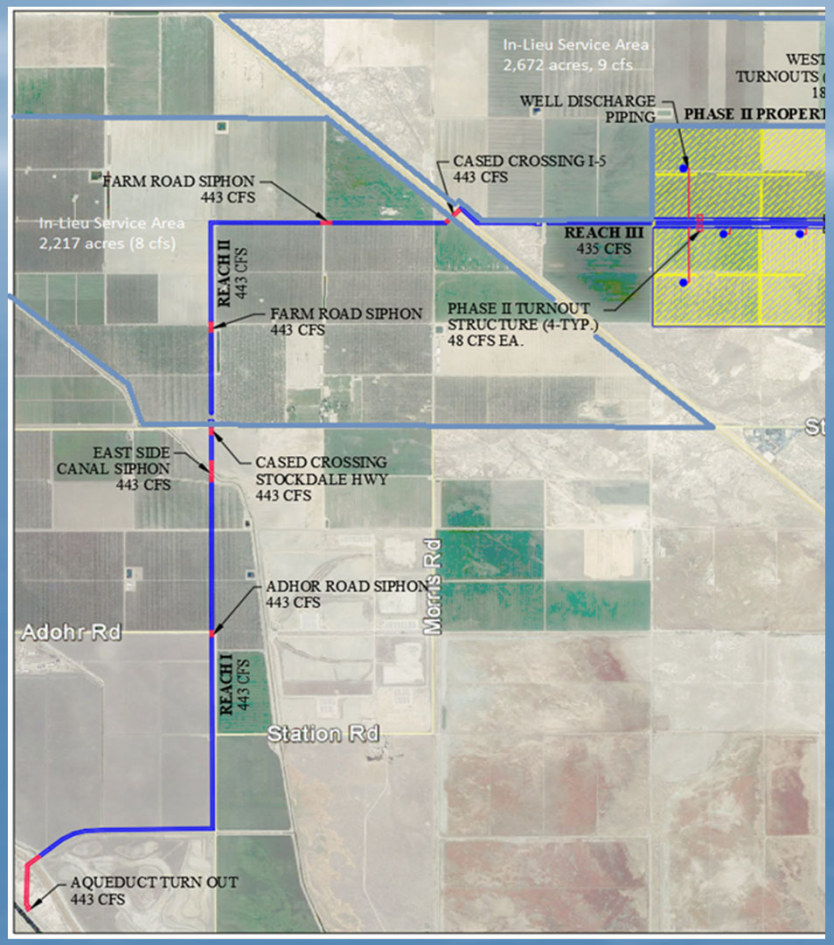
Kern Fan Project
Linear Pipeline Material and Cost Summary - Recommended

Pipe Capacity at 5-6 fps	SDR51 PIP PVC Pipe			DR41 & DR51 C900 PVC Pipe			DR32.5 & DR41 HDPE Pipe			ADS N-12 HDPE Pipe[1]			D25 Dry Cast RCP Pipe		
	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)
5 cfs	15	$18.17	$62.17	14	$19.42	$77.42	14	$14.58	$64.58						
10 cfs	18	$19.98	$77.98	18	$21.92	$79.92	20	$24.03	$82.03						
15 cfs	24	$36.53	$95.53	24	$49.68	$110.68	24	$34.34	$96.34						
20 cfs	27	$50.56	$111.56	24	$49.68	$110.68	28	$49.84	$127.84						
25 cfs				30	$68.31	$132.31	30	$54.35	$142.35						
30 cfs				30	$68.31	$132.31	34	$72.77	$178.77						
35 cfs				36	$99.14	$187.14	36	$58.30	$184.30	36	$56.50	$116.53	36	$111.78	$198.38
40 cfs				36	$99.14	$187.14	42	$72.40	$210.40	36	$56.50	$116.53	36	$111.78	$198.38
45 cfs				42	$131.23	$223.73	42	$72.40	$210.40	42	$70.18	$133.85	42	$142.83	$232.83
50 cfs				42	$131.23	$223.73	42	$72.40	$210.40	42	$70.18	$133.85	42	$142.83	$232.83
55 cfs				42	$131.23	$223.73	48	$88.00	$240.00	42	$70.18	$133.85	42	$142.83	$232.83
60 cfs				48	$165.80	$263.80	48	$88.00	$240.00	48	$93.15	$161.19	48	$173.88	$268.32
70 cfs				48	$165.80	$263.80	54	$104.20	$277.20	48	$93.15	$161.19	48	$173.88	$268.32
80 cfs				48	$165.80	$263.80	54	$104.20	$277.20	48	$93.15	$161.19	54	$204.93	$304.93
90 cfs				54	$266.35	$390.35	63	$128.37	$332.37	60	$130.41	$203.78	54	$204.93	$304.93
100 cfs				60	$316.45	$448.45	63	$128.37	$332.37	60	$130.41	$210.46	60	$235.98	$343.92
150 cfs													72	$298.08	$480.33
200 cfs													84	$360.18	$644.93
250 cfs													90	$391.23	$726.23
300 cfs													96	$422.28	$815.97
350 cfs													108	$484.38	$1,006.95
400 cfs													114	$515.43	$1,185.43
450 cfs													120	$546.48	$1,364.18
500 cfs													126	$577.53	$1,547.53

Represents most economical pipe material based upon costs estimates and information available in October 2020.
Represents secondary pipe material alternatives that may be more economical depending on actual design and project timing.
[1]The ADS N-12 HDPE pipe is not applicable to a linear, pressurized pipeline design, but is anticipated to be used at recharge facility turnouts, "in-lieu" turnouts, and interbasin structures.

FACILITY EVALUATIONS

- Aqueduct Turnout – 443 cfs
  - Estimated 108-inch Turnout Piping
  - Velocity = 7 fps
  - Pipe Material = RCP
- Adhor Road Crossing – 443 cfs
  - Estimated 120-inch Piping
  - Velocity = 6 fps
  - Pipe Material = RCP
  - Alternative = 8’ x 12’ Box Culvert
- East Side Canal Crossing – 443 cfs
  - Estimated 120-inch Piping
  - Velocity = 6 fps
  - Pipe Material = RCP
  - Anticipated to be a Siphon Crossing
- Farm Road Crossings – 240 to 443 cfs
  - Estimated 90-inch & 120-inch Piping
  - Velocity = 6 fps
  - Pipe Material = RCP
  - Alternative = 8’ x 12’ Box Culvert or Pre-Cast Bridge
- Cased Road Crossing – 443 cfs
  - Estimated 120-inch Piping
  - Velocity = 6 fps
  - Pipe Material = RCP
  - Steel Casing to be 168-inch Pipe



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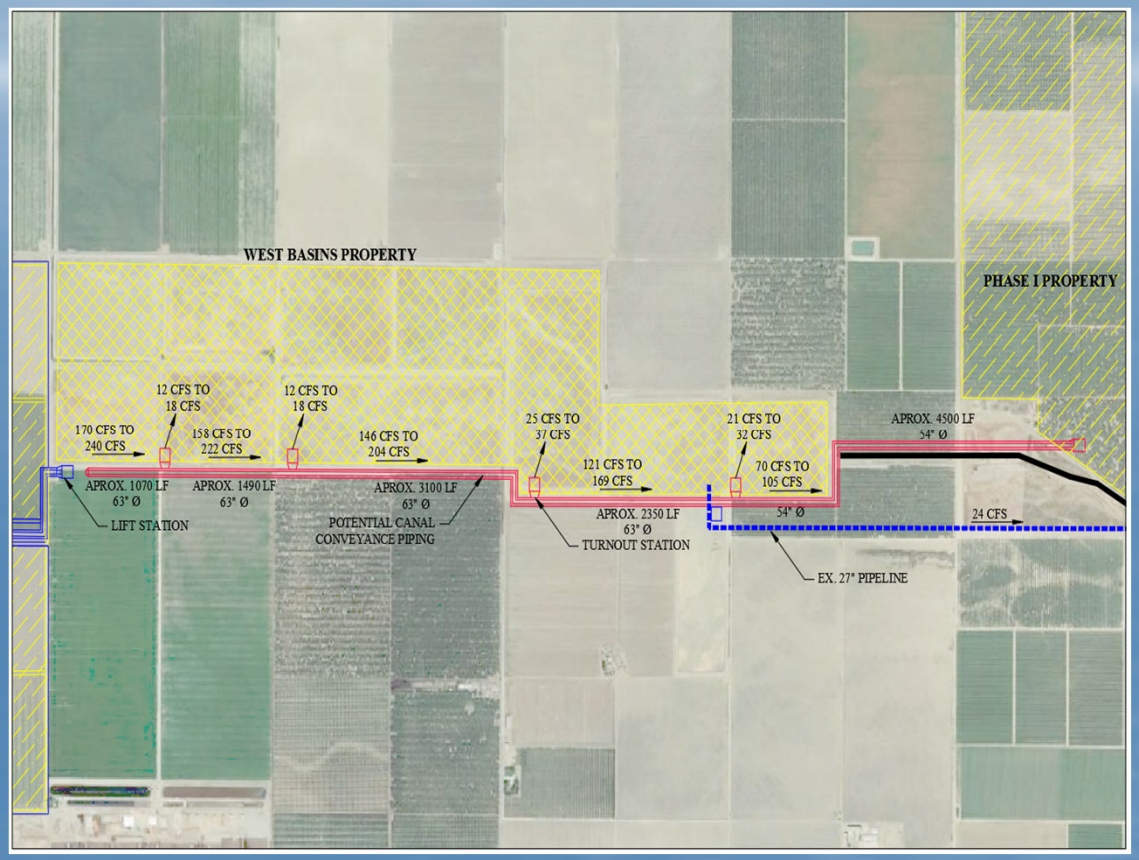
Joint Powers Authority

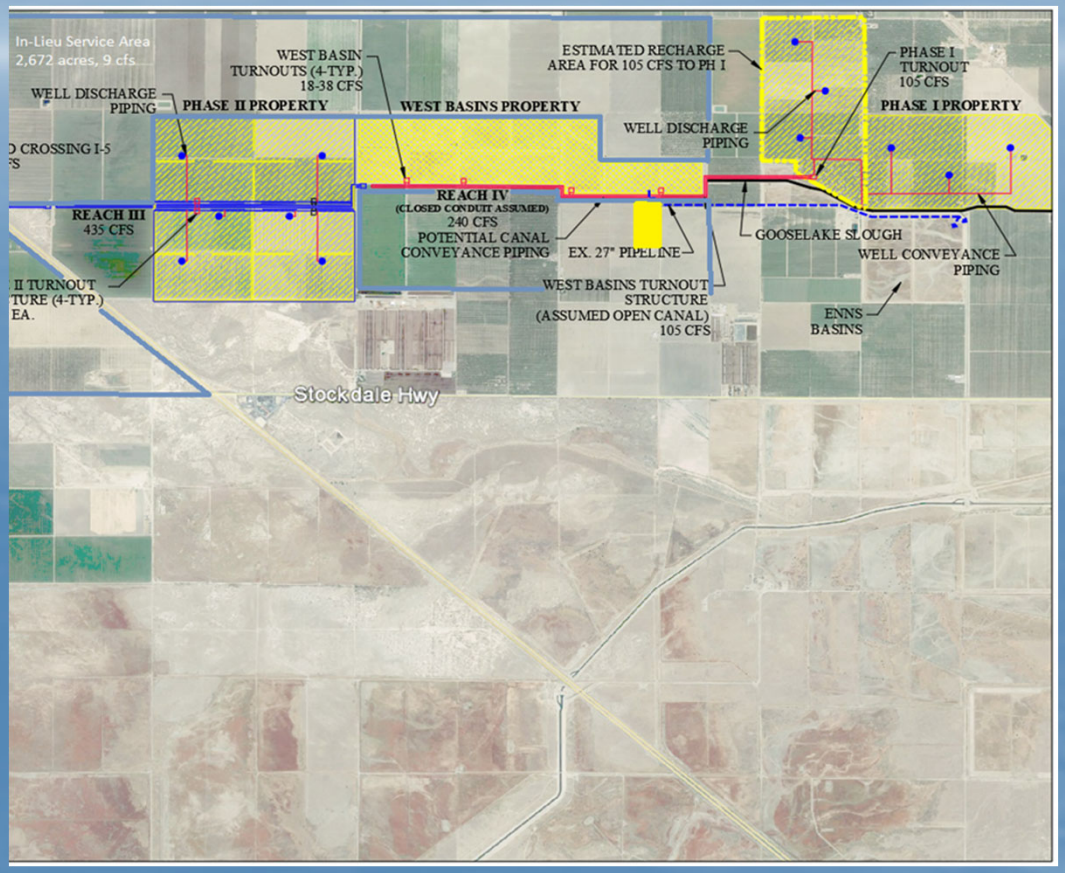
FACILITY EVALUATIONS

- Reach Four – 240 cfs Fill Rate, 170 cfs Avg Rate
  - May be Open Channel or Closed Conduit
  - Estimated 54-inch & 63-inch Turnout Piping
  - Velocity = 12.5 fps
  - Pipe Material = DR41 HDPE
- Pump Station Discharge Piping – 240 cfs to 443 cfs
  - Pipe Size various based on Pump Selection
  - Velocity = 10 fps
  - Pipe Material = FBEL&C Steel above ground could transition to PVC or HDPE below ground
- Phase II Turnout – 192 cfs
  - Estimating Four (4) Turnouts
  - Estimated 48-inch Piping
  - Velocity = 5 fps
  - Pipe Material = ADS N-12 HDPE
- West Basins Turnout – 105 cfs
  - Could be one (1) Turnout to Four (4) Turnouts
  - Estimated 36-inch or 48-inch Piping
  - Velocity = 5 fps
  - Pipe Material = ADS N-12 or DR41 HDPE
- Phase I Turnout – 105 cfs
  - Estimated 48-inch Piping
  - Velocity = 5 fps
  - Pipe Material = ADS N-12 or DR41 HDPE



FACILITY EVALUATIONS

- Well Discharge Piping – 6 cfs
  - Estimated 12-inch Discharge Piping
  - Velocity = 8 fps
  - Pipe Material = FBEL&C Steel
- Well Conveyance Piping – 6 cfs to 36 cfs
  - Pipe Size various based on number of wells connected too
  - Velocity = 5 fps
  - Pipe Material = PIP PVC below 27-inch
    PVC or HDPE greater than 27-inch
- Interbasin Structure Piping – 30 cfs to 60 cfs
  - Estimated 36-inch or 48-inch Piping
  - Velocity = 5 fps
  - Pipe Material = ADS N-12 HDPE
- In-Lieu Turnout Piping
  - Estimated 24-inch Piping
  - Velocity = 5 fps
  - Pipe Material = ADS N-12 HDPE



TURNOUT & PIPELINE RECOMMENDATIONS

- Evaluated pipe sizing based on estimated hydraulic conditions.
- Evaluated pipe costs and materials.
- Provided recommendations based on the above, however it is further recommended to include bid alternates for project facilities where appropriate.

Project Facility	Nominal Pipe Size	Pipe Type
Aqueduct Turnout	108-inch	D50 Dry Cast RCP
Adohr Road Siphon	120-inch	C25 Dry Cast RCP
East Side Canal Siphon	120-inch	C25 Dry Cast RCP
Reach 2 Farm Road Siphon	120-inch	C25 Dry Cast RCP
Reach 3 Farm Road Siphon	120-inch	C25 Dry Cast RCP
Reach 4 Farm Road Siphon	90-inch	C25 Dry Cast RCP
Stockdale Hwy Cased Crossing Carrier Pipe	120-inch	D25 Dry Cast RCP
I-5 Fwy Cased Crossing Carrier Pipe	120-inch	D25 Dry Cast RCP
Reach 4 Conveyance Piping	63-inch and 54-inch	DR41 HDPE
Phase II Turnout	48-inch	ADS N12 WT HDPE
West Basins Turnout (Open Channel Design)	48-inch (2 Barrels)	ADS N12 WT HDPE
West Basins Turnout (Closed Conduit Design)	36-inch	DR41 HDPE
Phase I Turnout (Open Channel Design)	48-inch (2 Barrels)	ADS N12 WT HDPE
Phase I Turnout (Closed Conduit Design)	54-inch	DR41 HDPE
Well Conveyance Pipelines	15-inch to 27-inch	SDR51 PIP PVC
Well Conveyance Pipelines	30-inch to 36-inch	DR51 C900 PVC or DR41 HDPE
Interbasin Piping	36-inch and 48-inch	ADS N12 WT HDPE
In-Lieu Turnout Piping	24-inch	ADS N12 WT HDPE

1. *The "D" class of pipe is a conservative assumption at this stage in the design. The RCP pipe classification shall be re-evaluated during detailed design and be based on actual design elevations, earth cover, and operating conditions.*
2. *The project shall prepare for bid alternatives for pipe sizes and structures where more than one alternative is an option and close in pricing such as for the Reach 4 Conveyance Canal Piping, the Well Conveyance Pipelines, and Road Crossings and Bridges or Box Culverts.*

SUMMARY

- Any questions or comments on the items covered or discussed in the three TM's?
- Next Steps…..
  - Currently working on Technical Memorandum #4 – Pump Station Requirements
  - Will soon begin working on the next four memoranda:
    - TM#5 – Geotechnical Report
    - TM#6 – Canal Liner and Turnout Requirements
    - TM#7 – Well Drilling and Equipping Requirements
    - TM#8 – ROW Acquisitions
  - Final memoranda will include the Recharge Basins, SCADA, and a detailed Engineer's Estimate
  - Preparation of RFP/RFQ's

KERN FAN GROUNDWATER STORAGE PROJECT

GBJPA
Groundwater Banking Joint Powers Authority

Groundwater Banking Joint Powers Authority
849 Allen Road
Bakersfield, CA 93314

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2730 UNICORN ROAD, BLDG A
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KERN FAN GROUNDWATER STORAGE PROJECT

TECHNICAL MEMORANDUM NO. 1

(Project Phasing and Design/Contractor Selection)

PREPARED FOR: Groundwater Banking Joint Powers Authority (JPA)
PREPARED BY: Curtis Skaggs, P.E., Dee Jaspar & Associates, Inc.
DATE: August 15, 2020

SUBJECT: ***Project Phasing and Design/Contractor Selection***

I. Executive Summary

The Kern Fan Groundwater Storage Project is planned to have multiple phases for the design and the construction of the project with the goal of lean project management. This effort will divide the project into subsets that will lead to the most qualified firms and contractors working on those phases as well as break the project down into more manageable sizes.

The project duration is anticipated to be six to eight years from start to finish. The JPA is currently working on land acquisition, environmental documents, funding options, and preliminary engineering design in the form of technical memoranda. The technical memoranda will be incorporated into requests for proposals (RFP's) or requests for qualifications (RFQ's) in the selection of engineering design firms.

It is envisioned that there may be up to five different design firms and potentially multiple construction administration and inspection contracts for the following project phases:

1. Phase I Recharge Basins & Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie; Phase II Recharge Basins & Phase II Well Pipelines and Interbasin Structures

2. Phase I Well Drilling and Equipping; Phase II Well Drilling and Equipping

3. Aqueduct Turnout Facility

4. Conveyance Facilities including Turnouts & Pump Stations

5. SCADA and PLC Programming

The design will include multiple project construction packages. These construction packages are outlined below and describe the type of work to be completed, the typical Contractor licensing requirements, the minimum contents of the bid packages, and sample front-end contract documents. The licensing requirements, bid packages, and sample contract documents outlined herein are not intended to be comprehensive, but provide a framework and understanding of the work involved in the engineering design and preparation of bid packages. It is envisioned that there will be ten project bid packages as outlined below:

1. Phase I Recharge Basins

2. Phase I Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie

3. Phase I Well Drilling and Equipping

4. Phase II Recharge Basins

5. Phase II Well Drilling and Equipping

6. Phase II Well Pipelines and Interbasin Structures

7. Aqueduct Turnout Facility

8. Conveyance Facilities including Turnouts & Pump Stations

9. Pump Station Equipping

10. SCADA and PLC Programming

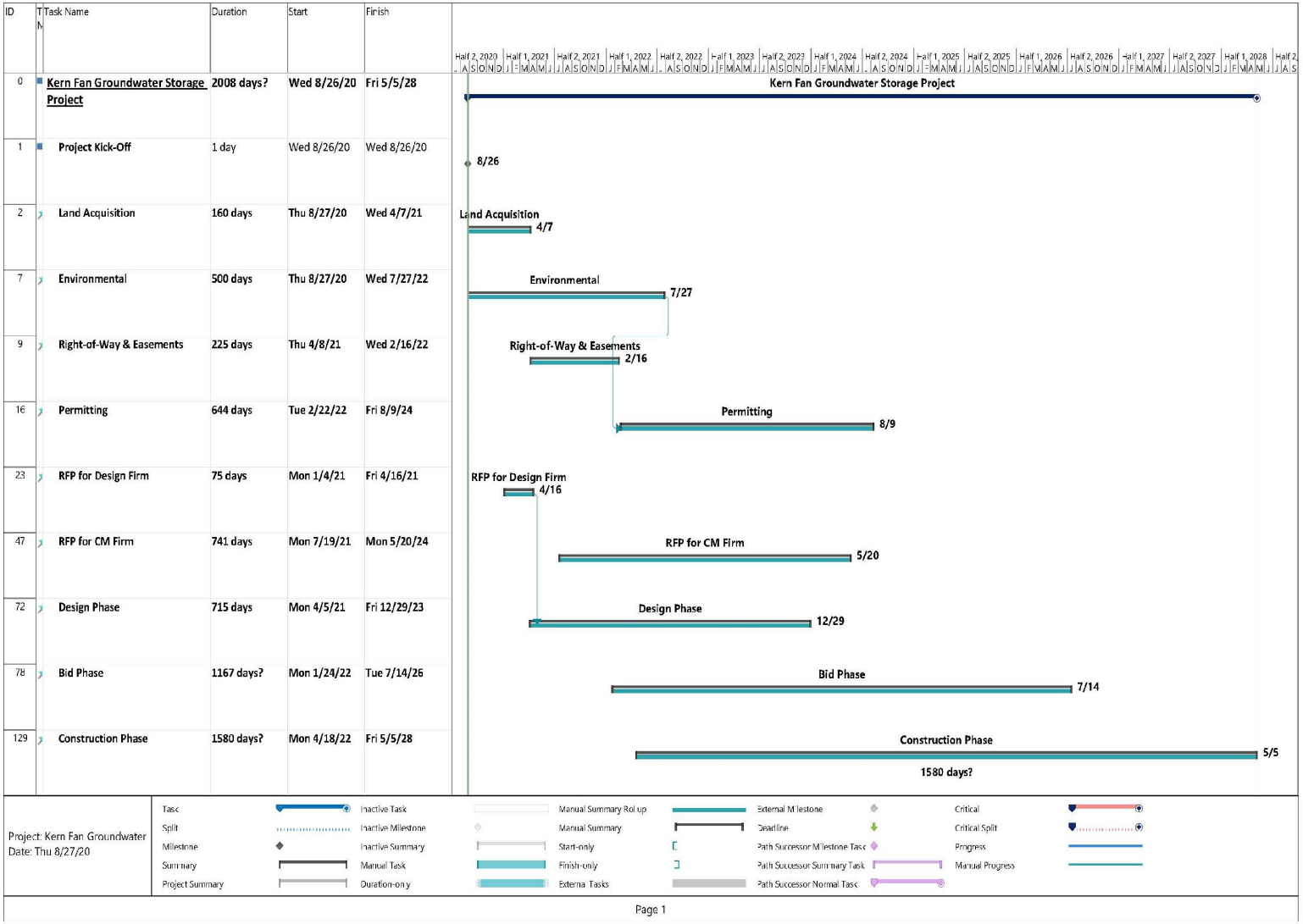
The projects will be competitively bid in order to comply with all grant funding requirements, however a pre-qualification process may be implemented for more unique project phases.

II. Project Schedule

A preliminary project schedule has been prepared based on the JPA formation date of August 25th, 2020. The schedule includes timeframes for land acquisition, environmental work, project rights-of-way, permitting, engineering design, the bid process, and construction.

A compressed project schedule is illustrated in Figure 1 below and a more detailed schedule is attached in Appendix A. The project is shown to begin on August 26, 2020 after the formation of the JPA and is completed and operational by May 5, 2028.

Figure 1: Project Schedule



III. Project Phasing (Construction Bid Packages)

A. Phase I Recharge Basins

- Type of Work

  The Recharge Basin work will consist primarily of earthwork and earth moving activities. This will include, but not be limited to, crop removal, utility and underground locating work as well as utility/facility removal or relocation, clearing and grubbing, over-excavation and re-compaction, obtaining borrow material, hauling, filling and compacting levee embankments, ramps, and islands, fine grading, and slope grading. In addition, this may include the placement of all-weather surfacing on levee embankment roads as well as ripping/slip plowing of recharge basin bottoms.

- Contractor Licensing

  Contractors for this work shall be licensed with the State of California for a Class A General Engineering Contractors License or a C-12 Earthwork and Paving Contractors License.

- Bid Package

  1. Cover Sheet
  2. Demolition Plan for Tree Removal, Oil/Gas/Irrigation Line Removal or Relocation, Power Line Relocations, etc.
  3. Site Plan
  4. Plan Sheets illustrating Levee Embankment Layouts, Dimensions, Grades, Borrow Areas, & Well Pads
  5. Embankment Cross-Sections
  6. Earthwork Details – Embankment Over-Ex and Re-Compact, Keyways, Slopes, etc.
  7. Fence Plan, if applicable
  8. Project Specifications including Earthwork Volumes and Geotechnical Report

- Design Standards/Project Specification Format

  See attached boiler plate specifications in Appendix B for reference. The boiler plate front-end specifications shall be reviewed and revised as a joint effort between the engineering design firm and the JPA at the time of design.

  The technical specifications will be developed to be project specific. Sample technical specifications are provided in subsequent technical memoranda.

B. Phase I Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie

- Type of Work

  This work will include, but not be limited to, the installation of interbasin structures through the Phase I Recharge Basin levee embankments, the installation of underground well conveyance pipelines through the basins with a connection to the RRBWSD Intake Canal, construction of a check structure in the Goose Lake Channel, and construction of a pump station in the Goose Lake Channel.

- Contractor Licensing

  Contractors for this work shall be licensed with the State of California for a Class A General Engineering Contractors License.

- Bid Package

  1. Cover Sheet
  2. Site Plan
  3. Interbasin Structure Plan View Layout
  4. Interbasin Structure & Piping Elevation
  5. Interbasin Details
  6. Existing Well & Irrigation Lateral Plan
  7. Well Conveyance Piping Layout Plan including modifications to existing irrigation lines
  8. Well Conveyance Plan & Profile Sheets

9. Well Conveyance In-Lieu Service Turnouts
10. Well Conveyance Details
11. Goose Lake Channel Check Structure Site Plan
12. Check Structure Elevation Views
13. Check Structure Details
14. Goose Lake Channel Pump Station Site Plan
15. Pump Station Elevation Views
16. Pump Station Structural Details
17. Pump Station Pump & Motor Details
18. Pump Station Discharge Piping Plan & Profile Sheets
19. Pump Station Recharge Basin Outlet Plan & Elevation Views
20. Pump Station Security & Remote Monitoring
21. Pump Station Fencing, if applicable
22. Pump Station Detail Sheets
23. Pump Station Electrical & Controls
24. PG&E Electrical Supply Plan
25. Project Specifications

- Design Standards/Project Specification Format

  See attached boiler plate specifications in Appendix B for reference. The boiler plate front-end specifications shall be reviewed and revised as a joint effort between the engineering design firm and the JPA at the time of design.

  The technical specifications will be developed to be project specific. Sample technical specifications are provided in subsequent technical memoranda.

C. Phase I Well Drilling and Equipping

- Type of Work

The Phase I Well Drilling and Equipping work will consist primarily of well drilling and well equipping work for up to six wells in the Phase I Recharge area as well as constructing monitoring wells. This work will include, but not be limited to, drilling reverse rotary pilot holes, performing geophysical logging, water depth sampling, reaming of the pilot holes,

casing installation, gravel installation, cement annular seal placement, well development, and testing. In addition, the work will include site development and well equipping with a deep well vertical turbine pump, vertical hollowshaft electric motor, discharge piping, appurtenances, well motor enclosure, concrete foundations, electrical and controls, shade structure, site lighting, site security, remote monitoring, and all-weather surfacing.

- Contractor Licensing

  Contractors for this work shall be licensed with the State of California for the following:

  1. Class C57 Well Drilling Contractors License
  2. Class C10 Electrical Contractors License

- Bid Package

  1. Cover Sheet
  2. Site Plan showing Existing and Proposed Well Locations
  3. Well Rehabilitation and Equipping Plan for Existing Wells
  4. Well Destruction Plan for Existing Wells
  5. Well Drilling Cross Section
  6. Well Drilling Details
  7. Monitoring Well Construction
  8. Well Site Plan Layout
  9. Well Pump & Motor Cross Section
  10. Well Discharge Piping Plan & Elevation
  11. Well Pump Foundation
  12. Well Motor Enclosure
  13. Well Electrical Foundation
  14. Well Electrical Shade Structure
  15. Well Site Details
  16. Well Site Security & Remote Monitoring
  17. Well Site Fencing, if applicable
  18. Well Electrical and Controls
  19. PG&E Electrical Supply Plan
  20. Project Specifications

- Design Standards/Project Specification Format

See attached boiler plate specifications in Appendix B for reference. The boiler plate front-end specifications shall be reviewed and revised as a joint effort between the engineering design firm and the JPA at the time of design.

The technical specifications will be developed to be project specific. Sample technical specifications are provided in subsequent technical memoranda.

D. Phase II Recharge Basins

- Type of Work

  The Recharge Basin work will consist primarily of earthwork and earth moving activities. This will include, but not be limited to, crop removal, utility and underground locating work as well as utility removal or relocation, clearing and grubbing, over-excavation and re-compaction, obtaining borrow material, hauling, filling and compacting levee embankments, ramps, and islands, fine grading, and slope grading. In addition, this may include the placement of all-weather surfacing on levee embankment roads as well as ripping/slip plowing of recharge basin bottoms.

- Contractor Licensing

  Contractors for this work shall be licensed with the State of California for a Class A General Engineering Contractors License or a C-12 Earthwork and Paving Contractors License.

- Bid Package

  1. Cover Sheet
  2. Demolition Plan for Tree Removal, Oil/Gas/Irrigation Line Removal or Relocation, Power Line Relocations, etc.
  3. Site Plan
  4. Plan Sheets illustrating Levee Embankment Layouts, Dimensions, Grades, Borrow Areas, & Well Pads
  5. Embankment Cross-Sections

6. Earthwork Details – Embankment Over-Ex and Re-Compact, Keyways, Slopes, etc.
7. Fence Plan, if applicable
8. Project Specifications including Earthwork Volumes and Geotechnical Report

- Design Standards/Project Specification Format

  See attached boiler plate specifications in Appendix B for reference. The boiler plate front-end specifications shall be reviewed and revised as a joint effort between the engineering design firm and the JPA at the time of design.

  The technical specifications will be developed to be project specific. Sample technical specifications are provided in subsequent technical memoranda.

E. Phase II Well Drilling and Equipping

- Type of Work

  The Phase II Well Drilling and Equipping work will consist primarily of well drilling and well equipping work for up to six wells in the Phase II Recharge area as well as constructing monitoring wells. This work will include, but not be limited to, drilling reverse rotary pilot holes, performing geophysical logging, water depth sampling, reaming of the pilot holes, casing installation, gravel installation, cement annular seal placement, well development, and testing. In addition, the work will include site development and well equipping with a deep well vertical turbine pump, vertical hollowshaft electric motor, discharge piping, appurtenances, well motor enclosure, concrete foundations, electrical and controls, shade structure, site lighting, site security, remote monitoring, and all-weather surfacing.

- Contractor Licensing

  Contractors for this work shall be licensed with the State of California for the following:

  1. Class C57 Well Drilling Contractors

License
2. Class C10 Electrical Contractors License

- Bid Package

1. Cover Sheet
2. Site Plan showing Existing and Proposed Well Locations
3. Well Rehabilitation and Equipping Plan for Existing Wells
4. Well Destruction Plan for Existing Wells
5. Well Drilling Cross Section
6. Well Drilling Details
7. Monitoring Well Construction
8. Well Site Plan Layout
9. Well Pump & Motor Cross Section
10. Well Discharge Piping Plan & Elevation
11. Well Pump Foundation
12. Well Motor Enclosure
13. Well Electrical Foundation
14. Well Electrical Shade Structure
15. Well Site Details
16. Well Site Security & Remote Monitoring
17. Well Site Fencing, if applicable
18. Well Electrical and Controls
19. PG&E Electrical Supply Plan
20. Project Specifications

- Design Standards/Project Specification Format

See attached boiler plate specifications in Appendix B for reference. The boiler plate front-end specifications shall be reviewed and revised as a joint effort between the engineering design firm and the JPA at the time of design.

The technical specifications will be developed to be project specific. Sample technical specifications are provided in subsequent technical memoranda.

F. Phase II Well Pipelines and Interbasin Structures

- Type of Work

This work will include, but not be limited to, the installation of interbasin structures through the Phase

II Recharge Basin levee embankments and the installation of underground well conveyance pipelines through the basins with connections to the Conveyance Canal.

- Contractor Licensing

  Contractors for this work shall be licensed with the State of California for a Class A General Engineering Contractors License.

- Bid Package

  1. Cover Sheet
  2. Site Plan
  3. Interbasin Structure Plan View Layout
  4. Interbasin Structure & Piping Elevation
  5. Interbasin Details
  6. Existing Well & Irrigation Lateral Plan
  7. Well Conveyance Piping Layout Plan including modifications to existing irrigation lines
  8. Well Conveyance Plan & Profile Sheets
  9. Well Conveyance In-Lieu Service Turnouts
  10. Well Conveyance Details
  11. Project Specifications

- Design Standards/Project Specification Format

  See attached boiler plate specifications in Appendix B for reference. The boiler plate front-end specifications shall be reviewed and revised as a joint effort between the engineering design firm and the JPA at the time of design.

  The technical specifications will be developed to be project specific. Sample technical specifications are provided in subsequent technical memoranda.

G. Aqueduct Turnout Facility

- Type of Work

  This work will include, but not be limited to, the installation of the aqueduct turnout which shall involve coordination with the Department of Water

Resources, mobilization/installation/demobilization of a cofferdam, earthwork, reinforced concrete construction, installation of miscellaneous steel, installation of a sluice gate, installation of electrical and controls, site security, remote monitoring, installation of the turnout piping, and the restoration of all-weather surfacing on the Aqueduct embankment road.

- Contractor Licensing

  Contractors for this work shall be licensed with the State of California for the following:

  1. Class A General Engineering Contractors License.
  2. Class C10 Electrical Contractors License

- Bid Package

  1. Cover Sheet
  2. Aqueduct Cofferdam Plan
  3. Aqueduct Turnout Site Plan
  4. Aqueduct Turnout Grading Plan
  5. Aqueduct Turnout Elevation Views
  6. Aqueduct Turnout Structural Details
  7. Aqueduct Turnout Pipe Plan & Profile
  8. Aqueduct Turnout Trashrack
  9. Aqueduct Turnout Details
  10. Aqueduct Turnout Electrical and Controls
  11. Aqueduct Turnout Security & Remote Monitoring
  12. PG&E Electrical Supply Plan
  13. Project Specifications

- Design Standards/Project Specification Format

  See attached boiler plate specifications in Appendix B for reference. The boiler plate front-end specifications shall be reviewed and revised as a joint effort between the engineering design firm and the JPA at the time of design.

The technical specifications will be developed to be project specific. Sample technical specifications are provided in subsequent technical memoranda.

H. Conveyance Facilities including Turnouts & Pump Stations

- Type of Work

  This work will include, but not be limited to, crop removal, utility and underground locating work as well as utility removal or relocation, the installation of the conveyance canal facility, siphon crossings, road crossings, utility crossings, highway cased crossings, pump station facilities, pump station forebays, pump station afterbays, in-lieu service turnouts, turnout facilities to the Phase II Recharge Basins, turnout facilities to the West Recharge Basins, site security, and remote monitoring.

  The pump station facility work will need to be coordinated with the pump station equipping work. Pump station hydraulic design and modeling will be performed and recommended design features and mitigation measures will need to be incorporated into the structure design and pump design.

- Contractor Licensing

  Contractors for this work shall be licensed with the State of California for the following:

  1. Class A General Engineering Contractors License.
  2. Class C10 Electrical Contractors License

- Bid Package

  1. Cover Sheet
  2. Site Plan
  3. Utility Plan & Utility Relocation/Removal Plan
  4. Conveyance Canal Plan & Profile Sheets
  5. Conveyance Canal Cross Sections
  6. Conveyance Canal Transition Structure Plan & Elevation

7. Conveyance Canal Forebay Plan & Elevation
8. Conveyance Canal Afterbay Plan & Elevation
9. Conveyance Canal Details
10. Conveyance Canal In-Lieu Service Turnouts
11. Conveyance Canal Fencing Site Plan, if applicable
12. Conveyance Canal Fence Details, if applicable
13. Adohr Road Crossing Site Plan
14. Adohr Road Crossing Plan & Elevation
15. Adohr Road Crossing Details
16. East Side Canal Crossing Site Plan
17. East Side Canal Crossing Plan & Elevation
18. East Side Canal Crossing Details
19. Stockdale Hwy Site Plan
20. Stockdale Hwy Plan & Elevation
21. Stockdale Hwy Crossing Details
22. Road Crossing/Bridge Site Plan
23. Road Crossing/Bridge Plan & Elevation
24. Road Crossing/Bridge Details
25. Interstate 5 Fwy Site Plan
26. Interstate 5 Fwy Plan & Elevation
27. Interstate 5 Fwy Crossing Details
28. Phase II Property Turnout Site Plan
29. Phase II Property Turnout Grading Plan
30. Phase II Property Turnout Plan & Elevations
31. Phase II Property Turnout Structural Details
32. Phase II Property Turnout Pipe Profile
33. Phase II Property Turnout Details
34. Phase II Property Turnout Electrical and Controls
35. Phase II Property Turnout Security & Remote Monitoring
36. West Basins Turnout Site Plan
37. West Basins Turnout Grading Plan
38. West Basins Turnout Plan & Elevation
39. West Basins Turnout Structural Details
40. West Basins Turnout Pipe Profile
41. West Basins Turnout Details
42. West Basins Turnout Electrical and Controls

43. West Basins Turnout Security & Remote Monitoring
44. Pump Station Site Plan Layout
45. Pump Station Grading Plans
46. Pump Station Elevation Views
47. Pump Station Structural Details
48. PG&E Electrical Supply Plan
49. Project Specifications

- Design Standards/Project Specification Format

  See attached boiler plate specifications in Appendix B for reference. The boiler plate front-end specifications shall be reviewed and revised as a joint effort between the engineering design firm and the JPA at the time of design.

  The technical specifications will be developed to be project specific. Sample technical specifications are provided in subsequent technical memoranda.

I. Pump Station Equipping

It is recommended that the pump station equipment be bid as a separate project from the "Conveyance Facilities including Turnouts and Pump Stations". The reinforced concrete pump station, miscellaneous steel embeds such as ladder rungs, stop log slots, grating, and handrailing, and steel trashracks will be installed as part of the Conveyance Facilities scope of work along with the conveyance canal earthwork and lining work. The "Pump Station Equipping" scope of work will begin at the pump sole plates and include the pump assembly, pump discharge head, pump sole plate and anchorage, motor, discharge piping, electrical, control building, site lighting, and site development.

The advantage to separating the project in this fashion is it allows the District to include small and medium size Contractors in the "Pump Station Equipping" work and potentially utilize local Contractors and vendors for mechanical and electrical equipment that will require on-going service and maintenance.

- Type of Work

  This work will include, but not be limited to, the procurement, testing, and installation of the conveyance canal pump station pumps and motors, the pump discharge piping and appurtenances, site electrical and controls, electrical control building and appurtenances, site security, remote monitoring, and site development. This work shall be coordinated with the pump station design and structural concrete construction.

  The pump station equipping work will need to be coordinated with the pump station structure work. Pump station hydraulic design and modeling will be performed and recommended design features and mitigation measures will need to be incorporated into the structure design and pump design.

- Contractor Licensing

  Contractors for this work shall be licensed with the State of California for the following:

  1. Class A General Engineering Contractors License.
  2. Class C10 Electrical Contractors License

- Bid Package

  1. Cover Sheet
  2. Site Plan
  3. Pump Station Site Plans
  4. Pump Station Elevation Views
  5. Pump & Motor Cross Section Views
  6. Pump & Motor Details
  7. Pump Station Pump & Motor Base Plate Details
  8. Pump Station Discharge Piping Plan & Profile Sheets
  9. Pump Station Detail Sheets
  10. Pump Station Control Building Foundation
  11. Pump Station Control Building Plan & Elevation Exterior Views
  12. Pump Station Control Building Plan &

Elevation Interior Views
13. Pump Station Control Building Details
14. Pump Station Electrical & Controls
15. Cathodic Protection Details
16. Pump Station Site Security & Remote Monitoring
17. Pump Station Fence Plan, if applicable
18. Return Water Pump Station Site Plan
19. Return Water Pump Station Grading Plan
20. Return Water Pump Station Elevation Views
21. Return Water Pump Station Structural Details
22. Return Water Pump Station Pump & Motor Base Plate Details
23. Return Water Pump Station Discharge Piping Plan & Profile Sheets
24. Return Water Pump Station Detail Sheets
25. Return Water Pump Station Electrical Foundation
26. Return Water Pump Station Electrical Shade Structure/Control Building
27. Return Water Pump Station Electrical & Controls
28. Return Water Pump Station Site Security & Remote Monitoring
29. Return Water Pump Station Fence Plan, if applicable
30. PG&E Electrical Supply Plan
31. Project Specifications

- Design Standards/Project Specification Format

  See attached boiler plate specifications in Appendix B for reference. The boiler plate front-end specifications shall be reviewed and revised as a joint effort between the engineering design firm and the JPA at the time of design.

  The technical specifications will be developed to be project specific. Sample technical specifications are provided in subsequent technical memoranda.

J. SCADA and PLC Programming

- Type of Work

  This work will include, but not be limited to, the preparation of a control narrative and preparation of programmable logic for the PLC units at all pump stations, turnouts, and wells for the project as well as radio surveys. In addition, this work will include furnishing and installing all SCADA equipment including all hardware and software for each facility and the master headquarters.

  This work shall be coordinated with the design and construction of the well sites, pump stations, and turnouts. The SCADA work and PLC programming will be implemented in conjunction with each phase of the work described above.

- Contractor Licensing

  Contractors for this work shall be licensed with the State of California for a Class C-7 or C-10 Contractors License.

- Bid Package

  1. Cover Sheet
  2. Site Plan
  3. Control Narrative
  4. PLC Diagrams
  5. SCADA Block Diagrams
  6. P&ID Drawings
  7. Electrical Details
  8. Project Specifications including Control Logic/Philosophy

- Design Standards/Project Specification Format

  See attached boiler plate specifications in Appendix B for reference. The boiler plate front-end specifications shall be reviewed and revised as a joint effort between the engineering design firm and the JPA at the time of design.

The technical specifications will be developed to be project specific. Sample technical specifications are provided in subsequent technical memoranda.

IV. Design Firm Selection

A. Design Effort Groupings

a. Phase I Recharge Basins & Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie Phase II Recharge Basins & Phase II Well Pipelines and Interbasin Structures

Once property acquisition is finalized, the priority will be to design the Phase I and Phase II recharge basins along with the necessary infrastructure to take advantage of available water if the opportunity presents itself. This work is outlined above under Item III. A, B, D, and F and includes the following:

- Phase I Recharge Basins
- Goose Lake Channel Pump Station
- Goose Lake Channel Check Structure
- Phase I Interbasin Structures
- Phase I Well Pipelines & Intertie
- Phase II Recharge Basins
- Phase II Interbasin Structures
- Phase II Well Pipelines

The scope of work for engineering design shall include:

- Review of Preliminary Engineering documents including Technical Memorandums
- Provide Feedback on Technical Memorandum and any suggested value engineering alternatives or suggested changes
- Attendance and Participation in

monthly Project Design meetings
- Hydraulic Analysis and Design
- Site and Topographic Surveying
- Preparation of 60% Level Drawings and Engineer's Estimate for Review and Comment
- Preparation of 90% Level Drawings, Specifications, and Engineer's Estimate for Review and Comment
- Incorporation of Environmental Mitigation Measures into Bid Documents (Measures provided by District)
- Preparation of 100% Level Drawings, Specifications, and Engineer's Estimate for Bidding Purposes
- Bid Assistance with Responses to RFI's and Addenda
- Assistance with Power Service to Pump Station
- Preparation of Conformed Documents
- Construction Phase Services for responses to RFI's (Est. 10), shop drawing review (Est. 50 plus 25 resubmittals), and preparation of Record Drawings

b. Phase I Well Drilling and Equipping
Phase II Well Drilling and Equipping

Upon completion of the recharge basins, it is planned to drill and construct the water recovery wells and monitoring wells. This work will include the equipping of the water wells with pumps, motors, discharge piping, and electrical and connection to the underground well conveyance pipelines. The work is outlined above under Item III. C and E.

- Phase I Well Drilling
- Phase I Well Equipping
- Phase II Well Drilling
- Phase II Well Equipping

The scope of work for engineering design shall include:

- Review of Preliminary Engineering documents including Technical Memorandums
- Provide Feedback on Technical Memorandum and any suggested value engineering alternatives or suggested changes
- Attendance and Participation in monthly Project Design meetings
- Incorporation of Well Design and Specification information from Thomas Harder & Associates, Inc.
- Hydraulic Analysis and Design
- Site and Topographic Surveying
- Preparation of 60% Level Drawings and Engineer's Estimate for Review and Comment
- Preparation of 90% Level Drawings, Specifications, and Engineer's Estimate for Review and Comment
- Incorporation of Environmental Mitigation Measures into Bid Documents (Measures provided by District)
- Preparation of 100% Level Drawings, Specifications, and Engineer's Estimate for Bidding Purposes
- Bid Assistance with Responses to RFI's and Addenda
- Assistance with Power Service to Wells
- Preparation of Conformed Documents
- Construction Phase Services including responses to RFI's (Est. 15), shop drawing review (Est. 70 plus 35 resubmittals), and preparation of Record Drawings

c. Aqueduct Turnout Facility

It is planned for the Aqueduct turnout facility to be one package as outlined above under Item III. G.

The scope of work for engineering design shall include:

- Review of Preliminary Engineering documents including Technical Memorandums
- Provide Feedback on Technical Memorandum and any suggested value engineering alternatives or suggested changes
- Attendance and Participation in monthly Project Design meetings
- Hydraulic Analysis and Design
- Site and Topographic Surveying
- Preparation of 60% Level Drawings and Engineer's Estimate for Review and Comment
- Preparation of 90% Level Drawings, Specifications, and Engineer's Estimate for Review and Comment
- Incorporation of Environmental Mitigation Measures into Bid Documents (Measures provided by District)
- Preparation of 100% Level Drawings, Specifications, and Engineer's Estimate for Bidding Purposes
- Permit Assistance
- Coordination with Department of Water Resources
- Bid Assistance with Responses to RFI's and Addenda
- Assistance with Power Service to Turnout
- Preparation of Conformed Documents
- Construction Phase Services including responses to RFI's (Est. 50), shop drawing review (Est. 200

plus 100 resubmittals), and preparation of Record Drawings

d. Conveyance Facilities including Turnouts & Pump Stations

It is planned for the conveyance facilities, pump stations, and turnout facilities to be one package as outlined above under Item III. H and I.

The scope of work for engineering design shall include:

- Review of Preliminary Engineering documents including Technical Memorandums and Hydraulic Analysis
- Provide Feedback on Technical Memorandum and any suggested value engineering alternatives or suggested changes
- Attendance and Participation in monthly Project Design meetings
- Site and Topographic Surveying
- Hydraulic Modeling, Analysis, and Design
- Preparation of 60% Level Drawings and Engineer's Estimate for Review and Comment
- Preparation of 90% Level Drawings, Specifications, and Engineer's Estimate for Review and Comment
- Incorporation of Environmental Mitigation Measures into Bid Documents (Measures provided by District)
- Preparation of 100% Level Drawings, Specifications, and Engineer's Estimate for Bidding Purposes
- Permit Assistance
- Bid Assistance with Responses to RFI's and Addenda
- Assistance with Power Service to Pump Stations and Turnouts
- Preparation of Conformed

Documents
- Construction Phase Services including responses to RFI's (Est. 50), shop drawing review (Est. 200 plus 100 resubmittals), and preparation of Record Drawings

e. SCADA and PLC Programming

It is planned for the SCADA and PLC Programming to be one package as outlined above under Item III. J. This work will need to be coordinated with the design of the electrical and controls for each of the other design packages. This work will be implemented and installed with each of the construction phases and then coordinated to add additional communications and remote monitoring as the rest of the overall project is constructed.

The scope of work for engineering design shall include:

- Review of Preliminary Engineering documents including Technical Memorandums and Hydraulic Analysis
- Provide Feedback on Technical Memorandum and any suggested value engineering alternatives or suggested changes
- Attendance and Participation in monthly Project Design meetings
- Preparation of a Control Narrative for the Overall Project as well as for Specific Phases of Project
- Coordination with other Design Firms and Project Phases
- Preparation of 60% Level Drawings and Engineer's Estimate for Review and Comment
- Preparation of 90% Level Drawings, Specifications, and Engineer's Estimate for Review and Comment
- Incorporation of Environmental

Mitigation Measures into Bid Documents (Measures provided by District)
- Preparation of 100% Level Drawings, Specifications, and Engineer's Estimate for Bidding Purposes
- Permit Assistance
- Bid Assistance with Responses to RFI's and Addenda
- Preparation of Conformed Documents
- Construction Phase Services including responses to RFI's (Est. 20), shop drawing review (Est. 50 plus 25 resubmittals), and preparation of Record Drawings

B. Selection Process – Qualifications vs Contract Amount

It is anticipated that there may be up to five engineering design firms selected as divided up above. The Item A "Phase I Recharge Basins & Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie; Phase II Recharge Basins & Phase II Well Pipelines and Interbasin Structures" and Item B "Phase I Well Drilling and Equipping; Phase II Well Drilling and Equipping" will be selected based upon a traditional proposal process.

A traditional proposal process or pre-qualification process may be administered for all interested engineering firms for Item C above "Turnout Facility", Item D above "Conveyance Facilities including Turnouts and Pump Stations", and Item E above "SCADA and PLC Programming". The firm selection process will be at the discretion of the JPA. The pre-qualification process may require the presentation of the Engineering Team to the District in proposal format including not only the partnering of firms (joint ventures), but also the proposed staff that will lead the design efforts and perform the actual work.

The pre-qualification process would evaluate the experience and capabilities of the Engineering Teams

and result in the selection of a short-list of Engineering Teams that would be asked to submit a project proposal. The final firm selection may not necessarily be made based upon cost as all aspects of the qualifications will be considered.

C. Firm Qualifications

Engineering Team: Provide a description of the Engineering Team for this project and include an outline and organizational chart of the personnel that will be assigned to this project. Include a description and location of where the primary engineering work will be performed.

The proposal shall describe the specific experience and capabilities of each project staff member along with an outline of their responsibilities on this project. Include a schedule showing the percentage of time each member will contribute to the project.

The proposal shall include a project understanding and approach and describe how the work product will be performed and the level of quality control to be provided.

The proposal shall include a schedule showing the critical path with milestones for deliverables as outlined herein. The schedule shall provide an assurance of the firm's ability to complete all work with consideration given to current and future workload and include a list of outside factors that could affect the schedule. All assumptions shall be clearly identified.

D. Firm Reputation

Firm reputation will be a critical component of this evaluation. The proposal shall include a list of recent projects of a similar nature that the proposed Engineering Team and Project Staff were involved with. If this is a first time partnership for the Engineering Team then each respective firm may submit independent lists, however these should be lists that the proposed project staff was intimately involved in.

The recent project list shall include project details, project costs, Contractor name, project timeframe, contact information for the Owner's Representative, and any other pertinent information.

E. Firm Experience

The proposal shall include a list of similar projects that have been completed in the last ten (10) years by the Engineering Team. This experience shall only include projects that the proposed project staff were intimately involved in. Include a discussion of such factors as control of costs, quality of work, and ability to meet project schedule.

V. Construction Administration Firm Selection

A. Construction Administration Effort Groupings

a. Phase I Recharge Basins & Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie Phase II Recharge Basins & Phase II Well Pipelines and Interbasin Structures

The priority will be to construct the Phase I and Phase II recharge basins along with the necessary infrastructure to take advantage of available water if the opportunity presents itself. This work is outlined above under Item III. A, B, D, and F and includes the following:

- Phase I Recharge Basins
- Goose Lake Channel Pump Station
- Goose Lake Channel Check Structure
- Phase I Interbasin Structures
- Phase I Well Pipelines & Intertie
- Phase II Recharge Basins
- Phase II Interbasin Structures
- Phase II Well Pipelines

The scope of work for construction administration and inspection shall include:

- Facilitate a Pre-Construction Kick-off Meeting.
- Coordinate Submittal Reviews
- Coordinate RFI Responses
- Review & Evaluate Change Orders
- Perform Daily Site Inspections and Quality Control
- Perform Materials Testing
- Monitor Permit Compliance
- Monitor Environmental Compliance
- Prepare Inspection Reports with Photo Log
- Provide Labor Compliance Monitoring
- Monitor Buy American Affidavits
- Monitor MBE/WBE/DBE Compliance
- Review & Approve Progress Payments and Quantities
- Facilitate Weekly Project Meetings
- Facilitate Conflict Resolutions
- Coordinate Power Service
- Maintain Construction Records
- Perform Start-up & Testing
- Facilitate Project Close-Out and Preparation of Record Drawings

b. Phase I Well Drilling and Equipping
Phase II Well Drilling and Equipping

Upon completion of the recharge basins, it is planned to drill and construct the water recovery wells. This work will include the equipping of the water wells with pumps, motors, discharge piping, and electrical and connection to the underground well conveyance pipelines. The work is outlined above under Item III. C and E.

- Phase I Well Drilling
- Phase I Well Equipping
- Phase II Well Drilling
- Phase II Well Equipping

The scope of work for engineering design shall include:

- Facilitate a Pre-Construction Kick-off Meeting.
- Coordinate Submittal Reviews
- Coordinate RFI Responses
- Review & Evaluate Change Orders
- Perform Daily Site Inspections and Quality Control
- Perform Materials Testing
- Monitor Environmental Compliance
- Prepare Inspection Reports with Photo Log
- Provide Labor Compliance Monitoring
- Monitor Buy American Affidavits
- Monitor MBE/WBE/DBE Compliance
- Review & Approve Progress Payments and Quantities
- Facilitate Weekly Project Meetings
- Facilitate Conflict Resolutions
- Coordinate Power Service
- Maintain Construction Records
- Perform Start-up & Testing
- Facilitate Project Close-Out and
- Preparation of Record Drawings

c. Aqueduct Turnout Facility

It is planned for the Aqueduct turnout facility to be one package as outlined above under Item III. G.

The scope of work for engineering design shall include:

- Facilitate a Pre-Construction Kick-off Meeting.
- Coordinate Submittal Reviews
- Coordinate RFI Responses
- Review & Evaluate Change Orders
- Perform Daily Site Inspections and Quality Control
- Perform Materials Testing
- Monitor Permit Compliance
- Monitor Environmental Compliance

- Prepare Inspection Reports with Photo Log
- Provide Labor Compliance Monitoring
- Monitor Buy American Affidavits
- Monitor MBE/WBE/DBE Compliance
- Review & Approve Progress Payments and Quantities
- Facilitate Weekly Project Meetings
- Facilitate Conflict Resolutions
- Coordinate Power Service
- Maintain Construction Records
- Perform Start-up & Testing
- Facilitate Project Close-Out and
- Preparation of Record Drawings

d. Conveyance Facilities including Turnouts & Pump Stations

It is planned for the conveyance facilities, pump stations, and turnout facilities to be one package as outlined above under Item III. H and I.

The scope of work for engineering design shall include:

- Facilitate a Pre-Construction Kick-off Meeting.
- Coordinate Submittal Reviews
- Coordinate RFI Responses
- Review & Evaluate Change Orders
- Perform Daily Site Inspections and Quality Control
- Perform Materials Testing
- Monitor Permit Compliance
- Monitor Environmental Compliance
- Prepare Inspection Reports with Photo Log
- Provide Labor Compliance Monitoring
- Monitor Buy American Affidavits
- Monitor MBE/WBE/DBE Compliance
- Review & Approve Progress Payments and Quantities

- Facilitate Weekly Project Meetings
- Facilitate Conflict Resolutions
- Coordinate Power Service
- Maintain Construction Records
- Perform Start-up & Testing
- Facilitate Project Close-Out and
- Preparation of Record Drawings

e. SCADA and PLC Programming

It is planned for the SCADA and PLC Programming to be one package as outlined above under Item III. J, however it will be implemented as each of the above phases of the project are constructed and completed.

The scope of work for engineering design shall include:

- Facilitate a Pre-Construction Kick-off Meeting.
- Coordinate Submittal Reviews
- Coordinate RFI Responses
- Review & Evaluate Change Orders
- Perform Daily Site Inspections and Quality Control
- Perform Materials Testing
- Prepare Inspection Reports with Photo Log
- Provide Labor Compliance Monitoring
- Monitor Buy American Affidavits
- Monitor MBE/WBE/DBE Compliance
- Review & Approve Progress Payments and Quantities
- Facilitate Weekly Project Meetings
- Facilitate Conflict Resolutions
- Coordinate with other Construction Contracts
- Maintain Construction Records
- Perform Start-up & Testing
- Facilitate Project Close-Out and
- Preparation of Record Drawings

B. Selection Process – Qualifications vs Contract Amount

It is anticipated that there may be up to five construction management firms selected as divided up above. The Item A "Phase I Recharge Basins & Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie; Phase II Recharge Basins & Phase II Well Pipelines and Interbasin Structures" and Item B "Phase I Well Drilling and Equipping; Phase II Well Drilling and Equipping" will be selected based upon a traditional proposal process.

A traditional proposal process or pre-qualification process may be administered for all interested construction management firms for Item C above "Aqueduct Turnout Facility, Item D above "Conveyance Facilities including Turnouts and Pump Stations", and Item E above "SCADA and PLC Programming". The firm selection process will be at the discretion of the JPA. The pre-qualification process may require the presentation of the Construction Management Team to the District in proposal format including not only the partnering of firms (joint ventures), but also the proposed staff that will lead the construction management efforts and perform the actual work.

The pre-qualification process would evaluate the experience and capabilities of the Construction Management Teams and result in the selection of a short-list of CM Teams that would be asked to submit a project proposal. The final firm selection may not necessarily be made based upon cost as all aspects of the qualifications will be considered.

C. Firm Qualifications

Construction Management Team: Provide a description of the CM Team for this project and include an outline and organizational chart of the personnel that will be assigned to this project.

The proposal shall describe the specific experience and capabilities of each project staff member along with an

outline of their responsibilities on this project. Include a schedule showing the percentage of time each member will contribute to the project.

The proposal shall include a project understanding and approach and describe how the work product will be performed and the level of quality control to be provided.

The proposal shall include a schedule showing the critical path with milestones for deliverables as outlined herein. The schedule shall provide an assurance of the firm's ability to complete all work with consideration given to current and future workload and include a list of outside factors that could affect the schedule. All assumptions shall be clearly identified.

D. Firm Reputation

Firm reputation will be a critical component of this evaluation. The proposal shall include a list of recent projects of a similar nature that the proposed Construction Management Team and Project Staff were involved with. If this is a first time partnership for the CM Team then each respective firm may submit independent lists, however these should be lists that the proposed project staff was intimately involved in.

The recent project list shall include project details, project costs, Contractor name, project timeframe, contact information for the Owner's Representative, and any other pertinent information.

E. Firm Experience

The proposal shall include a list of similar projects that have been completed in the last ten (10) years by the Construction Management Team. This experience shall only include projects that the proposed project staff were intimately involved in. Include a discussion of such factors as control of costs, quality of work, and ability to meet project schedule.

VI. Contractor Selection

A. Selection Process – Qualifications vs Contract Amount

The Contractor selection may be made based upon a competitive bid process or may include a combination pre-qualification and competitive bid process at the discretion of the JPA.

The pre-qualification process may require the presentation of the Construction Team to the District including not only the General Contracting Firm but also all subcontractors or vendors that will be responsible for greater than 10% of the work (cost wise).

The pre-qualification process would evaluate the experience and capabilities of the Construction Teams and result in the selection of a short-list of Construction Teams that would be asked to submit a project proposal.

The proposals will be evaluated based upon competitive bid and the lowest responsive and responsible bidder selected. Bids will include the following requirements:

- Prevailing Wage and Certified Payroll
- Labor Compliance Monitoring
- American Steel & Iron Compliance
- MBE/WBE/DBE Good Faith Effort

B. Company Qualifications

Construction Team: Provide a description of the Construction Team for this project and include an outline and organizational chart of the personnel that will be assigned to this project.

The proposal shall describe the specific experience and capabilities of key construction staff along with an outline of their responsibilities on this project. Include a schedule showing the percentage of time each member will contribute to the project.

The proposal shall include a project understanding and approach and describe how the work product will be

performed and the level of quality control to be provided.

The proposal shall include a list of similar projects that have been completed in the last ten (10) years by the Construction Team. This experience shall only include projects that the proposed project staff were intimately involved in. Include a discussion of such factors as control of costs, number of change orders and reason for, quality of work, and ability to meet project schedule.

The recent project list shall include project details, project costs, project timeframe, contact information for the Owner's Representative, and any other pertinent information.

The proposal shall include a schedule showing the critical path with milestones for deliverables as outlined herein. The schedule shall provide an assurance of the firm's ability to complete all work with consideration given to current and future workload. Clearly identify all third-party aspects that could affect the project schedule.

VII. Related Work Specified Elsewhere

A. TM 2 – Conveyance Capacity Requirements
B. TM 3 – Pipeline Requirements
C. TM 4 - Pump Station Requirements
D. TM 5 – Geotechnical Investigation
E. TM 6 – Canal Liner and Turnout Requirements
F. TM 7 – Well Drilling and Equipping Requirements
G. TM 8 – Right of Way Acquisition
H. TM 9 – Recharge Basin Requirements
I. TM 10 – Facility Operation and SCADA Requirements
J. TM 11 – Engineer's Estimates

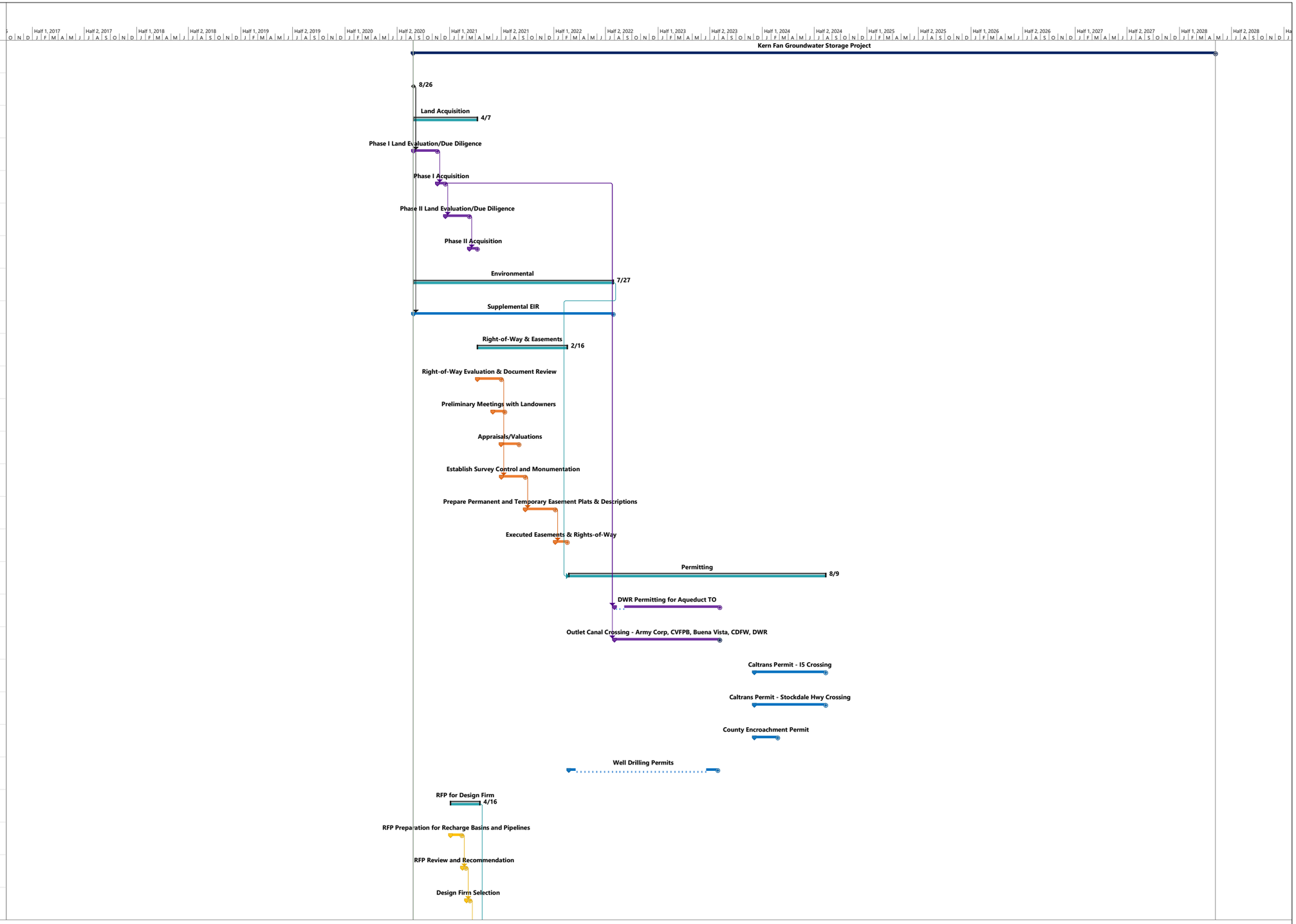
Appendices

Appendix A – Project Schedule 11 x 17
Appendix B – Sample Front End Specifications

APPENDIX A

Project Schedule 11 x 17

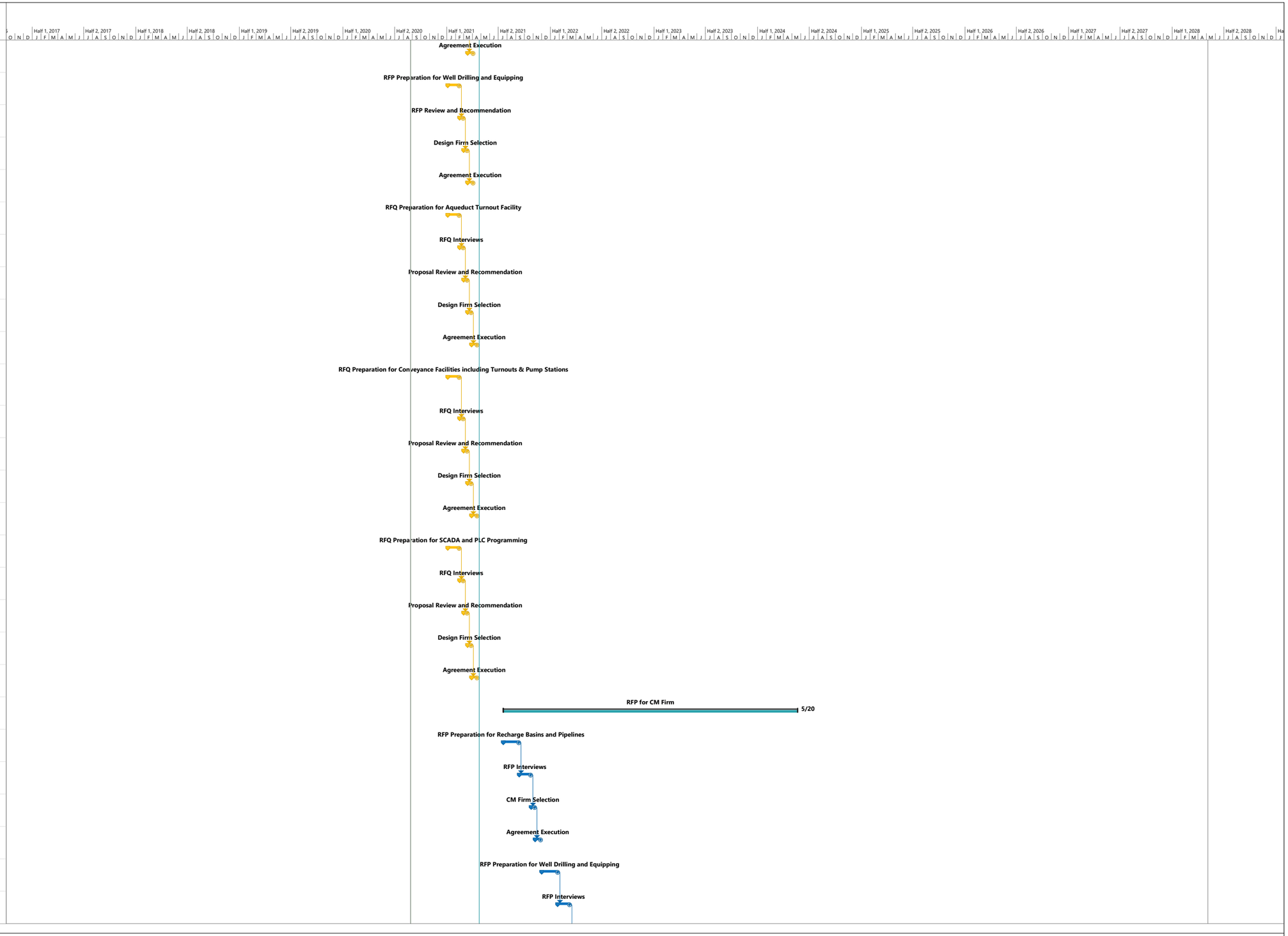
ID	Task Name	Duration	Start	Finish
0	**Kern Fan Groundwater Storage Project**	**2008 days?**	**Wed 8/26/20**	**Fri 5/5/28**
1	**Project Kick-Off**	1 day	Wed 8/26/20	Wed 8/26/20
2	**Land Acquisition**	**160 days**	**Thu 8/27/20**	**Wed 4/7/21**
3	Phase I Land Evaluation/Due Diligence	60 days	Thu 8/27/20	Wed 11/18/20
4	Phase I Acquisition	20 days	Thu 11/19/20	Wed 12/16/20
5	Phase II Land Evaluation/Due Diligence	60 days	Thu 12/17/20	Wed 3/10/21
6	Phase II Acquisition	20 days	Thu 3/11/21	Wed 4/7/21
7	**Environmental**	**500 days**	**Thu 8/27/20**	**Wed 7/27/22**
8	Supplemental EIR	500 days	Thu 8/27/20	Wed 7/27/22
9	**Right-of-Way & Easements**	**225 days**	**Thu 4/8/21**	**Wed 2/16/22**
10	Right-of-Way Evaluation & Document Review	60 days	Thu 4/8/21	Wed 6/30/21
11	Preliminary Meetings with Landowners	30 days	Tue 6/1/21	Mon 7/12/21
12	Appraisals/Valuations	45 days	Wed 6/30/21	Tue 8/31/21
13	Establish Survey Control and Monumentation	60 days	Thu 7/1/21	Wed 9/22/21
14	Prepare Permanent and Temporary Easement Plats & Descriptions	75 days	Thu 9/23/21	Wed 1/5/22
15	Executed Easements & Rights-of-Way	30 days	Thu 1/6/22	Wed 2/16/22
16	**Permitting**	**644 days**	**Tue 2/22/22**	**Fri 8/9/24**
17	DWR Permitting for Aqueduct TO	245 days	Mon 8/1/22	Fri 8/4/23
18	Outlet Canal Crossing - Army Corp, CVFPB, Buena Vista, CDFW, DWR	265 days	Mon 8/1/22	Fri 8/4/23
19	Caltrans Permit - I5 Crossing	180 days	Mon 12/4/23	Fri 8/9/24
20	Caltrans Permit - Stockdale Hwy Crossing	180 days	Mon 12/4/23	Fri 8/9/24
21	County Encroachment Permit	60 days	Mon 12/4/23	Fri 2/23/24
22	Well Drilling Permits	47 days	Tue 2/22/22	Fri 7/28/23
23	**RFP for Design Firm**	**75 days**	**Mon 1/4/21**	**Fri 4/16/21**
24	RFP Preparation for Recharge Basins and Pipelines	30 days	Mon 1/4/21	Fri 2/12/21
25	RFP Review and Recommendation	10 days	Mon 2/15/21	Fri 2/26/21
26	Design Firm Selection	10 days	Mon 3/1/21	Fri 3/12/21



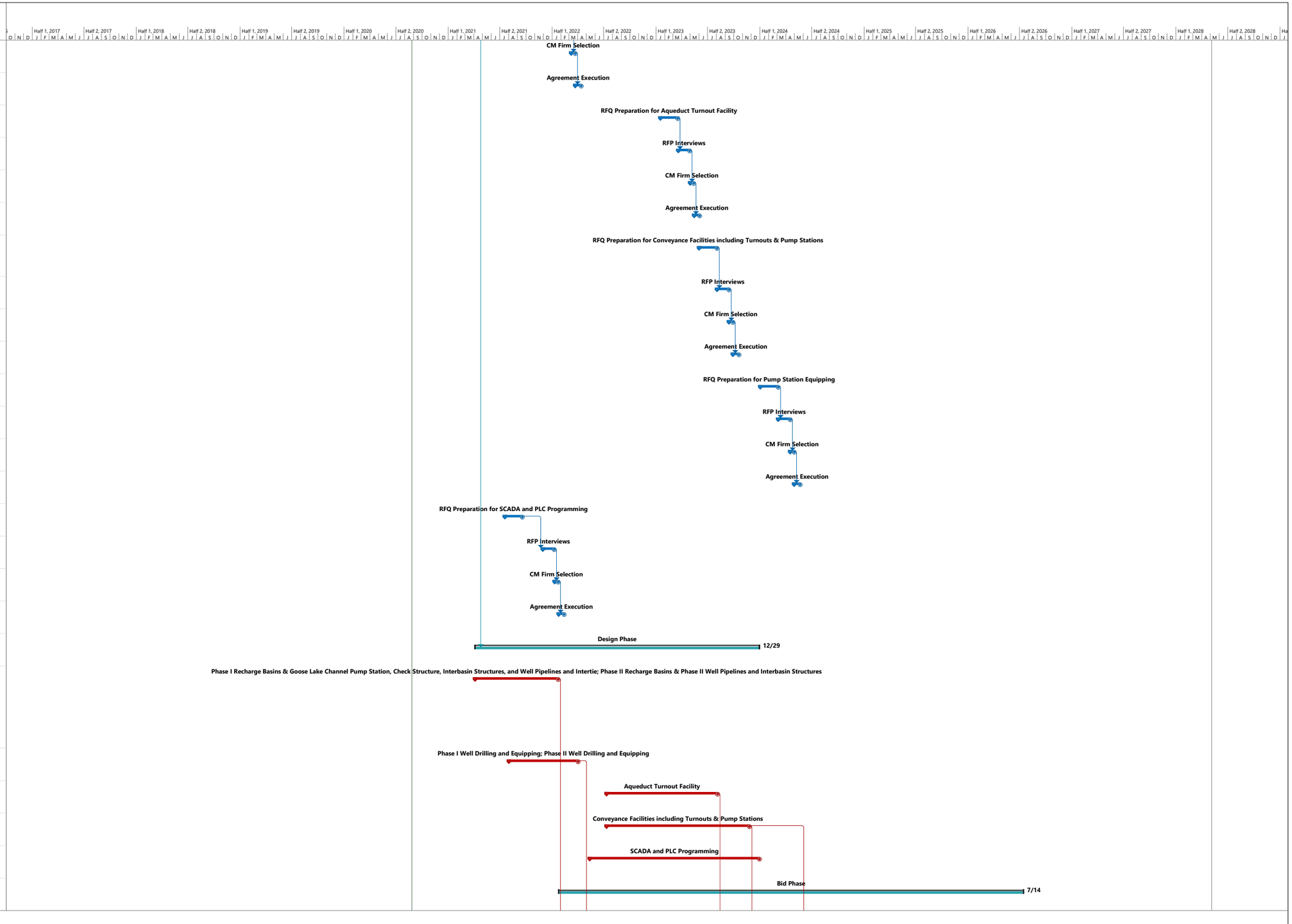
Project: Kern Fan Groundwater
Date: Thu 8/27/20

Task | Split | Milestone | Summary | Project Summary | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Deadline | Path Successor Milestone Task | Path Successor Summary Task | Path Successor Normal Task | Critical | Critical Split | Progress | Manual Progress

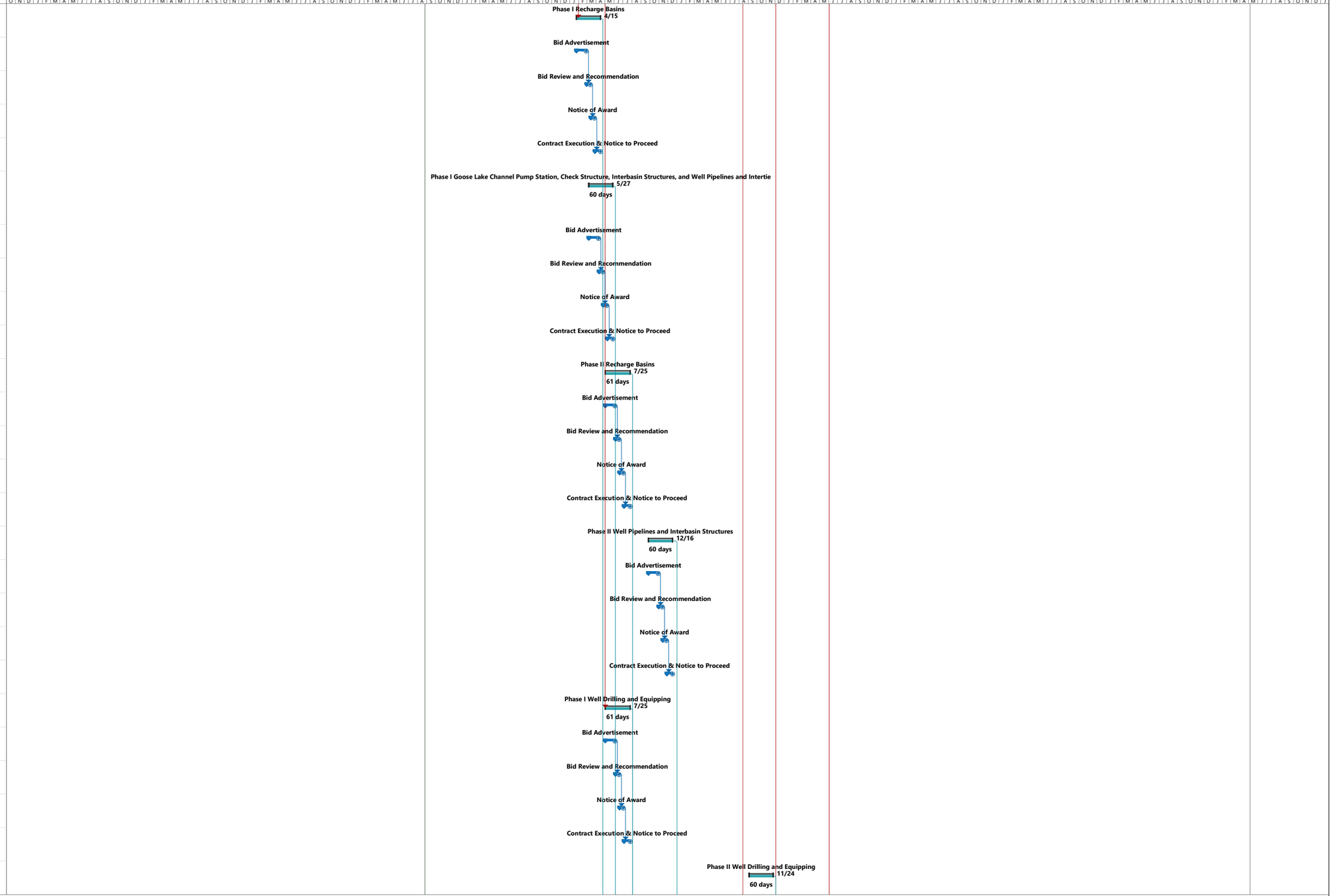
ID	Task Mode	Task Name	Duration	Start	Finish
27		Agreement Execution	15 days	Mon 3/15/21	Fri 4/2/21
28		RFP Preparation for Well Drilling and Equipping	30 days	Mon 1/4/21	Fri 2/12/21
29		RFP Review and Recommendation	10 days	Mon 2/15/21	Fri 2/26/21
30		Design Firm Selection	10 days	Mon 3/1/21	Fri 3/12/21
31		Agreement Execution	15 days	Mon 3/15/21	Fri 4/2/21
32		RFQ Preparation for Aqueduct Turnout Facility	30 days	Mon 1/4/21	Fri 2/12/21
33		RFQ Interviews	10 days	Mon 2/15/21	Fri 2/26/21
34		Proposal Review and Recommendation	10 days	Mon 3/1/21	Fri 3/12/21
35		Design Firm Selection	10 days	Mon 3/15/21	Fri 3/26/21
36		Agreement Execution	15 days	Mon 3/29/21	Fri 4/16/21
37		RFQ Preparation for Conveyance Facilities including Turnouts & Pump Stations	30 days	Mon 1/4/21	Fri 2/12/21
38		RFQ Interviews	10 days	Mon 2/15/21	Fri 2/26/21
39		Proposal Review and Recommendation	10 days	Mon 3/1/21	Fri 3/12/21
40		Design Firm Selection	10 days	Mon 3/15/21	Fri 3/26/21
41		Agreement Execution	15 days	Mon 3/29/21	Fri 4/16/21
42		RFQ Preparation for SCADA and PLC Programming	30 days	Mon 1/4/21	Fri 2/12/21
43		RFQ Interviews	10 days	Mon 2/15/21	Fri 2/26/21
44		Proposal Review and Recommendation	10 days	Mon 3/1/21	Fri 3/12/21
45		Design Firm Selection	10 days	Mon 3/15/21	Fri 3/26/21
46		Agreement Execution	15 days	Mon 3/29/21	Fri 4/16/21
47		**RFP for CM Firm**	**741 days**	**Mon 7/19/21**	**Mon 5/20/24**
48		RFP Preparation for Recharge Basins and Pipelines	40 days	Mon 7/19/21	Fri 9/10/21
49		RFP Interviews	30 days	Mon 9/13/21	Fri 10/22/21
50		CM Firm Selection	10 days	Mon 10/25/21	Fri 11/5/21
51		Agreement Execution	15 days	Mon 11/8/21	Fri 11/26/21
52		RFP Preparation for Well Drilling and Equipping	40 days	Wed 12/1/21	Tue 1/25/22
53		RFP Interviews	30 days	Wed 1/26/22	Tue 3/8/22



ID	Task Mode	Task Name	Duration	Start	Finish
54		CM Firm Selection	10 days	Wed 3/9/22	Tue 3/22/22
55		Agreement Execution	15 days	Wed 3/23/22	Tue 4/12/22
56		RFQ Preparation for Aqueduct Turnout Facility	45 days	Mon 1/16/23	Fri 3/17/23
57		RFP Interviews	30 days	Mon 3/20/23	Fri 4/28/23
58		CM Firm Selection	10 days	Mon 5/1/23	Fri 5/12/23
59		Agreement Execution	15 days	Mon 5/15/23	Fri 6/2/23
60		RFQ Preparation for Conveyance Facilities including Turnouts & Pump Stations	45 days	Thu 6/1/23	Wed 8/2/23
61		RFP Interviews	30 days	Thu 8/3/23	Wed 9/13/23
62		CM Firm Selection	10 days	Thu 9/14/23	Wed 9/27/23
63		Agreement Execution	15 days	Thu 9/28/23	Wed 10/18/23
64		RFQ Preparation for Pump Station Equipping	45 days	Tue 1/2/24	Mon 3/4/24
65		RFP Interviews	30 days	Tue 3/5/24	Mon 4/15/24
66		CM Firm Selection	10 days	Tue 4/16/24	Mon 4/29/24
67		Agreement Execution	15 days	Tue 4/30/24	Mon 5/20/24
68		RFQ Preparation for SCADA and PLC Programming	45 days	Mon 7/19/21	Fri 9/17/21
69		RFP Interviews	30 days	Mon 11/29/21	Fri 1/7/22
70		CM Firm Selection	10 days	Mon 1/10/22	Fri 1/21/22
71		Agreement Execution	15 days	Mon 1/24/22	Fri 2/11/22
72		**Design Phase**	**715 days**	**Mon 4/5/21**	**Fri 12/29/23**
73		Phase I Recharge Basins & Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie; Phase II Recharge Basins & Phase II Well Pipelines and Interbasin Structures	210 days	Mon 4/5/21	Fri 1/21/22
74		Phase I Well Drilling and Equipping; Phase II Well Drilling and Equipping	8.75 mons	Mon 8/2/21	Fri 4/1/22
75		Aqueduct Turnout Facility	14 mons	Mon 7/11/22	Fri 8/4/23
76		Conveyance Facilities including Turnouts & Pump Stations	18 mons	Mon 7/11/22	Fri 11/24/23
77		SCADA and PLC Programming	21.3 mons	Fri 5/13/22	Fri 12/29/23
78		**Bid Phase**	**1167 days?**	**Mon 1/24/22**	**Tue 7/14/26**



ID	Task Name	Duration	Start	Finish
79	**Phase I Recharge Basins**	**60 days?**	**Mon 1/24/22**	**Fri 4/15/22**
80	Bid Advertisement	25 days	Mon 1/24/22	Fri 2/25/22
81	Bid Review and Recommendation	10 days	Mon 2/28/22	Fri 3/11/22
82	Notice of Award	10 days	Mon 3/14/22	Fri 3/25/22
83	Contract Execution & Notice to Proceed	15 days	Mon 3/28/22	Fri 4/15/22
84	**Phase I Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie**	**60 days**	**Mon 3/7/22**	**Fri 5/27/22**
85	Bid Advertisement	25 days	Mon 3/7/22	Fri 4/8/22
86	Bid Review and Recommendation	10 days	Mon 4/11/22	Fri 4/22/22
87	Notice of Award	10 days	Mon 4/25/22	Fri 5/6/22
88	Contract Execution & Notice to Proceed	15 days	Mon 5/9/22	Fri 5/27/22
89	**Phase II Recharge Basins**	**61 days**	**Mon 5/2/22**	**Mon 7/25/22**
90	Bid Advertisement	25 days	Mon 5/2/22	Fri 6/3/22
91	Bid Review and Recommendation	10 days	Mon 6/6/22	Fri 6/17/22
92	Notice of Award	10 days	Mon 6/20/22	Fri 7/1/22
93	Contract Execution & Notice to Proceed	15 days	Tue 7/5/22	Mon 7/25/22
94	**Phase II Well Pipelines and Interbasin Structures**	**60 days**	**Mon 9/26/22**	**Fri 12/16/22**
95	Bid Advertisement	25 days	Mon 9/26/22	Fri 10/28/22
96	Bid Review and Recommendation	10 days	Mon 10/31/22	Fri 11/11/22
97	Notice of Award	10 days	Mon 11/14/22	Fri 11/25/22
98	Contract Execution & Notice to Proceed	15 days	Mon 11/28/22	Fri 12/16/22
99	**Phase I Well Drilling and Equipping**	**61 days**	**Mon 5/2/22**	**Mon 7/25/22**
100	Bid Advertisement	25 days	Mon 5/2/22	Fri 6/3/22
101	Bid Review and Recommendation	10 days	Mon 6/6/22	Fri 6/17/22
102	Notice of Award	10 days	Mon 6/20/22	Fri 7/1/22
103	Contract Execution & Notice to Proceed	15 days	Tue 7/5/22	Mon 7/25/22
104	**Phase II Well Drilling and Equipping**	**60 days**	**Mon 9/4/23**	**Fri 11/24/23**



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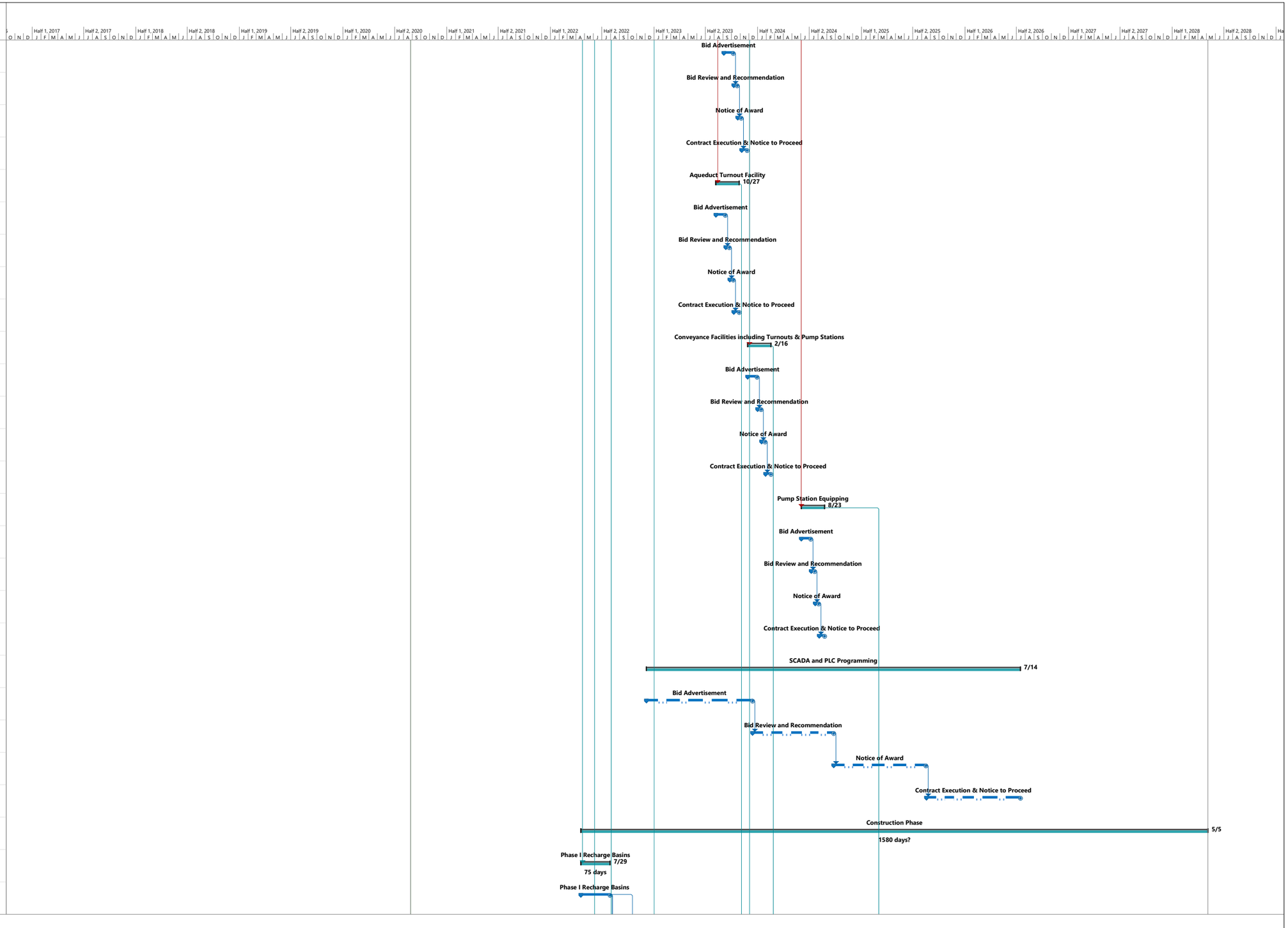
ID	Task Name	Duration	Start	Finish
105	Bid Advertisement	25 days	Mon 9/4/23	Fri 10/6/23
106	Bid Review and Recommendation	10 days	Mon 10/9/23	Fri 10/20/23
107	Notice of Award	10 days	Mon 10/23/23	Fri 11/3/23
108	Contract Execution & Notice to Proceed	15 days	Mon 11/6/23	Fri 11/24/23
109	**Aqueduct Turnout Facility**	**60 days**	**Mon 8/7/23**	**Fri 10/27/23**
110	Bid Advertisement	25 days	Mon 8/7/23	Fri 9/8/23
111	Bid Review and Recommendation	10 days	Mon 9/11/23	Fri 9/22/23
112	Notice of Award	10 days	Mon 9/25/23	Fri 10/6/23
113	Contract Execution & Notice to Proceed	15 days	Mon 10/9/23	Fri 10/27/23
114	**Conveyance Facilities including Turnouts & Pump Stations**	**60 days**	**Mon 11/27/23**	**Fri 2/16/24**
115	Bid Advertisement	25 days	Mon 11/27/23	Fri 12/29/23
116	Bid Review and Recommendation	10 days	Mon 1/1/24	Fri 1/12/24
117	Notice of Award	10 days	Mon 1/15/24	Fri 1/26/24
118	Contract Execution & Notice to Proceed	15 days	Mon 1/29/24	Fri 2/16/24
119	**Pump Station Equipping**	**60 days**	**Mon 6/3/24**	**Fri 8/23/24**
120	Bid Advertisement	25 days	Mon 6/3/24	Fri 7/5/24
121	Bid Review and Recommendation	10 days	Mon 7/8/24	Fri 7/19/24
122	Notice of Award	10 days	Mon 7/22/24	Fri 8/2/24
123	Contract Execution & Notice to Proceed	15 days	Mon 8/5/24	Fri 8/23/24
124	**SCADA and PLC Programming**	**942 days**	**Mon 12/5/22**	**Tue 7/14/26**
125	Bid Advertisement	180 days	Mon 12/5/22	Wed 12/13/23
126	Bid Review and Recommendation	115 days	Thu 12/14/23	Tue 9/24/24
127	Notice of Award	145 days	Wed 9/25/24	Fri 8/15/25
128	Contract Execution & Notice to Proceed	150 days	Mon 8/18/25	Tue 7/14/26
129	**Construction Phase**	**1580 days?**	**Mon 4/18/22**	**Fri 5/5/28**
130	**Phase I Recharge Basins**	**75 days**	**Mon 4/18/22**	**Fri 7/29/22**
131	Phase I Recharge Basins	75 days	Mon 4/18/22	Fri 7/29/22



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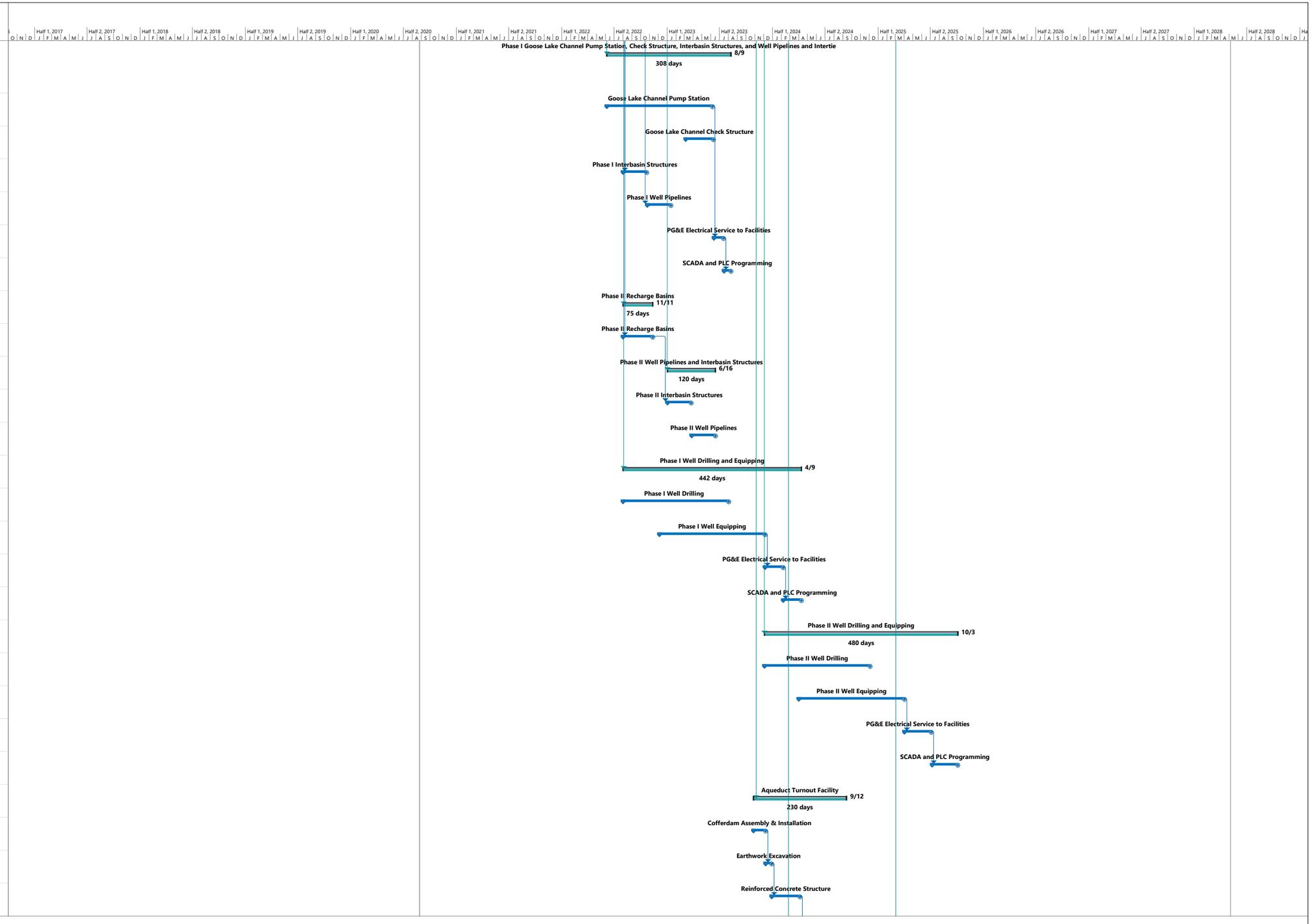
ID	Task Name	Duration	Start	Finish
132	**Phase I Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie**	**308 days**	**Mon 6/6/22**	**Wed 8/9/23**
133	Goose Lake Channel Pump Station	262 days	Mon 6/6/22	Tue 6/6/23
134	Goose Lake Channel Check Structure	70 days	Mon 3/6/23	Fri 6/9/23
135	Phase I Interbasin Structures	60 days	Mon 8/1/22	Fri 10/21/22
136	Phase I Well Pipelines	60 days	Mon 10/24/22	Fri 1/13/23
137	PG&E Electrical Service to Facilities	25 days	Mon 6/12/23	Fri 7/14/23
138	SCADA and PLC Programming	18 days	Mon 7/17/23	Wed 8/9/23
139	**Phase II Recharge Basins**	**75 days**	**Mon 8/1/22**	**Fri 11/11/22**
140	Phase II Recharge Basins	75 days	Mon 8/1/22	Fri 11/11/22
141	**Phase II Well Pipelines and Interbasin Structures**	**120 days**	**Mon 1/2/23**	**Fri 6/16/23**
142	Phase II Interbasin Structures	60 days	Mon 1/2/23	Fri 3/24/23
143	Phase II Well Pipelines	60 days	Mon 3/27/23	Fri 6/16/23
144	**Phase I Well Drilling and Equipping**	**442 days**	**Mon 8/1/22**	**Tue 4/9/24**
145	Phase I Well Drilling	262 days	Mon 8/1/22	Tue 8/1/23
146	Phase I Well Equipping	262 days	Mon 12/5/22	Tue 12/5/23
147	PG&E Electrical Service to Facilities	45 days	Wed 12/6/23	Tue 2/6/24
148	SCADA and PLC Programming	45 days	Wed 2/7/24	Tue 4/9/24
149	**Phase II Well Drilling and Equipping**	**480 days**	**Mon 12/4/23**	**Fri 10/3/25**
150	Phase II Well Drilling	262 days	Mon 12/4/23	Tue 12/3/24
151	Phase II Well Equipping	262 days	Mon 4/1/24	Tue 4/1/25
152	PG&E Electrical Service to Facilities	67 days	Wed 4/2/25	Thu 7/3/25
153	SCADA and PLC Programming	65 days	Mon 7/7/25	Fri 10/3/25
154	**Aqueduct Turnout Facility**	**230 days**	**Fri 10/27/23**	**Thu 9/12/24**
155	Cofferdam Assembly & Installation	30 days	Fri 10/27/23	Thu 12/7/23
156	Earthwork Excavation	15 days	Fri 12/8/23	Thu 12/28/23
157	Reinforced Concrete Structure	70 days	Fri 12/29/23	Thu 4/4/24



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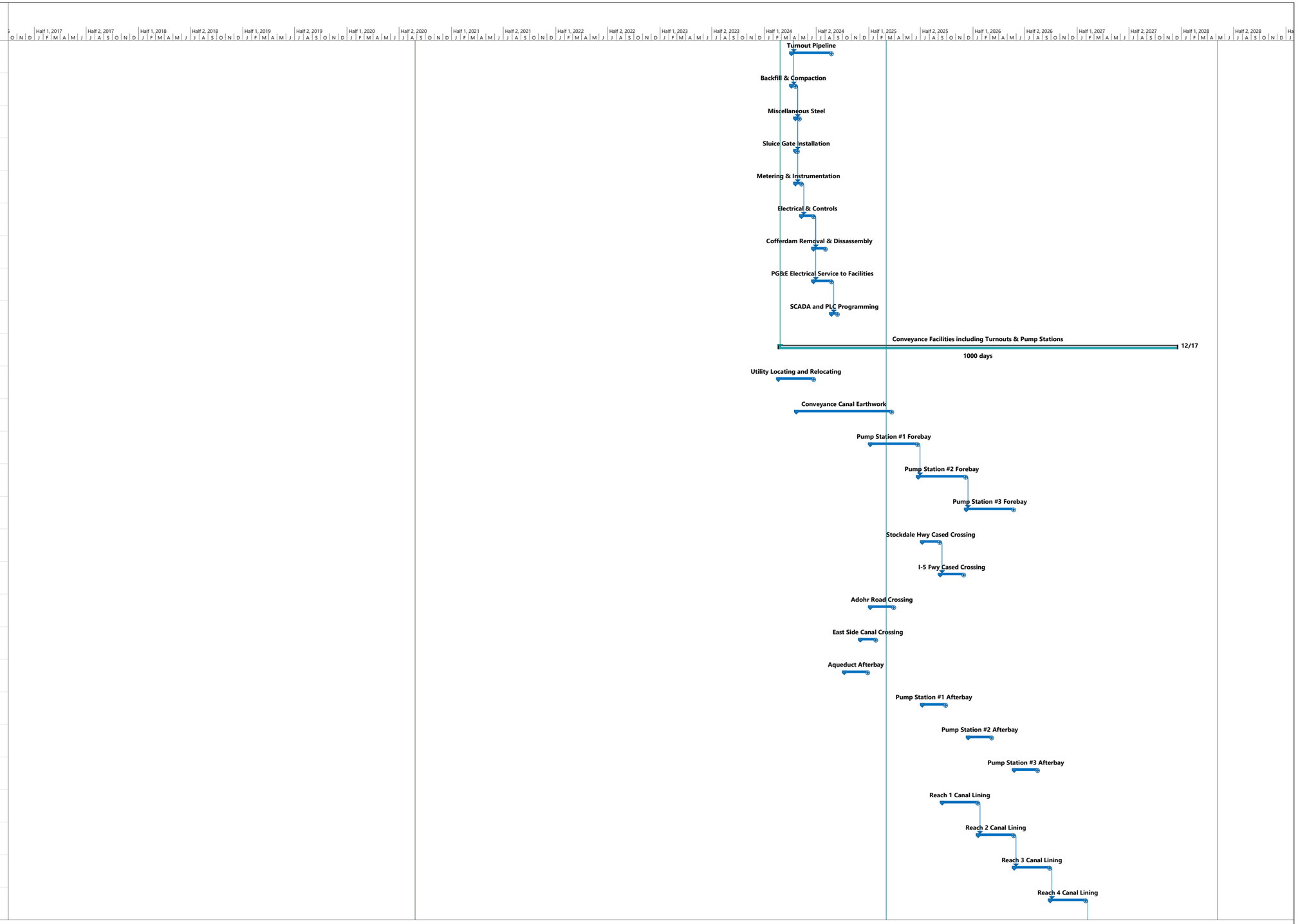
Task | Split | Milestone | Summary | Project Summary | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Deadline | Path Successor Milestone Task | Path Successor Summary Task | Path Successor Normal Task | Critical | Critical Split | Progress | Manual Progress

ID	Task Name	Duration	Start	Finish
158	Turnout Pipeline	100 days	Fri 4/5/24	Thu 8/22/24
159	Backfill & Compaction	10 days	Fri 4/5/24	Thu 4/18/24
160	Miscellaneous Steel	10 days	Fri 4/19/24	Thu 5/2/24
161	Sluice Gate Installation	5 days	Fri 4/19/24	Thu 4/25/24
162	Metering & Instrumentation	15 days	Fri 4/19/24	Thu 5/9/24
163	Electrical & Controls	30 days	Fri 5/10/24	Thu 6/20/24
164	Cofferdam Removal & Dissassembly	30 days	Fri 6/21/24	Thu 8/1/24
165	PG&E Electrical Service to Facilities	45 days	Fri 6/21/24	Thu 8/22/24
166	SCADA and PLC Programming	15 days	Fri 8/23/24	Thu 9/12/24
167	**Conveyance Facilities including Turnouts & Pump Stations**	**1000 days**	**Mon 2/19/24**	**Fri 12/17/27**
168	Utility Locating and Relocating	90 days	Mon 2/19/24	Fri 6/21/24
169	Conveyance Canal Earthwork	240 days	Mon 4/22/24	Fri 3/21/25
170	Pump Station #1 Forebay	120 days	Mon 1/6/25	Fri 6/20/25
171	Pump Station #2 Forebay	120 days	Mon 6/23/25	Fri 12/5/25
172	Pump Station #3 Forebay	120 days	Mon 12/8/25	Fri 5/22/26
173	Stockdale Hwy Cased Crossing	45 days	Mon 7/7/25	Fri 9/5/25
174	I-5 Fwy Cased Crossing	60 days	Mon 9/8/25	Fri 11/28/25
175	Adohr Road Crossing	60 days	Mon 1/6/25	Fri 3/28/25
176	East Side Canal Crossing	40 days	Mon 12/2/24	Fri 1/24/25
177	Aqueduct Afterbay	60 days	Mon 10/7/24	Fri 12/27/24
178	Pump Station #1 Afterbay	60 days	Mon 7/7/25	Fri 9/26/25
179	Pump Station #2 Afterbay	60 days	Mon 12/15/25	Fri 3/6/26
180	Pump Station #3 Afterbay	60 days	Mon 5/25/26	Fri 8/14/26
181	Reach 1 Canal Lining	90 days	Mon 9/15/25	Fri 1/16/26
182	Reach 2 Canal Lining	90 days	Mon 1/19/26	Fri 5/22/26
183	Reach 3 Canal Lining	90 days	Mon 5/25/26	Fri 9/25/26
184	Reach 4 Canal Lining	90 days	Mon 9/28/26	Fri 1/29/27



Project: Kern Fan Groundwater
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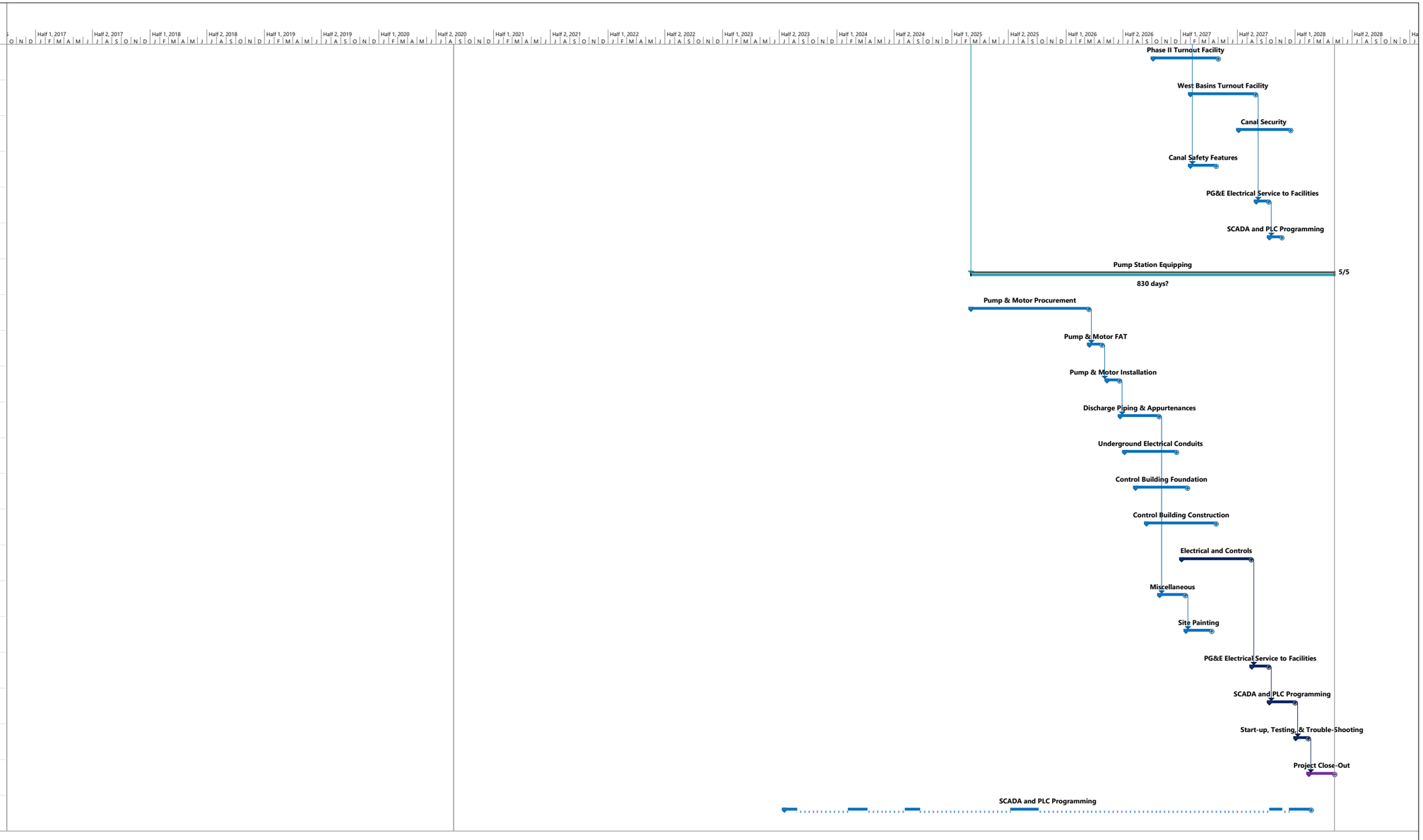
Task	Milestone	Project Summary	Inactive Milestone	Manual Task	Manual Summary Rollup	Start-only	External Tasks	Deadline	Path Successor Summary Task	Critical	Progress				
Split	Summary	Inactive Task	Inactive Summary	Duration-only	Manual Summary	Finish-only	External Milestone	Path Successor Milestone Task	Path Successor Normal Task	Critical Split	Manual Progress				

ID	Task Name	Duration	Start	Finish
185	Phase II Turnout Facility	150 days	Mon 10/5/26	Fri 4/30/27
186	West Basins Turnout Facility	150 days	Mon 2/1/27	Fri 8/27/27
187	Canal Security	120 days	Mon 7/5/27	Fri 12/17/27
188	Canal Safety Features	60 days	Mon 2/1/27	Fri 4/23/27
189	PG&E Electrical Service to Facilities	30 days	Mon 8/30/27	Fri 10/8/27
190	SCADA and PLC Programming	30 days	Mon 10/11/27	Fri 11/19/27
191	**Pump Station Equipping**	**830 days?**	**Mon 3/3/25**	**Fri 5/5/28**
192	Pump & Motor Procurement	270 days	Mon 3/3/25	Fri 3/13/26
193	Pump & Motor FAT	30 days	Mon 3/16/26	Fri 4/24/26
194	Pump & Motor Installation	30 days	Mon 5/11/26	Fri 6/19/26
195	Discharge Piping & Appurtenances	90 days	Mon 6/22/26	Fri 10/23/26
196	Underground Electrical Conduits	120 days	Mon 7/6/26	Fri 12/18/26
197	Control Building Foundation	120 days	Mon 8/10/26	Fri 1/22/27
198	Control Building Construction	160 days	Mon 9/14/26	Fri 4/23/27
199	Electrical and Controls	160 days	Mon 1/4/27	Fri 8/13/27
200	Miscellaneous	60 days	Mon 10/26/26	Fri 1/15/27
201	Site Painting	60 days	Mon 1/18/27	Fri 4/9/27
202	PG&E Electrical Service to Facilities	40 days	Mon 8/16/27	Fri 10/8/27
203	SCADA and PLC Programming	60 days	Mon 10/11/27	Fri 12/31/27
204	Start-up, Testing, & Trouble-Shooting	30 days	Mon 1/3/28	Fri 2/11/28
205	Project Close-Out	3 mons	Mon 2/14/28	Fri 5/5/28
206	SCADA and PLC Programming	255.38 days	Mon 7/17/23	Mon 2/21/28



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APPENDIX B

Sample Front End Specifications

PROJECT MANUAL

FOR

_____

_____

_____

PROJECT NO. XXXXX

CODE XXXX

MONTH 20XX

GROUNDWATER BANKING
JOINT POWERS AUTHORITY (JPA)

PROJECT MANUAL

FOR

_____

_____

_____

PROJECT NO. XXXXX

MONTH 20XX

Insert Engineer's Stamp and Signature Here

_____

JPA Engineering Manager Date

PROJECT MANUAL

Table of Contents

BID DOCUMENTS

Contents

NOTICE INVITING SEALED PROPOSALS (BIDS)

FOR THE

_____

_____

PROJECT NO. XXXXX

GROUNDWATER BANKING JOINT POWERS AUTHORITY

NOTICE IS HEREBY GIVEN that the Groundwater Banking Joint Powers Authority ("JPA") invites and will receive electronically submitted proposals ("Bids") up to the hour of 2:00 PM on the ___ day of _____, 20__, at the PlanetBids website, for furnishing to JPA all transportation, materials, equipment, labor, services, and supplies necessary to construct the Work for JPA. At the time specified above the Bids will be electronically opened, and Bidders may view the bid opening online at the PlanetBids website.

Prospective bidders must be on the Bidders List accompanying this Notice. Bids will not be accepted from bidders that are not on the Bidders List. Prequalification to be placed on the Bidders List for this project is closed. Bids must be submitted to JPA through the PlanetBids website as given below.

https://www.planetbids.com/portal/portal.cfm?CompanyID=39499

Bids shall conform to and be responsive to all of the Contract Documents for the Work as heretofore approved by JPA and must be accompanied by the security referred to in the Instructions to Bidders.

The Contract Documents consist of the IRWD Construction Manual, the Project Manual, and the Plans, and may be downloaded free of charge at the PlanetBids website. Complete hard copy sets of the Project Manual and Plans may be purchased from _____.

Under the provisions of the California Labor Code, the Director of the Department of Industrial Relations has determined the prevailing rate of wages for the locality in which the Work is to be performed and JPA has adopted said prevailing rate of wages. A copy of the prevailing wage rates can be found online with the State of California at http://www.dir.ca.gov/dlsr/pwd. A copy of such prevailing wage rates shall be posted on the jobsite by CONTRACTOR.

It shall be mandatory for the bidder to whom the Work is awarded, and upon any subcontractor under the successful bidder, to pay not less than the specified rates to all workers employed by them in the execution of the Work. The project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

The Contractor and subcontractors, require proof of current registration. A bid shall not be accepted nor any contract or subcontract entered into without proof of the contractor's and subcontractor's current registration.

The Contractor to whom this project is awarded must possess a class _____ contractor's license, issued by the State of California, which is current and full.

The Contractor will be permitted to substitute securities for moneys withheld under this Agreement to ensure performance. Such substitution shall be subject to the provisions of Article 11.8 of the General Provisions of the Agreement. A payment bond and performance bond are required to be provided by the Contractor.

A pre-bid meeting and site visit will be held at the hour of ___:00 _M on the ___ day of _____, 20__, at _____.

SUBSTANTIALLY COMPLEX PROJECT FINDING

_____

_____

PROJECT NO. XXXXX

(Delete this page unless the Board has made a finding on the project complexity.)

JPA's Board of Directors on _____ approved the following finding during a properly noticed and normally scheduled public hearing and prior to bid: "That this project is substantially complex and therefore requires a higher retention amount than five (5) percent, and that the actual retention amount of _____ percent be established for this project." All references in the Contract Documents indicating a five (5) percent retention amount are hereby superseded and replaced with the higher retention amount specified in the preceding sentence. The basis of the finding, including a description of the project and why it is a unique project that is not regularly, customarily or routinely performed by JPA or licensed contractors, is set forth below.

Insert information from the Board write-up on the basis of the finding, including a description of the project and why it is a unique project that is not regularly, customarily or routinely performed by JPA or licensed contractors.

BIDDERS LIST

_____

_____

PROJECT NO. XXXXX

BIDDERS LIST

_____

_____

PROJECT NO. XXXXX

*Delete the names of the **Mechanical** firms not to be invited to bid on this project.*

BIDDERS LIST

_____

_____

PROJECT NO. XXXXX

Contractor categories other than Pipeline or Mechanical:

1. *Insert contractor names from JPA's Prequalified Contractor List*
2.
3.
4.
5.

INSTRUCTIONS TO BIDDERS

Table of Contents

INSTRUCTIONS TO BIDDERS

ARTICLE 1 PROPOSAL REQUIREMENTS AND CONDITIONS

1.1 Contract Documents

The documents that comprise the Contract Documents are set forth in the Agreement and the definition of "Contract Documents" in Article 1 of the General Provisions.

1.2 Contractor's License

No bid will be accepted from a Bidder who is not a licensed contractor in the State of California for the contracting class indicated in the Notice Inviting Sealed Proposals.

1.3 Proposals

1.3.1 Bids shall be made in accordance with the following: Bids shall be submitted electronically through JPA's PlanetBids website. The electronically submitted bid is a part of the Contract Documents. All bids shall be properly executed and with all items filled in; the signatures of all persons signing shall be in longhand. Erasures, interlineations, or other corrections shall be authenticated by affixing in the margin immediately adjacent to the correction the initials of a person signing the bid.

1.3.2 Bids shall not contain any additional description or summaries of the work to be done. Alternative proposals will not be considered, except as called for. No paper copy, oral, telegraphic, or telephonic proposals or modifications will be considered.

1.3.3 The Bid Security Declaration and proposal guarantee in the form of cash, a cashier's or a certified check, or bidder's bond, in an amount not less than ten (10) percent of the amount of bid, made payable to or for the benefit of JPA shall be submitted in paper form in a sealed envelope to JPA prior to the bid opening. The envelope exterior shall indicate "Bid Security" and the project title. The check or bond shall be given as a guarantee that the Bidder will enter into a contract if awarded the Work, and in case of refusal or failure to enter into said contract and furnish the required bonds and insurance certificates and endorsements within fifteen (15) calendar days after Notice of Award by JPA in writing, the check and the money represented by the check shall be forfeited to JPA, or in the event that a bond is deposited, said bond shall be deemed to be forfeited. Forfeiture does not preclude JPA from seeking all other remedies provided by law to recover losses sustained as a result of Bidder's failure to enter into the contract or to furnish the required bonds, insurance certificates and endorsements.

1.3.4 Bids shall be submitted on or before the day and hour set for the opening of bids in the Notice Inviting Sealed Proposals. It is the sole responsibility of the Bidder to see that their bid is submitted and received in proper time.

1.3.5 Prospective bidders must be on the Bidders List accompanying the Notice Inviting Sealed Proposals. Bids will not be accepted from bidders that are not on the Bidders List. Prequalification to be placed on the Bidders List for this project is closed.

1.4 Withdrawal of Bid

A Bidder may withdraw their bid electronically through PlanetBids any time prior to the scheduled time for opening of the bids.

1.5 Bidders Interested in More Than One Bid

No person, partnership, or corporation shall be allowed to make or file or be interested in more than one bid for the Work, unless alternative bids are called for. A person, partnership, or corporation submitting a subproposal to a Bidder, or who has quoted prices on material to a Bidder, is not disqualified from submitting a subproposal or quoting prices to other Bidders.

1.6 Interpretation of Plans and Other Documents

If any prospective Bidder is in doubt as to the true meaning of any part of the plans, specifications, or other Contract Documents, or finds discrepancies in, or omissions from the Plans and specifications or other Contract Documents, they may submit to JPA through PlanetBids a written request for an interpretation or correction. An interpretation or correction of the documents will be made solely at JPA's discretion and only by addendum duly issued by JPA; a copy of such addendum will be made available to Bidders through PlanetBids. JPA and the Engineer will not be responsible for any other explanation or interpretation of the documents.

1.7 Substitute and Or Equivalent Items

The contract, if awarded, will be on the basis of materials and equipment shown or specified in the Contract Documents without consideration of possible substitute or "or equivalent" items. Application for acceptance of a substitute or "or equivalent" item of material or equipment will not be considered by JPA until after the effective date of the Agreement except as may be specified for major items of equipment in the Special Provisions. The procedure for submission of a request for substitution is set forth in the general provisions.

1.8 Engineer's Opinion of Probable Cost

The quantities of work to be done and materials to be furnished are approximate as shown in the Contract Documents and are given as a basis for comparison of bids only. JPA does not expressly or by implication agree or represent that the actual amount of work will correspond with the engineer's opinion of probable cost.

1.9 Addenda

Addenda issued through PlanetBids before the time in which to submit bids expires shall be covered in the bid and shall form a part of the Contract Documents.

1.10 Registration To Perform Public Work

Contractor and subcontractors, if required in Article 1.11, require proof of current registration. A bid shall not be accepted nor any contract or subcontract entered into without proof of the contractor’s or subcontractor’s current registration.

1.11 Subcontractors

The bidder shall provide the name, State of California license number, Department of Industrial Relations registration number, location of place of business, type of work which will be done, and percentage of work of each subcontractor who will perform work or labor or render service to the bidder in or about the construction of the Work in an amount in excess of 1/2 of 1 percent (0.5%) of the bidder's total Bid on the PlanetBids website.

ARTICLE 2 EXISTING CONDITIONS AND EXAMINATION OF CONTRACT DOCUMENTS

2.1 General

2.1.1 Any investigations and reports related to the Work are listed in the Special Provisions and are available for review at JPA's office. Bidder should visit the project site prior to submitting a bid in order to confirm soil and groundwater conditions in the project area at the time of bidding. If additional information is required, it is recommended that it be obtained from a qualified soils engineer.

2.1.2 The Bidder shall examine the Contract Documents and the site where the Work is to be performed. The submittal of a bid shall be conclusive evidence that the Bidder has investigated and has determined to their satisfaction the conditions to be encountered and the character, quality, and scope of the Work.

2.1.3 The plans for the Work show conditions as they are supposed or believed by JPA to exist; but it is not represented or intended to be inferred that the conditions are actually existent. JPA and the Engineer will not be liable for any loss sustained by CONTRACTOR as a result of any variance between the conditions as shown on the plans and the actual conditions revealed during the progress of the Work or otherwise.

2.1.4 Where JPA or the Engineer or their consultants have made investigations of subsurface conditions in areas where the Work is to be performed, such investigations were made only for the purpose of study and design. The conditions indicated by such investigations apply only at the specific location of each boring or excavation at the time the borings or excavations were made. Where such investigations have been made, the records as to such investigations are available for inspection at the office of JPA.

2.1.5 The records of such investigations are not a part of the Contract Documents and are available solely for the convenience of the Bidder or CONTRACTOR. It is expressly understood and agreed that JPA, the Engineer, and their consultants assume no responsibility whatsoever in respect to the sufficiency or accuracy of the investigations, the records, or of the interpretations set forth or made by JPA, the Engineer or their consultants. There is no warranty or guarantee, either expressed or implied, that the conditions indicated by such investigations or records are representative of those existing throughout the area, or any part of an area, or that unlooked for developments may not occur, or that materials other than, or in proportions different from, those indicated may not be encountered.

2.1.6 When a log of test borings showing a record of the data obtained by the investigation of subsurface conditions by JPA, the Engineer, or their consultants is included with the Contract Documents it is expressly understood and agreed that said log of test borings does not constitute a part of the Agreement, that it represents only the opinion of JPA or the Engineer or their consultants as to the character of the materials encountered by them in the test borings at the time they were made, that it is included in the plans only for the convenience of Bidders, and that their use is subject to all of the conditions and limitations set forth in this Article.

2.1.7 The availability or use of information described in this Article is not to be construed in any way as a waiver of the provisions of subparagraph 2.1.2 and a Bidder or CONTRACTOR is cautioned to make such independent investigations and examination as they deem necessary to satisfy themselves as to conditions to be encountered in the performance of the Work.

2.1.8 No information derived from such inspection of records of investigations or compilation of records made by JPA, the Engineer, or their consultants will in any way relieve the Bidder or CONTRACTOR from any risk or from properly fulfilling the terms of the Agreement.

ARTICLE 3 AWARD OF CONTRACT OR REJECTION OF BIDS

3.1 Award

3.1.1 The award of the Agreement, if it is awarded, will be to the lowest responsive and responsible Bidder complying with the instructions contained in the Contract Documents. JPA, however, reserves the right to reject any and all bids and to waive any informality in bids received. If, in the judgment of JPA, a bid is unbalanced or if the Bidder is not responsive and responsible, it shall be considered sufficient grounds for rejection of the entire bid.

3.1.2 JPA shall have sixty (60) days, unless otherwise specified in the Special Provisions, after the opening of bids within which to accept or reject the bids. No Bidder may withdraw their bid during said period. JPA will return the proposal guarantees, except Bidders' bonds and any guarantees that have been forfeited, to the respective Bidders whose proposals they accompanied within ten (10) days after the execution of the Agreement by the successful Bidder or rejection of all bids.

3.1.3 Before award of the contract, any Bidder upon request shall furnish a recent statement of their financial condition and previous construction experience or such other evidence of their qualifications as may be requested by JPA. Failure to do so upon request shall constitute grounds for rejection of the bid.

3.1.4 If the schedule of work items includes bid items or schedule(s) of bid items that may be added to (“Additive Items”) or deducted from (“Deductive Items”) the bids, the lowest responsive and responsible Bidder will be determined by adding all Additive Items to, and deducting all Deductive Items from, the total of the base bid, unless another method is provided in the Special Provisions. JPA reserves the right to award the Work to the lowest responsive and responsible bidder based on any single schedule or combination of schedules of bid items deemed by JPA, in its sole discretion, to be in JPA's best interest.

3.2 Agreement and Bonds

3.2.1 The form of Agreement, bonds, and other documents that the successful Bidder, as CONTRACTOR, shall be required to execute are included in the Contract Documents and should be carefully examined by the Bidder.

3.2.2 The successful Bidder, simultaneously with the execution of the Agreement, will be required to furnish a payment bond and a performance bond, each in an amount equal to one hundred (100) percent of the Contract Price. Said bonds shall be secured from a surety company satisfactory to JPA and who is admitted and authorized to transact business in California. A certified copy of Power of Attorney must be attached to each bond. Said bonds shall continue in full force and effect for the guarantee period.

3.2.3 Should any surety or sureties be deemed unsatisfactory at any time by JPA, notice will be given CONTRACTOR to that effect, and CONTRACTOR shall substitute a new surety or sureties satisfactory to JPA. No further payment shall be deemed due or will be made under the Agreement until the new sureties qualify and are accepted by JPA.

3.2.4 All alterations, time extensions, extra and additional work, and other changes authorized by the Specifications, or any part of the Agreement, may be made without securing consent of the surety or sureties on the contract bonds.

3.3 Insurance Requirements

The successful Bidder will be required to furnish JPA proof of full compliance with all insurance requirements as specified in the Articles on CONTRACTOR's Insurance in the General and Special Provisions. The form of certificates of insurance and endorsements which the successful Bidder, as CONTRACTOR, shall be required to furnish are included in the Contract Documents and should be carefully examined by the Bidder. No alteration or substitution of said forms will be allowed.

3.4 Execution of Agreement

The Agreement shall be signed by the successful Bidder and returned to JPA, together with the contract bonds and certificates of insurance coverage and endorsements, within fifteen (15) calendar days after the mailing date of the Notice of Award. The date of commencement stated in the Notice of Award will constitute the beginning of the Contract Time. The Agreement, bonds, certificates of insurance and endorsements, and other documents to be executed by CONTRACTOR shall be executed and submitted in original-triplicate, two of which shall be filed with JPA and one returned to CONTRACTOR after execution by JPA. Following receipt and approval of the executed Contract Documents, JPA will issue a Notice to Proceed. The receipt of the Notice to Proceed will be authorization for CONTRACTOR to begin work in the field and to start ordering of equipment and material.

3.5 Failure to Execute Agreement or Submit Insurance

3.5.1 Failure by a Bidder to whom the Work is awarded to execute the Agreement and file acceptable bonds and certificates of insurance coverage and endorsements as provided herein shall be just cause for the annulment of the award and the forfeiture of the proposal guarantee, and shall make the Bidder liable to JPA for all damages resulting from the failure, including reasonable attorneys' fees. The value of the proposal guarantee shall not be a limitation of damages.

3.5.2 The insurance certificates and endorsements included in the Contract Documents shall be completed, without alteration, to the satisfaction of JPA, and submitted to JPA by CONTRACTOR or CONTRACTOR's insurance company within fifteen (15) calendar days of the date of the Notice of Award. JPA shall be allotted seven (7) calendar days for review of insurance documents. Additional time as may be required for transmittal and review of follow-up insurance submittals shall not result in an extension of the Contract Time. The insurance certificates and endorsements shall reflect coverage that complies with all insurance requirements in the general provisions and Special Provisions.

ARTICLE 4 ASSIGNMENT OF ANTITRUST ACTIONS

4.1 General

In entering into a public works contract or subcontract to supply goods, services, or materials pursuant to a public works contract, CONTRACTOR or Subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2, commencing with Section 16700, of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works

contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to CONTRACTOR, without further acknowledgment by the parties.

ARTICLE 5 MISCELLANEOUS

5.1 Bid Breakdown

Lump-sum and unit-price bid items shall be broken down as indicated on the Schedule of Work. CONTRACTOR may be directed to provide greater detail of the items making up the Contract Price prior to submission of the first Progress Payment Request as indicated in the General Provisions.

5.2 Contract Time

The Contract Time shall be as set forth in the Agreement.

5.3 Liquidated Damages

Liquidated damages shall be as set forth in the Agreement.

5.4 Unit Price Bid Item Quantities

It is understood that the unit price bid item quantities listed in the Schedule of Work are approximate only and are solely for the purpose of facilitating the comparison of bids, and that CONTRACTOR's compensation will be computed upon the basis of the actual quantities in the completed Work whether they be more or less than those shown in the bid.

SCHEDULE OF WORK

_____

_____

PROJECT NO. XXXXX

Base Bid Items

Item No.	Approx. Quantity	Description	Unit Price Dlrs./Cts.	Total Amount Dlrs./Cts.
1-N		(PROJECT BID ITEMS AS REQUIRED)	ENTER AMOUNTS ON PLANETBIDS	
N+1		Trench Safety Measures		
N+2		Startup Testing		
N+3		Final Record Drawings		
		SUBTOTAL, Base Bid Items		

Additive and Deductive Bid Items

Item No.	Approx. Quantity	Description	Unit Price Dlrs./Cts.	Total Amount Dlrs./Cts.
A-1		Builder's Risk Insurance	ENTER AMOUNTS ON PLANETBIDS	
A-2		Additive Bid Item No. 2		
D-1		Deductive Bid Item No. 1		
		SUBTOTAL, Additive/Deductive Bid Items		
		SUBTOTAL, Base Bid and Additive/Deductive Bid Items		
		ADDITION (+) OR		
		DEDUCTION (-)*		
		TOTAL AMOUNT OF BID		

Fill in total amounts for specified Bid Item numbers N+1, N+2, N+3, etc. in blanks above; leave remaining blank for CONTRACTOR to fill in. Only CONTRACTOR entered bid amounts should be greyed out.

*Provision is made here for the bidder to include an addition or deduction in their Bid, if bidder wishes, to reflect any last-minute adjustments in price. The addition or deduction, if made, will be proportionately applied to all of the base bid items.

BID PROPOSAL

DOCUMENT CHECKLIST

_____

_____

PROJECT NO. XXXXX

Bid proposals shall include the following information entered electronically on PlanetBids:

☐ Schedule of Work

Bid proposals shall include the Bid Form and all contents provided therein as listed below that shall be completed by hand and uploaded to PlanetBids as a compiled single document:

☐ Bid Form

- ☐ Statements by Bidder
- ☐ Certification of Bidder and Qualifications
- ☐ Safety Program Certification
- ☐ Non-Collusion Declaration

Bid proposals shall include the following documents that shall be submitted in a sealed envelope to JPA prior to Bid Opening in accordance with the Article 1.3.3 of the Instructions to Bidders:

- ☐ Bid Security Declaration
- ☐ Bid Bond, Cash, or Certified Check

BID FORM

PROPOSAL TO

GROUNDWATER BANKING JOINT POWERS AUTHORITY (JPA)

_____

_____

PROJECT NO. XXXXX

Name of Bidder:_____

TO: BOARD OF DIRECTORS, JPA

Pursuant to and in compliance with your notice inviting sealed proposals (the "Bids") and the other documents relating thereto, the bidder, having familiarized himself with the terms of the Contract Documents, local conditions affecting the performance of the Work, and the cost of the Work at the place where the Work is to be done, hereby proposes and agrees to perform the Work within the Contract Time stipulated in the Agreement, including all of its component parts and everything required to be performed, and to provide and furnish any and all of the labor, material, tools, expendable equipment, and all utility and transportation services necessary to perform and complete in a workmanlike manner, all of the Work required by the Contract Documents, including Addenda, for the prices hereinafter set forth.

The bidder declares that the only persons or parties interested in this proposal as principals are those named herein; that this proposal is made without collusion with any person, firm, or corporation; and bidder proposes and agrees, if the proposal is accepted, that bidder will execute an Agreement with JPA in the form set forth in the Contract Documents and that bidder will accept in full payment thereof the prices submitted electronically on PlanetBids.

Signed this ____ day of _____, 20 __

_____
Name of Bidder

_____
Signature of Bidder

_____
Title of Signatory

STATEMENTS BY BIDDER

_____

_____

PROJECT NO. XXXXX

Bidder shall indicate opposite each item listed by JPA below the name of the manufacturer or supplier proposed to be used under the Agreement. Award of an Agreement under this proposal (bid) will not imply approval by JPA of a manufacturer or supplier listed by the bidder. However, if a manufacturer or supplier is acceptable to JPA, the successful bidder shall furnish the items from the manufacturer or supplier indicated. Any manufacturer or supplier listed in the Agreement may be substituted, changed, or omitted by the successful bidder, subject to the approval of JPA, without subjecting JPA to any liability for the substitution, change or omission.

The listing of any manufacturer or supplier in the Agreement does not, and is not intended to, grant any right, title, or interest in the Agreement for the benefit of the named manufacturer or supplier. Each bidder shall inform in writing each named manufacturer or supplier that the so named manufacturer or supplier is listed for information purposes only and they may be substituted, changed, or omitted by the successful bidder, subject to the approval of JPA, without subjecting JPA to any liability for the substitution, change or omission. The successful bidder shall reimburse JPA for any expenses incurred by JPA as a result of the successful bidder's failure to so notify each named manufacturer or supplier.

A. For each item listed by JPA below, the bidder intends to furnish materials supplied by the following manufacturers: (Bidder to list one manufacturer only for each item.)

Item	Manufacturer
Insert "None" if no items are going to be listed	

Signed this ____ day of _____, 20 __

_____
Name of Bidder

_____
Signature of Bidder

_____
Title of Signatory

CERTIFICATION OF BIDDER AND QUALIFICATIONS

_____

_____

PROJECT NO. XXXXX

The undersigned bidder certifies that bidder is, at the time of bidding, and shall be, throughout the period of the Contract, licensed by the State of California to do the type of work required under the terms of the Contract Documents. Bidder further certifies that bidder is skilled and regularly engaged in the general class and type of work called for in the Contract Documents.

The undersigned bidder certifies that it is not an ineligible contractor for the purposes of California Labor Code Section 1777.1 or 1777.7. The undersigned further certifies that no subcontractor to be used for the performance of the Work is an ineligible contractor for the purposes of Labor Code Section 1777.1 or 1777.7.

The bidder represents that bidder is competent, knowledgeable and has special skills regarding the nature, extent and inherent conditions of the Work to be performed. Bidder further acknowledges that there are certain peculiar and inherent conditions existent in the construction of the Work which may create, during the Work, unusual or peculiar unsafe conditions hazardous to persons and property.

Bidder expressly acknowledges that bidder is aware of such peculiar risks and that they have the skill and experience to foresee and to adopt protective measures to adequately and safely perform the Work with respect to such hazards.

Furthermore, Bidder hereby certifies to JPA that all representations, certifications, and statements made by Bidder, as set forth in this bid, are true and correct and are made under penalty of perjury.

Signed this ____ day of _____, 20 __

_____
Name of Bidder

_____
Signature of Bidder

_____
Title of Signatory

SAFETY PROGRAM CERTIFICATION

_____

_____

PROJECT NO. XXXXX

CONTRACTOR acknowledges that CONTRACTOR has read Section 01410 of Division 1 – General Requirements, Construction Safety Procedures.

CONTRACTOR certifies to JPA that CONTRACTOR's SAFETY PROGRAM includes the following elements:

Safety Policy
Incident Investigation Program
Safety Meeting Program
Statistical Injury and Illness Data
Safety Training Program and Records
Disciplinary Procedures
Safety Inspection Program
OSHA T1 Annual Trench Excavation Permit: Permit No. _____

Signed this ____ day of _____, 20 __

_____
Name of Bidder

_____
Signature of Bidder

_____
Title of Signatory

NON-COLLUSION DECLARATION

_____

_____

PROJECT NO. XXXXX

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____ [date], at _____ [city], _____ [state].

_____
Name of Bidder

_____
Signature of Bidder

_____
Title of Signatory

BID SECURITY DECLARATION

_____

_____

PROJECT NO. XXXXX

THIS PROPOSAL INCLUDES _____
(Insert the words "cash", "bidder's bond", "cashier's check", or "certified check", as the case may be) in an amount equal to at least ten percent (10%) of the total amount of the bid, payable in lawful money of the United States of America to the JPA.

Prior to bid opening, the Bid Security Declaration and the bid security must be received in a sealed envelope by mail or hand delivery to JPA at _____, Attention: _____.

The undersigned deposits the security in the form set forth above as a proposal guarantee and agrees that it shall be forfeited to JPA in case this is accepted by JPA and the undersigned fails to execute an Agreement with JPA as specified in the Contract Documents accompanied by the required payment and faithful performance bonds with sureties satisfactory to JPA, and accompanied by the required certificates of insurance coverage and endorsements. Should JPA be required to engage the services of an attorney(s) in connection with the enforcement of this Bid, bidder promises to pay all of JPA's reasonable attorneys' fees and costs incurred with or without suit. The bidder's liability to JPA for failure to do any of the foregoing shall not be limited to the amount of the deposited security in the form set forth above.

The names of all persons interested in the foregoing proposal as principals are as follows:

(NOTICE: If bidder or other interested person is a **corporation**, state legal name of corporation also names of the president, secretary, treasurer and manager thereof; if a **general partnership**, state true name of firm, also names of all individual partners and limited partners; if bidder or other interested person is an **individual**, state first and last names in full; if the bidder is a **joint venture**, state the complete name of each venture; if the bidder is a **limited liability company**, state the complete name of each manager and each member, and if the manager or member is a corporation, its president, secretary and treasurer, and state the complete name of the chief executive officer, if any, of the limited liability company).

_____

_____

_____

_____

_____

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we

_____

_____

as Principal, and _____ as Surety, are held and

firmly bound unto the

GROUNDWATER BANKING JOINT POWERS AUTHORITY (JPA)

hereinafter called JPA, in the penal sum of

_____

_____ Dollars ($_____),

lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, assigns, and successors, jointly and severally, firmly by these presents. The condition of this obligation is such that whereas the Principal has submitted a Bid for the construction of:

_____

_____

PROJECT NO. XXXXX

NOW THEREFORE, if the Principal shall not withdraw said Bid within the period of time set forth in the Contract Documents, and shall within fifteen (15) calendar days after the prescribed forms are presented to the Principal for signature enter into a written contract with JPA in accordance with the Bid as accepted, and if the Principal shall give the required bonds with good and sufficient sureties for the faithful performance and proper fulfillment of such contract, and for the protection of laborers and material men, or in the event of the withdrawal of the Bid within the period specified, or the failure to enter into the Agreement, and give such bonds within the time specified, if the Principal shall within sixty (60) days after request by JPA pay to JPA the difference between the amount specified in the Bid and the amount for which JPA may procure the required work, if the latter amount be in excess of the former, then the above obligation shall be void and of no effect, otherwise it shall remain in full force and virtue.

Forfeiture of this bond shall not preclude JPA from seeking any or all other remedies provided by law to cover losses sustained as a result of the Principal's failure to do any of the foregoing, and this bond shall not be a limitation on Principal's liability therefor.

It is further agreed that if JPA is required to initiate legal proceedings to recover on this bond, it may also recover its costs relating thereto including a reasonable amount for attorneys' fees incurred with or without suit.

IN WITNESS WHEREOF the above-bounded parties have executed this instrument this day of _____, 20___, the name and corporate seal for each corporate party being hereto affixed and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

Two Witnesses (if individual)

_____

_____

_____
PRINCIPAL

By _____

Title _____

ATTEST: (if corporation, or limited liability company with officers)

_____

_____
Title

Corporate Seal

Attach acknowledgments of authorized representative of Principal.

Any claims under this bond may be addressed to:

_____ (name and address of Surety)

_____

_____

_____ (name and address of agent or representative in California, if different from above)

_____

_____

_____ (telephone number of Surety and agent of representative in California)

_____
SURETY

By _____

Title _____

ATTEST: (if corporation)

_____

_____
Title

Corporate Seal

Attach acknowledgments of authorized representatives of Surety.

AGREEMENT, BONDS, AND INSURANCE

Contents

AGREEMENT

THIS AGREEMENT, made and entered into by and between the GROUNDWATER BANKING JOINT POWERS AUTHORITY hereinafter referred to as "JPA" and _____ a corporation organized and existing under the laws of the State of _____; a partnership consisting of _____; a joint venture consisting of _____; a limited liability company consisting of _____; or an individual trading as _____; in the City of _____, County of _____, State of _____, hereinafter referred to as "CONTRACTOR".

WITNESSETH: That JPA and CONTRACTOR, for the consideration hereinafter named, agree as follows:

1. SCOPE OF WORK: CONTRACTOR will furnish all materials and will perform all of the work for the construction of:

(PROJECT NAME)
PROJECT NO. XXXXX (XXXX)

in accordance with the Contract Documents therefor.

2. CONTRACT TIME:

2.1 The work shall be substantially completed within one hundred eighty (180) calendar days from the date of the Notice of Award.

3. CONTRACT PRICE: JPA will pay CONTRACTOR in accordance with the prices shown in the bid form.

4. PAYMENTS: Monthly progress payments and the final payment will be made in accordance with the General Provisions. The filing of the notice of completion by JPA shall be preceded by final acceptance of the Work by JPA.

5. LIQUIDATED DAMAGES:

5.1 Liquidated Damages shall be assessed at the rate of $XXX.00 per calendar day, in accordance with the General Provisions.

6. COMPLIANCE WITH PUBLIC CONTRACTS LAW: JPA is a public agency in the State of California and is subject to provisions of law relating to public contracts. It is agreed that all applicable provisions of law related to public contracts are a part of this Agreement to the same extent as though set forth herein and will be complied with by CONTRACTOR.

7. CONTRACT DOCUMENTS: The complete contract includes all the contract documents set forth herein, to wit: Project Manual, Construction Manual, Plans, Addenda, and supplemental agreements.

IN WITNESS WHEREOF, this agreement is executed by the Executive / General Manager and the Secretary of JPA pursuant to Minutes of the meeting of the Board of Directors held on _____, authorizing the same, and CONTRACTOR has caused this agreement to be executed.

Dated: _____

GROUNDWATER BANKING
JOINT POWERS AUTHORITY
Owner

By _____
General Manager

ATTEST: _____
Secretary to the Board

(SEAL)

Dated: _____

_____
Contractor

By _____

APPROVED:

Title _____

_____
Attorney for JPA

(SEAL)

CORPORATE CERTIFICATE

I, _____, certify that I am the _____

Secretary of _____, a _____corporation;

That said corporation executed the foregoing Agreement as *(check only one):*

☐ CONTRACTOR,

☐ venturer of the joint venture named as CONTRACTOR in the foregoing Agreement,

☐ partner of the partnership named as CONTRACTOR in the foregoing Agreement,

☐ manager or member of the limited liability company named as CONTRACTOR in the foregoing Agreement;

that _____, who signed said agreement on behalf of CONTRACTOR was then _____ of said corporation; and that said corporation is in good standing; and that said contract was duly signed for and in behalf of CONTRACTOR by said corporation by express authority of its governing body and is within the scope of its corporate powers; and that if CONTRACTOR is a joint venture, partnership or limited liability company that includes said corporation, said corporation is CONTRACTOR's duly authorized signatory.

By _____

Bond No._____

Premium $_____

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: THAT

WHEREAS, THE Board of Directors of the

GROUNDWATER BANKING JOINT POWERS AUTHORITY

by Minute Order at the meeting held the ___ day of _____, 20__, has awarded to

_____ hereinafter designed as the "Principal", a contract for the construction of:

(PROJECT NAME)
PROJECT NO. XXXX (XXXX)

WHEREAS, said Principal is required under the terms of the Contract to furnish a bond for the faithful performance of the Contract,

NOW, THEREFORE, we the Principal and

_____

as Surety, and held firmly bound unto the

GROUNDWATER BANKING JOINT POWERS AUTHORITY

hereinafter called the "Obligee", in the penal sum of _____

_____

_____Dollars ($_____), lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, and firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if the above-bounded Principal, his or its heirs, executors, administrators, successors, or assigns shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions, and agreements in the Contract and any alteration thereof made as therein provided, on his or their part to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the Obligee, the Obligee's Representative, the

Engineer/Architect and their consultants and each of their officers, directors, agents and employees, as therein stipulated, this obligation shall become null and void, otherwise, it shall be and remain in full force and virtue inclusive of the entire Contract guarantee period. And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract, or to the Work to be performed thereunder, or the plans or specifications accompanying the same, shall in any way affect its obligation on this bond, and it does hereby waive notice by JPA of any such change, extension of time, alteration or addition to the terms of the Contract, or to the work or to the plans or specifications. Principal and Surety agree that if Obligee is required to engage the services of an attorney(s) in connection with the enforcement of this bond, each shall also pay Obligee's reasonable attorneys' fees incurred with or without suit.

IN WITNESS WHEREOF, three counterparts of this instrument, each of which shall for all purposed be deemed an original hereof, have been duly executed by the Principal and Surety above named, on the ___ day of _____ 20___.

APPROVED:

_____
(Attorney for the JPA)

_____
Principal
By _____

Title _____

Any Claims under this bond may be addressed to:

_____ (Name and address of Surety)

_____

_____

_____ (Name and Address of Agent or Representative in California, if different from above)

_____

_____ (Telephone Number of Surety and Agent or Representative in California)

_____

_____
Surety

(Attach Acknowledgment)

By_____

Title _____

NOTICE: No substitution or revision to this bond form will be accepted. Sureties must be admitted and authorized to do business in and have an agent for service of process in California. A certified copy of Power of Attorney must be attached.

PAYMENT BOND

We,_____

as Principal, and _____

as Surety, jointly and severally, bind ourselves, our heirs, representatives, successors and assigns, as set forth herein, to the Joint Powers Authority (herein called Owner) for payment of the penal of sum of _____ Dollars ($_____), lawful money of the United States of America. Owner has awarded Principal a contract for the construction of:

(PROJECT NAME
PROJECT NO. XXXXX (XXXX)

If Principal or any of his subcontractors fails to pay any of the persons named in Section 3181 of the California Civil Code, or amounts due under the California Unemployment Insurance Code with respect to work or labor performed under the Contract or during the one-year guarantee period, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department Franchise Tax Board from wages of employees of the Contractor and his subcontractors pursuant to Section 13020 of the California Unemployment Insurance Code, with respect to such work and labor, then Surety will pay the same in an amount not exceeding the sum specified above, and also will pay, in case suit is brought upon this bond, such reasonable attorney's fees as shall be fixed by the court.

This bond shall inure to the benefit of any of the persons named in Section 3181 of the California Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Surety agrees that no change, extension of time, alteration, or addition to the terms of the Contract, or the work to be performed thereunder, or the plans and specifications shall in any way affect its obligation on this bond, and it does hereby waive notice by JPA thereof.

Principal and Surety agree that should Owner become a party to any action on this bond that each will also pay Owner reasonable attorneys' fees incurred therein in addition to the sum above set forth.

Executed in three original counterparts on

_____, 20___.

_____
Principal

(Seal of Corporation)

By _____

Title _____

Any claims under this bond may be addressed to:

_____ (Name and Address of Surety)

_____

_____

_____ (Name and Address of Agent or Representative in California, if different from above)

_____

_____

_____ (Telephone Number of Surety's Agent in California)

(Attach Acknowledgment)

_____
Surety

By _____
Attorney-in-Fact

APPROVED:

_____
Attorney for JPA

NOTICE: No substitution or revision to this bond form will be accepted. Sureties must be admitted and authorized to do business in and have an agent for service of process in California. Certified copy of Power of Attorney must be attached.

CONTRACTOR'S CERTIFICATE
REGARDING WORKER'S COMPENSATION

Description of Contract:

(PROJECT NAME
PROJECT NO. XXXXX (XXXX)

California Labor Code Section 3700 provides:

> "Every employer, except the state shall secure the payment of compensation in one or more of the following ways:
>
> (a) By being insured against liability to pay compensation in one or more insurers duly authorized to write compensation insurance in this state.
>
> (b) By securing from the Director of Industrial Relations a certificate of consent to self-insure, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his employees...."

I am aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of the Labor Code, and I will comply with such provisions before commencing the performance of any and all work required under the terms and conditions of this Contract.

Dated: _____, 20___

_____
Contractor

By _____

_____

(SEAL)

(In accordance with Article 5 commencing at Section 1860, Chapter 1, Division 2, Part 7, of the California Labor Code, the above certificate must be signed and filed with the JPA (the awarding body) prior to performing any work under this contract.)

GENERAL REQUIREMENTS

SECTION 1

(PROJECT NAME)

PROJECT NO. XXXXX (XXXX)

SECTION 1
GENERAL REQUIREMENTS

Table of Contents

SECTION 01000

INITIAL SUBMITTAL REQUIREMENTS

1.01 SUBMITTALS:

A. Initial Submittals shall be made in accordance with General Provisions Article GP 2.

B. Shop drawings shall be submitted in accordance with Article 9 of the General Provisions.

C. Shop drawings related to instrumentation shall be submitted with two (2) additional copies. (i.e. 10 sets instead of 8 sets of drawings.)

   a. Section 9.1.3 of Article 9 of the General Provisions shall be modified to reflect that the JPA will return three (3) sets of shop drawings with comments.

   b. If the CONTRACTOR desires more than three (3) sets of shop drawings, then the number of drawings shall be incremented by the number of additional shop drawings desired. For example, if the CONTRACTOR would like to have four (4) copies returned, then his initial submittal shall have nine (9) sets rather than the specified eight (8) sets.

1.02 SHOP DRAWING TRANSMITTAL FORM:

A. The Shop Drawing Submittal Form, a copy of which is included in the appendix, shall accompany all shop drawing submittals. Submittals shall be returned "unreviewed" if not accompanied by a submittal form or if the form is not completed in full.

1.03 REVISION OR RESUBMITTAL OF SHOP DRAWINGS:

A. Please insert the following revision to the wording at the lower portion of Section 9.2.5 after this sentence:

   CONTRACTOR shall make corrections required by the GROUNDWATER BANKING JOINT POWERS AUTHORITY (JPA), and shall return the required number of corrected copies of Shop Drawings and submit new samples as required for review and approval. Corrected Shop Drawings shall retain the number assigned to it upon the first submittal and shall be given an R (for revision) and the number of revision of that Shop Drawing. For example: Submittal No. 15-R1 (Submittal No. 15, Revision 1). CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by the JPA on previous submittals.

END OF SECTION

SECTION 01100

CONSTRUCTION SURVEY STAKING

1.01 SURVEY STAKING FOR CLEARING LANDS AND RIGHTS-OF-WAY:

A. JPA shall provide field markers along both sides of the construction right-of-way (except where a side is contiguous with an improved road, street, or property) at horizontal curve BCs and ECs, at angle points, and at 100-foot-maximum intervals in horizontal curves and 500-foot-maximum intervals along horizontal tangent runs.

B. Markers will be wooden laths in open terrain and painted marks on structures and pavements.

1.02 SURVEY STAKING FOR CONSTRUCTING PIPELINES

A. For use in constructing pipelines, construction stakes and grade sheets shall be provided by JPA as follows based upon the CONTRACTOR'S pipeline installation drawings:

B. For pipelines not installed in tunnels or casings, one stake will be set at 50-foot intervals , for water lines, 25-foot intervals for sewer lines, and at all angle points and grade breaks. One additional reference stake and/or witness lath will be provided for each pipeline appurtenance. Stakes will be set at the surface of the ground or painted on the paved surface of the ground or painted on the paved surface along a mutually acceptable offset to the centerline of the pipeline. The offset shall be constant both as to side and distance from centerline for runs of not less than 2,000 feet where physically practicable with the provided easements. Station, offset, and cut/fill to flow line will appear on these stakes. The elevation of each point and the cut/fill to the pipe invert will be given on grade sheets. The Contractor shall exercise care in determining what offset is to be used, if sloping of the trench is anticipated. In no instance will the JPA'S Representative stake safety sloping. It shall be the CONTRACTOR'S responsibility to accurately transfer the line and grade for the facility to the trench bottom. Pavement scoring, cutting, and removal shall be accomplished from this same set of construction stakes. No additional stakes will be set for such purpose.

C. For pipe inside tunnels, two benchmarks and principal control monuments shall be provided for line and grade inside the tunnel or casing. The exact location of these benchmarks and monuments will be dictated by conditions at the site.

1.03 SURVEY STAKING FOR CONSTRUCTING STRUCTURES AND APPURTENANCES

A. JPA shall provide survey staking and reference points.

B. Major structures will be controlled by two lines set at right angles to each other, along two faces of the structure, the ends of each line to be beyond the limits of the work, and with elevations only marked on at least two of these control points.

C. Minor structures, manways, and appurtenances will have a stake set along the pipeline construction offset, with the respective pipeline station for its centerline shown.

D. Stakes will be provided after site rough grading has been completed.

1.04 SURVEY STAKING FOR CONSTRUCTING JACKING PITS AND RECEIVING PITS

A. The Contractor shall submit to the JPA'S Representative a separate diagram for each jacking and receiving pit showing the desired control and offset. No more than six (6) stakes will be set for each such pit. Grade sheets (with diagram) will show the stake elevations and the pipeline elevations calculated from the elevations and grades shown on the construction drawings.

B. JPA shall provide survey staking and reference points.

1.05 CONSTRUCTION STAKING PROVIDED BY THE JPA SHALL BE SUBJECT TO THE FOLLOWING CONDITIONS

A. The request for construction stakes shall be received in writing at least three (3) working days in advance of needed staking on the form provided in the Appendix.

B. The stakes, reference markers, and other survey points shall be carefully preserved. Otherwise, the Contractor will be charged for their replacement and will assume any expense resulting from their loss or disturbance. Should the JPA'S Representative be required to reset construction stakes, the cost for such resetting will be at the then current per diem rates. The full charges will include additional administrative and supervisory time charges as billed to the JPA and will be deducted by the JPA from the progress payments to the Contractor for the month in which the surveying work is done, and thereon paid to the JPA'S Representative.

C. Unless otherwise specified, the construction staking provided by the JPA'S Representative will be only for those items specified to be constructed or reconstructed on the plans or in the specifications. Any additional construction stakes required for the replacement of existing improvements that have been

removed or disturbed at the CONTRACTOR'S option shall be the CONTRACTOR'S responsibility.

1.06 COMMENCEMENT OF WORK

A. Work shall not proceed until construction stakes, which constitute instructions from the JPA'S representative, are provided.

END OF SECTION

SECTION 01110

COMPACTION TESTING

1.01 REQUIREMENTS

A. The JPA shall perform all compaction tests on backfill.

B. The request for compaction testing shall be made to the JPA in writing at least forty-eight (48) hours before the Contractor is ready for compaction tests to be taken.

C. The Contractor shall make available construction equipment necessary to assist the JPA'S Representative in taking the tests.

D. If the backfill should fail the compaction test, the Contractor shall pay the cost of retesting.

E. If the Contractor is not ready to have compaction tests taken at the time and in the locations indicated on the written request, the Contractor shall be responsible for all standby charges and/or return visit costs to take the requested tests.

F. If the Contractor plans to use imported sand or other imported material for backfill, a sample of the material to be used for the backfill shall be delivered to the JPA for testing, prior to the commencement of backfilling. If the test fails, the Contractor shall pay the cost of retesting.

END OF SECTION

SECTION 01120

EROSION CONTROL

1.01 REQUIREMENTS

A. The Contractor shall employ methods and approved devices for the control of erosion within the project construction area during the contract period.

B. All work shall be in accordance with the grading code of Kern County and any special requirements of the California Regional Water Quality Control Board, Central Valley Region.

.

C. Erosion Control Plans are required from October 15 to May 15, and shall be submitted to the JPA for approval prior to September 25. If plans are not submitted by September 25, or within 21 days from Notice of Award for projects that commence work after September 25, JPA will withhold 30 percent of progress payment amount until plans are submitted and approved.

D. Loose excavated material shall not be placed or stored in waterways or storm drain channels.

E. All excess excavated soil and materials shall be removed and disposed of in a proper and legal manner by the Contractor.

F. All disturbed surface areas shall be shaped to facilitate drainage and avoid ponding and restored to near natural or preconstruction conditions. Work under this section shall also extend to include those erosion control measures indicated on the plans.

G. In the event that erosion control repairs or corrections are required, if CONTRACTOR does not initiate erosion control repair or corrective action within four (4) hours of notification by JPA, JPA may take action it deems necessary to prevent erosion. CONTRACTOR shall be responsible for all costs of repairs performed by JPA.

END OF SECTION

SECTION 01130

DEWATERING

1.01 GENERAL

A. No excavation shall take place below the water level until the area has been dewatered. Dewatering shall be done in such a manner as to protect adjacent structures.

B. Dewatering shall consist of furnishing all permits, plans, labor, equipment and materials, and performing all work to design, construct, and operate dewatering systems, dispose of the water from the operation and maintain in a safe and dewatered condition the areas on which the construction work will be performed, and remove the dewatering system upon completion of the work. If CONTRACTOR is unable to obtain a permit with a project specific monitoring and reporting program in a timely manner from the Regional Water Quality Control Board, CONTRACTOR may request and on approval be allowed to perform dewatering under JPA dewatering permit and monitoring and reporting program.

C. Dewatering systems shall be equipped with meters that register in gallons in order to measure dewatering volumes.

1.02 DEWATERING PLAN

A. CONTRACTOR shall submit for the JPA'S review, drawings and data showing proposed plan for dewatering of all work areas, which shall include the planned method of dewatering, excavation plan, location and capacity of such facilities as dewatering wells, well points, pumps, sumps, collection and discharge lines, standby units proposed, receiving streams, and protective fills and ditches required for control of ground-water and surface water. The plan for dewatering shall be submitted within fifteen (15) days after the date of receipt of the Notice to Proceed. CONTRACTOR shall furnish such other information as may be required for the complete under-standing and analysis of the dewatering and excavation plan by JPA. Information on groundwater conditions may be found in the Soil Investigation Reports listed in Section 00210, Investigations and Reports of the Special Provisions. CONTRACTOR is advised that the reports present conditions which existed at the time of the investigation.

B. Review by JPA will not relieve CONTRACTOR of the responsibility for the adequacy of the dewatering and excavation plan, compliance with dewatering permit requirements or for furnishing all equipment, labor, and materials necessary for performing the various parts of the work. If, during the progress of the work, it is determined by JPA that the dewatering system and excavation plan are inadequate, not in compliance with discharge requirements, or

CONTRACTOR'S plan of construction is inoperative, CONTRACTOR shall, at CONTRACTOR'S expense, furnish, install, and operate such additional dewatering equipment and make such changes in other features of the plan or operation as may be necessary to perform the work in a manner satisfactory to the JPA. CONTRACTOR shall, at CONTRACTOR'S expense, pay any fines or penalties assessed against CONTRACTOR, JPA, Owner, ENGINEER, or their affiliates by the Regional Water Quality Control Board and other applicable agencies as a result of noncompliance with dewatering discharge requirements under CONTRACTOR'S or JPA'S permit (whichever permit CONTRACTOR is performing dewatering under). In addition, CONTRACTOR shall be subject to, at JPA's discretion, a fee by JPA as compensation for JPA administrative costs associated with each non-compliance occurrence. The fee shall be in an amount to pay JPA's actual costs, or $2,000, whichever is greater.

1.03 DEWATERING REPORTING

CONTRACTOR shall comply with all permit and monitoring and reporting requirements for the permit under which CONTRACTOR is operating. Specifically, CONTRACTOR shall:

A. Prepare a report which shall include the following:
   1. Characterization of the proposed wastewater discharge
   2. The estimated average and maximum daily flow rates
   3. A schedule detailing the frequency and duration of the planned discharge(s)
   4. The affected receiving water(s)
   5. A description of the proposed treatment system (if appropriate)
   6. A map showing the path from the point of initial discharge to the ultimate location of the discharge

B. Submit report from Paragraph A to: (1) the RWQCB and copy JPA five (5) days prior to the planned discharge if CONTRACTOR is operating under CONTRACTOR'S permit, or (2) JPA for submittal to the RWQCB ten (10) days prior to the planned discharge if CONTRACTOR is operating under JPA's permit.

C. Not commence work until receiving written acknowledgement on the information provided to JPA from paragraph A.

D. CONTRACTOR shall be responsible for conducting monitoring required under the permit and any additional monitoring requested by the RWQCB. All monitoring and report preparation shall be conducted as specified in the permit under which dewatering is occurring. If CONTRACTOR is operating under the JPA permit, reports shall be forwarded to JPA by the 20th of the month for submittal by JPA to the RWQCB. This report shall include a cover letter noting any violations and stating what action was taken to correct these violations. If CONTRACTOR is operating under CONTRACTOR'S

permit, copies of reports that CONTRACTOR submits to the RWQCB shall be provided to JPA.

END OF SECTION

SECTION 01200

REQUESTS FOR INFORMATION (RFI)

1.01 GENERAL

A. CONTRACTOR shall submit a Request for Instruction (RFI) to JPA if CONTRACTOR:

1. requires instruction pursuant to General Provision Article 6.15, Errors or Discrepancies Noted by CONTRACTOR,

2. raises a question requiring clarification,

3. requests product or material changes,

4. requests design changes, or

5. requires other information from JPA.

1.02 RFI SUBMITTAL PROCEDURE

All RFIs shall be submitted on JPA Forms and shall include all backup information. Backup information shall include, but not be limited to, CONTRACTOR verified field measurements, quantities, dimensions, installation requirements, materials, catalog number, and any other information that will assist the JPA in reviewing the RFI. A copy of RFI form can be found in Appendix.

1.03 JPA RESPONSE

Within seven (7) days of receipt of RFI, JPA will either return a response to the RFI or notify CONTRACTOR when a response will be issued.

1.04 COMMENCEMENT OF RFI-RELATED WORK

No portion of the work requiring instruction from JPA shall begin until RFI has been reviewed by JPA and returned to CONTRACTOR with instruction or with notation indicating JPA response is not necessary.

END OF SECTION

SECTION 01300

TRAFFIC REGULATION

1.01 GENERAL

A. Traffic shall be maintained at those locations indicated and in conformance with the plans and specifications.

B. Furnish, construct, maintain, and remove detours, road closures, lights, signs, barricades, fences, flares, miscellaneous traffic devices, flagmen, drainage facilities, paving, and such other items and services as are necessary to adequately safeguard the public from hazard and inconvenience. All such work shall comply with the ordinances, directives, permits, and regulations of authorities with jurisdiction over the public roads in which the construction takes place and over which detoured traffic is routed by the Contractor.

C. Prior to the start of construction operations, notification shall be given to the police and fire departments in whose jurisdiction the project lies, giving the expected starting date, completion date, and the name and telephone number of the responsible person who may be contacted at any hour in the event of a condition requiring immediate correction.

1.02 CONSTRUCTION SIGNING

A. Construction signing used for handling traffic and public convenience shall conform to the latest edition of the State of California, Department of Transportation, "Manual of Traffic Controls for Construction and Maintenance Work Zones" and "Work Area Traffic Control Hand-book" (WATCH) published by Buildings News Incorporated. In case of conflict between the two previously referenced manuals with regard to recommended sign spacing, the manual, which is more stringent, shall be used.

B. Signs shall be illuminated or reflectorized when they are used during hours of darkness. Cones, pylons, barricades, or posts used in the diversion of traffic shall be provided with flashers or other illumination if in place during hours of darkness.

C. A 24-hour emergency service shall be maintained to remove, install, relocate, and maintain warning devices. The names and telephone numbers of three persons responsible for this emergency service shall be furnished to the agency having jurisdiction over traffic control for the project. If any of these persons do not promptly respond or the jurisdictional agency deems it necessary to call out other forces to accomplish emergency service, the Contractor will be held responsible for the cost of such emergency service.

1.03 VEHICULAR TRAFFIC CONTROL

A. If necessary traffic control within the area along Stockdale Highway or Enos Lane shall conform to the ordinances and regulations of the California Department of Transportation (Caltrans) and the County of Kern Roads Departments.

B. The failure of the Contractor to maintain construction signing, delineators, or barricading at all times to the satisfaction of the California Department of Transportation (Caltrans) shall be sufficient cause for closing down the work until such equipment is in satisfactory condition. All costs associated with the stoppage of work, loss of production, costs of restart, etc., shall be borne by the Contractor.

C. A minimum 2-foot clearance between the curb face or edge of pavement, and a 5-foot clearance between the edge of excavation and the edge of any traffic lane shall be maintained at all times. Shoring members, beams, or other obstructions shall not be permitted within the 2-foot clearance between the edge of excavation and the edge of any traffic lane. Any projections or activity within 2 feet to 5 feet from the adjacent traffic lane must be protected by a solid concrete barrier (K-rail). "NO PARKING" signs shall be placed as necessary.

D. Work areas adjacent to the existing traffic lane shall be delineated in accordance with the requirements for the normal posted speed limit. The Contractor shall post signing, barricades, and delineators to provide clear guidance to traffic as approved by the jurisdictional agency having authority over traffic control.

1.04 PEDESTRIAN TRAFFIC CONTROL AND SAFETY

A. Fencing or other means of securement shall be provided to preclude unauthorized entry to any excavation during all nonworking hours on a 24-hour basis including weekends and holidays. Fencing shall be a minimum of 6 feet high around the entire excavation, and shall consist of a minimum 9-gage chain link type fence sturdy enough to prohibit toppling by children or adults. There shall be no openings under the wire large enough for any child to crawl through. Gates shall be locked if no adult is in attendance. Warning signs shall be placed at 50-foot centers on the outside of the fence with the statement "DEEP HOLE DANGER."

1.05 ACCESS TO ADJACENT PROPERTIES

A. Reasonable access from public streets to all adjacent properties shall be maintained at all times during construction. Prior to restricting normal access from public streets to adjacent properties, each property owner or responsible person shall be informed of the nature of the access restriction, the approximate duration of the restriction, and the best alternate access route for that particular property.

1.06 PERMANENT TRAFFIC CONTROL DEVICES

A. Existing permanent traffic control signs, barricades, and devices shall remain in effective operation unless a substitute operation is arranged for and approved as a portion of vehicular traffic control above. Replacement work shall be in accordance with the ordinances and regulations of the California Department of Transportation (Caltrans).

B. Restriping of Streets

Any permanent restriping that is required shall be done by the Contractor. The Contractor is cautioned to check with the California Department of Transportation (Caltrans) and County of Kern Roads Department to ascertain the extent and specifications for restriping. Full compensation for restriping within the right of way shall be included in the contract unit price for which such work is appurtenant thereto. Temporary striping required for traffic control during construction shall also be done by the Contractor with full compensation to be included in the contract unit price for which such work is appurtenant, and no additional allowance shall be given. Temporary striping includes any striping required on any pavement replaced prior to the final surface course. The Contractor shall remove any permanent striping that conflicts with the detour plan and all detour striping completely, prior to replacement of any final striping, by sandblasting only. Painting out existing striping shall not be permitted. Any damaged or obliterated raised pavement markers shall also be replaced in accordance with the appropriate standard with compensation for such work and materials included in the unit contract price for which such work is appurtenant.

C. Traffic Control Wire Loops

Traffic control wire loops which are cut, removed, or otherwise disturbed for construction of the pipeline shall be replaced to the exact original position. Replacement work shall be in accordance with Section 86-5.01A of the State of California, Department of Transportation, Standard Specifications. The number of turns in the loop shall be in accordance with the manufacturer's specifications for the vehicle detector.

Detector lead-in conductors, cable, inductive loop conductor, and epoxy shall conform to the provisions of Section 86 of the State of California, Department of Transportation, Standard Specifications. The cable shall not be spliced. Splices to lead-in conductors shall be made in pull boxes and soldered, wrapped, and waterproofed after sensitivity check at tuning turn on. Inductive loop wires shall be labeled in the pull box, identifying the loop and the direction of current flow. Saw cuts for inductive loop wire shall be of a width such that the loop wires will fit within the cut snugly but without need for forcing of the wire.

Damaged traffic signal conduits shall be replaced to the nearest pull box, including new wire, back to the terminal, and/or back to the signal controller to the satisfaction of the agency having jurisdiction over the equipment.

Damaged traffic loops or signal conduit shall be repaired before proceeding to the construction phase. Two traffic signal vehicle heads shall be visible at all times to vehicular traffic at signalized intersections during construction.

1.07 PAYMENT

Payment for conforming to all of the traffic control and pedestrian safety requirements of these specifications shall be considered to be included in the contract unit or lump-sum price paid for the various items of work wherein maintenance of traffic control and detours is required. No additional allowance will be given for maintenance of traffic control and detours.

END OF SECTION

SECTION 01400

PRECONSTRUCTION AND POST CONSTRUCTION CONFERENCES

1.01 PRECONSTRUCTION CONFERENCE

A. Upon issuance of Notice to Proceed, or earlier when mutually agreeable, JPA will arrange a preconstruction conference.

B. CONTRACTOR'S superintendent, JPA, Engineer/Architect representatives of utilities, major subcontractors and others involved in performance of the Work, and others necessary to agenda shall attend Preconstruction Conference.

C. JPA will preside at conference.

D. Purpose of Conference: To establish working understanding between parties and to discuss Construction Schedule, shop drawing and other submittals, cost breakdown of major lump sum items, processing of submittals and applications for payment, and other subjects pertinent to execution of the Work.

E. Agenda will include:

1. Adequacy of distribution of Contract Documents.

2. Distribution and discussion of list of major subcontractors and suppliers.

3. Proposed progress schedules and critical construction sequencing.

4. Major equipment deliveries and priorities.

5. Project coordination.

6. Permits and Permit Conditions.

7. Environmental (CEQA) Mitigation Requirements.

8. Designation of responsible personnel.

9. Procedures and Processing of:

   a. Field decisions

   b. Proposal requests

   c. Submittals
   d. Change Orders

e. Applications for Payment

f. Record Documents

10. Use of Premises:

a. Office, construction, and storage areas

b. JPA'S requirements

11. Construction facilities, controls, and construction aids

12. Coordination of construction with JPA operations and others

13. Temporary utilities

14. Safety and first aid procedures

15. Security procedures

16. Housekeeping procedures

F. JPA will record minutes of meeting and distribute copies of minutes within seven (7) days of meeting to participants and interested parties.

1.02 POST CONSTRUCTION MEETING

A. Meet with JPA and inspect the Work eleven (11) months after the date of recording by the County of the Notice of Completion of the Work.

B. Arrange meeting at least seven (7) days before meeting.

C. Meet in JPA'S office or other mutually agreed upon place.

D. Inspect the Work and draft list of items to be completed or corrected.

E. Review service and maintenance contracts, and take appropriate corrective action when necessary.

F. Complete or correct defective work and extend correction period accordingly.

G. Require attendance of Superintendent, appropriate manufacturers and installers of major units of constructions, and affected subcontractors.

END OF SECTION

SECTION 01410

CONSTRUCTION SAFETY PROCEDURES

1.01 GENERAL

A. CONTRACTOR shall assure that each employee is trained in the work practices necessary to safely perform his/her job.

B. CONTRACTOR shall assure that each employee is instructed in the known potential hazards related to his/her job and the process, and the applicable provisions of the emergency action plan for the plant or facility as covered during CONTRACTOR safety orientation.

C. CONTRACTOR shall document that each employee has received and understood the training required. The documentation shall contain the identity of the employee, the date of training, and the means used to verify that the employee understood the training. Documentation shall be submitted to JPA upon request.

D. CONTRACTOR shall advise JPA of any unique hazards presented by the CONTRACTOR'S work.

E. CONTRACTOR shall immediately notify JPA of any hazards found or discovered during the course of the work.

F. CONTRACTOR shall submit copy of OSHA T1 Annual Trench Excavation Permit upon request.

1.02 CONSTRUCTION SAFETY

A. CONTRACTOR shall submit a Construction Safety Plan detailing the methods and procedures for complying with California Labor Code Section 6401.7, Federal, and local health and safety laws, rules and requirements for the duration of the contract time. The plan shall include the following:

1. Identification of the Safety Officer (or Consultant), who will prepare, initiate, maintain and supervise safety programs, and procedures.

2. Procedures for providing workers with an awareness of safety and health hazards expected to be encountered in the course of construction.

3. Safety equipment appropriate to the safety and health hazards expected to be encountered during construction.

4. Methods for minimizing employees' exposure to safety and health hazards expected during construction.

5. Procedures for reporting safety or health hazards.

6. Procedures to follow to correct a recognized safety and health hazard.

7. Procedures for investigation of accidents, injuries, illnesses and unusual events that have occurred at the construction site.

8. Periodic and scheduled inspections of general work areas and specific workstations.

9. Training for employees and workers at the jobsite.

10. Methods of communication of safe working conditions, work practices and required personal protection equipment.

B. CONTRACTOR shall assume responsibility for every aspect of Health and Safety on the jobsite, including the health and safety of Subcontractors, suppliers, and other persons on the jobsite.

C. CONTRACTOR'S Safety Officer shall periodically review job safety information and reports and make recommendations concerning worker health and safety at the jobsite.

D. CONTRACTOR shall employ health and safety measures specified by the Safety Officer, as necessary, for workers in accordance with OSHA guidelines.

E. CONTRACTOR shall transmit to JPA copies of reports and other documents related to accidents or injuries encountered during construction.

1.03 SAFETY PROCEDURES

A. Accident Prevention:

1. Exercise precautions throughout construction for protection of persons and property.

2. Observe safety provisions of applicable Laws and Regulations.

3. Guard machinery and equipment, and eliminate other hazards.

4. Make reports required by authorities having jurisdiction, and permit safety inspections of the Work.

5. Before commencing construction Work, take necessary action to comply with provisions for safety and accident prevention.

B. Barricades:

1. Place barriers at ends of excavations and along excavations to warn pedestrian and vehicular traffic of excavations.

2. Provide barriers with flashing lights after dark.

3. Keep barriers in place until excavations are entirely backfilled and compacted.

4. Barricade excavations to prevent persons from entering excavated areas in streets, roadways, parking lots, treatment plants, or other public or private areas.

C. Warning Devices and Barricades: Adequately identify and guard hazardous areas and conditions by visual warming devices and, where necessary, physical barriers.

1. Devices shall conform to minimum requirements of OSHA and State agency which administers OSHA regulations where Project is located.

D. Hazards in Public Right-of-Way:

1. Mark at reasonable intervals, trenches and other continuous excavations in public right-of-way, running parallel to general flow of traffic, with traffic cones, barricades, or other suitable visual markers during daylight hours.

a. During hours of darkness, provide markers with torches, flashers, or other adequate lights.

2. At intersections or for pits and similar excavations, where traffic may reasonably be expected to approach head on, protect excavations by continuous barricades.

a. During hours of darkness, provide warning lights at close intervals.

E. Hazards in Protected Areas: Mark or guard excavations in areas from which public is excluded, in manner appropriate for hazard.

F. Above Grade Protection: On multi-level structures, provide safety protection that meets requirements of OSHA and State agency which administers OSHA regulations where Project is located.

G. Protect existing structures, trees, shrubs, and other items to be preserved on Project site from injury, damage or destruction by vehicles, equipment, worker or other agents with substantial barricades or other devices commensurate with hazards.

H. Fences: Enclose site of the Work with fence adequate to protect the Work against acts of theft, violence and vandalism.

END OF SECTION

SECTION 01420

CONFINED SPACES

1.01 GENERAL

A. Attention is directed to the provisions of :

1. Article 108 of the General Industry Safety Orders, Title 8, California Code of Regulations.

2. Article 4 of the Construction Safety Orders, Title 8, California Code of Regulations.

B. The General Industry Safety Orders define a confined space as a space that: (1) is large enough and so configured that a person can bodily enter and perform work, and (2) has limited or restricted means for entry and exit, and (3) is not designed for continuous occupancy.

C. Confined spaces shall be as described above, and shall include the interior of storm drains, sewers, vaults, utility pipelines, manholes, reservoirs, and any other such structure which is similarly surrounded by confining surfaces so as to permit an oxygen deficient atmosphere or the accumulation of dangerous gases or vapors.

D. A Permit Required Confined Spaces is defined as a confined space that has one or more of the following characteristics:

1. Contains a hazardous atmosphere,

2. Contains a liquid or solid materials that can engulf an entrant,

3. A configuration that can trap and suffocate an entrant,

4. Mechanical or electrical hazards, or

5. Contains any other recognized serious safety and health hazard.

6. Contains unknown atmospheric environment.

The general industry regulations define a Non-Permit Required Confined Space as a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or physical harm.

E. Confined spaces shall be considered permit-required confined spaces (PRCS) until proven safe from atmospheric hazards by testing and ventilation; and until evaluated as safe from any other serious safety or health hazards.

1.02 CONFINED SPACE OPERATING PROCEDURES

A. CONTRACTOR shall submit confined space operating and rescue procedures to the JPA for record keeping purposes. Procedures shall conform to the applicable provisions of Article 108, General Industry Safety Orders, Title 8, California Code of Regulations.

B. CONTRACTOR shall test for the presence of combustible or dangerous gases and/or oxygen deficiency in confined spaces using an approved device immediately prior to a worker entering the confined space, and at intervals frequent enough to ensure a safe atmosphere during the time a worker is in such a structure. A record of such tests shall be kept at the jobsite.

C. Employees shall not be permitted to enter a confined space, where tests indicate the presence of a hazardous atmosphere, unless the employee is wearing suitable and approved respiratory equipment, or until such time that continuous forced air ventilation has removed the hazardous atmosphere from the confined space.

D. Confined spaces that contain or that have last been used as containers of toxic gases, light oils, hydrogen sulfide, corrosives, or poisonous substances, shall, in every case, be tested by means of approved devices or chemical analysis before being entered without wearing approved respiratory equipment.

E. Sources of ignition shall be prohibited in any confined space until after the atmosphere within the confined space has been tested and found safe.

F. Reservoirs, vessels, or other confined spaces having openings or manholes in the side as well as in the top shall be entered from the side openings or manholes when practicable.

G. CONTRACTOR shall coordinate entry operations with JPA when both CONTRACTOR personnel and JPA personnel will be working together as authorized entrants into a permit-required confined space.

H. CONTRACTOR shall submit to JPA a photocopy of the canceled permit at the conclusion of the entry operation. This information is for record-keeping purposes only, and is not intended to provide enforcement of confined space regulations.

END OF SECTION

SECTION 01430

HAZARDOUS SUBSTANCES COMMUNICATION

1.01 REFERENCE

A. General Requirements Section 01430

1.02 GENERAL

A. The following hazardous substances are known to be present or will be encountered during performance of the work.

1. None know at this time.

B. Material Safety Data Sheets (MSDS) for each known hazardous substance can be found in the Appendix.

1.03 PROCESS OVERVIEW

A. If a hazardous substance is found or identified the CONTRACTOR shall immediately stop work in the area and notify the JPA'S Representative.

B. If asbestos-containing materials are uncovered during project construction, work at the project site shall immediately halt and a qualified hazardous materials professional shall be contacted and brought to the project site to make a proper assessment of the suspect materials. All potentially friable asbestos-containing material shall be removed in accordance with Federal, State, and local laws and the National Emission Standards for Hazardous Air Pollutants guidelines prior to ground disturbance that may disturb such material. All demolition activities shall be undertaken in accordance with California Occupational Safety and Health Administration standards, as contained in Title 8 of the CCR, Section 1529, to protect workers from exposure to asbestos. Material containing more than one percent asbestos shall also be subject to San Joaquin Valley Air Pollution Control District regulations. Demolition shall be performed in conformance with Federal, State, and location laws and regulations so that construction workers and or the public avoid significant exposure to asbestos-containing materials.

END OF SECTION

SECTION 01435

HAZARDOUS SUBSTANCE PROCEDURES

1.01 REFERENCES

A. California Health and Safety Code, Section 25117.

B. United States Code of Federal Regulation (CFR), Title 29 and Title 40.

C. State of California Code of Regulations (CCR), Title 8 and Title 22.

D. Steel Structure Painting Council – PA Guide 3.

E. 29 CFR 1910.1000.

F. 29 CFR 1910.134.

G. Steel Structure Painting Council:

1. Guide 61 – Guide for Containing Debris Generated During Paint Removal Operations.

2. Guide 71 – Guide for the Disposal of Lead-Contaminated Surface Preparation Debris.

1.02 GENERAL

A. CONTRACTOR shall inform JPA and other affected persons of hazardous substances that are brought onto the jobsite or suspected hazardous substances which are encountered during performance of the work. CONTRACTOR shall notify such agencies as required to be notified by law or by regulation of the presence of hazardous substances.

B. Definitions

1. Hazardous substance: Defined as any substance included in the list (Director's List) of hazardous substances prepared by the Director, California Department of Industrial Relations, pursuant to Labor Code Section 6382. Includes hazardous waste as defined herein.

2. Hazardous waste: A waste or combination of wastes as defined in 40 CFR 261.3, or regulated as hazardous waste in California pursuant to Chapter 11, Division 4.5, Title 22, California Code of Regulations, and Chapter

6.5, Division 20, California Health and Safety Code, or those substances defined as hazardous wastes in 49 CFR 171.8.

C. CONTRACTOR shall provide plans, procedures, and controls to be used when encountering hazardous substances during performance of the work.

D. Prior to commencing work, and where it is known or suspected that hazardous substances will be encountered, CONTRACTOR shall submit a copy of its hazard communication program to JPA. Program shall describe CONTRACTOR'S communication procedures and shall give evidence of employees training for complying with procedures.

E. CONTRACTOR shall designate a Certified Industrial Hygienist to issue instructions and recommendations for worker safety in the event a hazardous substance is encountered.

F. CONTRACTOR shall file request for adjustment of Contract Price or Time due to the finding of hazardous materials at the work-site, in accordance with Article 14 of the General Provisions.

1.03 HAZARDOUS SUBSTANCE PROCEDURES

A. For work where hazardous substances will be present or encountered, CONTRACTOR shall:

1. Submit to JPA a Site Safety and Health Plan. A copy of the plan shall be made available to the jobsite while work is being performed.

2. Submit to JPA a Materials Disposal Plan.

3. Submit to JPA a Material Safety Data Sheet (MSDS) for each hazardous substance proposed to be used or encountered at the jobsite. MSDS shall be submitted prior to commencing work.

4. Exercise extreme care when handling or disposing of materials or substances that are listed as hazardous substances in Section 8-339 of California Occupational Safety and Health Regulations, Title 8, California Code of Regulations, or in Title 26 (Toxics) of the California Code of Regulations, or as evidenced by the manufacturer's MSDS.

5. Immediately notify JPA of any spill of material that is, or contains, a hazardous substance, including, but not limited to, motor oil, hydraulic fluid, or other petroleum products and hazardous materials or wastes used or generated on site. JPA personnel will notify the proper

authorities of the spill and will specify the necessary measures to be taken by the CONTRACTOR to neutralize and/or remove the hazardous substance.

B. For work where materials suspected of containing hazardous substances are encountered, CONTRACTOR shall immediately comply with the requirement set forth above in Paragraph A, as well as the following:

1. Sampling and Testing

Contractor shall sample and test all materials suspected of containing hazardous substances to determine if they are classifiable as hazardous wastes that must be disposed of at a Class I disposal site, or non-hazardous wastes that must be disposed of at a Class II or Class III disposal site. All sampling and testing shall be performed by a laboratory that complies with and is certified under the Environmental Laboratory Accreditation Program (ELAP) of the California Department of Health Services.

2. Hazardous Substances that may be Encountered

All the materials listed below that are to be disposed of from the site shall be sampled and analyzed for hazardous constituents. Analytical reports shall be submitted to the JPA prior to disposing of each material.

a. Sandblast Media, sealant, soil

b. Wastewater, sediments

c. Metals analyses will include the following 17 metals:

Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Cobalt, Lead, Mercury, Molybdenum, Nickel, Selenium, Silver, Thallium, Vanadium and Zinc

3. Handling Samples

a. Each sample shall have an identifying sample number assigned by the CONTRACTOR when the sample is taken. Sample number shall be included on the sampling chain of custody and in all reports, correspondence, and other documentation related to the sample. Each sample shall have a sampling chain of custody. Chain of custody shall show the name and organization of each person having custody of the sample, and shall also show the sample number, job name and location, time of day and date sample taken, material sampled, and tests to be performed.

JPA's Representative will witness sampling and may take samples for JPA records and for additional analyses if required. Notify the JPA at least 24 hours prior to sampling.

b. JPA's Representative will witness sampling and may take samples for JPA records and for additional analyses if required.

c. JPA's Representative will review laboratory analysis results and will obtain a Hazardous Waste Generator's EPA ID Number if required.

4. Disposal

a. JPA's Representative will give CONTRACTOR written notice to dispose of all or a portion of material at a Class I disposal site if the JPA's Representative determines that such disposal is required based on review of analytical results of samples collected in accordance with sampling plan. Non-hazardous waste shall be disposed of in either a Class II or Class III facility dependent on material composition and landfill requirements.

b. Remove and handle the material as hazardous until the JPA's Representative has reviewed the required laboratory analysis and determined the appropriate classification. Materials from different sites shall not be transported or mixed until the material is determined to be non-hazardous. Excavation materials shall be stored or stockpiled at each site until classified.

c. Transport materials in accordance with all local, state, and federal laws, rules, and regulations. Submit hazardous waste shipping manifests to the JPA'S Representative within five (5) days of offhaul. Include the name, address, EPA Identification Number and Hauler License Number of the transport company and the EPA Identification Number of the disposal site.

1.04 SUBMITTALS

A. Site Safety and Health Plan

1. Plan shall be approved by a Certified Industrial Hygienist and shall comply with all applicable requirements of the Federal Resource

Conservation and Recovery Act, Title 8, Title 22, and Title 26 of the California Code of Regulations, and all applicable regulations of all local, state, and federal agencies having jurisdiction over the safety and health hazards of all phases of the work to be performed.

2. Submit name of individual who has been designated as the site safety and health supervisor.

B. Materials Disposal Plan

1. Prepare a materials disposal plan that complies with all applicable requirements of the Federal Resource Conservation and Recovery Act, Title 8, Title 11, and Title 26 of the California Code of Regulations; and all applicable regulations of all local, state and federal agencies having jurisdiction over the disposal of removed materials, and other waste, whether hazardous or non-hazardous. Submit a copy of the plan for the JPA'S Representative prior to disposing of any material.

2. Submit permission to dispose of material from disposal site owner prior to disposing of any material. Include name, address, and telephone number of disposal site and of owner.

3. Hazardous wastes:

a. CONTRACTOR shall prepare and JPA shall accept all hazardous waste manifests prior to use.

b. Submit manifests, Bill of Lading, land disposal restriction, or other documentation required by applicable regulations governing transport and disposal of hazardous wastes for disposal of hazardous substances within five (5) days of transport. Manifests or Bill of Lading (or other listed documentation) shall identify disposed material and source, show quantity of disposed material in pounds or tons, and show method used for final disposition as buried, incinerated, chemically treated and/or other means.

c. Submit proof that the transporter and disposal site are regulated by the State to handle and dispose of hazardous wastes.

D. Sampling and Analysis, Laboratory Designation, and Test Results

1. Submit project sampling plan prior to any sampling. Include collection methods, locations, and frequencies. Include analytical methods for each material sampled.

2. Submit name and Environmental Laboratory Accreditation Program Certificate number of laboratory that will sample and test suspected hazardous substances. Include statement of laboratory's certified testing areas and analyses that laboratory is qualified to perform. Submit prior to any laboratory testing.

3. Submit laboratory analysis results of samples taken per sampling plan. Specify any deviations from original sampling plan.

END OF SECTION

SECTION 01440

TEMPORARY FACILITIES AND CONTROLS

1.01 CONSTRUCTION WATER

A. The Contractor shall be responsible for bringing construction water to the site as necessary. Water usage and location of water supply shall be coordinated with and approved by the JPA. The Contractor shall be responsible for furnishing, installing, and operating all necessary pumps, standtanks, piping, appurtenances, and necessary connections.

1.02 CONSTRUCTION POWER

A. The Contractor shall be responsible for bringing power to the site as necessary.

1.03 DUST CONTROL

A. Submit a plan detailing the means and methods for controlling dust generated by work on the site at or below ambient dust levels for the JPA'S acceptance. The plan shall also make provision for the control of paint overspray generated during painting operations. The plan shall detail equipment and methods for monitoring compliance with the plan.

B. One or more operable street sweeping machines with vacuums in combination with a water truck for dust abatement purposes shall be maintained on the jobsite.

C. All soil excavated or graded shall be sufficiently watered to prevent excessive dust. Watering shall occur as needed with complete coverage of disturbed areas. Watering shall be a minimum of twice daily on unpaved/untreated roads and on soil areas with active operations.

D. All clearing, grading, earth moving, and excavation activities shall cease during periods of high winds greater than 20 mph (averaged over one hour), if disturbed material is easily windblown, or when dust plumes of twenty percent (20%) or greater opacity impact public roads, occupied structures, or neighboring properties.

E. All fine material transported offsite shall be either sufficiently watered or securely covered to prevent excessive dust.

F. Areas disturbed by clearing, earth moving, or excavation activities shall be minimized at all times.

G. Stockpiles of soil or other fine loose material shall be stabilized by watering or other appropriate method to prevent wind-blown fugitive dust.

H. Once initial grading has ceased, all inactive soil areas within the construction site shall be treated with a dust palliative or watered twice daily until soil has sufficiently crusted to prevent fugitive dust emission.

I. All active disturbed soil areas shall be sufficiently watered to prevent excessive dust, but no less than twice a day.

J. Onsite vehicle speed shall be limited to 15 mph.

K. All areas with vehicle traffic shall be paved, treated with dust palliatives, or watered a minimum of twice daily.

L. Streets adjacent to the project site and construction activity shall be kept clean and accumulated silt removed.

M. Contractor shall properly maintain and tune all internal combustion engine powered equipment.

N. Contractor shall require employees and subcontractors to comply with California's idling restrictions for compression ignition engines.

O. Contractor shall use low sulfur (CARB) diesel fuel.

1.04 NOISE ABATEMENT

A. The CONTRACTOR shall comply with all local sound control and noise level rules, regulations, and ordinances which apply to any work pursuant to the Contract. The CONTRACTOR is responsible to provide noise abatement to limit noise levels to less than 55 dBA and is responsible for all associated costs. If surrounding land owners complain or the CONTRACTOR exceeds allowable noise levels, the CONTRACTOR shall provide a sound abatement protocol to the complete satisfaction of the JPA.

B. The CONTRACTOR shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.

C. The CONTRACTOR shall locate equipment staging in areas that create the greatest possible distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

D. The Contractor shall ensure proper maintenance and working order of equipment and vehicles, and that all construction equipment is equipped with manufacturers approved mufflers and baffles.

E. The Contractor shall install sound-control devices in all construction equipment and impact equipment, no less effective than those provided on the original equipment.

1.05 DISPOSAL OF EXCESS EXCAVATED SOIL MATERIALS

A. The CONTRACTOR shall dispose of any hazardous materials, pipe, electrical, etc. that is encountered that is not to be incorporated into the project scope of work. Organic material for project clearing and grubbing shall be removed and stockpiled in a manner that it is not incorporated into the engineered fill, however it shall be spread evenly and uniformly in the basin bottoms after the completion of all work to the satisfaction of the JPA.

1.06 TEMPORARY FACILITIES

A. The CONTRACTOR shall be responsible for furnishing and installing any temporary facilities that are deemed necessary. CONTRACTOR shall be responsible for furnishing and maintaining suitable portable sanitary facilities along with sanitary hand washing facilities.

1.07 CULTURAL RESOURCES

A. In the event that prehistoric or historic subsurface cultural resources are discovered during ground-disturbing activities, all work within 50 ft of the resources shall be halted and the JPA notified. The JPA will consult with a qualified archaeologist to assess the significance of the find according to CEQA Guidelines Section 15064.5. If any find is determined to be significant, then the JPA and the archeologist will meet to determine avoidance measures or other appropriate mitigation. The JPA will make the final determination and notify the CONTRACTOR of the necessary mitigation measures.

B. In the event that paleontological resources are discovered all work in the immediate area shall be halted and the JPA notified. The JPA will notify a qualified paleontologist depending upon the project component. The paleontologist will document the discovery as needed, evaluate the potential resource, and assess the significance of the find under the criteria set forth in CEQA Guidelines Section 15064.5. If fossil or fossil bearing deposits are discovered during construction, excavation within 50 feet of the find will be temporarily halted or diverted until the discovery is examined by a qualified paleontologist. The paleontologist will notify the appropriate agencies to determine procedures that would be followed before construction is allowed to resume at the location of the find. The JPA will make the final determination and notify the CONTRACTOR of the necessary mitigation or avoidance measures.

C. If human remains are uncovered during project construction all work in the immediate area shall be halted and the JPA notified. The JPA shall immediately contact the Kern County Coroner to evaluate the remains, and follow the procedure and protocols set forth in Section 15064.4 (e) (1) of the California Environmental Quality Act Guidelines. If the Coroner determines the remains are Native American in origin, the Coroner shall contact the Native American Heritage Commission (NAHC). As provided in Public Resources Code Section 5097.98, the NAHC shall identify the person or persons believed to be most likely descended from the deceased Native American. The most likely descendent shall be

afforded the opportunity to provide recommendations concerning the future disposition of the remains and any associates grave goods as provided in PRC 5097.98.

1.08 BIOLOGICAL RESOURCES

A. (*Description of biological surveys and requirements*)

END OF SECTION

SECTION 01500

EQUIPMENT AND EQUIPMENT SYSTEMS OPERATION

1.01 GENERAL

This section describes the intended function and operation of equipment and equipment systems.

1.02 EQUIPMENT FUNCTIONS

A. (*Description of the function of key equipment*)

1.03 EQUIPMENT SYSTEM FUNCTIONS

(*Description of how the entire system being constructed works*)

END OF SECTION

SECTION 01510

TESTING, TRAINING, AND FACILITY START-UP

1.01 SUMMARY

A. Section Includes: Equipment and system testing and start-up, services of manufacturer's representatives, training of JPA'S personnel, and final testing requirements for the complete facility.

1.02 CONTRACT REQUIREMENTS

A. Testing, training, and start-up are requisite to the satisfactory completion of the Contract.

B. Complete testing, training, and start-up within the Contract Time.

C. Allow realistic durations in the Progress Schedule for testing, training, and start-up activities.

D. Furnish labor, power, chemicals, tools, equipment, instruments, and services required for and incidental to completing functional testing, performance testing, and operational testing.

E. Provide competent, experienced technical representatives of equipment manufacturers for assembly, installation and testing guidance, and operator training.

1.03 START-UP/TESTING PROCESS OVERVIEW

A. This specification describes a process. The following definitions are provided for terms that are used in this specification and which describe the steps of the process.

B. Start-up Plan: A complete outline and schedule of the work that will be performed to meet the requirements of this specification.

C. Factory/Source Performance Testing: Testing which takes place at the supplier's facility to test equipment performance prior to shipment of the equipment to the job site. Factory pump test, or a control panel test, for example.

D. General Start-up and Testing: Initial adjustments, alignments, inspections, testing, etc., which are performed to confirm equipment is installed correctly and ready to be operated. Line flush, lubrication check, electrical integrity tests, instrument calibrations, for example.

E. Individual Equipment Functional Testing: Individual equipment operating tests which verify proper operation of the equipment. An individual pump functional test would include testing flow, pressure, amps, vibration, motor controls, associated instrument loops, and remote controls, for example.

F. Certification of Proper Installation: A written report from the equipment supplier and the equipment installer which certifies that the equipment tests are complete and the equipment performs satisfactorily.

G. Equipment/System Operational Testing: A test of the entire facility which demonstrates the individual equipment operates as a system and meets the operational requirements of the facility design. Operational requirements to test shall include system control features, station performance requirements such as flow and pressure for example.

1.04 START-UP PLAN

A. Submit start-up plan for each piece of equipment and each system not less than sixty (60) days prior to planned initial equipment or system start-up. Plan shall address all operating requirements set forth in Section 01500, Equipment and Equipment System Operation.

B. Provide a Schedule with the Following Activities Identified:

1. Manufacturer's services

2. Installation certifications

3. Operator training

4. Submission of Operation and Maintenance Manual

5. Performance testing

6. Functional testing

7. Operational testing

C. Provide testing plan with test logs for each item of equipment and each system when specified. Include testing of alarms, control circuits, capacities, speeds, flows, pressures, vibrations, sound levels, and other parameters.

D. Provide summary of shutdown requirements for existing systems, which are necessary to complete start-up of new equipment, and systems.

E. Revise and update start-up plan based upon review comments, actual progress, or to accommodate changes in the sequence of activities.

1.05 FACTORY/SOURCE PERFORMANCE TESTING

A. Test equipment for proper performance at point of manufacture or assembly when specified.

B. Equipment that is to be tested includes, but is not limited to:

Slide gates and electrical actuator require a witnessed factor test.

1. Demonstrate equipment meets specified performance requirements.

2. Provide certified copies of test results.

3. Do not ship equipment until certified copies have received written acceptance from JPA. Written acceptance does not constitute final acceptance.

1.06 FACTORY WITNESSED PUMP TESTS

A. Pumps having a motor drive of 100 horsepower or greater shall undergo factory witnessed pump testing. Each pumping unit, complete with the actual job motor drive, shall be tested at the factory in the presence of the JPA Representative. Tests shall be performed in accordance with the applicable provisions of AWWA E101 or the standards of the Hydraulic Institute. To successfully pass a laboratory performance test, a pumping unit shall meet all performance requirements specified.

B. JPA shall pay all costs for JPA'S Representative to travel to and from the location of the laboratory performance test, and all costs incurred during testing. Should results of the tests indicate, in the opinion of the JPA's Representative that the pumps fail to meet any of the specified requirements, the JPA's Representative will notify the CONTRACTOR of such failure. The manufacturer shall thereupon, at no expense to the JPA, make such modifications and perform additional testing as may be necessary to comply with these specifications. Any additional costs for travel and subsistence shall be reimbursed to the JPA by the CONTRACTOR.

1.07 GENERAL START-UP AND TESTING

A. Mechanical Systems:

1. Remove rust preventatives and oils applied to protect equipment during construction.

2. Flush lubrication systems and dispose of flushing oils. Recharge lubrication system with lubricant recommended by manufacturer.

3. Flush fuel system and provide fuel for testing and start-up. At completion of test, fill fuel tank.

4. Install and adjust packing, mechanical seals, O-rings, and other seals. Replace defective seals.

5. Remove temporary supports, bracing, or other foreign objects installed to prevent damage during shipment, storage, installation and construction.

6. Check rotating machinery for correct direction of rotation and for freedom of moving parts before connecting driver.

7. Perform cold alignment and hot alignment to manufacturer's tolerances.

8. Adjust V-belt tension and variable pitch sheaves.

9. Inspect hand and motorized valves for proper adjustment. Tighten packing glands to insure no leakage, but permit valve stems to rotate without galling. Verify valve seats are positioned for proper flow direction.

10. Tighten leaking flanges or replace flange gasket. Inspect screwed joints for leakage.

11. Install gratings, safety chains, handrails, shaft guards, and sidewalks prior to operational testing.

B. Electrical Systems:

1. Perform insulation resistance tests on wiring except 120-volt lighting, wiring, and control wiring inside electrical panels.

2. Perform continuity tests on grounding systems.

3. Test and set switchgear and circuit breaker relays for proper operation.

4. Perform direct current high potential tests on all cables that will operate at more than 2,000 volts. Obtain services of an approved, certified independent testing lab to perform tests.

5. Check motors for actual full load amperage draw. Compare to nameplate value.

C. Instrumentation Systems:

1. Bench or field calibrate instruments and make required adjustments and control point settings. Provide data on JPA's calibration sheets.

2. Leak test pneumatic controls and instrument air piping.

3. Energize transmitting and control signal systems, verify proper operation, ranges and settings.

1.08 INDIVIDUAL EQUIPMENT FUNCTIONAL TESTING

A. Functionally test mechanical and electrical equipment for proper operation after general start-up and testing tasks have been completed.

B. Demonstrate proper rotation, alignment, speed, flow, pressure, vibration, sound level, adjustments, and calibration. Perform initial checks in the presence of and with the assistance of the manufacturer's representative.

C. Demonstrate proper operation of each instrument loop function including alarms, local and remote controls, instrumentation and other equipment functions. Generate signals with test equipment to simulate operating conditions in each control mode.

D. Conduct continuous 8-hour test under full load conditions. Replace parts which operate improperly.

1.09 CERTIFICATE OF PROPER INSTALLATION

A. At Completion of Functional Testing, Furnish Written Report Prepared and Signed by Manufacturer's Authorized Representative, Certifying Equipment:

1. Has been properly installed, adjusted, aligned, and lubricated.

2. Is free of any stresses imposed by connecting piping or anchor bolts.

3. Is suitable for satisfactory full-time operation under full load conditions.

4. Operates within the allowable limits for vibration.

5. Controls, protective devices, instrumentation, and control panels furnished as part of the equipment package are properly installed, calibrated, and functioning.

6. Control logic for start-up, shutdown, sequencing, interlocks, and emergency shutdown have been tested and are properly functioning.

B. Furnish Written Report Prepared and Signed by the Electrical and/or Instrumentation Subcontractor Certifying:

1. Motor control logic that resides in motor control centers, control panels, and circuit boards furnished by the electrical and/or instrumentation subcontractor has been calibrated and tested and is properly operating.

2. Control logic for equipment start-up, shutdown, sequencing, interlocks and emergency shutdown has been tested and is properly operating.

C. Co-sign the reports along with the manufacturer's representative and subcontractors.

1.10 TRAINING OF OWNERS PERSONNEL

A. Provide operations and maintenance training for items of mechanical, electrical and instrumentation equipment. Utilize manufacturer's representatives to conduct training sessions. Coordinate with JPA to develop content for training sessions.

B. Coordinate training sessions to prevent overlapping sessions. Arrange sessions so that individual operators and maintenance technicians do not attend more than 2 sessions per week.

C. Provide Operation and Maintenance Manual for specific pieces of equipment or systems one month prior to training session for that piece of equipment or system.

D. Satisfactorily complete functional testing before beginning operator training.

E. CONTRACTOR shall coordinate the training periods with JPA personnel and manufacturer's representatives, and shall submit a training schedule for each piece of equipment or system for which training is to be provided. Such training schedule shall be submitted not less than 21 calendar days prior to the time that the associated training is to be provided and shall be based on the current plan of operation.

1.11 EQUIPMENT/SYSTEM OPERATIONAL TESTING

A. CONTRACTOR and JPA shall jointly develop and coordinate equipment system operational testing. Operation shall comply with requirements set forth in Section 01500, Equipment and Equipment Systems Operation.

B. Conduct operational test of the entire facility after completion of operator training. Demonstrate satisfactory operation of equipment and systems in actual operation.

C. Conduct operational test for continuous 7-day period.

D. JPA will provide operations personnel, power, fuel, and other consumables for duration of operational test.

E. Immediately correct defects in material, workmanship, or equipment which became evident during operational test.

F. Repeat operational test when malfunctions or deficiencies cause shutdown or partial operation of the facility or results in performance that is less than specified.

G. In the event an item of equipment cannot be tested continuously for seven (7) days, provide information for an alternative test, or modify the seven (7) day test period. For high horsepower equipment where testing will impact Time of Use (TOU) energy limitations, describe an intermittent test procedure. Identify TOU constraints.

1.12 RECORD KEEPING

A. Maintain and Submit Following Records Generated During Start-up and Testing Phase of Project:

1. Daily logs of equipment testing identifying all tests conducted and outcome.

2. Logs of time spent by manufacturer's representatives performing services on the job site.

3. Equipment lubrication records.

4. Electrical phase, voltage, and amperage measurements.

5. Insulation resistance measurements.

6. Data sheets of control loop testing including testing and calibration of instrumentation devices and set points.

END OF SECTION

SECTION 01520

CLOSEOUT PROCEDURES

1.01 FINAL CLEANING

A. Perform final cleaning prior to inspections for Final Acceptance.

B. Use cleaning materials which are recommended by manufacturers of surfaces to be cleaned.

C. Prevent scratching, discoloring, and otherwise damaging surfaces being cleaned.

D. Clean roofs, gutters, downspouts, and drainage systems.

E. Broom clean exterior paved surfaces and rake clean other surfaces of sitework. Police yards and grounds to keep clean.

F. Remove dust, cobwebs, and traces of insects and dirt.

G. Clean grease, mastic, adhesives, dust, dirt, stains, fingerprints, paint, blemishes, sealants, plaster, concrete, and other foreign materials from sight-exposed surfaces, and fixtures and equipment.

H. Remove non-permanent protection and labels.

I. Polish glossy surfaces to clear shine.

J. Vacuum carpeted and soft surfaces.

K. Clean light fixtures and replace burned-out or dim lamps.

1.02 WASTE DISPOSAL

A. Surplus materials, waste products, and other debris shall be disposed off-site

1.03 TOUCH-UP AND REPAIR

A. Touch-up, repair, or replace finished surfaces on structures, equipment and installation that have been damaged prior to inspection for final acceptance.

1.04 CLOSEOUT DOCUMENTS

A. Submit following closeout documents upon completion of the Work, and at least 7 days prior to application for Final Payment:

1. Project Record Documents, including:

   Record drawings
   Testing reports
   Survey data
   Instrument calibration sheets

2. Operation and Maintenance Manuals

3. Warranties and Bonds.

4. Spare Parts

END OF SECTION

SECTION 01600

JPA FURNISHED EQUIPMENT

1.01 EQUIPMENT FURNISHED BY JPA

The JPA will not furnish any materials for this project.

1.02 JPA RESPONSIBILITIES

A. Arrange for and deliver necessary shop drawings, installation instructions, product data and samples to CONTRACTOR.

B. Arrange and pay for product delivery to site in accordance with construction schedule.

C. Deliver supplier's bill of materials to CONTRACTOR.

D. Inspect deliveries jointly with CONTRACTOR.

E. Submit claims for transportation damage.

F. Arrange for replacement of damaged, defective, or missing items.

G. Arrange for manufacturer's warranties, bonds, service, and inspections, as required.

1.03 CONTRACTOR RESPONSIBILITIES

A. Designating required delivery date for each JPA furnished product.

B. Reviewing shop drawings, product data and samples.

C. Submitting notification of discrepancies or anticipated problems.

D. Receiving and unloading products at site.

E. Promptly inspecting products jointly with JPA and recording shortages, damaged or defective items.

F. Handling products at site, including uncrating and storage.

G. Protecting products from damage.

H. Installing, including assembly, connections, adjustments, tests, and finish products in accordance with Contract Documents.

I. Providing operating oils, lubricants, and incidental materials required for complete installation.

J. Repairing or replacing items damaged after receipt until Date of Acceptance of the Work by JPA.

1.04 DELIVERY

A. If JPA fails to deliver products in accordance with approved Construction Schedule, adjustments will be made to Contract Time and Contract Price as stipulated in General Provisions.

END OF SECTION

SECTION 01700

EARLY OCCUPANCY OF PORTIONS OF WORK

1.01 PORTIONS OF WORK SCHEDULED FOR EARLY OCCUPANCY

A. CONTRACTOR shall complete following portions of Work for JPA'S utilization including specified testing, training of JPA'S personnel, and other preparations necessary for JPA'S occupancy or use:

No portion of the project is scheduled for early occupancy.

1.02 SUBSTANTIAL COMPLETION CERTIFICATIONS

A. Certificates of Substantial Completion will be executed for each designated portion of Work prior to JPA occupancy. Such certificate of substantial completion will describe the portion of the Work to be occupied by JPA, items that may be incomplete or defective, date of occupancy by JPA, and other information required by JPA and CONTRACTOR.

1.03 FOLLOWING OCCUPANCY

A. Occupancy by JPA will relieve CONTRACTOR of responsibility for injury or damage to the above-listed completed portions of the Work resulting from use by JPA or from the action of the elements, or from other cause, except CONTRACTOR operations or negligence.

B. After JPA occupancy, allow access for JPA'S personnel, access for others authorized by JPA, and access by JPA for operation of equipment and systems.

C. Following Occupancy, JPA will provide power to operate equipment and systems, and repair damage caused by JPA occupancy.

D. CONTRACTOR will not be required to reclean early occupied portions of Work prior to final acceptance, except for cleanup made necessary by CONTRACTOR's operations.

E. Guarantee period for portions of the Work occupied by JPA shall commence with date of Certificate of Substantial Completion of portions of Work for use by JPA. Progress payment retentions for portions of the Work occupied by JPA will be released as part of the retention for the total Work.

F. JPA'S use of occupied facilities shall not relieve CONTRACTOR from responsibility for correcting defective work or materials.

G. No partial acceptance of the Work will be made and no acceptance other than the final acceptance of the completed Work will be made except for those portions of Work designated for early occupancy by JPA.

END OF SECTION

SECTION 01800

TESTING AND LABORATORY SERVICES

1.01 GENERAL

A. Requirements:

1. The JPA shall perform all concrete and compaction testing for the project.

2. The request for compaction and concrete testing shall be made to the JPA in writing at least forty-eight (48) hours before the CONTRACTOR is ready for tests to be taken.

3. The CONTRACTOR shall make available construction equipment and materials as necessary to assist the JPA'S Representative in taking the tests.

4. If the backfill shall fail the compaction tests, the CONTRACTOR shall pay the cost of restesting. If the concrete cylinders do not reach the design 28-day compressive strength, the CONTRACTOR shall be responsible for any additional testing such as concrete cores and any remedial work.

5. If the CONTRACTOR is not ready to have compaction or concrete tests taken at the time and in the locations indicated on the written request, the CONTRACTOR shall be responsible for all standby charges and/or return visit costs to take the requested tests.

6. If the CONTRACTOR elects to use any imported materials or imported sand for backfill, a sample of the material to be used for the backfill shall be delivered to the JPA Representative for testing, prior to the commencement of backfilling. If the test fails, the CONTRACTOR shall pay the cost of retesting.

7. The JPA will witness factory testing of slide gates and actuators. The CONTRACTOR shall make arrangements for all slide gates and actuators be tested in a single location during a single visit. The CONTRACTOR shall be responsible for any cost incurred by the JPA for retesting of failed equipment or need for additional visits.

END OF SECTION

SECTION 01810

SPECIAL MEETINGS

1.01 GENERAL

A. The JPA or the JPA'S Representative may schedule a Special Meeting to discuss project related activities or issues. The CONTRACTOR shall be readily available for these meetings and ensure that any project subcontractors attend when so requested by the JPA. The time and place for such meeting will be established by the JPA or the JPA'S Representative.

B. Project Meetings: The JPA may elect to administer weekly or bi-weekly project meetings to discuss project activities, review the project schedule, and to discuss any project related issues or concerns. The CONTRACTOR shall have its Project Manager and/or Project Superintendent attend each of these meetings as well as any necessary subcontractors and provide a project look ahead schedule at each meeting. The time and place for project meetings will be established at a mutually agreeable time and place prior to the commencement of work.

END OF SECTION

SECTION 01820

SPECIAL CONTRACT CLOSE OUT

(*Description of final clean up and expected job site conditions at completion of project*)

SECTION 01840

BASIS OF MEASUREMENT FOR PAYMENT

1.01 WORK LISTED IN THE SCHEDULE OF WORK ITEMS

A. Work under this contract will be paid on a unit price or lump-sum basis as outlined on the Bid Form for the quantity of work installed.

B. The unit prices and lump-sump prices include full compensation for furnishing the labor, materials, tools, and equipment and doing all the work involved to complete the work included in the Contract Documents.

C. The application for payment will be for a specific item based on the percentage completed or quantity installed. The percentage complete will be based on the value of the partially completed work relative to the value of the item when entirely completed and ready for service.

1.02 BID ITEMS

(Provide Description of each bid item)

1. **ITEM NO. 1 – MOBILIZATION, DEMOBLIZATION, AND CLEANUP**

   Work under this item shall include all labor, tools, equipment and transportation of personnel, equipment, and operating supplies to and from the site, establishment of portable sanitary facilities, site electrical, and site communications, obtaining an adequate supply of fresh water if necessary, trench safety measures, SWPPP, Dust Control Plan, final cleanup work and all bonds, insurance, overhead, permits, shop drawings, close-out documents, and costs of work not specifically included in any other contract item.

   During the progress of the work, the Contractor shall maintain the site and related equipment in a clean, orderly condition, free from unsightly accumulation of rubbish. Upon completion of the work and before the final estimate is submitted, the Contractor shall at his own expense remove from the vicinity of the work all weeds, rubbish, uninstalled materials and other like materials, belonging to him or used under his direction during construction. In the event of his failure to do so, the same may be removed by the JPA after ten days written notice to the Contractor. Such removal shall be at the expense of the Contractor and will be deducted from the final payment due him. Where construction crosses public or private property, it shall be restored by the Contractor to the complete satisfaction of the JPA, at the Contractor's expense.

1.02 WORK NOT LISTED IN THE SCHEDULE OF WORK ITEMS

A. The General Provisions and items in the Special Provisions, general requirements, and specifications which are not listed in the schedule of work items of the Bid Form are, in general, applicable to more than one listed work item, and no separate work item is provided therefore. Include the cost of work not listed but necessary to complete the project designated in the Contract Documents in the various listed work items of the Bid Form.

B. The bids for the work are intended to establish at total cost for the work in its entirety. Should the CONTRACTOR feel that the cost for the work has not been established by specific items in the Bid Form, include the cost for that work in some related bid item so that the Proposal for the project reflects the total cost for completing the work in its entirety.

1.03 MOBILIZATION

Payment for mobilization shall be made at the time of the first progress payment after the CONTRACTOR has purchased bonds and insurance and established a Contractor's site office with telephone service and a temporary field office for the JPA'S Representative.

1.04 TRENCH SAFETY MEASURES

Payment for sheeting, shoring, and bracing for the protection of life and limb, in conformance with all applicable safety orders, shall be provided for in the applicable bid items and will be paid for in accordance with the provisions outlined herein.

1.05 STORM WATER POLLUTION CONTROL / DUST CONTROL PLAN

Payment for storm water pollution control and air quality control shall be provided for in the applicable bid items and will be paid for in accordance with the provisions outlined herein.

END OF SECTION

SECTION 01900

GENERAL DESIGN REQUIREMENTS

1.01 GENERAL

(*Description of permits to be obtained, requirement to comply with all permit requirements, necessary notifications when working on other person's land, identification of time sensitive work and allowable time to complete work, etc.*)

1.02 EXISTING UTILITIES / STRUCTURES

Prior to construction, the CONTRACTOR shall perform a U.S.A. Locate and shall expose all known utility crossings and facilities in order to construct the project without damaging existing facilities or encountering a conflict with said facilities. CONTRACTOR shall be responsible for all associated costs with identifying and exposing existing utilities.

1.03 PERMITS

The JPA will submit a Notice of Intent to Discharge, along with appurtenant fee, under the Construction Activities Storm Water General Permit (99-08-DWQ). Under this permit the CONTRACTOR must prepare and submit a Storm Water Pollution Prevention Plan. CONTRACTOR shall be responsible for operating in accordance with the SWPPP.

The CONTRACTOR shall be responsible for preparing, obtaining, and complying with a SJVAPCD Dust Control Plan and Permit and be responsible for all associated costs.
See also Section 00600 herein.

END OF SECTION

SECTION 02000

MITIGATION MEASURES

1.01 GENERAL

The CONTRACTOR shall be responsible for complying with mitigation measurements listed in Table S-1 herein. Below is a summary list of items that pertain to the CONTRACTOR:

- (*List of required mitigation measure for this specific project*)

END OF SECTION

SECTION 0

SPECIAL PROVISIONS

(PROJECT NAME)

PROJECT NO. XXXXX (XXXX)

SECTION 0
SPECIAL PROVISIONS

Table of Contents

SECTION 00100

BID MODIFICATIONS

1.01 BASIS FOR DETERMINING LOWEST RESPONSIBLE BIDDER

See Paragraph 3.1.4 of Instructions to Bidders.

1.02 BIDDING ON SUBSTITUTE ITEMS

See language in Instruction to Bidders IB 1.7

1.03 TIME ALLOWED FOR ACCEPTANCE OF BIDS

See Instructions to Bidders IB 3.1.2.

END OF SECTION

SECTION 00110

DEFINITIONS

1.01 DEFINITIONS

Owner Groundwater Banking Joint Powers Authority (JPA)

Engineer

(*Any other agencies involved*)

END OF SECTION

SECTION 00200

THE WORK

1.01 GENERAL

The work to be done by the Contractor under these Specifications shall consist of performing all operations necessary for the construction of the (*Project Name*) at the locations, in the positions, to the elevations and dimensions and conforming to the design shown on the plans and in accordance with these specifications.

The Contractor shall furnish all transportation, materials (except where stipulated otherwise), equipment, labor, and supplies to complete installation of the (*Project Name*) together with all appurtenant work necessary or incidental to complete in a workmanlike manner the improvements as contemplated and as intended by the plans and these specifications.

1.02 LOCATION OF PROJECT SITE

The project site is located in Sections X & X, Township XX South, Range XX East and is (*description of project location relative to known landmarks, highways, roads, etc.*).

1.03 DESCRIPTION OF THE WORK

(*General Description of project as a whole and major components*)

1.04 ORDER OF WORK

Contractor will be responsible for complying with the Environmental Commitments included in these specifications. The Contractor shall submit a construction schedule within fifteen (15) calendar days of the date of the Notice to Proceed from the JPA. The schedule shall outline the various phases of work, estimate the dates of commencement and completion for each phase.

1.05 WORK BY OTHERS

The CONTRACTOR shall coordinate work with the JPA or the JPA'S Representative at all times. Work by others may be taking place in the project vicinity by (*list other possible agency's that may be working in the vicinity*) and the CONTRACTOR shall not interfere with their activities or maintenance operations.

1.06 WORKING HOURS AND HOLIDAYS

Normal working hours are from 7:00 am to 3:30 pm, Monday through Friday, excluding holidays. JPA inspection hours are from 7:00 a.m. to 3:30 p.m., Monday through Friday. No work shall be performed on Saturdays, Sundays, or JPA holidays. See appendix for list of JPA holidays. In instances where contract time extends past the year's list of JPA holidays, regularly observed holidays shall be followed.

The Contractor shall be responsible for all costs associated with inspection services outside JPA inspection hours at the rate of $150.00 per hour.

1.07 OBSTRUCTIONS AND COORDINATION WITH OTHER WORK

At least forty-eight (48) hours prior to construction and prior to any operations involving existing JPA or RRBWSD facilities, the Contractor shall notify the JPA's Representative.

Prior to construction, the Contractor shall expose all known utility crossings in order to provide for grade and alignment adjustments, if necessary.

END OF SECTION

SECTION 00210

INVESTIGATIONS AND REPORTS

1.01 INVESTIGATIONS AND REPORTS

A. The following investigations and reports are included herewith in Appendix:

1. (*List investigations and reports*)

B. The following investigations and reports are available at JPA for review:

1. (*List investigations and reports*)

END OF SECTION

SECTION 00220

LANDS AND RIGHTS-OF-WAY

1.01 LANDS AND RIGHTS-OF-WAY

See General Provisions GP 5.4.

END OF SECTION

SECTION 00300

CONTRACTOR'S INSURANCE

1.01 GENERAL

A. Contractor's insurance coverage shall be as specified in the General Provisions, shall provide the following amounts of coverage, shall include additional insureds, and shall include additional information as set forth below.

1.02 COMMERCIAL GENERAL LIABILITY INSURANCE

A. Bodily injury and property damage coverage shall be for not less than one million dollars ($1,000,000) for each occurrence and for not less than three million dollars ($3,000,000) per project aggregate.

B. Products/Completed Operations coverage shall be for not less than three million dollars ($3,000,000) aggregate.

1.03 AUTOMOBILE LIABILITY

A. Contractor shall carry and maintain a business automobile policy or equivalent coverage for bodily injury and property damage on all owned, non-owned and hired automobiles or other licensed highway vehicles used in the performance of the Contract. The limit shall be for not less than two million ($2,000,000) for each accident.

1.04 WORKER'S COMPENSATION INSURANCE AND EMPLOYER'S LIABILITY INSURANCE

A. Worker's Compensation Insurance coverage shall comply with statutory limits.

B. Employer's Liability Insurance shall be for not less than:

$1,000,000 Each Accident
$1,000,000 Each Disease – Policy Limit
$1,000,000 Each Disease – Each Employee

C. State Compensation Insurance Fund: Notwithstanding the requirements of General Provisions Section 4.2, JPA will accept Workers Compensation Insurance from the State Compensation Fund (State Fund) that is not rated and that is evidenced on the State Fund's certificate form. Except as provided above with respect to State Fund, all other insurance shall comply with all requirements of the General and Special Provisions.

1.05 ADDITIONAL INSUREDS

A. Commercial General Liability Insurance shall include as additional insureds: JPA, (List all other applicable) _____

_____

1.06 ADDITIONAL INFORMATION

A. Certificates of Insurance shall:

1. List all Endorsement forms that are part of said policy.
2. List all entities required to be named as additional insureds.
3. Include a statement that no less than 30 days written notice will be provided by certified mail to the JPA prior to any material change or cancellation of said policy.

END OF SECTION

SECTION 00400

SHOP DRAWINGS

1.01 SHOP DRAWING SUBMITTALS

A. Shop drawings shall be submitted in accordance with Article 9 of the General Provisions and Section 01210 of the General Requirements.

END OF SECTION

SECTION 00500

CONSTRUCTION SCHEDULE

1.01 CONSTRUCTION SCHEDULE

A. The Contractor shall submit a construction progress schedule in compliance with Article 10 of the General Provisions. The schedule shall be a Gantt Chart, and shall show the various parts of the work in sufficient detail so as to identify the beginning and end of each of the various construction activities. The schedule shall include the following at the minimum:

Submittal milestones
All construction activities
Equipment/material procurement and deliveries
Permit imposed work times
Partial, substantial, and final completion milestones
Critical path activities

1.02 SCHEDULE CONSTRAINTS

A. No construction activities shall be allowed at the project site prior to receiving the Notice to Proceed, including any mobilization activities.

B. (List any other constraints)

END OF SECTION

SECTION 00500A

CONSTRUCTION SCHEDULE

1.01 CONSTRUCTION SCHEDULE

A. CONTRACTOR shall submit a construction progress schedule in compliance with Article 10 of the General Provisions. The schedule shall show the various parts of the work in detail so as to identify the beginning and end of each of the various construction activities. The schedule shall include the following at the minimum:

Submittal milestones
All construction activities
Equipment/material procurement and deliveries
Permit imposed work times
Partial, substantial, and final completion milestones
Critical path activities

B. Within ten (10) days after Notice of Award, JPA will schedule and conduct a Preconstruction Scheduling Conference to commence development of the required project schedule. At this meeting, scheduling requirements will be reviewed with CONTRACTOR. CONTRACTOR shall be prepared to review and discuss methodology for the schedule and sequence of operations plus cost and manpower loading methodology.

C. CONTRACTOR shall submit Construction Schedule to JPA for review within thirty (30) days after Notice of Award. CONTRACTOR's Construction Schedule shall be comprised of a detailed Network Diagram as described in Paragraph F. All on site construction activities shall be cost loaded. The cost value of all on site construction activities shall equal the Contract value.

D. Time extensions shall not be granted nor delay damages paid until a delay occurs which is beyond the control and without the fault or negligence of CONTRACTOR and its SUBCONTRACTORS or SUPPLIERS, at any tier and which extends actual performance of the work beyond the current Contract Completion Date. If the delay occurs along a path which the current approved Construction Schedule update projects late completion prior to addition of any JPA caused delay, then the time extension allowed will be only for the additional delay demonstrated by the approved Time Impact Analysis. Time extensions shall be granted only if they are clearly demonstrated by CONTRACTOR through the submittal of a Time Impact Analysis which demonstrates the estimated impact on the end date of the work; is based upon the updated Construction Schedule current as of the month the delay occurred; and demonstrates that the delay cannot be mitigated, offset, or eliminated through such actions as revising the intended sequence of work or other means. Since float time within the Construction Schedule is jointly owned, it is acknowledged that JPA caused delays on the project may be offset by JPA caused time savings (*e.g.* critical path submittals returned in less time than allowed by the Contract, approval of substitution requests which result in a savings of time to CONTRACTOR). In such an event, CONTRACTOR shall not be entitled to receive a time extension or delay damages until all JPA caused time savings are exceeded and the Contract completion date is also exceeded.

E. Upon JPA's request, CONTRACTOR shall participate in the review of CONTRACTOR's Construction Schedule submissions (including the original

material, all update submittals, and any resubmittals). All revisions shall be submitted within fifteen (15) calendar days after JPA's review.

F. The Detailed Network Diagram shall provide a workable plan for performing the work, establish and clearly display the critical elements of the work, forecast completions of the construction, and match the Contract duration in time. Exclusive of those activities for submittal review and material fabrication and delivery, activity durations shall not be less than one (1) nor more than thirty (30) calendar days, unless otherwise approved by JPA. In addition to the detailed network diagram, CONTRACTOR shall submit the following reports with the original submittal:

1. Predecessor/ Successor Report or a list showing the predecessor activities and successor activities for each activity in the schedule sorted by Early Start.
2. Activity Report sorted by activity number or a list showing each activity in the schedule.

G. An updated Construction Schedule shall be submitted to JPA with the submittal of CONTRACTOR's monthly payment request. For those activities started but not yet completed at the time of submittal, the updated schedule shall reflect the percentage complete, as agreed between CONTRACTOR and JPA, and an estimate of the remaining duration. The monthly update of the construction schedule shall include a copy of the following:

1. A bar chart diagram showing target versus actual dates for each activity remaining to be completed.
2. The Predecessor/Successor report sorted by Early Start.
3. The Activity Report sorted by activity number.
4. The updated network diagram or the data necessary to produce such a diagram on computer diskette(s), as agreed with JPA.

H. Upon approval of a change order or issuance of a notice to proceed with a change, the approved change shall be reflected in the next schedule update submittal by CONTRACTOR.

I. If completion of any part of the work, the delivery of equipment or materials, or submittal of CONTRACTOR submittals is behind the updated Construction Schedule, and will impact the end date of the work past the contract completion date, CONTRACTOR shall submit in writing, a recovery plan acceptable to JPA for completing the work by the current Contract completion date, if requested by JPA.

1.02 SCHEDULE CONSTRAINTS

A. None at this time.

END OF SECTION

SECTION 00600

PERMITS

1.01 PERMITS OBTAINED BY JPA

A. The JPA has obtained or applied for and not yet received the following permits required to construct the project. Proper notification to the agencies affected is the responsibility of the Contractor. The Contractor shall conform to the requirements of the permits and all costs therefor shall be included in the contract prices bid for the items involved. Copies or sample copies of these permits are included in the Appendix of these specifications.

1. The JPA will have submitted a Notice of Intent to Discharge, along with appurtenant fee, under the Construction Activities Storm Water General Permit (99- 08-DWQ). Under this permit the Contractor must prepare and submit Storm Water Pollution Prevent Plan per Section 01120 of the General Requirements.

1.02 PERMITS TO BE OBTAINED BY CONTRACTOR

A. Prepare and comply with a Storm Water Pollution Prevention Plan (SWPPP).

B. Prepare and comply with a San Joaquin Valley Air Pollution Control District Dust Control Plan.

C. (*List all other applicable permits*)

1.03 PERMIT-REQUIRED INSPECTION COSTS

CONTRACTOR shall pay the cost of inspection by Permit Issuer for work that is required by permit conditions to be performed on weekends or outside normal working hours. See individual permits for information on weekend work.

END OF SECTION

SECTION 00700

CONNECTIONS TO EXISTING SERVICES

1.01 COSTS OF CONNECTION TO EXISTING SERVICES

General Provisions Article GP 6.24 calls for Contractor to make connections to existing services at no additional expense to JPA.

END OF SECTION

SECTION 00800

SPECIAL STORAGE REQUIREMENTS

1.01 SPECIAL STORAGE REQUIREMENTS

General Provisions Article GP 7.10.2 indicates special methods may be required for storing excavated materials and materials and equipment in general.

END OF SECTION

DEE JASPAR & ASSOCIATES, INC.
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KERN FAN GROUNDWATER STORAGE PROJECT

TECHNICAL MEMORANDUM NO. 2
(*Conveyance Capacity Requirements)*

PREPARED FOR: Groundwater Banking Joint Powers Authority (JPA)
PREPARED BY: Curtis Skaggs, P.E., Dee Jaspar & Associates, Inc.
DATE: September 23, 2020

SUBJECT: ***Conveyance Capacity Requirements***
(90% Draft)

I. Executive Summary

This technical memorandum serves to evaluate the potential project water demands and identify the capacity requirements for the Conveyance Canal and the associated Pump Stations.

The memorandum addresses these primary questions:

1. What demand estimates should be utilized for project recharge areas?

2. What is the proper application of these demands in order to size the conveyance facilities?

Appendix A provides a brief project description for reference. This project description was used throughout the grant application process and is based upon the thirty-percent (30%) design. Therefore, the capacities, recharge rates, acreages, etc. may be outdated. It anticipated the recharge rates for the Phase I and Phase II properties at approximately 0.35 feet per day to 0.70 feet per day. The purpose of this memorandum is to more closely evaluate the Phase I and Phase II property locations and estimated recharge rates in an effort to design more closely to actual conditions.

The recharge areas have been evaluated based on soil survey maps, available tTEM geophysical survey information, and historical recharge rates for existing nearby recharge basins. An average recharge rate of 0.6 feet per day has been utilized for the Phase I Recharge Property and an average recharge rate of 0.5 feet per day has been utilized for the Phase II Recharge Property. The initial fill rate for these facilities is estimated at

1.5 times the average recharge rate. This affords the most aggressive filling rate for ponds of three (3) to seven (7) days and is still manageable by system operators. A 1.25 fill rate factor would be considered adequate and reduces the conveyance capacity requirement by 72 cfs. The 1.5 versus the 1.25 factor would provide approximately 1,000 AF additional recharge per Article 21 startup (72 cfs x 7 days). The 1.5 fill rate factor would also provide redundant conveyance capacity in terms of pump outages, aquatic restrictions, and subsidence.

The demands that will be served by the Conveyance Canal consist primarily of the Phase II Property and the West Basins Property. The canal diversion points include:

- In-Lieu Agricultural Demands

  The "in-lieu" agricultural lands include areas west of the I-5 Freeway and north of Stockdale Highway within the service area of the Rosedale-Rio Bravo Water Storage District. In addition, there are "in-lieu" agricultural lands adjacent to the conveyance canal that are east of the I-5 Freeway as well as surrounding the existing West Basins property.

  These demands are for lands that are considered adjacent to the conveyance canal and require relatively little infrastructure to be served.

  In addition, the peak "in-lieu" agricultural demand (June, July, August) is not anticipated to overlap with the peak recharge events (December, January, February, March) which will likely occur in the winter or early spring. An analysis of the Kern Fan Groundwater Storage Project for the Water Storage Investment Program by MBK Engineers dated February 23, 2018 evaluated the availability of Article 21 supply. In wet years and above normal water years, Article 21 supply has been available during the months of December, January, February, March, April, and May. In below normal water years, Article 21 supply has been available in the month of March.

  However, while a small portion of Article 21 supply may be utilized for "in-lieu" during recharge events, the canal will be capable of supplying one-hundred percent (100%) of the average "in-lieu" agricultural demand. The canal capacity is based upon the average "in-lieu" agricultural demand plus the recharge basin fill rate of 1.5 times the average recharge rate. In the event the peaking demand for "in-lieu" agricultural demand plus the fill rates of the recharge basins exceeds the canal capacity, the "in-lieu" water will be prioritized above recharge water.

- Phase II Recharge Property. Location of this property has been assumed at this time and is estimated as approximately 640 gross acres with approximately 508 wetted acres.

- West Basins Recharge Property. This is an existing recharge facility with approximately 388 gross acres and approximately 280 wetted acres. This property will be supplied water from the California Aqueduct in return for freeing up capacity from the east (Kern River or CVC) to supply the Phase I Recharge Property.

- West Basins Pipeline Intertie to Enns Basins. There is an existing 27-inch pipeline that can be utilized to convey water from the canal to the existing Enns Basins in order to free up additional capacity from the east (Kern River or CVC) to supply the Phase I Recharge Property. This will require a small pump station to convey the water through the 27-inch pipeline to the Enns Basins. If a Reach 5 is constructed to convey water to the Phase I Recharge Property (105 cfs Exchange Capacity) it may make more sense to deliver water to the Enns Basins from Reach 5 and forego the use of the existing 27-inch pipeline (24 cfs capacity). Rather than construct two small pump stations (Pump Station No. 4 and 27-inch Pipeline Pump Station) it may make more sense to simply construct Pump Station No. 4 and increase the amount of water to the Phase I Recharge Property through Reach 5 to 130 cfs.

- Phase I Recharge Property. Location of this property has been assumed at this time and is estimated as approximately 640 gross acres with approximately 530 wetted acres. This property has originally been assumed to not be served by the new conveyance canal, however this property could ultimately be acquired in close proximity to the conveyance canal or there is a disparity in the water exchange between the West Basins and the Phase I property that must be accounted for. The West Basins exchange currently estimates 135 cfs that can be supplied from the east via the Kern River and Goose Lake Channel (105 cfs + 24 cfs in WB Pipe Intertie + 6 cfs In-Lieu). The Phase I Property initial fill rate demand is approximately 240 cfs. This is a disparity of approximately 105 cfs that may need to be supplied by the conveyance canal from the California Aqueduct.

The table below summarizes the design criteria for flow capacities.

Capacity may also be considered for future projects such as supply for future recharge basins, Stockdale West, and Strand Ranch, however the scope of this memorandum does not evaluate future projects.

Table 1

Kern Fan Groundwater Banking Project

		Reach 1	Reach 2		Reach 3			Reach 4						
Conveyance Canal	Maximum Aqueduct Capacity	Aqueduct To Stockdale Hwy	Pump Station No. 1	Divert to In-Lieu Adjacent to Canal	Pump Station No. 2	Divert to In-Lieu Adjacent to Canal	Divert to Phase II	Pump Station No. 3	Divert to In-Lieu Adjacent to West Basins	Divert to WB Pipe Intertie with Enns	Divert to West Basins	Phase I Exchange Capacity[1]	Divert to Phase I	Balance
Conveyance Canal Demand Summary	500 cfs	443	443	8	435	3	192	240	6	24	105	105	105	57 cfs

[1]Water to Phase I is by an exchange with the West Basins and In-Lieu properties. However a disparity in demand exists whereby the demand for the West Basins, In-Lieu, and the WB Pipeline Intertie to the Enns Basins is 135 cfs (105 cfs + 6 cfs + 24 cfs Demand) and the Phase I Property is 240 cfs (240 cfs Initial Fill Rate). This is a disparity of 105 cfs to be accounted for by the Phase II conveyance canal.

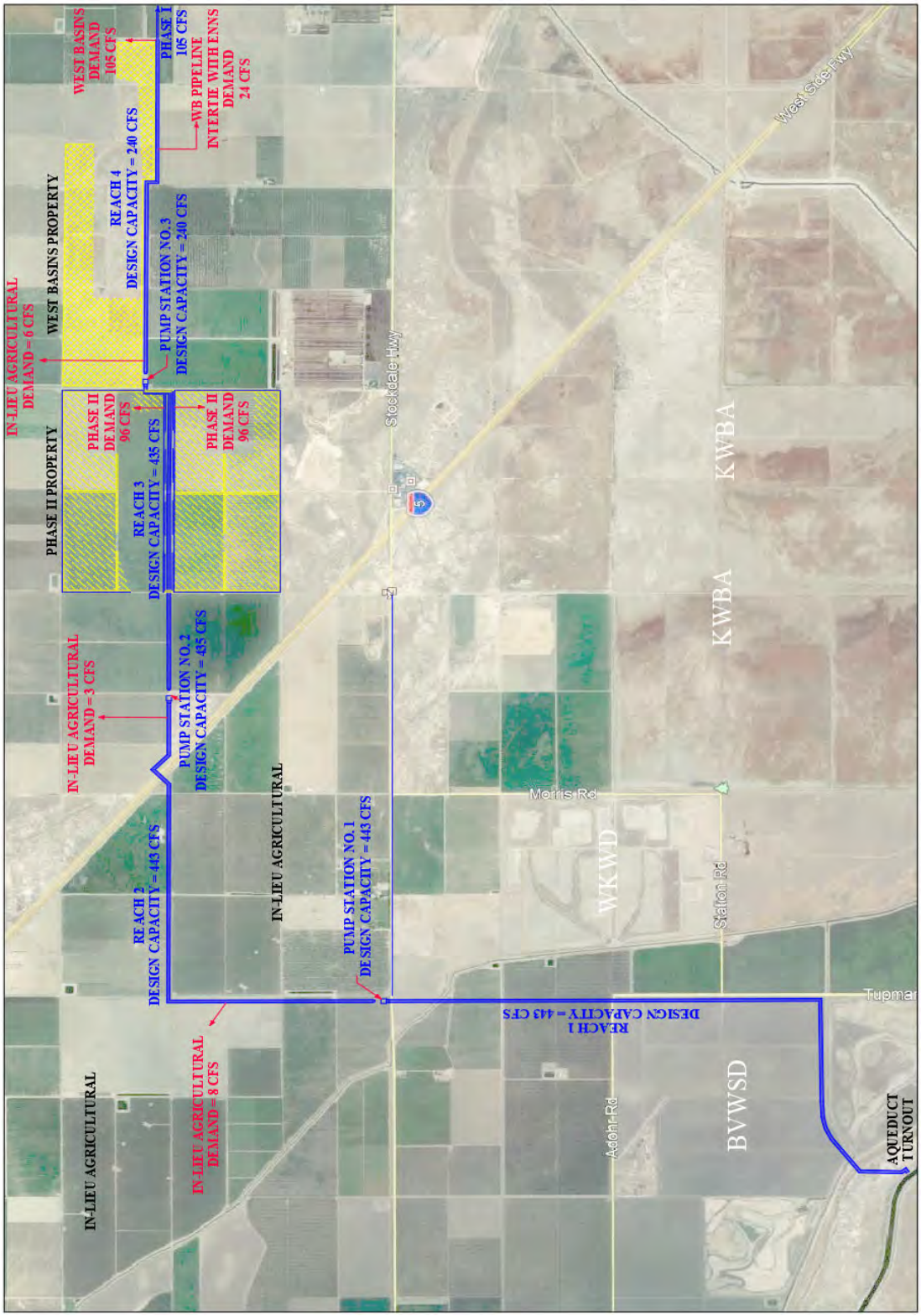

Figure 1: Conveyance Canal Demands and Capacities

It should be noted that the estimates herein are preliminary and subject to change in the event that the actual Phase I and Phase II recharge locations change or the conveyance canal alignment changes. In addition, physical geotechnical work, and perhaps tTEM geophysical work, will need to be performed at the Phase I and Phase II recharge locations during the engineering design to confirm the soil types and permeabilities.

I. Recharge Pond Infiltration and Filling Rates

A. Phase I Recharge Property

The proposed Phase I property is located west of Enos Lane and north of Stockdale Highway in Sections 26 and 27 of T29S, R25E, M.D.B.&M.

The property consists of approximately 630 acres as illustrated in Figure 2 below.

Figure 2: Phase I Property

The United States Department of Agriculture Soil Conservation Service Soil Survey Maps for the northwestern part of Kern County were reviewed in the area of the proposed Phase I property. The proposed property consists of the following soil types, generally speaking, in the top five-feet of the soil:

- Garces Silt Loam (SCS-156) +/- 20 acres
- Wasco Sandy Loam (SCS-243) +/- 30 acres
- Wasco Fine Sandy Loam (SCS-244) +/- 210 acres

- Westhaven Fine Sandy Loam (SCS-245) +/- 200 acres
- Cajon Loamy Sand (SCS-125) +/- 170 acres

The acreages noted above are estimates of the soil type across the property. The majority of the soil is:

- Wasco Fine Sandy Loam (+/- 33% of Property)
  Moderately Rapid Permeability

- Westhaven Fine Sandy Loam (+/- 33% of Property)
  Moderately Slow Permeability

- Cajon Loamy Sand (+/- 27% of Property)
  Rapid Permeability

The Rosedale-Rio Bravo Water District existing Enns Basins are located in the closest proximity to this property. The soil types for that area are predominantly:

- Cajon Loamy Sand (+/- 50% of Property)
  Rapid Permeability

- Wasco Fine Sandy Loam (+/- 45% of Property)
  Moderately Rapid Permeability

- Westhaven Fine Sandy Loam (+/- 5% of Property)
  Moderately Slow Permeability

The soil types for the Enns Basins are very similar to the soil types for the proposed Phase I property. The historic recharge rates for the Enns Basins were reviewed. An average recharge capacity for the Enns Basins is approximately 0.6 feet per day.

In addition, Rosedale-Rio Bravo Water Storage District had Ramboll, an engineering firm out of Emeryville, California, perform a tTEM geophysical survey of a portion of the proposed Phase I property. The transient electromagnetic (tTEM) method is a geophysical exploration technique in which electric and magnetic fields are induced by transient pulses of electric current and the subsequent decay response measured. This allows for a non-intrusive method of obtaining subsurface resistivity-conductivity data in an effort to identify the subsurface lithology.

The tTEM method measures the electrical resistivity of the earth. To assess the lithology below the ground surface, the resistivities measured by the receivers must be translated to lithologies. Translating resistivities to lithology is based on a general correlation between resistivity and type of sediments. Impermeable clay has a low resistivity. Sandy clay typically results in a resistivity ranging from 30 to 100 ohm-m, while sand to coarse sand has a resistivity above 50 ohm-m.

The average resistivity to an approximate depth of 200-feet for the southern half of Section 27 is approximately 25.1 ohm-m. This is illustrated in Figure 3 below. The average resistivity is comparable to the Stockdale East Recharge Facility property.

Figure 3: Average Resistivity for McCaslin Property (Portion of Phase I)

Figure 4 below illustrates the lithology vertically based on elevation and shows how the top 90-feet to 100-feet has coarser material (purple) well suited for groundwater recharge. A more detailed analysis of the tTEM survey in the area of the Phase I property is attached in Appendix B.

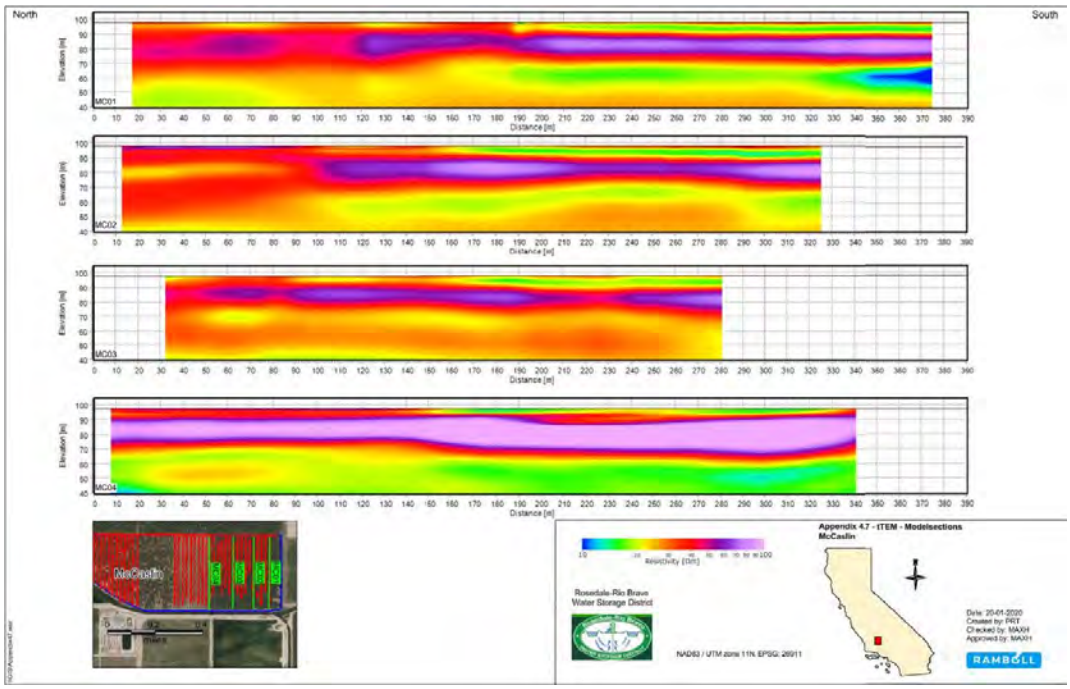

Figure 4: Model Sections of Southern Half of Section 27

The proposed Phase I Recharge property is anticipated to encompass approximately 630 acres. This may result in approximately 530 wetted acres of recharge basins. Based on the information above it is recommended that an average recharge rate of 0.6 feet per day be utilized for the proposed Phase I Recharge Basins. At the above described recharge rates, the following capacities will be required:

Average Maintenance Rate = 530 acres * 0.6 ft/day = 318 ac-ft/d = 160 cfs

Initial Fill Rate = 1.5 * 160 cfs = 240 cfs

This results in a flowrate of approximately 160 cfs. The initial fill rate is estimated as 1.5 * average flow rate which equates to a fill rate of approximately 240 cfs.

B. Phase II Recharge Property

The proposed Phase II property is located west of Bussell Road and north of Stockdale Highway in Sections 30 and 31, T29S, R25E, M.D.B.&M.

The property consists of approximately 640 acres as illustrated in Figure 5 below.

Figure 5: Phase II Property

The United States Department of Agriculture Soil Conservation Service Soil Survey Maps for the northwestern part of Kern County were reviewed in the area of the proposed Phase II property and the proposed property consists of the following soil types:

- Garces Silt Loam (SCS 156) +/- 20 acres
- Kimberlina Fine Sandy Loam (SCS 174) +/- 190 acres
- Westhaven Fine Sandy Loam (SCS 245) +/- 380 acres
- Cajon Loamy Sand (SCS 125) +/- 50 acres

The acreages noted above are estimates of the soil type across the property. The majority of the soil is:

- Kimberlina Fine Sandy Loam (+/- 30% of Property)
  Moderately Rapid Permeability

- Westhaven Fine Sandy Loam (+/- 60% of Property)
  Moderately Slow Permeability

The tTEM information did not exist for any properties in the vicinity of the Phase II property. It is recommended that this work be performed for the Enns Basins and the West Basins in an effort to correlate with actual average recharge rates and for comparison with the proposed Phase II property. The cost for these tTEM surveys is approximately $30,000 to $35,000. It is also recommended that tTEM surveys be performed on the eventual Phase I and Phase II recharge properties. The estimated cost for those surveys is approximately $60,000 to $65,000.

The Rosedale-Rio Bravo Water District existing West Basins are located in the closest proximity to this property. The historic recharge rates for the West Basins were reviewed. An average recharge capacity for the West Basins is approximately 0.5 feet per day.

Based on the information above it is recommended that an average recharge rate of 0.5 feet per day be utilized for the proposed Phase II Recharge Basins similar to that of the West Basins.

The proposed Phase II Recharge property is anticipated to encompass approximately 640 acres. This may result in approximately 508 wetted acres of recharge basins. At the above described recharge rates, the following capacities will be required:

Average Maintenance Rate = 508 acres * 0.5 ft/day = 254 ac-ft/d = 128 cfs

Initial Fill Rate = 1.5 * 128 cfs = 192 cfs

This results in a flowrate of approximately 128 cfs. The initial fill rate is estimated as 1.5 * average flow rate which equates to a fill rate of approximately 192 cfs.

C. West Basin Property

The West Basin property is already developed and utilized by the Rosedale-Rio Bravo Water Storage District. However, it is planned to provide recharge capacity for this property from the California Aqueduct and thus this recharge capacity must be accounted for in the conveyance facilities. The proposed West Basin property is located north of Stockdale Highway and is bisected by Bussell Road in Sections 28 and 29, T29S, R25E, M.D.B.&M.

The property consists of approximately 388 acres as illustrated in Figure 6 below.

Figure 6: West Basins Property

The United States Department of Agriculture Soil Conservation Service Soil Survey Maps for the northwestern part of Kern County were reviewed in the area of the West Basin property and the property consists of the following soil type:

- Westhaven Fine Sandy Loam (SCS 245) +/- 388 acres

The acreages noted above are estimates of the soil type across the property. The majority of the soil is:

- Westhaven Fine Sandy Loam (+/- 100% of Property)
  Moderately Slow Permeability

The historic recharge rates for the West Basins were reviewed. An average recharge capacity for the West Basins is approximately 0.5 feet per day.

The existing West Basins Recharge property encompasses approximately 388 acres. It is estimated that there are approximately 280 wetted acres of recharge basins.

It has been demonstrated for the West Basins that an average recharge rate of 0.5 feet per day can be achieved. At the above described recharge rates, the following capacities will be required:

Average Maintenance Rate = 280 acres * 0.5 ft/day = 140 ac-ft/d = 70 cfs

Initial Fill Rate = 1.5 * 70 cfs = 105 cfs

This results in a flowrate of approximately 70 cfs. The initial fill rate is estimated as 1.5 * average flow rate which equates to a fill rate of approximately 105 cfs.

II. In-Lieu (Agricultural) Demands

The Rosedale-Rio Bravo Water Storage District boundary is illustrated in Figure 7 below.

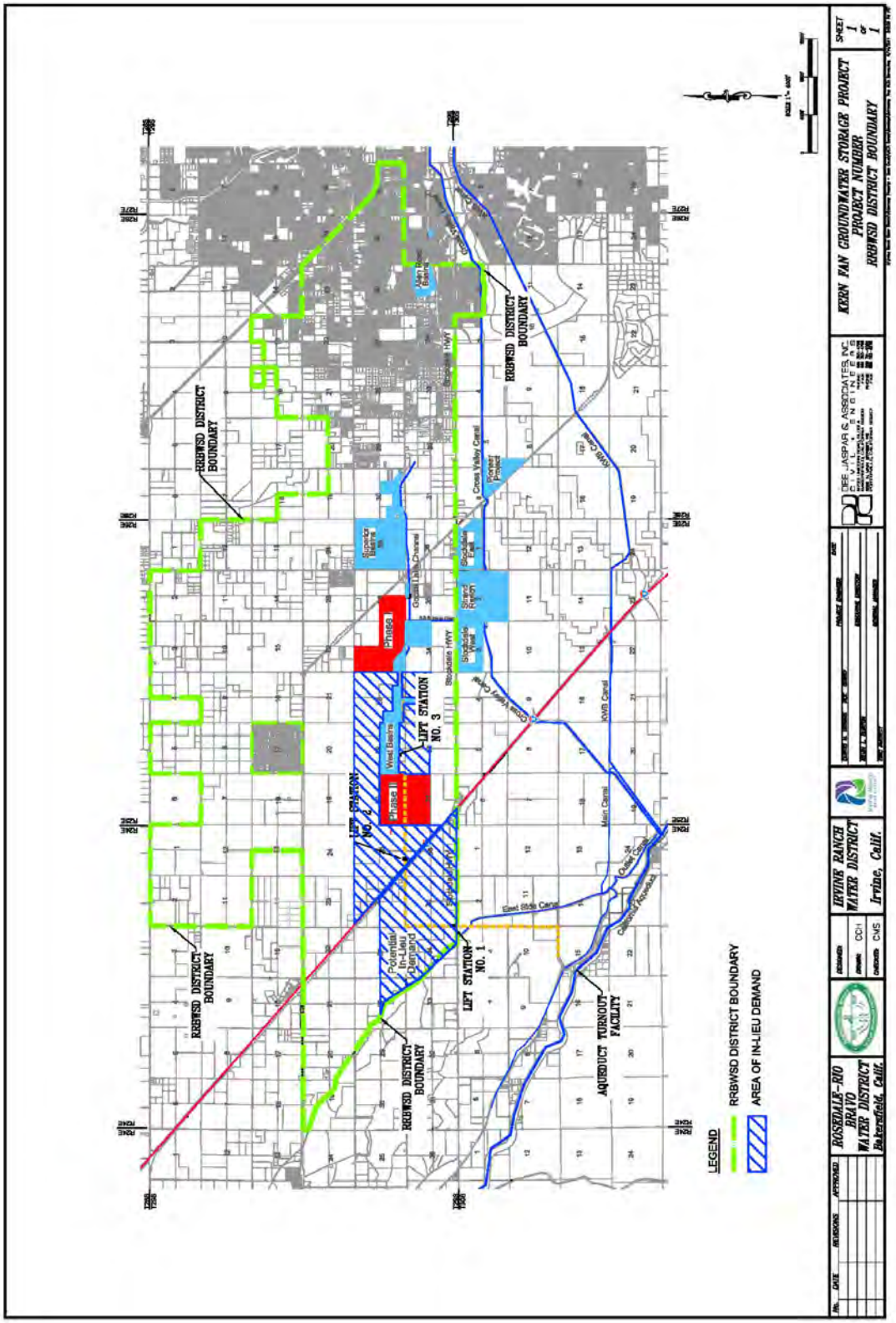

Figure 7: Potential In-Lieu Area

There are approximately 4,889 acres of farmland in the western region of the District, on the west and east sides of Interstate 5, that currently have limited access to surface water.

Due to this lack of infrastructure, these properties rely heavily on groundwater pumping. Implementing in-lieu service areas would enable the District to expand its area of surface water supply. This would achieve the following objectives:

- Allow the District to make greater use of high flow water supplies
- Reduce groundwater pumping
- Improve groundwater levels in the western region of the District

The lands identified herein for in-lieu water are considered adjacent to the proposed conveyance canal and are illustrated in Figure 7 above. The properties west of the I-5 Freeway considered adjacent to the conveyance canal consist of portions of Sections 26, 27, 28, 34, 35, and 36 in T29S, R24E. In addition, the cropping pattern has been estimated as of July 2020, see Table 2 below.

Table 2
Cropping Pattern Adjacent to Canal

Lands West of I-5 Freeway			
Crop	Acreage (acres)	Annual Demand (ac-ft)	Peak Demand (cfs)
Alfalfa	263.2	1174	5.86
Almonds	482.1	1745	10.74
Grape	64.8	172	1.44
Fallow	6.7	24	0.15
Pistachio	1400.1	4746	31.20
Totals:	2216.9	7862	49.39

[1]Water Demand for fallow lands estimated at 3.61 ac-ft/ac to account for development of these lands with surface water supply in future.
[2]Peak demand estimated as 10 gpm/acre.

There are also agricultural properties east of the I-5 Freeway and surrounding the existing West Basins that would likely receive water from the conveyance canal for in-lieu recharge. These lands are in portions of Sections 28, 29, 30, 31, 32, and 33 in T28S, R25E and are shown in Table 3 below.

Table 3
Cropping Pattern Adjacent to Canal

Lands East of I-5 Freeway			
Crop	Acreage (acres)	Annual Demand (ac-ft)	Peak Demand (cfs)
Alfalfa	258.4	1152.2	5.76
Almonds	814.1	2947.0	18.14
Carrots	280.0	700.0	6.24
Corn	600.6	1681.5	13.38
Cotton	249.6	773.6	5.56
Grape	360.0	957.6	8.02
Fallow	109.6	395.7	2.44
Totals:	2672.2	8608	59.54

[1]Water Demand for fallow lands estimated at 3.61 ac-ft/ac to account for development of these lands with surface water supply in future.
[2]Peak demand estimated as 10 gpm/acre.

This is a total in-lieu demand of 109 cfs (49.39 cfs + 59.54 cfs) for lands adjacent to the canal. However, high flow water supplies such as Article 21 water are typically available in wet years around the months of December through May. There is some overlap with the irrigation season noted above, however it avoids overlap with the peak irrigation months of June, July, August, and September as shown below in Table 4. Table 4 has been included to estimate the water demand for agriculture throughout the course of the year and demonstrates how the water demand drops off in the months of November through April.

During the months of January, February, March, and April when the Kern Fan Project would be receiving high flow water supplies and recharging under initial recharge rates, the in-lieu water demand would be a fraction (14% to 41%) of the peak month demands of July and August. Accounting for this limited irrigation demand equates to the need for additional conveyance capacity of approximately 17 cfs (109 cfs x 16%).

Table 4

Estimate of Seasonal Irrigation Demand

Month	Alfalfa		Almonds		Carrots		Corn		Cotton		Grapes		Pistachios		Totals		Estimate of Peak Water Demand Based on 10 gpm/ac
	ETc (in)	Water Use (ac-ft)	ETc (in)	Water Use (ac-ft)	ETc (in)	Water Use (ac-ft)	ETc (in)	Water Use (ac-ft)	ETc (in)	Water Use (ac-ft)	ETc (in)	Water Use (ac-ft)	ETc (in)	Water Use (ac-ft)	Water Use (ac-ft)	% of Peak Month	
Jan	1.11	48.25	1.05	113.42	1.11	25.90	1.11	55.56	1.11	23.09	1.06	37.52	1.05	122.51	400.34	14%	16 cfs
Feb	2.45	106.49	1.15	124.22	0.92	21.47	0.92	46.05	0.92	19.14	0.94	33.28	0.95	110.84	440.01	16%	17 cfs
Mar	4.32	187.78	1.30	140.42	1.20	28.00	1.20	60.06	0.12	2.50	0.52	18.41	0.12	14.00	423.16	15%	17 cfs
Apr	6.19	269.06	4.41	476.35	1.84	42.93	1.83	91.59	1.39	28.91	1.94	68.68	1.69	197.18	1131.77	41%	44 cfs
May	7.55	328.17	6.78	732.35	2.82	65.80	2.84	142.14	1.68	34.94	4.52	160.01	2.75	320.86	1718.48	62%	67 cfs
Jun	7.86	341.65	7.00	756.12	7.94	185.27	7.68	384.38	5.26	109.41	6.46	228.68	6.59	768.89	2589.13	93%	101 cfs
Jul	7.53	327.30	7.32	790.68	8.15	190.17	8.83	441.94	8.92	185.54	6.35	224.79	8.95	1044.24	3014.49	108%	109 cfs
Aug	6.57	285.58	6.00	648.10	2.76	64.40	5.96	298.30	8.10	168.48	5.06	179.12	7.75	904.23	2483.81	89%	97 cfs
Sept	5.13	222.98	4.45	480.67	0.02	0.47	0.46	23.02	5.74	119.39	2.58	91.33	5.73	668.55	1605.95	58%	63 cfs
Oct	2.10	91.28	2.03	219.27	0.33	7.70	0.33	16.52	1.57	32.66	0.51	18.05	3.10	361.69	739.47	27%	29 cfs
Nov	1.40	60.85	0.82	88.57	0.86	20.07	0.86	43.04	0.86	17.89	0.83	29.38	0.87	101.51	341.25	12%	13 cfs
Dec	1.27	55.20	1.10	118.82	1.14	26.60	1.14	57.06	1.14	23.71	1.11	39.29	1.10	128.34	422.43	15%	17 cfs
Totals:	53.48	2324.60	43.41	4689.00	29.09	678.77	33.16	1659.66	36.81	765.65	31.88	1128.55	40.65	4742.84	15310.30		
Average (AC-FT/AC):		4.46		3.62		2.42		2.76		3.07		2.66		3.39			

[1]ETc values used from Table 11 for Zone 15 in a Typical Year from the ITRC California Crop and Soil Evapotranspiration Report

The peak irrigation demand has been estimated as 109 cfs during the month of July. As stated above it is anticipated that high flow supplies will be available beginning around the months of December, January, February, or March. Therefore, an estimated irrigation demand of 17 cfs (Month of February) has been added to the conveyance canal capacity. It is assumed that even if the District is still recharging water through the summer months, that the average maintenance rates will be more appropriate than the fill rates, therefore there will be capacity in the canal for in-lieu recharge.

III. Enns Basins utilizing WB Pipeline Intertie

There is also an existing 27-inch well lateral that connects the West Basin wells to the RRBWSD Intake Canal directly adjacent to the Enns Basins. This pipeline could be utilized during recharge events to convey water to the Enns Basins via pumping from the conveyance canal. The Enns Basins include approximately 175 wetted acres of recharge area. The historic average recharge rate for these basins is 0.62 feet per day which results in a recharge flow rate of 55 cfs. The initial fill rate is estimated as 1.5 * average flow rate which equates to a fill rate of approximately 83 cfs.

Average Maintenance Rate = 175 acres * 0.62 ft/day = 109 ac-ft/d = 55 cfs

Initial Fill Rate = 1.5 * 55 cfs = 83 cfs

However, this conveyance is limited by the carrying capacity of the existing 27-inch well lateral or pipeline intertie. Since a pump station will be required at the conveyance canal, pipeline velocities could be designed to exceed 5 fps in an effort to increase the capacity of the pipeline.

WB Pipeline Capacity = at 5 fps = 20 cfs

WB Pipeline Capacity = at 6 fps = 24 cfs

WB Pipeline Capacity = at 7 fps = 28 cfs

WB Pipeline Capacity = at 8 fps = 32 cfs

In the event a Reach 5 is constructed to supply the Phase I Recharge Property, then it may make more sense to forego the use of the existing 27-inch pipeline and simply supply the Enns Basins from the Reach 5 Facilities or increase the overall reach capacity to the Phase I Property from 105 cfs to 129 cfs so that there is only one additional pump station.

IV. Other Potential Opportunities

There is the potential for other cooperative projects or future projects that could benefit RRBWSD and IRWD, however these have not been evaluated herein. Potential projects could include, but are not limited too:

- Recharge Area Expansion within RRBWSD District Boundary
- Cooperative Projects with the Buena Vista Water Storage District, the Kern Water Bank Authority, or the West Kern Water District

- Conveyance of Aqueduct Water to Stockdale West
- Conveyance of Aqueduct Water to Strand Ranch

V. Pump Stations and Reach Capacities

Three pump stations are currently planned for the conveyance canal which would divide the canal into four reaches.

- Reach One (1) of the conveyance canal begins at the California Aqueduct and ends at Pump Station No. 1 located just north of Stockdale Highway.

  Reach One Capacity is approximately 443 cfs which accounts for the following demands.

  - Phase II Property Initial Fill Rate 192 cfs
  - West Basins Initial Fill Rate 105 cfs
  - In-Lieu Agricultural Recharge 17 cfs
  - Enns Basins -WB Pipeline Intertie 24 cfs
  - Phase I Exchange Capacity 105 cfs

- Reach Two (2) of the conveyance canal begins at Pump Station No. 1 on the north side of Stockdale Highway and ends at Pump Station No. 2 on the east side of the Interstate 5 Freeway.

  Reach Two Capacity and Pump Station No. 1 Capacity is approximately 443 cfs which accounts for the following demands.

  - Phase II Property Initial Fill Rate 192 cfs
  - West Basins Initial Fill Rate 105 cfs
  - In-Lieu Agricultural Recharge 17 cfs
  - Enns Basins -WB Pipeline Intertie 24 cfs
  - Phase I Exchange Capacity 105 cfs

- Reach Three (3) of the conveyance canal begins at Pump Station No. 2 located on the east side of the Interstate 5 Freeway and ends at Pump Station No. 3 near the west end of the West Basins.

  Reach Three Capacity and Pump Station No. 2 Capacity is approximately 435 cfs which accounts for the following demands:

  - Phase II Property Initial Fill Rate 192 cfs
  - West Basins Initial Fill Rate 105 cfs
  - In-Lieu Agricultural Recharge 9 cfs
  - Enns Basins -WB Pipeline Intertie 24 cfs
  - Phase I Exchange Capacity 105 cfs

- Reach Four (4) of the conveyance canal begins at Pump Station No. 3 located near the west end of the West Basins and ends at the West Basins Turnout at the east end of the West Basins.

  Reach Four Capacity and Pump Station No. 3 Capacity is approximately 240 cfs which accounts for the following demands:

  - West Basins Initial Fill Rate 105 cfs
  - In-Lieu Agricultural Recharge 6 cfs
  - Enns Basins -WB Pipeline Intertie 24 cfs
  - Phase I Exchange Capacity 105 cfs

VI. Summary

The conveyance canal will need to provide capacity for the following uses:

- In-Lieu Agricultural Demand 17 cfs
- Phase II Property Recharge 192 cfs
- West Basins Property Recharge 105 cfs
- Enns Basins – WB Pipeline Intertie 24 cfs
- Phase I Exchange Capacity (Potential Reach 5) 105 cfs

The conveyance capacity and associated pump station capacity would decrease as these demands are accounted for. These reach capacities are summarized in Table 5 and illustrated in Figure 11.

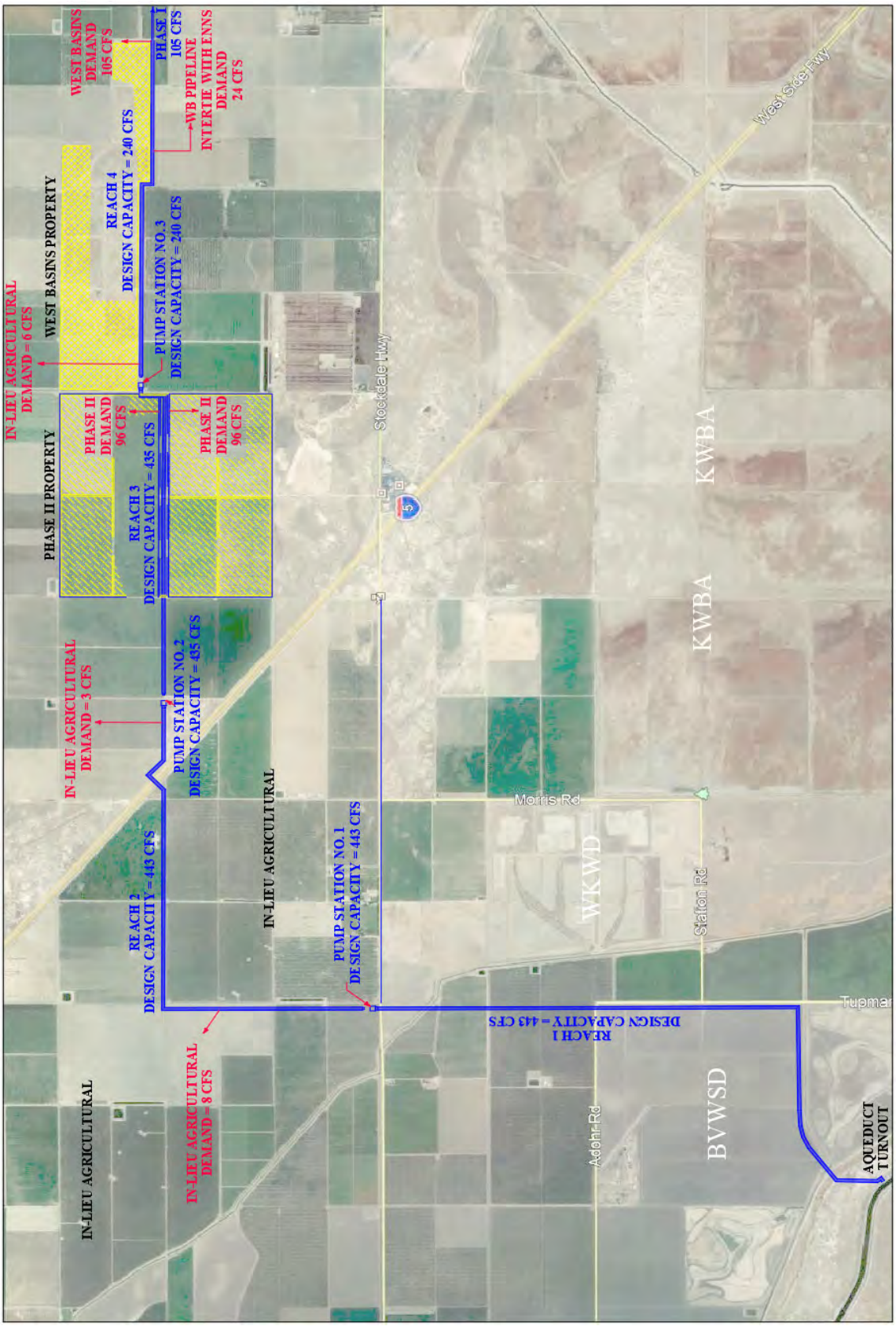

Figure 8: Conveyance Canal Demands and Capacities

A summary of the conveyance capacities is shown below in Table 5:

Table 5
Conveyance Canal Design Capacity

Conveyance Canal Facility	Design Canal Capacity	Design Pump Station Capacity
Reach 1	443 cfs	
Reach 2	443 cfs	443 cfs
Reach 3	435 cfs	435 cfs
Reach 4	240 cfs	240 cfs
Reach 5, if necessary	129 cfs	129 cfs

As described herein, Article 21 water supply is typically available in the months of December, January, February, March, April and May. Beyond these months of the year it is anticipated that the recharge areas would be at the maintenance rates rather than the initial fill rates.

The agricultural demands are typically the highest during the months of June, July, August, and September.

Table 6 illustrates the conveyance canal demands throughout the year for a 1) wet year or above normal year, 2) below normal wet year, and 3) for a dry or critical year. The anticipated peak flow of the conveyance canal is 443 cfs.

In wet years and above normal years, the conveyance canal is able to supply 100% of the average "in-lieu" agricultural demand as the recharge decreases to the estimated maintenance rates. While in below normal years and dry or critical years, the conveyance canal is able to supply 100% of the average "in-lieu" agricultural demand as water is available.

Table 6

Estimated Maximum Conveyance Canal Capacity by Month

Demand Description	January	February	March	April [2]	May	June	July	August	September	October	November	December
Recharge Operations (Wet Year or Above Normal Year)[3]	426	426	426	354	282	282	282	282	282	282	282	426
In-Lieu Agricultural[1]	16	17	17	44	67	101	109	97	63	29	13	17
Monthly Totals (Wet Year or Above Normal Year):	**442**	**443**	**443**	**398**	**349**	**383**	**391**	**379**	**345**	**311**	**295**	**443**
Recharge Operations (Below Normal Year)[3]	0	0	426	0	0	0	0	0	0	0	0	0
In-Lieu Agricultural[1]	16	17	17	44	67	101	109	97	63	29	13	17
Monthly Totals (Below Normal Year):	**16**	**17**	**443**	**44**	**67**	**101**	**109**	**97**	**63**	**29**	**13**	**17**
Recharge Operations (Dry or Critical Year)	0	0	0	0	0	0	0	0	0	0	0	0
In-Lieu Agricultural[1]	16	17	17	44	67	101	109	97	63	29	13	17
Monthly Totals (Dry or Critical Year):	**16**	**17**	**17**	**44**	**67**	**101**	**109**	**97**	**63**	**29**	**13**	**17**

[1]The "In-Lieu" agricultural demand is the average demand based upon land area, cropping pattern, and monthly Et_c.

[2]The recharge demand for the month of April is an interpolation between the fill rate of 426 cfs in March and the maintenance rate of 282 cfs in May.

[3]The months of December through April are based upon Article 21 supplies being available for recharge up to the estimated filling rate. The months of May through November are the maintenance rates and are based on other water supplies besides Article 21 water.

VII. Related Work Specified Elsewhere

A. TM 3 – Pipeline Requirements
B. TM 4 – Pump Station Requirements
C. TM 5 – Geotechnical Investigation
D. TM 6 - Canal Liner and Turnout Requirements
E. TM 8 - ROW Acquisitions
F. TM 11 – Facility Operation and SCADA Requirements
G. TM 12- Engineer's Estimates

Appendices

Appendix A – Original Project Description
Appendix B - tTEM Results on portion of Phase I Property

Appendix A
Project Description

The Kern Fan Groundwater Storage Project (Project) consists of a regional water bank in the Kern County Groundwater Sub-basin of the San Joaquin Groundwater Basin in Kern County, California that will provide water supply, groundwater and ecosystem benefits. Project facilities will be planned, designed, constructed, owned, and operated by the Kern Fan Joint Powers Authority (JPA) that consists of representatives from the Irvine Ranch Water District (IRWD) and the Rosedale-Rio Bravo Water Storage District (RRBWSD). IRWD and RRBWSD share a ten-year history of implementing successful water banking projects in Kern County. The Project concept, sizing, location, features and operations are based on the experience and knowledge gained from IRWD's and RRBWSD's existing water banking projects.

The total storage capacity to be developed by the Project is anticipated to be 100,000 acre-feet. The Project will be supplied primarily by the State Water Project's supplies that exceed the SWP Contractors allocation during a wet year (Article 21 supplies) and also by other wet-year water supplies as available, including Kern River water. In wet years, when it is declared available by the California Department of Water Resources (DWR), the JPA will take delivery of Article 21 supplies to store in the Project. IRWD and RRBWSD will equally share 75 percent of the Article 21 water delivered into storage for water supply and groundwater benefits. The remaining 25 percent of the stored Article 21 water will be held as State Water Project (SWP) system water that will be used for ecosystem benefit purposes. The ecosystem benefits will be derived by exchanging water from the Kern Fan Project to Oroville Reservoir where they will be released as needed for short term pulse flows. This exchange will be coordinated through a separate agreement.

Other water supplies that could be available for the Project include other SWP supplies diverted from the California Aqueduct, as well as other supply sources including Central Valley Project Section 215 flood water and high-flow Kern River water.

The Project objectives are to cost-efficiently recharge and store groundwater for subsequent recovery to address the following:

- Enhance water supply reliability;
- Reduce imported water demands on the San Francisco Bay/Sacramento –San Joaquin Delta Estuary (Delta) to benefit spring and winter-run Chinook salmon;
- Provide water supply during drought conditions;
- Provide water supply for emergency response benefits;
- Establish temporary wetlands through intermittent recharge events that will attract migratory and other water fowl in Kern County;
- Benefit the water levels in the Kern County Groundwater Sub-basin;
- Provide sustainable water supply for local agricultural use; and
- Be integrated into other water storage projects and storage reservoirs to provide greater statewide benefits.

The Project involves purchasing approximately 640 acres of land mostly within the Rosedale Rio Bravo Water Storage District (RRBWSD) boundary and within the limits of the Stockdale Integrated Banking Project Environmental Impact Report (EIR). Water will be conveyed to this property for recharge from the Friant-Kern Canal or the Kern River by exchange via the Goose Lake Channel or from the Cross Valley Canal (CVC) via the RRBWSD Intake Canal. An interconnection pipeline will be constructed from the RRBWSD Intake Canal to the proposed property to connect the two. A new check structure will be required in the Goose Lake Channel with a reinforced concrete turnout structure constructed behind it to convey water from the Goose Lake Channel to the Phase I property. This turnout structure will include a lift station with four 60 cfs pumps each equipped with 200 hp vertical motors to lift the water up to the Phase I property for recharge and include discharge piping, metering, appurtenances, lighting, electrical, controls, and SCADA communication. The anticipated recharge at this proposed property will initially be 230 cfs (0.7 ft/d of recharge) and then drop to an approximate maintenance rate of 115 cfs (0.35 ft/d of recharge).

The Phase I property will be developed for recharging ground water and the construction work will include site clearing and grubbing, installation of site fencing and gates, construction of earthen levees, construction of inter-basin structures and conveyance facilities, rip-rap, and existing well abandonments. In addition the property will be equipped with up to six recovery wells with an approximate capacity of 5 to 6 cfs each. These will be 20-inch diameter wells cased to approximately 930-ft. The wells will be equipped with vertical turbine pumps, 400 hp vertical hollowshaft motors, discharge piping, appurtenances, electrical and controls, and site improvements. The underground well conveyance piping will be PVC pipe ranging in size from 12-inch to 30-inch diameter. The recovery wells will return water through a conveyance pipeline that crosses the Goose Lake Channel and discharges into the RRBWSD Intake Canal whereby the water is returned to the Cross Valley Canal (CVC) for delivery or exchange to the California Aqueduct.

In order to have capacity in the Goose Lake Channel to recharge water to the Phase I property it is proposed to supply water to the existing RRBWSD West Basins by an alternate means. Due to limited capacity in the Goose Lake Channel and the CVC it is planned to construct a new reinforced concrete turnout at the California Aqueduct and convey 500 cfs approximately 9.0 miles to the easterly end of the RRBWSD West Basins. The 500 cfs capacity will account for initial recharge to the West Basins of approximately 120 cfs, initial recharge to the Phase II Property of approximately 230 cfs, and potential in lieu recharge water to District farmlands. The approximate water surface elevation at the California Aqueduct is 305-ft. The approximate elevation at the east end of the West Basins is 315-ft therefore requiring an approximate static lift of 10-feet. This water supply will be conveyed in a new canal with the approximate dimensions of a 20-ft wide bottom, 8-ft depth, and 1.5:1 side slopes. A habitat conservation plan (HCP) and mitigation credit for the conveyance easement equal to approximately 100 acres is included. The canal will be concrete lined and have siphon crossings at the following major locations:

- Outlet Canal & West Side Canal
- Adohr Road
- East Side Canal
- Stockdale Highway
- Interstate 5 Freeway
- Miscellaneous Levee Roads and Farm Roads

The canal is planned to be concrete lined in an effort to minimize weeds, debris, and sediment in the siphon crossings and the lift station forebays. Furthermore the concrete lining has the longest useful life. The canal will have three lift stations along the alignment to lift water to the recharge basins. It is estimated that the first lift station will consist of a reinforced concrete pump station with two 30 cfs low lift pumps with 100 hp motors, two 60 cfs low lift pumps with 200 hp motors, and four 80 cfs low lift pumps with 300 hp vertical motors, discharge piping and appurtenances, electrical and controls in order to convey 500 cfs to the east side of the I-5 Freeway. The second lift station will consist of a reinforced concrete pump station with two 30 cfs low lift pumps with 100 hp motors, two 60 cfs low lift pumps with 200 hp motors, and four 80 cfs low lift pumps with 300 hp vertical motors, discharge piping and appurtenances, electrical and controls in order to convey 500 cfs to the west end of the West Basins and to the Phase II Recharge Property. The third lift station will consist of a reinforced concrete pump station with two 30 cfs low lift pumps with 100 hp motors, two 60 cfs low lift pumps with 200 hp motors, and four 80 cfs low lift pumps with 300 hp vertical motors, discharge piping and appurtenances, electrical and controls in order to convey 500 cfs to the east end of the West Basins and the Goose Lake Channel. Each lift station will also include a gravity bypass line with slide gate into the lift station structure for the reverse flow of recovered water back to the California Aqueduct.

A reinforced concrete turnout structure for approximately 420 cfs will be constructed at the east end of the West Basins to convey recharge water to the West Basins and to the Goose Lake Channel if necessary. This structure will be equipped such that recovered water from the WB wells can be returned through the canal conveyance facility to the California Aqueduct.

In addition, the Project involves purchasing approximately 640 acres of Phase II land located within the Rosedale Rio Bravo Water Storage District boundary but outside of the limits of the Stockdale Integrated Banking Project EIR. Water will then be conveyed to this property from the California Aqueduct via the new canal.

The Phase II property will be developed for the recharge and recovery of ground water. The anticipated recharge at this property will initially be approximately 230 cfs (0.7 ac-ft/d) and then drop to an approximate maintenance rate of 115 cfs (0.35 ac-ft/d). The scope of work for construction will include site clearing and grubbing, installation of site fencing and gates, construction of earthen levees, construction of inter-basin structures and conveyance facilities, rip-rap, and existing well abandonments. In addition the property will be equipped with six recovery wells with an approximate capacity of 5 to 6

cfs each. These will be 20-inch diameter wells cased to approximately 930-ft. The wells will be equipped with vertical turbine pumps, 400 hp vertical hollowshaft motors, discharge piping, appurtenances, electrical and controls, and site improvements. The underground well conveyance piping will be PVC pipe ranging in size from 12-inch to 30-inch diameter. The recovery wells will pump water through conveyance pipelines back to the new canal and reverse flow water in the canal by gravity to return water to the California Aqueduct. At the California Aqueduct turnout afterbay facility, a small lift station will be constructed to lift water into the turnout pipeline and convey the water back to the California Aqueduct.

The proposed Project will also include the construction of a SCADA system to aid in the operations of the Aqueduct turnout, the canal lift stations, the turnout facilities to the groundwater banking properties, and the recovery water well facilities. This will include PLC's, radio communication, computer station at a central headquarters, and control programming.

Appendix B
tTEM Results on portion of Phase I Property

The tTEM method measures the electrical resistivity of the earth. To assess the lithology below the ground surface, the resistivities measured by the receivers must be translated to lithologies. Translating resistivities to lithology is based on a general correlation between resistivity and type of sediments. Impermeable clay has a low resistivity. Sandy clay typically results in a resistivity ranging from 30 to 100 ohm-m, while sand to coarse sand has a resistivity above 50 ohm-m. This correlation is a general assumption and can vary between locations. For purposes of the figures below, from the Ramboll study, the resistivities are color coded, see Figure 2.

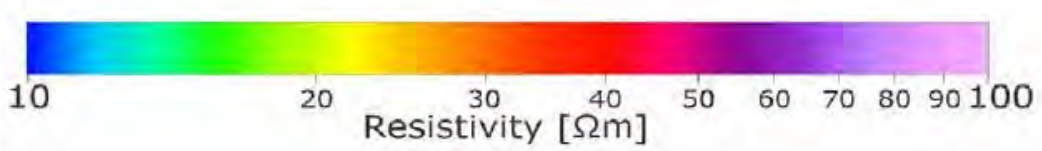

Figure 1: Resistivity Color Scale

It is estimated that clays are typically below 15 ohm-m (blue, light blue), silt layers are found to vary significantly from 10 – 40 ohm-m (green, yellow, orange, red), and sands and/or gravels are typically above 40 ohm-m (pink, purple). The large variations for the silt layers are interpreted to reflect the clay content, either as thin interbedded clay sequences or as a mixture of silt and clay.

The data surveyed indicates the southern half of Section 27 is interpreted mostly as clay and silts at depths to 13-feet below ground surface. See figures 2 and 3 below.

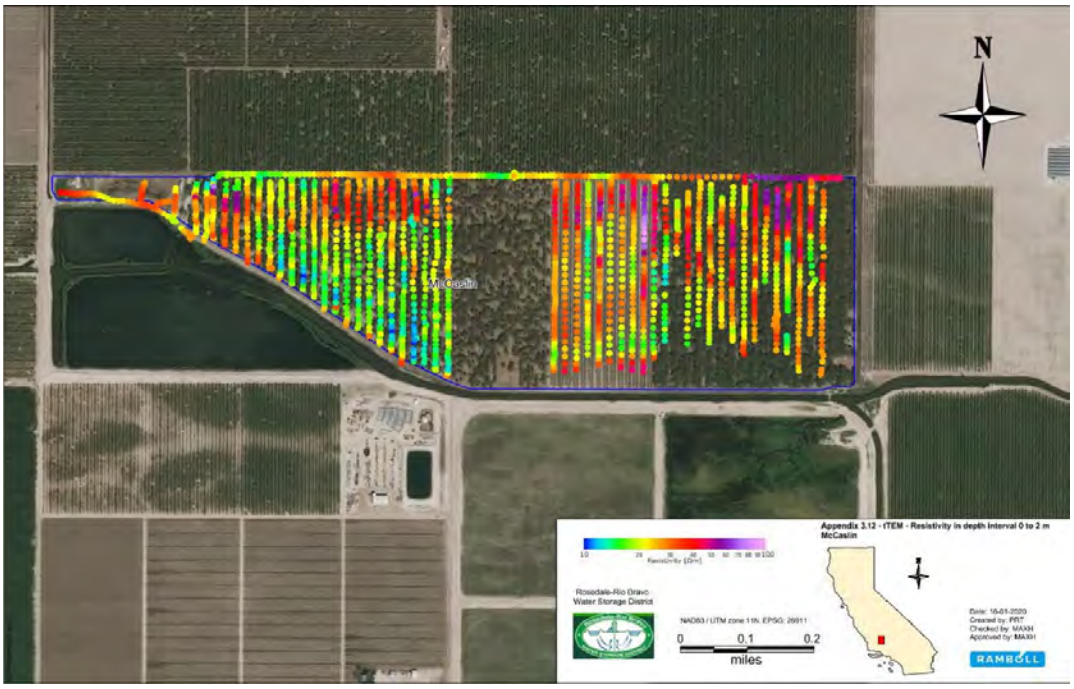

Figure 2: Depths of 0-feet to 6.5-feet

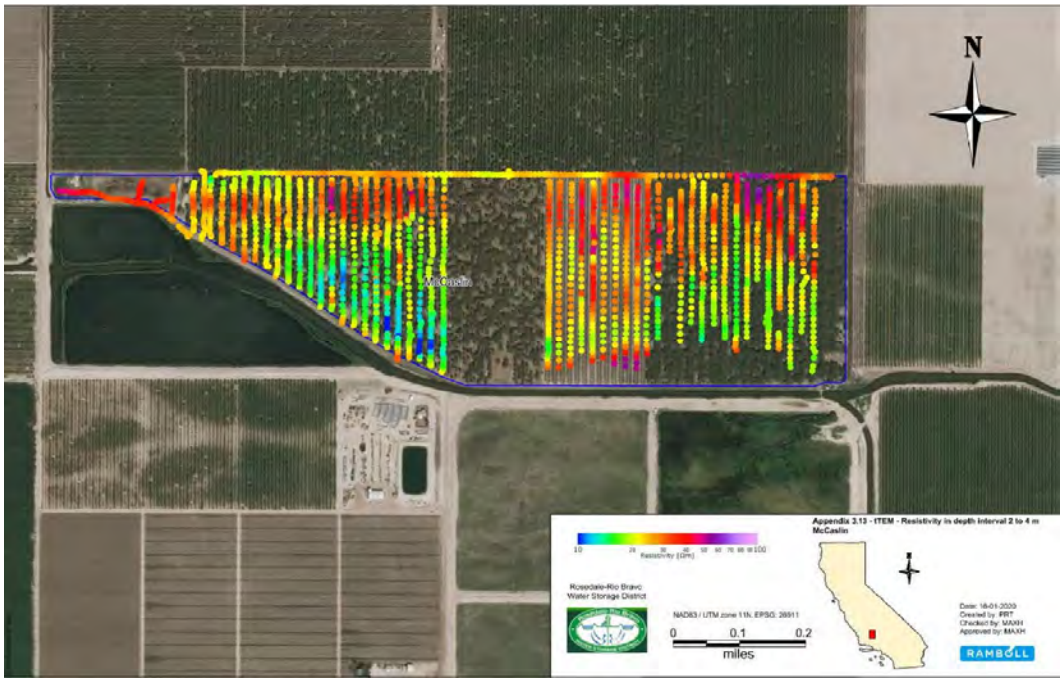

Figure 3: Depths of 6.5-feet to 13-feet

The depth interval from 13-feet to approximately 32-feet begins to transition from the silt and clays to coarser material, see Figures 4 and 5.

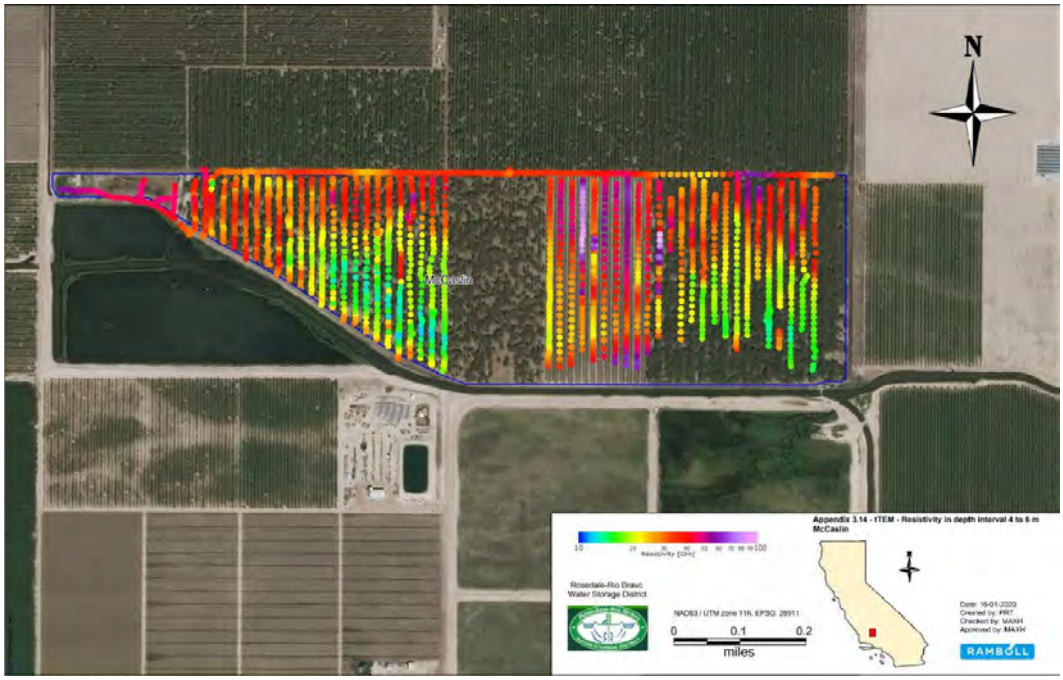

Figure 4: Depths of 13-feet to 20-feet

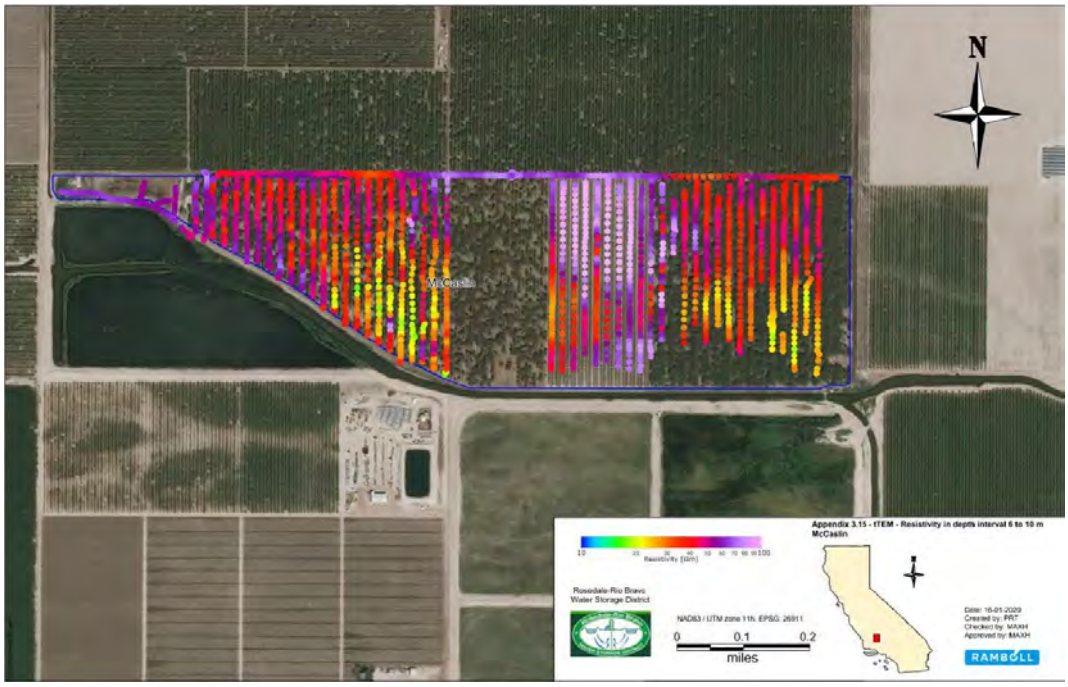

Figure 5: Depths of 20-feet to 32-feet

The depth interval from 32-feet to 65-feet illustrates coarse sands and gravels throughout the majority of the southern half of Section 27 as shown in Figures 6 and 7.

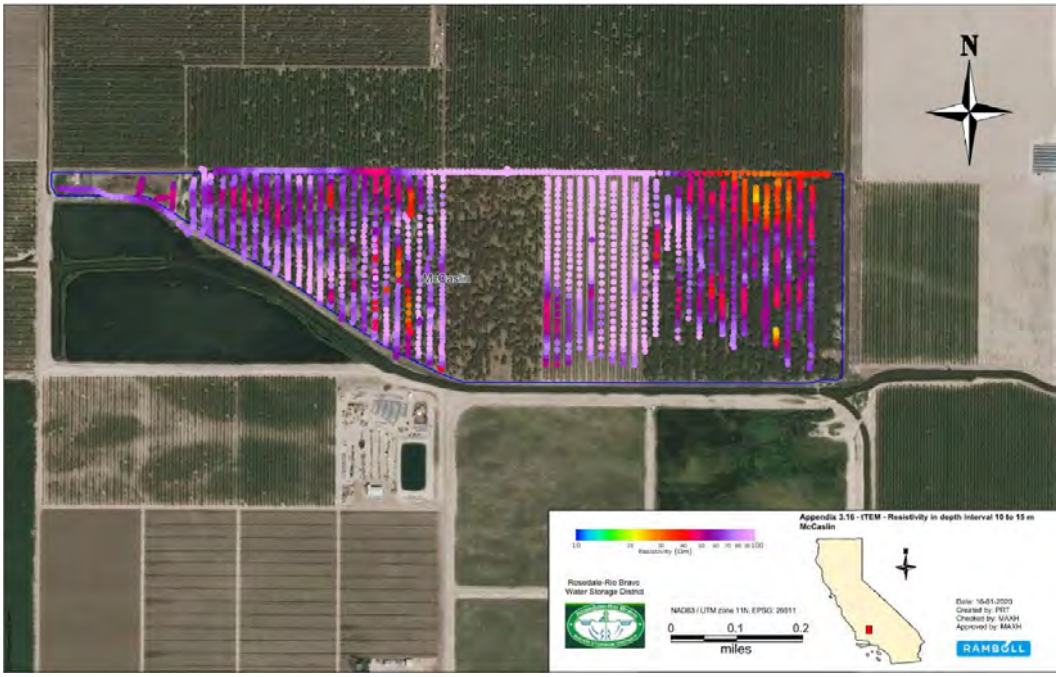

Figure 6: Depths of 32-feet to 49-feet

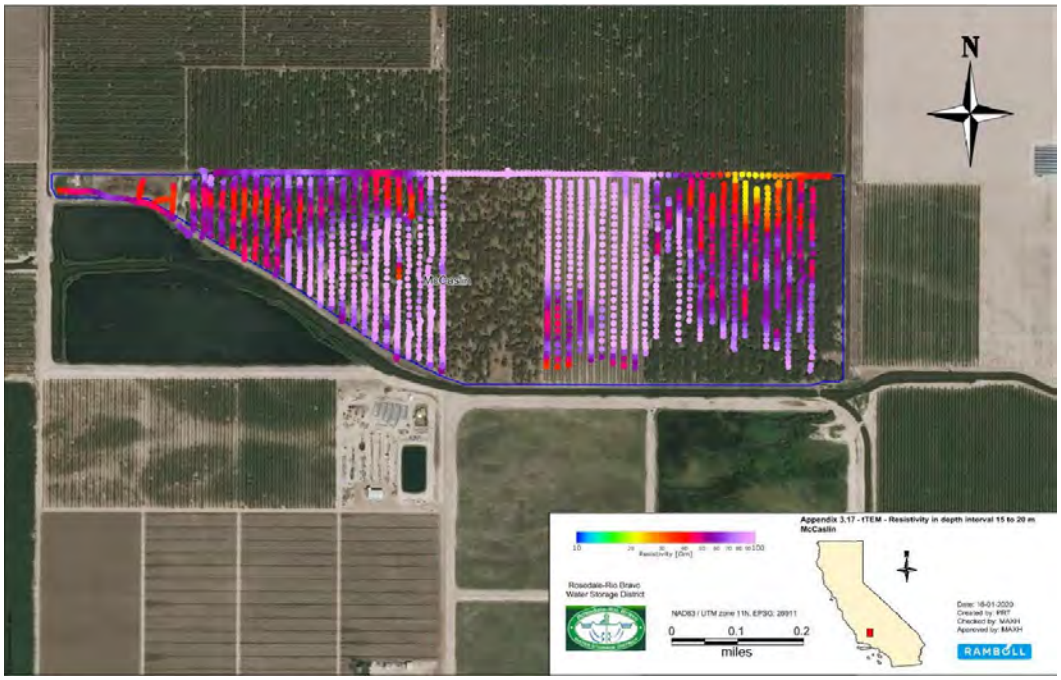

Figure 7: Depths of 49-feet to 65-feet

The depth interval from 65-feet to 82-feet below ground surface shows a large area in the central part as being coarse sand material. To the northwest and eastern parts of the south half of Section 27, the resistivities tend to be slightly lower, indicating finer material, see Figure 8.

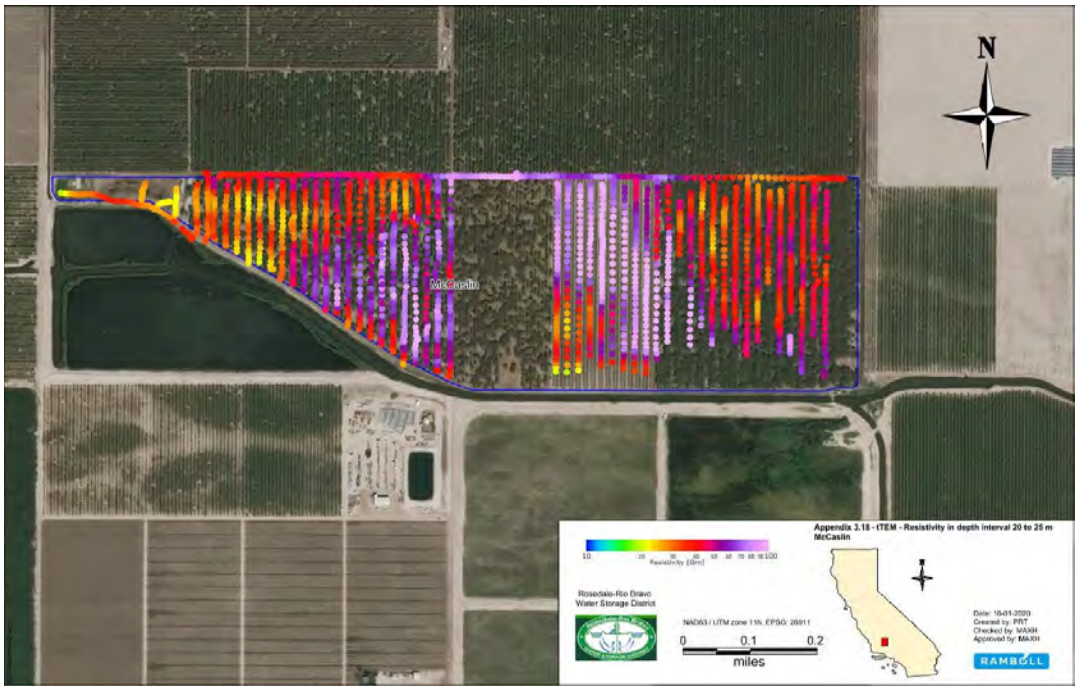

Figure 8: Depths of 65-feet to 82-feet

Beyond a depth of approximately 82-feet the material begins to transition back to a finer, siltier material with some clay, see Figures 9 through 12.

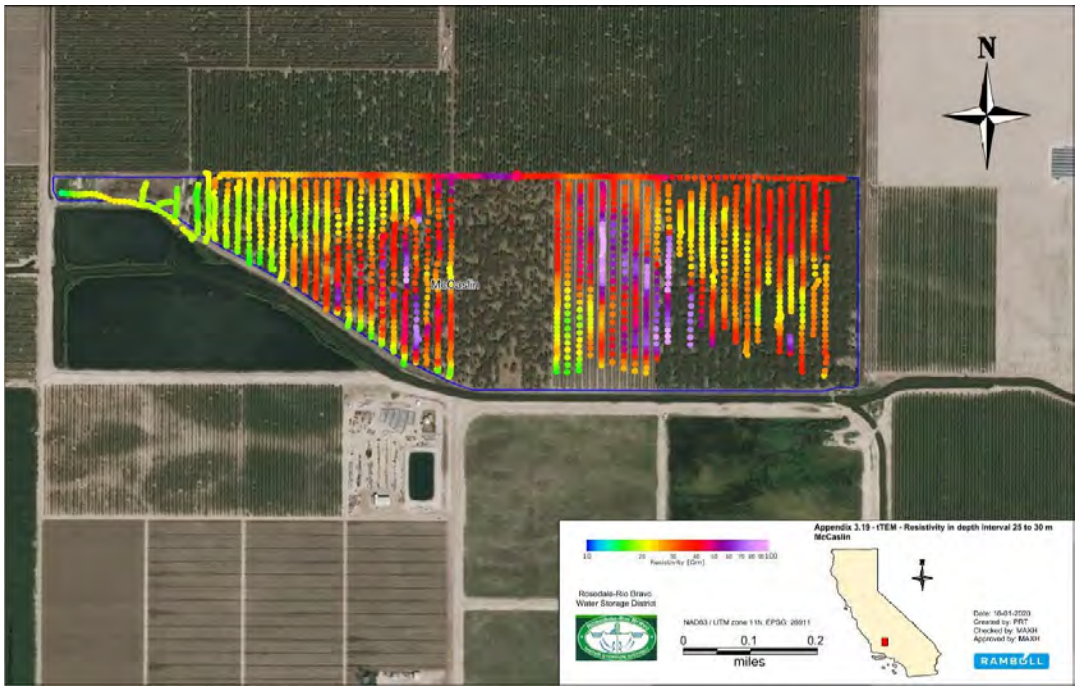

Figure 9: Depths of 82-feet to 98-feet

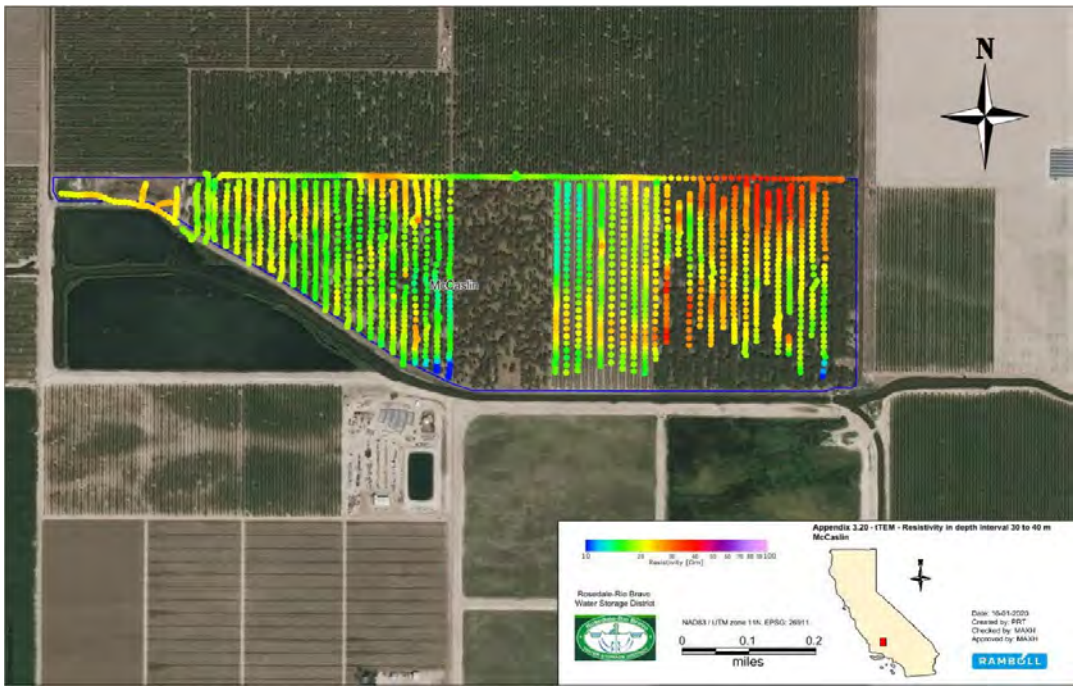

Figure 10: Depths of 98-feet to 131-feet

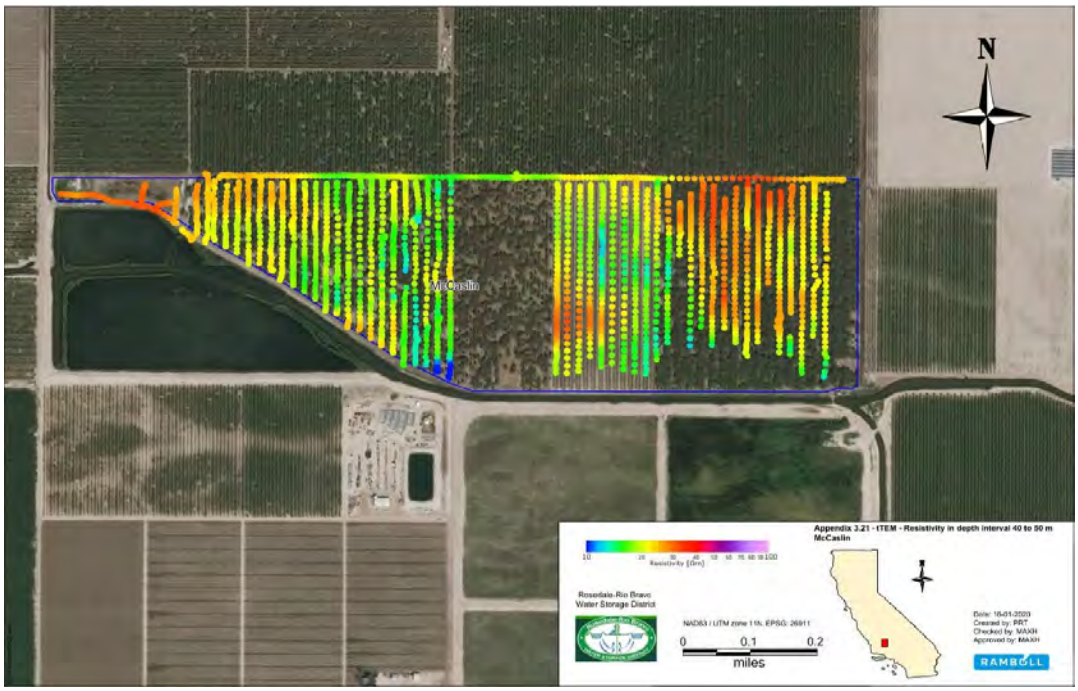

Figure 11: Depths of 131-feet to 164-feet

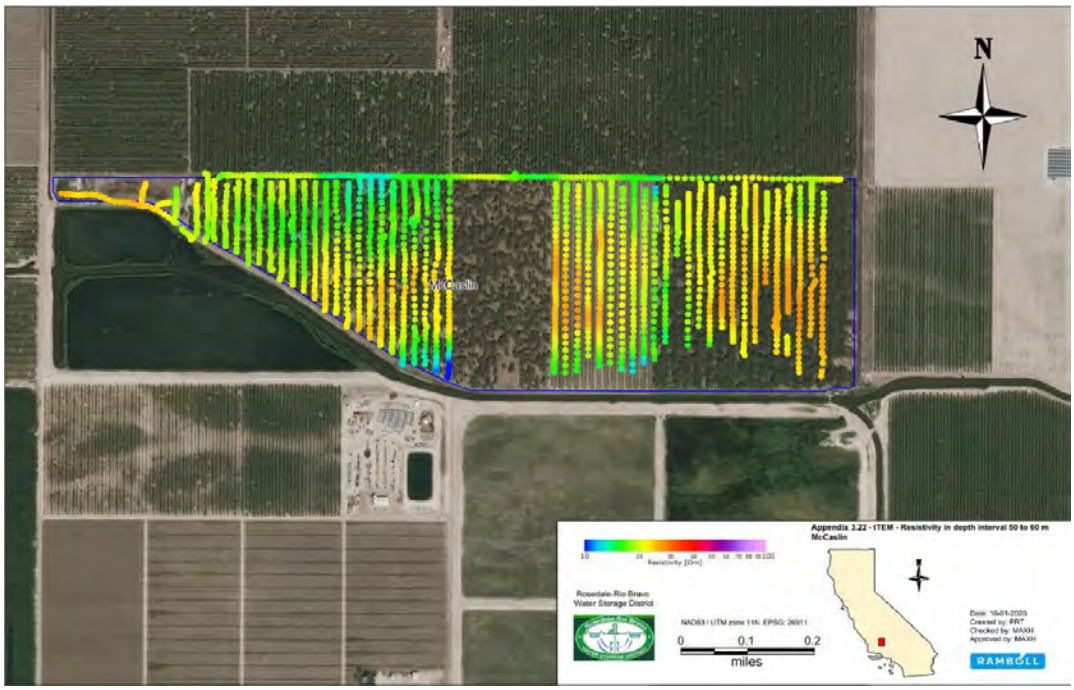

Figure 12: Depths of 164-feet to 197-feet

The average resistivity for the southern half of Section 27 is approximately 25.1 ohm-m. Figure 13 below illustrates the lithology vertically based on elevation and shows how the top 90-feet to 100-feet has coarser material well suited for groundwater recharge.

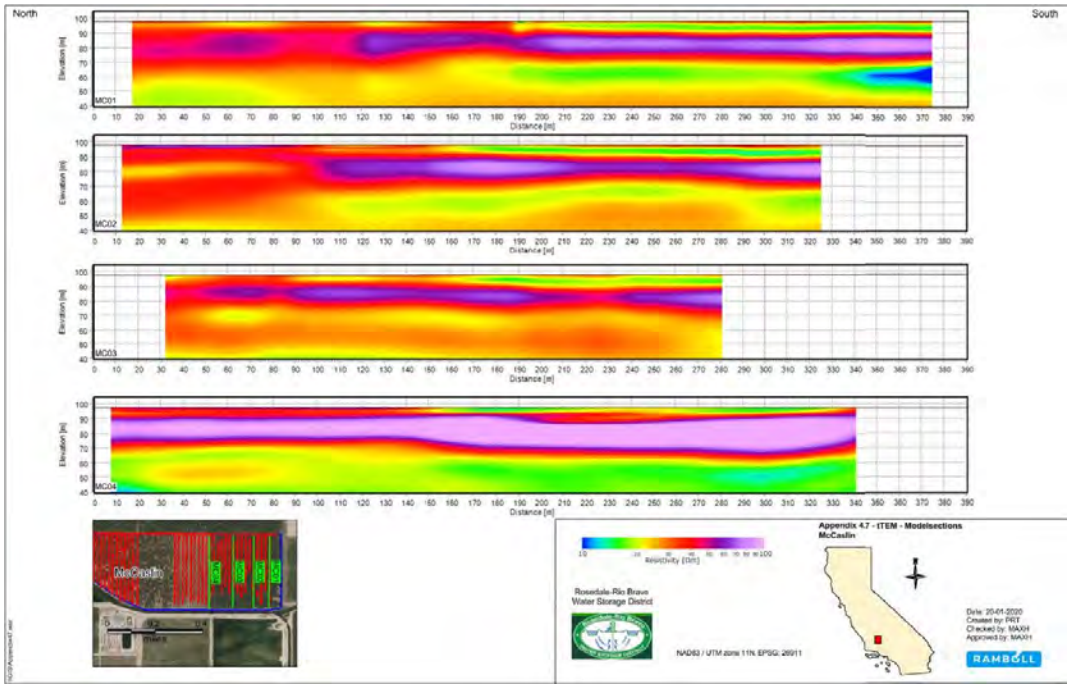

Figure 13: Model Sections of Southern Half of Section 27

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KERN FAN GROUNDWATER STORAGE PROJECT

TECHNICAL MEMORANDUM NO. 3
(Pipeline Requirements)

PREPARED FOR: Groundwater Banking Joint Powers Authority (JPA)
PREPARED BY: Curtis Skaggs, P.E.
DATE: November 23, 2020

SUBJECT: ***Pipeline Requirements***

I. Executive Summary

The successful performance of any pipe generally depends on:

1) proper selection of the type of pipe and class of pipe for the application
2) proper sizing of the pipeline for the hydraulic conditions
3) type of bedding and backfill material
4) proper installation and care of bedding, backfill, and compaction
5) pipeline venting to protect the pipeline system and maintain its efficiency
6) corrosion implications and protection

This memorandum serves to address some of the items above and provide the basis for the pipeline design and the preliminary Engineer's Estimate. The type of pipe and sizes of pipe recommended herein are preliminary and subject to change. The project designer shall review and evaluate the findings herein and will ultimately be responsible for the final design thereof.

The table below summarizes the project facility, the type of pipe recommended, and the estimated pipe size. The pipeline installation, bedding, backfill, and compaction will be addressed during the engineering design phase as part of the detailed project technical specifications.

Project Facility	Nominal Pipe Size	Pipe Type
Aqueduct Turnout	108-inch	D50 Dry Cast RCP
Adohr Road Siphon	120-inch	C25 Dry Cast RCP
East Side Canal Siphon	120-inch	C25 Dry Cast RCP
Reach 2 Farm Road Siphon	120-inch	C25 Dry Cast RCP
Reach 3 Farm Road Siphon	120-inch	C25 Dry Cast RCP
Reach 4 Farm Road Siphon	90-inch	C25 Dry Cast RCP
Stockdale Hwy Cased Crossing Carrier Pipe	120-inch	D25 Dry Cast RCP
I-5 Fwy Cased Crossing Carrier Pipe	120-inch	D25 Dry Cast RCP
Reach 4 Conveyance Piping	63-inch and 54-inch	DR41 HDPE
Phase II Turnout	48-inch	ADS N12 WT HDPE
West Basins Turnout (Open Channel Design)	48-inch (2 Barrels)	ADS N12 WT HDPE
West Basins Turnout (Closed Conduit Design)	36-inch	DR41 HDPE
Phase I Turnout (Open Channel Design)	48-inch (2 Barrels)	ADS N12 WT HDPE
Phase I Turnout (Closed Conduit Design)	54-inch	DR41 HDPE
Well Conveyance Pipelines	15-inch to 27-inch	SDR51 PIP PVC
Well Conveyance Pipelines	30-inch to 36-inch	DR51 C900 PVC or DR41 HDPE
Interbasin Piping	36-inch and 48-inch	ADS N12 WT HDPE
In-Lieu Turnout Piping	24-inch	ADS N12 WT HDPE

1. *The "D" class of pipe is a conservative assumption at this stage in the design. The RCP pipe classification shall be re-evaluated during detailed design and be based on actual design elevations, earth cover, and operating conditions.*
2. *The project shall prepare for bid alternatives for pipe sizes and structures where more than one alternative is an option and close in pricing such as for the Reach 4 Conveyance Canal Piping, the Well Conveyance Pipelines, and Road Crossings and Bridges or Box Culverts.*

Pipeline venting is not addressed herein, however it will need to be considered during the engineering design. The pipeline must have the ability to vent large volumes of air during filling or startup, release accumulations of air during operation, and allow air back into the pipeline at times to prevent negative pressures. Similarly, corrosion protection is not addressed in detail herein, but shall be considered during the engineering design where steel pipelines and appurtenances are installed below ground.

Section II of this memorandum discusses the different types of pipe materials:

Section III then briefly discusses the types of crossings such as trenchless pipe installations, siphon or road pipe crossings, box culverts, or bridges

Section IV evaluates the pipe types and pipe sizes for the primary project components as outlined below:

Cost estimates utilized herein are preliminary and only for purposes of the preliminary engineering work. Budgetary pipe material costs have been obtained as of September and October 2020 and installation cost estimates utilized from previous projects similar in nature. It is understood that these costs are subject to change based on the actual project conditions and engineering design, actual quantities to be installed, external global impacts to material pricing, and other unforeseen circumstances. Therefore, it is recommended to verify pipeline material costs in the design phase and to consider bidding multiple pipe material options for those close in cost.

II. PIPE MATERIALS

A. PVC Pipe

PVC pipe is an ideal pipe material for certain aspects of this project as it is a corrosion resistant material, is suitable for these water temperatures and water quality parameters, and is easy to install.

There are many types of PVC pipe, however for water pressure pipe the most common types of pipe are AWWA pressure pipe and ASTM pressure pipe. A roughness coefficient of 0.010 and a Hazen-Williams coefficient of 150 was used for PVC pipe per the McGraw-Hill Hydraulic Design Handbook.

AWWA pressure pipe is governed by the standards, AWWA C900 and C909, and use cast-iron pipe size outside diameters. This diameter regimen is compatible with both cast-iron pipe and ductile-iron pipe.

ASTM pressure pipe is governed by the standard, ASTM D2241, and is also referred to as plastic irrigation pipe (PIP). This diameter regimen is compatible with iron pipe sizes or steel pipe.

The above noted types of pipe have varying pressure classes, pipe wall thicknesses, and available diameters. For purposes of cost comparison, it has been assumed that a pressure class of 80 psi will be adequate for the applications that PVC pipe would be installed in, i.e. turnouts, well conveyance pipelines, etc. Specific pipe classes and costs however, are discussed in greater detail under Section IV Facility Piping.

a) Size Ranges and Availability

Plastic Irrigation Pipe (PIP)

Plastic Irrigation Pipe (PIP) is available in size ranges from 12-inch diameter to 27-inch diameter. The size chart below is for a standard dimension ratio (SDR) of 51. The dimension ratio defines a constant ratio between the outer pipe diameter and the pipe wall thickness thus providing a simple means of specifying product dimensions to maintain constant mechanical properties regardless of pipe size. The pressure class for ASTM D2241 SDR51 pipe is 80 psig.

Table 1

Kern Fan Project PIP Pipe Data (SDR51 PC 80)				
Nominal Diameter (in)	O.D.	I.D.	Capacity at Velocity = 5 fps	Capacity at Velocity = 6 fps
12	12.24	11.73	3.8	4.5
15	15.30	14.66	5.9	7.0
18	18.70	17.92	8.8	10.5
21	22.05	21.13	12.2	14.6
24	24.80	23.77	15.4	18.5
27	27.95	26.79	19.6	23.5
30	NA	NA	NA	NA
36	NA	NA	NA	NA
42	NA	NA	NA	NA
48	NA	NA	NA	NA

The PIP pipe size availability will likely mean that this pipe is not a suitable alternative for turnout piping. However, it would work for the well conveyance pipelines that are 27-inch diameter and smaller. Assuming, 6 cfs per well, it is likely that this pipe would work for connecting up to 3 wells maximum.

The PIP pipe is also advantageous as it is readily available locally since it is the typical pipe used by agricultural contractors in the area and most contractors are experienced with its installation.

The PIP pipe fittings used by the District are typically Gheen or Morrill stainless steel fittings, or equivalent. This is a result of past experience with coating issues on the Gheen fittings.

C900 PVC Pipe

AWWA C900 PVC pipe is available in size ranges from 12-inch diameter to 60-inch diameter. The largest size available in the previous C905-10 standard was 48-inch, however the revised C900-16 standard added two larger pipe sizes – 54-inch and 60-inch. The size chart below is for a dimension ratio (DR) of 41 and 51. The dimension ratio defines a constant ratio between the outer pipe diameter and the pipe wall thickness thus providing a simple means of specifying product dimensions to maintain constant mechanical properties regardless of pipe size. The pressure class for AWWA C900 DR41 pipe is 100 psig and is for the 54-inch and 60-inch pipe. The AWWA C900 DR51 pipe is 80 psig and is for the 30-inch through 48-inch pipe.

Table 2

Kern Fan Project PVC Pipe Data (DR51 PC 80)				
Nominal Diameter (in)	O.D.	I.D.	Capacity at Velocity = 5 fps	Capacity at Velocity = 6 fps
30	32.00	30.67	25.6	30.8
36	38.30	36.71	36.7	44.1
42	44.50	42.65	49.6	59.5
48	50.80	49.69	67.3	80.8

Table 2A

Kern Fan Project PVC Pipe Data (DR41 PC 100)				
Nominal Diameter (in)	O.D.	I.D.	Capacity at Velocity = 5 fps	Capacity at Velocity = 6 fps
54	57.56	54.02	79.6	95.5
60	61.61	57.82	91.2	109.4

The C900 PVC pipe availability allows for capacities upwards of 90 to 110 cfs. This piping is an option for recharge facility turnouts, interbasin structures, "in-lieu" turnouts, and well conveyance pipelines.

The C900 PVC pipe fittings are typically ductile iron fittings and film wrapped below grade to prevent corrosion.

b) Limitations/Concerns

PVC pipe is often a cost effective, corrosion resistant, and trouble-free option for pipeline projects. Limitations or concerns for the use of PVC pipe would include:

- Water temperatures greater than 73°F require the pressure de-rating of the pipe.
- Pipe installation requires adequate compaction and support around the pipe haunches and springline.
- Heavy equipment shall not be placed over the pipe until the pipe zone is backfilled and compacted to specifications.
- Pipe not recommended to be exposed to the environment due to concerns with damage from impact or UV exposure.

c) Capital Cost Estimate

As demonstrated in Tables 3 and 4 below, ASTM D2241 PIP PVC pipe is the most economical pipe material in the available pipe sizes of 27-inches and smaller.

Plastic Irrigation Pipe (PIP)

Table 3

Kern Fan Project PIP Pipe Data (SDR51 PC 80) - Cost Estimate		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
12	$14.64	$54.64
15	$18.17	$62.17
18	$19.98	$77.98
21	$28.76	$89.76
24	$36.53	$95.53
27	$50.56	$111.56
30	NA	NA
36	NA	NA
42	NA	NA
48	NA	NA

C900 PVC Pipe

Table 4

Kern Fan Project PVC Pipe Data (DR51 PC 80) - Cost Estimate		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
30	$68.31	$132.31
36	$99.14	$187.14
42	$131.23	$223.73
48	$165.80	$263.80

Table 4A

Kern Fan Project PVC Pipe Data (DR41 PC 100) - Cost Estimate		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
14	$19.42	$77.42
16	$20.04	$78.04
18	$21.92	$79.92
20	$37.80	$98.80
24	$49.68	$110.68
30	$70.45	$134.45
36	$106.89	$194.89
42	$144.54	$237.04
48	$200.18	$298.18
54	$266.35	$390.35
60	$316.45	$448.45

Pipe cost estimates based on approximately 1,200-ft of pipe.
Increases in quantity may affect pricing.

B. HDPE Pipe

HDPE pipe is an ideal pipe material for certain aspects of this project as it is a corrosion resistant material, is suitable for these water temperatures and water quality parameters, and is easy to install. A roughness coefficient of 0.009 and a Hazen-Williams coefficient of 160 was used for HDPE pipe per the McGraw-Hill Hydraulic Design Handbook.

HDPE is a high-density polyethylene structure wall thermal winding pipe. It is made from high-density polyethylene resin. HDPE pipe can be joined by butt welding, electrofusion welding, socket welding, or extrusion welding. These joints heat the pipe during the joining process, creating a completely homogenous joint so the weld becomes as strong, or stronger, than the existing pipe on either side of the weld.

HDPE pipe can be manufactured to AWWA C906, ASTM F714, and ASTM D3035 standards for use with cast-iron or iron pipe size outside diameters. This diameter regimen is compatible with both cast-iron pipe and ductile-iron pipe or with iron pipe sizes and steel pipe sizes.

Corrugated dual wall HDPE pipe with a smooth wall interior is also an option for the recharge basin interbasin structures and turnouts. This pipe can be provided with a water-tight joint per ASTM D3212 and has a roughness coefficient of 0.012 per the published Advanced Drainage Systems, Inc. (ADS) data.

a) Size Ranges and Availability

AWWA C906 HDPE pipe is available in size ranges from 12-inch diameter to 63-inch diameter. The size chart below is for a dimension ratio (DR) of 32.5 and of 41. The dimension ratio defines a constant ratio between the outer pipe diameter and the pipe wall thickness thus providing a simple means of specifying product dimensions to maintain constant mechanical properties regardless of pipe size. The pressure class for AWWA C906 DR32.5 pipe is 63 psig and is suitable for pipe diameters from 14-inches to 63-inches. The DR41 pipe is rated for 50 psig and is suitable for pipe diameters from 36-inches to 63-inches.

Table 5

Kern Fan Project HDPE Pipe Data (DR32.5 PC 63)				
Nominal Diameter (in)	O.D.	I.D.	Capacity at Velocity = 5 fps	Capacity at Velocity = 6 fps
14	14.00	13.09	4.7	5.6
16	16.00	14.96	6.1	7.3
18	18.00	16.83	7.7	9.3
20	20.00	18.70	9.5	11.4
22	22.00	20.57	11.5	13.8
24	24.00	22.44	13.7	16.5
26	26.00	24.30	16.1	19.3
28	28.00	26.17	18.7	22.4
30	30.00	28.04	21.4	25.7
32	32.00	29.91	24.4	29.3
34	34.00	31.78	27.5	33.0
36	36.00	33.65	30.9	37.0
42	42.00	39.26	42.0	50.4
48	48.00	44.87	54.9	65.9
54	54.00	50.48	69.5	83.3
63	63.00	58.89	94.5	113.4

Table 5A

Kern Fan Project HDPE Pipe Data (DR41 PC 50)				
Nominal Diameter (in)	O.D.	I.D.	Capacity at Velocity = 5 fps	Capacity at Velocity = 6 fps
36	36.00	34.14	31.8	38.1
42	42.00	39.83	43.2	51.9
48	48.00	45.52	56.5	67.8
54	54.00	51.21	71.5	85.8
63	63.00	59.74	97.3	116.7

The HDPE pipe availability allows for capacities upwards of 95 to 116 cfs. This piping is an option for recharge facility turnouts, interbasin structures, “in-lieu” turnouts, and well conveyance pipelines.

It is also possible that a combination of PVC pipe and HDPE pipe could be installed together such as for the well conveyance pipelines. However, consideration will need to be given to the amount of HDPE pipe to be installed and the cost to mobilize and demobilize pipe fusing equipment.

The ADS N-12 Dual Wall HDPE is anticipated to be used for recharge basin turnouts, farmer or “in-lieu” turnouts, and interbasin structures. This pipe is available in pipe diameters from 4-inches to 60 inches. The pipe is a watertight joint per ASTM D3212.

Table 6

Kern Fan Project ADS N-12 Pipe Data (WT IB)				
Nominal Diameter (in)	O.D.	I.D.	Capacity at Velocity = 5 fps	Capacity at Velocity = 6 fps
24	28.00	24.00	15.7	18.8
30	36.00	30.00	24.5	29.4
36	42.00	36.00	35.3	42.4
42	48.00	42.00	48.1	57.7
48	54.00	48.00	62.8	75.4
60	67.00	60.00	98.1	117.8

b) Limitations/Concerns

HDPE pipe is often a cost effective, corrosion resistant, and trouble-free option for irrigation pipeline projects. Limitations or concerns for the use of HDPE pipe would include:

- Water temperatures greater than 73°F require the pressure de-rating of the pipe.
- Pipe installation and repairs require special equipment and specialized contractors.
- Pipe subject to greater temperature expansion and contraction during installation.
- Pipe installation, in larger sizes, typically needs to be filled with water prior to performing backfill and compaction.
- Pipe installation requires adequate compaction and support around the pipe haunches and springline.

c) Capital Cost Estimate

Table 7

Kern Fan Project HDPE Pipe Data (DR32.5 PC 63) - Cost Estimate		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
14	$14.58	$64.58
16	$17.24	$67.24
18	$19.92	$71.92
20	$24.03	$82.03
22	$28.60	$86.60
24	$34.34	$96.34
26	$42.61	$113.61
28	$49.84	$127.84
30	$54.35	$142.35
32	$63.11	$159.11
34	$72.77	$178.77
36	$78.30	$204.30
42	$92.40	$230.40
48	$108.00	$260.00
54	$124.20	$297.20
63	$148.37	$352.37

Table 7A

Kern Fan Project HDPE Pipe Data (DR41 PC 50) - Cost Estimate		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
36	$58.30	$184.30
42	$72.40	$210.40
48	$88.00	$240.00
54	$104.20	$277.20
63	$128.37	$332.37

Pipe cost estimates based on approximately 1,200-ft of pipe.
Increases in quantity may affect pricing.

The costs for the ADS N-12 Dual Wall HDPE pipe are shown below.

Table 8

Kern Fan Project ADS N-12 Pipe Data (WT IB) - Cost Estimate		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
24	$28.57	$89.57
30	$41.04	$105.04
36	$56.50	$144.50
42	$70.18	$162.68
48	$93.15	$191.15
60	$130.41	$262.41

C. Wet Cast RCP

Wet or centrifugally cast RCP shall be manufactured in accordance with ASTM C361 for water-tight pressure joints. A roughness coefficient of 0.013 and a Hazen-Williams coefficient of 130 was used for concrete pipe per the McGraw-Hill Hydraulic Design Handbook.

The wet cast process is a flowable form of concrete which may be poured from a mixer, hopper, or truck and cast into forms where it is then stripped, finished, and marked prior to shipping. This process normally contains concrete with a slump less than 4-inches and is used on the production of large diameter pipe.

Wet cast is also used for non-standard joints and custom pipe or fittings.

RCP pipe shall have a watertight joint utilizing a confined gasket of the O-ring type.

a) Size Ranges and Availability

Table 9

Kern Fan Project RCP Pipe Data (ASTM C361) - Wet Cast				
Nominal Diameter (in)	O.D.	I.D.	Capacity at Velocity = 5 fps	Capacity at Velocity = 6 fps
36	44.00	36.00	35.3	42.4
42	51.00	42.00	48.1	57.7
48	58.00	48.00	62.8	75.4
54	65.00	54.00	79.5	95.4
60	72.00	60.00	98.2	117.8
66	80.50	66.00	118.8	142.5
72	87.50	72.00	141.4	169.6
78	94.50	78.00	165.9	199.1
84	101.50	84.00	192.4	230.9
90	108.50	90.00	220.9	265.1
96	115.50	96.00	251.3	301.6
102	121.00	102.00	283.7	340.5
108	128.00	108.00	318.1	381.7
114	133.00	114.00	354.4	425.3
120	140.00	120.00	392.7	471.2
126	147.00	126.00	433.0	519.5
132	157.50	132.00	475.2	570.2
144	168.00	144.00	565.5	678.6

b) Limitations/Concerns

- Lower compressive strength than dry cast pipe.
- Typically takes longer to manufacturer than dry cast pipe (approximately 12-14 joints/day).
- Higher cost (higher labor costs in manufacturing)

c) Capital Cost Estimate

Table 10

Kern Fan Project D50 RCP Pipe Data (ASTM C361) - Cost Estimate (Wet Cast)		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
36	$300.00	$386.60
42	$390.00	$480.00
48	$486.18	$580.62
54	$617.90	$717.90
60	$749.61	$857.55
66	$896.42	$1,036.42
72	$1,043.22	$1,225.47
78	$1,184.25	$1,414.25
84	$1,327.25	$1,612.00
90	$1,470.36	$1,805.36
96	$1,608.89	$2,002.58
102	$1,808.95	$2,263.95
108	$2,009.00	$2,531.57
114	$2,231.16	$2,901.16
120	$2,453.32	$3,271.02
126	$2,565.69	$3,535.69
132	$2,678.06	$3,775.23
144	$2,775.00	$4,141.46

Pipe cost estimates based on approximately 1,200-ft of pipe.
Increases in quantity may affect pricing.

D. Dry Cast RCP

Dry cast RCP shall be manufactured in accordance with ASTM C361 for water-tight pressure joints. A roughness coefficient of 0.013 and a Hazen-Williams coefficient of 130 was used for concrete pipe per the McGraw-Hill Hydraulic Design Handbook.

The dry cast process has a low water to cement ratio and a zero slump. This method uses low frequency-high amplitude vibration to distribute and densely compact the dry mix in the form. This process allows for the concrete to be stripped sooner and for the forms to be re-used.

Dry cast pipe is poured with a drier mix than wet cast pipe and the barrel of the joint can be stripped immediately after pouring. The bell and spigot ends remain in the forms for 24 hours while a plastic bag is normally placed over the barrel immediately after stripping the forms.

a) Size Ranges and Availability

Table 11

Kern Fan Project RCP Pipe Data (ASTM C361) - Dry Cast				
Nominal Diameter (in)	O.D.	I.D.	Capacity at Velocity = 5 fps	Capacity at Velocity = 6 fps
36	44.00	36.00	35.3	42.4
42	51.00	42.00	48.1	57.7
48	58.00	48.00	62.8	75.4
54	65.00	54.00	79.5	95.4
60	72.00	60.00	98.2	117.8
66	80.50	66.00	118.8	142.5
72	87.50	72.00	141.4	169.6
78	94.50	78.00	165.9	199.1
84	101.50	84.00	192.4	230.9
90	108.50	90.00	220.9	265.1
96	115.50	96.00	251.3	301.6
102	121.00	102.00	283.7	340.5
108	128.00	108.00	318.1	381.7
114	133.00	114.00	354.4	425.3
120	140.00	120.00	392.7	471.2
126	147.00	126.00	433.0	519.5
132	157.50	132.00	475.2	570.2
144	168.00	144.00	565.5	678.6

b) Limitations/Concerns

- Surface of pipe may be a little rougher due to the manufacturing process.
- Important to ensure form vibrators are effectively imparting energy to the concrete and not just the forms.
- Dry cast RCP can have difficulty meeting watertight requirements at joint when pressure tested. Testing needs to be implemented to confirm ability of manufacturer to meet this requirement and joints shall be of double gasket construction.

c) Capital Cost Estimate

Costs are estimated below in Table 12 for D25 Dry Cast RCP as well as D50 Dry Cast RCP.

Table 12

Kern Fan Project D25 RCP Pipe Data (ASTM C361) - Cost Estimate (Dry Cast)		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
36	$111.78	$198.38
42	$142.83	$232.83
48	$173.88	$268.32
54	$204.93	$304.93
60	$235.98	$343.92
66	$267.03	$407.03
72	$298.08	$480.33
78	$329.13	$559.13
84	$360.18	$644.93
90	$391.23	$726.23
96	$422.28	$815.97
102	$453.33	$908.33
108	$484.38	$1,006.95
114	$515.43	$1,185.43
120	$546.48	$1,364.18
126	$577.53	$1,547.53
132	$608.58	$1,705.75
144	$639.63	$2,006.09

Table 12A

Kern Fan Project D50 RCP Pipe Data (ASTM C361) - Cost Estimate (Dry Cast)		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
36	$175.12	$261.72
42	$202.45	$292.45
48	$229.77	$324.21
54	$257.72	$357.72
60	$285.66	$393.60
66	$312.98	$452.98
72	$340.31	$522.56
78	$367.63	$597.63
84	$394.96	$679.71
90	$422.28	$757.28
96	$450.85	$844.54
102	$479.41	$934.41
108	$509.22	$1,031.79
114	$540.27	$1,210.27
120	$571.32	$1,389.02
126	$602.37	$1,572.37
132	$639.63	$1,736.80
144	$683.10	$2,049.56

Pipe cost estimates based on approximately 1,200-ft of pipe.
Increases in quantity may affect pricing.

E. Fusion Bonded Epoxy Lined and Coated Steel Pipe (FBEL&C)

Fusion Bonded Epoxy Lined and Coated Steel Pipe (FBEL&C) is a steel cylinder pipe per AWWA C200 that is internally and externally lined with a fusion bonded epoxy. A roughness coefficient of 0.011 and a Hazen-Williams coefficient of 145 was used for epoxy lined pipe per the McGraw-Hill Hydraulic Design Handbook.

a) Size Ranges and Availability

The fusion bonded epoxy lined and coated steel pipe comes in a wide range of pipe sizes, however it is typically more competitive price wise with plastic pipes and other pipe types in pipe sizes greater than 42-inch diameter.

Table 13

Kern Fan Project FBEL Steel Pipe Data (1/4" Wall)				
Nominal Diameter (in)	O.D.	I.D.	Capacity at Velocity = 5 fps	Capacity at Velocity = 6 fps
36	36.00	35.50	34.4	41.2
42	42.00	41.50	46.9	56.3
48	48.00	47.50	61.5	73.8
54	54.00	53.50	78.0	93.6
60	60.00	59.50	96.5	115.8
66	66.00	65.50	116.9	140.3
72	72.00	71.50	139.3	167.2
84	84.00	83.50	190.0	228.1
90	90.00	89.50	218.3	262.0
96	96.00	95.50	248.6	298.3
102	102.00	101.50	280.8	337.0
108	108.00	107.50	315.0	378.0
114	114.00	113.50	351.1	421.4
120	120.00	119.50	389.2	467.1
126	126.00	125.50	429.3	515.2
132	132.00	131.50	471.3	565.6
138	138.00	137.50	515.3	618.4
144	144.00	143.50	561.3	673.5

b) Limitation/Concerns

Fusion bonded epoxy steel pipe is often a cost effective and trouble-free option for pipeline projects and is preferred in above ground installations where it is subject to inclement weather, UV exposure, seismic events, or nearby to traffic and vehicular access. Limitations or concerns for the use of FBE pipe would include:

- Corrosion protection required typically in order to prevent corrosion in the event of coating holidays. Typically a sacrificial or passive system is adequate for cathodic protection and an impressed current system can be added in the future if necessary.
- Pipe installation requires adequate compaction and support around the pipe haunches and springline.
- Installation requires inspection of fusion bonded epoxy lining and coating for damage and holidays. Surface preparation and application need to be inspected to prevent delamination and other coating defects.
- Cutting or welding of the pipe will damage the epoxy lining and coating. Repairs typically made with a two-part epoxy repair kit.

c) Capital Cost Estimate

Table 14

Kern Fan Project FBEL Steel Pipe (AWWA C200) - Cost Estimate		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Matrial + Install Pipe Cost ($/LF)
36	$161.00	$287.83
42	$190.00	$321.00
48	$220.00	$356.38
54	$255.00	$431.00
60	$330.00	$524.24
66	$400.00	$620.00
72	$500.00	$767.86
78	$550.00	$880.00
84	$600.00	$997.09
90	$650.00	$1,110.00
96	$700.00	$1,303.36
102	$750.00	$1,450.00
108	$810.00	$1,612.71
114	$1,007.37	$1,877.37
120	$1,205.00	$2,197.48
126	$1,320.00	$2,470.00
132	$1,570.00	$2,856.00
144	$1,710.00	$3,282.00

Pipe cost estimates based on approximately 1,200-ft of pipe.
Increases in quantity may affect pricing.

F. Cement Mortar Lined and Coated Steel Pipe (CMLC)

Cement Mortar Lined and Coated (CMLC) Steel pipe is a steel cylinder pipe per AWWA C200 that is internally lined with a cement mortar lining that is centrifugally spun and a brush or spray applied cement mortar coating exterior in accordance with AWWA C205. A roughness coefficient of 0.013 and a Hazen-Williams coefficient of

130 was used for cement mortar lined pipe per the McGraw-Hill Hydraulic Design Handbook.

a) Size Ranges and Availability

The cement mortar lined and coated steel pipe comes in a wide range of pipe sizes, however it is typically more competitive price wise with plastic pipes and other pipe types in pipe sizes greater than 42-inch diameter.

Table 15

Kern Fan Project CMLC Steel Pipe Data (1/4" Wall, 1/2" Lining, 3/4" Coating)				
Nominal Diameter (in)	O.D.	I.D.	Capacity at Velocity = 5 fps	Capacity at Velocity = 6 fps
36	37.50	34.50	32.5	39.0
42	43.50	40.50	44.7	53.7
48	49.50	46.50	59.0	70.8
54	55.50	52.50	75.2	90.2
60	61.50	58.50	93.3	112.0
66	67.50	64.50	113.5	136.1
72	73.50	70.50	135.5	162.7
84	85.50	82.50	185.6	222.7
90	91.50	88.50	213.6	256.3
96	97.50	94.50	243.5	292.2
102	103.50	100.50	275.4	330.5
108	109.50	106.50	309.3	371.2
114	115.50	112.50	345.1	414.2
120	121.50	118.50	382.9	459.5
126	127.50	124.50	422.7	507.2
132	133.50	130.50	464.4	557.3
138	139.50	136.50	508.1	609.7
144	145.50	142.50	553.8	664.5

b) Limitations/Concerns

CMLC steel pipe is often a cost effective and trouble-free option for pipeline projects. Limitations or concerns for the use of CMLC pipe would include:

- Corrosion protection required. Typically a sacrificial or passive system is adequate for cathodic protection and an impressed current system can be added in the future if necessary.
- Pipe installation requires adequate compaction and support around the pipe haunches and springline.
- Installation requires inspection of cement mortar lining and coating for damage and cracks.
- Personnel must have confined space training to repair & inspect interior joint lining repairs.

c) Capital Cost Estimate

Table 16

Kern Fan Project CMLC Steel Pipe (AWWA C200) - Cost Estimate		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Matrial + Install Pipe Cost ($/LF)
36	$171.00	$257.83
42	$194.00	$305.00
48	$220.00	$336.38
54	$255.00	$411.00
60	$340.00	$514.24
66	$450.00	$650.00
72	$550.00	$797.86
78	$600.00	$910.00
84	$650.00	$1,027.09
90	$700.00	$1,160.00
96	$810.00	$1,363.36
102	$936.00	$1,586.00
108	$1,070.00	$1,872.71
114	$1,152.00	$2,022.00
120	$1,205.00	$2,197.48
126	$1,320.00	$2,470.00
132	$1,580.00	$2,866.00
144	$1,760.00	$3,332.00

Pipe cost estimates based on approximately 1,200-ft of pipe.
Increases in quantity may affect pricing.

G. Cost Summary

The Table 17 below summarizes the costs of the different pipe materials and highlights the pipe sizes that are the most economical.

Table 17

Kern Fan Project

Linear Pipeline Material and Cost Summary - Recommended

Pipe Capacity at 5-6 fps	SDR51 PIP PVC Pipe			DR41 & DR51 C900 PVC Pipe			DR32.5 & DR41 HDPE Pipe			ADS N-12 HDPE Pipe[1]			CMLC Pipe			FBEL&C Pipe			D50 Wet Cast RCP Pipe			D25 Dry Cast RCP Pipe		
	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)
5 cfs	15	$18.17	$62.17	14	$19.42	$77.42	14	$14.58	$64.58														
10 cfs	18	$19.98	$77.98	18	$21.92	$79.92	20	$24.03	$82.03														
15 cfs	24	$36.53	$95.53	24	$49.68	$110.68	24	$34.34	$96.34														
20 cfs	27	$50.56	$111.56	24	$49.68	$110.68	28	$49.84	$127.84														
25 cfs				30	$68.31	$132.31	30	$54.35	$142.35														
30 cfs				30	$68.31	$132.31	34	$72.77	$178.77														
35 cfs				36	$99.14	$187.14	36	$58.30	$184.30	36	$56.50	$116.53	36	$171.00	$257.83	36	$161.00	$287.83	36	$300.00	$386.60	36	$111.78	$198.38
40 cfs				36	$99.14	$187.14	42	$72.40	$210.40	36	$56.50	$116.53	42	$194.00	$305.00	42	$190.00	$321.00	36	$300.00	$386.60	36	$111.78	$198.38
45 cfs				42	$131.23	$223.73	42	$72.40	$210.40	42	$70.18	$133.85	42	$194.00	$305.00	42	$190.00	$321.00	42	$390.00	$480.00	42	$142.83	$232.83
50 cfs				42	$131.23	$223.73	42	$72.40	$210.40	42	$70.18	$133.85	42	$194.00	$305.00	42	$190.00	$321.00	42	$390.00	$480.00	42	$142.83	$232.83
55 cfs				42	$131.23	$223.73	48	$88.00	$240.00	42	$70.18	$133.85	48	$220.00	$336.38	48	$220.00	$356.38	42	$390.00	$480.00	42	$142.83	$232.83
60 cfs				48	$165.80	$263.80	48	$88.00	$240.00	48	$93.15	$161.19	48	$220.00	$336.38	48	$220.00	$356.38	48	$486.18	$580.62	48	$173.88	$268.32
70 cfs				48	$165.80	$263.80	54	$104.20	$277.20	48	$93.15	$161.19	48	$220.00	$336.38	48	$220.00	$356.38	48	$486.18	$580.62	48	$173.88	$268.32
80 cfs				48	$165.80	$263.80	54	$104.20	$277.20	48	$93.15	$161.19	54	$255.00	$411.00	54	$255.00	$431.00	54	$617.90	$717.90	54	$204.93	$304.93
90 cfs				54	$266.35	$390.35	63	$128.37	$332.37	60	$130.41	$203.78	54	$255.00	$411.00	54	$255.00	$431.00	54	$617.90	$717.90	54	$204.93	$304.93
100 cfs				60	$316.45	$448.45	63	$128.37	$332.37	60	$130.41	$210.46	60	$340.00	$514.24	60	$330.00	$524.24	60	$749.61	$857.55	60	$235.98	$343.92
150 cfs													72	$550.00	$797.86	72	$500.00	$767.86	72	$1,043.22	$1,225.47	72	$298.08	$480.33
200 cfs													84	$650.00	$1,027.09	84	$600.00	$997.09	84	$1,327.25	$1,612.00	84	$360.18	$644.93
250 cfs													90	$700.00	$1,160.00	90	$650.00	$1,110.00	90	$1,470.36	$1,805.36	90	$391.23	$726.23
300 cfs													102	$936.00	$1,586.00	102	$750.00	$1,450.00	96	$1,608.89	$2,002.58	96	$422.28	$815.97
350 cfs													108	$1,070.00	$1,872.71	108	$810.00	$1,612.71	108	$2,009.00	$2,531.57	108	$484.38	$1,006.95
400 cfs													114	$1,152.00	$2,022.00	114	$1,007.37	$1,877.37	114	$2,231.16	$2,901.16	114	$515.43	$1,185.43
450 cfs													120	$1,205.00	$2,197.48	120	$1,205.00	$2,197.48	120	$2,453.32	$3,271.02	120	$546.48	$1,364.18
500 cfs													126	$1,320.00	$2,470.00	126	$1,320.00	$2,470.00	126	$2,565.69	$3,535.69	126	$577.53	$1,547.53

Represents most economical pipe material based upon costs estimates and information available in October 2020.

Represents secondary pipe material alternatives that may be more economical depending on actual design and project timing.

[1]The ADS N-12 HDPE pipe is not applicable to a linear, pressurized pipeline design, but is anticipated to be used at recharge facility turnouts, "in-lieu" turnouts, and interbasin structures.

III. Crossings

The conveyance canal will involve crossings at the following locations, at a minimum:

- Adhor Road (County Road)
- East Side Canal
- Stockdale Highway (Caltrans R/W)
- Interstate 5 Freeway (Caltrans R/W)
- Farm Roads/Dirt Roads

These crossings may be completed by a bore and jack operation, micro-tunnel operation, open cut, or remain an open channel utilizing a bridge crossing to maintain farm road access. These are discussed in greater detail below.

The trenchless pipe installation will require specific soils investigation to be performed at each of the proposed crossings. The soils work will need to identify depth to groundwater, type of soils, ability of soil to maintain arching until grouting, need for soil stabilization, and potential settlement.

Siphon or road crossings may be a siphon pipe, box culvert, or open channel with a bridge crossing.

The casing pipes at Stockdale Highway and the I-5 Freeway shall be designed for H20 traffic loadings and conform to the minimum wall thicknesses as required by the California Department of Transportation (Caltrans). The casing pipe shall be sloped to one end to drain, shall have end seals, and shall have a minimum diameter of the carrier pipe outside diameter plus 12-inches. The casing shall extend a minimum of three-feet (3-ft) outside the Caltrans right-of-way plus the distance from the bottom of casing to the finish grade. The minimum cover above the casing pipe shall be 3.5-feet. All casing joints shall be butt welded and watertight and shall be welded by welder's qualified per ANSI/AWS D1.1. All welds shall be visually and radiographically tested per ANSI/AWS D1.1. The carrier pipe shall have casing spacers installed at the appropriate frequency and be the bolt-on type. It is anticipated that the annulus between the casing pipe and carrier pipe will be filled with a two-sack cement slurry.

a) Bore and Jack

The trenchless installation using the bore and jack is a method for installing a steel casing or liner plate that will be used to install a carrier pipe. It is a multi-stage process consisting of constructing a temporary horizontal jacking platform and a starting alignment track in an entrance pit (boring pit) at a desired elevation. The casing pipe is then jacked by manual control along the starting alignment track with simultaneous excavation of the soil being accomplished by a rotating cutting head in the leading edge of the product's annular space. The ground up soil (spoil) is transported back to the entrance pit by helical wound auger flights rotating inside the casing pipe.

The jack and bore method typically provides limited tracking and steering as well as limited support to the excavation face.

The jack and bore method is suitable for steel casing pipes or liner plates.

b) Micro tunnel

The trenchless installation using the micro tunneling method is conducted similar to the above described jack and bore method with the exception that it is remotely controlled, guided pipe jacking process that provides continuous support to the excavation face.

The guidance system usually consists of a laser mounted in the tunneling drive shaft which communicates a reference line to a target mounted inside the micro tunneling machine's articulated steering head. The micro tunneling process provides the ability to control the excavation face stability by applying mechanical or fluid pressure to counterbalance the earth and hydrostatic pressures.

The micro tunneling method is suitable for casing pipes that are steel, ductile iron, reinforced concrete cylinder pipe, or RCP.

c) Bridges

Bridges allow for the conveyance channel to be installed across farm roads or dirt roads without alteration or disturbance necessarily to the road grade. In addition, the elimination of a siphon crossing or box culvert eliminates headlosses and improves the hydraulic conditions of the conveyance canal.

The bridges shall be clear-span bridges that do not require infilling or restrict the area of water flow within the conveyance canal.

The bridges shall include guardrailing and/or fencing to protect against the entrance of vehicles or equipment into the canal.

IV. Facility Piping

This analysis serves to evaluate turnout pipes, siphon pipes, interbasin pipes, pump station discharge pipes, well pipes, and conveyance pipelines. These include the following:

- Aqueduct Turnout
- Adohr Road Siphon
- East Side Canal Siphon
- Farm Road Siphons
- Cased Crossings – Stockdale Hwy and I-5 Fwy
- Canal Conveyance Piping
- Pump Station Discharge Piping
- Phase II Turnout
- West Basins Turnout
- Phase I Turnout
- Well Discharge Piping
- Well Conveyance Piping
- Interbasin Piping

Figure 1 illustrates the approximate locations of the above described facilities.

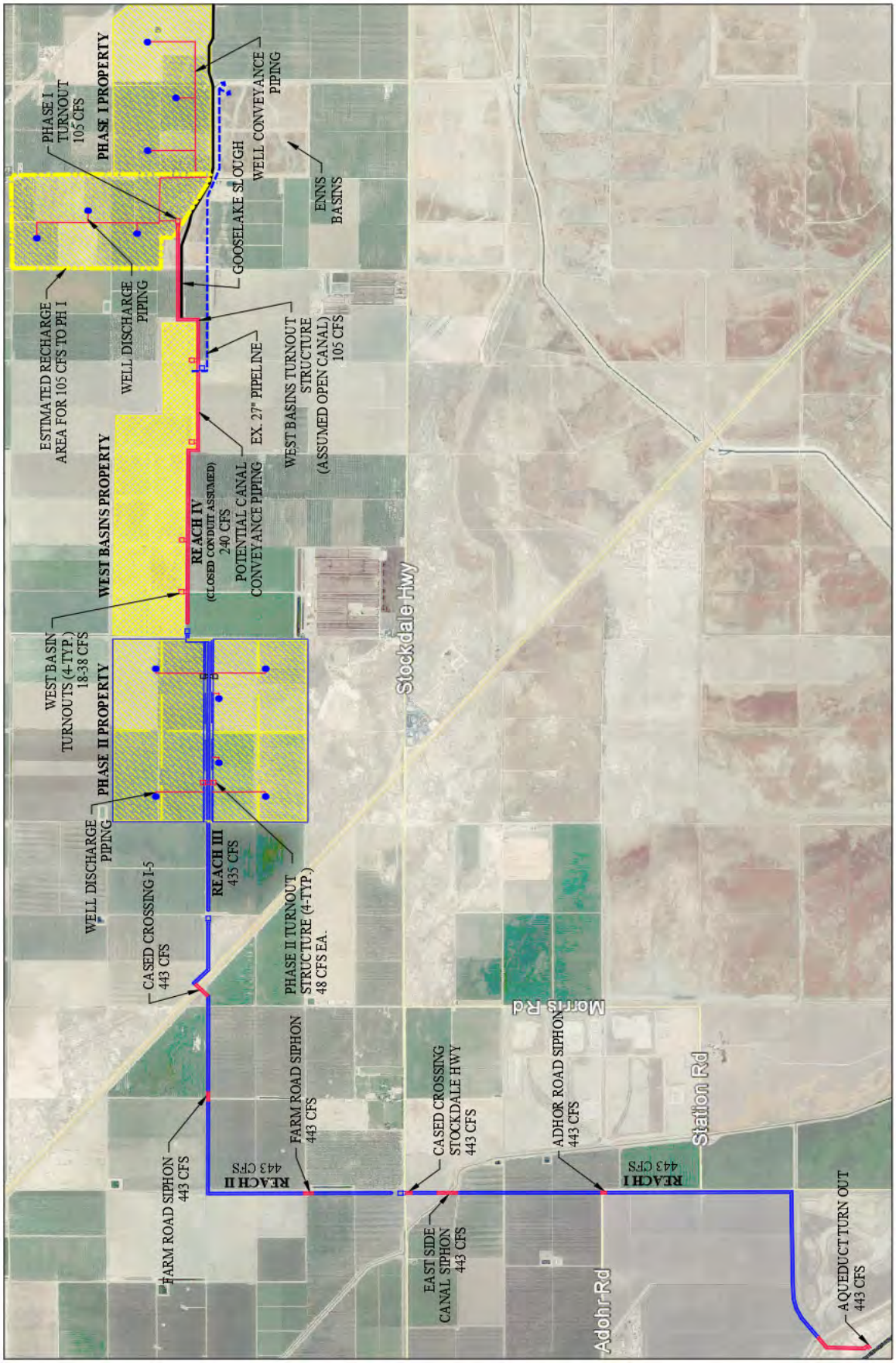

Figure 1: Project Map

The sizing and headloss calculations herein are based upon conceptual layouts and design and are subject to change during the detailed engineering design phase. However, this analysis shall provide a basis for the pipe sizes, materials, and value engineering.

A. Aqueduct Turnout

a) Sizing Criteria

The design flow for the conveyance canal from the California Aqueduct is 443 cfs.

- Flowrate = 443 cfs
- Maximum Velocity = 5 fps. This is typical for pipe turnouts, however Reach 1 of the canal is well below the Aqueduct in this location and there is excess head, therefore a higher velocity has been considered.
- Recommended Maximum Velocity = 7 fps
- Pipe Diameter = Approximate 108-in (9.0-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the turnout piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Manning's Equation for the friction loss through the pipe. In addition, the turnout piping will be installed well below the canal operating surface and will be submerged at all times, therefore the hydraulic calculations were also reviewed using the Hazen-Williams Equation.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Hazen-Williams Equation: $h_f = (3.022 * V^{1.85} * L) / (C^{1.85} * D^{1.17})$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.013 for new concrete pipe)
C = Roughness Coefficient (Used 130 for new concrete pipe)
L = Pipe Length (Estimated as 2,100-ft)

Results:

A = 443 cfs / 7 fps = 63.3 sf
D = 8.98 ft < 9.0 ft (108-in)

$A = (3.14*D^2)/4 = 63.59$ sf
V = 443 cfs / 63.59 sf = 6.97 fps
Velocity Head = $h_v = v^2/2g = 0.75$ ft

Wetted Perimeter = P = 34.54 ft
Hydraulic Radius = R = A/P = 94.99 sf / 34.54 ft = 2.75 ft
Entrance Loss = 0.5 * $v^2/2g$ = 0.38 ft
H_L= 0.95 ft / 1,000 ft
Exit Loss = 1.0 * $v^2/2g$ = 0.75 ft

Total Estimated Headloss = 3.13-ft

Design the turnout piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 20-inches.

b) Pipe Materials

The Aqueduct Turnout piping is large diameter pipe in the approximate size of 9-ft diameter. The pipe material options consist of FBE steel pipe, CMLC steel pipe, wet cast RCP, and dry cast RCP. It is standard practice for the pipe deflection to be limited to 2% for CMLC steel pipe and 5% for FBE steel pipe. Assuming an earth cover of 15-ft, the deflection for a 5/8" wall FBE steel pipe is approximately 4.5%. However, the use of CMLC in this application with such a large diameter and a significant earth cover while maintaining pipe wall deflections of less than 2% is difficult. The wet cast and dry cast RCP pipe would be ASTM C361 pipe, D50 double gasketed pipe. The "D" designation signifies that the pipe is suitable for earth cover over the top of the pipe up to 20-ft. The "50" designation signifies that the pipe can handle hydrostatic heads up to 50-ft above the centerline of the pipe. The hydrostatic head under normal gravity flow operations will likely be approximately 35-ft to 40-ft and potentially a little higher when pumping in a return water condition back to the Aqueduct.

c) Material Recommendations

The Aqueduct Turnout piping is estimated to be approximately 2,100-ft in length. The FBE steel pipe is estimated as $810 per lineal foot for material cost and $1,613 per lineal foot for material and installation. The wet cast RCP is estimated as $2,009 per lineal foot for material cost and $2,532 per lineal foot for material and installation while the dry cast D50 RCP is estimated as $585 per lineal foot for material cost and $1,400 per lineal foot for material and installation.

Steel pipe is not recommended in this application due to excessive pipe deflections of 4-inches to 5-inches even if it is within acceptable percentages. The dry cast RCP is the most economical pipe in this pipe diameter. Provided DWR does not require wet cast RCP, it is recommended that dry cast RCP pipe be used for the Aqueduct Turnout piping. In addition, RCP is a preferred pipe material for this application since it is corrosion resistant, more suitable to resist flotation, and a rigid pipe.

If DWR does require the use of wet cast RCP, then it is anticipated that the District will install wet cast RCP within the Aqueduct right-of-way and then utilize dry cast RCP outside of the right-of-way.

B. Road Crossings

Adhor Road

a) Sizing Criteria

The design flow for the road crossing at Adohr Road is 443 cfs.

- Flowrate = 443 cfs
- Maximum Velocity = 6 fps
- Pipe Diameter = Approximate 120-in (10-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the crossing piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Manning's Equation for the friction loss through the pipe.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.013 for new concrete pipe)
L = Pipe Length (Estimated as 100-ft)

Results:

A = 443 cfs / 6 fps = 73.8 sf
D = 9.70 ft < 10.0 ft (120-in)

$A = (3.14*D^2)/4 = 78.5$ sf
V = 443 cfs / 78.5 sf = 5.64 fps
Velocity Head = $h_v = v^2/2g = 0.49$ ft
Wetted Perimeter = P = 31.4 ft
Hydraulic Radius = R = A/P = 78.5 sf / 31.4 ft = 2.50 ft
Entrance Loss = $0.5 * v^2/2g = 0.25$ ft
H_L= 0.71 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.49$ ft

Total Estimated Headloss = 0.81-ft

Design the road crossing piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 14-inches.

Another option for the Adohr Road crossing is a box culvert if the grade allows for it. The hydraulic properties for a 8' x 12' box culvert are noted below:

The continuity equation was used to solve for the cross-sectional area of the box culvert and the culvert dimensions given the design flow and maximum velocity.

$A = Q/V$

The headloss through the box culvert was calculated using the velocity head of the culvert for minor entrance and exit losses and the Manning's Equation for the friction loss through the culvert.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Culvert Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.013 for precast concrete)
L = Culvert Length (Estimated as 100-ft)

Results:

A = 443 cfs / 6 fps = 73.8 sf
D = 9.7 ft < 10.0 ft (120-in)

A = 8' x 12' = 96.0 sf
V = 443 cfs / 96 sf = 4.61 fps
Velocity Head = $h_v = v^2/2g = 0.33$ ft
Wetted Perimeter = P = 40.0 ft
Hydraulic Radius = R = A/P = 96 sf / 40 ft = 2.40 ft
Entrance Loss = $0.5 * v^2/2g = 0.17$ ft
H_L = 0.50 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.33$ ft

Total Estimated Headloss = 0.55-ft

Design structure to minimize headloss at maximum flow and closely match culvert invert with canal invert to avoid material buildup in the box culvert during low flow conditions.

b) Pipe Materials

The Adohr Road crossing piping is large diameter pipe in the approximate size of 10-ft diameter. The pipe material options consist of FBE steel pipe, CMLC steel pipe, wet cast RCP, and dry cast RCP. It is standard practice for the pipe deflection to be limited to 2% for CMLC steel pipe and 5% for FBE steel pipe. Assuming an earth cover of 10-ft, the deflection for a 3/8" wall FBE steel pipe is approximately 3%. However, the use of CMLC in this application with such a large diameter and a significant earth cover while maintaining pipe wall deflections of less than 2% is difficult. The wet cast and dry cast RCP pipe would be ASTM C361 pipe, C25 double gasketed pipe. The "C" designation signifies that the pipe is suitable for earth cover over the top of the pipe up to 15-ft. The "25" designation signifies that the pipe can handle hydrostatic heads up to 25-ft

above the centerline of the pipe. The hydrostatic head under normal gravity flow operations will likely be less than 10-ft.

c) Material Recommendations

The Adohr Road crossing piping is estimated to be approximately 100-ft in length. The FBE steel pipe is estimated as $1,205 per lineal foot for material cost and $2,197 per lineal foot for material and installation. The wet cast RCP is estimated as $2,453 per lineal foot for material cost and $3,271 per lineal foot for material and installation while the dry cast RCP is estimated as $546 per lineal foot for material cost and $1,364 per lineal foot for material and installation.

Steel pipe is not recommended in this application due to excessive pipe deflections of 3-inches to 4-inches even if it is within acceptable percentages. The dry cast RCP is the most economical pipe in this pipe diameter. Therefore, it is recommended that dry cast RCP pipe be used for the Adhor Road siphon piping. In addition, RCP is a preferred pipe material for this application since it is corrosion resistant, more suitable to resist flotation, and a rigid pipe.

The box culvert is also an economical alternative provided the grades work and do not require an inverted siphon.

East Side Canal

a) Sizing Criteria

The design flow for the siphon crossing at the East Side Canal is 443 cfs. This crossing is anticipated to be an inverted siphon due to dropping down to cross beneath the East Side Canal prism and provide proper clearances. Therefore, a box culvert is not anticipated as an option at this location.

- Flowrate = 443 cfs
- Maximum Velocity = 6 fps
- Pipe Diameter = Approximate 120-in (10-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the inverted siphon piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Manning's Equation for the friction loss through the pipe.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)

V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.013 for new concrete pipe)
C = Roughness Coefficient (Used 130 for new concrete pipe)
L = Pipe Length (Estimated as 250-ft)

Results:

A = 443 cfs / 6 fps = 73.8 sf
D = 9.70 ft < 10.0 ft (120-in)

$A = (3.14*D^2)/4 = 78.5$ sf
V = 443 cfs / 78.5 sf = 5.64 fps
Velocity Head = $h_v = v^2/2g = 0.49$ ft
Wetted Perimeter = P = 31.4 ft
Hydraulic Radius = R = A/P = 78.5 sf / 31.4 ft = 2.50 ft
Entrance Loss = $0.5 * v^2/2g = 0.25$ ft
H_L= 0.71 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.49$ ft

Total Estimated Headloss = 0.92-ft

Design the siphon piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 14-inches.

b) Pipe Materials

The East Side Canal crossing piping is large diameter pipe in the approximate size of 10-ft diameter. The pipe material options consist of FBE steel pipe, CMLC steel pipe, wet cast RCP, and dry cast RCP. It is standard practice for the pipe deflection to be limited to 2% for CMLC steel pipe and 5% for FBE steel pipe. Assuming a maximum earth cover of 10-ft, the deflection for a 3/8" wall FBE steel pipe is approximately 3%. However, the use of CMLC in this application with such a large diameter and a significant earth cover while maintaining pipe wall deflections of less than 2% is difficult. The wet cast and dry cast RCP pipe would be ASTM C361 pipe, C25 double gasketed pipe. The "C" designation signifies that the pipe is suitable for earth cover over the top of the pipe up to 15-ft. The "25" designation signifies that the pipe can handle hydrostatic heads up to 25-ft above the centerline of the pipe. The hydrostatic head under normal gravity flow operations will likely be less than 10-ft.

c) Material Recommendations

The East Side Canal crossing piping is estimated to be approximately 250-ft in length. The FBE steel pipe is estimated as $1,205 per lineal foot for material cost and $2,197 per lineal foot for material and installation. The wet cast RCP is estimated as $2,453 per lineal foot for material cost and $3,271 per lineal foot for material and installation while the dry cast RCP is estimated as $546 per lineal foot for material cost and $1,364 per lineal foot for material and installation.

Steel pipe is not recommended in this application due to excessive pipe deflections of 3-inches to 4-inches even if it is within acceptable percentages.

The dry cast RCP is the most economical pipe in this pipe diameter. Therefore, it is recommended that dry cast RCP pipe be used for the East Side Canal siphon piping. In addition, RCP is a preferred pipe material for this application since it is corrosion resistant, more suitable to resist flotation, and a rigid pipe.

Reach 2 Farm Road

a) Sizing Criteria

The design flow for the crossing at a Reach 2 Farm Road crossing is 443 cfs.

- Flowrate = 443 cfs
- Maximum Velocity = 6 fps
- Pipe Diameter = Approximate 120-in (10-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the crossing piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Manning's Equation for the friction loss through the pipe.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.013 for new concrete pipe)
L = Pipe Length (Estimated as 60-ft)

Results:

A = 443 cfs / 6 fps = 73.8 sf
D = 9.70 ft < 10.0 ft (120-in)

$A = (3.14*D^2)/4 = 78.5$ sf
V = 442 cfs / 78.5 sf = 5.64 fps
Velocity Head = $h_v = v^2/2g = 0.49$ ft
Wetted Perimeter = P = 31.4 ft
Hydraulic Radius = R = A/P = 78.5 sf / 31.4 ft = 2.50 ft
Entrance Loss = $0.5 * v^2/2g = 0.25$ ft
H_L= 0.71 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.49$ ft

Total Estimated Headloss = 0.78-ft

Design the road crossing piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 14-inches.

Other options for the Farm Road crossing include a pre-cast box culvert or a precast bridge. The hydraulic properties for a 8' x 12' box culvert are noted below:

The continuity equation was used to solve for the cross-sectional area of the box culvert and the culvert dimensions given the design flow and maximum velocity.

$A = Q/V$

The headloss through the box culvert was calculated using the velocity head of the culvert for minor entrance and exit losses and the Manning's Equation for the friction loss through the culvert.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Culvert Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.013 for precast concrete)
L = Culvert Length (Estimated as 60-ft)

Results:

A = 443 cfs / 6 fps = 73.8 sf
D = 9.7 ft < 10.0 ft (120-in)

A = 8' x 12' = 96.0 sf
V = 443 cfs / 96 sf = 4.61 fps
Velocity Head = $h_v = v^2/2g = 0.33$ ft
Wetted Perimeter = P = 40.0 ft
Hydraulic Radius = R = A/P = 96 sf / 40 ft = 2.40 ft
Entrance Loss = $0.5 * v^2/2g = 0.17$ ft
H_L = 0.50 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.33$ ft

Total Estimated Headloss = 0.53-ft

Design structure to minimize headloss at maximum flow and closely match culvert invert with canal invert to avoid material buildup in the box culvert during low flow conditions.

b) Pipe Materials

The Farm Road crossing piping is large diameter pipe in the approximate size of 10-ft diameter. The pipe material options consist of FBE steel pipe, CMLC steel pipe, wet cast RCP, and dry cast RCP. It is standard practice for the pipe

deflection to be limited to 2% for CMLC steel pipe and 5% for FBE steel pipe. Assuming an earth cover of 10-ft, the deflection for a 3/8" wall FBE steel pipe is approximately 3%. However, the use of CMLC in this application with such a large diameter and a significant earth cover while maintaining pipe wall deflections of less than 2% is difficult. The wet cast and dry cast RCP pipe would be ASTM C361 pipe, C25 double gasketed pipe. The "C" designation signifies that the pipe is suitable for earth cover over the top of the pipe up to 15-ft. The "25" designation signifies that the pipe can handle hydrostatic heads up to 25-ft above the centerline of the pipe. The hydrostatic head under normal gravity flow operations will likely be less than 10-ft.

c) Material Recommendations

The Farm Road crossing piping is estimated to be approximately 60-ft in length. The FBE steel pipe is estimated as $1,205 per lineal foot for material cost and $2,197 per lineal foot for material and installation. The wet cast RCP is estimated as $2,453 per lineal foot for material cost and $3,271 per lineal foot for material and installation while the dry cast RCP is estimated as $546 per lineal foot for material cost and $1,364 per lineal foot for material and installation.

Steel pipe is not recommended in this application due to excessive pipe deflections of 3-inches to 4-inches even if it is within acceptable percentages. The dry cast RCP is the most economical pipe in this pipe diameter. Therefore, it is recommended that dry cast RCP pipe be used for the Farm Road crossing piping. In addition, RCP is a preferred pipe material for this application since it is corrosion resistant, more suitable to resist flotation, and a rigid pipe.

The box culvert is also an economical alternative provided the grades work and do not require an inverted siphon. It is envisioned that a 8' x 12' box culvert could be installed and the farm road built up over the box culvert so that it did not require an inverted siphon.

Reach 3 Farm Road

a) Sizing Criteria

The design flow for the crossing at a Reach 3 Farm Road crossing is 435 cfs.

- Flowrate = 435 cfs
- Maximum Velocity = 6 fps
- Pipe Diameter = Approximate 120-in (10-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the crossing piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the

Manning's Equation for the friction loss through the pipe.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.013 for new concrete pipe)
L = Pipe Length (Estimated as 60-ft)

Results:

A = 435 cfs / 6 fps = 72.5 sf
D = 9.61 ft < 10.0 ft (120-in)

$A = (3.14*D^2)/4 = 78.5$ sf
V = 435 cfs / 78.5 sf = 5.54 fps
Velocity Head = $h_v = v^2/2g = 0.48$ ft
Wetted Perimeter = P = 31.4 ft
Hydraulic Radius = R = A/P = 78.5 sf / 31.4 ft = 2.50 ft
Entrance Loss = $0.5 * v^2/2g = 0.24$ ft
H_L = 0.68 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.48$ ft

Total Estimated Headloss = 0.78-ft

Design the road crossing piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 14-inches.

Other options for the Farm Road crossing include a pre-cast box culvert or a precast bridge. The hydraulic properties for a 8' x 12' box culvert are noted below:

The continuity equation was used to solve for the cross-sectional area of the box culvert and the culvert dimensions given the design flow and maximum velocity.

$A = Q/V$

The headloss through the box culvert was calculated using the velocity head of the culvert for minor entrance and exit losses and the Manning's Equation for the friction loss through the culvert.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Culvert Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope

n = Material Coefficient (Used 0.013 for precast concrete)
L = Culvert Length (Estimated as 60-ft)

Results:

A = 435 cfs / 6 fps = 72.5 sf
D = 9.6 ft < 10.0 ft (120-in)

A = 8' x 12' = 96.0 sf
V = 435 cfs / 96 sf = 4.53 fps
Velocity Head = $h_v = v^2/2g$ = 0.32 ft
Wetted Perimeter = P = 40.0 ft
Hydraulic Radius = R = A/P = 96 sf / 40 ft = 2.40 ft
Entrance Loss = 0.5 * $v^2/2g$ = 0.16 ft
H_L = 0.48 ft / 1,000 ft
Exit Loss = 1.0 * $v^2/2g$ = 0.32 ft

Total Estimated Headloss = 0.51-ft

Design structure to minimize headloss at maximum flow and closely match culvert invert with canal invert to avoid material buildup in the box culvert during low flow conditions.

b) Pipe Materials

The Farm Road crossing piping is large diameter pipe in the approximate size of 10-ft diameter. The pipe material options consist of FBE steel pipe, CMLC steel pipe, wet cast RCP, and dry cast RCP. It is standard practice for the pipe deflection to be limited to 2% for CMLC steel pipe and 5% for FBE steel pipe. Assuming an earth cover of 10-ft, the deflection for a 3/8" wall FBE steel pipe is approximately 3%. However, the use of CMLC in this application with such a large diameter and a significant earth cover while maintaining pipe wall deflections of less than 2% is difficult. The wet cast and dry cast RCP pipe would be ASTM C361 pipe, C25 double gasketed pipe. The "C" designation signifies that the pipe is suitable for earth cover over the top of the pipe up to 15-ft. The "25" designation signifies that the pipe can handle hydrostatic heads up to 25-ft above the centerline of the pipe. The hydrostatic head under normal gravity flow operations will likely be less than 10-ft.

c) Material Recommendations

The Farm Road crossing piping is estimated to be approximately 60-ft in length. The FBE steel pipe is estimated as $1,205 per lineal foot for material cost and $2,197 per lineal foot for material and installation. The wet cast RCP is estimated as $2,453 per lineal foot for material cost and $3,271 per lineal foot for material and installation while the dry cast RCP is estimated as $546 per lineal foot for material cost and $1,364 per lineal foot for material and installation.

Steel pipe is not recommended in this application due to excessive pipe deflections of 3-inches to 4-inches even if it is within acceptable percentages. The dry cast RCP is the most economical pipe in this pipe diameter. Therefore, it is recommended that dry cast RCP pipe be used for the Farm Road crossing piping. In addition, RCP is a preferred pipe material for this application since it is corrosion resistant, more suitable to resist flotation, and a rigid pipe.

The box culvert is also an economical alternative provided the grades work and do not require an inverted siphon. It is envisioned that a 8' x 12' box culvert could be installed and the farm road built up over the box culvert so that it did not require an inverted siphon.

Reach 4 Farm Road

a) Sizing Criteria

The design flow for the crossing at a Reach 4 Farm Road crossing is 240 cfs.

- Flowrate = 240 cfs
- Maximum Velocity = 6 fps
- Pipe Diameter = Approximate 90-in (7.5-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the crossing piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Manning's Equation for the friction loss through the pipe.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.013 for new concrete pipe)
L = Pipe Length (Estimated as 60-ft)

Results:

A = 240 cfs / 6 fps = 40.0 sf
D = 7.14 ft < 7.5 ft (90-in)

$A = (3.14*D^2)/4 = 44.2$ sf
V = 240 cfs / 44.2 sf = 5.43 fps
Velocity Head = $h_v = v^2/2g = 0.46$ ft
Wetted Perimeter = P = 23.6 ft
Hydraulic Radius = R = A/P = 44.2 sf / 23.6 ft = 1.87 ft
Entrance Loss = $0.5 * v^2/2g = 0.23$ ft
H_L= 0.97 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.46$ ft

Total Estimated Headloss = 0.75-ft

Design the road crossing piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 13-inches.

Other options for the Farm Road crossing include a pre-cast box culvert or a precast bridge. The hydraulic properties for a 8' x 8' box culvert are noted below:

The continuity equation was used to solve for the cross-sectional area of the box culvert and the culvert dimensions given the design flow and maximum velocity.

$A = Q/V$

The headloss through the box culvert was calculated using the velocity head of the culvert for minor entrance and exit losses and the Manning's Equation for the friction loss through the culvert.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Culvert Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.013 for precast concrete)
L = Culvert Length (Estimated as 60-ft)

Results:

A = 240 cfs / 6 fps = 40.0 sf

A = 8' x 8' = 64.0 sf
V = 240 cfs / 64 sf = 3.75 fps
Velocity Head = $h_v = v^2/2g$ = 0.22 ft
Wetted Perimeter = P = 32.0 ft
Hydraulic Radius = R = A/P = 64 sf / 32 ft = 2.00 ft
Entrance Loss = $0.5 * v^2/2g$ = 0.11 ft
H_L = 0.42 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g$ = 0.22 ft

Total Estimated Headloss = 0.36-ft

Design structure to minimize headloss at maximum flow and closely match culvert invert with canal invert to avoid material buildup in the box culvert during low flow conditions.

b) Pipe Materials

The Farm Road crossing piping is large diameter pipe in the approximate size of 7.5-ft diameter. The pipe material options consist of FBE steel pipe, CMLC steel pipe, wet cast RCP, and dry cast RCP. It is standard practice for the pipe deflection to be limited to 2% for CMLC steel pipe and 5% for FBE steel pipe. Assuming an earth cover of 10-ft, the deflection for a 3/8" wall FBE steel pipe is approximately 3%. However, the use of CMLC in this application with such a

large diameter and a significant earth cover while maintaining pipe wall deflections of less than 2% is difficult. The wet cast and dry cast RCP pipe would be ASTM C361 pipe, C25 double gasketed pipe. The "C" designation signifies that the pipe is suitable for earth cover over the top of the pipe up to 15-ft. The "25" designation signifies that the pipe can handle hydrostatic heads up to 25-ft above the centerline of the pipe. The hydrostatic head under normal gravity flow operations will likely be less than 10-ft.

c) Material Recommendations

The Farm Road crossing piping is estimated to be approximately 60-ft in length. The FBE steel pipe is estimated as $650 per lineal foot for material cost and $1,110 per lineal foot for material and installation. The wet cast RCP is estimated as $1,470 per lineal foot for material cost and $1,805 per lineal foot for material and installation while the dry cast RCP is estimated as $391 per lineal foot for material cost and $726 per lineal foot for material and installation.

Steel pipe is not recommended in this application due to excessive pipe deflections of 3-inches to 4-inches even if it is within acceptable percentages. The dry cast RCP is the most economical pipe in this pipe diameter. Therefore, it is recommended that dry cast RCP pipe be used for the Farm Road crossing piping. In addition, RCP is a preferred pipe material for this application since it is corrosion resistant, more suitable to resist flotation, and a rigid pipe.

The box culvert is also an economical alternative provided the grades work and do not require an inverted siphon. It is envisioned that a 8' x 8' box culvert could be installed and the farm road built up over the box culvert so that it did not require an inverted siphon.

C. Highway Cased Crossings

a) Sizing Criteria

The design flow for the cased crossing at Stockdale Highway in Reach 1 and the cased crossing at the Interstate 5 Freeway in Reach 2 is 443 cfs.

- Flowrate = 443 cfs
- Maximum Velocity = 6 fps
- Pipe Diameter = Approximate 120-in (10-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the carrier piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Manning's Equation for the friction loss through the pipe.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.013 for new concrete pipe)
L = Pipe Length (Stockdale Hwy estimated as 150-ft)
(I-5 Fwy estimated as 280-ft)

Results:

A = 443 cfs / 6 fps = 73.8 sf
D = 9.70 ft < 10.0 ft (120-in)

$A = (3.14*D^2)/4 = 78.5$ sf
V = 442 cfs / 78.5 sf = 5.64 fps
Velocity Head = $h_v = v^2/2g = 0.49$ ft
Wetted Perimeter = P = 31.4 ft
Hydraulic Radius = R = A/P = 78.5 sf / 31.4 ft = 2.50 ft
Entrance Loss = $0.5 * v^2/2g = 0.25$ ft
H_L= 0.71 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.49$ ft

Total Estimated Headloss = 0.85-ft for Stockdale Hwy
0.94-ft for I-5 Fwy

Design the cased crossing piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 14-inches.

b) Pipe Materials

The casing pipe material for these crossings is estimated to be a minimum of 168" diameter bare steel pipe or steel liner plate with an approximate wall thickness of 3/4" per the requirements of the California Department of Transportation.

The cased crossing carrier piping is large diameter pipe in the approximate size of 10-ft diameter. The annulus between the casing pipe and the carrier pipe will be filled with a cement slurry. For this reason, RCP pipe is recommended for the carrier piping. The wet cast and dry cast RCP pipe would be ASTM C361 pipe, D25 double gasketed pipe with an approximate O.D. of 142".

c) Material Recommendations

The estimated cost for the cased crossings includes installation of the 168" diameter liner plate by the tunnel boring machine method and soil stabilization and is approximately $2,000 per lineal foot material cost and approximately $4,000 per lineal foot for material and installation. The carrier pipe is estimated as 10-ft diameter ASTM C361 D25 double gasketed RCP and the annulus filled with a cement slurry. The estimated cost to install the carrier piping is approximately $585 per lineal foot material cost and $2,500 per lineal foot for material and installation.

D. Reach 4 Conveyance Piping

a) Sizing Criteria

The Reach 4 of the conveyance canal may be an open channel or a closed conduit design. The design flow for a closed conduit in Reach 4 is 240 cfs. However, this 240 cfs demand is for the initial filling of the recharge basins and is expected to be a short-term event. Therefore, it is more desirable to design the closed conduit system for the average rates (approximately 160 cfs) rather than the short-term peak fill rates. Furthermore, it is anticipated that a closed conduit design could reduce in pipeline size as water is conveyed through turnouts along the pipeline to the West Basins, see Figure 2.

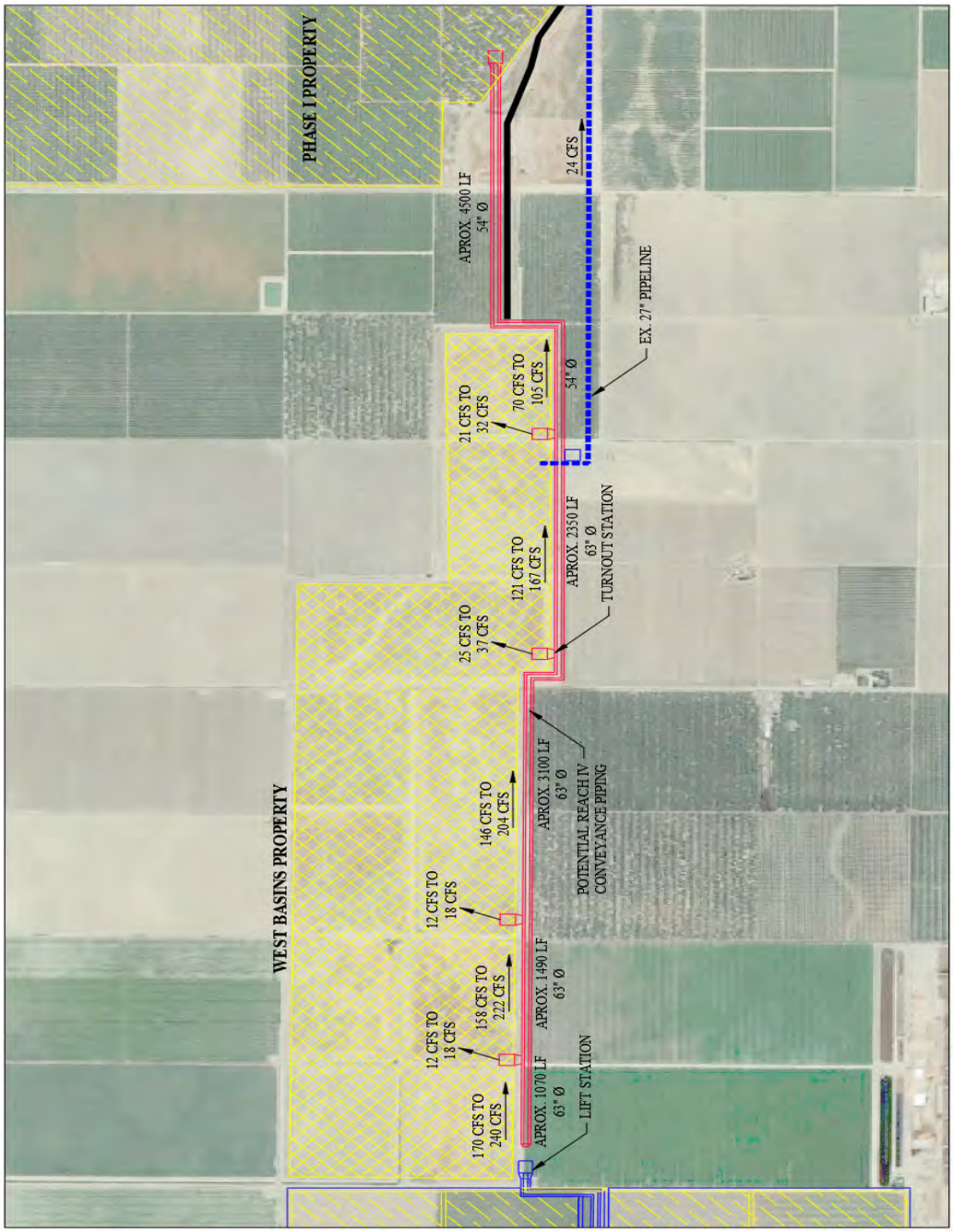

Figure 2: West Basin Turnouts

Alternative 1a: Fill Rate – Max Velocity 7 fps

The first alternative targets maintaining pipeline velocities below 7 fps during the initial filling operations and below 5 fps during average recharge conditions.

- Flowrate = 240 cfs
- Maximum Velocity at Initial Fill = 7.0 fps
- Pipe Diameter = Approximate 84-in (7-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the conveyance piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Hazen-Williams Equation for the friction loss through the pipe.

Hazen-Williams Equation: $h_f = (3.022 * V^{1.85} * L) / (C^{1.85} * D^{1.17})$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 130 for Dry Cast RCP pipe)
L = Pipe Length (Estimated as 1,070-ft)

Results:

A = 240 cfs / 7.0 fps = 34.3 sf
D = 6.6 ft < 7.0 ft (84-in)

$A = (3.14*D^2)/4 = 38.47$ sf
V = 240 cfs / 38.47 sf = 6.24 fps
Velocity Head = $h_v = v^2/2g = .60$ ft
Wetted Perimeter = P = 22.0 ft
Hydraulic Radius = R = A/P = 38.5 sf / 22.0 ft = 1.75 ft
Entrance Loss = $0.5 * v^2/2g = 0.30$ ft
H_L= 1.21 ft
Minor Loss = $0.2 * v^2/2g = 0.60$ ft

Total Estimated Headloss = 2.11-ft

The flow then decreases to approximately 222 cfs after the first turnout to the West Basins. The pipeline remains a 84" Dry Cast RCP pipe with an approximate 84" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)

D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 130 for Dry Cast RCP pipe)
L = Pipe Length (Estimated as 1,490-ft)

Results:

A = 222 cfs / 7.0 fps = 31.71 sf
D = 6.4 ft < 7.0 ft (84-in)

$A = (3.14*D^2)/4 = 38.47$ sf
V = 222 cfs / 38.47 sf = 5.77 fps
Velocity Head = $h_v = v^2/2g = 0.52$ ft
Wetted Perimeter = P = 22.0 ft
Hydraulic Radius = R = A/P = 38.5 sf / 22.0 ft = 1.75 ft
H_L= 1.45 ft
Minor Loss = $0.2 * v^2/2g = 0.10$ ft

Total Estimated Headloss = 1.55-ft

The flow then decreases to approximately 204 cfs after the first and second turnouts to the West Basins. The pipeline then reduces to a 72" Dry Cast RCP pipe with an approximate 72" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 130 for Dry Cast RCP pipe)
L = Pipe Length (Estimated as 3,100-ft)

Results:

A = 204 cfs / 7.0 fps = 29.1 sf
D = 6.1 ft $\leq$ 6 ft (72-in)

$A = (3.14*D^2)/4 = 28.3$ sf
V = 204 cfs / 28.3 sf = 7.2 fps
Velocity Head = $h_v = v^2/2g = 0.81$ ft
Wetted Perimeter = P = 18.8 ft
Hydraulic Radius = R = A/P = 28.3 sf / 18.8 ft = 1.51 ft
H_L= 5.45 ft
Minor Loss = $0.2 * v^2/2g = 0.16$ ft

Total Estimated Headloss = 5.61-ft

The flow then decreases to approximately 167 cfs after the first, second, and third turnouts to the West Basins. The pipeline then reduces to a 66" Dry Cast RCP pipe with an approximate 66" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)

A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 130 for Dry Cast RCP pipe)
L = Pipe Length (Estimated as 2,350-ft)

Results:

A = 167 cfs / 7.0 fps = 23.9 sf
D = 5.5 ft $\leq$ 5.5 ft (66-in)

$A = (3.14*D^2)/4 = 23.7$ sf
$V = 167$ cfs / 23.7 sf = 7.05 fps
Velocity Head = $h_v = v^2/2g = 0.77$ ft
Wetted Perimeter = P = 17.3 ft
Hydraulic Radius = R = A/P = 23.7 sf / 17.3 ft = 1.37 ft
H_L= 4.40 ft
Minor Loss = $0.2 * v^2/2g = 0.15$ ft

Total Estimated Headloss = 4.55-ft

The flow then decreases to approximately 135 cfs after the fourth and final turnout to the West Basins. In addition, approximately 24 cfs is conveyed to the existing 27-inch West Basin pipeline and 6 cfs to "in-lieu" turnout demands leaving approximately 105 cfs to be conveyed to the Phase I Property. The pipeline reduces to a 54" Dry Cast RCP pipe with an approximate 54" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 130 for Dry Cast RCP pipe)
L = Pipe Length (Estimated as 4,500-ft)

Results:

A = 105 cfs / 7.0 fps = 15.0 sf
D = 4.37 ft < 4.5 ft (54-in)

$A = (3.14*D^2)/4 = 15.9$ sf
$V = 105$ cfs / 15.9 sf = 6.6 fps
Velocity Head = $h_v = v^2/2g = 0.68$ ft
Wetted Perimeter = P = 14.1 ft
Hydraulic Radius = R = A/P = 15.9 sf / 14.1 ft = 1.13 ft
H_L= 9.43 ft
Exit Loss = $1.0 * v^2/2g = 0.68$ ft

Total Estimated Headloss = 10.11-ft

The estimated headloss above (23.93-ft) would need to be added to the static lift which is estimated as 13-ft for a total TDH (excluding Pump Station losses for sake of comparison) of approximately 36.93-ft. The total dynamic head (TDH) for the Pump Station No. 3 under the open channel design is approximately 13-ft (excluding Pump Station losses for sake of comparison). The closed conduit design results in an approximate increase of 1,000 bhp to convey the water

through Reach 4. This results in cost increases to the pumps, motors, VFD's, and electrical equipment.

This also results in higher operational costs. The higher pump station lift is approximately 23.93-ft than an open channel design. This equates to approximately 37.70 kwh/ac-ft. In a wet year it is estimated that approximately 7,140 ac-ft could be pumped through this reach during the initial fill over an approximate two-week duration. This equates to approximately 269,170 kwh per year. Assuming an average energy rate of $0.14/kwh equates to an increased operational cost in wet years of approximately $37,684.00.

Alternative 1b: Avg. Recharge Rate – Max Velocity 7 fps

The same calculations as above were performed accounting for the average recharge rates:

- Flowrate = 170 cfs
- Maximum Velocity = 7.0 fps
- Pipe Diameter = Approximate 84-in (7-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the conveyance piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Hazen-Williams Equation for the friction loss through the pipe.

Hazen-Williams Equation: $h_f = (3.022 * V^{1.85} * L) / (C^{1.85} * D^{1.17})$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 130 for Dry Cast RCP pipe)
L = Pipe Length (Estimated as 1,070-ft)

Results:

A = 170 cfs / 7.0 fps = 24.3 sf
D = 5.6 ft < 7 ft (84-in)

$A = (3.14*D^2)/4 = 38.47$ sf
V = 170 cfs / 38.47 sf = 4.42 fps
Velocity Head = $h_v = v^2/2g = 0.30$ ft
Wetted Perimeter = P = 22.0 ft
Hydraulic Radius = R = A/P = 38.5 sf / 22.0 ft = 1.75 ft
Entrance Loss = $0.5 * v^2/2g = 0.15$ ft
H_L = 0.64 ft

Minor Loss = 0.2 * $v^2/2g$ = 0.06 ft

Total Estimated Headloss = 0.85-ft

The flow then decreases to approximately 158 cfs after the first turnout to the West Basins. The pipeline remains a 84" Dry Cast RCP pipe with an approximate 84" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 130 for Dry Cast RCP pipe)
L = Pipe Length (Estimated as 1,490-ft)

Results:

A = 158 cfs / 7.0 fps = 22.6 sf
D = 5.36 ft < 7.0 ft (84-in)

A = $(3.14*D^2)/4$ = 38.47 sf
V = 158 cfs / 38.47 sf = 4.11 fps
Velocity Head = $h_v = v^2/2g$ = 0.26 ft
Wetted Perimeter = P = 22.0 ft
Hydraulic Radius = R = A/P = 38.5 sf / 22.0 ft = 1.75 ft
H_L= 0.78 ft
Minor Loss = 0.2 * $v^2/2g$ = 0.05 ft

Total Estimated Headloss = 0.83-ft

The flow then decreases to approximately 146 cfs after the first and second turnouts to the West Basins. The pipeline reduces to a 72" Dry Cast RCP pipe with an approximately 72" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 130 for Dry Cast RCP pipe)
L = Pipe Length (Estimated as 3,100-ft)

Results:

A = 146 cfs / 7.0 fps = 20.9 sf
D = 5.15 ft < 6.0 ft (72-in)

A = $(3.14*D^2)/4$ = 28.26 sf
V = 146 cfs / 28.26 sf = 5.17 fps
Velocity Head = $h_v = v^2/2g$ = 0.41 ft
Wetted Perimeter = P = 18.8 ft
Hydraulic Radius = R = A/P = 28.3 sf / 18.8 ft = 1.51 ft
H_L= 2.95 ft
Minor Loss = 0.2 * $v^2/2g$ = 0.08 ft

Total Estimated Headloss = 3.04-ft

The flow then decreases to approximately 121 cfs after the first, second, and third turnouts to the West Basins. The pipeline further reduces to a 66" Dry Cast RCP pipe with an approximate 66" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 130 for Dry Cast RCP pipe)
L = Pipe Length (Estimated as 2,350-ft)

Results:

A = 121 cfs / 7.0 fps = 17.29 sf
D = 4.69 ft < 5.5 ft (66-in)

$A = (3.14*D^2)/4 = 23.75$ sf
V = 121 cfs / 23.75 sf = 5.09 fps
Velocity Head = $h_v = v^2/2g = 0.40$ ft
Wetted Perimeter = P = 17.3 ft
Hydraulic Radius = R = A/P = 23.8 sf / 17.3 ft = 1.38 ft
H_L= 2.41 ft
Minor Loss = $0.2 * v^2/2g = 0.08$ ft

Total Estimated Headloss = 2.49-ft

The flow then decreases to approximately 100 cfs after the fourth and final turnout to the West Basins. In addition, approximately 24 cfs is conveyed to the existing 27-inch West Basin pipeline and 6 cfs to "in-lieu" turnout demands leaving approximately 70 cfs to be conveyed to the Phase I Property. The pipeline reduces to a 54" Dry Cast RCP pipe with an approximate 54" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 130 for Dry Cast RCP pipe)
L = Pipe Length (Estimated as 4,500-ft)

Results:

A = 70 cfs / 7.0 fps = 10.0 sf
D = 3.57 ft < 4.5 ft (54-in)

$A = (3.14*D^2)/4 = 15.9$ sf
V = 70 cfs / 15.9 sf = 4.40 fps
Velocity Head = $h_v = v^2/2g = 0.30$ ft
Wetted Perimeter = P = 14.1 ft
Hydraulic Radius = R = A/P = 15.9 sf / 14.1 ft = 1.13 ft
H_L= 4.46 ft

Exit Loss = 1.0 * $v^2/2g$ = 0.30 ft

Total Estimated Headloss = 4.76-ft

The estimated headloss above (11.97-ft) would need to be added to the static lift which is estimated as 13-ft for a total TDH (excluding Pump Station losses for sake of comparison) of approximately 24.97-ft.

This also results in higher operational costs that must be considered. The higher pump station lift is approximately 11.97-ft. This equates to approximately 18.86 kwh/ac-ft. In a wet year it is estimated that approximately 42,860 ac-ft could be pumped through this reach during the average recharge operations to bank the total 50,000 ac-ft goal. This equates to approximately 808,226 kwh per year. Assuming an average energy rate of $0.14/kwh equates to an increased operational cost in wet years of approximately $113,152.00.

This equates to a total operating cost in a wet year of approximately $150,836.00 more than would be experienced with an open channel facility. The approximate capital cost for the 84" Dry Cast RCP closed conduit design would be roughly $5.5M. In addition, the increased pump station horsepower is anticipated to add approximately $800,000 in cost for a total capital cost of approximately $6.3M.

Alternative 2a: Fill Rate – Max Velocity 12.5 fps

The second alternative evaluates using HDPE pipe and pushing the velocities higher during the initial filling period with the understanding that the majority of the time the system will be operating under average recharge rates and lower pipeline velocities.

- Flowrate = 240 cfs
- Maximum Velocity at Initial Fill = 12.5 fps
- Pipe Diameter = Approximate 60-in (5-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the conveyance piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Hazen-Williams Equation for the friction loss through the pipe.

Hazen-Williams Equation: $h_f = (3.022 * V^{1.85} * L) / (C^{1.85} * D^{1.17})$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope

C = Material Coefficient (Used 160 for HDPE pipe)
L = Pipe Length (Estimated as 1,070-ft)

Results:

A = 240 cfs / 12.5 fps = 19.2 sf
D = 4.95 ft < 5 ft (60-in)

$A = (3.14*D^2)/4 = 19.46$ sf
V = 240 cfs / 19.46 sf = 12.34 fps
Velocity Head = $h_v = v^2/2g = 2.36$ ft
Wetted Perimeter = P = 15.6 ft
Hydraulic Radius = R = A/P = 19.5 sf / 15.6 ft = 1.25 ft
Entrance Loss = $0.5 * v^2/2g = 1.18$ ft
H_L= 4.32 ft
Minor Loss = $0.2 * v^2/2g = 0.47$ ft

Total Estimated Headloss = 5.97-ft

The flow then decreases to approximately 222 cfs after the first turnout to the West Basins. The pipeline remains a 63" HDPE pipe with an approximately 60" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 160 for HDPE pipe)
L = Pipe Length (Estimated as 1,490-ft)

Results:

A = 222 cfs / 12.5 fps = 17.8 sf
D = 4.76 ft < 5 ft (60-in)

$A = (3.14*D^2)/4 = 19.46$ sf
V = 222 cfs / 19.46 sf = 11.41 fps
Velocity Head = $h_v = v^2/2g = 2.02$ ft
Wetted Perimeter = P = 15.6 ft
Hydraulic Radius = R = A/P = 19.5 sf / 15.6 ft = 1.25 ft
H_L= 5.20 ft
Minor Loss = $0.2 * v^2/2g = 0.40$ ft

Total Estimated Headloss = 5.60-ft

The flow then decreases to approximately 204 cfs after the first and second turnouts to the West Basins. The pipeline remains a 63" HDPE pipe with an approximately 60" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope

C = Material Coefficient (Used 160 for HDPE pipe)
L = Pipe Length (Estimated as 3,100-ft)

Results:

A = 204 cfs / 12.5 fps = 16.3 sf
D = 4.56 ft < 5 ft (60-in)

$A = (3.14*D^2)/4 = 19.46$ sf
V = 204 cfs / 19.46 sf = 10.48 fps
Velocity Head = $h_v = v^2/2g = 1.71$ ft
Wetted Perimeter = P = 15.6 ft
Hydraulic Radius = R = A/P = 19.5 sf / 15.6 ft = 1.25 ft
H_L= 9.26 ft
Minor Loss = $0.2 * v^2/2g = 0.34$ ft

Total Estimated Headloss = 9.60-ft

The flow then decreases to approximately 167 cfs after the first, second, and third turnouts to the West Basins. The pipeline remains a 63" HDPE pipe with an approximately 60" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 160 for HDPE pipe)
L = Pipe Length (Estimated as 2,350-ft)

Results:

A = 167 cfs / 12.5 fps = 13.4 sf
D = 4.13 ft < 5 ft (60-in)

$A = (3.14*D^2)/4 = 19.46$ sf
V = 167 cfs / 19.46 sf = 8.58 fps
Velocity Head = $h_v = v^2/2g = 1.14$ ft
Wetted Perimeter = P = 15.6 ft
Hydraulic Radius = R = A/P = 19.5 sf / 15.6 ft = 1.25 ft
H_L= 4.82 ft
Minor Loss = $0.2 * v^2/2g = 0.23$ ft

Total Estimated Headloss = 5.05-ft

The flow then decreases to approximately 135 cfs after the fourth and final turnout to the West Basins. In addition, approximately 24 cfs is conveyed to the existing 27-inch West Basin pipeline and 6 cfs to "in-lieu" turnout demands leaving approximately 105 cfs to be conveyed to the Phase I Property. The pipeline reduces to a 54" HDPE pipe with an approximately 51" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius

S = Slope
C = Material Coefficient (Used 160 for HDPE pipe)
L = Pipe Length (Estimated as 4,500-ft)

Results:

A = 105 cfs / 12.5 fps = 8.4 sf
D = 3.27 ft < 4.5 ft (54-in)

$A = (3.14*D^2)/4 = 14.30$ sf
V = 105 cfs / 14.30 sf = 7.34 fps
Velocity Head = $h_v = v^2/2g = .84$ ft
Wetted Perimeter = P = 13.4 ft
Hydraulic Radius = R = A/P = 14.3 sf / 13.4 ft = 1.07 ft
H_L= 8.32 ft
Exit Loss = $1.0 * v^2/2g = 0.84$ ft

Total Estimated Headloss = 9.16-ft

The estimated headloss above (35.38-ft) would need to be added to the static lift which is estimated as 13-ft for a total TDH (excluding Pump Station losses for sake of comparison) of approximately 48.38-ft. The total dynamic head (TDH) for the Pump Station No. 3 under the open channel design is approximately 13-ft (excluding Pump Station losses for sake of comparison). The closed conduit design results in an approximate increase of 1,480 bhp to convey the water through Reach 4. This results in cost increases to the pumps, motors, VFD's, and electrical equipment.

This also results in higher operational costs. The higher pump station lift is approximately 35.38-ft more than an open channel design. This equates to approximately 55.74 kwh/ac-ft. In a wet year it is estimated that approximately 7,140 ac-ft could be pumped through this reach during the initial fill over an approximate two-week duration. This equates to approximately 397,963 kwh per year. Assuming an average energy rate of $0.14/kwh equates to an increased operational cost in wet years of approximately $55,715.00.

Alternative 2b: Avg. Recharge Rate – Max Velocity 12.5 fps

The same calculations as above were performed accounting for the average recharge rates:

- Flowrate = 170 cfs
- Maximum Velocity = 12.5 fps
- Pipe Diameter = Approximate 60-in (5-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the conveyance piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Hazen-Williams Equation for the friction loss through the pipe.

Hazen-Williams Equation: $h_f = (3.022 * V^{1.85} * L) / (C^{1.85} * D^{1.17})$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 160 for HDPE pipe)
L = Pipe Length (Estimated as 1,070-ft)

Results:

A = 170 cfs / 12.5 fps = 13.6 sf
D = 4.16 ft < 5 ft (60-in)

$A = (3.14*D^2)/4 = 19.46$ sf
V = 170 cfs / 19.46 sf = 8.74 fps
Velocity Head = $h_v = v^2/2g = 1.19$ ft
Wetted Perimeter = P = 15.6 ft
Hydraulic Radius = R = A/P = 19.5 sf / 15.6 ft = 1.25 ft
Entrance Loss = $0.5 * v^2/2g = 0.59$ ft
H_L= 2.28 ft
Minor Loss = $0.2 * v^2/2g = 0.24$ ft

Total Estimated Headloss = 3.11-ft

The flow then decreases to approximately 158 cfs after the first turnout to the West Basins. The pipeline remains a 63" HDPE pipe with an approximately 60" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 160 for HDPE pipe)
L = Pipe Length (Estimated as 1,490-ft)

Results:

A = 158 cfs / 12.5 fps = 12.6 sf
D = 4.01 ft < 5 ft (60-in)

$A = (3.14*D^2)/4 = 19.46$ sf
V = 158 cfs / 19.46 sf = 8.12 fps
Velocity Head = $h_v = v^2/2g = 1.02$ ft
Wetted Perimeter = P = 15.6 ft
Hydraulic Radius = R = A/P = 19.5 sf / 15.6 ft = 1.25 ft
H_L= 2.77 ft
Minor Loss = $0.2 * v^2/2g = 0.20$ ft

Total Estimated Headloss = 2.97-ft

The flow then decreases to approximately 146 cfs after the first and second turnouts to the West Basins. The pipeline remains a 63" HDPE pipe with an approximately 60" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 160 for HDPE pipe)
L = Pipe Length (Estimated as 3,100-ft)

Results:

A = 146 cfs / 12.5 fps = 11.7 sf
D = 3.86 ft < 5 ft (60-in)

$A = (3.14*D^2)/4 = 19.46$ sf
V = 146 cfs / 19.46 sf = 7.50 fps
Velocity Head = $h_v = v^2/2g = 0.87$ ft
Wetted Perimeter = P = 15.6 ft
Hydraulic Radius = R = A/P = 19.5 sf / 15.6 ft = 1.25 ft
H_L= 4.99 ft
Minor Loss = $0.2 * v^2/2g = 0.17$ ft

Total Estimated Headloss = 5.16-ft

The flow then decreases to approximately 121 cfs after the first, second, and third turnouts to the West Basins. The pipeline remains a 63" HDPE pipe with an approximately 60" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 160 for HDPE pipe)
L = Pipe Length (Estimated as 2,350-ft)

Results:

A = 121 cfs / 12.5 fps = 9.7 sf
D = 3.51 ft < 5 ft (60-in)

$A = (3.14*D^2)/4 = 19.46$ sf
V = 121 cfs / 19.46 sf = 6.22 fps
Velocity Head = $h_v = v^2/2g = .60$ ft
Wetted Perimeter = P = 15.6 ft
Hydraulic Radius = R = A/P = 19.5 sf / 15.6 ft = 1.25 ft
H_L= 2.67 ft
Minor Loss = $0.2 * v^2/2g = 0.12$ ft

Total Estimated Headloss = 2.79-ft

The flow then decreases to approximately 100 cfs after the fourth and final turnout to the West Basins. In addition, approximately 24 cfs is conveyed to the existing 27-inch West Basin pipeline and 6 cfs to "in-lieu" turnout demands leaving approximately 70 cfs to be conveyed to the Phase I Property. The pipeline reduces to a 54" HDPE pipe with an approximately 51" I.D.

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Material Coefficient (Used 160 for HDPE pipe)
L = Pipe Length (Estimated as 4,500-ft)

Results:

A = 70 cfs / 12.5 fps = 5.6 sf
D = 2.67 ft < 4.5 ft (54-in)

$A = (3.14*D^2)/4 = 14.30$ sf
V = 70 cfs / 14.30 sf = 6.99 fps
Velocity Head = $h_v = v^2/2g = .76$ ft
Wetted Perimeter = P = 13.4 ft
Hydraulic Radius = R = A/P = 14.3 sf / 13.4 ft = 1.07 ft
H_L= 3.93 ft
Exit Loss = $1.0 * v^2/2g = 0.76$ ft

Total Estimated Headloss = 4.69-ft

The estimated headloss above (18.72-ft) would need to be added to the static lift which is estimated as 13-ft for a total TDH (excluding Pump Station losses for sake of comparison) of approximately 31.72-ft.

This also results in higher operational costs that must be considered. The higher pump station lift is approximately 18.72-ft. This equates to approximately 29.49 kwh/ac-ft. In a wet year it is estimated that approximately 42,860 ac-ft could be pumped through this reach during the average recharge operations to bank the total 50,000 ac-ft goal. This equates to approximately 1,263,905 kwh per year. Assuming an average energy rate of $0.14/kwh equates to an increased operational cost in wet years of approximately $176,947.00.

This equates to a total operating cost in a wet year of approximately $232,662.00 as opposed to designing the closed conduit piping system closer to a more conventional velocity of 5 to 7 fps. This is an approximate increase of $81,826.00 in operating expenses per wet year as a result of utilizing a smaller diameter piping system. The approximate capital cost for the 63" HDPE closed conduit design would be roughly $4.0M. In addition, the increased pump station horsepower is anticipated to add approximately $1.5M in cost for a total capital cost of approximately $5.5M. Therefore, the increased capital cost for the difference between 63" HDPE and 84" Dry Cast RCP in a closed conduit design would be approximately $0.8M ($6.3M - $5.5M). However, the increased pipe size saves approximately $81,826.00 annually in wet years ($232,662 - $150,836). This requires approximately 10 wet years to pay for the increased

capital cost which is a great deal of time when considering that wet years typically occur only about two years out of every ten which would equate to an approximate payback period of 50 years.

Value engineering during the design phase may also consider possible parallel pipelines, more detailed pump station costs, rights-of-way and crop take, etc. when evaluating the Reach 4 design.

b) Pipe Materials

The conveyance piping is large diameter pipe in the approximate size of 5-ft diameter. The pipe material options consist of PVC, HDPE, FBE steel pipe, CMLC steel pipe, wet cast RCP, and dry cast RCP. The PVC pipe would be DR41 pipe and the HDPE would be 63" DR41 pipe. It is anticipated that a 3/8-inch steel pipe wall thickness would be utilized for the FBE steel pipe and CMLC steel pipe. The wet cast and dry cast RCP pipe would be ASTM C361 pipe, C50 double gasketed pipe. The "C" designation signifies that the pipe is suitable for earth cover over the top of the pipe up to 15-ft which is anticipated when crossing levee embankments. The "50" designation signifies that the pipe can handle hydrostatic heads up to 50-ft above the centerline of the pipe.

c) Material Recommendations

The conveyance piping is estimated to be approximately 12,510-ft in length. The PVC pipe is estimated as $316 per lineal foot for material cost and $448 per lineal foot for material and installation. The HDPE pipe is estimated as $128 per lineal foot for material cost and $332 per lineal foot for material and installation. The FBE steel pipe is estimated as $330 per lineal foot for material cost and $524 for material and installation. The CMLC steel pipe is estimated as $340 per lineal foot for material cost and $514 per lineal foot for material and installation. The wet cast RCP is estimated as $750 per lineal foot for material cost and $858 per lineal foot for material and installation while the dry cast RCP is estimated as $236 per lineal foot for material cost and $344 per lineal foot for material and installation.

The DR41 HDPE pipe is the most economical pipe in this pipe diameter. Therefore, 63" DR41 HDPE pipe is the recommended pipe material for the Reach 4 canal conveyance piping if a closed conduit design is selected. The pipe size could also be reduced as the closed conduit system turns out water to each recharge basin.

The pipe pressure class will need to be re-evaluated upon completion of the pump station design to ensure the pipe is designed for the appropriate working pressures, potential surge pressures, and pump shut-off head, if applicable.

E. Pump Station Discharge Piping

a) Sizing Criteria

The design flow for Pump Station No. 1 located near Stockdale Highway is 443 cfs. The design flow for Pump Station No. 2 located near the Interstate 5 Freeway is 435 cfs. The design flow for Pump Station No. 3 near the West Basins is 240 cfs. Each of these pump stations will consist of multiple pumps. The calculations below are for various sizes of pump discharge piping. Technical Memorandum No. 4 (Pump Station Requirements) will evaluate the different combinations of pumps.

- Flowrate = 240 cfs to 443 cfs
- Flowrate varies for each pump discharge line
- Maximum Velocity = 10 fps

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the discharge piping was calculated using the velocity head of the pipe for minor losses and the Hazen-Williams Equation for the friction loss through the pipe.

Hazen-Williams Equation: $h_f = (3.022 * V^{1.85} * L) / (C^{1.85} * D^{1.17})$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
C = Roughness Coefficient (Used 145 for lined steel pipe)
L = Pipe Length (Estimated as 150-ft)

Results:

125 cfs Pumps

A = 125 cfs / 10 fps = 12.5 sf
D = 3.99 ft < 4.0 ft (48-in)

$A = (3.14*D^2)/4 = 12.6$ sf
V = 125 cfs / 12.6 sf = 9.92 fps
Velocity Head = $h_v = v^2/2g = 1.53$ ft
Wetted Perimeter = P = 12.6 ft
Hydraulic Radius = R = A/P = 12.6 sf / 12.6 ft = 1.0 ft
Entrance Loss = $0.5 * v^2/2g = .77$ ft
H_L= 0.63 ft
Check Valve = 0.50-ft
Flow Meter = 0.01-ft
Butterfly Valve = 0.55-ft
Exit Loss = $1.0 * v^2/2g = 1.53$ ft

Total Estimated Headloss = 3.99-ft

100 cfs Pumps

A = 100 cfs / 10 fps =10.00 sf
D = 3.56 ft < 4.0 ft (48-in)

$A = (3.14*D^2)/4 = 12.6$ sf
V = 100 cfs / 12.6 sf = 7.94 fps
Velocity Head = $h_v = v^2/2g = 0.98$ ft
Wetted Perimeter = P = 12.6 ft
Hydraulic Radius = R = A/P = 12.6 sf / 12.6 ft = 1.0 ft
Entrance Loss = $0.5 * v^2/2g = 0.49$ ft
H_L= 0.51 ft
Check Valve = 0.35-ft
Flow Meter = 0.01-ft
Butterfly Valve = 0.35-ft
Exit Loss = $1.0 * v^2/2g = 0.98$ ft

Total Estimated Headloss = 2.69-ft

90 cfs Pumps

A = 90 cfs / 10 fps = 9.00 sf
D = 3.39 ft < 3.5 ft (42-in)

$A = (3.14*D^2)/4 = 9.62$ sf
V = 90 cfs / 9.6 sf = 9.38 fps
Velocity Head = $h_v = v^2/2g = 1.36$ ft
Wetted Perimeter = P = 11.0 ft
Hydraulic Radius = R = A/P = 9.6 sf / 11.0 ft = 0.87 ft
Entrance Loss = $0.5 * v^2/2g = 0.68$ ft
H_L= 0.66 ft
Check Valve = 0.45-ft
Flow Meter = 0.01-ft
Butterfly Valve = 0.50-ft
Exit Loss = $1.0 * v^2/2g = 1.36$ ft

Total Estimated Headloss = 3.66-ft

80 cfs Pumps

A = 80 cfs / 10 fps = 8.0 sf
D = 3.19 ft < 3.5 ft (42-in)

$A = (3.14*D^2)/4 = 9.62$ sf
V = 80 cfs / 9.6 sf = 8.33 fps
Velocity Head = $h_v = v^2/2g = 1.08$ ft
Wetted Perimeter = P = 11.0 ft
Hydraulic Radius = R = A/P = 9.6 sf / 11.0 ft = 0.875 ft
Entrance Loss = $0.5 * v^2/2g = 0.54$ ft
H_L= 0.53 ft
Check Valve = 0.35-ft
Flow Meter = 0.01-ft
Butterfly Valve = 0.40-ft
Exit Loss = $1.0 * v^2/2g = 1.08$ ft

Total Estimated Headloss = 2.91-ft

65 cfs Pumps

A = 65 cfs / 10 fps = 6.5 sf
D = 2.88 ft < 3.0 ft (36-in)

$A = (3.14*D^2)/4 = 7.07$ sf
V = 65 cfs / 7.07 sf = 9.19 fps
Velocity Head = $h_v = v^2/2g = 1.31$ ft
Wetted Perimeter = P = 9.42 ft
Hydraulic Radius = R = A/P = 7.1 sf / 9.4 ft = 0.75 ft
Entrance Loss = $0.5 * v^2/2g = 0.66$ ft
H_L= 0.76 ft
Check Valve = 0.55-ft
Flow Meter = 0.01-ft
Butterfly Valve = 0.50-ft
Exit Loss = $1.0 * v^2/2g = 1.31$ ft

Total Estimated Headloss = 3.79-ft

60 cfs Pumps

A = 60 cfs / 10 fps = 6.0 sf
D = 2.76 ft < 3.0 ft (36-in)

$A = (3.14*D^2)/4 = 7.07$ sf
V = 60 cfs / 7.07 sf = 8.49 fps
Velocity Head = $h_v = v^2/2g = 1.12$ ft
Wetted Perimeter = P = 9.42 ft
Hydraulic Radius = R = A/P = 7.1 sf / 9.4 ft = 0.75 ft
Entrance Loss = $0.5 * v^2/2g = 0.56$ ft
H_L= 0.66 ft
Check Valve = 0.45-ft
Flow Meter = 0.01-ft
Butterfly Valve = 0.45-ft
Exit Loss = $1.0 * v^2/2g = 1.12$ ft

Total Estimated Headloss = 3.25-ft

50 cfs Pumps

A = 50 cfs / 10 fps = 5.0 sf
D = 2.52 ft < 3.0 ft (36-in)

$A = (3.14*D^2)/4 = 7.07$ sf
V = 50 cfs / 7.07 sf = 7.07 fps
Velocity Head = $h_v = v^2/2g = 0.78$ ft
Wetted Perimeter = P = 9.42 ft
Hydraulic Radius = R = A/P = 7.07 sf / 9.42 ft = 0.75 ft
Entrance Loss = $0.5 * v^2/2g = 0.39$ ft
H_L= 0.57 ft
Check Valve = 0.32-ft
Flow Meter = 0.01-ft
Butterfly Valve = 0.26-ft
Exit Loss = $1.0 * v^2/2g = 0.78$ ft

Total Estimated Headloss = 2.33-ft

40 cfs Pumps

A = 40 cfs / 10 fps = 4.00 sf
D = 2.26 ft < 2.5 ft (30-in)

$A = (3.14*D^2)/4 = 4.91$ sf

V = 40 cfs / 4.91 sf = 8.15 fps
Velocity Head = $h_v = v^2/2g$ = 1.03 ft
Wetted Perimeter = P = 7.85 ft
Hydraulic Radius = R = A/P = 4.91 sf / 7.85 ft = 0.63 ft
Entrance Loss = 0.5 * $v^2/2g$ = 0.52 ft
H_L= 0.76 ft
Check Valve = 0.45-ft
Flow Meter = 0.01-ft
Butterfly Valve = 0.45-ft
Exit Loss = 1.0 * $v^2/2g$ = 1.03 ft

Total Estimated Headloss = 3.22-ft

30 cfs Pumps
A = 30 cfs / 10 fps = 3.00 sf
D = 1.95 ft < 2.0 ft (24-in)

A = (3.14*D^2)/4 = 3.14 sf
V = 30 cfs / 3.14 sf = 9.55 fps
Velocity Head = $h_v = v^2/2g$ = 1.42 ft
Wetted Perimeter = P = 6.28 ft
Hydraulic Radius = R = A/P = 3.14 sf / 6.28 ft = 0.50 ft
Entrance Loss = 0.5 * $v^2/2g$ = 0.71 ft
H_L= 1.31 ft
Check Valve = 0.50-ft
Flow Meter = 0.01-ft
Butterfly Valve = 0.50-ft
Exit Loss = 1.0 * $v^2/2g$ = 1.42 ft

Total Estimated Headloss = 4.45 ft

Table 18

Pump Station Discharge Pipe Size Summary			
Pump Capacity (cfs)	Pipe Size (in)	Velocity (fps)	Estimated Headloss (ft)
125	48	9.92	3.99
100	48	7.94	2.69
90	42	9.38	3.66
80	42	8.33	2.91
65	36	9.19	3.79
60	36	8.49	3.25
50	36	7.07	2.33
40	30	8.15	3.22
30	24	9.55	4.45

1. Pump discharge piping does not take into consideration the pump column pipe size or valve/meter sizes at this time. Size recommendations solely based on pipe velocity.

b) Pipe Materials

The pump station discharge piping configuration is evaluated and discussed in the Technical Memorandum No. 4. The selected configuration will dictate what the flow capacities are for each discharge pipeline. However, generally speaking, Table 18 above, estimates the discharge pipe size for the given flows.

It is anticipated that the above ground discharge piping will be either fusion bonded epoxy lined and coated steel pipe or cement mortar lined and exterior painted steel pipe. Fusion bonded epoxy lined or cement mortar lined steel pipe is preferred in above ground installations where it is subject to inclement weather, UV exposure, seismic events, or nearby to traffic and vehicular access. The underground piping could be PVC pipe, HDPE pipe, FBE steel pipe, or CMLC steel pipe. The pipe class or pressure rating will depend on the pump selection and the associated shutoff head of each pump. However, for purposes of this evaluation a minimum pressure class of 50 psi has been estimated and is figured to be conservative.

c) Material Recommendations

The pump station discharge piping is estimated to be approximately 150-ft in length. The FBE lined steel pipe is estimated as the following costs per foot:

Table 19

Pump Station Discharge Piping Fusion Bonded Epoxy Lined Steel Pipe		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
24	$120.00	$210.00
30	$148.20	$238.50
36	$161.20	$287.83
42	$190.80	$321.00
48	$220.00	$356.38

The CML steel pipe is estimated as the following cost per foot:

Table 20

Pump Station Discharge Piping Cement Mortar Lined Steel Pipe		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
24	$100.00	$190.00
30	$123.50	$213.50
36	$171.00	$257.83
42	$194.00	$305.00
48	$220.00	$336.38

The underground piping may be plastic rather than FBE or CMLC steel pipe.

The SDR51 and DR51 PVC pipe is estimated as the following cost per foot:

Table 21

Pump Station Discharge Piping PVC Pipe (DR51 and SDR51)		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
24	$36.53	$95.53
27	$50.56	$111.56
30	$68.31	$132.31
36	$99.14	$187.14
42	$131.23	$223.73
48	$165.80	$263.80

The DR32.5 HDPE pipe is estimated as the following cost per foot:

Table 22

Pump Station Discharge Piping HDPE Pipe (DR32.5 and DR41)		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
24	$34.34	$96.34
30	$54.35	$142.35
36	$58.30	$184.30
42	$72.40	$210.40
48	$88.00	$240.00

F. Phase II Turnout

a) Sizing Criteria

The Phase II Turnout is currently illustrated with two turnouts – one on the north side of the conveyance canal and one on the south side of the conveyance canal. This results in a turnout capacity of 96 cfs each. However, this is subject to change based on the actual location of the Phase II Property and the canal alignment. In addition, it may be more cost efficient to install multiple turnouts such that there is a canal turnout to each recharge basin. This could result in four turnouts (2 each side) and reduce the capacity of the turnouts to approximately 48 cfs each.

The design flow per turnout for four turnouts to the Phase II Property is 48 cfs each.

- Flowrate = 48 cfs
- Maximum Velocity = 5 fps
- Pipe Diameter = Approximate 48-in (4.0-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the turnout piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Manning's Equation for the friction loss through the pipe.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.012 for ADS HDPE pipe)
L = Pipe Length (Estimated as 150-ft)

Results:

A = 48 cfs / 5 fps = 9.6 sf
D = 3.49 ft < 4.0 ft (48-in)
D = 47.24" I.D.

$A = (3.14*D^2)/4 = 12.2$ sf
V = 48 cfs / 12.6 sf = 3.93 fps
Velocity Head = $h_v = v^2/2g = 0.24$ ft
Wetted Perimeter = P = 12.4 ft
Hydraulic Radius = R = A/P = 12.2 sf / 12.4 ft = 0.98 ft
Entrance Loss = $0.5 * v^2/2g = 0.12$ ft
H_L= 1.02 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.24$ ft

Total Estimated Headloss = 0.51-ft

Design the turnout piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 8-inches.

b) Pipe Materials

The District desires to standardize the turnout piping to be 48-inch diameter. This will allow them to have uniform sizes for precast structures, slide gates, and stop log slots or weir boards.

The 48-inch diameter turnout piping is a size which falls within the availability of PVC, HDPE, CMLC, or RCP. The PVC pipe would be a pressure class 80 psi (DR51) pipe with a nominal interior diameter of 49.69-inches and an outside diameter of 50.80 inches. The HDPE pipe would be a pressure class of 50 psi (DR41) pipe with a nominal interior diameter of 45.52-inches and an outside diameter of 48.00-inches. The ADS N-12 corrugated HDPE pipe is also an alternative and has an O.D. of 54-inches and an I.D. of 47.24-inches. The cement

mortar lined and coated steel pipe would have a ¼-inch wall thickness, ½-inch thick lining, and ¾-inch thick coating. The wet cast and dry cast RCP pipe would be ASTM C361 pipe, C25 double gasketed pipe. The "C" designation signifies that the pipe is suitable for earth cover over the top of the pipe up to 15-ft. The "25" designation signifies that the pipe can handle hydrostatic heads up to 25-ft above the centerline of the pipe.

c) Material Recommendations

The turnout piping is estimated to be approximately 150-ft in length. The PVC pipe is estimated as $166 per lineal foot material cost and $264 per lineal foot material and installation. The HDPE pipe is estimated as $88 per lineal foot material cost and $240 per lineal foot for material and installation. The ADS N-12 pipe is estimated as $93 per lineal foot material cost and $161 per lineal foot material and installation. The CMLC steel pipe is estimated as $220 per lineal foot material cost and $336 per lineal foot for material and installation. The wet cast RCP is estimated as $486 per lineal foot material cost and $581 per lineal foot for material and installation while the dry cast RCP is estimated as $174 per lineal foot material cost and $268 per lineal foot for material and installation.

The ADS N-12 HDPE pipe is the most economical pipe material for the turnout piping and is a preferred material by the District. Therefore, it is recommended that ADS N-12 HDPE pipe be utilized at the Phase II turnouts.

G. West Basins Turnout

a) Sizing Criteria

Alternative 1: Reach 4 Open Channel Design

The West Basins Turnout is illustrated in the 30% Preliminary Design Report as one turnout with four barrels discharging water into the canal that supplies the easterly boundary of the West Basins. However, if Reach 4 is an open channel then a single turnout at the end of Reach 4 to the West Basins could be two barrels each 48" diameter in size.

The design flow for a two barrel design to the West Basins Property is 52.5 cfs per barrel.

- Flowrate = 52.5 cfs
- Maximum Velocity = 5 fps
- Pipe Diameter = Approximate 48-in (4.0-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the turnout piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Manning's Equation for the friction loss through the pipe.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.012 for ADS HDPE pipe)
L = Pipe Length (Estimated as 200-ft)

Results:

A = 52.5 cfs / 5 fps = 10.5 sf
D = 3.65 ft < 4.0 ft (48-in)
D = 47.24" I.D.

$A = (3.14*D^2)/4 = 12.2$ sf
V = 52.5 cfs / 12.6 sf = 4.30 fps
Velocity Head = $h_v = v^2/2g = 0.29$ ft
Wetted Perimeter = P = 12.4 ft
Hydraulic Radius = R = A/P = 12.2 sf / 12.4 ft = 0.98 ft
Entrance Loss = $0.5 * v^2/2g = 0.15$ ft
H_L= 1.23 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.29$ ft

Total Estimated Headloss = 0.69-ft

Design the turnout piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 10-inches.

Alternative 2: Reach 4 Closed Conduit Design

If multiple turnouts are constructed along a closed conduit design then it is anticipated that there may be four turnouts ranging in capacity from 18 cfs to 37.5 cfs.

The turnout piping is anticipated to be 36-inch diameter HDPE piping.

- Flowrate = 18 cfs
- Maximum Velocity = 5 fps
- Pipe Diameter = Approximate 36-in (3.0-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the turnout piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Manning's Equation for the friction loss through the pipe.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.009 for HDPE pipe)
L = Pipe Length (Estimated as 200-ft)

Results:

A = 18 cfs / 5 fps = 3.6 sf
D = 2.14 ft < 3.0 ft (36-in)
D = 34.14" I.D.

$A = (3.14*D^2)/4 = 6.4$ sf
V = 18 cfs / 6.4 sf = 2.81 fps
Velocity Head = $h_v = v^2/2g = 0.12$ ft
Wetted Perimeter = P = 8.9 ft
Hydraulic Radius = R = A/P = 6.4 sf / 8.9 ft = 0.72 ft
Entrance Loss = $0.5 * v^2/2g = 0.06$ ft
H_L= 0.45 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.12$ ft

Total Estimated Headloss = 0.27-ft

Design the turnout piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 6-inches.

- Flowrate = 37.5 cfs
- Maximum Velocity = 5 fps
- Pipe Diameter = Approximate 36-in (3.0-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the turnout piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Manning's Equation for the friction loss through the pipe.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)

D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.009 for HDPE pipe)
L = Pipe Length (Estimated as 200-ft)

Results:

A = 37.5 cfs / 5 fps = 7.5 sf
D = 3.1 ft $\leq$ 3.0 ft (36-in)
D = 34.14" I.D.

$A = (3.14*D^2)/4 = 6.4$ sf
V = 37.5 cfs / 6.4 sf = 5.86 fps
Velocity Head = $h_v = v^2/2g = 0.53$ ft
Wetted Perimeter = P = 8.9 ft
Hydraulic Radius = R = A/P = 6.4 sf / 8.9 ft = 0.72 ft
Entrance Loss = $0.5 * v^2/2g = 0.27$ ft
H_L= 1.95 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.53$ ft

Total Estimated Headloss = 1.19-ft

Design the turnout piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 15-inches.

b) Pipe Materials

The District desires to standardize the turnout piping to be 36-in or 48-inch diameter. This will allow them to have uniform sizes for precast structures, slide gates, and stop log slots or weir boards. A single turnout to the West Basins at the end of an open channel design in Reach 4 is anticipated to be two 48-inch barrels. If Reach 4 is a closed conduit design with four turnouts to the West Basins along the pipeline, then it is anticipated that each turnout will be a 36-inch diameter branch from the DR41 HDPE pipeline and controlled by a 36-inch diameter butterfly valve. The material recommendations below are for a single turnout to the West Basins at the end of an open channel design.

The 48-inch diameter turnout piping is a size which falls within the availability of PVC, HDPE, CMLC, or RCP. The PVC pipe would be a pressure class 80 psi (DR51) pipe with a nominal interior diameter of 49.69-inches and an outside diameter of 50.80 inches. The HDPE pipe would be a pressure class of 50 psi (DR41) pipe with a nominal interior diameter of 45.52-inches and an outside diameter of 48.00-inches. The ADS N-12 corrugated HDPE pipe is also an alternative and has an O.D. of 54-inches and an I.D. of 47.24-inches. The cement mortar lined and coated steel pipe would have a ¼-inch wall thickness, ½-inch thick lining, and ¾-inch thick coating. The wet cast and dry cast RCP pipe would be ASTM C361 pipe, C25 double gasketed pipe. The "C" designation signifies that the pipe is suitable for earth cover over the top of the pipe up to 15-ft. The "25" designation signifies that the pipe can handle hydrostatic heads up to 25-ft above the centerline of the pipe.

c) Material Recommendations

The turnout piping is estimated to be approximately 200-ft in length. The PVC pipe is estimated as $166 per lineal foot material cost and $264 per lineal foot material and installation. The HDPE pipe is estimated as $88 per lineal foot material cost and $240 per lineal foot for material and installation. The ADS N-12 pipe is estimated as $93 per lineal foot material cost and $161 per lineal foot material and installation. The CMLC steel pipe is estimated as $220 per lineal foot material cost and $336 per lineal foot for material and installation. The wet cast RCP is estimated as $486 per lineal foot material cost and $581 per lineal foot for material and installation while the dry cast RCP is estimated as $174 per lineal foot material cost and $268 per lineal foot for material and installation.

The ADS N-12 HDPE pipe is the most economical pipe material for the turnout piping and is a preferred material by the District. Therefore, it is recommended that ADS N-12 HDPE pipe be utilized at the West Basin turnouts. However, if a closed conduit system is utilized using DR41 HDPE then it is likely that the turnouts will also be DR41 HDPE pipe.

H. Phase I Turnout

a) Sizing Criteria

The Phase I Turnout is currently illustrated as one turnout with two barrels discharging into the Phase I property.

The design flow for a two barrel design to the Phase I Property is 52.5 cfs per barrel.

- Flowrate = 52.5 cfs
- Maximum Velocity = 5 fps
- Pipe Diameter = Approximate 48-in (4.0-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the turnout piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Manning's Equation for the friction loss through the pipe.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area

R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.012 for ADS HDPE pipe)
L = Pipe Length (Estimated as 200-ft)

Results:

A = 52.5 cfs / 5 fps = 10.5 sf
D = 3.65 ft < 4.0 ft (48-in)
D = 47.24" I.D.

$A = (3.14*D^2)/4 = 12.2$ sf
V = 52.5 cfs / 12.6 sf = 4.30 fps
Velocity Head = $h_v = v^2/2g = 0.29$ ft
Wetted Perimeter = P = 12.4 ft
Hydraulic Radius = R = A/P = 12.2 sf / 12.4 ft = 0.98 ft
Entrance Loss = $0.5 * v^2/2g = 0.15$ ft
H_L= 1.23 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.29$ ft

Total Estimated Headloss = 0.69-ft

Design the turnout piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 10-inches.

b) Pipe Materials

The District desires to standardize the turnout piping to be 48-inch diameter. This will allow them to have uniform sizes for precast structures, slide gates, and stop log slots or weir boards. A single turnout to the Phase I Property at the end of an open channel design is anticipated to be two 48-inch barrels. If Reach 4 is a closed conduit design that continues all the way to the Phase I Property, then it is anticipated that the pipeline and the discharge to the Phase I property will be a 54-inch DR41 HDPE pipeline. The material recommendations below are for a single turnout to the Phase I Property at the end of an open channel design.

The 48-inch diameter turnout piping is a size which falls within the availability of PVC, HDPE, CMLC, or RCP. The PVC pipe would be a pressure class 80 psi (DR51) pipe with a nominal interior diameter of 49.69-inches and an outside diameter of 50.80 inches. The HDPE pipe would be a pressure class of 50 psi (DR41) pipe with a nominal interior diameter of 45.52-inches and an outside diameter of 48.00-inches. The ADS N-12 corrugated HDPE pipe is also an alternative and has an O.D. of 54-inches and an I.D. of 47.24-inches. The cement mortar lined and coated steel pipe would have a ¼-inch wall thickness, ½-inch thick lining, and ¾-inch thick coating. The wet cast and dry cast RCP pipe would be ASTM C361 pipe, C25 double gasketed pipe. The "C" designation signifies that the pipe is suitable for earth cover over the top of the pipe up to 15-ft. The "25" designation signifies that the pipe can handle hydrostatic heads up to 25-ft above the centerline of the pipe.

c) Material Recommendations

The turnout piping is estimated to be approximately 200-ft in length. The PVC pipe is estimated as $166 per lineal foot material cost and $264 per lineal foot

material and installation. The HDPE pipe is estimated as $88 per lineal foot material cost and $240 per lineal foot for material and installation. The ADS N-12 pipe is estimated as $93 per lineal foot material cost and $161 per lineal foot material and installation. The CMLC steel pipe is estimated as $220 per lineal foot material cost and $336 per lineal foot for material and installation. The wet cast RCP is estimated as $486 per lineal foot material cost and $581 per lineal foot for material and installation while the dry cast RCP is estimated as $174 per lineal foot material cost and $268 per lineal foot for material and installation.

The ADS N-12 HDPE pipe is the most economical pipe material for the turnout piping and is a preferred material by the District. Therefore, it is recommended that ADS N-12 HDPE pipe be utilized at the Phase I turnout. However, if a closed conduit system is utilized using DR41 HDPE then it is likely that the turnout will remain DR41 HDPE pipe.

I. Well Discharge Piping

a) Sizing Criteria

The Well Discharge Piping is the above ground piping and appurtenances from the well pump head to the transition below grade to the underground well conveyance piping.

The design flow for a well is 5 to 6 cfs.

- Flowrate = 6 cfs
- Maximum Velocity = 8 fps
- Pipe Diameter = Approximate 12-in (1-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$$A = Q/V$$

The headloss through the well discharge piping was calculated using the velocity head of the pipe for minor losses and the Hazen-Williams Equation for the friction loss through the pipe.

Hazen-Williams Equation: $h_f = (3.022 * V^{1.85} * L) / (C^{1.85} * D^{1.17})$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Roughness Coefficient (Used 145 for lined steel pipe)

L = Pipe Length (Estimated as 40-ft)

Results:

A = 6 cfs / 8 fps = 0.75 sf
D = 0.98 ft < 1.0 ft (12-in)

$A = (3.14*D^2)/4 = 0.78$ sf
V = 6 cfs / 0.78 sf = 7.64 fps
Velocity Head = $h_v = v^2/2g = 0.91$ ft
Wetted Perimeter = P = 3.1 ft
Hydraulic Radius = R = A/P = 0.78 sf / 3.1 ft = 0.25 ft
Entrance Loss = $0.5 * v^2/2g = 0.46$ ft
H_L= 0.52 ft
Check Valve = 2.7 ft
Flow Meter = 0.25 ft
Butterfly Valve = 0.40 ft
Minor Loss (90° Bend) = 0.18 ft
Exit Loss = $1.0 * v^2/2g = 0.91$ ft

Total Estimated Headloss = 5.42-ft

b) Pipe Materials

The well discharge piping will be fusion bonded epoxy lined and coated steel pipe. This is common for all the District wells. Fusion bonded epoxy steel pipe is preferred in above ground installations where it is subject to inclement weather, UV exposure, seismic events, or nearby to traffic and vehicular access.

c) Material Recommendations

The well discharge piping will be fusion bonded epoxy lined and coated steel pipe. The size is estimated as 12-inch diameter, however this is subject to change based on the actual well capacity at the time of design.

J. Well Conveyance Pipelines

a) Sizing Criteria

The Well Conveyance Piping is the below ground piping from the well discharge piping to the point of discharge typically at a canal. The pipeline lengths are subject to change, but have been estimated based on the feasibility study drawings for purposes of this analysis.

The design flow for the well conveyance piping from a single well is 6 cfs.

- Flowrate = 6 cfs
- Maximum Velocity = 5 fps
- Pipe Diameter = Approximate 15-in (1.25-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the well conveyance piping was calculated using the velocity head of the pipe for minor losses and the Hazen-Williams Equation for the friction loss through the pipe.

Hazen-Williams Equation: $h_f = (3.022 * V^{1.85} * L) / (C^{1.85} * D^{1.17})$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Roughness Coefficient (Used 150 for PVC pipe)
L = Pipe Length (Estimated as 1,830-ft)

Results:

A = 6 cfs / 5 fps = 1.2 sf
D = 1.22 ft < 1.25 ft (15-in)

$A = (3.14*D^2)/4 = 1.17$ sf
V = 6 cfs / 1.17 sf = 5.13 fps
Velocity Head = $h_v = v^2/2g = 0.41$ ft
Wetted Perimeter = P = 3.8 ft
Hydraulic Radius = R = A/P = 1.17 sf / 3.8 ft = 0.31 ft
Entrance Loss = $0.5 * v^2/2g = 0.22$ ft
H_L= 8.52 ft
Minor Losses (Bends) = 1.23 ft
Exit Loss = $1.0 * v^2/2g = 0.41$ ft

Total Estimated Headloss = 10.38-ft

The design flow for the well conveyance piping from two wells is 12 cfs.

- Flowrate = 12 cfs
- Maximum Velocity = 5 fps
- Pipe Diameter = Approximate 21-in (1.75-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the well conveyance piping was calculated using the velocity head of the pipe for minor losses and the Hazen-Williams Equation for the friction loss through the pipe.

Hazen-Williams Equation: $h_f = (3.022 * V^{1.85} * L) / (C^{1.85} * D^{1.17})$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Roughness Coefficient (Used 150 for PVC pipe)
L = Pipe Length (Estimated as 1,300-ft)

Results:

A = 12 cfs / 5 fps = 2.4 sf
D = 1.75 ft $\leq$ 1.75 ft (21-in)

A = $(3.14*D^2)/4$ = 2.43 sf
V = 12 cfs / 2.43 sf = 4.94 fps
Velocity Head = $h_v = v^2/2g$ = 0.38 ft
Wetted Perimeter = P = 5.5 ft
Hydraulic Radius = R = A/P = 2.43 sf / 5.5 ft = 0.44 ft
Entrance Loss = $0.5 * v^2/2g$ = 0.19 ft
H_L= 3.67 ft
Minor Losses (Bends) = 1.14 ft
Exit Loss = $1.0 * v^2/2g$ = 0.38 ft

Total Estimated Headloss = 5.38-ft

The design flow for the well conveyance piping from three wells is 18 cfs.

- Flowrate = 18 cfs
- Maximum Velocity = 5 fps
- Pipe Diameter = Approximate 27-in (2.25-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the well conveyance piping was calculated using the velocity head of the pipe for minor losses and the Hazen-Williams Equation for the friction loss through the pipe.

Hazen-Williams Equation: $h_f = (3.022 * V^{1.85} * L) / (C^{1.85} * D^{1.17})$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Roughness Coefficient (Used 150 for PVC pipe)
L = Pipe Length (Estimated as 3,670-ft)

Results:

A = 18 cfs / 5 fps = 3.6 sf
D = 2.14 ft < 2.25 ft (27-in)

A = (3.14*D^2)/4 = 3.97 sf
V = 18 cfs / 3.97 sf = 4.53 fps
Velocity Head = $h_v = v^2/2g$ = 0.32 ft
Wetted Perimeter = P = 7.1 ft
Hydraulic Radius = R = A/P = 3.97 sf / 7.1 ft = 0.56 ft
Entrance Loss = 0.5 * $v^2/2g$ = 0.16 ft
H_L= 6.62 ft
Minor Losses (Bends) = 0.96 ft
Exit Loss = 1.0 * $v^2/2g$ = 0.32 ft

Total Estimated Headloss = 8.06-ft

The design flow for the well conveyance piping from four wells is 24 cfs.

- Flowrate = 24 cfs
- Maximum Velocity = 5 fps
- Pipe Diameter = Approximate 30-in (2.5-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the well conveyance piping was calculated using the velocity head of the pipe for minor losses and the Hazen-Williams Equation for the friction loss through the pipe.

Hazen-Williams Equation: $h_f = (3.022 * V^{1.85} * L) / (C^{1.85} * D^{1.17})$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Roughness Coefficient (Used 150 for PVC pipe)
L = Pipe Length (Estimated as 1,500-ft)

Results:

A = 24 cfs / 5 fps = 4.8 sf
D = 2.47 ft < 2.5 ft (30-in)

A = (3.14*D^2)/4 = 4.91 sf
V = 24 cfs / 4.91 sf = 4.89 fps
Velocity Head = $h_v = v^2/2g$ = 0.37 ft
Wetted Perimeter = P = 7.85 ft
Hydraulic Radius = R = A/P = 4.91 sf / 7.85 ft = 0.63 ft
Entrance Loss = 0.5 * $v^2/2g$ = 0.19 ft

H_L= 2.76 ft
Minor Losses (Bends) = 1.11 ft
Exit Loss = 1.0 * $v^2/2g$ = 0.37 ft

Total Estimated Headloss = 4.43-ft

The design flow for the well conveyance piping from six wells is 36 cfs.

- Flowrate = 36 cfs
- Maximum Velocity = 5 fps
- Pipe Diameter = Approximate 36-in (3.0-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the well conveyance piping was calculated using the velocity head of the pipe for minor losses and the Hazen-Williams Equation for the friction loss through the pipe.

Hazen-Williams Equation: $h_f = (3.022 * V^{1.85} * L) / (C^{1.85} * D^{1.17})$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
C = Roughness Coefficient (Used 150 for PVC pipe)
L = Pipe Length (Estimated as 1,500-ft)

Results:

A = 36 cfs / 5 fps = 7.2 sf
D = 3.03 ft $\leq$ 3.0 ft (36-in)

A = $(3.14*D^2)/4$ = 7.07 sf
V = 36 cfs / 7.1 sf = 5.07 fps
Velocity Head = $h_v = v^2/2g$ = 0.40 ft
Wetted Perimeter = P = 9.42 ft
Hydraulic Radius = R = A/P = 7.07 sf / 9.42 ft = 0.75 ft
Entrance Loss = 0.5 * $v^2/2g$ = 0.20 ft
H_L= 2.38 ft
Minor Losses (Bends) = 1.20 ft
Exit Loss = 1.0 * $v^2/2g$ = 0.40 ft

Total Estimated Headloss = 4.18-ft

Table 23

Well Conveyance Pipe Sizing Summary			
Turnout Capacity (cfs)	Number of Wells	Pipe Size (in)	Estimated Headloss (ft)
6	1	15	10.38
12	2	21	5.38
18	3	27	8.06
24	4	30	4.43
36	6	36	4.18

b) Pipe Materials

The 16-inch to 36-inch diameter well conveyance piping is a size which falls within the availability of PVC, HDPE, or CMLC, however plastic pipe would be the preferred material.

The ASTM D2241 PIP PVC pipe would be a pressure class 80 psi (SDR 51) pipe with the following nominal diameters:

- 15" 15.30" O.D. and 14.66" I.D.
- 18" 18.70" O.D. and 17.92" I.D.
- 21" 22.05" O.D. and 21.13" I.D.
- 24" 24.80" O.D. and 23.77" I.D.
- 27" 27.95" O.D. and 26.79" I.D.

The AWWA C905 PVC pipe would be a pressure class 80 psi (DR 51) with the following nominal pipe diameters:

- 30" 32.00" O.D. and 30.67" I.D.
- 36" 38.30" O.D. and 36.71" I.D.

The HDPE pipe would be a pressure class of 63 psi (DR32.5) and 50 psi (DR41) pipe with the following nominal pipe diameters:

- 16" 16.00" O.D. and 14.96" I.D.
- 24" 24.00" O.D. and 22.44" I.D.
- 30" 30.00" O.D. and 28.04" I.D.
- 36" 36.00" O.D. and 34.14" I.D.

c) Material Recommendations

The well conveyance piping is estimated to be approximately 1,300-ft to 3,600-ft in length for each pipe size. The ASTM D2241 SDR51 PIP PVC pipe is estimated as the following cost per foot:

Table 24

Well Conveyance Piping SDR51 PIP PVC Pipe		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
15	$18.17	$62.17
18	$19.98	$77.98
21	$28.76	$89.76
24	$36.53	$95.53
27	$50.56	$111.56

The AWWA C905 DR51 PVC pipe is estimated as the following cost per foot:

Table 25

Well Conveyance Piping C905 DR51 PVC Pipe		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
30	$68.31	$132.31
36	$99.14	$187.14

The DR32.5 and DR41 HDPE pipe is estimated as the following cost per foot:

Table 26

Well Conveyance Piping DR32.5 HDPE Pipe		
Nominal Diameter (in)	Material Pipe Cost ($/LF)	Material + Install Pipe Cost ($/LF)
16	$17.24	$67.24
24	$34.34	$96.34
30	$54.35	$142.35
36	$58.30	$184.30

Based on the costs above it is recommended that PVC pipe be installed for the well conveyance pipelines utilizing ASTM D2241 PIP PVC pipe in sizes 27-inches and smaller and AWWA C905 PVC pipe or HDPE pipe for sizes 30-inches and larger.

The size and pressure class of pipe are estimated, however this is subject to change based on the actual well capacity and conveyance pipeline configuration at the time of design. In addition, it is recommended that multiple pipe options such as PVC and HDPE be included in the bid to identify the most economical pipe between PVC and HDPE.

K. Interbasin Piping

a) Sizing Criteria

The Interbasin piping is the piping in between recharge basins that are used for the conveyance of water between basins. These are anticipated to be precast structures with weir boards for regulating flow and water level and the piping installed beneath the levee to a discharge point in the downstream basin. The District would like to standardize the size of the interbasin piping to be 36-inch or 48-inch diameter.

The design flow for a 36" single barrel design is 24 to 30 cfs.

- Flowrate = 30 cfs
- Maximum Velocity = 5 fps
- Pipe Diameter = Approximate 36-in (3.0-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the turnout piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Manning's Equation for the friction loss through the pipe.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.012 for ADS HDPE pipe)
L = Pipe Length (Estimated as 60-ft)

Results:

A = 30 cfs / 5 fps = 6.0 sf
D = 2.76 ft < 3.0 ft (36-in)
D = 35.43" I.D.

$A = (3.14*D^2)/4 = 6.8$ sf
V = 30 cfs / 6.8 sf = 4.41 fps
Velocity Head = $h_v = v^2/2g = 0.30$ ft
Wetted Perimeter = P = 9.3 ft
Hydraulic Radius = R = A/P = 6.8 sf / 9.3 ft = 0.73 ft
Entrance Loss = $0.5 * v^2/2g = 0.15$ ft
H_L= 1.91 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.30$ ft

Total Estimated Headloss = 0.56-ft

Design the interbasin piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 10-inches.

The design flow for a 48" single barrel design is 55 to 60 cfs.

- Flowrate = 60 cfs
- Maximum Velocity = 5 fps
- Pipe Diameter = Approximate 48-in (4.0-ft) Internal Diameter

The continuity equation was used to solve for the cross-sectional area of the pipe and the pipe diameter given the design flow and maximum velocity.

$A = Q/V$

The headloss through the turnout piping was calculated using the velocity head of the pipe for minor entrance and exit losses and the Manning's Equation for the friction loss through the pipe.

Manning's Equation: $V = (1.49/n)*R^{2/3}*S^{1/2}$

Where:

Q = Flow (cfs)
V = Velocity (fps)
D = Diameter (ft)
A = Pipe Internal Cross-Sectional Area
R = Hydraulic Radius
S = Slope
n = Material Coefficient (Used 0.012 for ADS HDPE pipe)
L = Pipe Length (Estimated as 60-ft)

Results:

A = 60 cfs / 5 fps = 12.0 sf
D = 3.91 ft < 4.0 ft (48-in)
D = 47.24" I.D.

$A = (3.14*D^2)/4 = 12.18$ sf
V = 60 cfs / 12.18 sf = 4.93 fps
Velocity Head = $h_v = v^2/2g = 0.38$ ft
Wetted Perimeter = P = 12.4 ft
Hydraulic Radius = R = A/P = 12.2 sf / 12.4 ft = 0.98 ft
Entrance Loss = $0.5 * v^2/2g = 0.19$ ft
H_L= 1.61 ft / 1,000 ft
Exit Loss = $1.0 * v^2/2g = 0.38$ ft

Total Estimated Headloss = 0.67-ft

Design the interbasin piping so that the control water surface submerges the pipe at the headwall structure a minimum 1.78 times h_v plus 3-inches or approximately 12-inches.

b) Pipe Materials

The District desires to standardize the interbasin piping to be 36-inch or 48-inch diameter piping. This will allow them to have uniform sizes for precast structures and stop log slots or weir boards.

The 36-inch and 48-inch diameter turnout piping is a size which falls within the availability of PVC, HDPE, CMLC, or RCP.

The AWWA C905 DR51 PVC pipe would be a pressure class 80 psi. The 36" PVC pipe has a 38.30" O.D. and a 36.71" I.D. The 48" PVC pipe has a 50.80" O.D. and a 49.69" I.D.

The HDPE pipe would be a pressure class 50 psi (DR 41). The 36" HDPE pipe has a 36.00" O.D. and a 34.14" I.D or the pipe could be a ADS Dual Wall HDPE Pipe, corrugated with a smooth interior wall and watertight joint. The ADS Dual Wall HDPE has an O.D. of 42.00" and an I.D. of 36.00". The 48" HDPE pipe has a 48.00" O.D. and a 45.52" I.D or the pipe could be a ADS Dual Wall HDPE Pipe, corrugated with a smooth interior wall and watertight joint. The ADS Dual Wall HDPE has an O.D. of 54.00" and an I.D. of 48.00".

The cement mortar lined and coated steel pipe would have a ¼-inch wall thickness, ½-inch thick lining, and ¾-inch thick coating. The 36" pipe has a 37.50" O.D. and a 34.50" I.D.

The ASTM C361 C25 double gasketed RCP would be suitable for hydrostatic heads up to 25-ft from the centerline of the pipe. The 36" RCP has a bell outside diameter of 50.25" O.D. and a 36" I.D.

c) Material Recommendations

The 36" interbasin piping is estimated to be approximately 60-ft in length. The PVC pipe is estimated as $99 per lineal foot material cost and $187 per lineal foot for material and installation. The HDPE pipe is estimated as $58 per lineal foot material cost and $184 per lineal foot for material and installation while the ADS pipe is estimated as $57 per lineal foot material cost and $117 per lineal foot for material and installation.

The 48" interbasin piping is estimated to be approximately 60-ft in length. The PVC pipe is estimated as $166 per lineal foot material cost and $264 per lineal foot for material and installation. The HDPE pipe is estimated as $88 per lineal foot material cost and $240 per lineal foot for material and installation while the ADS pipe is estimated as $93 per lineal foot material cost and $161 per lineal foot for material and installation.

The ADS Dual-Wall HDPE pipe is the most economical pipe material for the interbasin piping. This pipe material is preferred for this application as it is corrosion resistant, has good strength, and the corrugations help extend the seepage path.

V. Summary

The type and size of piping has been evaluated for each of the major project components. These are summarized below in Table 27.

Table 27

Project Facility	Nominal Pipe Size	Pipe Type
Aqueduct Turnout	108-inch	D50 Dry Cast RCP
Adohr Road Siphon	120-inch	C25 Dry Cast RCP
East Side Canal Siphon	120-inch	C25 Dry Cast RCP
Reach 2 Farm Road Siphon	120-inch	C25 Dry Cast RCP
Reach 3 Farm Road Siphon	120-inch	C25 Dry Cast RCP
Reach 4 Farm Road Siphon	90-inch	C25 Dry Cast RCP
Stockdale Hwy Cased Crossing Carrier Pipe	120-inch	D25 Dry Cast RCP
I-5 Fwy Cased Crossing Carrier Pipe	120-inch	D25 Dry Cast RCP
Reach 4 Conveyance Piping	63-inch and 54-inch	DR41 HDPE
Phase II Turnout	48-inch	ADS N12 WT HDPE
West Basins Turnout (Open Channel Design)	48-inch (2 Barrels)	ADS N12 WT HDPE
West Basins Turnout (Closed Conduit Design)	36-inch	DR41 HDPE
Phase I Turnout (Open Channel Design)	48-inch (2 Barrels)	ADS N12 WT HDPE
Phase I Turnout (Closed Conduit Design)	54-inch	DR41 HDPE
Well Conveyance Pipelines	15-inch to 27-inch	SDR51 PIP PVC
Well Conveyance Pipelines	30-inch to 36-inch	DR51 C900 PVC or DR41 HDPE
Interbasin Piping	36-inch and 48-inch	ADS N12 WT HDPE
In-Lieu Turnout Piping	24-inch	ADS N12 WT HDPE

1. *The "D" class of pipe is a conservative assumption at this stage in the design. The RCP pipe classification shall be re-evaluated during detailed design and be based on actual design elevations, earth cover, and operating conditions.*
2. *The project shall prepare for bid alternatives for pipe sizes and structures where more than one alternative is an option and close in pricing such as for the Reach 4 Conveyance Canal Piping, the Well Conveyance Pipelines, and Road Crossings and Bridges or Box Culverts.*

In addition, Table 28 summarizes the estimated material costs and installation costs (material + installation) for the various pipe sizes and capacities and highlights the most economical options.

Table 28

Kern Fan Project

Linear Pipeline Material and Cost Summary - Recommended

Pipe Capacity at 5-6 fps	SDR51 PIP PVC Pipe			DR41 & DR51 C900 PVC Pipe			DR32.5 & DR41 HDPE Pipe			ADS N-12 HDPE Pipe[1]			CMLC Pipe			FBE&C Pipe			D50 Wet Cast RCP Pipe			D25 Dry Cast RCP Pipe		
	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)	Pipe Size	Material Cost ($/LF)	Material + Install Cost ($/LF)
5 cfs	15	$18.17	$62.17	14	$19.42	$77.42	14	$14.58	$64.58															
10 cfs	18	$19.98	$77.98	18	$21.92	$79.92	20	$24.03	$82.03															
15 cfs	24	$36.53	$95.53	24	$49.68	$110.68	24	$34.34	$96.34															
20 cfs	27	$50.56	$111.56	24	$49.68	$110.68	28	$49.84	$127.84															
25 cfs				30	$68.31	$132.31	30	$54.35	$142.35															
30 cfs				30	$68.31	$132.31	34	$72.77	$178.77															
35 cfs				36	$99.14	$187.14	36	$58.30	$184.30	36	$56.50	$116.53	36	$171.00	$257.83	36	$161.00	$287.83	36	$300.00	$386.60	36	$111.78	$198.38
40 cfs				36	$99.14	$187.14	42	$72.40	$210.40	36	$56.50	$116.53	42	$194.00	$305.00	42	$190.00	$321.00	36	$300.00	$386.60	36	$111.78	$198.38
45 cfs				42	$131.23	$223.73	42	$72.40	$210.40	42	$70.18	$133.85	42	$194.00	$305.00	42	$190.00	$321.00	42	$390.00	$480.00	42	$142.83	$232.83
50 cfs				42	$131.23	$223.73	42	$72.40	$210.40	42	$70.18	$133.85	42	$194.00	$305.00	42	$190.00	$321.00	42	$390.00	$480.00	42	$142.83	$232.83
55 cfs				42	$131.23	$223.73	48	$88.00	$240.00	42	$70.18	$133.85	48	$220.00	$336.38	48	$220.00	$356.38	42	$390.00	$480.00	42	$142.83	$232.83
60 cfs				48	$165.80	$263.80	48	$88.00	$240.00	48	$93.15	$161.19	48	$220.00	$336.38	48	$220.00	$356.38	48	$486.18	$580.62	48	$173.88	$268.32
70 cfs				48	$165.80	$263.80	54	$104.20	$277.20	48	$93.15	$161.19	48	$220.00	$336.38	48	$220.00	$356.38	48	$486.18	$580.62	48	$173.88	$268.32
80 cfs				48	$165.80	$263.80	54	$104.20	$277.20	48	$93.15	$161.19	54	$255.00	$411.00	54	$255.00	$431.00	54	$617.90	$717.90	54	$204.93	$304.93
90 cfs				54	$266.35	$390.35	63	$128.37	$332.37	60	$130.41	$203.78	54	$255.00	$411.00	54	$255.00	$431.00	54	$617.90	$717.90	54	$204.93	$304.93
100 cfs				60	$316.45	$448.45	63	$128.37	$332.37	60	$130.41	$210.46	60	$340.00	$514.24	60	$330.00	$524.24	60	$749.61	$857.55	60	$235.98	$343.92
150 cfs													72	$550.00	$797.86	72	$500.00	$767.86	72	$1,043.22	$1,225.47	72	$298.08	$480.33
200 cfs													84	$650.00	$1,027.09	84	$600.00	$997.09	84	$1,327.25	$1,612.00	84	$360.18	$644.93
250 cfs													90	$700.00	$1,160.00	90	$650.00	$1,110.00	90	$1,470.36	$1,805.36	90	$391.23	$726.23
300 cfs													102	$936.00	$1,586.00	102	$750.00	$1,450.00	96	$1,608.89	$2,002.58	96	$422.28	$815.97
350 cfs													108	$1,070.00	$1,872.71	108	$810.00	$1,612.71	108	$2,009.00	$2,531.57	108	$484.38	$1,006.95
400 cfs													114	$1,152.00	$2,022.00	114	$1,007.37	$1,877.37	114	$2,231.16	$2,901.16	114	$515.43	$1,185.43
450 cfs													120	$1,205.00	$2,197.48	120	$1,205.00	$2,197.48	120	$2,453.32	$3,271.02	120	$546.48	$1,364.18
500 cfs													126	$1,320.00	$2,470.00	126	$1,320.00	$2,470.00	126	$2,565.69	$3,535.69	126	$577.53	$1,547.53

Represents most economical pipe material based upon costs estimates and information available in October 2020.

Represents secondary pipe material alternatives that may be more economical depending on actual design and project timing.

[1]The ADS N-12 HDPE pipe is not applicable to a linear, pressurized pipeline design, but is anticipated to be used at recharge facility turnouts, "in-lieu" turnouts, and interbasin structures.

VI. Related Work Specified Elsewhere

A. TM 2 – Conveyance Capacity
B. TM 4 – Pump Station Requirements
C. TM 5 – Geotechnical Requirements
D. TM 6 – Canal Liner and Turnout Requirements
E. TM 7 – Well Drilling and Equipping Requirements
F. TM 11- Engineer's Estimates

December 28, 2020
Prepared by: Fiona Sanchez
Agenda Item: 6b

Groundwater Banking JPA Formation Tasks Update

DISCUSSION:

Irvine Ranch Water District and Rosedale-Rio Bravo Water Storage District formed the Groundwater Banking Joint Powers Authority, a joint exercise of powers agency (Groundwater Banking JPA). Prior to formation, special counsel to IRWD prepared a summary of tasks required to form the JPA. The tasks specified the requirements to form such an entity, principally under the Joint Exercise of Powers Act, Government Code sections 6500 et seq. They also included formation-related action items specified by the Joint Powers Agreement Between Rosedale-Rio Bravo Water Storage District and Irvine Ranch Water District creating the Groundwater Banking Joint Powers Authority to Develop and Administer a Kern Fan Groundwater Storage Project, which took legal effect on July 1, 2020, and by the Groundwater Banking JPA's Bylaws adopted August 25, 2020. An update on the status of the formation tasks is provided as Exhibit "A".

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

Exhibit "A" – Summary of Groundwater Banking Formation Tasks

Exhibit "A"

Groundwater Banking JPA Formation Tasks

Items not yet completed are **bolded**.

Task	Citation	Timeline	Explanation/Notes	Completed
Draft joint exercise of powers agreement	GC § 6502 GC § 6503		An agreement must contain information required by the Act	IRWD and RRB executed the Agreement on April 8, 2020, and the Agreement became effective July 1, 2020
Each founding agency approves Agreement	GC § 6502		Each member agency to the JPA must approve the Agreement	IRWD and RRB each approved the Agreement
File Form Notice and copy of Agreement with Secretary of State	GC § 6503.5	Within 30 days of Agreement approval	The JPA may not issue bonds or incur indebtedness until this filing is complete	Filed with the Secretary of State on July 29, 2020
File Form and copy of Agreement with the State Controller	GC § 6503.6	After filing a Notice of a Joint Powers Agreement	After filing a Notice of Joint Powers Agreement with the Secretary of State, file a copy of the full text of the Agreement with the State Controller	Filed with the State Controller on July 29, 2020
Send Registry of Public Agencies (Form SF-405) to the Secretary of State	GC § 53051	Within 70 days of creation of the agency	The JPA is a new entity so must file this notice; filing ensures full benefits of the shorter statute of limitations under the Government Claims Act	Filed July 29, 2020
Send Registry of Public Agencies (Form SF-405) to County Clerk	GC § 53051	Within 70 days of creation of the agency	The JPA is a new entity so must file this notice; filing ensures full benefits of the shorter statute of limitations under the Government Claims Act	Filed August 5, 2020 with Kern County Clerk
IRWD & RRB boards each appoint two persons and an alternate to serve on JPA Board of Directors		Prior to first JPA Board meeting	Agreement § 5(A) provides JPA Board consists of 4 members: • IRWD appoint 2, including 1 IRWD Board member and 1 other. • IRWD appoint 1 alternate who is an IRWD Board member or a designee. • RRB appoint 2, including 1 RRB Board member and 1 other. • RRB appoint 1 alternate who is an RRB Board member or a designee.	**Not yet completed.** Board Members appointed at August 25, 2020 Board Meeting of the Authority. Alternates have not yet been appointed.
Designate, and file an official bond for, the treasurer or other officer in charge of the JPA property	GC § 6505.5 GC § 6505.1	At first JPA Board meeting	The JPA must name an officer and bond them for the management of JPA property, debts, and equity	**Not yet completed.**

Task	Citation	Timeline	Explanation/Notes	Completed
				Agreement § 11 says Treasurer and General Manager shall file bonds
Designate a General Manager and Treasurer	GC § 6505	At first JPA Board meeting	The JPA must name these officers pursuant to the Agreement. Agreement § 6 says the General Manager shall be from RRB Agreement § 7 says the Treasurer shall be from IRWD Both can be from other member agency but both shall not be from same member agency	General Manager and Treasurer appointed at August 25, 2020 Board Meeting of the Authority.
Designate Legal Counsel, which also will serve as Secretary	Agreement § 9		Agreement § 9 provides JPA Board will select Legal Counsel, which also shall serve as Secretary	Completed.
Establish reporting requirements, including requirements for quarterly reports and designate an auditor to make annual audits	GC § 6505 GC § 6505.5		The JPA must name an officer in charge of making quarterly reports on the amount of debt and equity held by the JPA and to conduct an annual audit of the JPA	**Not yet completed.** Agreement, § 13 provides that JPA board shall designate reporting requirements and appoint an independent CPA will make annual audits and reports to the JPA's board
Establish a regular meeting time and place	GC § 54954(a)	At first JPA Board meeting	State law dictates the JPA Board must set time and location of regular meetings by ordinance, resolution, or in bylaws Agreement, § 5(B) says the JPA Board will set regular meetings by resolution at its first meeting	Established by Resolution at August 25, 2020 Board Meeting of the Authority.
Adopt Bylaws	Agreement § 5(E)		Agreement § 5(E) requires JPA Board to adopt bylaws detailing how the Board will conduct business.	Adopted at August 25, 2020 Board Meeting of the Authority.
Adopt a Conflict of Interest Code	GC § 87303	6 months; then reviewed every 2 years	Conflict of Interest Code must be submitted to the code reviewing body for approval	**Not yet completed.**
Adopt an Investment Policy	GC § 53646(a)(2)	Annually	The treasurer or CFO may annually render a statement of investment policy	**Not yet completed.**

Task	Citation	Timeline	Explanation/Notes	Completed
Adopt a Debt Management Policy	GC § 8855(i)(1)	Before issuing debt	A debt policy shall include: (A) The purposes for which the debt proceeds may be issued (B) The types of debt that may be issued (C) The relationship of the debt to, and integration with, the issuer's capital improvement program or budget (D) Policy goals related to the issuer's planning goals and objectives (E) The Internal control procedures that the issuer has implemented, or will implement, to ensure that the proceeds of the proposed debt issuance will be directed to the intended use	**Not yet completed.**
Adopt JPA-specific CEQA Guidelines	PRC § 21082		A public agency shall adopt, by resolution, rule, or regulation, objective, criteria, and procedures for the evaluation of environmental impacts from a proposed project pursuant to CEQA	**Not yet completed.**
JPA Board appoint standing Project Committee	Draft Bylaws § 6(a)(i)		Draft Bylaws § 6(a)(i) provides JPA Board will appoint a standing Project Committee as follows: • 1 IRWD JPA Board member and 1 other; • 1 RRB JPA Board member and 1 other; • JPA General Manager; and • JPA Treasurer.	Appointed at August 25, 2020 Board meeting.
JPA Board appoint standing Finance Committee	Draft Bylaws § 6(a)(ii)		Draft Bylaws § 6(a)(ii) provides JPA Board will appoint a standing Finance Committee as follows: • 1 IRWD JPA Board member; • 1 RRB JPA Board member; • JPA General Manager; and • JPA Treasurer.	Appointed at August 25, 2020 Board meeting.
Finance Committee recommend to JPA Board one or more policies on insurance coverage to be maintained by JPA	Draft Bylaws § 12			**Not yet completed.**
RRB and IRWD each contribute $2,500 to open JPA bank account(s)	Draft Bylaws § 10(b)(3)		Draft Bylaws § 10(b)(3) says initial contributions to occur upon JPA formation	**Not yet completed.**

Task	Citation	Timeline	Explanation/Notes	Completed
				Pending bank account establishment.
RRB and IRWD each contribute “main initial funding to start up” JPA operations	Draft Bylaws § 10(b)(3)		Draft Bylaws § 10(b)(3) provides that at JPA’s initial Board meeting, the JPA Board shall adopt resolution specifying initial funding contributions to be made by RRB and IRWD, which shall have been submitted to and approved by the RRB and IRWD Boards in advance of the JPA’s first Board meeting.	Budget and funding contributions approved November 2, 2020.