LEMOORE

CALIFORNIA

LEMOORE CITY COUNCIL
COUNCIL CHAMBER
429 C STREET
August 17, 2021

AGENDA

Please silence all electronic devices as a courtesy to those in attendance. Thank you.

7:00 pm CLOSED SESSION

This item has been set aside for the City Council to meet in a closed session to discuss matters pursuant to Government Code Section 54956.9(d)(4). The City Attorney will provide an oral report regarding the Closed Session at the beginning of the next regular City Council meeting.

1. Conference with Labor Negotiator
   Government Code Section 54957.6
   Agency Designated Representatives: Mary Lerner, City Attorney and Michelle Speer, Assistant City Manager
   Employee Organizations: General Association of Service Employees, Lemoore Police Officers Association, Lemoore Police Sergeants Unit, Police Professional Services Bargaining Unit, Unrepresented
2. Government Code Section 54956.9
   Conference with Legal Counsel – Exposure to Litigation
   Significant Exposure to Litigation Pursuant to Paragraph (2) or (3) of Subdivision (d) of Section 54956.9
   Two Cases
3. Government Code Section 54956.9
   Conference with Legal Counsel – Anticipated Litigation
   Initiation of Litigation Pursuant to Paragraph (4) of Subdivision (d) of Section 54956.9
   Two Cases

In the event that all the items on the closed session agenda have not been deliberated in the time provided, the City Council may continue the closed session at the end of the regularly scheduled Council Meeting.

7:30 pm REGULAR SESSION

a. CALL TO ORDER
b. INVOCATION
c. PLEDGE OF ALLEGIANCE
d. ROLL CALL
e. CLOSED SESSION REPORT
f. AGENDA APPROVAL, ADDITIONS, AND/OR DELETIONS

PUBLIC COMMENT

Public comment will be in accordance with the attached policy. This time is reserved for members of the audience to address the City Council on items of interest that are not on the Agenda and are within the subject matter jurisdiction of the Council. It is recommended that speakers limit their comments to three (3) minutes each and it is requested that no comments be made during this period on items on the Agenda. The Council is prohibited by law from taking any action on matters discussed that are not on the Agenda. Prior to addressing the Council, any handouts for Council will be provided to the City Clerk for distribution to the Council and appropriate staff.

CEREMONIAL / PRESENTATION – Section 1

No Ceremonial / Presentations

DEPARTMENT AND CITY MANAGER REPORTS – Section 2

2-1 Department & City Manager Reports

CONSENT CALENDAR – Section 3

Items considered routine in nature are placed on the Consent Calendar. They will all be considered and voted upon in one vote as one item unless a Council member or member of the public requests individual consideration.

3-1 Approval – Minutes – Regular Meeting – August 3, 2021
3-2 Approval – Professional Services Agreement with Infosend for FedEx Door Hanger Notices
3-3 Approval – Request Authorization to Record the Final Parcel Map for Tentative Parcel Map 2021-01 submitted by Semas Farming

PUBLIC HEARINGS – Section 4

Report, discussion and/or other Council action will be taken.

4-1 Public Hearing – First Reading – Ordinance 2021-05 – Authorizing an Amendment to the Contract between the City Council of the City of Lemoore and Board of Administration of the California Public Employees' Retirement System (Speer)

NEW BUSINESS – Section 5

Report, discussion and/or other Council action will be taken.

5-1 Report and Recommendation – Resolution 2021-17 – To Review and Renew the Declaration of a Local Emergency and the Related Declarations and Orders Therin (Speer)
5-2 Report and Recommendation – Resolution 2021-18 – Adopting the Water, Wastewater. And Storm Water Master Plans and Authorize the Filing of the Notice of Exemption (Rivera)

BRIEF CITY COUNCIL REPORTS AND REQUESTS – Section 6

6-1 City Council Reports / Requests

Upcoming Council Meetings

- City Council Regular Meeting, Tuesday, September 7, 2021
- City Council Regular Meeting, Tuesday, September 21, 2021

Agendas for all City Council meetings are posted at least 72 hours prior to the meeting at the Council Chamber, 429 C Street and the Cinnamon Municipal Complex, 711 W. Cinnamon Drive. Written communications from the public for the agenda must be received by the City Clerk's Office no less than seven (7) days prior to the meeting date. The City of Lemoore complies with the Americans with Disabilities Act (ADA of 1990). The Council Chamber is accessible to the physically disabled. Should you need special assistance, please call (559) 924-6744, at least 4 business days prior to the meeting.

PUBLIC NOTIFICATION

I, Marisa Avalos, City Clerk for the City of Lemoore, declare under penalty of perjury that I posted the above City Council Agenda for the meeting of August 17, 2021 at Council Chamber, 429 C Street and Cinnamon Municipal Complex, 711 W. Cinnamon Drive, Lemoore, CA on August 13, 2021.

//s//
Marisa Avalos, City Clerk

CITY OF LEMOORE
CITY COUNCIL SPECIAL/REGULAR MEETING
AUGUST 17, 2021 @ 5:00 p.m. & 7:30 p.m.

Attendance and Public Comment Changes Due to COVID-19

The Lemoore City Council will be conducting its special/regular meeting on August 17, 2021. Given the current Shelter-In-Place covering Kings County and the Social Distance Guidelines issued by Federal, State, and Local Authorities, the City is implementing the following changes for attendance and public comment.

All upcoming regular and special City Council meetings ***will be open to fifteen (15) members of the public on a first come, first served basis and via Zoom.*** The meeting may be viewed through the following options:

- Join Zoom Meeting
- Please click the link below to join the webinar:
- https://us06web.zoom.us/j/84856635638?pwd=TXNCa1dLbkRBTEV4NUVhaVhaUnNqQT09
- Meeting ID: 848 5663 5638
- Passcode: 290378
- Phone: +1 669 900 6833

The City will also provide links to streaming options on the City's website and on its Facebook page.

If you wish to make a general public comment or public comment on a particular item on the agenda, **participants may do so via Zoom during the meeting** or by **submitting public comments by e-mail to**: cityclerk@lemoore.com. In the subject line of the e-mail, please state your name and the item you are commenting on. If you wish to submit a public comment on more than one agenda item, please send a separate e-email for each item you are commenting on. Please be aware that written public comments, including your name, may become public information. Additional requirements for submitting public comments by e-mail are provided below.

General Public Comments & Comments on City Council Business Items

For general public comments and comments regarding specific City Council Business Items, public comments can be made via Zoom during the meeting or all public comments must be received by e-mail no later than 5:00 p.m. the day of the meeting. Comments received by this time will be read aloud by a staff member during the applicable agenda item, provided that such comments may be read within the normal three (3) minutes allotted to each speaker. Any portion of your comment extending past three (3) minutes may not be read aloud due to time restrictions. If a general public comment or comment on a business item is received after 5:00 p.m., efforts will be made to read your comment into the record. However, staff cannot guarantee that written comments received after 5:00 p.m. will be read. All written comments that are not read into the record will be made part of the meeting minutes, provided that such comments are received prior to the end of the City Council meeting.

Public Hearings

For public comment on a public hearing, all public comments must be received by the close of the public hearing period. All comments received by the close of the public hearing period will be read aloud by a staff member during the applicable agenda item, provided that such comments may be read within the normal three (3) minutes allotted to each speaker. Any portion of your comment extending past three (3) minutes may not be read aloud due to time restrictions. If a comment on a public hearing item is received after the close of the public hearing, such comment will be made part of the meeting minutes, provided that such comment is received prior to the end of the meeting.

PLEASE BE AWARE THAT ANY PUBLIC COMMENTS RECEIVED THAT DO NOT SPECIFY A PARTICULAR AGENDA ITEM WILL BE READ ALOUD DURING THE GENERAL PUBLIC COMMENT PORTION OF THE AGENDA.

The City thanks you for your cooperation in advance. Our community's health and safety is our highest priority.

Item 3-1

August 3, 2021 Minutes
Lemoore City Council
Study Session Meeting

CALL TO ORDER:

At 5:30 p.m., the meeting was called to order.

ROLL CALL: Mayor: LYONS
Mayor Pro Tem: MATTHEWS
Council Members: CHANEY, GORNICK, ORTH

City Staff and contract employees present: City Manager Olson; Assistant City Manager Speer; City Attorney Lerner; Police Chief Kendall; Management Analyst Champion; City Clerk Avalos.

PUBLIC COMMENT

Tom Reed inquired about the Golf Course staff. He stated that he saw an article in the Lemoore Advance and reminded Council to be cautious in their roles.

STUDY SESSION

SS-1 Lighting and Landscape Maintenance District (LLMD) and Public Facilities Maintenance District (PFMD) Reports Presentation (Champion)

Management Analyst Champion presented the LLMD and PFMD reports which included:

- *The LLMD and PFMD districts were created to fund the shared improvement/benefits through an annual assessment collected with the parcels property taxes.*
- *LLMD specifically collects for:*
  - *Shared landscaping, parkways, and streetscaping*
  - *Zone 08B also collects for streetlights and a small pocket park*
  - *Willdan Admin Fees*
- *PFMD specifically collects for:*
  - *Shared landscaping, parkways, and streetscaping*
  - *Streetlights*
  - *Pavement surface area (streets and roads)*
  - *Pocket Parks, Paths, and Block Walls*
  - *Willdan Admin Fees*
- *LLMD is comprised of 11 different zones*
- *PFMD is comprised of 10 different zones*
- *Each year an engineer's report must be filed to justify the assessments. The report includes the following for each zone:*
  - *Descriptions of each zone*
  - *Descriptions of the shared benefits*
  - *General Benefits Analysis*
  - *The methodology for assessment*
  - *District budgets*
  - *Maps*
  - *Assessment Rolls*

Adjourned to Closed Session at 5:55 p.m.

CLOSED SESSION

1. Conference with Labor Negotiator
   Government Code Section 54957.6
   Agency Designated Representatives: Mary Lerner, City Attorney and Michelle Speer, Assistant City Manager
   Employee Organizations: General Association of Service Employees, Lemoore Police Officers Association, Lemoore Police Sergeants Unit, Police Professional Services Bargaining Unit, Unrepresented
2. Conference with Legal Counsel – Existing Litigation
   Government Code Section 54956.9(d)(1)
   Name of Case: Fabry v. City of Lemoore, Kings County Superior Court Case No. 19C-0159
3. Government Code Section 54956.8
   Conference with Real Property Negotiators
   Property: Lemoore Little League (APNs: 023-120-003 and 023-120-004)
   Agency Negotiator: Nathan Olson, City Manager
   Under Negotiation: Price and Terms

ADJOURNMENT

At 7:13 p.m., Council adjourned.

August 3, 2021 Minutes
Lemoore City Council
Regular Meeting

CALL TO ORDER:

At 7:30 p.m., the meeting was called to order.

ROLL CALL: Mayor Pro Tem: MATTHEWS
Council Members: CHANEY, GORNICK, ORTH
Absent: LYONS

City Staff and contract employees present: City Manager Olson; City Attorney Lerner; Police Chief Kendall; Public Works Director Rivera; Management Analyst Champion; City Clerk Avalos.

AGENDA APPROVAL, ADDITIONS, AND/OR DELETIONS

None.

CLOSED SESSION REPORT

Nothing to report.

PUBLIC COMMENT

Jennifer Solis thanked City staff for all their hard work happening behind the scenes. She appreciates all the extra hours. She attended Ice Pops with the Cops. It was very well attended. She thanked the Police Department for hosting the event.

CEREMONIAL / PRESENTATION – Section 1

No Ceremonies / Presentations.

DEPARTMENT AND CITY MANAGER REPORTS – Section 2

City Manager Olson attended Ice Pops with the Cops. He stated that it was nice to see the officers interact with the children.

CONSENT CALENDAR – Section 3

3-1 Approval – Minutes – Regular Meeting – July 20, 2021
3-2 Approval – Joint Use Agreement between the Lemoore Union High School District and the City of Lemoore

Item 3-2 was pulled for separate consideration.

Motion by Council Member Orth, seconded by Council Member Chaney, to approve the Consent Calendar, except item 3-2.

Ayes: Orth, Chaney, Gornick, Matthews
Absent: Lyons

3-2 Approval – Joint Use Agreement between the Lemoore Union High School District and the City of Lemoore

Motion by Council Member Gornick, seconded by Council Member Orth, to approve the Joint Use Agreement between the Lemoore Union High School District and the City of Lemoore.

Ayes: Gornick, Orth, Chaney, Matthews
Absent: Lyons

PUBLIC HEARINGS – Section 4

4-1 Public Hearing – Confirming the Diagram and Assessment of Annual Levy for Fiscal Year 2021-22 for Landscape and Lighting Maintenance District Number 1 (LLMD) Zones 1 through 13 - Resolution 2021-14 - and Public Facilities Maintenance District Number 1 (PFMD) Zones 1 through 10 - Resolution 2021-15 (Champion)

Public Hearing Opened: 7:40 p.m.

Spoke: Jennifer Solis

Public Hearing Closed: 7:42 p.m.

Motion by Council Member Orth, seconded by Council Member Gornick, to approve Resolutions 2021-14 and 2021-15, Confirming the Diagram and Assessment of Levy for Fiscal Year 2021-22 for LLMD Zones and PFMD Zones.

Ayes: Orth, Gornick, Matthews
Noes: Chaney
Absent: Lyons

NEW BUSINESS – Section 5

5-1 Report and Recommendation – Nisei Farmers League Request for Letters of Support (Avalos)

Motion by Council Member Gornick, seconded by Council Member Chaney, to approve the support letters to be sent to the Senate.

Ayes: Gornick, Chaney, Matthews
Noes: Orth
Absent: Lyons

5-2 Report and Recommendation – Appointment of Voting Delegate to League of California Cities Annual Conference (Avalos)

Motion by Council Member Chaney, seconded by Council Member Gornick, to appoint Council Member Orth as primary voting delegate and Mayor Pro Tem Matthews as the alternate voting delegate for the League of California Cities Annual Conference.

Ayes: Chaney, Gornick, Orth, Matthews
Absent: Lyons

BRIEF CITY COUNCIL REPORTS AND REQUESTS – Section 6

6-1 City Council Reports / Requests

Council Member Orth attended the KART meeting. Seasonal passes are up 330% since last year. It has been the highest ridership they have had. They are looking into offering a Fall and Winter pass. CalTrans will be installing a K-rail on 41 from Excelsior to Elkhorn. He stated that the stop signs on 19th and Cedar look good. He attended the LVFD 100th Anniversary event. It was a great turnout. He thanked Fire, Police and Public Works.

Council Member Gornick attended the LVFD 100th Anniversary celebration as well. He stated that it is nice to see Police and Fire support each other. We are moving in the right direction. He stated that the Golf Course is looking good.

Council Member Chaney thanked Ms. Champion for her presentation. He stated that his vote is not a reflection of her hard work. He thanked the Police Department. He sleeps well at night knowing they are out there. Kudos to the PD.

Mayor Pro Tem Matthews attended the Ice Pops for Cops event. She appreciated the water features. It was a very well attended event. She also attended the LVFD 100th anniversary event. The K-rails are half way down the 41 between Excelsior and Elkhorn.

ADJOURNMENT

At 8:14 p.m., Council adjourned.

Approved the 17th day of August 2021.

APPROVED:

Stuart Lyons, Mayor

ATTEST:

Marisa Avalos, City Clerk

City of
LEMOORE
CALIFORNIA

711 West Cinnamon Drive ● Lemoore, California 93245 ● (559) 924-6744

Staff Report

Item No: 3-2

To: **Lemoore City Council**

From **Michelle Speer, Assistant City Manager/Admin. Services Director**

Date: **August 6, 2021** **Meeting Date:** **August 17, 2021**

Subject: **Professional Services Agreement with Infosend for FedEx Door Hanger Notices**

Strategic Initiative:

☐ Safe & Vibrant Community	☐ Growing & Dynamic Economy
☒ Fiscally Sound Government	☒ Operational Excellence
☐ Community & Neighborhood Livability	☐ Not Applicable

Proposed Motion:

Authorize the City Manager, or designee, to execute a professional services agreement with Infosend for FedEx Door Hanger Notices to meet all requirements outlined in Senate Bill 998 (SB998).

Subject/Discussion:

SB998 has mandated that after February 1, 2020, all written notices of payment delinquency and impending discontinuation shall be mailed to the customer. Previously, the city would have staff hang door hangers at the residence. Soon after this mandate went into effect, the coronavirus mandates did not allow the city to turn off any delinquent accounts. In preparing to begin shut offs again, possibly as soon as October, staff would like to prepare for the mailing of notices.

Infosend currently does all of our monthly statements and has the ability to produce door hanger notifications for customers that are in danger of having their services interrupted due to non-payment. Infosend contracts door hanger notice delivery through FedEx. Door hangers are delivered at least 48 hours prior to interruption of service as mandated in Senate Bill 998.

Financial Consideration(s):

Our current water ordinance allows for a charge of $30.00 as a late penalty. This fee covers the cost of $24.18 per item for the FedEx mailers from Infosend. The estimated costs associated with this service were included in the approved operating budget for FY 2022.

Alternatives or Pros/Cons:

Pros:

- Follows protocols mandated by SB998
- Consistent delivery
- Ability to track when mailers were delivered

Cons:

- None noted

Commission/Board Recommendation:

Not applicable.

Staff Recommendation:

Staff recommends approval of the Professional Services agreement with Infosend for FedEx door hanger notices.

Attachments:	Review:	Date:
☐ Resolution:	☒ Asst. City Manager	08/12/2021
☐ Ordinance:	☒ City Attorney	08/13/2021
☐ Map	☒ City Clerk	08/13/2021
☒ Contract	☒ City Manager	08/13/2021
☐ Other	☒ Finance	08/06/2021
List:		

InfoSend FedEx Door Hanger Service Agreement

This Agreement, entered into as of **date fully executed below** in Anaheim, California, by and between **InfoSend, Inc.,** having its main office at 4240 E. La Palma Ave, Anaheim, California 92807 and **City of Lemoore,** a California municipal corporation, having its main office at 119 Fox Street, Lemoore, California 93245 ("Client"). InfoSend's primary phone number is (714) 993-2690.

Section 1. Term of Agreement
The "Initial Term" of this Agreement shall be a period of twenty-four (24) months. Subsequent "Renewal Periods" equal in duration to the Initial Term shall automatically commence upon the expiration of any term (Initial Term or Renewal Period) unless either party shall, at least sixty (60) days prior to the end of the Initial Term or subsequent Renewal Period, give sixty (60) days' written notice of termination, via certified mail.

Section 2. InfoSend Services
Subject to the terms and conditions of this Agreement, InfoSend will provide to Client, and Client will purchase from InfoSend, the services listed in Exhibit A ("Scope of Primary Services") to this Agreement for the pricing set forth in Exhibit B ("InfoSend Monthly Service Fees").

Section 3. Termination
This Agreement, and any future amendments to the Agreement, may be terminated as follows:

(a) If either party breaches any material term or condition of this Agreement, other than for Client's failure to pay and other than a failure to perform due to the causes described in Section 8, "Force Majeure," and fails either to substantially cure breach within thirty (30) days after receiving written notice specifying the breach, or, for those breaches which cannot reasonably be cured within thirty (30) days, to promptly commence curing such breach and thereafter proceed with all due diligence to substantially cure such breach, then the party not in breach may, by giving written notice to the breaching party, terminate this Agreement in its entirety, or as it pertains to a particular Product, Deliverable, Service or Professional Service, as of a date specified in such notice of termination. All of the obligations of the parties contained in this Agreement, except for Client's obligation to pay fees, shall be deemed to have been performed in an acceptable manner unless the party not in breach provides the breaching party with written notice as stated above within sixty (60) days of the event giving rise to the breach.

(b) If Client fails to pay when due any payables owed hereunder within sixty (60) days of receiving written notice of such failure to pay thereof, InfoSend may, at InfoSend's option, terminate this Agreement in its entirety or only as it pertains to a particular Product, Deliverable, Service or Professional Service, by giving written notice to Client, as of a date specified in such termination notice.

(c) In the event that either party hereto becomes or is declared insolvent or bankrupt, is the subject of any proceedings related to its liquidation, insolvency or for the appointment of a receiver or similar officer for it, makes an assignment for the benefit of all or substantially all of its creditors, or enters into an agreement for the composition, extension or readjustment of all or substantially all of its obligations, then the other party hereto may, by giving written notice thereof to such party, terminate this Agreement as of the date specified in such notice of termination.

(d) Notwithstanding any other provision in this Agreement, either party may terminate this Agreement with or without cause upon ninety (90) days' written notice to the other party.

Upon termination of this Agreement or any portion hereof for any reason, all rights granted to Client under this Agreement with respect to terminated Products, Deliverables, Services and Professional Services, will cease and Client will promptly pay to InfoSend any and all charges due, including, but not limited to, payables that are due pursuant to this Agreement, and accrued interest, if any.

Section 4. Confidentiality of Information

All information and data relating to Client's business ("Client's Data") submitted by Client to InfoSend under this Agreement shall be treated as confidential by InfoSend and shall not, unless otherwise required by law, be disclosed to any third party by InfoSend without Client's written consent. InfoSend shall promptly notify Client should InfoSend be served with a summons, complaint, subpoena, notice of deposition, request for documents, interrogatories, requests for admission, or other discovery request or court order from any third party regarding this Agreement and/or the Services performed under this Agreement.

In the event that InfoSend becomes aware of an unauthorized disclosure of Client's Data, or of circumstances that could have resulted in unauthorized access to or disclosure or use of Client's Data, InfoSend will immediately notify Client, fully investigate the incident, and reasonably cooperate with Client's investigation of and response to the incident. Except as otherwise required by law, InfoSend will not provide notice of the incident directly to affected individuals whose personally identifiable information was involved, to regulatory agencies, or to other entities, without prior written permission from Client.

InfoSend takes great care in both, data security and human resource security. InfoSend has a Human Resources policy that requires all new employees to pass a background check performed by an outside company. All new employees must pass a drug-screening test as well. These practices will remain in place for the duration of the Agreement.

Section 5. Limitation of Liability and Indemnification

InfoSend will not be responsible for actions or omissions resulting from receiving data and/or following instructions received from Client. No damages shall be assessed against InfoSend when any delay or breach on InfoSend's part is caused by failure of Client to perform Client's responsibilities, or any other reason beyond the control of InfoSend.

InfoSend is a service provider, as such; Client acknowledges that data processing involves the risk of human and machine errors; that InfoSend shall not be liable for any errors, omissions, delays or losses. In no event shall InfoSend be liable for indirect, special or inconsequential damages, even if InfoSend has been advised of the possibility of such potential claim, loss or damage. The foregoing limitation of liability and exclusion of certain damages shall apply regardless of the success or effectiveness of other remedies. Notwithstanding anything to the contrary contained herein, InfoSend shall not be responsible for delays in receipt of Client information or processing Client information because of causes beyond its reasonable control, including, without limitation, failures or limitations on the availability of third party telecommunications or other transmission facilities and Clients' failure to properly enter and/or transmit information.

Section 6. Indemnity

Notwithstanding the foregoing limitation of liability, InfoSend agrees to defend, indemnify, and hold harmless Client and its councilmembers, committees, representatives, officers, agents, and employees, from and against any and all claims, demands, liabilities, damages, losses, suits and actions, and expenses (including, but not limited to attorney fees and costs, including fees of consultants) of any kind, nature and description (collectively, the "Claims") directly arising out of, connected with, or resulting from any act, error, omission, negligence, or willful misconduct of InfoSend, or its officers, agents, subcontractors, or employees in the performance of or failure to perform InfoSend's obligations under this Agreement

Section 8. Insurance
Without in any way limiting InfoSend's indemnification obligations set forth in Section 6 above, InfoSend shall secure and maintain throughout the term of this Agreement the following insurance: (i) comprehensive general liability insurance with limits of not less than $1,000,000 each occurrence and $2,000,000 in the aggregate; (ii) commercial automobile liability insurance with limits not less than $1,000,000 each occurrence and $2,000,000 in the aggregate, if applicable; and (iii) worker's compensation insurance as required by Labor Code section 3200, *et seq.*, if applicable.

Section 9. Invoicing and Payment
InfoSend will issue weekly invoices. Invoice terms are NET 15. Should Client dispute any invoiced charges, it must do so in a reasonable time frame. Disputes must be made within six (6) months of the invoice date. Past due invoices are subject to a 1.5% per month finance charge.

Section 10. Force Majeure
Neither party will be liable for any failure or delay in performing an obligation under this Agreement that is due to causes beyond its reasonable control, including, but not limited to, fire, explosion, epidemics or pandemics, earthquake, lightning, failures or fluctuations in electrical power or telecommunications equipment, accidents, floods, acts of God, the elements, war, civil disturbances, acts of civil or military authorities or the public enemy, fuel or energy shortages, acts or omissions of any common carrier, strikes, labor disputes, regulatory restrictions, restraining orders or decrees of any court, changes in law or regulation or other acts of government authority, transportation stoppages or slowdowns or the inability to produce parts or materials. These causes will not excuse Client from paying accrued payables due to InfoSend through any available lawful means acceptable to InfoSend.

Section 11. Miscellaneous
The substantive laws of the State of California shall govern this Agreement. This Agreement constitutes the entire Agreement between the parties with respect to the subject matter hereof. No representations and agreements modifying or supplementing the terms of this Agreement will be valid unless in writing, signed by persons authorized to sign agreements on behalf of both parties. This Agreement is not intended to, and shall not be construed to, create or confer any right in or upon any person or entity not a party to it.

City of Lemoore		**InfoSend, Inc.**	
Name:	______________________	Name:	______________________
Title:	______________________	Title:	______________________
Signature:	______________________	Signature:	______________________
Date:	______________________	Date:	______________________

Exhibit A - Scope of InfoSend Primary Services

Section 1. Scope of FedEx Door Hanger Service:

Data Transfer and Processing

- Client to transmit data to InfoSend in an agreed-upon format by 9 AM PST. If client optionally chooses to review and approve sample files, the sample must be approved by 9:00 AM, PST to ensure desired notice delivery times.

- A File Transfer Report will be emailed to the Client representatives who have opted-in to this email. A copy of this report is also available to download from the InfoSend website.

- InfoSend will process the shut-off data and mailing addresses and perform the following functions:

    - Create a shut-off notice on an 8 ½ x 11 inch form on one side and a FedEx Label on the reverse, insert this notice into a FedEx Envelope and deliver to FedEx for Standard delivery using the FedEx method chosen by the Client.
    - Comply with FedEx requirements.
    - Provide immediate email to Client regarding any delivery exceptions and FedEx follow-up to get notice delivered same day.
    - Provide optional access to tracking portal to review delivery confirmations.

- Should Client make changes to data file format after initial setup is complete, it agrees to pay for the professional services required to accommodate the new file format.

Exhibit B - InfoSend Monthly Service Fees

Section 1. Price Escalations to InfoSend Service Fees
InfoSend reserves the right to adjust its Monthly Service Fees once every twelve (12) months (starting with the first anniversary of the Agreement date) to account for increases in the cost of materials, labor, and other overhead costs. Any such annual increase in Monthly Service Fees shall not exceed the Consumer Price Index (CPI) for the State of California, plus 1%. This information can currently be found at www.dof.ca.gov/HTML/FS_DATA/LatestEconData/FS_Price.htm. The Client will be notified, in writing, at least thirty (30) days prior to such price increase. An amendment to this Agreement will not be required if the Monthly Service Fees are changed, unless the terms or conditions of the Agreement have changed. Postage fees can change at any time per USPS regulations and do not require an Agreement amendment.

In addition to this, Client accepts that InfoSend reserves the right to pass on any increases to the cost of service due to increases in FedEx rates at any time. The Client will be notified, in writing, at least thirty (30) days prior to such price increase.

Section 2. FedEx Door Hanger Service Fees:

Sales tax is not included. Any applicable sales tax will be charged at the current Orange County, California rate.

<table>
<tr><td colspan="4">InfoSend's Monthly Fees – Turnkey FedEx Door Hanger Service:

The individual prices shown in the table below apply only to the turnkey data processing, printing, and mailing service for the following document types. Other types of document printing and or mailing can be quoted later, if needed.</td></tr>
<tr><td rowspan="3">Primary Services</td><td rowspan="3">Turnkey data processing, BillPrint & Mail service

Price is per physical page. Includes processing of your unique data, printing, and mail insertion. Finished mail pieces are delivered to FedEx same day as long as data file is transferred and accepted by InfoSend by 9 AM PST, and approved by 9AM PST.

Some delivery addresses and zip codes incur a surcharge from FedEx and will be charged as pass through.</td><td>Per Item</td><td>Options Below:</td></tr>
<tr><td>Late Notice Door Hanger- Standard Next Day (24 hour delivery)

Data file must be received by InfoSend the morning before the day of FedEx delivery.</td><td>$26.68</td></tr>
<tr><td>Late Notice Door Hanger- Priority Next Day (24 hour delivery)

Data file must be received by InfoSend the morning before the day of FedEx delivery.</td><td>$28.86</td></tr>
</table>

		Late Notice Door Hanger- Standard Two-day (48 hour delivery) **Data file must be received by InfoSend the morning before the day of FedEx delivery.**	**$24.18**
		DAS –Delivery Surcharge pass through **Extended DAS – pass through**	**$4.70** **$5.90**
		Additional laser pages, duplexed	**$0.15**

Section 2.1. FedEx and other Carrier Rates

A large component of the above fees is determined by FedEx. Shipping rate changes are determined directly by FedEx and are independent of any InfoSend service or materials fees. In no event shall any change in the FedEx rates affect the InfoSend service or materials fees.

Shipping fees from FedEx can change at any time. InfoSend will pass on the exact cost of the rate increases when the shipping carriers levy them.

Section 3. Professional Services Fees

Changes made to the document template after go-live will be assessed a $175.00 per hour fee. A quote will be provided for approval before any work is started.

City of
LEMOORE
CALIFORNIA

711 West Cinnamon Drive ● Lemoore, California 93245 ● (559) 924-6700 ● Fax (559) 924-9003

Staff Report

Item No: 3-3

To: **Lemoore City Council**

From: **Frank Rivera, Public Works Director**

Date: **August 9, 2021** **Meeting Date:** **August 17, 2021**

Subject: **Request Authorization to Record the Final Parcel Map for Tentative Parcel Map 2021-01 submitted by Semas Farming**

Strategic Initiative:

☐ Safe & Vibrant Community	☒ Growing & Dynamic Economy
☐ Fiscally Sound Government	☐ Operational Excellence
☐ Community & Neighborhood Livability	☐ Not Applicable

Proposed Motion:

Authorize the recordation of the Final Parcel Map for Tentative Parcel No. 2021-01.

Subject/Discussion:

Tentative Parcel Map 2021-01 was submitted by Semas Farming, and approved by the planning commission on April 12, 2021.

The map allows the division of a 148.68 acre parcel into two parcels of 116.14 acres and 32.54 acres located at the southeast corner of Industrial Way and Production Avenue in the City of Lemoore (APNS 023-510-033, 23-501-044, 023-520-007, and 023-520-008.)

The parcel map would facilitate development of the 32.54- acre parcel for industrial use consistent with the site's zoning. The intended developer would be for Helena Chemical.

The map identifies various easements, street abandonment, and dedications. After review by the Planning Department, Public Works, and the City Engineer, it has been determined that the Final Parcel Map is in compliance with the approved tentative map and all condition of approval have been met.

Therefore, as required by Section 8-7B-19 of the Municipal Code, the Final Parcel Map is being recommended for City Council approval of the map and acceptance of all offers of dedication as indicated.

Financial Consideration(s):
None at this time.

Alternatives or Pros/Cons:
Not Applicable

Commission/Board Recommendation:
Not Applicable

Staff Recommendation:
Staff recommends Council approve Final Parcel Map 2021-01 and accept the offers of public dedication and authorize the City Clerk to certify such approval on the map and forward to the Kings County Recorder for its recordation.

Attachments:	Review:	Date:
☐ Resolution:	☒ Asst. City Manager	08/12/2021
☐ Ordinance:	☒ City Attorney	08/13/2021
☒ Map- Final Parcel Map 2021-01	☒ City Clerk	08/13/2021
☐ Contract	☒ City Manager	08/13/2021
☐ Other	☒ Finance	08/13/2021
List:		

PARCEL MAP

BEING A SUBDIVISION OF PARCEL 4 AS SHOWN ON MAP RECORDED JUNE 28, 2006 IN BOOK 18 AT PAGE 6 OF PARCEL MAPS, KINGS COUNTY RECORDS, AND BEING IN THE SOUTH HALF OF SECTION 5 AND THE NORTH HALF OF SECTION 8, TOWNSHIP 19 SOUTH, RANGE 20 EAST, MOUNT DIABLO BASE AND MERIDIAN, IN THE CITY OF LEMOORE, COUNTY OF KINGS, STATE OF CALIFORNIA

OWNER'S STATEMENT

(I / WE) HEREBY STATE THAT (I / WE) ARE THE OWNERS OF AND HAVE THE RIGHT, TITLE, AND INTEREST IN AND TO THE REAL PROPERTY INCLUDED WITHIN THE SUBDIVISION BOUNDARY SHOWN UPON THIS MAP, AND (AM / ARE) THE ONLY PERSON(S) WHOSE CONSENT IS NECESSARY TO PASS CLEAR TITLE TO SAID PROPERTY, AND (I / WE) CONSENT TO THE MAKING AND FILING OF SAID MAP OF THE SUBDIVISION SHOWN WITHIN THE BORDER LINES, AND HEREBY IRREVOCABLY DEDICATE TO THE CITY OF LEMOORE FREE OF ENCUMBRANCE ALL AREAS (E.G., STREETS, PUBLIC UTILITY EASEMENTS, STORM DRAIN EASEMENTS) AS SHOWN ON THE MAP.

OWNER'S NAME: Mardell B. Pedersen 7/12/2021 DATE
MARDELL B. PEDERSEN TRUSTEE OF THE ROBERT &
MARDELL MARITAL EXEMPT TRUST
MARDELL B. PEDERSEN, TRUSTEE

A NOTARY PUBLIC OR OTHER OFFICER COMPLETING THIS CERTIFICATE VERIFIES ONLY THE IDENTITY OF THE INDIVIDUAL WHO SIGNED THE DOCUMENT TO WHICH THIS CERTIFICATE IS ATTACHED, AND NOT THE TRUTHFULNESS, ACCURACY, OR VALIDITY OF THAT DOCUMENT.

STATE OF CALIFORNIA
COUNTY OF Kings
ON July 12, 2021 BEFORE ME, GLORIA J. Bench,
NOTARY PUBLIC, PERSONALLY APPEARED Mardell B. Pedersen
WHO PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE/SHE/THEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND THAT BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.
I CERTIFY UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING PARAGRAPH IS TRUE AND CORRECT.
WITNESS MY HAND AND OFFICIAL SEAL.

SIGNATURE Gloria J. Bench
(PRINT NAME) GLORIA J. Bench
MY COMMISSION NO. 2299601 MY COMMISSION EXPIRES Aug 26, 2023
PRINCIPAL OFFICE IN COUNTY OF Kings

OWNER'S NAME: Mardell B. Pedersen 7/12/2021 DATE
MARDELL B. PEDERSEN TRUSTEE OF THE ROBERT &
MARDELL PEDERSEN MARITAL TRUST
MARDELL B. PEDERSEN, TRUSTEE

A NOTARY PUBLIC OR OTHER OFFICER COMPLETING THIS CERTIFICATE VERIFIES ONLY THE IDENTITY OF THE INDIVIDUAL WHO SIGNED THE DOCUMENT TO WHICH THIS CERTIFICATE IS ATTACHED, AND NOT THE TRUTHFULNESS, ACCURACY, OR VALIDITY OF THAT DOCUMENT.

STATE OF CALIFORNIA
COUNTY OF Kings
ON July 12, 2021 BEFORE ME, GLORIA J. Bench,
NOTARY PUBLIC, PERSONALLY APPEARED Mardell B. Pedersen
WHO PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE/SHE/THEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND THAT BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.
I CERTIFY UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING PARAGRAPH IS TRUE AND CORRECT.
WITNESS MY HAND AND OFFICIAL SEAL.

SIGNATURE Gloria J. Bench
(PRINT NAME) GLORIA J. Bench
MY COMMISSION NO. 2299601 MY COMMISSION EXPIRES Aug. 26, 2023
PRINCIPAL OFFICE IN COUNTY OF Kings

OWNER'S NAME: Mardell B. Pedersen 7/12/2021 DATE
MARDELL B. PEDERSEN TRUSTEE OF THE ROBERT &
MARDELL PEDERSEN CREDIT TRUST
MARDELL B. PEDERSEN, TRUSTEE

A NOTARY PUBLIC OR OTHER OFFICER COMPLETING THIS CERTIFICATE VERIFIES ONLY THE IDENTITY OF THE INDIVIDUAL WHO SIGNED THE DOCUMENT TO WHICH THIS CERTIFICATE IS ATTACHED, AND NOT THE TRUTHFULNESS, ACCURACY, OR VALIDITY OF THAT DOCUMENT.

STATE OF CALIFORNIA
COUNTY OF Kings
ON July 12, 2021 BEFORE ME, GLORIA J. Bench,
NOTARY PUBLIC, PERSONALLY APPEARED Mardell B. Pedersen
WHO PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE/SHE/THEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND THAT BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.
I CERTIFY UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING PARAGRAPH IS TRUE AND CORRECT.
WITNESS MY HAND AND OFFICIAL SEAL.

SIGNATURE Gloria J. Bench
(PRINT NAME) GLORIA J. Bench
MY COMMISSION NO. 2299601 MY COMMISSION EXPIRES Aug. 26, 2023
PRINCIPAL OFFICE IN COUNTY OF Kings

OWNER'S NAME: Mardell B. Pedersen 7/12/2021 DATE
SEMAS FARMING, LLC, A CALIFORNIA LIMITED LIABILITY COMPANY
MARDELL B. PEDERSEN, MANAGER

A NOTARY PUBLIC OR OTHER OFFICER COMPLETING THIS CERTIFICATE VERIFIES ONLY THE IDENTITY OF THE INDIVIDUAL WHO SIGNED THE DOCUMENT TO WHICH THIS CERTIFICATE IS ATTACHED, AND NOT THE TRUTHFULNESS, ACCURACY, OR VALIDITY OF THAT DOCUMENT.

STATE OF CALIFORNIA
COUNTY OF Kings
ON July 12, 2021 BEFORE ME, GLORIA J. Bench,
NOTARY PUBLIC, PERSONALLY APPEARED Mardell B. Pedersen
WHO PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE/SHE/THEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND THAT BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.
I CERTIFY UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING PARAGRAPH IS TRUE AND CORRECT.
WITNESS MY HAND AND OFFICIAL SEAL.

SIGNATURE Gloria J. Bench
(PRINT NAME) GLORIA J. Bench
MY COMMISSION NO. 2299601 MY COMMISSION EXPIRES Aug. 26, 2023
PRINCIPAL OFFICE IN COUNTY OF Kings

OWNER'S NAME: Stephen L. Semas 7/12/21 DATE
SEMAS FARMING, LLC, A CALIFORNIA LIMITED LIABILITY COMPANY
STEPHEN L. SEMAS, MANAGER

A NOTARY PUBLIC OR OTHER OFFICER COMPLETING THIS CERTIFICATE VERIFIES ONLY THE IDENTITY OF THE INDIVIDUAL WHO SIGNED THE DOCUMENT TO WHICH THIS CERTIFICATE IS ATTACHED, AND NOT THE TRUTHFULNESS, ACCURACY, OR VALIDITY OF THAT DOCUMENT.

STATE OF CALIFORNIA
COUNTY OF Kings
ON July 12, 2021 BEFORE ME, GLORIA J. Bench,
NOTARY PUBLIC, PERSONALLY APPEARED Stephen L. Semas
WHO PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE/SHE/THEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND THAT BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.
I CERTIFY UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING PARAGRAPH IS TRUE AND CORRECT.
WITNESS MY HAND AND OFFICIAL SEAL.

SIGNATURE Gloria J. Bench
(PRINT NAME) GLORIA J. Bench
MY COMMISSION NO. 2299601 MY COMMISSION EXPIRES Aug. 26, 2023
PRINCIPAL OFFICE IN COUNTY OF Kings

OWNER'S NAME: Gwendolyn M. Martin 7/8/21 DATE
SEMAS FARMING, LLC, A CALIFORNIA LIMITED LIABILITY COMPANY
GWENDOLYN M. MARTIN, MANAGER

A NOTARY PUBLIC OR OTHER OFFICER COMPLETING THIS CERTIFICATE VERIFIES ONLY THE IDENTITY OF THE INDIVIDUAL WHO SIGNED THE DOCUMENT TO WHICH THIS CERTIFICATE IS ATTACHED, AND NOT THE TRUTHFULNESS, ACCURACY, OR VALIDITY OF THAT DOCUMENT.

STATE OF ~~CALIFORNIA~~ BD OREGON
COUNTY OF Tillamook
ON July 8th, 2021 BEFORE ME, Bryton Clay Dorland,
NOTARY PUBLIC, PERSONALLY APPEARED Gwendolyn M. Martin
WHO PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE/SHE/THEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND THAT BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.
I CERTIFY UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING PARAGRAPH IS TRUE AND CORRECT.
WITNESS MY HAND AND OFFICIAL SEAL.

SIGNATURE BRYTON DORLAND
(PRINT NAME) BRYTON DORLAND
MY COMMISSION NO. 1012915 MY COMMISSION EXPIRES May 24, 2025
PRINCIPAL OFFICE IN COUNTY OF Tillamook

CIVIL ENGINEERS
ZUMWALT HANSEN INC.
LAND SURVEYORS

609 N. IRWIN ST. HANFORD, CA. 93230 PH. (559) 582-1056 FILE NO. 0790711 SHEET 1 OF 3

CITY OF LEMOORE
TPM No. 2021-01

PARCEL MAP

BEING A SUBDIVISION OF PARCEL 4 AS SHOWN ON MAP RECORDED JUNE 28, 2006 IN BOOK 18 AT PAGE 6 OF PARCEL MAPS, KINGS COUNTY RECORDS, AND BEING IN THE SOUTH HALF OF SECTION 5 AND THE NORTH HALF OF SECTION 8, TOWNSHIP 19 SOUTH, RANGE 20 EAST, MOUNT DIABLO BASE AND MERIDIAN, IN THE CITY OF LEMOORE, COUNTY OF KINGS, STATE OF CALIFORNIA

CITY CLERK'S STATEMENT

THIS IS TO CERTIFY THAT AT A REGULAR MEETING OF THE CITY COUNCIL OF THE CITY OF LEMOORE HELD ON THE ______ DAY OF ______________, 2021 AN ORDER WAS DULY AND REGULARLY MADE AND ENTERED APPROVING THIS MAP AND SUBDIVISION AND ACCEPTING, ON BEHALF OF THE PUBLIC, THE ABANDONMENT OF A PORTION OF PRODUCTION AVENUE AND THE RETENTION OF ALL PUBLIC UTILITY EASEMENTS LOCATED IN THAT VICINITY, AS SHOWN HEREON.

DATED THIS ______ DAY OF __________________, 202___.

____

MARISA AVALOS, CITY CLERK
CITY OF LEMOORE, STATE OF CALIFORNIA

PLANNING COMMISSION STATEMENT

I HEREBY CERTIFY THAT THIS MAP CONFORMS TO THE TENTATIVE PARCEL MAP APPROVED BY THE CITY OF LEMOORE PLANNING COMMISSION IN ACCORDANCE WITH REQUIREMENTS OF LAW IN A DULY AUTHORIZED MEETING HELD April 12, 2021.

DATED THIS 12th DAY OF August, 2021.

J Holwell

JUDY HOLWELL, COMMUNITY DEVELOPMENT DIRECTOR
CITY OF LEMOORE, STATE OF CALIFORNIA

SURVEYOR'S STATEMENT

THIS MAP WAS PREPARED BY ME OR UNDER MY DIRECTION AND IS BASED UPON A FIELD SURVEY IN CONFORMANCE WITH THE REQUIREMENTS OF THE SUBDIVISION MAP ACT AND LOCAL ORDINANCE AT THE REQUEST OF MARDELL B. PEDERSEN ON NOVEMBER 20, 2020. I HEREBY STATE THAT THIS PARCEL MAP SUBSTANTIALLY CONFORMS TO THE APPROVED OR CONDITIONALLY APPROVED TENTATIVE MAP, IF ANY, AND MONUMENTS SHOWN HEREON WILL BE SET UPON COMPLETION OF IMPROVEMENTS, IF APPLICABLE, OR WITHIN ONE YEAR FROM THE DATE OF FILING ON THIS MAP AND THAT SAID MONUMENTS ARE OR WILL BE SUFFICIENT TO ENABLE THE SURVEY TO BE RETRACED.

PROFESSIONAL LAND SURVEYOR
RON G. ROSELIUS
No. 8167
STATE OF CALIFORNIA

Ron G. Roselius — 8-2-2021

RON G. ROSELIUS, L.S. 8167 — DATE

PARTIAL PRODUCTION AVENUE RIGHT-OF-WAY ABANDONMENT

THAT PORTION OF THE 24' WIDE PRODUCTION AVENUE RIGHT-OF-WAY AS SHOWN ON MAP RECORDED IN BOOK 18, OF PARCEL MAPS, AT PAGE 6, SHEET 8 OF 18, KINGS COUNTY RECORDS, AND THAT PORTION OF THE 60' WIDE PRODUCTION AVENUE RIGHT-OF-WAY AS DESCRIBED IN THE IRREVOCABLE OFFER OF DEDICATION RECORDED AS DOCUMENT NO. 0420815, OFFICIAL RECORDS OF KINGS COUNTY, BOTH LYING SOUTH OF THE TEMPORARY TURNAROUND EASEMENTS "A" AND "B", AS DESCRIBED IN SAID DOCUMENT NO. 0420815, SHALL BE ABANDONED PER THIS MAP AS ALLOWED BY THE SUBDIVISION MAP ACT IN SECTION 66434(g).

ALL PUBLIC UTILITY EASEMENTS SHALL BE RETAINED AS A CONDITION OF THE ACCEPTANCE OF THE RIGHT-OF-WAY ABANDONMENT.

IMPROVEMENT NOTE

IMPROVEMENTS ALONG WEST INDUSTRY WAY, ON THE NORTH SIDE OF PARCEL 2, INCLUDING CURB AND GUTTER, SIDEWALK, STREETLIGHTS AND LANDSCAPE, SHALL BE CONSTRUCTED, BY THE DEVELOPER OF PARCEL 2, IN CONFORMANCE WITH APPLICABLE CITY STANDARDS AND POLICIES.

IMPROVEMENTS MAY BE DEFERRED UNTIL THE ISSUANCE OF BUILDING PERMITS FOR PARCEL 2.

CITY ENGINEER'S STATEMENT

I DO HEREBY STATE THAT I HAVE EXAMINED THIS MAP AND THAT THE DIVISION IS SUBSTANTIALLY THE SAME AS IT APPEARED ON THE APPROVED TENTATIVE MAP, IF REQUIRED, AND ANY APPROVED ALTERATIONS THEREOF, AND THAT ALL OF THE PROVISIONS OF SECTION 66425 THROUGH 66450 OF THE GOVERNMENT CODE AND OF ANY LOCAL ORDINANCES APPLICABLE AT THE TIME OF APPROVAL OF THE TENTATIVE MAP, IF ANY, HAVE BEEN COMPLIED WITH AND THAT I AM SATISFIED THAT THE MAP IS TECHNICALLY CORRECT.

REGISTERED PROFESSIONAL ENGINEER
JEFFERY S. COWART
No. 41964
CIVIL
STATE OF CALIFORNIA

8/12/21

JEFFERY S. COWART, RCE 41964 — DATE

RECORDER'S STATEMENT

DOCUMENT NO. ____________ FEE ____________FILED THIS _____ DAY OF ______________, 20 ____, AT ________ ___ . M. IN BOOK______ OF PARCEL MAPS AT PAGE ________, KINGS COUNTY RECORDS, AT THE REQUEST OF ZUMWALT HANSEN & ASSOCIATES, INC..

KRISTINE LEE, KINGS COUNTY RECORDER

BY: ____

DEPUTY

TAX COLLECTOR'S STATEMENT

THIS IS TO CERTIFY THAT THE PROVISIONS OF ARTICLE 8 OF CHAPTER 4 OF DIVISION 2 OF THE GOVERNMENT CODE HAVE BEEN COMPLIED WITH REGARDING DEPOSITS.

DATE: _______________

JAMES P. ERB, CPA; DIRECTOR OF FINANCE

BY: ________________________________

CITY SURVEYOR'S STATEMENT

I DO HEREBY STATE THAT I HAVE EXAMINED THIS MAP AND THAT THE DIVISION IS SUBSTANTIALLY THE SAME AS IT APPEARED ON THE APPROVED TENTATIVE MAP, IF REQUIRED, AND ANY APPROVED ALTERATIONS THEREOF, AND THAT ALL OF THE PROVISIONS OF SECTIONS 66425 THROUGH 66450 OF THE GOVERNMENT CODE AND OF ANY LOCAL ORDINANCES APPLICABLE AT THE TIME OF APPROVAL OF THE TENTATIVE MAP, IF ANY, HAVE BEEN COMPLIED WITH AND THAT I AM SATISFIED THAT THE MAP IS TECHNICALLY CORRECT.

PROFESSIONAL LAND SURVEYOR
ANTONIO S. WESTERLUND
No. 9399
STATE OF CALIFORNIA
AW
8/11/21

Antonio S. Westerlund — 8/11/2021

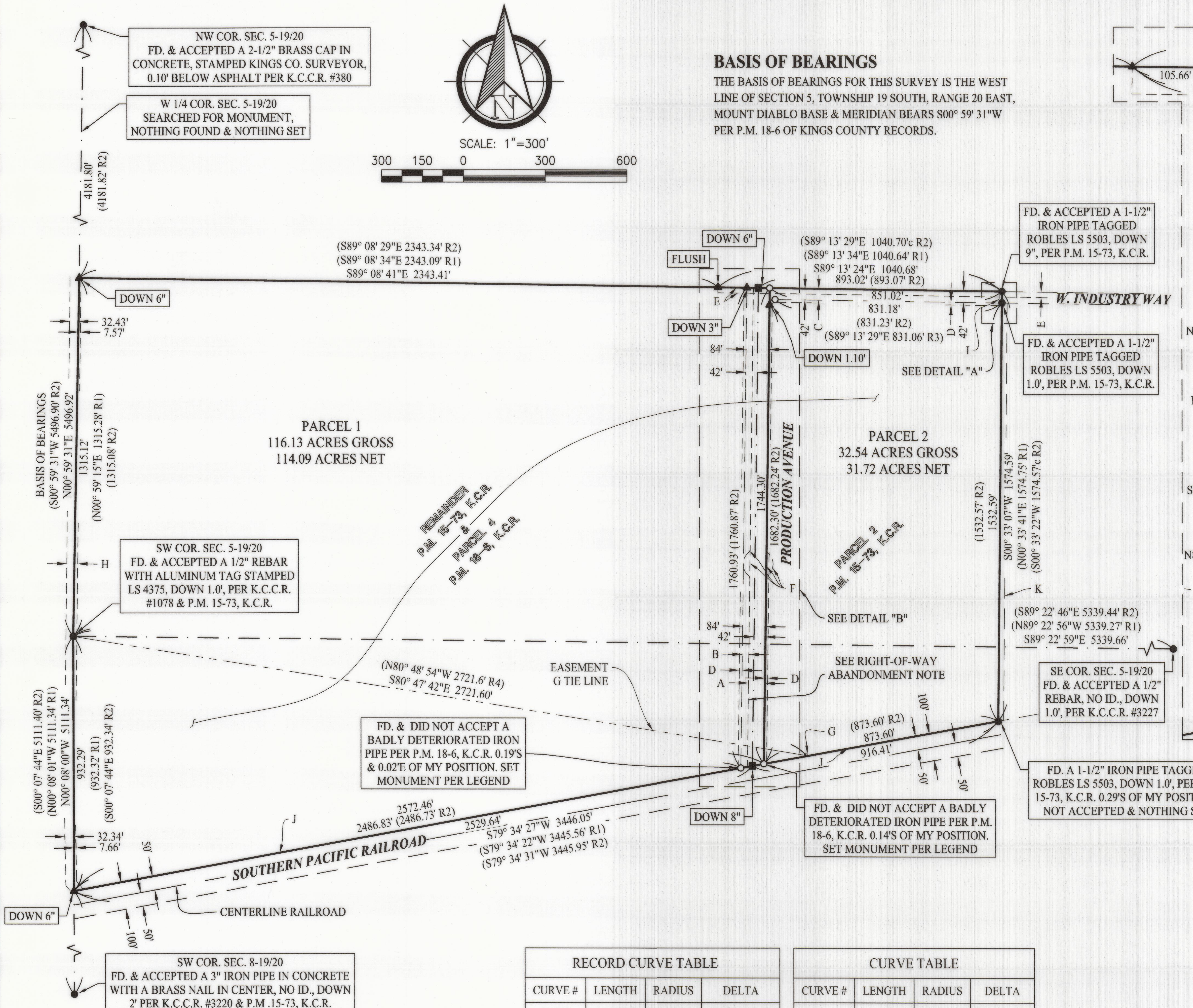
ANTONIO S. WESTERLUND, P.L.S. 9399 — DATE

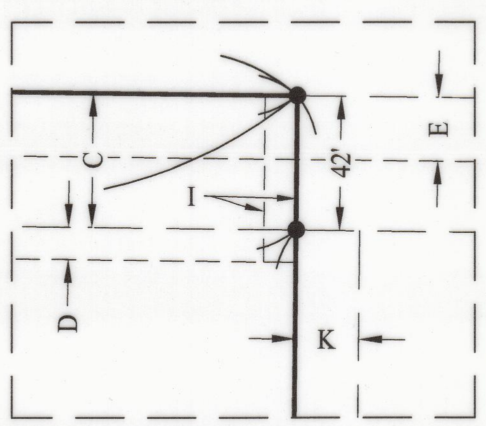
PARCEL MAP

BEING A SUBDIVISION OF PARCEL 4 AS SHOWN ON MAP RECORDED JUNE 28, 2006 IN BOOK 18 AT PAGE 6 OF PARCEL MAPS, KINGS COUNTY RECORDS, AND BEING IN THE SOUTH HALF OF SECTION 5 AND THE NORTH HALF OF SECTION 8, TOWNSHIP 19 SOUTH, RANGE 20 EAST, MOUNT DIABLO BASE AND MERIDIAN, IN THE CITY OF LEMOORE, COUNTY OF KINGS, STATE OF CALIFORNIA

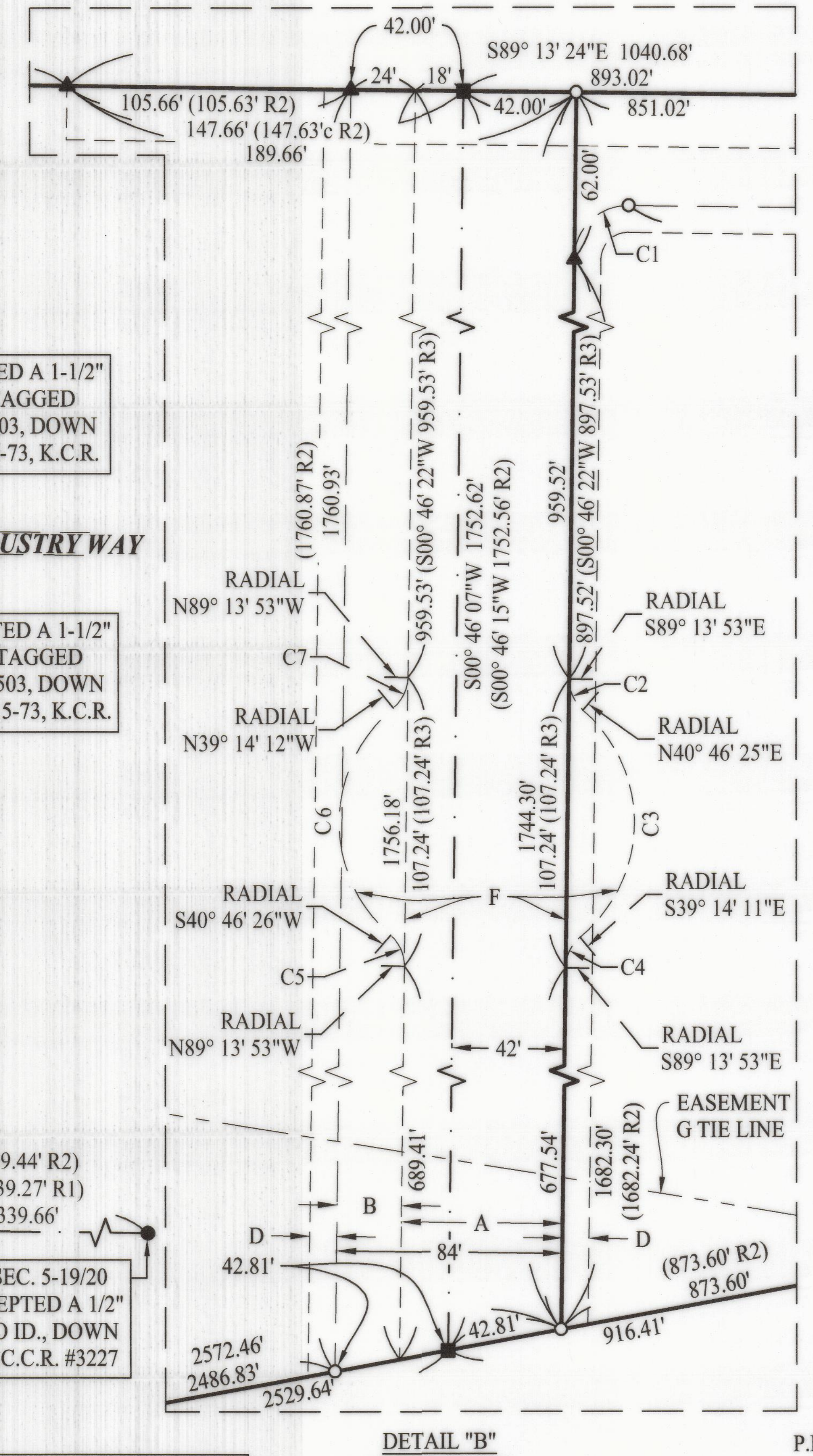
BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE WEST LINE OF SECTION 5, TOWNSHIP 19 SOUTH, RANGE 20 EAST, MOUNT DIABLO BASE & MERIDIAN BEARS S00° 59' 31"W PER P.M. 18-6 OF KINGS COUNTY RECORDS.





DETAIL "A"
SCALE: 1" = 60'



DETAIL "B"
SCALE: 1" = 60'

EASEMENT LEGEND

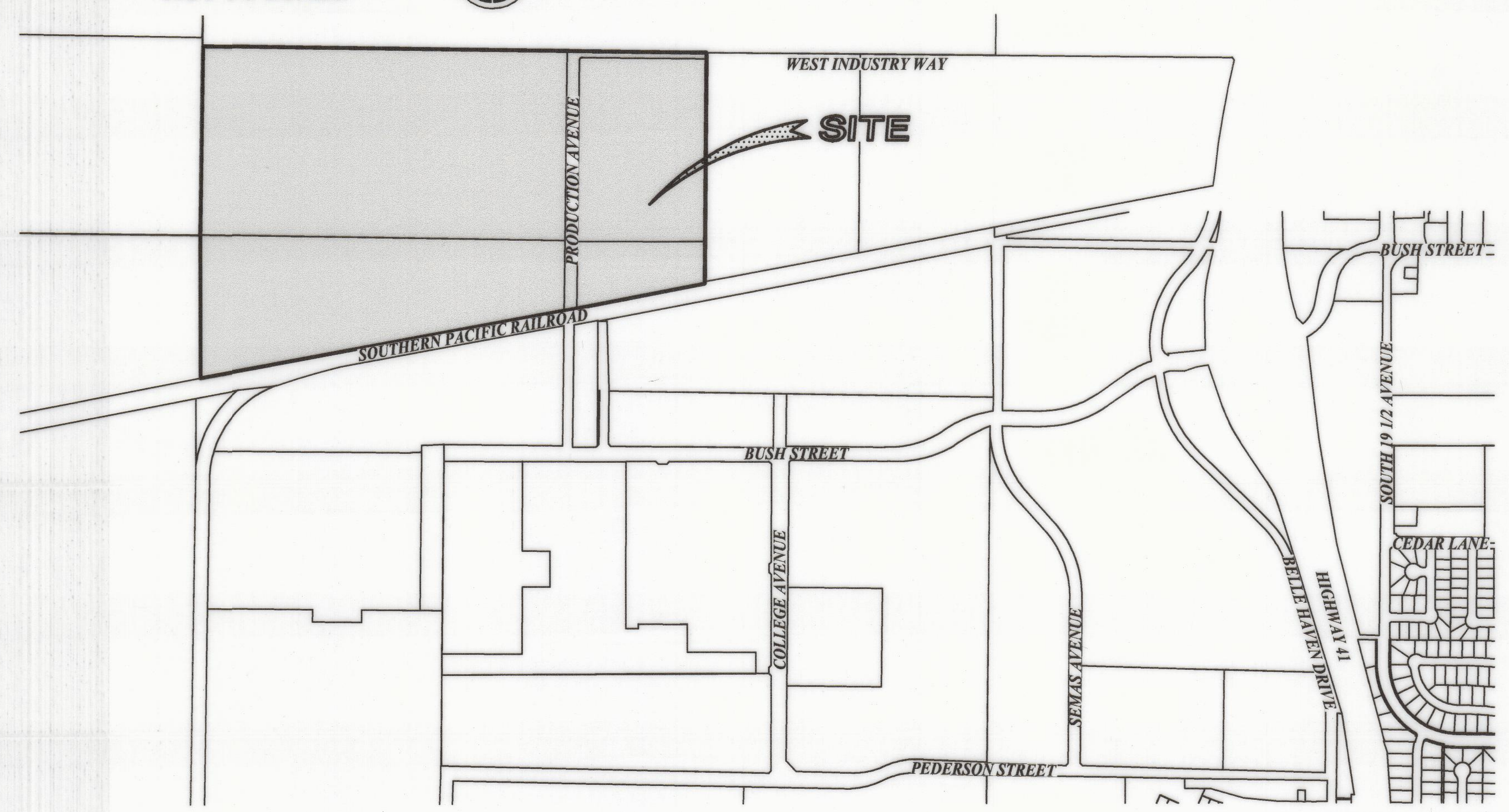
A - 60' ROAD RIGHT-OF-WAY PER DOCUMENT NO. 0420815, O.R.K.C.
B - 24' ADDITIONAL ROAD RIGHT-OF-WAY PER P.M. 18-6, K.C.R.
C - 42' ROAD RIGHT-OF-WAY PER DOCUMENT NO. 0420815, O.R.K.C.
D - 10' PUBLIC UTILITY EASEMENT PER P.M. 18-6, K.C.R.
E - 20' INGRESS/EGRESS EASEMENT PER DOCUMENT NO. 11791, O.R.K.C., RECORDED 12/21/1955 IN VOLUME 634, PAGES 171-178, O.R.K.C.
F - TEMPORARY TURNAROUND EASEMENT PER DOCUMENT NO. 0420815, O.R.K.C.
G - 10' WIDE PG&E EASEMENT PER INSTRUMENT NO. 0111436, O.R.K.C.
H - 40' UTILITY EASEMENT FOR PG&E PER BOOK 808, PAGE 345, O.R.K.C.
I - APPROXIMATE AREA AT WEST END OF PG&E EASEMENT PER INSTRUMENT NO. 0433733, O.R.K.C.
J - UNRECORDED EASEMENT FOR PG&E DATED 3-11-1938 PER PG&E R/W NO. 2022, LD# 2219-20-0021 (NO WIDTH IDENTIFIED IN DOCUMENT)
K - 10' WIDE EASEMENT GRANTED TO PG&E PER EASEMENT RECORDED DECEMBER 15, 2000 AS DOCUMENT NO. 0022824, O.R.K.C., AND AS PG&E DOC. NO. LD 2219-20-0317, AS SHOWN ON EXHIBIT "A", DATED 10/28/2000 OF SAID DOCUMENT - LINE SHOWN IS THE APPROXIMATE CENTERLINE LOCATION

LEGEND

●	FOUND MONUMENTS AS NOTED
▲	FOUND & ACCEPTED A 3/4" IRON PIPE, TAGGED LS 7680, PER P.M. 18-6 OF KINGS COUNTY RECORDS
■	FOUND & ACCEPTED A 3/4" IRON PIPE, TAGGED LS 7680, IN CONCRETE, PER P.M. 18-6 OF KINGS COUNTY RECORDS
○	SET 1/2" REBAR, 30" LONG, 0.5' DEEP, TAGGED LS 8167
c	CALCULATED FROM RECORD DATA
K.C.R.	KINGS COUNTY RECORDS
K.C.C.R.	KINGS COUNTY CORNER RECORDS
O.R.K.C.	OFFICIAL RECORDS OF KINGS COUNTY
P.M. XX-YY K.C.R.	PARCEL MAPS BOOK XX - PAGE YY KINGS COUNTY RECORDS
(R1)	RECORD DATA PER P.M. 15-73 OF KINGS COUNTY RECORDS
(R2)	RECORD DATA PER P.M. 18-6 OF KINGS COUNTY RECORDS OR CALCULATED THEREFROM
(R3)	RECORD DATA PER DOCUMENT NO. 0420815, O.R.K.C.
(R4)	RECORD DATA PER INSTRUMENT NO. 0111436, O.R.K.C.

ALL DIMENSIONS ARE IN US SURVEY FEET AND DECIMALS THEREOF.

VICINITY MAP
NOT TO SCALE



RECORD CURVE TABLE

CURVE #	LENGTH	RADIUS	DELTA
(C1 R2)	(31.42' R2)	(20.00' R2)	(90° 00' 16" R2)
(C1 R3)	(31.42' R3)	(20.00' R3)	(90° 00' 10" R3)
(C2 R3)	(13.09' R3)	(15.00' R3)	(49° 59' 41" R3)
(C3 R3)	(95.98' R3)	(55.00' R3)	(99° 59' 22" R3)
(C4 R3)	(13.09' R3)	(15.00' R3)	(49° 59' 41" R3)
(C5 R3)	(13.09' R3)	(15.00' R3)	(49° 59' 41" R3)
(C6 R3)	(95.98' R3)	(55.00' R3)	(99° 59' 22" R3)
(C7 R3)	(13.09' R3)	(15.00' R3)	(49° 59' 41" R3)

CURVE TABLE

CURVE #	LENGTH	RADIUS	DELTA
C1	31.42'	20.00'	90° 00' 29"
C2	13.09'	15.00'	49° 59' 42"
C3	95.98'	55.00'	99° 59' 23"
C4	13.09'	15.00'	49° 59' 42"
C5	13.09'	15.00'	49° 59' 41"
C6	95.98'	55.00'	99° 59' 22"
C7	13.09'	15.00'	49° 59' 41"

CIVIL ENGINEERS
ZUMWALT HANSEN INC.
LAND SURVEYORS
609 N. IRWIN ST. HANFORD, CA. 93230 PH. (559) 582-1056

FILE NO. 0790711

SHEET 3 OF 3

CITY OF LEMOORE
TPM No. 2021-01

City of
LEMOORE
CALIFORNIA

711 West Cinnamon Drive ● Lemoore, California 93245 ● (559) 924-6744

Staff Report

Item No: 4-1

To: **Lemoore City Council**

From **Michelle Speer, Assistant City Manager/Admin. Services Director**

Date: **July 9, 2021** **Meeting Date:** **July 20, 2021**

Subject: **First Reading – Ordinance 2021-05 – Authorizing an Amendment to the Contract between the City Council of the City of Lemoore and Board of Administration of the California Public Employees' Retirement System**

Strategic Initiative:

☐ Safe & Vibrant Community	☐ Growing & Dynamic Economy
☒ Fiscally Sound Government	☐ Operational Excellence
☐ Community & Neighborhood Livability	☐ Not Applicable

Proposed Motion:
Introduce and waive the first reading of Ordinance 2021-05

Subject/Discussion:
City staff and CalPERS have been working together to complete a contract amendment to provide Section 20903 (Two-Years Additional Service Credit) for safety employees. This benefit is already included as an option to non-safety members.

This amendment is only to include the language in the contracts for safety members for future use if needed. The City will not be offering the benefit at this time.

Resolution 2021-16, a resolution of intention was approved by Council at the July 20, 2021 meeting.

Financial Consideration(s):
None at this time.

Alternatives or Pros/Cons:
Pros:

- Consistency with non-safety members.

Cons:

- None noted.

Commission/Board Recommendation:

Not applicable

Staff Recommendation:

Staff Recommends the introduction and waive the first reading of Ordinance 2021-05.

Attachments:	Review:	Date:
☒ Resolution: 2021-16	☒ Asst. City Manager	08/13/2021
☒ Ordinance: 2021-05	☒ City Attorney	08/13/2021
☐ Map	☒ City Clerk	08/13/2021
☒ Contract	☒ City Manager	08/13/2021
☐ Other	☒ Finance	08/13/2021
List:		

ORDINANCE NO. 2021-05

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF LEMOORE AUTHORIZING AN AMENDMENT TO THE CONTRACT BETWEEN THE CITY COUNCIL OF THE CITY OF LEMOORE AND BOARD OF ADMINISTRATION OF THE CALIFORNIA PUBLIC EMPLOYEES' RETIREMENT SYSTEM

THE CITY COUNCIL OF THE CITY OF LEMOORE HEREBY DOES ORDAIN:

SECTION 1.

That an amendment to the contract between the City Council of the City of Lemoore and the Board of Administration, California Public Employees' Retirement System is hereby authorized, a copy of said amendment being attached hereto, marked Exhibit, and by such reference made a part hereof as though herein set out in full.

SECTION 2. TEXT

The Mayor of the City of Lemoore is hereby authorized, empowered, and directed to execute said amendment for and on behalf of said Agency.

SECTION 3.

If any provision of this ordinance is declared unlawful by a court of competent jurisdiction, the City Council intends that the remaining provisions of this ordinance remain in effect.

SECTION 4. EFFECTIVE DATE.

The ordinance codified herein shall take effect and be in full force and effect from and after thirty (30) days after its final passage and adoption. Within fifteen (15) days after its adoption, the ordinance codified herein, or a summary of the ordinance codified herein, shall be published once in a newspaper of general circulation.

* *

The foregoing Ordinance was introduced at a regular meeting of the City Council of the City of Lemoore held on the 17th day of August 2021 and was passed and adopted at a regular meeting of the City Council held on the 7th day of September, 2021 by the following vote:

AYES:

NOES:

ABSTAINING:

ABSENT:

ATTEST:	APPROVED:
______________________________	______________________________
Marisa Avalos, City Clerk	Stuart Lyons, Mayor

RESOLUTION NO. 2021-16

**RESOLUTION OF INTENTION
TO APPROVE AN AMENDMENT TO CONTRACT
BETWEEN THE
BOARD OF ADMINISTRATION
CALIFORNIA PUBLIC EMPLOYEES' RETIREMENT SYSTEM
AND THE
CITY COUNCIL
CITY OF LEMOORE**

WHEREAS, the Public Employees' Retirement Law permits the participation of public agencies and their employees in the Public Employees' Retirement System by the execution of a contract, and sets forth the procedure by which said public agencies may elect to subject themselves and their employees to amendments to said Law; and

WHEREAS, one of the steps in the procedures to amend this contract is the adoption by the governing body of the public agency of a resolution giving notice of its intention to approve an amendment to said contract, which resolution shall contain a summary of the change proposed in said contract; and

WHEREAS, the following is a statement of the proposed change:
To provide Section 20903 (Two-Years Additional Service Credit) for local police members.

NOW, THEREFORE, BE IT RESOLVED that the governing body of the above agency does hereby give notice of intention to approve an amendment to the contract between said public agency and the Board of Administration of the Public Employees' Retirement System, a copy of said amendment being attached hereto, as an "Exhibit" and by this reference made a part hereof.

PASSED AND ADOPTED by the City Council of the City of Lemoore at a regular meeting held on the 20th day of July 2021 by the following vote:

AYES: Gornick, Chaney, Orth, Lyons

NOES: None

ABSENT: Matthews

ABSTAIN: None

ATTEST:

Marisa Avalos

Marisa Avalos
City Clerk

APPROVED:

Stuart Lyons
Mayor

CalPERS

California Public Employees' Retirement System
Financial Office | Pension Contracts and Prefunding Programs Division
P.O. Box 942703, Sacramento, CA 94229-2703
888 CalPERS (or **888**-225-7377) | TTY: (877) 249-7442 | **www.calpers.ca.gov**

Certification of Governing Body's Action

I hereby certify that the foregoing is a true and correct copy of a Resolution adopted by the

City Council of the
(governing body)

City of Lemoore
(public agency)

on July 20, 2021.
(date)

CITY OF LEMOORE KINGS COUNTY
SEAL
CALIFORNIA

Marisa Avalos
Clerk/Secretary

City Clerk / Executive Assistant
Title

PERS-CON12 (rev. 1/22/19)

CalPERS

EXHIBIT

California
Public Employees' Retirement System

AMENDMENT TO CONTRACT

Between the Board of Administration California Public Employees' Retirement System and the City Council City of Lemoore

The Board of Administration, California Public Employees' Retirement System, hereinafter referred to as Board, and the governing body of the above public agency, hereinafter referred to as Public Agency, having entered into a contract effective July 1, 1958, and witnessed May 16, 1958, and as amended effective August 1, 1977, December 1, 1977, June 1, 1991, November 1, 1997, April 1, 2002 and April 21, 2004 which provides for participation of Public Agency in said System, Board and Public Agency hereby agree as follows:

A. Paragraphs 1 through 13 are hereby stricken from said contract as executed effective April 21, 2004, and hereby replaced by the following paragraphs numbered 1 through 17 inclusive:

1. All words and terms used herein which are defined in the Public Employees' Retirement Law shall have the meaning as defined therein unless otherwise specifically provided. "Normal retirement age" shall mean age 55 for classic local miscellaneous members, age 62 for new local miscellaneous members, age 55 for classic local fire members, age 50 for classic local police members and age 57 for new local safety members.

2. Public Agency shall participate in the Public Employees' Retirement System from and after July 1, 1958 making its employees as hereinafter provided, members of said System subject to all provisions of the Public Employees' Retirement Law except such as apply only on election of a contracting agency and are not provided for herein and to all amendments to said Law hereafter enacted except those, which by express provisions thereof, apply only on the election of a contracting agency.

3. Public Agency agrees to indemnify, defend and hold harmless the California Public Employees' Retirement System (CalPERS) and its trustees, agents and employees, the CalPERS Board of Administration, and the California Public Employees' Retirement Fund from any claims, demands, actions, losses, liabilities, damages, judgments, expenses and costs, including but not limited to interest, penalties and attorney fees that may arise as a result of any of the following:

   (a) Public Agency's election to provide retirement benefits, provisions or formulas under this Contract that are different than the retirement benefits, provisions or formulas provided under the Public Agency's prior non-CalPERS retirement program.

   (b) Any dispute, disagreement, claim, or proceeding (including without limitation arbitration, administrative hearing, or litigation) between Public Agency and its employees (or their representatives) which relates to Public Agency's election to amend this Contract to provide retirement benefits, provisions or formulas that are different than such employees' existing retirement benefits, provisions or formulas.

   (c) Public Agency's agreement with a third party other than CalPERS to provide retirement benefits, provisions, or formulas that are different than the retirement benefits, provisions or formulas provided under this Contract and provided for under the California Public Employees' Retirement Law.

4. Employees of Public Agency in the following classes shall become members of said Retirement System except such in each such class as are excluded by law or this agreement:

   a. Local Fire Fighters (herein referred to as local safety members);

   b. Local Police Officers (herein referred to as local safety members);

   c. Employees other than local safety members (herein referred to as local miscellaneous members).

5. In addition to the classes of employees excluded from membership by said Retirement Law, the following classes of employees shall not become members of said Retirement System:

NO ADDITIONAL EXCLUSIONS

6. The percentage of final compensation to be provided for each year of credited prior and current service as a classic local miscellaneous member shall be determined in accordance with Section 21354 of said Retirement Law subject to the reduction provided therein for Federal Social Security (2% at age 55 Modified).

7. The percentage of final compensation to be provided for each year of credited prior and current service as a new local miscellaneous member shall be determined in accordance with Section 7522.20 of said Retirement Law (2% at age 62 Supplemental to Federal Social Security).

8. The percentage of final compensation to be provided for each year of credited prior and current service as a classic local fire member shall be determined in accordance with Section 21369 of said Retirement Law subject to the reduction provided therein for Federal Social Security (2% at age 55 Modified).

9. The percentage of final compensation to be provided for each year of credited prior and current service as a new local fire member shall be determined in accordance with Section 7522.25(b) of said Retirement Law (2% at age 57 Supplemental to Federal Social Security).

10. The percentage of final compensation to be provided for each year of credited prior and current service as a classic local police member shall be determined in accordance with Section 21362 of said Retirement Law subject to the reduction provided therein for Federal Social Security (2% at age 50 Modified).

11. The percentage of final compensation to be provided for each year of credited prior and current service as a new local police member shall be determined in accordance with Section 7522.25(d) of said Retirement Law (2.7% at age 57 Supplemental to Federal Social Security).

12. Public Agency elected and elects to be subject to the following optional provisions:

    a. Section 20965 (Credit for Unused Sick Leave).

    b. Section 20903 (Two Years Additional Service Credit) for local miscellaneous members and local police members only.

13. Public Agency, in accordance with Government Code Section 20790, ceased to be an "employer" for purposes of Section 20834 effective on December 1, 1977. Accumulated contributions of Public Agency shall be fixed and determined as provided in Government Code Section 20834, and accumulated contributions thereafter shall be held by the Board as provided in Government Code Section 20834.

14. Public Agency shall contribute to said Retirement System the contributions determined by actuarial valuations of prior and future service liability with respect to local miscellaneous members and local safety members of said Retirement System.

15. Public Agency shall also contribute to said Retirement System as follows:

a. A reasonable amount, as fixed by the Board, payable in one installment within 60 days of date of contract to cover the costs of administering said System as it affects the employees of Public Agency, not including the costs of special valuations or of the periodic investigation and valuations required by law.

b. A reasonable amount, as fixed by the Board, payable in one installment as the occasions arise, to cover the costs of special valuations on account of employees of Public Agency, and costs of the periodic investigation and valuations required by law.

16. Contributions required of Public Agency and its employees shall be subject to adjustment by Board on account of amendments to the Public Employees' Retirement Law, and on account of the experience under the Retirement System as determined by the periodic investigation and valuation required by said Retirement Law.

17. Contributions required of Public Agency and its employees shall be paid by Public Agency to the Retirement System within fifteen days after the end of the period to which said contributions refer or as may be prescribed by Board regulation. If more or less than the correct amount of contributions is paid for any period, proper adjustment shall be made in connection with subsequent remittances. Adjustments on account of errors in contributions required of any employee may be made by direct payments between the employee and the Board.

B. This amendment shall be effective on the _____ day of _______________, _______.

BOARD OF ADMINISTRATION
PUBLIC EMPLOYEES' RETIREMENT SYSTEM

BY_________________________________
ANDY NGUYEN, ASSISTANT DIVISION CHIEF
PENSION CONTRACTS AND PREFUNDING
PROGRAMS DIVISION
PUBLIC EMPLOYEES' RETIREMENT SYSTEM

CITY COUNCIL
CITY OF LEMOORE

BY_________________________________
PRESIDING OFFICER

____
Witness Date

Attest:

____
Clerk

PLEASE DO NOT SIGN "EXHIBIT ONLY"

City of
LEMOORE
CALIFORNIA

711 West Cinnamon Drive ● Lemoore, California 93245 ● (559) 924-6744

Staff Report

Item No: 5-1

To: **Lemoore City Council**

From: **Nathan Olson, City Manager**

Date: **August 12, 2021** **Meeting Date:** **August 17, 2021**

Subject: **Resolution 2021-17 – To Review and Renew the Declaration of a Local Emergency and the Related Declarations and Orders Therein**

Strategic Initiative:

☐ Safe & Vibrant Community	☐ Growing & Dynamic Economy
☐ Fiscally Sound Government	☐ Operational Excellence
☐ Community & Neighborhood Livability	☐ Not Applicable

<u>Proposed Motion:</u>
Adopt Resolution 2021-17, to review and renew the declaration of a local emergency, and the related declarations and orders therein.

<u>Subject/Discussion:</u>
Resolution 2021-11 was adopted on June 28, 2021, ratifying the declaration of a local emergency.

Conditions of disaster or of extreme peril to the safety of persons and property arose within the City of Lemoore on June 21, 2021, caused by one of the water tanks located at the City's Station 7 Water Facility Complex failing, resulting in the loss of access to two storage tanks holding 1.5 million gallons of water each, and three active water wells ("Water Incident"), all of which is further described in the Director's Emergency Proclamation.

The City Manager acting as the Director proclaimed the existence of a Local Emergency within the City on June 22, 2021 and issued Emergency Orders effective immediately in accordance with the Local Emergency Proclamation.

The Resolution states that the local emergency shall be reviewed at least once every sixty (60) days, as required by law.

Financial Consideration(s):
Full fiscal impacts are unknown at this time.

Alternatives or Pros/Cons:
City Council could require that each decision be made by City Council, however, that option could lead to numerous issues including, but not limited to, untimely delays in protecting the safety of the public and property, additional monetary losses, ongoing OSHA involvement, as well as infringe upon the Council – Manager form of government, whereby the City Manager is responsible for decisions on day-to-day operations.

Staff Recommendation:
Approve Resolution 2021-17, to review and renew the declaration of a local emergency, and the related declarations and orders therein.

Attachments:		**Review:**	**Date:**
☒ Resolution:	2021-17	☒ Asst. City Manager	08/13/2021
☐ Ordinance:		☒ City Attorney	08/13/2021
☐ Map		☒ City Clerk	08/13/2021
☐ Contract		☒ City Manager	08/13/2021
☐ Other		☒ Finance	08/13/2021
List:			

RESOLUTION NO. 2021-17

A RESOLUTION OF THE LEMOORE CITY COUNCIL TO REVIEW AND RENEW THE DECLARATION OF A LOCAL EMERGENCY, AND THE RELATED DECLARATIONS AND ORDERS THEREIN.

WHEREAS, California Government Code section 8630 and Lemoore Municipal Code section 2-4-4 empowers the Director of Emergency Services ("Director") to proclaim a Local Emergency if the City Council is not in session, and requires that the City Council shall take action to ratify the Proclamation within seven (7) days thereafter; and

WHEREAS, conditions of disaster or of extreme peril to the safety of persons and property arose within the City of Lemoore on June 21, 2021, caused by one of the water tanks located at the City's Station 7 Water Facility Complex failing, resulting in the loss of access to two storage tanks holding 1.5 million gallons of water each, and three active water wells ("Water Incident"), all of which is further described in the Director's Emergency Proclamation (Attached hereto as **Exhibit A**); and

WHEREAS, the City Manager acting as the Director proclaimed the existence of a Local Emergency within the City on the 22nd day of June, 2021; and

WHEREAS, the City Council ratified and confirmed the Director's proclamation of the existence of a Local Emergency within the City on the 22nd day of June, 2021; and

WHEREAS, because of the Water Incident the City has been unable to provide full uninterrupted water service to City customers due to the decreased storage capacity at Station 7 Water Facility Complex and the method of treating the water currently required as a result of the Water Incident; and

WHEREAS, California Government Code section 8630 requires the City Council to review the need for continuing the Local Emergency at least once every sixty (60) days; and

WHEREAS, the City Council does hereby find that the above described conditions of disaster or of extreme peril have not abated, that because of the Water Incident the City is still unable to provide full uninterrupted water service to City customers, and that the existence of a Local Emergency continues within the City.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Lemoore as follows:

1. The Proclamation of Local Emergency Due to Critical Incident Involving City Water Facilities is hereby continued.
2. The following declarations, orders, and restrictions remain in place:
    a. Existing water restrictions remain in effect until rescinded.

b. Additional water restrictions will be issued as needed, including a daily limitation on gallons of usage per residence and business. The water restrictions may be based upon certain areas of the City. Any additional water restrictions shall take effect immediately upon issuance by the Director. The City Manager in consultation with the Public Works Director shall develop rules for implementation of any additional water restrictions.

c. The Director acting as the City Manager has authority to transfer funds as necessary to respond to the Local Emergency in all respects.

d. The Director may waive all local, State, and federal bidding and requests for proposal requirements prior to entering into contracts that the Director deems necessary to remedy the conditions relating to the Local Emergency. The Director shall make reasonably prudent business decisions under the circumstances.

e. No retail or wholesale business shall engage in charging more than the normal average retail price for any merchandise sold during the state of local emergency, including, but not limited to, specifically water (commonly referred to as price gouging). The average retail price as used herein is defined to be that price at which similar merchandise was being sold during the ninety (90) days immediately preceding the state of local emergency, or a mark-up that is not a larger percentage over wholesale cost than was being added to wholesale cost before the Local Emergency.

f. A copy of this Resolution continuing the Director's Emergency Proclamation, shall be forwarded to the Kings County Office of Emergency Services, as well as appropriate State and Federal agencies with the coordination of the Kings County Office of Emergency Services, for reimbursement under state and federal disaster assistance acts. The Director is hereby designated as the authorized representative for public assistance, and the Director shall receive, process, and coordinate all inquiries, filings, and requirements necessary to obtain available state and/or federal assistance to the City for coping with the Local Emergency.

3. The local emergency shall be reviewed at least once every sixty (60) days as required by law, and otherwise be deemed to continue to exist until its termination is proclaimed by the City Council of the City of Lemoore.

PASSED AND ADOPTED at a Special Meeting of the City Council of the City of Lemoore held on the 17th day of August 2021 by the following vote:

AYES:

NOES:

ABSTAINING:

ABSENT:

ATTEST:	APPROVED:
________________________	________________________
Marisa Avalos City Clerk	Stuart Lyons Mayor

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City of LEMOORE CALIFORNIA

711 West Cinnamon Drive ● Lemoore, California 93245 ● (559) 924-6700 ● Fax (559) 924-9003

Staff Report

Item No: 5-2

To: **Lemoore City Council**

From: **Frank Rivera, Public Works Director**

Date: **August 9, 2021** **Meeting Date:** **August 17, 2021**

Subject: **Resolution 2021-18 – Adopting the Water, Wastewater, and Storm Water Master Plans and authorize the filing of the Notice of Exemption (NOE) for CEQA**

Strategic Initiative:

☐ Safe & Vibrant Community	☐ Growing & Dynamic Economy
☐ Fiscally Sound Government	☐ Operational Excellence
☒ Community & Neighborhood Livability	☐ Not Applicable

Proposed Motion:

Approve Resolution 2021-18, adopting the water, wastewater and storm water master plans, and authorizing Staff to file the Notice of Exemption for CEQA.

Subject/Discussion:

On April 20, 2021 Jeff Cowart from QK presented the draft water, wastewater, and storm drain master plans to Council during a study session. The master plans presented assist in the long-term development of the City by evaluating current systems and planning for future infrastructure needs in order to provide resident and businesses with a comprehensive water system adequate for current and future demands.

If approved staff will come back at a later date with an update to the Development Impact Fee so they may include the approved projects that are related to future growth.

It has been determined that the plans are exempt from additional CEQA processes because they fall within the categorical exemption in Section 15061(b)(3) of the CEQA guidelines, which state that CEQA only applies to projects that have a "significant effect on the environment" as defined in Public Resources Code Section 21068 and Section 15382 of the CEQA guidelines, as being a substantial or potentially substantial, adverse change in the environment. Once approved staff will file the Notice of Exemption at the County Offices.

Financial Consideration(s):
None at this time.

Alternatives or Pros/Cons:
Alternative:
City Council may choose to deny approval of the Master Plans, however it would make it difficult for future development to determine if potential projects would have adequate infrastructure to support a build.

Commission/Board Recommendation:
Not Applicable

Staff Recommendation:
Staff recommends City Council approve Resolution 2021-18, adopting the water, wastewater, and storm drain master plans.

Attachments:	**Review:**	**Date:**
☒ Resolution: 2021-18	☒ Asst. City Manager	08/12/2021
☐ Ordinance:	☒ City Attorney	08/13/2021
☐ Map	☒ City Clerk	08/13/2021
☐ Contract	☒ City Manager	08/13/2021
☒ Other	☒ Finance	08/13/2021
List: Water Master Plan		
Wastewater Master Plan		
Storm Drain Master Plan		

RESOLUTION NO. 2021-18

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LEMOORE ADOPTING THE WATER, WASTEWATER, AND STORM DRAIN MASTER PLANS

WHEREAS, the City of Lemoore owns and operates public water, wastewater and storm water systems; and

WHEREAS, the City of Lemoore approved a contract with Quad Knopf in 2017 to develop water, wastewater, and storm water master plans; and

WHEREAS, the master plans assist in the long term development strategies by planning for infrastructure to sustain residents and businesses with a comprehensive water system that meets their current and future needs; and

WHEREAS, on April 20, 2021, Quad Knopf presented the final water, wastewater, and storm water plans to Council City; and

WHEREAS, it has been determined that these plans are exempt from additional CEQA processes because they fall within the categorical exemption in Section 15061(b)(3) of the CEQA guidelines, which state that CEQA only applies to projects that have a "significant effect on the environment" as defined in Public resources Code Section 21068 and Section 15382 of the CEQA guidelines, as being a substantial or potentially substantial, adverse change in the environment;

THEREFORE, the City Council of the City of Lemoore resolves, finds and determines as follows:

1. The recitals in this resolution, above, are true and correct.

2. The adoption of the water, wastewater, and storm water plan shall take effect immediately upon adoption of this resolution.

3. Pursuant to California Environmental Quality Act (CEQA), it has been determined that this project is exempt from additional CEQA processes because the proposed ordinance project falls within the categoric1. Pursuant to California Environmental Quality Act (CEQA), it has been determined that this project is exempt from additional CEQA processes because the proposed ordinance project falls within the categorical exemption in Section 15061(b)(3) of the CEQA Guidelines, which states that CEQA only applies to projects that have a "significant effect on the environment" as defined in Public Resources Code section 21068 and Section 15382 of the CEQA Guidelines, as being a substantial or potentially

substantial, adverse change in the environment. al exemption in Section 15061(b)(3) of the CEQA Guidelines, which states that CEQA only applies to projects that have a “significant effect on the environment” as defined in Public Resources Code section 21068 and Section 15382 of the CEQA Guidelines, as being a substantial or potentially substantial, adverse change in the environment.

4. The plans are consistent with the general plan goals, policies, and implementation programs

PASSED AND ADOPTED by the City Council of the City of Lemoore at a regular meetings held on the 17th day of August 2021 by the following vote:

AYES:

NOES:

ABSENT:

ABSTAIN:

ATTEST:	APPROVED:
______________________________	______________________________
Marisa Avalos City Clerk	Stuart Lyons Mayor

LEMOORE
CALIFORNIA

Water Master Plan

FINAL | FEBRUARY 2020

carollo
Engineers...Working Wonders With Water ®

LEMOORE
CALIFORNIA

City of Lemoore

WATER MASTER PLAN

FINAL | February 2020

Digitally signed by Eric T Casares
Contact Info: Carollo Engineers, Inc.
Date: 2020.02.27 15:43:40-08'00'

REGISTERED PROFESSIONAL ENGINEER
ERIC T. CASARES
No. 73351
CIVIL
STATE OF CALIFORNIA

Digitally signed by Ryan F. Orgill
Date: 2020.03.02 13:06:17-08'00'

REGISTERED PROFESSIONAL ENGINEER
RYAN F. ORGILL
No. 75802
CIVIL
STATE OF CALIFORNIA

Contents

Appendices

Tables

Figures

Abbreviations

AACE	Advancement of Cost Engineering
AWWA	American Water Works Association
ADD	average day demand
BO	buildout
CDPH	California Department of Public Health
Carollo	Carollo Engineers, Inc.
City	City of Lemoore
ENR CCI	Engineering News Record Construction Cost Index
EPA	Environmental Protection Agency
EPS	extended period simulation
fps	feet per second
ft	feet
GIS	geographic information system
gpcd	gallons per capita day
gpm	gallons per minute
GUI	graphical user interface
MDD	maximum day demand
MG	million gallons
mgd	million gallons per day
MMD	maximum month demand
PA	Planning Area
PHD	peak hour demand
PS	pump station
psi	pounds per square inch
QK	QK Incorporated
RO	reverse osmosis
SCADA	supervisory control and data acquisition
WDF	Water Duty Factors
WMP	Water Master Plan
WWMP	Wastewater Treatment and Collection System Master Plan
WWTP	wastewater treatment plant
WTP	water treatment plant

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EXECUTIVE SUMMARY

ES.1 Background

The City of Lemoore (City) contracted Carollo Engineers, Inc. (Carollo) and QK to develop a water master plan (WMP). The WMP identifies constraints within the existing water distribution system, provides recommendations, and prioritizes necessary improvements through the development of a capital improvement plan (CIP).

ES.2 Introduction

The City has not had a master plan completed for their water or wastewater systems. Recognizing the importance of developing an integrated approach to prioritizing water infrastructure upgrades, the City contracted Carollo and QK to identify constraints in the existing systems and recommend improvements.

ES.3 Study Area

The City's study area consists of two boundaries which are identified in the General Plan and defines the City's current and future limits. These boundaries include the City limits and Planning Area (PA). The City provides water distribution service to residents, businesses, industrial, and other institutions within City limits. The PA is land planned for long term growth and conservation. The total area of the water study includes approximately 19 square miles. Figure ES.1 shows the City's existing and future boundaries.

ES.4 Planning Horizon

This WMP is intended to serve as a guiding document for the planning and implementation of system improvements to accommodate future growth for the planning years of 2040 and Buildout. Population and land use are consistent with the City's planning outlined in the General Plan.

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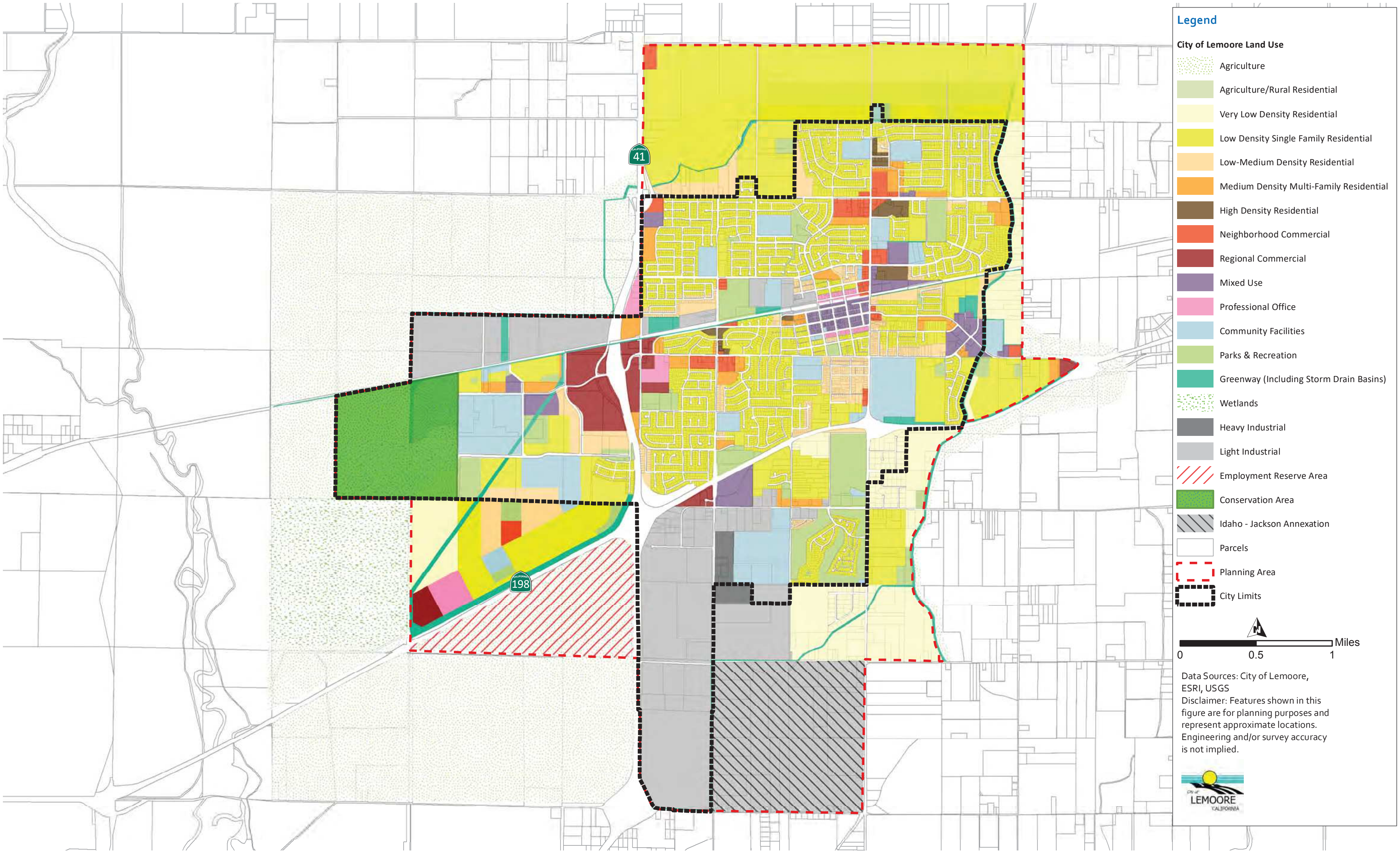

carollo
Last Revised: January 28, 2019|Carollo\Documents\Client\CA\Lemoore\10651A00\Data\GIS\Lemoore_Fig_2-1.mxd

Figure ES.1 General Plan Land Use

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ES.5 Population

Figure ES.2 shows the City's historic and projected population. According to the projected growth outlined in the General Plan, the City is projected to experience an annual growth rate of 0.9 percent. Table ES.1 shows the estimated growth for the City.

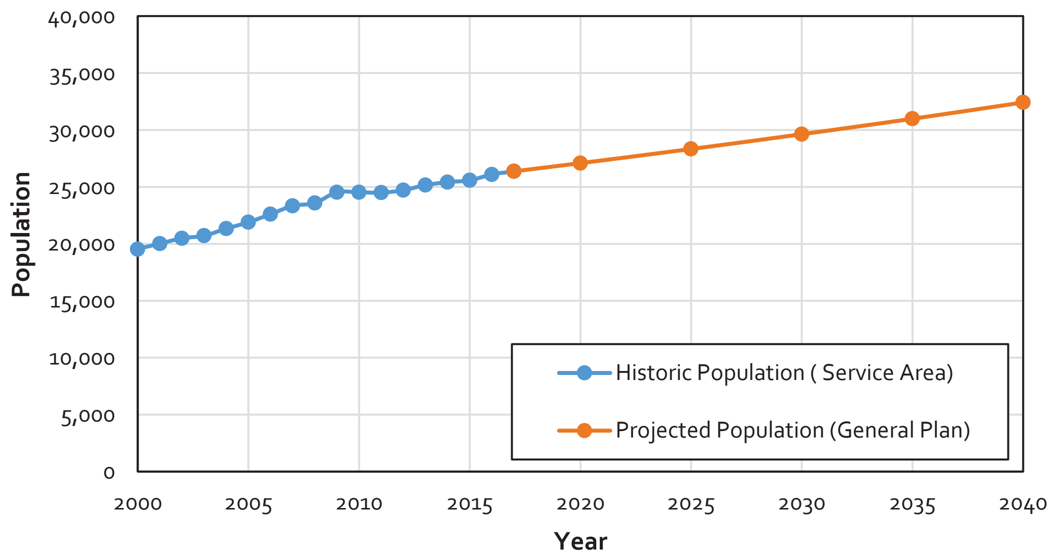

Figure ES.2 Citywide Historic and Projected Population

Table ES.1 Projected Population Growth

Year	Population	Net Increase	Growth from Previous Year
2017	26,369	276	1.06
2020	27,089	720	0.9
2025	28,332	1,244	0.9
2030	29,633	1,301	0.9
2035	30,993	1,360	0.9
2040	32,416	1,422	0.9

Notes:
(1) The General Plan estimates a total population of 32,416 by 2040. The growth rate is based on an average annual rate is based on an average annual rate from 2017 to 2040.

ES.6 Existing Water Distribution System

The existing water distribution system consists of approximately 120 miles of pipeline up to 18-inches in diameter, ten active wells, five storage tanks, and four booster pump stations. Figure ES.3 presents the City's existing water distribution system.

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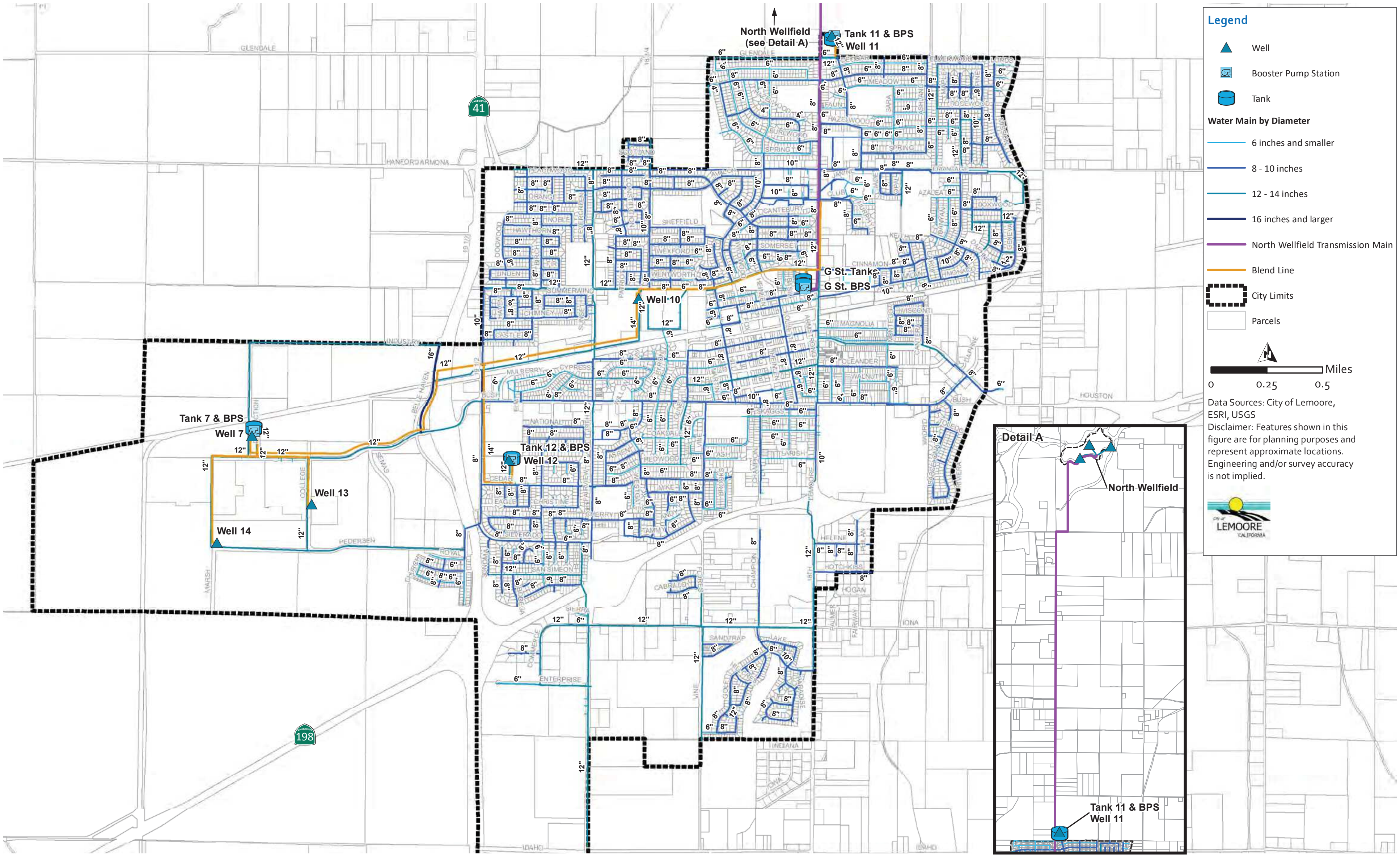

Figure ES.3 Existing Water Distribution System

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ES.7 Existing and Projected Average Daily and Maximum Daily Demands

The planning horizon for this WMP is 2040 and buildout, and according to the general plan the City's population is expected to increase to 32,416 by 2040.

Table ES.2 provides a summary of the City's existing, 2040, and build-out demand projections. As shown in Table ES.2, the City's ADD is projected to increase from an existing demand of 6.92 mgd to a 2040 demand of 8.3 mgd. By build-out, the projected ADD could approach roughly 15.78 mgd.

Table ES.2 Water Demand Projection Summary

Year	ADD (mgd)	MDD(1) (mgd)
Existing	6.92	13.50
2040	8.30	16.19
Buildout	15.78	30.78

Notes:
(1) MDD = 1.95 x ADD

ES.8 Water Distribution System Hydraulic Model

The City's water distribution system hydraulic model was developed using InfoWater, which was developed by Innovyze. The hydraulic model was constructed based on Geographic Information System (GIS) data, record drawings, and the direction of City staff. Operational data such as pump controls, tank dimensions, and other special features, were input manually into the model based on available information.

Allocation of water demands to appropriate nodes in the hydraulic model was accomplished by using geocoded water billing records from the City. The City's water distribution system hydraulic model was calibrated using a three step process that included a macro calibration, a fire flow calibration, and an EPS calibration. The calibrated model was used for the distribution system analysis presented in this WMP.

ES.9 Distribution System Capacity Analysis and Proposed Improvements

Following the model calibration, a capacity analysis of the existing and future distribution system was performed. The capacity analysis entailed identifying areas in the distribution system where pressures, pipeline velocities violate the established criteria. Additionally a fire flow analysis was performed. The evaluation criteria used for the analysis of the City's distribution system are summarized in Table ES.3.

The existing system analysis showed that 122 hydrants had residual pressures less than 20 psi under MDD plus fire flow conditions, and 14 pipelines exceeded the velocity criteria under PHD conditions. The analysis of the future system was performed in a manner similar to the existing system analysis. As part of the future system analysis, the planning year 2040 was evaluated. In addition, a preliminary analysis was performed to identify improvements under Build-Out PHD conditions. The future analysis also evaluated preliminary alignments for new development.

Table ES.3 Planning and Evaluation Criteria Summary

Description	Demand Condition	Value
Pipeline Velocity		
Existing Pipelines	PHD	8 ft/s
New Pipelines (≤ 12-inch diameter)	PHD	5 ft/s
New Pipelines (≥ 16-inch diameter)	PHD	4 ft/s
Pipeline Headloss		
Existing Pipelines	PHD	10 ft/kft
New Pipelines	PHD	5 ft/kft
System Pressures		
Minimum, without Fire Flow	PHD	35 psi
Minimum, with Fire Flow	MDD + FF	20 psi
Maximum, Normal Operating Conditions	ADD	80 psi
Storage Capacity		
Operational Storage	-	25% x ADD
Emergency Storage	-	50% x ADD
Fire Flow Storage	-	Max FF Demand x Duration
Supply Capacity		
Well Production Capacity	MDD	Meet MDD with Largest Two Wells Out of Service
Pump Station Capacity		
BPS Capacity	Greater of PHD or MDD+FF	Firm Pumping Capacity Sufficient to Meet Greater of PHD or MDD+FF
Fire Flow Requirements		
Land Use Type	Fire Flow Demand (gpm)	Duration (hours)
Single Family Residential	1,500	2
Multi-Family Residential	2,000	2
Commercial	3,000	3
Industrial	3,000	3
Olam/Leprino	4,000	4
Public/Institutional	3,000	3

Figure ES.4 illustrates the recommended improvements to mitigate the distribution system deficiencies under existing conditions while Figure ES.5 and Figure ES.6 shows future improvements. The following summarizes the improvements:

Existing System Improvements:

- Two well projects are recommended. The addition of Well 15 and Well 16 will each provide an additional 2.5 mgd supply for the existing system. These projects are already planned and funded.

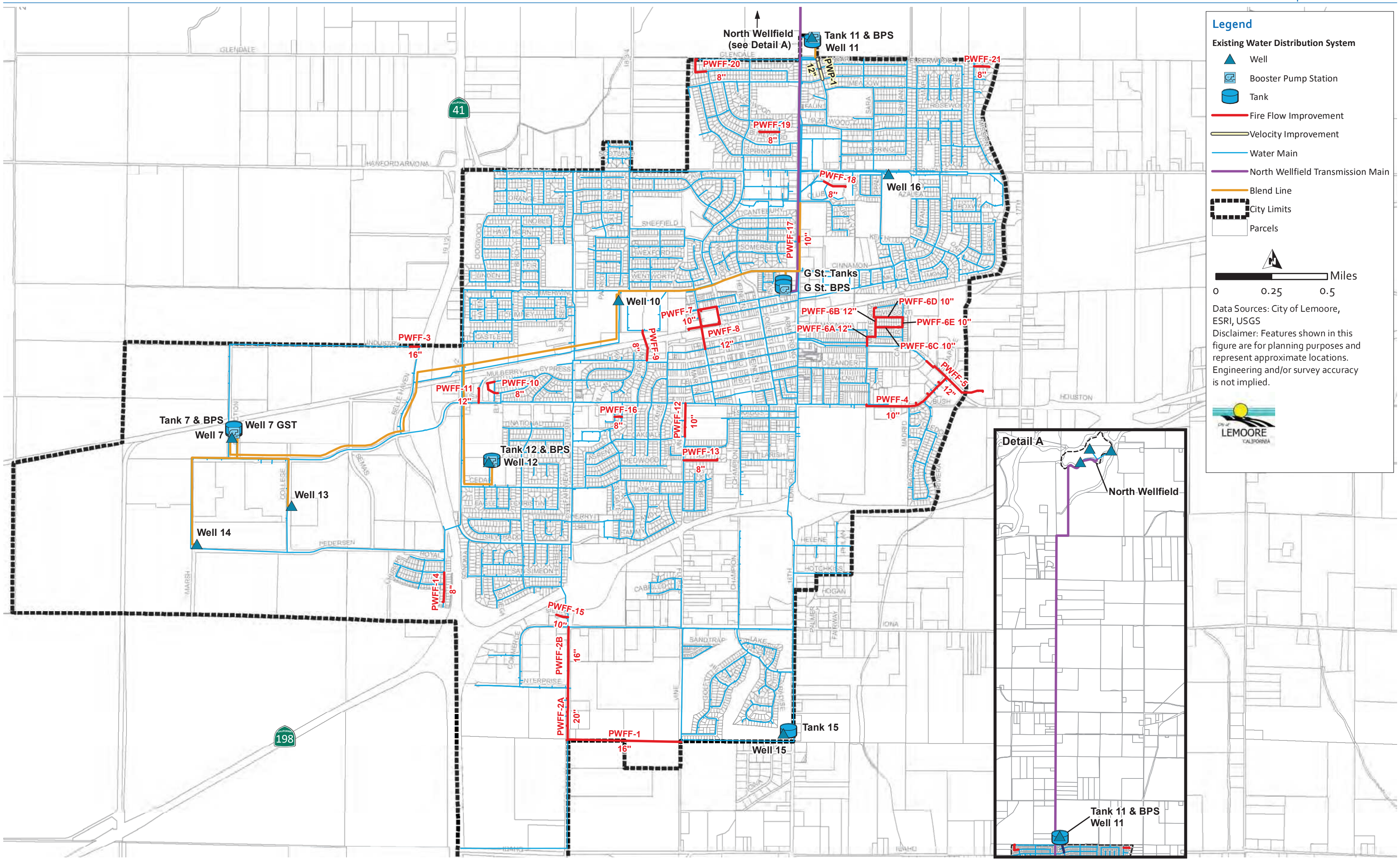

Figure ES.4 Existing System Improvements

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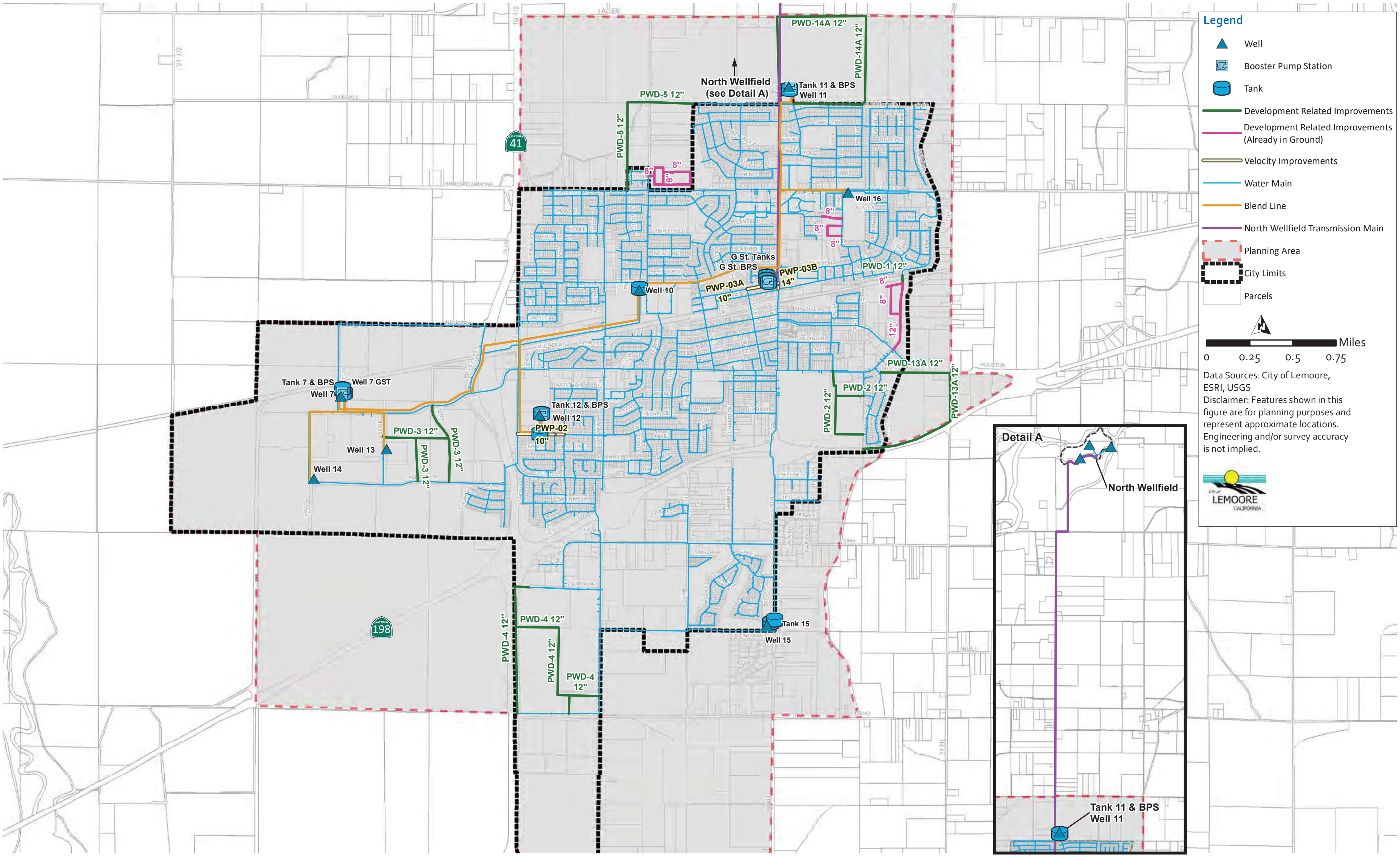

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Figure ES.5 2040 System Improvements

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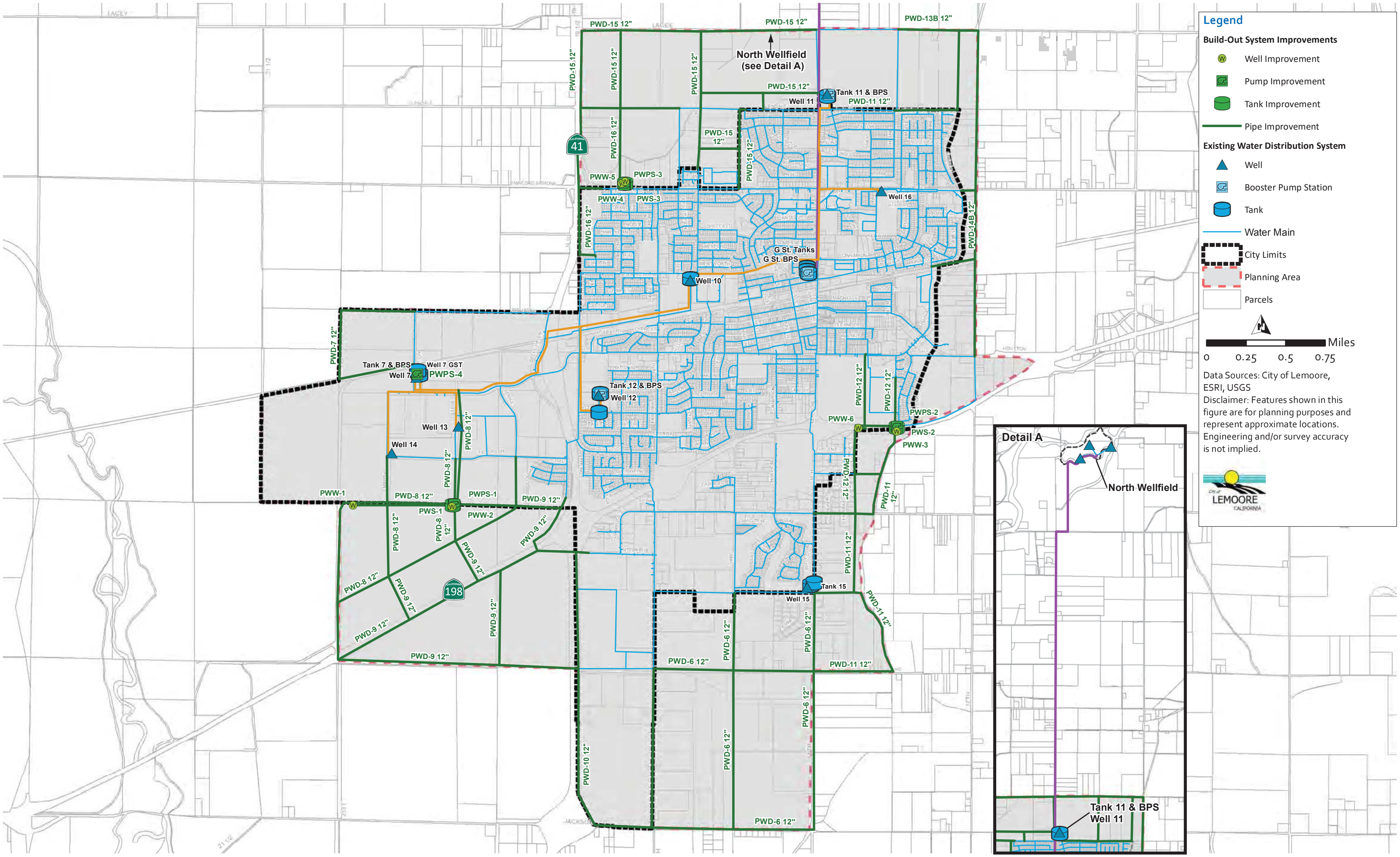

Figure ES.6 Buildout System Improvements

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- 21 fire flow improvement projects with a total length of 4 miles is recommended to mitigate the deficiencies.
- Two transmission/velocity improvements are recommended to mitigate capacity deficiencies. One of these projects is the North Wellfield Transmission Line replacement. This line is in poor condition and in need of replacement.

Future Capacity Improvements:

- Three transmission/velocity improvements are recommended to mitigate capacity deficiencies for year 2040.

New Service related Improvements

- A preliminary analysis recommends seventeen projects to serve future growth. The location of the new trunks are conceptual and should be refined as more data becomes available.
- A preliminary analysis recommends eight wells, four storage tanks, and four pump station improvements to serve future growth. The location of the lift stations are conceptual and should be refined as more data becomes available.

Other Projects

- Water Master Plan Update is recommended every 5-years to evaluate water distribution system.
- The City is currently in the process of designing Water Treatment Plan Projects for the Well 7 site and Well 11 site to address water quality issues throughout the system. This project is already funded.

ES.10 Capital Improvement Program

This Section presents the recommended capital improvement program (CIP) for the water distribution system. The proposed CIP presents improvement projects based on system evaluations described in Chapter 6.

The proposed capital improvements are prioritized bases on their urgency to mitigate existing deficiencies and condition issues and for serving future growth. The capital improvements were phased according to the following improvement categories:

- *Phase 1 (2019-2023):* This phase includes projects that are targeted as highest priority existing improvements.
- *Phase 2 (2024-2028):* This phase includes medium priority existing improvements.
- *Phase 3 (2029-2040):* This phase includes low priority existing improvements, as well as projects triggered by growth that is expected to occur by the year 2040.
- *Phase 4 (2041 and beyond):* This phase includes improvements related to ultimate buildout of the City.

Figure ES.7 illustrates the CIP cost summary by project type. As shown in Figure ES.7, development related projects account for the largest portion of capital improvement projects at 62 percent. Table ES. 4 provides a summary by phase and project type. Phase 1 improvements account for 9-percent ($10.0 million) of the total project cost, with Phase 4 having the largest cost share at 80-percent ($84.1 million).

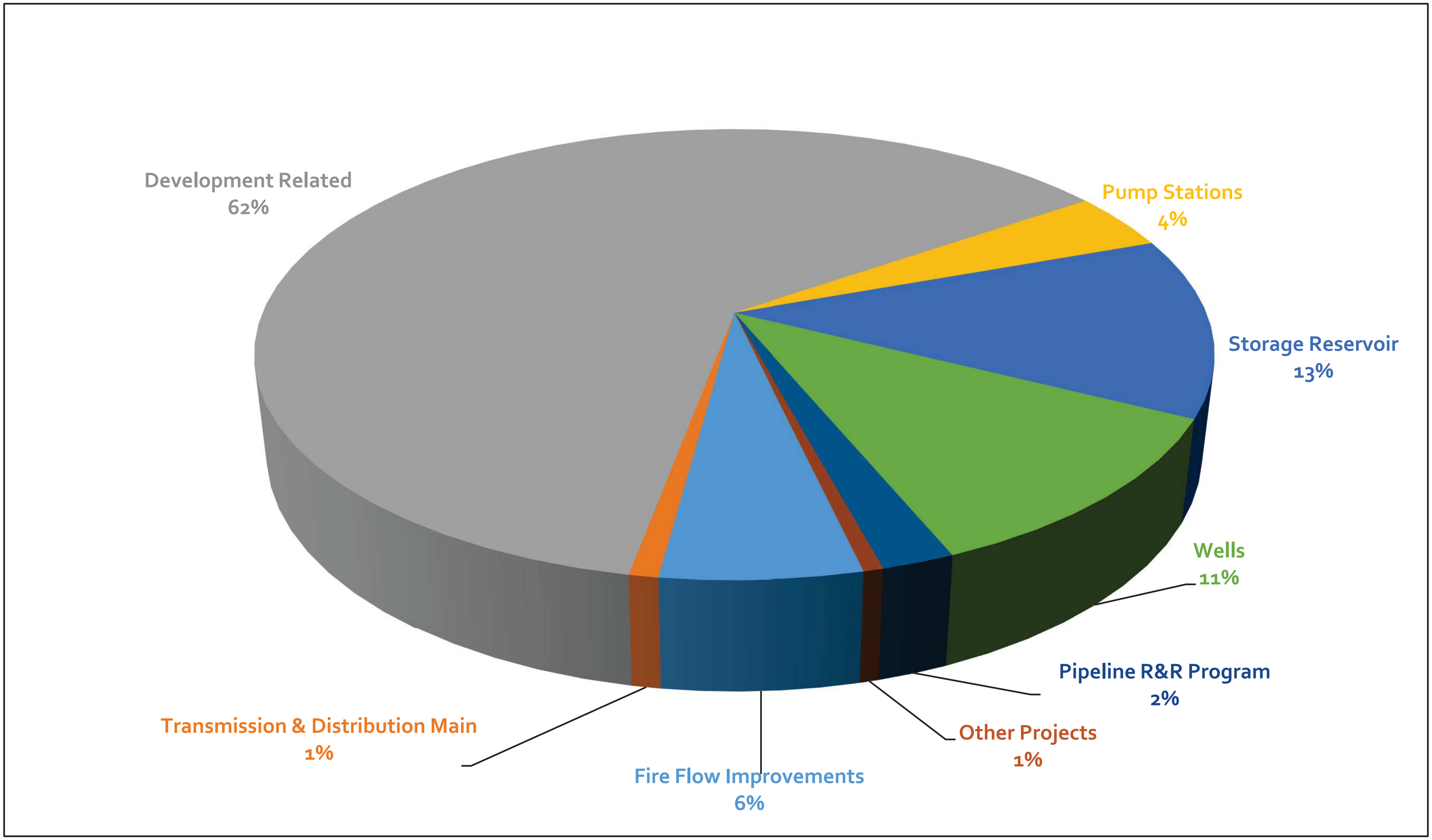

Figure ES.7 Project Cost Summary by Type

Table ES.4 CIP Cost by Project Type and Phase

Project Type	Phase 1 (2019-2023) ($)	Phase 2 (2024-2028) ($)	Phase 3 (2028-2040) ($)	Phase 4 (2041 & Beyond) ($)	Total ($)
Capacity/Storage Improvements					
Fire Flow Related	4,353,000	1,684,000	--	--	6,037,000
Pipeline Related	136,000	--	744,000	--	880,000
Development Related	4,836,000	--	7,081,000	54,117,000	66,034,000
Pump Stations	--	--	--	4,342,000	4,342,000
Storage Reservoir	--	--	--	13,674,000	13,674,000
Wells	--	--	--	11,970,000	11,970,000
Subtotal	9,325,000	1,684,000	7,825,000	84,103,000	102,937,000
Rehabilitation and Replacement Projects					
Pipeline R&R Program	500,000	500,000	1,200,000	--	2,200,000
Subtotal	500,000	500,000	1,200,000	--	2,200,000
Other Projects					
Other Projects	150,000	150,000	300,000	--	600,000
Subtotal	150,000	150,000	300,000	--	600,000
Total	**9,,975,000**	**2,334,000**	**9,325,000**	**84,103,000**	**105,737,000**

Notes:
(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

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Chapter 1

INTRODUCTION

The City of Lemoore (City) has retained the QK Incorporated (QK)/Carollo Engineers, Inc. (Carollo) team to prepare master plans for water, wastewater treatment and collection system, and storm drainage systems, with QK primarily responsible for the development of the Storm Drainage Master Plan, and Carollo responsible for the development of this Water Master Plan (WMP) as well as the Wastewater Treatment and Collection System Master Plan (WWMP). This chapter presents the purpose, objective, and background of the WMP.

1.1 Background

This WMP outlines the City's approach to optimizing water distribution, including the steps recommended to increase system reliability and to serve future users. Along with the system analysis, a financial plan that distributes cost according existing and future projects is provided to assist in funding.

1.2 City Location

The City is located in Kings County, California and resides in the heart of the agriculturally rich San Joaquin Valley. The City is located near the junction of Highway 41 and 198, which are the two major highways within the region (Figure 1.1).

The City, which was incorporated in 1900, provides water, sewer, and storm drainage service to its customers. Water service is provided to all residential, commercial, and industrial customers, and for fire protection services. The City limits compromise 8.5 square miles. The water service area encompasses the entire City limits. In addition, the City provides water service to Kings Christian School which is located just outside City limits to the east.

1.3 Water Distribution System Overview

The City provides water distribution to approximately 26,000 residents, industrial, and commercial users. The water distribution system consists of approximately 115 miles of active water pipelines, ranging from 1 to 18 inches, 10 active wells, 5 tanks, and 4 pump stations.

1.4 Goals and Objectives

The purpose of this WMP is to provide a planning document of the City's water distribution system. Overall, the WMP will assist the City in their approach to optimize their distribution system and facilities. The objectives of this WMP include:

1. Determine existing and buildout water demands.
2. Define planning and evaluation criteria for the City's water distribution system.
3. Identify capacity deficiencies in the distribution system under existing and buildout conditions.
4. Address regulatory requirements and develop strategies for future compliance.
5. Prepare a capital improvement plan (CIP) for the distribution system.

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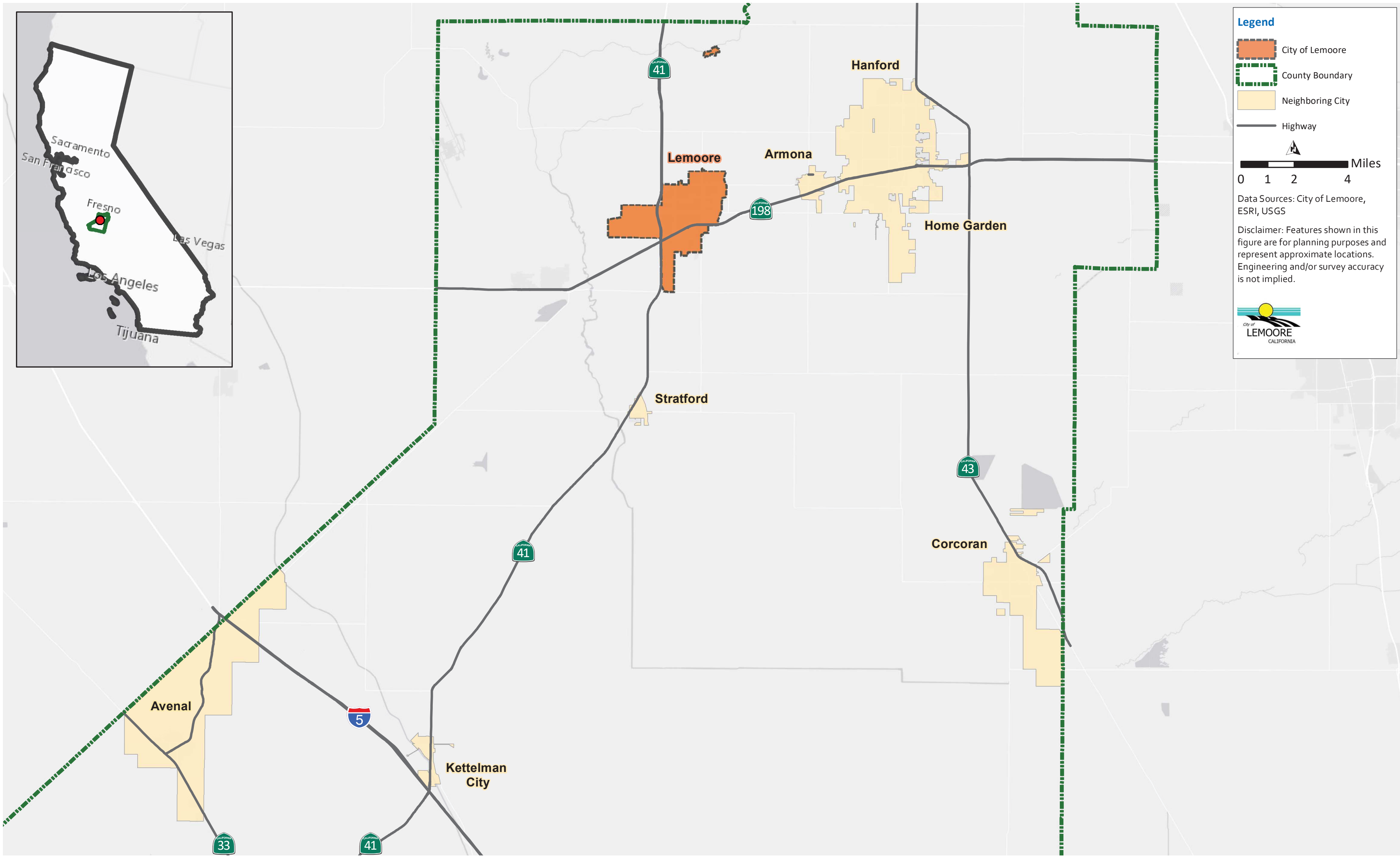

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Figure 1.1 Regional Location Map

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1.5 Report Organization

The Master Plan report contains seven chapters, followed by appendices that provide supporting documentation for the information presented in the report. The chapters are briefly described below:

- *Chapter 1 - Introduction.* This chapter presents a brief summary of the City's water distribution system service area, the need for this Master Plan, and the objectives of the study.
- *Chapter 2 - Land Use and Population.* This chapter presents a discussion of the City's planning area characteristics, land use classifications, and historical and projected population trends. Planned developments and information obtained on build-out land use will be discussed. The planning assumptions described in this chapter form the basis for the demand projections included in Chapter 3.
- *Chapter 3 – Existing Distribution System.* This chapter summarizes the City's existing water distribution system infrastructure, including the WTP, booster pump stations, pressure zones, storage tanks, PRV stations, and water mains.
- *Chapter 4 - Water Demands.* This chapter summarizes the City's historical water consumption and production records used to determine the daily, monthly, and seasonal fluctuations experienced by the water system. Also summarized are the average Water Duty Factors (WDFs), peaking factors, and the projected demands through the year 2036 and ultimate build-out of the City limits.
- *Chapter 5 - Water Distribution System Hydraulic Model.* This chapter also describes the development and calibration of the City's water distribution system hydraulic model.
- *Chapter 6 - Planning and Evaluation Criteria and System Analysis.* This chapter presents the planning criteria that were used to evaluate the existing water distribution system to size future improvements and expansions. This chapter also discusses the hydraulic evaluation of the water distribution system and the proposed projects that correct capacity deficiencies and serve future users
- *Chapter 7 - Capital Improvement Plan.* This chapter presents the capital improvement projects, a summary of the capital costs, and a basic assessment of the possible financial impacts on the City. This chapter presents the recommended CIP for the City and a summary of the capital costs.

1.6 Acknowledgements

We would like to thank the following City staff for their assistance and oversight of this project:

- Nate Olson; City Manager
- John Souza; Utilities Manager
- Frank Rivera; Interim Public Works Director
- Rick Joyner, P.E.; City Engineer (QK)

The following Carollo staff members were principally involved in this project:

- Eric Casares, P.E.; Principal In Charge
- Ryan Orgill, P.E.; Project Engineer
- Tim Loper, P.E.; Quality Management
- Grace Mitzel; Staff Engineer
- Riley Powers, GIS/Graphics
- Candice Padilla/Stephanie McLaury; Document Processing

Chapter 2

STUDY AREA, LAND USE, AND POPULATION

This chapter outlines the planning area for the water distribution system, defines land use classifications, and describes planned development within the City of Lemoore's (City's) service area. A summary of historical population trends, and population projections are presented in this chapter.

2.1 Study Area

The City's study area consists of two boundaries which are identified in the General Plan and defines the City's current and future limits. These boundaries include the City limits and Planning Area (PA). The City provides water service to residents, businesses, industrial, and other institutions within City limits. The PA is land planned for long term growth and conservation. The total area of the water study includes approximately 14.4 square miles. Figure 2.1 shows the City's existing and future boundaries.

2.2 Planning Horizon

This WMP is intended to serve as a guiding document for the planning and implementation of water system improvements to accommodate future growth for the planning years of 2040 and Buildout. The population and land use projections included in the City's General Plan Update are summarized in this chapter, and set the foundation for the demand projections and water system infrastructure requirements identified in this Master Plan.

2.3 Climate and Topography

The City's climate is characterized by hot dry summers and mild winters with an average annual rainfall of approximately 8.38 inches. Approximately 80 percent of the average annual precipitation occurs between November and March. The winter months are characterized by dense Tule fog. Table 2.1 summarizes the study area climate. The City's elevation ranges from approximately 213 feet above sea level in the southwestern portion of the City to approximately 236 feet above sea level in the northeast corner of the City.

2.4 Land Use

Land use information is an integral component in determining the water demand within a given service area. The type of land use in an area will affect the volume and character of the water demand. Adequately estimating water demands from various land use types is important in sizing and maintaining effective water system facilities.

The City is currently in the process of updating their General Plan (General Plan Update). The land use plan used for this WMP is based on planning assumptions provided by QK Incorporated (QK) and the City.

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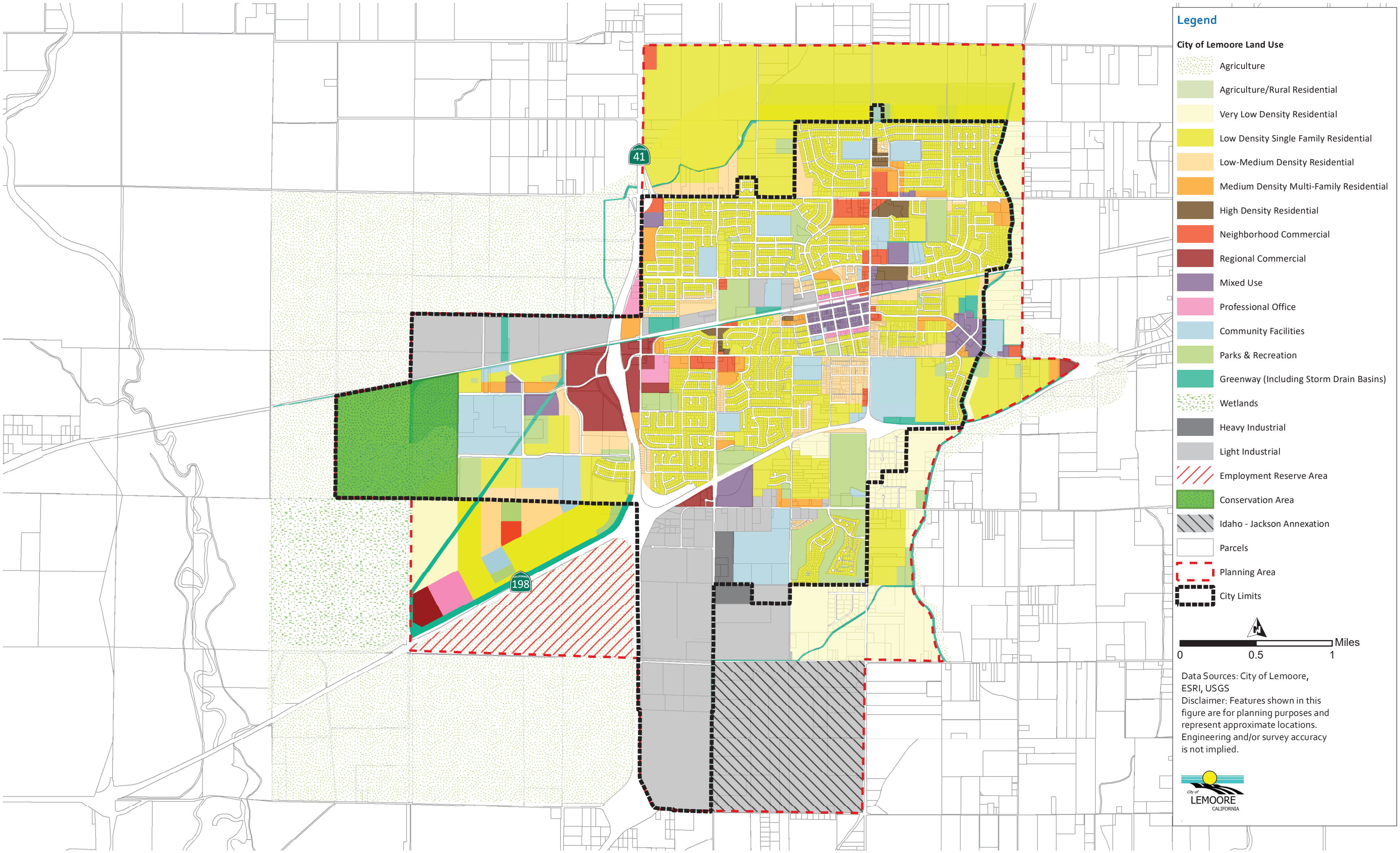

Figure 2.1 General Plan Land Use

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Table 2.1 Study Area Climate

Month	Average Temperature(1) (ºF)		Monthly Average ETo(2)	Average Total Precipitation(1)
	Min.	Max.	(inches)	(inches)
January	35.2	54.7	1.19	1.54
February	38.6	61.9	2.14	1.42
March	42.1	67.5	4.11	1.21
April	46.4	74.9	6.06	0.50
May	52.5	83.6	8.16	0.30
June	58.3	91.4	8.97	0.05
July	62.5	97.8	9.04	0.05
August	60.4	96.1	8.12	0.06
September	55.5	90.5	6.18	0.12
October	47.4	80.0	4.09	0.67
November	38.8	66.2	2.12	0.49
December	34.6	55.4	1.16	1.27
Avgerage or Total	47.7	76.7	61.34	7.69

Notes:
(1) Source: Western Regional Climate Center Hanford (043747). Represents monthly average from July 1899 to June 2016.
(2) Source: California Irrigation Management Information System (CIMIS) Station 15 Stratford. Represents monthly average ETo from November 1982 to August 2017.

2.4.1 Existing Service Area Land Use

The City provides water distribution service to residents, businesses, and other institutions within its City limits. Figure 2.1 shows the City's existing land use within in the City's service area. Table 2.2 provides a summary, by land use, of the amount of developed and developable land within the study area.

Table 2.2 Study Area Land Use

Land Use Category	Land Use Category			
	Developed	Developed	Vacant	Developed
Residential				
Very Low Density	39	0	20	59
Low Density Single Family	1,278	15	281	1,574
Low Medium Density	167	0	98	265
Medium Density	102	0	40	142
High Density	43	0	0	43
Commercial/Industrial				
Mixed-Use	55	6	96	157
Professional Office	11	15	2	28
Neighborhood Commercial	57	6	18	81
Regional Commercial	17	10	125	152
Light Industrial(1)	132	23	573	728
Heavy Industrial	22	0	5	27
Employment Reserve	0	0	0	0
Significant Industrial User(2)	144	22	34	200
Other				
Community Facilities	370	15	101	486
Parks/Recreation	264	0	73	337
Greenway/Detention Basin	19	22	61	93
Wetlands	0	173	0	173
Agriculture	0	0	0	0
Agriculture/Rural Residential	0	0	0	0
Conservation	0	0	382	382
Total	2,711	134	1,909	4,754

Notes:
(1) Does not include Leprino, Olam, and Agusa.
(2) Consists of Leprino, Olam, and Agusa

As shown in Table 2.2, there are approximately 2,711 acres of developed land within the City limits (excluding right-of –ways such as streets, highways, and railroads). Of the 2,711 developed acres, 1,629 acres (60-percent) are classified as residential, 438 acres (16-percent) are classified as commercial/industrial, and the remaining 644 acres (24-percent) are associated with community facilities, parks/recreation, greenway/detention basins, wetlands, or agriculture/rural residential. Leprino, Olam, and Agusa are separated into their own category because they attribute a large amount of water usage compared to the other light industrial users.

2.4.2 Known Development

The City has plans for development of new residential communities, infill, and redevelopment of existing land. As shown in Table 2.3, the City has currently identified sixteen residential and nine multi-purpose developments. These developments are assumed to be fully developed by planning year 2040. The number of units and area of each planned development is summarized in Table 2.3, while the location of each development is shown on Figure 2.2. The known developments are expected to result in 909 new residential units.

Known development data was obtained from the City's website under the Planning Commission Agendas for years 2018, 2017, and 2016. In addition, the City has a map of "Approved Subdivisions".

2.4.3 Future Land Use

Future land use includes the development of vacant or underdeveloped areas not defined as known development. This includes growth outside the current City limits and encompassed by the Planning Area. It is assumed that development and redevelopment will occur according to the land use designations as depicted on Figure 2.1.

Build-out is defined as development of all land including the Planning Area of the City. At build-out, the service area will encompass approximately 14.4 square miles (excluding wetlands and agriculture). The City has expressed interest in providing service to the area south of Idaho Avenue. As shown on Figure 2.1, this annexation covers approximately 645 acres and is considered light industrial.

2.5 Population

This section summarizes the historical population trends, existing, and projected population.

2.5.1 Historical and Existing Population

Historical population estimates from the Department of Finance from years 1996 through 2017 are presented in Table 2.4 and depicted on Figure 2.3. As of 2017, the total existing population within the City's boundaries was estimated at 26,369 people. From 1997 to 2017 (20 years) the growth rate for the city has averaged 2.12-percent. With 2010 and 2011 excluded (negative growth), the City has experienced a 2.4 percent growth.

Table 2.3 Known Development

Tract/SPR	Subdivision/Developer	Land Use	Residential Units	Size (Acres)
Residential				
781	Silva Estates Patio Homes	Multi-Family	30	4
793	Silva Estates	Single/Multi Family	42	18
797	Park View Estates	Single Family	90	18
816	Holly Oaks	Single Family	28	18
820	Fairway Courtyard	Multi-Family	39	3
827	Park Meadows	Single Family	20	6
839	G.J Gardner	Single Family	37	9
845	Victory Village	Single Family	51	14
908	Capistrano V	Single Family	20	0.3
920	Lennar Homes	Single Family	172	40
921	Woodside Homes	Single Family	64	20
2018-04	Cinnamon Villas	Single Family	28	2
2017-08	Granville Homes	Multi-Family	141	9
2009-01	Village at Acacia	Multi-Family	81	7
2006-20	Oleander Terrace	Multi-Family	66	5
-	Lennar West (2)	Mixed-Use	-	32
-	Rugman (2)	Multi-Family	-	10.9
-	Lacy Ranch	Single Family	220	155
-	17th Avenue	Single Family	-	135
-	Lemoore Mobile Home Park	Multi-Family	70	10
Subtotal		-	1,199	435
Community Facilities				
2017-09	Last Days Ministries	Community Facility	-	2
Industrial/ Commercial				
-	Dollar General	Neighborhood Commercial	-	2
2017-06	Virgil Beard	Light Industry	-	3.8
2015-03	Fast and Friendly Market	Regional Commercial	-	1
2016-01	PG&E	Light Industrial	-	12
2018-08	Kashian Industrial	Light Industrial	-	80
-	Rodriguez	Light Industrial	-	0.6
-	Immediate Care Facility	Regional Commercial	-	9
-	Rugman	Mixed Use	-	4.6
Subtotal		-	-	115
Total		**NA**	**1,199**	**550**

Notes:
(1) SPR – Site Plan Review.
(2) Housing units for development is unknown.

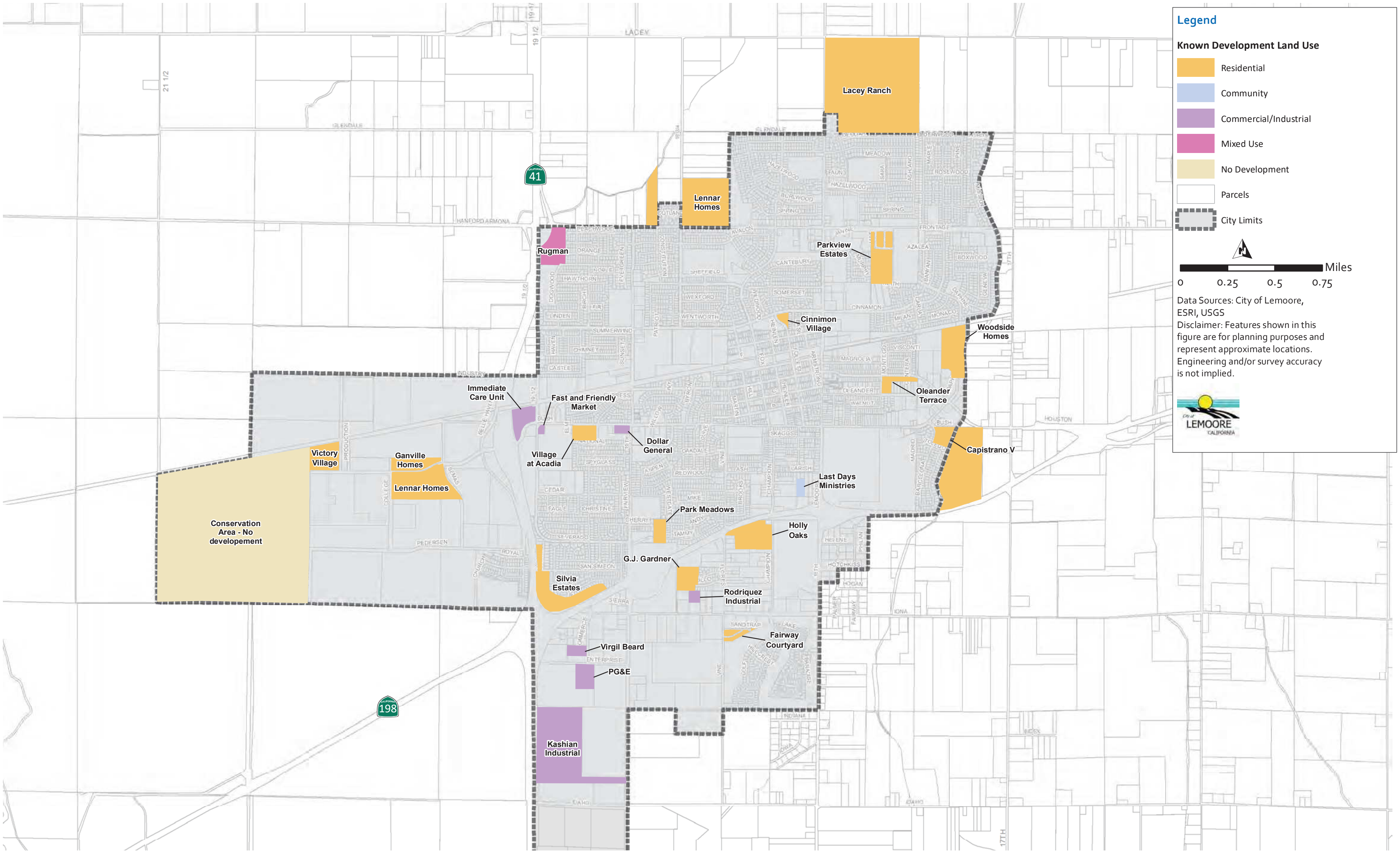

Figure 2.2 Known Development

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Table 2.4 Historical Population

Year	Population[(1)]	Net Increase	Growth from Previous Year
1996	16,550	-	-
1997	17,358	808	4.88%
1998	18,108	750	4.32%
1999	18,804	696	3.84%
2000	19,525	721	3.83%
2001	20,021	496	2.54%
2002	20,487	466	2.33%
2003	20,714	227	1.11%
2004	21,340	626	3.02%
2005	21,893	553	2.59%
2006	22,607	714	3.26%
2007	23,331	724	3.20%
2008	23,589	258	1.11%
2009	24,531	942	3.99%
2010	24,531	0	0.00%
2011	24,493	-38	-0.15%
2012	24,711	218	0.89%
2013	25,163	452	1.83%
2014	25,418	255	1.01%
2015	25,585	167	0.66%
2016	26,093	508	1.99%
2017	26,369	276	1.06%
20 Year Average Growth			**2.12%**
20 year Average Growth Excluding Negative and No Growth			**2.37%**

Notes:
(1) Source: California Department of Finance

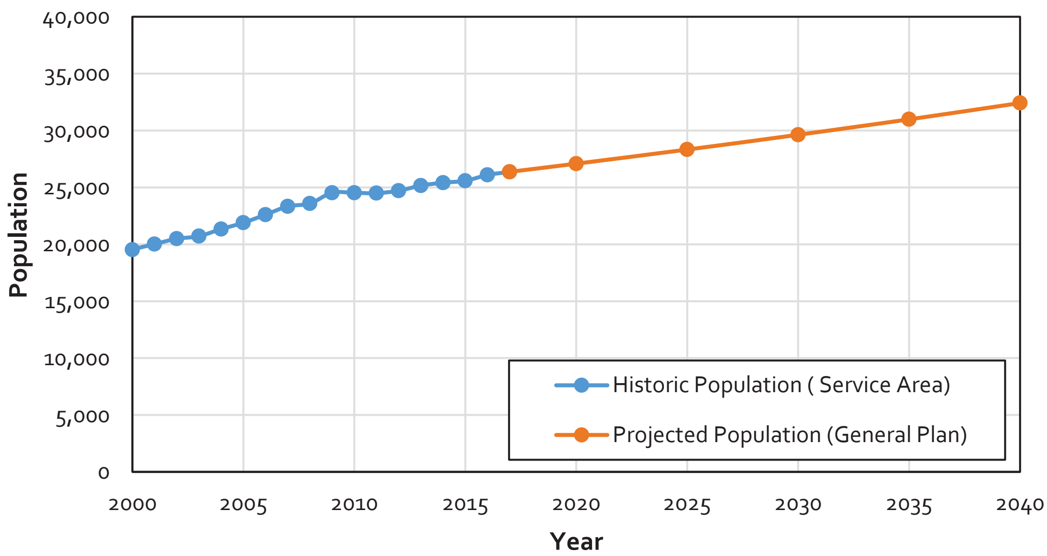

Figure 2.3 Citywide Historic and Projected Population

2.5.2 Projected Population

Figure 2.3 shows the population according to projected growth outlined in the General Plan. Overall, this WMP utilizes the growth projected in the General Plan. The projected population growth is summarized in Table 2.5. As shown in Table 2.5, the City is projected to experience an annual growth rate of 0.9-percent.

Table 2.5 Projected Population

Year	Projected Population	Net Increase	Growth from Previous Year
2017	26,369	276	1.06%
2020	27,089	720	0.9%
2025	28,332	1,244	0.9%
2030	29,633	1,301	0.9%
2035	30,993	1,360	0.9%
2040	32,416	1,422	0.9%

Notes:
(1) The General Plan estimates a total population of 32,416 by 2040. The growth rate is based on an average annual rate from 2017 to 2040.

Chapter 3

EXISTING DISTRIBUTION SYSTEM

This chapter summarizes the City of Lemoore's (City's) existing distribution system infrastructure, including the booster pump stations, storage tanks, and water mains.

3.1 Existing Water Distribution System

This section presents and overview of the City's existing water distribution system, water supply, storage, and pumping facilities as shown on Figure 3.1. Figure 3.2 provides a schematic representation of how water is currently supplied to the water distribution system.

3.1.1 Water Supply

The City's sole source of water is from wells located throughout the distribution system. Water from these wells are pumped into the City's existing storage tanks, and then pumped into the system. There are a total of ten active wells throughout the system. Of the ten active wells, one is seasonal, one is emergency, and one is a backup well. The total well pumping capacity is 13,150 gallons per minute (gpm). Of the City's ten active wells, seven are located within the City (In-Town) and three are located in the "North Wellfield" located approximately 5 miles north of the City limits. Table 3.1 summarizes the current capacities of the City's active groundwater wells.

Table 3.1 Existing Groundwater Well Summary

Well Name	Current Status	Well Capacity (gpm)
	North Wellfield	
Well 2	Inactive	--
Well 3	Abandoned	--
Well 4	Active	1,850
Well 5	Active	1,850
Well 6	Active	1,100
	In-Town Wells	
Well 7	Active	1,200
Well 8	Abandoned	--
Well 9	Emergency	1,200
Well 10	Seasonal	2,000
Well 11	Active	800
Well 12	Backup	1,150
Well 13	Active	1,000
Well 14	Active	1,000
Total	**--**	**13,150**

The City has had challenges with their drinking water supply due to poor water quality from the City wells. Elevated levels of ammonia, arsenic, color, iron, and TOC have been observed in many of the City's wells. The high levels of TOC are of particular interest because the City has recently been out of compliance with Disinfection by-product (DBP) standards. The City currently deals with the challenging well water quality through a blended water transmission system which allows water from different wells to be transferred to various water storage reservoirs. Blending of the water quality has not been sufficient to meet drinking water quality. The City has looked into treatment options for meeting drinking water quality standards. In 2016, the City selected AdEdge Water Technologies, LLC (AdEdge) to conduct a pilot study in order to develop a treatment scheme for treating water from the City's wells. AdEdge performed several phases of a pilot study in 2016 – 2017 and developed a treatment scheme for meeting drinking water quality standards. The completion of water treatment pilot study and development of an efficacious treatment approach by AdEdge led the City to move forward with design of the selected treatment approach, which is currently being designed by Carollo.

3.1.2 Transmission and Distribution System

The City's distribution system consists of approximately 120 miles of pipeline up to 18-inches in diameter. This section describes the distribution of pipelines by diameter, material, age, and pressure zone. Figure 3.1 shows a map of the existing distribution system with pipe diameters and alignments. The information presented on Figure 3.1 was developed based on a review and analysis of the City's most recent water system geographic information system (GIS) database.

Table 3.2 provides a breakdown of the water distribution system by diameter, excluding laterals. This information is also presented graphically in Figure 3.3. As shown in Table 3.2 and Figure 3.3, roughly 67 percent of the City's distribution system is 8-inch in diameter or smaller. About 27 percent of the system ranges from is 10-inch to 14-inch in diameter, and approximately 6 percent of the system is 16-inch in diameter and larger.

The City has two major transmission mains that convey water between well and tank sites before it is pumped into the water distribution system, as described below:

- *North Wellfield Transmission Line:* The North Wellfield Transmission Line is an 18-inch diameter transmission main. It is roughly 6 miles long and conveys well water from the North Wellfield to either Tank 11 or the G Street Tanks. City staff have reported that the North Wellfield Transmission Line is in poor condition and in need of replacement. Currently, City staff limits the amount of water pumped through this line to reduce the risk of a transmission line failure.
- *Blend Line:* The Blend Line is approximately 6.3 miles long, and ranges in diameter from 12-inches to 14-inches. The purpose of the Blend Line is to move water between Tank 11, the G Street Tanks, Tank 12, and Tank 7 for water quality blending purposes. Figure 3.2 shows how the Blend Line is connected to the City's transmission system.

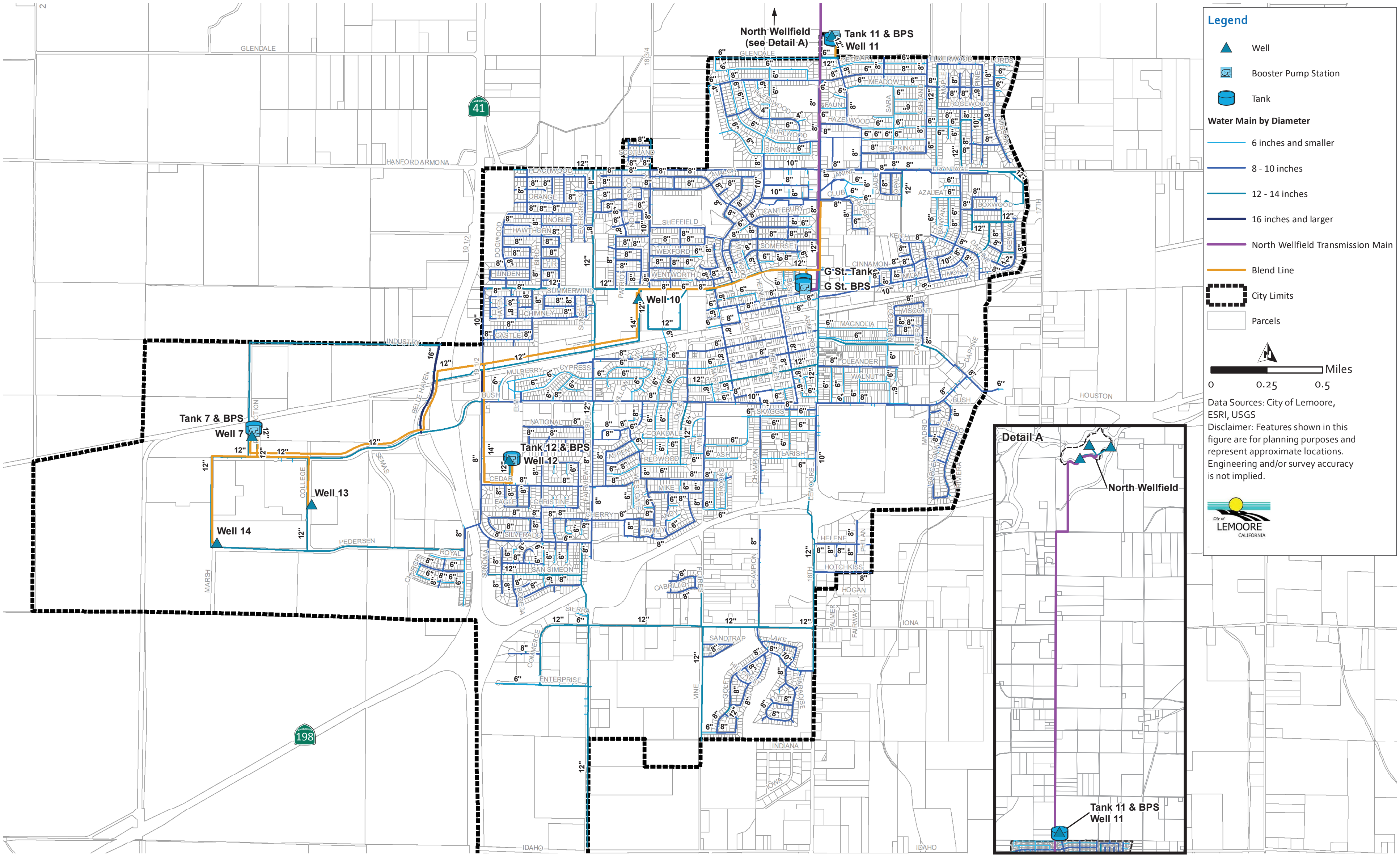

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Figure 3.1 Existing Water Distribution System

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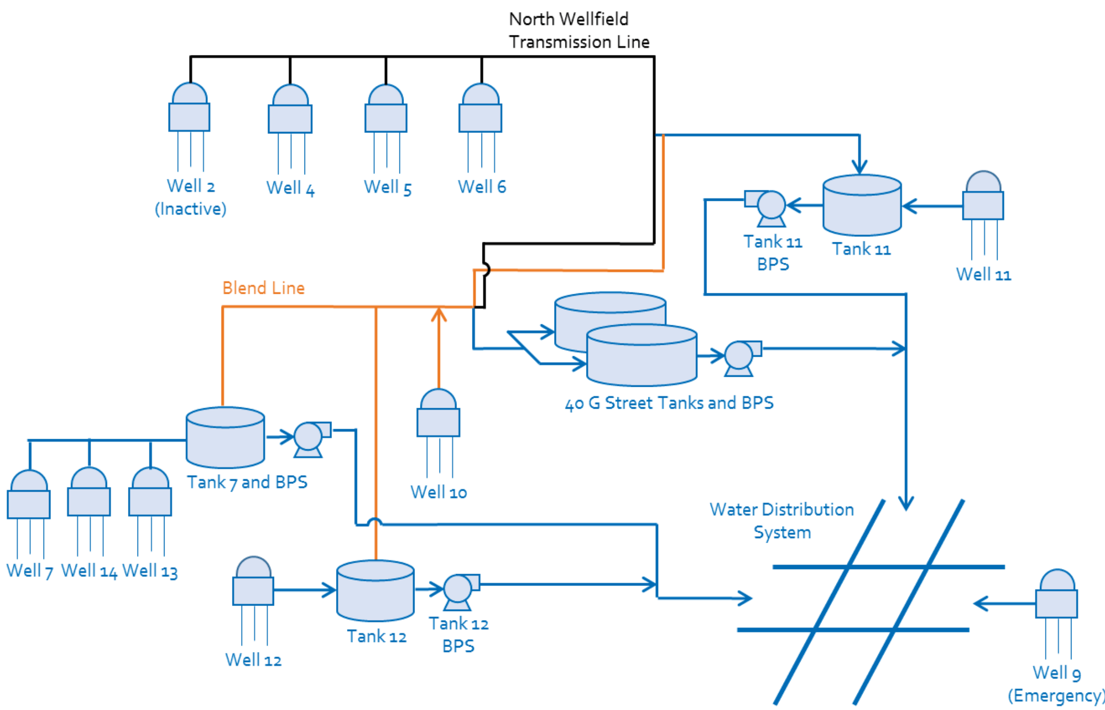

Figure 3.2 Existing Water Distribution System Schematic

Table 3.2 Existing System Pipeline Summary, by Diameter

Diameter (inches)	Length (1)(2) (feet)	Length (miles)	Percent of System
<6	1,000	0.2	0.2
6	127,200	24.1	20.9
8	278,600	52.8	45.8
10	25,800	4.9	4.2
12	131,300	24.9	21.6
14	10,500	2	1.7
16	2,200	0.4	0.3
18	32,800	6.2	5.4
Total	609,400	115.4	100

Notes:
(1) Source: City of Lemoore GIS database.
(2) Does not include laterals.

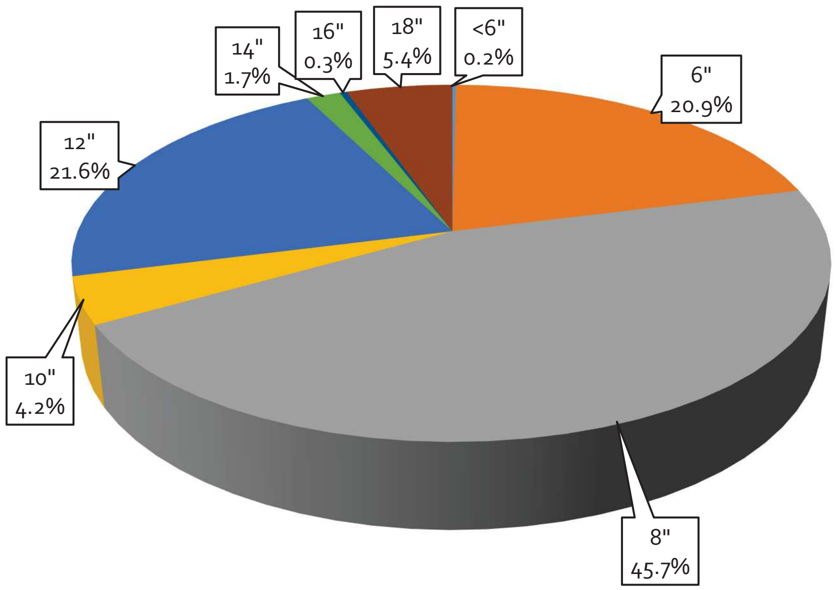

Figure 3.3 Existing System Pipeline Summary, by Diameter

3.1.3 Storage Tanks

Water distribution systems rely on stored water to help equalize daily fluctuations between supply and demand, to supply sufficient water for firefighting, and to meet demands during an emergency or an unplanned outage of a major source of supply.

The City's water system has five active water reservoirs at four different sites totaling 4.8 Million Gallons (MG). The locations of the City's existing reservoirs are shown on Figure 3.1, while detailed information for the water reservoirs is summarized in Table 3.3.

Table 3.3 Existing Storage Tank Summary

Name	Number of Tanks	Volume (MG)	Diameter (ft)	Height (ft)	High Water Line (ft)
Well 7 Tank	1	1.50	90	29	243
Well 11 Tank	1	0.90	90	19	250
Well 12 Tank	1	0.40	55	22	22
G Street Tanks	2	1.00	90	21	248

Each of the City's storage reservoirs are ground-level reservoirs, ranging in volume from 0.4 to 1.5 MG each. The water level in the existing water distribution tanks are controlled in the following manner:

- *Well 7 Tank:* The tank levels in Tank 7 are maintained by the flow from Wells 7, 13, and 14.
- *Well 11 Tank:* The tank levels in Well 11 Tank is maintained by flow from the flow from the blend line, the North Well Field, and Wells 11 and 16.
- *Well 12 Tank:* The tank levels in Well 12 Tank is maintained by flow from Well 12 and the blend line.

- *40 G Street Tanks (2):* The tank levels in the G Street Tanks are maintained by flow from the North Well Field and the blend line.

3.1.4 Booster Pump Stations

There are four booster pump stations located throughout the distribution system. A summary of the existing pump stations is located in Table 3.4.

Table 3.4 Existing Pump Station Summary

Name	Pump Number	Power (HP)	Pump Capacity (gpm)
West College BPS (Well 7 BPS)	1	60	1,200
	2	60	1,200
	3	60	1,200
Well 11 BPS	1	75	1,500
	2	75	1,500
Main BPS	1	150	1,800
	2	50	1,100
	3	100	2,200
	4	50	1,100
	5	100	2,200
	6	100	2200
Well 12 BPS	1	60	1,200
	2	60	1,200

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Chapter 4

WATER DEMANDS

This chapter summarizes the City of Lemoore's (City's) historical water consumption and production records used to determine the daily, monthly, and seasonal fluctuations experienced by the water system. Also summarizes are the average Water Duty Factors (WDFs), peaking factors, and the projected demands through the year 2040 and ultimate build-out of the City limits.

4.1 Historical Water Demands

The City provided historical production data for the years 2015 through 2017. The historical demand data was evaluated to characterize the unique water patterns of the City's customers.

Several key demand parameters were generated. These parameters include peaking factors, typical water use by customer class, and per capita water demands. The parameters are used as the basis for the existing demand estimates and demand projections.

4.1.1 Historical Water Production

Water production varies annually in response to customer water usage, which is correlated to weather, development, economic conditions, population, and conservation activities. The City provided historical production data from 2001 through 2016. In addition, the City provided historical flow data from the City's three significant industrial users (SIUs) – Leprino Foods Company (Leprino), Olam SVI (Olam), and Agusa. Table 4.1 summarizes the City's historical average day demand (ADD) from 2001 to 2016. The City's total annual production, as shown in Table 4.1, has been somewhat variable since 2001. Figure 4.1 illustrates the City's water production from 2001 to 2016. As shown in Figure 4.1, the City saw a significant drop in domestic water use from 2013 to 2016 attributable to water conservation associated with state mandates/extreme drought conditions.

Table 4.1 Historical Water Production

Year	Population	Domestic ADD (mgd)	Industrial ADD (mgd)	Total ADD (mgd)	Domestic Per Capita Generation (gpcd)
2001	20,021	2.97	1.60	4.57	148
2002	20,487	3.65	1.60	5.25	178
2003	20,714	4.72	1.57	6.29	228
2004	21,340	4.43	1.55	5.97	207
2005	21,893	4.29	1.87	6.16	196
2006	22,607	4.14	2.16	6.30	183
2007	23,331	4.24	2.37	6.61	182
2008	23,520	4.68	1.99	6.67	199
2009	23,859	4.56	1.99	6.55	191
2010	24,531	4.07	2.22	6.29	166
2011	24,493	4.07	2.20	6.27	166
2012	24,711	4.30	2.45	6.75	174
2013	25,163	4.81	2.25	7.07	191
2014	25,418	3.99	2.64	6.64	157
2015	25,585	3.27	2.42	5.69	128
2016	26,199	3.26	2.17	5.43	124

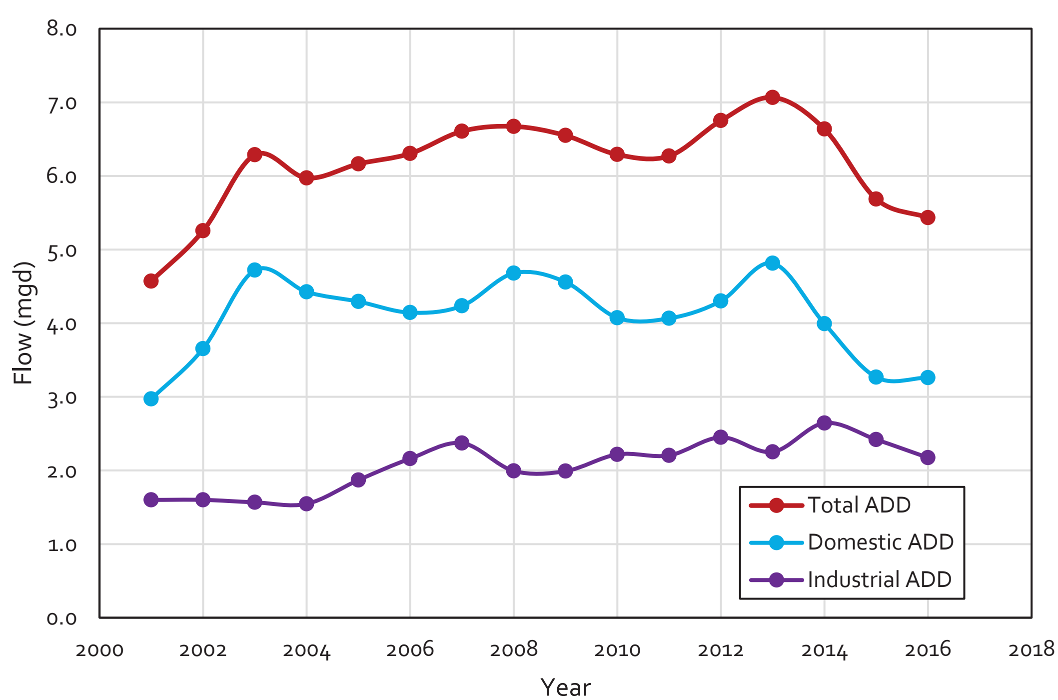

Figure 4.1 Historical Water Production

4.1.2 Seasonal Demands and Peaking Factors

Peaking factors represent the seasonal and daily variations in water use, above or below the average day water demand. The various peaking conditions are either statistical concepts or numerical values established through a review of historical data and are, at times, adjusted to reflect a level of conservatism.

Peaking conditions that are of particular significance to hydraulic analysis of the water system include the average day demand (ADD), maximum month demand (MMD), maximum day demand (MDD), and the peak hour demand (PHD). Peaking factors for expressing these demands as a function of the ADD were developed based on the City's demand patterns.

4.1.2.1 Average Day Demand

The ADD represents the daily average demand for the entire year. It is calculated by dividing the total water produced in any given year by the number of days per year. These values for the years 2010 through 2016 are presented in Table 4.2. As shown in this table, the ADD ranged from 6.29 million gallons a day (mgd) in 2010 to 5.43 mgd on 2016. The pre-drought (2010 through 2014) ADD was approximately 6.60 mgd. This value is more representative of the "existing" 2017 ADD for the purposes of this Master Plan.

Table 4.2 Historical Annual Production (2010 - 2016)

Year	Annual Production (MG)	Average Day Demand (mgd)	Maximum Month Demand (mgd)	MMD/ADD Peaking Factor
2010	2,296	6.29	9.42	1.50
2011	2,289	6.27	9.09	1.45
2012	2,471	6.75	9.51	1.41
2013	2,579	7.07	9.57	1.35
2014	2,422	6.64	9.04	1.36
2015	2,076	5.69	7.70	1.35
2016	1,989	5.43	7.76	1.43

4.1.2.2 Maximum Month Demand

The MMD is defined as the highest production in one month in a given year. The historical MMD and MMD/ADD peaking factors for years 2010 through 2016 are presented in Table 4.2. The MMD peaking factors ranged from 1.5 in 2010 to 1.35 in 2015. A MMD/ADD peaking factor of 1.5 was used to develop the existing and future MMDs for this master plan.

4.1.2.3 Maximum Day Demand

The MDD is an important demand condition, and is used to evaluate existing system supply, reservoir capacity, and pump station capacity. The MDD is defined as the highest production in one day in a given year, and usually occurs in the summer. Daily production/consumption data was not available, therefore, a MDD/MMD peaking factor of 1.3 was assumed. Based on the existing MMD peaking factor of 1.5, this yields an overall MDD/ADD peaking factor of 1.95.

4.1.2.4 Peak Hour Demand

The PHD is the highest water demand during any one-hour period of the year. A normal day typically experiences two peak demands, in the morning and then the evening. The PHD is expressed as a multiplier applied to the ADD. PHD simulates model high water use throughout the system and assist in identifying areas of the distribution system that experience low pressures.

The diurnal pattern developed as a part of this Master Plan is presented in Chapter 5. The calculated hourly diurnal peaking factor from this data was estimated to be 1.4.

The City's PHD/ADD peaking factor was developed by multiplying the MDD/ADD peaking factor of 1.95 by the typical daily diurnal peak of 1.4. This yields an estimated PHD/ADD peaking factor of 2.73.

4.1.3 Domestic Per Capita Water Demand

The per capita consumption rate is used for estimating the City's future water requirements, evaluating the adequacy of the supply source, and determining storage needs. The consumption rate, expressed in gallons per capita per day (gpcd), is applied to the projected population to yield future water requirements.

Table 4.3 summarizes the historical domestic per capita water demand. As shown on Figure 4.2, the City's per capita water demands has ranged from a high of 228 gpcd in 2003 to 124 in 2016. The reduction in per capita demand can be attributed to increased conservation by the City's customers, as well as additional conservation associated with recent drought conditions.

For planning purposes, a per capita demand of 171 gpcd was used for future flow projections. This value was chosen because the 2013 through 216 per capita demands may be artificially low due to state mandated water conservation, and therefore the City may see a rebound in the per capita water demands as drought conditions continue to ease.

Figure 4.3 shows the projected and historical domestic water demands through 2040.

Table 4.3 Historical Per Capita Water Demand

Year	Population (1)	Domestic ADD (mgd)	Per Capita Demand (gpcd)
2001	20,021	2.97	148
2002	20,487	3.65	178
2003	20,714	4.72	228
2004	21,340	4.43	207
2005	21,893	4.29	196
2006	22,607	4.14	183
2007	23,331	4.24	182
2008	23,520	4.68	199
2009	23,859	4.56	191
2010	24,531	4.07	166
2011	24,493	4.07	166
2012	24,711	4.30	174
2013	25,163	4.81	191
2014	25,418	3.99	157
2015	25,585	3.27	128
2016	26,199	3.26	124
		2010-2014 Average:	171

Notes:
(1) Source: California Department of Finance.

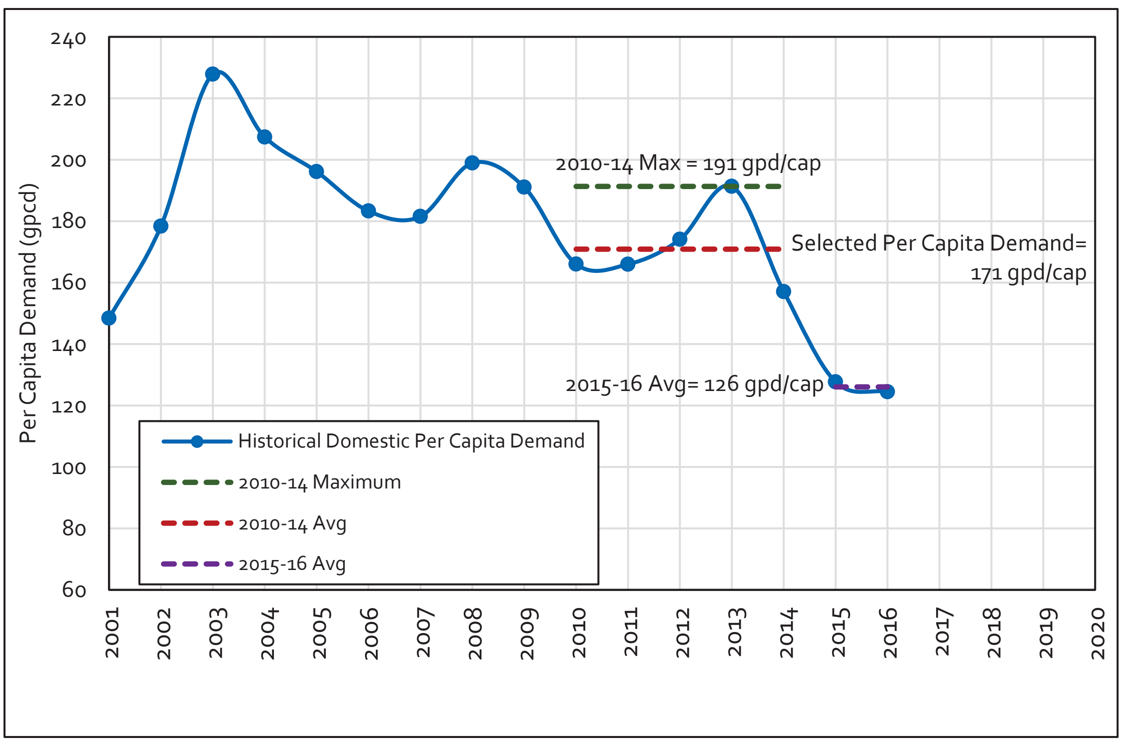

Figure 4.2 Historical Per Capita Water Demands

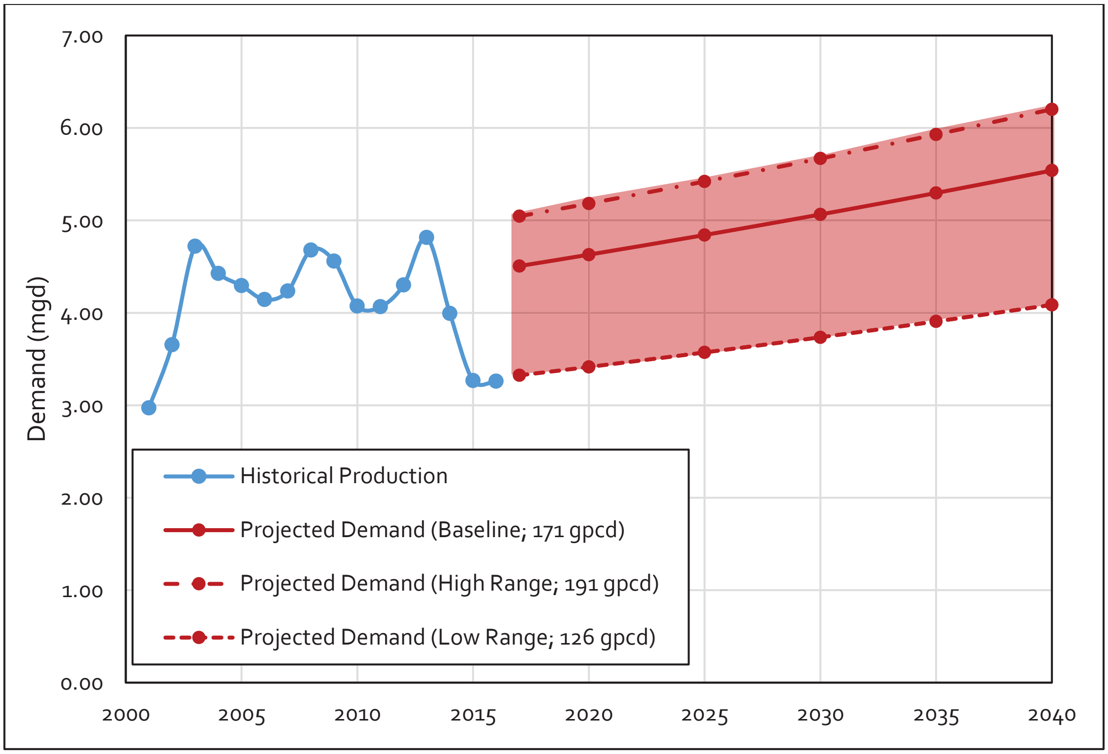

Figure 4.3 Projected and Historical Domestic Average Day Demand

4.1.4 Significant Industrial Users

Three large industrial water customers were identified within the City. Historical average annual water usage was provided for Leprino, Olam, and Agusa. The demand trends for the City's large customers are evaluated separately so that their demands can be allocated to their precise location in the water system. In 2016, the City's three largest consumers were all industrial accounts. Table 4.4 shows the average water demands for the significant users.

Table 4.4 Water Demands from Significant Industrial Users

Flow Type	Leprino(1) (mgd)	Olam(2) (mgd)	Agusa(2) (mgd)	Total (mgd)
Existing	1.99	0.33	0.10	2.42
2025	2.09	0.34	0.10	2.53
2040	2.29	0.38	0.10	2.76
Assumed Annual Growth	0.6%	0.6%	0.0%	--

Notes:
(1) Existing flow is average for years 2010 through 2014.
(2) Existing flows are averages for years 2014 and 2015.

4.1.5 Water Duty Factors

A WDF is defined as the estimated amount of water usage per area for a certain land use type. These factors are used to estimate the ADD for the potential development areas by multiplying the WDF with the total number of areas of each land use category. WDFs were developed as a part of this Master plan to allocate demands by land use type and to project demands for developable vacant land. WDFs are typically determined from a combination of geocoding billing records and land use information using special geographic information system (GIS) routines. The WDFs shown in Table 4.5 were developed by grouping the existing developed land use parcels by categories that correspond to the City's customer classes.

Table 4.5 Water Duty Factors

Land Use Category	WDF (gpd/acre)
Residential	
Very Low Density Residential	1,100
Low Density Single Family Residential	1,550
Low Medium Density Residential	2,200
Medium Density Multi-Family Residential	2,600
High Density Residential	3,800
Commercial/Industrial	
Mixed-Use	2,800
Professional Office	1,400
Neighborhood Commercial	1,400
Regional Commercial	1,400
Light Industrial (Exc. Leprino, Olam, Agusa)	2,000
Heavy Industrial	4,000
Employment Reserve	2,000
Significant Industrial User (Leprino, Olam, Agusa)	--
Other	
Community Facilities	1,500
Parks/Recreation	1,500
Greenway/Detention Basin	0
Wetlands	0
Agriculture	0
Agriculture/Rural Residential	0

4.2 Demand Projections

This section summarizes the future 2040 and build-out of the City limits. The 2040 and build-out demand projections were developed based on the planning assumptions documented in Chapter 2 of this report, as well as the existing water demand parameters identified in the previous sections.

4.2.1 2040 Demand Projections

The City recently adopted its General Plan Update, and are using the moderate growth expansion alternative to estimate future populations. For the purpose of this Master Plan, these population projections were used. These projections assume an annual growth rate of 0.9 percent, resulting in a population of 32,416 people by year 2040.

Table 4.6 summarizes the projected demands through the year 2040. As shown in Table 4.6, the City's ADD and MDD are projected to approach 8.30 mgd and 16.19 mgd by 2040, respectively. The projected demands are separated into domestic and industrial users. The City has multiple large industrial users. The projected domestic demands provided in Table 4.6 assume a per capita water demand of 171 gpcd, which is equal to the average per capita demand from 2010 through 2014. This is likely a conservative assumption, because the per capita water demand is expected to decrease in the future due to increased conservation measure and more water efficient construction associated with new developments. Because the purpose of this Master Plan is to size infrastructure needs for the distribution system, it is appropriate to include a level of conservatism when planning future transmission, distribution, and storage needs.

Table 4.6 Future Demand Projections through 2040

Year	Projected ADD (1) (mgd)	Projected MDD (2) (mgd)
2017 (Existing)	6.92	13.50
2020	7.09	13.82
2025	7.37	14.38
2030	7.67	14.96
2035	7.98	15.56
2040	8.30	16.19

Notes:
(1) Projected Population assumes a 0.9 percent per year population growth
(2) MDD/ADD Peaking Factor = 1.95

For Long Term (2040) flows, a combination of population and land use flow factors was utilized to estimate infill. Known development flow projections used water flow factors to project ADD. As shown in Table 4.7, known development within the City is projected at 1.08 mgd for 2040.

Table 4.7 Known Development Flow Projections

Tract/SPR	Development Name	Development Size		Planning Year ADD(1)
		Area (acre)	Residential Units	2040 (gpd)
	Residential			
781	Silva Estates Patio Homes	4	30	8,800
793	Silva Estates	18	42	27,900
797	Park View Estates	18	90	27,900
816	Holly Oaks	18	28	27,900
820	Fairway Courtyard	3	39	6,600
827	Park Meadows	6	20	9,300
839	G.J Gardner	9	37	13,950
845	Victory Village	14	51	21,700
908	Capistrano V	0.3	20	465
920	Lennar Homes	40	172	62,000
921	Woodside Homes	20	64	31,000
2018-04	Cinnamon Villas	2	28	3,100
2017-08	Granville Homes	9	141	23,400
2009-01	Village at Acacia	7	81	18,200
2006-20	Oleander Terrace	5	66	13,000

Tract/SPR	Development Name	Development Size		Planning Year ADD(1)
		Area (acre)	Residential Units	2040 (gpd)
-	Lennar West	32	-	89,600
-	Rugman	10.9	-	30,520
	Lacy Ranch	155	220	240,250
	17th Avenue	135	-	209,250
	Lemoore Mobile Home Park(2)	10	70	--
	Subtotal	**435**	**909**	**733,085**
Community Facility				
2017-09	Last Days Ministries	2	-	3,100
Industrial/Commercial				
-	Dollar General	2	-	2800
2017-06	Virgil Beard	3.8	-	7,600
2015-03	Fast and Friendly Market	1	-	1400
2016-01	PG&E	12	-	24,000
2018-08	Kashian Industrial	80	-	160,000
-	Rodriguez	0.6	-	1,200
-	Immediate Care Facility	9	-	12,600
-	Rugman	4.6	-	6,440
Subtotal		115	-	216,040
Total		550	909	1,080,875

Notes:
(1) Water flow factors used to determine demand.
(2) Not connecting to water system.

4.2.2 Build-Out Demand Projections

Build out demand projections were developed using a combination of General Plan land use information, specific plans, vacant land information, aerial photography, and water demand factors. This section summarizes the projected build out demand projections.

In general, build out demands were developed by multiplying the available developable land use area (in terms of parcel acreage) by land use based WDF. Table 4.8 summarizes the build out demands.

4.2.3 Demand Projection Summary

Table 4.9 provides a summary of the City's existing, 2040, and build-out demand projections. As shown in Table 4.9, the City's ADD is projected to increase from an existing demand of 6.92 mgd to a 2040 demand of 8.3 mgd. By build-out, the projected ADD could approach roughly 15.78 mgd.

Table 4.8 Build-Out Demand Projections

Land Use Category	Build-Out Demands			
	Developable Land (acres)	Water Duty Factor (gpd/acre)	ADD (mgd)	MDD(1) (mgd)
Existing (2017) Demands	--	--	6.92	13.5
Residential				
Very Low Density Residential	647	1,100	0.71	1.39
Low Density Single Family Residential	1,635	1,550	2.53	4.94
Low Medium Density Residential	195	2,200	0.43	0.84
Medium Density Multi-Family Residential	46	2,600	0.12	0.23
High Density Residential	0	3,800	0.00	0.00
Commercial/Industrial				
Mixed-Use	102	2,800	0.29	0.56
Professional Office	55	1,400	0.08	0.15
Neighborhood Commercial	45	1,400	0.06	0.12
Regional Commercial	158	1,400	0.22	0.43
Light Industrial (Exc. Leprino, Olam, Agusa)(2)	1,347	2,000	2.69	5.25
Heavy Industrial	25	4,000	0.10	0.20
Employment Reserve	412	2,000	0.82	1.61
Significant Industrial User (Leprino, Olam, Agusa)	45	--	0.35	0.68
Other				
Community Facilities	189	1,500	0.28	0.55
Parks/Recreation	135	1,500	0.20	0.40
Greenway/Detention Basin	222	0	0.00	0.00
Wetlands	659	0	0.00	0.00
Agriculture	3,446	0	0.00	0.00
Agriculture/Rural Residential	0	0	0.00	0.00
Total	9,363		15.78	30.78

Notes:
(1) MDD = 1.95 x ADD
(2) Includes the annexation south of Idaho Avenue.

Table 4.9 Demand Projection Summary

Year	ADD (mgd)	MDD(1) (mgd)
Existing	6.92	13.50
2040	8.30	16.19
Build-Out	15.78	30.78

Notes:
(1) MDD = 1.95 x ADD

Chapter 5

DISTRIBUTION SYSTEM HYDRAULIC MODEL DEVELOPMENT AND CALIBRATION

This chapter summarizes the City of Lemoore's (City's) existing distribution system hydraulic model development and calibration.

5.1 Hydraulic Model Development

This section summarizes the process used to develop the hydraulic computer model of the City's water distribution system, including modeling software selection, model development, and demand allocation process. The City did not have a previous hydraulic model, and therefore the hydraulic model was built from scratch. The model was built based on GIS data, record drawings, and the direction of City staff.

5.1.1 Selected Hydraulic Model Software

There is an abundance of water distribution system analysis software in the marketplace today, with a variety of features and capabilities. The selection of a particular model generally depends on user preferences, software costs, and the complexity of the water distribution system.

It was agreed that the City's hydraulic model would be created and calibrated using InfoWater, developed by Innovyze. InfoWater is a comprehensive hydraulic and dynamic water quality modeling software application. InfoWater uses the Environmental Protection Agency's (EPA) EPANET model simulation engine, which is widely used throughout the world for planning, analysis, and design related to water distribution systems. The InfoWater package can run directly within the ArcGIS environment and therefore offers an enhanced graphical user interface (GUI) and a variety of additional features and functionality.

5.1.2 Elements of the Hydraulic Model

The following provides a brief overview of the various elements of the hydraulic model and the required input parameters associated with each:

- *Junctions.* Locations where pipe sizes change, pipelines intersect, or where water demands are applied is represented by junctions in the hydraulic model. Required inputs for junctions include service elevation and water demands.
- *Pipes.* Water mains are represented as pipes in the hydraulic model. Input parameters for pipes include length, roughness (Hazen Williams C factor), diameter, and whether or not the pipe is a check valve (i.e., does not allow reverse flow).
- *Tanks.*
  - *Cylindrical and Variable Area Tanks:* Water tanks are included in the hydraulic model as either cylindrical tanks or variable area tanks, depending on the complexity of the tank geometry. Required input parameters for cylindrical tanks include bottom elevation, maximum level, initial level, and diameter. Required input parameters for

variable area tanks include bottom elevation, maximum level, initial level, and a curve that varies the cross sectional area of the tank depending on the tank level (developed as appropriate based on As-built drawings).
  - *Fixed Head Reservoirs:* For water distribution system modeling, fixed head reservoirs are used to represent a water source with a constant HGL. Typically, fixed head reservoirs are used to represent water sources, such as groundwater or other sources of water.
- *Pumps.* Pumps are included in the hydraulic model as links. Input parameters for pumps include pump curves and operational controls.
- *Valves.* Certain types of valves, such as altitude valves and pressure reducing valves, are represented explicitly as valves in the hydraulic model. Required input parameters for valves include diameter, operational controls, and other settings or headloss curves depending on the type of valve.
- *Demands.* Water demands are applied at specific junctions in the hydraulic model. Up to ten different demands can be assigned at a particular junction.

5.1.3 Hydraulic Model Development

The City's hydraulic model combines information on the physical and operational characteristics of the distribution system, and performs calculations to solve a series of mathematical equations to simulate flows in pipes.

The model development process consisted of six steps, as described below:

- *Step 1:* The City's GIS database files for the distribution system was imported into the model using the "GIS Exchange" feature functionality in InfoWater.
- *Step 2:* The City's storage tanks and pump stations were then imported into the model using the "GIS Exchange" feature, and operational information, such as pump controls were input into the model manually based on information provided by the City.
- *Step 3:* Junctions, or areas where two pipelines meet in the model, are required at every pipe intersection and dead end, as well as other areas in the model where demands are applied. Junctions were added into the model using InfoWater's "Append Nodes" feature.
- *Step 4:* Elevations were applied to each modeled junction using the City's ground elevation contour file and the "Elevation Extractor" tool in InfoWater.
- *Step 5:* InfoWater includes several connectivity tools that are used to verify that each pipeline in the model is connected properly. The model flagged questionable pipelines and facilities, which were reviewed and corrected, if necessary.
- *Step 6:* The hydraulic model contains certain run parameters that need to be set by the user at the beginning of the project. These include run duration, time steps, reporting parameters, output units, and other technical parameters. Once the run parameters were established, the model was debugged to ensure that it ran without errors or warnings.

5.1.4 Diurnal Pattern

For this WMP, no groundwater well flow or tank level data was provided. Therefore, a generic diurnal pattern was used. The diurnal pattern in shown on Figure 5.1, and was applied to the hydraulic model for use in 24-hour model simulations.

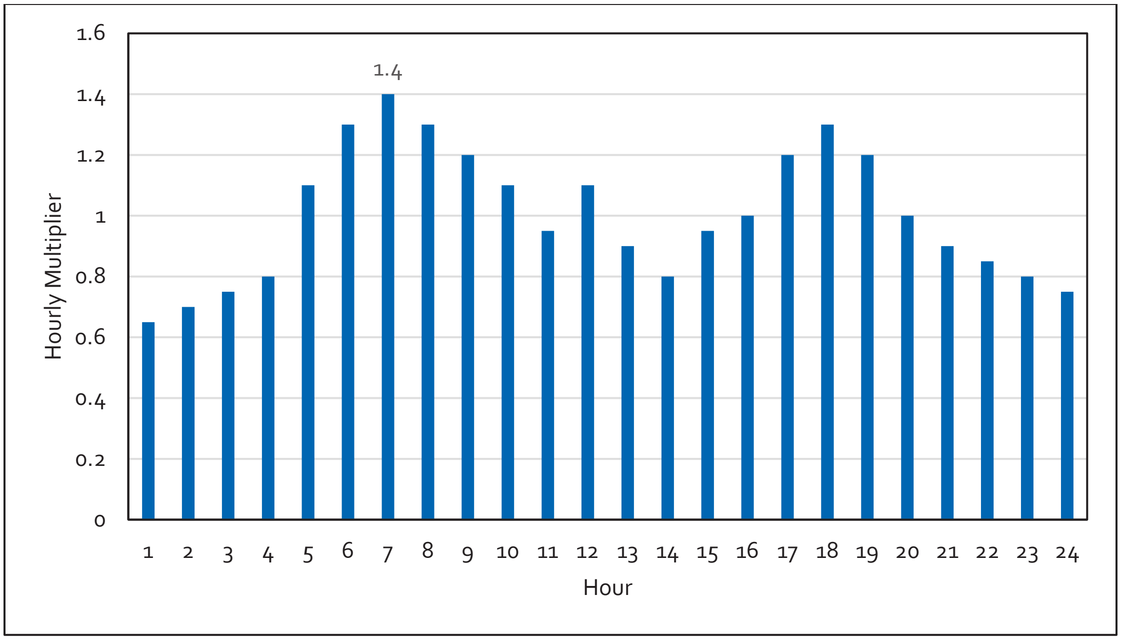

Figure 5.1 Citywide Diurnal Pattern

5.1.5 Water Demand Allocation

Allocation of water demands to appropriate nodes in the hydraulic model was accomplished in several steps using the City's water billing data. The City provided an MS Excel based database with monthly water consumption, by customer, for the years 2015 through 2017.

The City's 2017 water billing records were manipulated in excel to calculate the total average day consumption for each City customer. This billing data was then "geocoded" using GIS techniques to develop a point shapefile with spatial location of each billing record with the annual consumption. This shapefile was used along with InfoWater's "Demand Allocator" tool to allocate the system demand into the model. It should be noted that the demands associated with Leprino, Olam, and Agusa were allocated manually into the model to ensure they were applied to the correct node in the model. Once the geocoded billing data was allocated into the hydraulic model, the model demands were scaled to match the total 2017 average day demand (ADD), thereby accounting for the addition demand associated with unaccounted-for-water (UFW). Finally, diurnal patterns were input into the model (see Figure 5.1) to account for temporal change in demands throughout the day.

5.2 Hydraulic Model Calibration

This section summarizes overall methodology employed to calibrate the City's water system hydraulic model and the calibration results, including a detailed description of each of the major components of the model calibration process.

5.2.1 Model Calibration Data Collection

Carollo coordinated closely with City staff regarding the field data needs that were required to calibrate the hydraulic model. The required calibration data included site maps for specific fire flow test locations and pressure logger locations. This section summarizes the data collection process that was conducted.

- *Temporary Pressure Logger Installation:* Carollo provided temporary pressure loggers to the City staff that were attached to hydrants within the City's distribution system. The data obtained from the temporary pressure loggers consisted of 5-minute pressure data for the duration of the EPS data gathering period. Figure 5.2 shows the hydrant locations where the temporary pressure loggers were installed. The pressure logger distribution in August 2017 was selected to get a good representation of system pressures throughout the City.
- *Fire Flow Field Testing:* Carollo selected ten fire flow testing sites, which are shown on Figure 5.3. These tests were conducted between August 10, 2017 and August 17, 2017 at each of the ten locations.

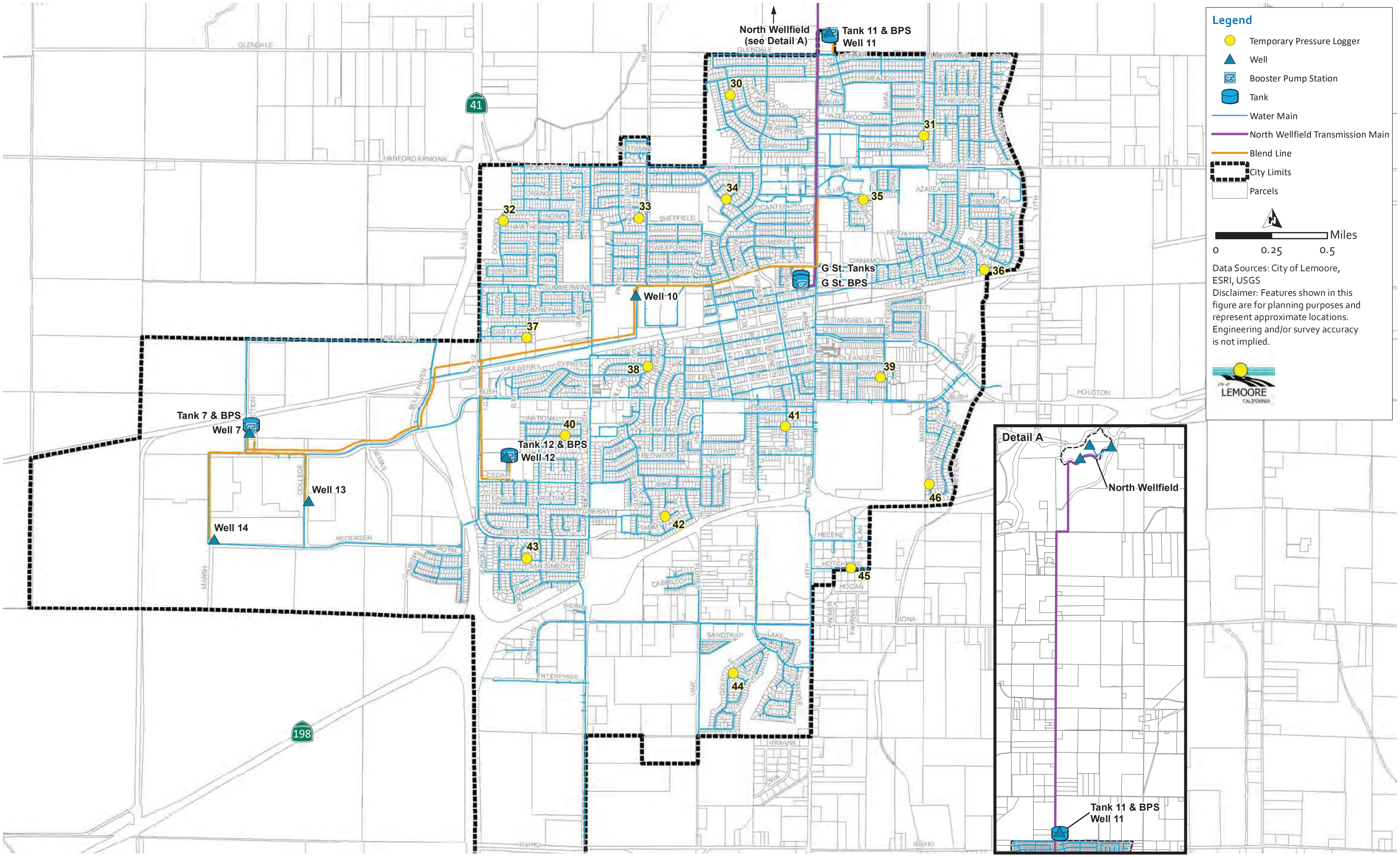

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Figure 5.2 Temporary Pressure Logger Locations

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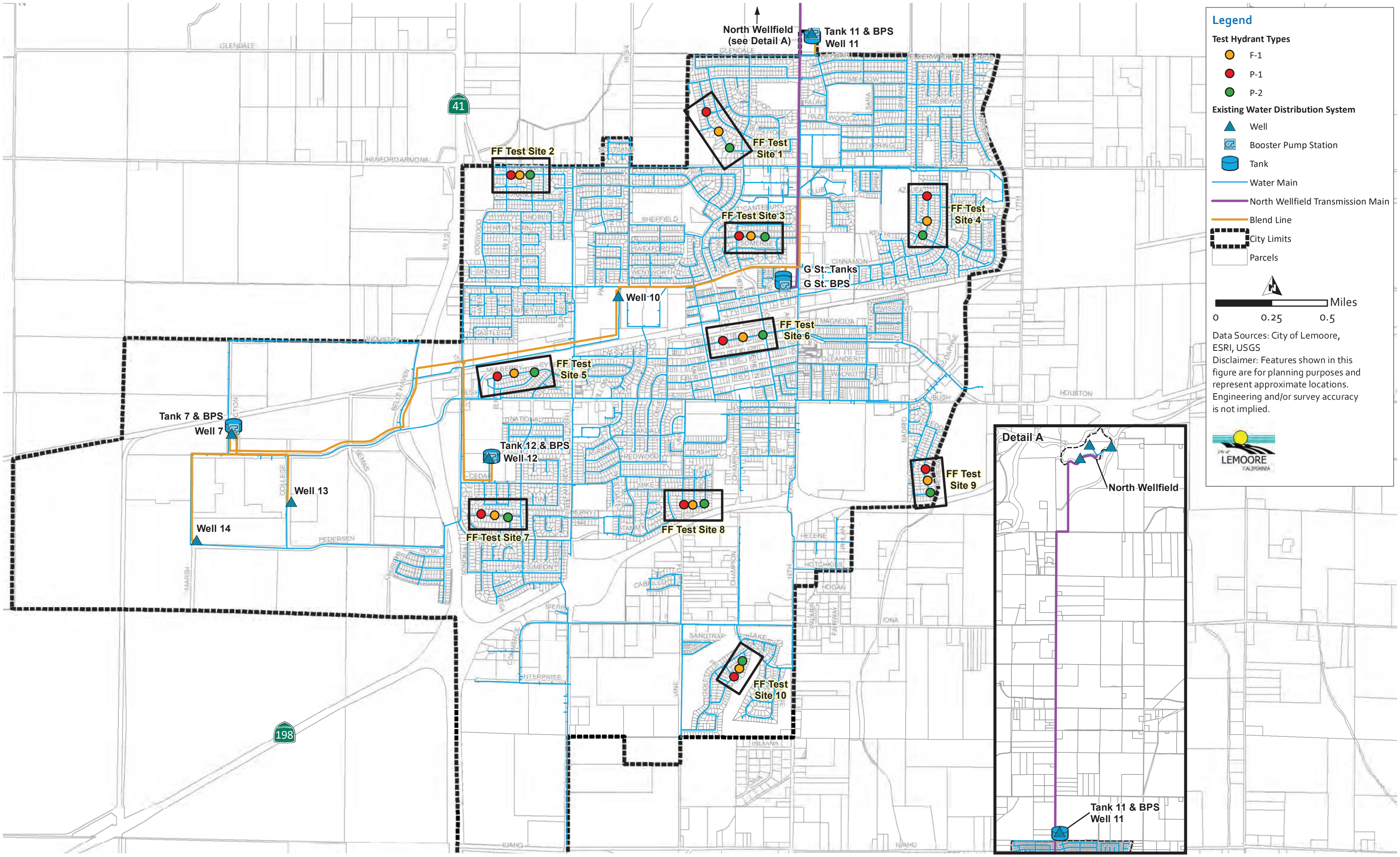

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Figure 5.3 Fire Flow Testing Locations

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5.2.2 Model Calibration Methodology and Results

The purpose of a water system hydraulic model is to estimate, or predict, how the water distribution system will respond under a given set of conditions. One way to test the accuracy of the hydraulic model is to create a set of known conditions in the water system and then compare the results observed in the field against the results of the hydraulic model simulation using the same conditions. Flow tests conducted in the field on the water system can yield a profound tool in verifying data used in the hydraulic model and greater understanding of how the water system operates.

Field testing can indicate errors in the data used to develop the hydraulic model, or show that a condition might exist in the field not otherwise known. Valves, which are reported as being open, might actually be closed (or vice versa), an obstruction could exist in a pipelines, or pressure settings for a PRV may be slightly different than noted. Field testing can also correct erroneous model data such as incorrect pipe diameters or connections.

Data obtained from the field tests can be used to determine appropriate roughness coefficients for each pipeline, as roughness coefficients can vary with age and pipe material. Other parameters can also be adjusted to generate a calibrated model.

The calibration process for the City's water distribution system hydraulic model consisted of three parts, a macro calibration, a fire flow test calibration, and an EPS calibration.

5.2.2.1 Macro Calibration

Initially, the model was run under existing demand conditions and necessary adjustments were made to produce reasonable system pressures. Such adjustments include modifications of pipeline connectivity, operational controls, ground elevations, and facility characteristics.

The macro calibration process involves several steps to ensure that the model produces reasonable results:

- *Transmission Main Connectivity:* Using the connectivity features of the modeling software, the connectivity of the transmission mains within the distribution system was verified. Problems found using the connectivity locators were reviewed to determine whether adjustments were needed to the connectivity of the model. Output reports of pipe flow characteristics, such as headloss (feet per thousand feet [ft/kft]) and velocity (feet per second [fps]) were also used to locate problem areas where additional adjustments may be necessary.
- *System Pressures:* The macro calibration compared the model output to the typical pressures observed within the distribution system in pounds per square inch (psi). This process was used to locate major errors in model creation, elevations, or connectivity, as well as changes that reflect how operational controls of the system should be implemented in the model.
- *Facility Characteristics:* Hydraulic model results were compared to data provided by the City to verify that facility attributes entered into the model, such as physical characteristics of the tanks, wells, and booster pump stations, produced results comparable to what the City experiences.

5.2.2.2 Extended Period Simulation Calibration

The purpose of extended period simulation (EPS) calibration is to demonstrate the hydraulic model's ability to accurately mimic the real world operations of the distribution system facilities, including pressure fluctuations, tank fill/drain cycles, well operation, and pump station operations. The primary varied parameters for this calibration were operational controls and pipeline roughness coefficients, although other parameters were also adjusted as calibration results were generated.

The first step in the EPS calibration process is the selection of a calibration day. During the EPS calibration period, it was determined that August 14, 2017 was the most appropriate calibration day.

The calculated daily demand for the calibration day was estimated to be 8.66 mgd (6,015 gallons per minute [gpm]). Therefore, the demands that were allocated in the hydraulic model were scaled to match a total demand of 8.66 mgd for the purposes of the EPS calibration scenario.

The EPS calibration compared model simulated pressures at the pressure logger locations to actual field pressures recorded during the calibration day.

A sample comparison of model results to observed field conditions for Pressure Logger 34 for the EPS calibration period is shown on Figure 5.4. Similar model results for the remaining facilities are presented in Appendix A.

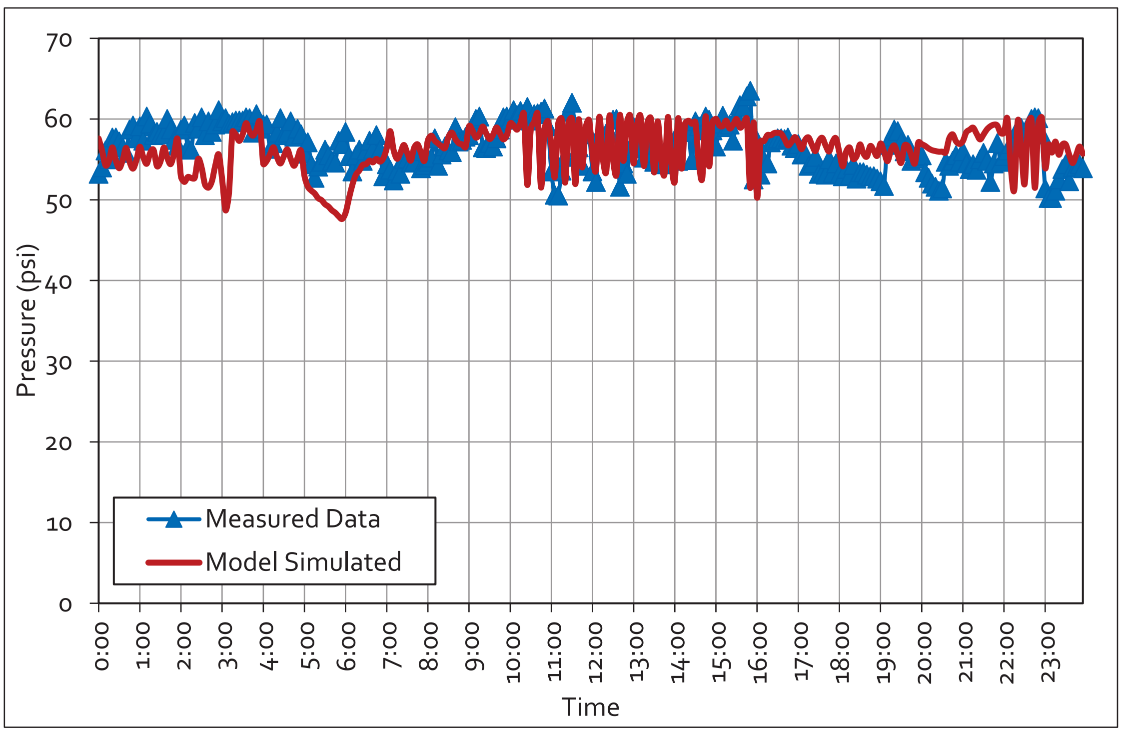

Figure 5.4 Example EPS Calibration Result - Pressure Logger 34

5.2.2.3 Fire Flow Test Calibration

The purpose of fire flow calibration is to demonstrate the model's ability to accurately replicate the performance of the distribution system of extreme demand conditions, such as when fire hydrants are being operated. The primary varied parameter for this calibration is pipeline roughness coefficient, although other parameters can also be adjusted as calibration results are generated.

Hazen-Williams roughness coefficients, or C-factors, have industry accepted value ranges based on pipeline material, diameter, and age. Characteristics specific to the City's water distribution system such as water quality, temperature, construction methodologies, material suppliers, and other factors may result in roughness coefficients that differ from the average of the industry accepted ranges. Fire flow calibration refines the initial estimation of the value of roughness coefficients that best indicate the conditions of the City's distribution system.

During average day flows, roughness coefficients have a relatively small effect on the operation of the distribution system. However, as the flows increase in the system on higher demand days, velocity within the pipelines increase and roughness coefficients contribute more to overall system headloss. Fire flow tests artificially create high demand events to generate more headloss, allowing a better estimation of the pipeline roughness coefficients.

Fire flow tests stress the distribution system by creating a differential between the HGL at the point of hydrant flow and the system HGL at neighboring hydrants. The HGL differential increases the effect of the roughness coefficients on system losses and allow adjustments to the model to match model pressure to field pressures within an acceptable tolerance. As the model is adjusted to match system pressures, roughness coefficients should be adjusted only within a tolerance of industry accepted roughness coefficient ranges. If the model is unable to match the calibration results without leaving the acceptable range of roughness coefficient values for a given pipeline material and age, there may be cause for further investigation of a previously unknown field condition. Examples of such conditions, which typically arise during hydraulic model calibration, include closed valves, partially closed or malfunctioning valves, extreme corrosion within pipelines, connectivity, and diameter errors in GIS layers or record drawings, and diurnal patterns or large water users.

A separate hydraulic model scenario was created for each flow test for both the static and the dynamic, or flowing condition. The flow observed at each fire flow hydrant was assigned as a demand to the model node at the location of the hydrant. Residual pressures were then read at each hydrant location while the hydrant was flowing. Model results were considered acceptable if they fall within a 10 percent tolerance or a 10 psi value. Table 5.1 shows a summary of the August 2017 fire test model calibration results.

As shown in Table 5.1 the comparison of model results to observed field data are good. There are a few notable items from the fire flow calibration results:

- *Fire Flow Test 5:* The hydraulic model was not able to simulate the residual and static pressure recorded for pressure hydrant 2 during this test. It is possible that the field pressure readings are incorrect. It was decided that since the model met the established criteria for pressure hydrant 1 and the flowing hydrant, that the calibration results at this test site were considered acceptable.
- *Fire Flow Test 8:* The hydraulic model was not able to simulate the residual or static pressure recorded for pressure hydrant 2 during this test. It is possible that the field pressure readings are incorrect. It was decided that since the model met the established criteria for pressure hydrant 1 and the flowing hydrant, that the calibration results at this test site were considered acceptable.

- *Fire Flow Test 10:* The hydraulic model was not able to simulate the residual or static pressure recorded for pressure hydrant 2 during this test. It is possible that the field pressure readings are incorrect. It was decided that since the model met the established criteria for pressure hydrant 1 and the flowing hydrant, that the calibration results at this test site were considered acceptable.

5.2.3 Hydraulic Model Calibration Summary

In summary, the calibration results indicate the model predicts conditions similar to those observed in the field. Within a few isolated areas of the model, there are some very minor discrepancies, but the overall distribution system is very well represented in the model.

Based on the results presented in this chapter, it can be concluded that the model is calibrated to steady state and extended period conditions. The model provides an accurate representation of the City's distribution system and system operations to a level suitable for this Master Plan and for the City's future hydraulic modeling needs.

Table 5.1 Fire Flow Test Calibration Results (August 2017)

Test Site	Test Location	Date/Time	Temp (°F)	Hydrant Type	Field Measured Data			Modeled Data		% Difference		Pressure Drop			Notes
					Hydrant Flow (gpm)	Pressure (psi) Static	Pressure (psi) Residual	Pressure (psi) Static	Pressure (psi) Residual	Static	Residual	Measured (psi)	Modeled (psi)	Difference	
1	W Spring	10-Aug/1:30 PM	85	Flowing	920	57	30	55.3	--	-3.0%		--	--	--	
				Pressure_1	--	58	48	55.9	51.3	-3.6%	6.9%	10	5	-5	
				Pressure_2	--	54	44	54.9	46.9	1.7%	6.6%	10	8	-2	
2	Peachwood	10-Aug/2:10 PM	85	Flowing	1,190	58	50	55.0	--	-5.2%		--	--	--	
				Pressure_1	--	56	50	55.5	48.4	-0.9%	-3.2%	6	7	1	
				Pressure_2	--	58	50	54.6	47.7	-5.9%	-4.6%	8	7	-1	
3	Devon	10-Aug/2:15 PM	85	Flowing	1,048	54	38	53.6	--	-0.8%		--	--	--	
				Pressure_1	--	50	42	53.7	44.9	7.3%	6.9%	8	9	1	
				Pressure_2	--	58	49	53.5	44.6	-7.8%	-9.0%	9	9	0	
4	Banyan	14-Aug/9:30 AM	85	Flowing	980	49	34	52.7	--	7.6%		--	--	--	
				Pressure_1	--	58	48	53.6	47.2	-7.7%	-1.7%	10	6	-4	
				Pressure_2	--	54	48	53.6	49.0	-0.8%	2.1%	6	5	-1	
5	Mulberry	14-Aug/9:00 AM	85	Flowing	900	54	29	54.3	--	0.6%		--	--	--	Two closed valves in the area. Field pressure readings are questionable (both pressure hydrants at nearly same elevation).
				Pressure_1	--	56	36	54.6	39.0	-2.5%	8.3%	20	16	-4	
				Pressure_2	--	62	43	54.1	36.2	-12.7%	-15.8%	19	18	-1	
6	Heinlen	17-Aug/7:30 AM	85	Flowing	1,090	50	42	53.5	--	6.9%		--	--	--	
				Pressure_1	--	52	44	53.5	47.2	2.9%	7.3%	8	6	-2	
				Pressure_2	--	50	45	53.4	48.3	6.8%	7.3%	5	5	0	
7	Morro	14-Aug/10:00 AM	85	Flowing	1,150	54	47	56.2	--	4.1%		--	--	--	
				Pressure_1	--	60	52	56.4	48.4	-6.0%	-6.9%	8	8	0	
				Pressure_2	--	56	48	55.8	49.2	-0.4%	2.5%	8	7	-1	
8	Beech	14-Aug/8:50 AM	85	Flowing	950	52	32	53.2	--	2.3%		--	--	--	Field pressure readings are questionable (both pressure hydrants at nearly the same elevation)
				Pressure_1	--	70	62	53.3	47.4	-23.9%	-23.5%	8	6	-2	
				Pressure_2	--	56	48	53.0	45.4	-5.4%	-5.5%	8	8	0	
9	Rivera	17-Aug/7:00 AM	85	Flowing	950	46	32	50.4	--	9.5%		--	--	--	
				Pressure_1	--	50	34	51.2	34.4	2.4%	1.2%	16	17	1	
				Pressure_2	--	52	34	51.3	33.8	-1.4%	-0.7%	18	18	0	
10	Par	14-Aug/11:00 AM	85	Flowing	1,110	48	44	51.7	--	7.6%		--	--	--	Field pressure readings are questionable (both pressure hydrants at nearly the same elevation)
				Pressure_1	--	52	42	51.8	39.0	-0.4%	-7.1%	10	13	3	
				Pressure_2	--	58	51	51.5	39.5	-11.2%	-22.5%	7	12	5	

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Chapter 6

WATER DISTRIBUTION SYSTEM EVALUATION CRITERIA AND SYSTEM ANALYSIS

This chapter presents the planning criteria that were used to evaluate the existing water distribution system and for sizing future water system infrastructure. The developed criteria address the water supply capacity, storage capacity, acceptable service pressures, and distribution main performance. Results of the capacity analysis and recommended improvements to mitigate system deficiencies and serve future users are also presented in this chapter.

6.1 Distribution System Evaluation Criteria

The capacity of the City of Lemoore's (City's) water distribution system was evaluated based on the planning criteria defined in this section. The planning criteria will address the distribution system capacity, service pressures, and maximum velocities within the system. The evaluation criteria used for the evaluation of the City's distribution system are summarized in Table 6.1.

6.1.1 Water Supply Capacity

In accordance with industry standard practices, as well as the California Department of Public Health's (CDPH) 2008 Water Works Standards Criteria for "New and Existing Source Capacity," the water systems water source shall have the capacity to meet the systems Maximum Day Demand (MDD). Demands in excess of the MDD required for Peak Hour Demand (PHD) or for the fire flows are planned to come from storage.

The City's sole source of supply is water from the water wells. Therefore, the wells must be capable of providing the City with MDD.

6.1.2 Water Storage Requirements

The principal function of storage is to provide a reserve supply of water for: 1) operation equalization; 2) fire reserve; and 3) emergency needs. Operational equalization storage is directly related to the amount of water necessary to meet peak demands. The intent of operational equalization storage is to provide the difference in quantity between the customer's peak demands and the system's reliable available supply. The volume of water allocated for emergency uses is decided based on the historical record of emergencies experienced, and on the amount of time which is expected to lapse before a hypothetical emergency can be corrected.

6.1.2.1 Operational Equalization Storage

This storage is the amount of desirable stored water in a system to regulate fluctuations in demand so that extreme variations will not be imposed on the source of supply. Operational equalization storage typically serves the peak demands exerted within the MDD. With operational equalization storage, system pressures are improved and stabilized to better serve customers throughout the service area.

An operational equalization storage equal to 25 percent of the City's average day demand (ADD) is recommended by Carollo for this planning effort based on the size and configuration of the City's system.

6.1.2.2 Fire Storage

Fire storage is the amount required to meet the necessary fire flow demands. In general, the recommended fire storage volume is determined by multiplying the highest required fire flow by its corresponding duration.

The recommended fire flows and durations used in this Master Plan are summarized in Section 5.6, and were developed based on input from City Staff, including the City's Fire Marshall, and Carollo experience on similar projects. The maximum recommended fire flow and duration are 4,000 gallons per minute (gpm) for a duration of four hours. This provision equates to a storage of 0.96 Million Gallons (MG).

6.1.2.3 Emergency Storage

This storage is the volume recommended to meet demands during emergency situations such as pipeline failures, major distribution main failures, pump failures, electrical power outages, or natural disasters. The amount of emergency storage included within a particular water distribution system is an owner option, based on an assessment of risk, the desired degree of system dependability, economic considerations, and water quality concerns. Emergency storage criteria are typically expressed as a multiplier of the ADD, and can range from 0 percent to 100 percent or more of the ADD. As a part of the development of storage improvement alternatives, which are discussed in greater detail in Section 6.8, a range of emergency storage criteria were examined. The criteria considered were 35 percent, 50 percent, and 100 percent of the ADD. Ultimately, the recommended emergency storage is equal to 50 percent of the ADD.

6.1.2.4 Total Storage

The recommended minimum operational storage capacity for the City is equal to 25 percent of the ADD. The recommended fire storage capacity is equal to the largest fire flow rate multiplied by the fire flow duration. For the city as a whole, the largest required fire flow volume is equivalent to 0.96 MG. The recommended emergency storage is equal to 50 percent of the ADD.

6.1.3 Service Pressures

Pressures maintained within the distribution system vary depending on distribution system operations. It is essential that the water pressure in a customer's residence or place of business be neither too high nor too low.

Low pressures, below 40 pounds per square inch (psi), cause annoying flow reductions when more than one water-using appliance is used. High pressures may cause faucets to leak and valve seats to wear out quickly. Additionally, high service pressures usually result in wasted water and high water utility bills. It is recommended that the water pressures not exceed 80 psi at service connections, unless the service is provided with a pressure-reducing device.

The American Water Works Association (AWWA) Manual on Distribution Network Analysis of Water Utilities (AWWA M-32), indicates that pressures between 30 psi and 90 psi are generally expected during the range of system water demands. For the purpose of this Master Plan, service pressures criteria were developed for various demand conditions, as summarized below.

- *Average Day Demand (ADD):* It is recommended that the City install a pressure reducing valve (PRV) on laterals with pressures that exceeds 80 psi during a typical ADD condition.
- *Peak Hour Demand (PHD):* In order to provide adequate service pressures, it is recommended that the City maintains a desirable service pressure of 35 psi during a typical PHD condition.
- *Maximum Day Demand (MDD) + Fire Flow:* This pressure criterion is related to fire flows and was devised to ensure adequate positive pressures during a fire. It is recommended that the City fire pressure criterion requires a minimum acceptable residual pressure of 20 psi at the connecting hydrant.

6.1.4 Distribution Mains

Transmission mains are generally sized to carry the greater of: 1) the PHD; or 2) the MDD plus fire flow. Other criteria related to the distribution piping include the maximum and minimum velocities and the maximum allowable friction losses.

High velocities may cause damage to the pipes and to their appurtenances. Normally, velocities of 10 feet per second (fps) (AWWA M-32), or higher, do not cause ill effects if they occur for a limited duration. It is normally good practice to limit pipe velocities to no more than 8 fps on a continuous basis.

New distribution/transmission system pipelines 12 inch in diameter or less should be sized for a maximum pipeline velocity of 5 fps, while new distribution system pipelines 16-inch in diameter or more should be sized for a maximum pipeline velocity of 4 fps.

Provided that the maximum velocity criteria and the pressure criteria are not exceeded, high pipeline head loss by itself is not a controlling factor. However, it may be an indication that the pipe is nearing the limit of its carrying capacity, and may not have sufficient capacity to perform under stringent conditions. Good practice dictates monitoring pipes that have a head loss in excess of 10 feet per 1,000 feet (AWWA M-32).

6.1.5 Fire Flow Criteria

Fire flows stress a water system in the area of the fire and often identify existing deficiencies. The deficiencies are generally associated with pipe sizes (diameter) or age (roughness) that results in high headloss and lower pressures. The fire flow criteria measures a system’s ability to deliver a high rate of water while maintaining a minimum pressure.

To evaluate the effect of fire flows throughout the distribution system, large point demands are applied at fire hydrants. The fire flow demands are run concurrent with the maximum day demand. Simulating maximum day demand plus fire flows also demonstrates the performance of supply sources, booster pumps, and storage tanks operating under the upper limit high demand conditions.

The recommended fire flow criteria are summarized below by land use. These fire flow criteria were developed based on input from City staff, including the City's Fire Marshal, and Carollo experience on similar projects.

- *Single-Family Residential:* 1,500 gpm for a duration of two hours.
- *Multi-Family Residential:* 2,000 gpm for a duration of two hours.
- *Commercial:* 3,000 gpm for a duration of three hours.
- *Industrial:* 3,000 gpm for a duration of three hours (4,000 gpm for a duration of four hours for hydrants serving Leprino and Olam).
- *Public/Institutional:* 3,000 gpm for a duration of three hours.

It should be noted that the recommended criteria flows are the minimum flows per land use type. Specific flow requirements for individual building sites may be higher depending on specific occupancy use, square footage, building height, and construction type used for the specific building (based on the currently adopted California Fire Code requirements). This Master Plan assumes that all required fire flows in excess of 4,000 gpm would be met through private onsite water supplies or supplemental storage. This approach is consistent with industry standard practice.

6.2 Supply/Pumping Capacity Evaluation

The supply capacity evaluation under existing and future demand conditions was performed by comparing the available water supplies to the projected water demands. As noted in Section 6.1, this study recommends that the City maintain a firm water supply capacity equal to the maximum day demand (MDD). Demands in excess of the MDD will be met through storage.

There are 10 active wells to supply the system. Based on input from City staff, the wells must be able to supply MDD with two wells out of service. Table 6.2 summarizes the existing available firm supply capacity of the City's wells. As shown on Table 6.2, the City's existing available firm supply capacity is 8,100 gpm (11.67 mgd).

Table 6.1 Planning and Evaluation Criteria Summary

Description	Demand Condition	Value
Pipeline Velocity		
Existing Pipelines	PHD	8 ft/s
New Pipelines (≤ 12-inch diameter)	PHD	5 ft/s
New Pipelines (≥ 16-inch diameter)	PHD	4 ft/s
Pipeline Headloss		
Existing Pipelines	PHD	10 ft/kft
New Pipelines	PHD	5 ft/kft
System Pressures		
Minimum, without Fire Flow	PHD	35 psi
Minimum, with Fire Flow	MDD + FF	20 psi
Maximum, Normal Operating Conditions	ADD	80 psi
Storage Capacity		
Operational Storage	-	25% x ADD
Emergency Storage	-	50% x ADD
Fire Flow Storage	-	Max FF Demand x Duration
Supply Capacity		
Well Production Capacity	MDD	Meet MDD with Largest Two Wells Out of Service
Pump Station Capacity		
BPS Capacity	Greater of PHD or MDD+FF	Firm Pumping Capacity Sufficient to Meet Greater of PHD or MDD+FF
Fire Flow Requirements		
Land Use Type	Fire Flow Demand (gpm)	Duration (hours)
Single Family Residential	1,500	2
Multi-Family Residential	2,000	2
Commercial	3,000	3
Industrial	3,000	3
Olam/Leprino	4,000	4
Public/Institutional	3,000	3

Table 6.2 Existing Groundwater Well Supply Capacity

Well Name	Current Status	Well Capacity (gpm)	Existing Firm Supply (1),(2),(3),(4) (gpm)
North Wellfield			
Well 2	Inactive	--	--
Well 3	Abandoned	--	--
Well 4	Active	1,850	--
Well 5	Active	1,850	1,850
Well 6	Active	1,100	1,100
In-Town Wells			
Well 7	Active	1,200	1,200
Well 8	Abandoned	--	--
Well 9	Emergency	1,200	--
Well 10	Seasonal	2,000	--
Well 11	Active	800	800
Well 12	Backup	1,150	1,150
Well 13	Active	1,000	1,000
Well 14	Active	1,000	1,000
Total	**--**	**13,150**	**8,100**

Notes.
(1) Capacity with Well 4 and 10 out of service.
(2) Only two wells operate at one time. Upgrading transmission main from North Well Field does not increase available firm capacity with two wells out of service.
(3) Well 8 and 9 not included.
(4) Well 12 is used as a backup well due to high color.

The City is planning to construct two additional wells (Wells 15 and 16) in the near future. For the purposes of this Master Plan, it was assumed that each new well will provide a pumping capacity of 1,750 gallons per minute (gpm). Table 6.3 shows the supply evaluation through build-out. Figure 6.1 is a graphical representation of the information presented in Table 6.2. As shown on Figure 6.1 and Table 6.3, with the addition of Well 15 and Well 16 there is enough supply capacity through 2040. Since the City is planning to construct Well 15 and Well 16 in the near future, these wells were included when evaluating the existing system.

Table 6.3 Supply Evaluation with Two Wells Out of Service

Year	MDD (mgd)	Available Firm Supply Capacity(1),(2),(3) (mgd)	Well Supply Increase (mgd)	New Well Number	Supply Surplus/ (Deficit) (mgd)
2017	13.50	11.66			(1.84)
2018	13.61	11.66			(1.95)
2019	13.72	11.66	2.52	15	0.46
2020	13.82	14.18	2.52	16	2.88
2021	13.94	16.70			2.77
2022	14.05	16.70			2.66
2023	14.16	16.70			2.54
2024	14.27	16.70			2.43
2025	14.38	16.70			2.32
2026	14.50	16.70			2.20
2027	14.61	16.70			2.09
2028	14.73	16.70			1.97
2029	14.85	16.70			1.86
2030	14.96	16.70			1.74
2031	15.08	16.70			1.62
2032	15.20	16.70			1.50
2033	15.33	16.70			1.38
2034	15.45	16.70			1.26
2035	15.56	16.70			1.14
2036	15.69	16.70			1.01
2037	15.82	16.70			0.88
2038	15.95	16.70			0.76
2039	16.07	16.70			0.63
2040	16.19	16.70			0.51
BO(4)	30.78	16.70	14.10	Locations TBD	0.03

Notes:
(1) Capacity with Well 4 and 10 out of service. Well 4 capacity is 2.66 mgd and Well 10 capacity is 2.88 mgd
(2) Well 8 and 9 not included.
(3) Well 12 is used as backup well due to high color.
(4) BO = buildout.

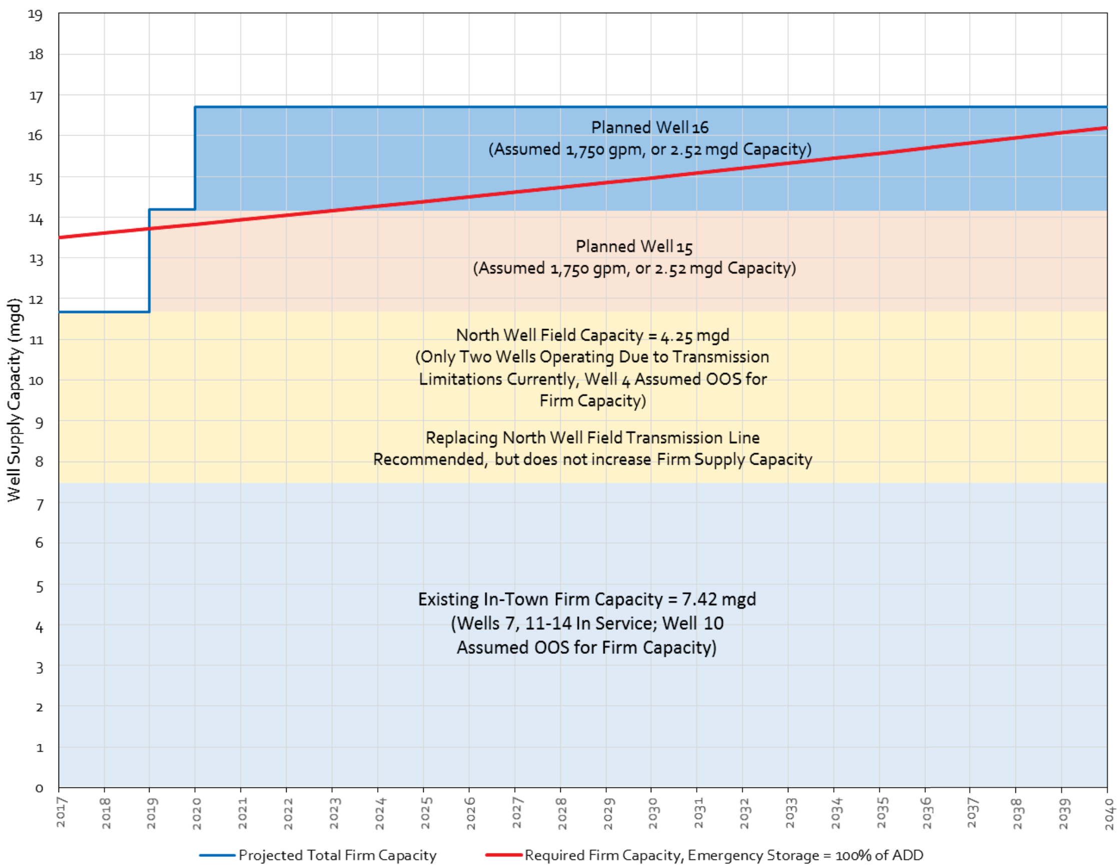

Figure 6.1 Well Supply Capacity Analysis through 2040

6.3 Storage Capacity Evaluation

The City currently has 5 storage reservoirs for a total of 4.8 million gallons (MG) of water storage. These reservoirs provide the City with operational equalization storage to meet peak hour demand (PHD), fire flow storage, and emergency storage.

6.3.1 Storage Capacity Evaluation

Treated water storage capacity criteria are defined in Section 6.2. The required operational storage is equal to 25 percent of ADD. The required fire flow storage is equal to the largest fire flow demand multiplied by the duration.

As part of the development of storage capacity improvement alternatives, three separate criteria were considered for the amount of emergency storage that would be provided. The emergency storage criteria considered were 35 percent, 50 percent, and 100 percent of the ADD. Ultimately, it was decided that the criteria of 50 percent of the ADD is the most appropriate for the City due to the nature of the City's water supply. Therefore, the information presented in this section is based on an emergency storage criteria of 50 percent of the ADD.

Table 6.4 summarizes the results of the existing system storage capacity evaluation. As shown on Table 6.4, there is currently a City-wide storage deficiency of approximately 1.35 MG (assuming a required emergency storage of 50 percent of the ADD). Figure 6.2 shows a comparison of the projected required City-wide storage through year 2040 to the total available storage volume in the City. The City is planning to construct two tanks (Well 15 Tank and an additional Well 7 Tank) in the near future. With the addition of Well 15 Tank and the additional Well 7 Tank, the City has sufficient storage capacity through 2040. Since the City is planning to construct Well 15 Tank and an additional Well 7 Tank in the near future, these tanks were included when evaluating the existing system.

Table 6.4 Storage Capacity Evaluation

Year	ADD (mgd)		MDD (mgd)	Operational Storage, 25% ADD (MG)	Emergency Storage, 50% ADD (MG)	Fire Flow, 4000 gpm for 4 hours (MG)	Required Storage (MG)	Available Tank Storage (MG)	Tank Storage Capacity Increase (MG)	Tank Name	Surplus/ (Deficit)
2017	6.93		13.50	1.73	3.46	0.96	6.15	4.80			(1.35)
2018	6.98		13.61	1.75	3.49	0.96	6.20	4.80			(1.40)
2019	7.04		13.72	1.76	3.52	0.96	6.24	4.80	2.50	Well 7, 15 Tank	1.06
2020	7.09		13.83	1.77	3.55	0.96	6.28	7.30			1.02
2021	7.15		13.94	1.79	3.57	0.96	6.32	7.30			0.98
2022	7.20		14.05	1.80	3.60	0.96	6.36	7.30			0.94
2023	7.26		14.16	1.82	3.63	0.96	6.41	7.30			0.89
2024	7.32		14.27	1.83	3.66	0.96	6.45	7.30			0.85
2025	7.38		14.39	1.84	3.69	0.96	6.49	7.30			0.81
2026	7.44		14.50	1.86	3.72	0.96	6.54	7.30			0.76
2027	7.49		14.61	1.87	3.75	0.96	6.58	7.30			0.72
2028	7.55		14.73	1.89	3.78	0.96	6.63	7.30			0.67
2029	7.61		14.85	1.90	3.81	0.96	6.67	7.30			0.63
2030	7.67		14.97	1.92	3.84	0.96	6.72	7.30			0.58
2031	7.74		15.08	1.93	3.87	0.96	6.76	7.30			0.54
2032	7.80		15.20	1.95	3.90	0.96	6.81	7.30			0.49
2033	7.86		15.33	1.96	3.93	0.96	6.85	7.30			0.45
2034	7.92		15.45	1.98	3.96	0.96	6.90	7.30			0.40
2035	7.98		15.57	2.00	3.99	0.96	6.95	7.30			0.35
2036	8.05		15.69	2.01	4.02	0.96	7.00	7.30			0.30
2037	8.11		15.82	2.03	4.06	0.96	7.04	7.30			0.26
2038	8.18		15.95	2.04	4.09	0.96	7.09	7.30			0.21
2039	8.24		16.07	2.06	4.12	0.96	7.14	7.30			0.16
2040	8.31		16.20	2.08	4.15	0.96	7.19	7.30			0.11
BO	15.78		30.78	3.63	7.26	0.96	11.85	7.30	5.50	Locations TBD	0.00

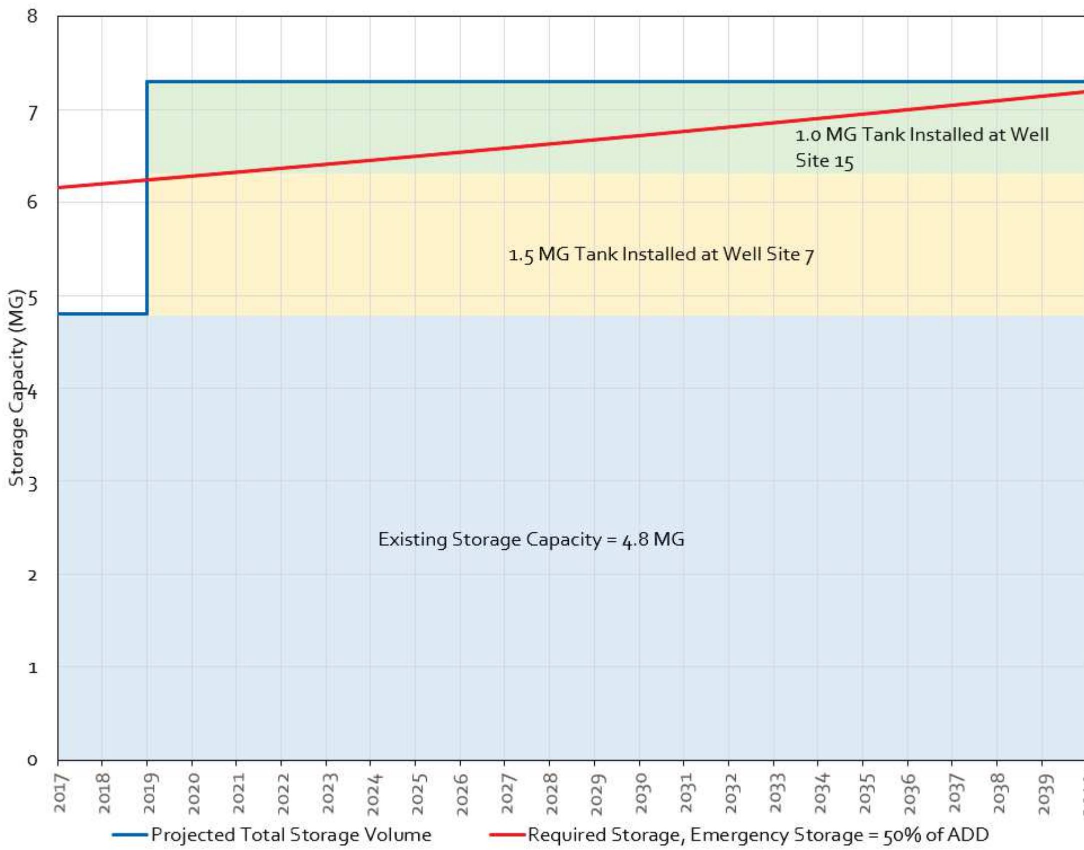

Figure 6.2 Storage Capacity Evaluation

6.4 Distribution System Capacity Analysis

This section presents results of system pressure analysis, fire flow analysis, and pipeline velocity analysis for the City's water distribution system. Recommendations to address identified deficiencies are presented in Section 6.10.

6.4.1 System Pressure Evaluation

In accordance with the criteria summarized in Section 6.1., system pressure analyses were performed using the hydraulic model for average day demand (ADD) and peak hour demand (PHD) conditions. This section summarizes the results of the analysis for the existing and future demand conditions.

For the ADD and PHD demand conditions, the hydraulic model was used to identify service nodes within the distribution system with pressures that violate the established pressure criteria. For the ADD conditions, the City's maximum desirable pressure is 80 pounds per square inch (psi). Under PHD conditions, the minimum pressure criterion in 35 psi.

6.4.1.1 ADD Maximum Pressure Analysis

Under existing ADD conditions, only one node exceeded the maximum criteria of 80 psi. This node is located near a tank and has no impact on customer pressures. No improvement projects were identified to address the high pressure node. Figure 6.3 shows the maximum modeled system pressures under ADD conditions.

Similar analyses were performed under 2040 and buildout demand conditions. The 2040 and buildout analyses did not show any additional noteworthy high pressure areas.

6.4.1.2 PHD Minimum Pressure Analysis

Figure 6.4 shows the minimum modeled system pressures under PHD conditions. The analysis showed that 2.3 percent of the nodes were below 35 psi under PHD conditions.

The areas that were identified as having pressures below 35 psi were along the Blend Line and near the tanks and pump stations. Since the low pressures occur along pipelines that do not directly serve City residents, no improvement projects were recommended to meet the minimum pressure criteria of 35 psi.

Similar analyses were performed under 2040 and buildout demand conditions. Under 2040 and buildout conditions there was not a noteworthy increase in the number of nodes with minimum pressures below 35 psi.

6.4.2 Fire Flow Analysis

The hydraulic model performs a steady state simulation at each node and reports the residual pressure at the node to evaluate impacts of the fire flow demands on the system. Nodes with less than 20 psi of residual pressure were considered deficient.

Fire flow demands were simulated at all model nodes within the existing system that are associated with a fire hydrant. This process excluded model nodes without an associated fire hydrant (such as dead end pipes without fire hydrants and nodes near tank sites).

The fire flow simulations were performed using the hydraulic models built in automated fire flow simulator. This eliminates the need to assign individual fire flow demands to all nodes, which would be extremely time consuming. Fire flow demands were assigned in the model by land use according to the fire flow demand criteria summarized in Section 6.5. Figure 6.5 shows the fire flow demand types that were assigned to each modeled system hydrant. The fire flow demands ranged from 1,500 gpm to 4,000 gpm.

The existing system fire flow analysis showed that 122 hydrants (approximately 13 percent of the system) had a residual pressure less than 20 psi under MDD plus fire flow conditions. For deficient hydrants with multiple hydrants in close proximity, it is possible to split the fire flow demand with another hydrant. The fire flow analysis was repeated for deficient hydrants by using multiple hydrants. Distributing the fire flow over two adjacent hydrants typically results in a lower pressure drop compared with the use of one hydrant. Using this approach, the number of deficient hydrants was reduced to 83. Figure 6.6 depicts hydrants that meet the evaluation criteria, deficient hydrants that were mitigated through splitting fire flows with another hydrant, and deficient hydrants. Individual improvements to address these deficiencies are presented later in Section 6.5.

Similar analyses were performed under 2040 and buildout demand conditions. No new fire flow deficiencies were identified.

6.4.3 Pipeline Velocity Analysis

Pipeline velocity analyses were performed based on the criteria provided in Section 6.4 using the hydraulic model for PHD conditions. As documented in Section 6.4, the pipeline velocity analysis was performed to identify pipelines within the distribution system with velocities that exceed

8 feet per second (fps) under PHD conditions. Under existing PHD conditions, 14 pipelines were identified that exceeded the pipeline velocity criteria. By year 2040, three additional pipelines exceeded the pipeline velocity criteria. No additional pipelines were identified at buildout.

The pipelines that exceeded the established maximum velocity criteria are shown on Figure 6.7. The proposed improvement projects to mitigate these deficiencies are discussed later in this chapter.

6.5 Distribution System Improvements

This section summarizes the improvements recommended for the water distribution system Figure 6.8 and Figure 6.9, and Figure 6.10 provide a graphical illustration of the improvements recommended to address existing capacity deficiencies, to meet projected 2040 water demands, and to serve full build out of the City service area, respectively. Detailed improvement sheets can be found in Appendix B.

6.5.1 Existing Versus Future Improvements

An existing deficiency is one where the existing facility's capacity is insufficient to meet the planning criteria (e.g. pipeline upgrades required to meet fire flow criteria) for existing users. If a project was proposed to exclusively correct an existing deficiency, then existing users would be assigned 100 percent of the project's benefit, and therefore, 100 percent of the costs.

Future growth will trigger the construction of new facilities to support this growth (e.g., new distribution system pipelines to serve vacant areas within the City service area). If a specific project is needed to serve future growth exclusively, the future users will be assigned 100 percent of the future project's benefit and 100 percent of the costs.

In some cases, such as a proposed storage tank, projects are needed to mitigate existing deficiencies and to accommodate future growth. Where a project is needed to mitigate existing deficiencies and serve future growth, the future user benefit was determined based on the additional capacity necessary to serve future growth. More information on the breakdown in cost split between existing and future users and whether a proposed improvement is intended to correct an existing deficiency, to serve a future user, or both is provided in Chapter 7.

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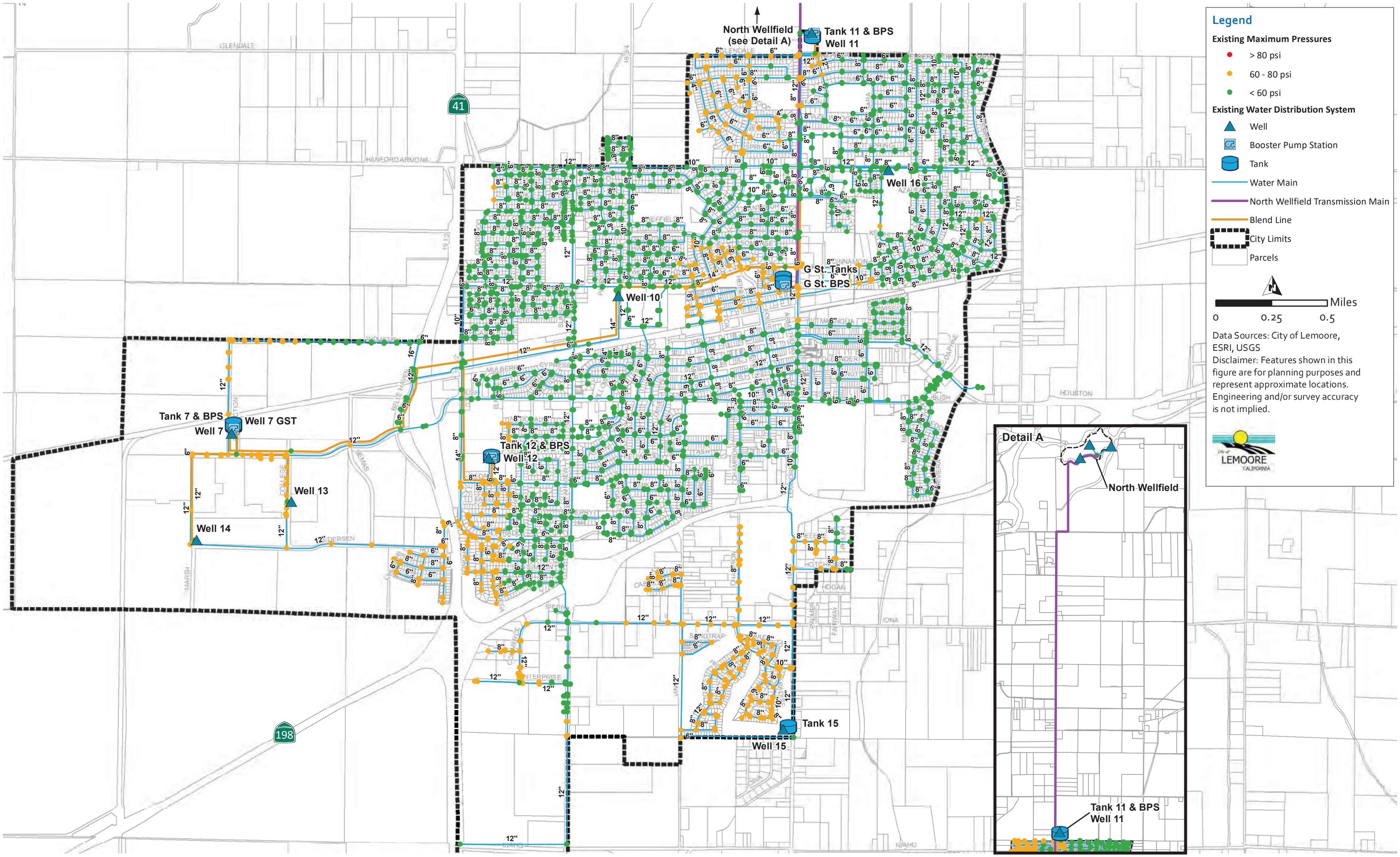

Figure 6.3 Existing Average Day Demand Maximum Pressures

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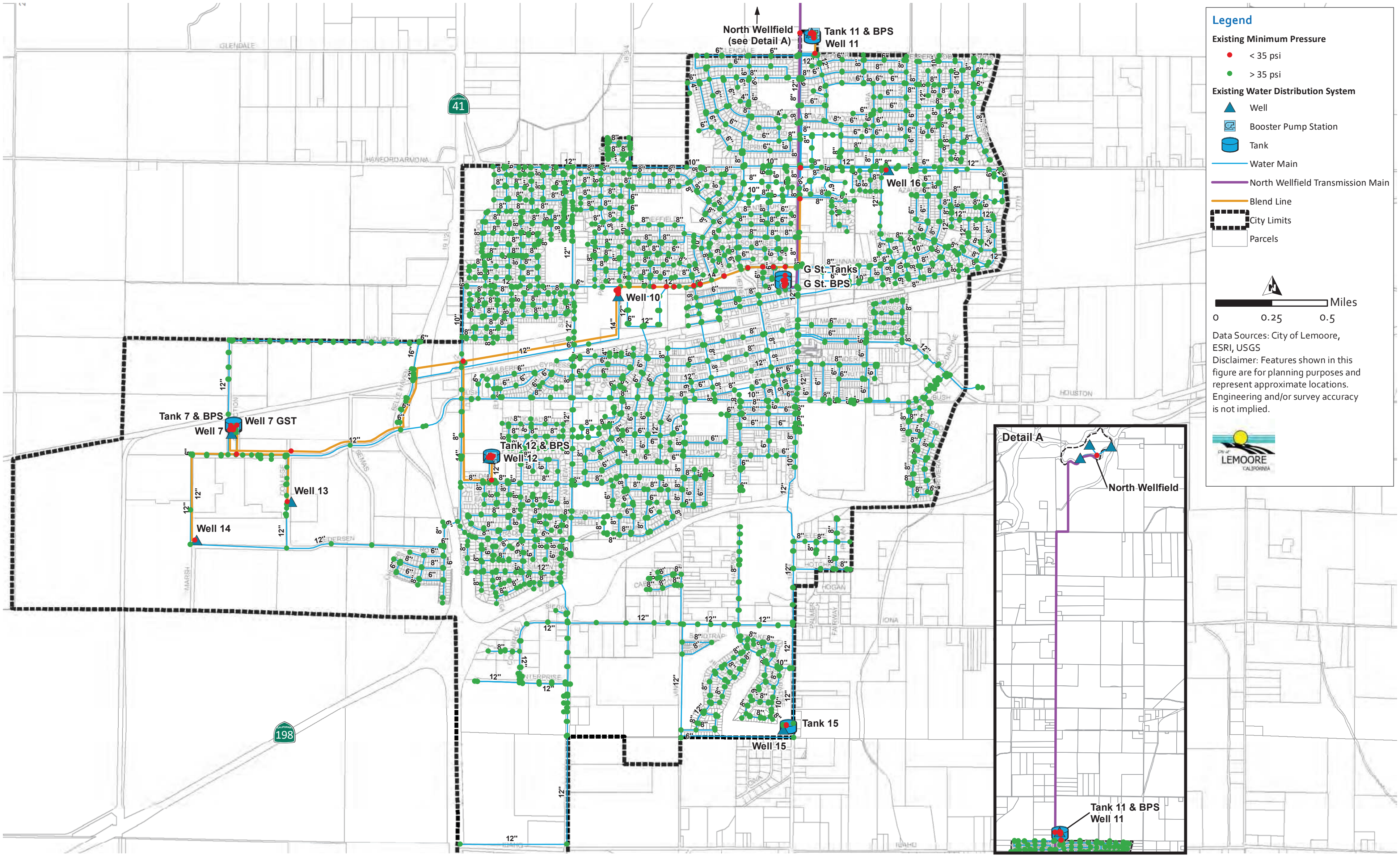

Figure 6.4 Existing Peak Hour Demand Minimum Pressures

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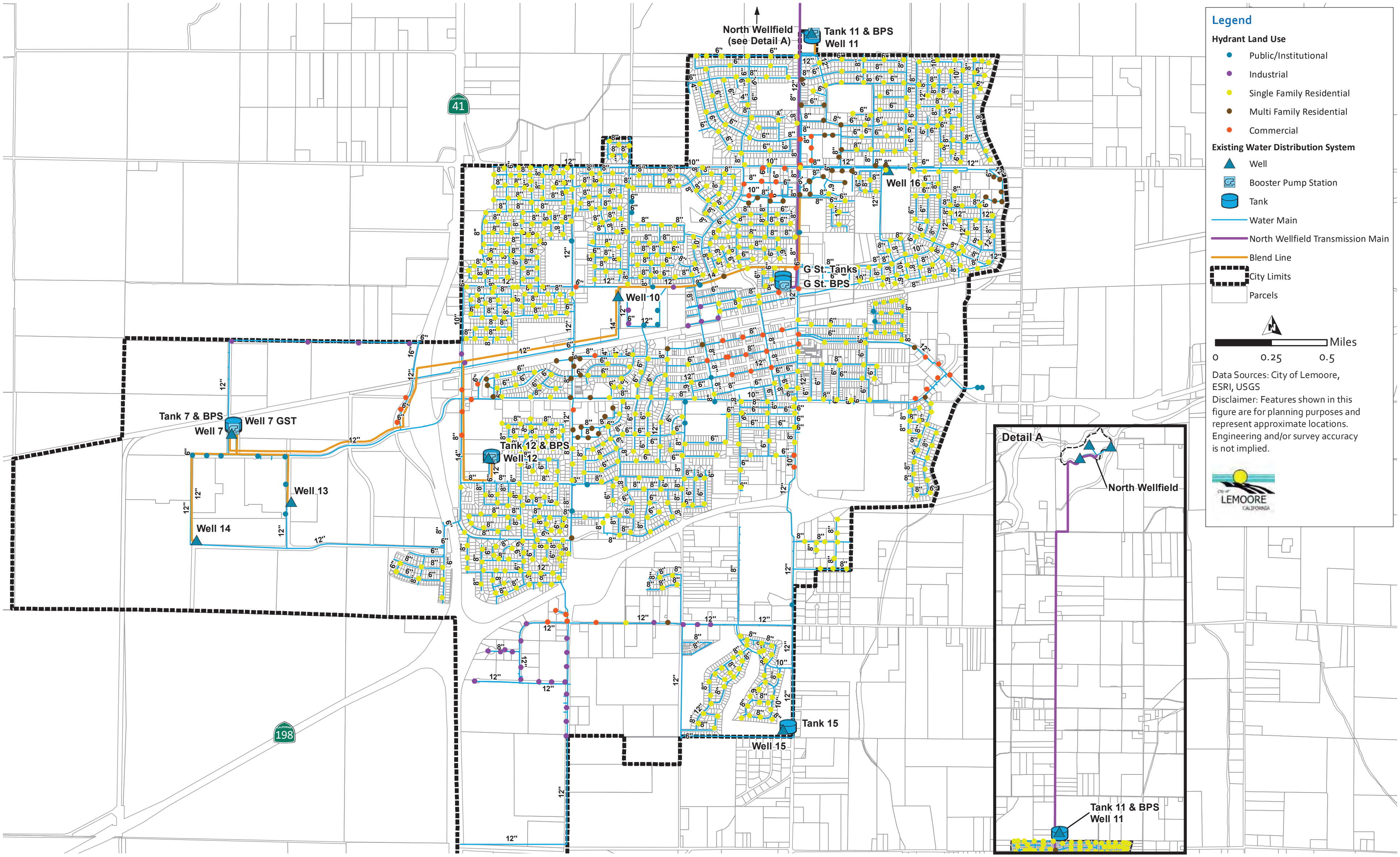

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Figure 6.5 Existing Fire Hydrant Land Use

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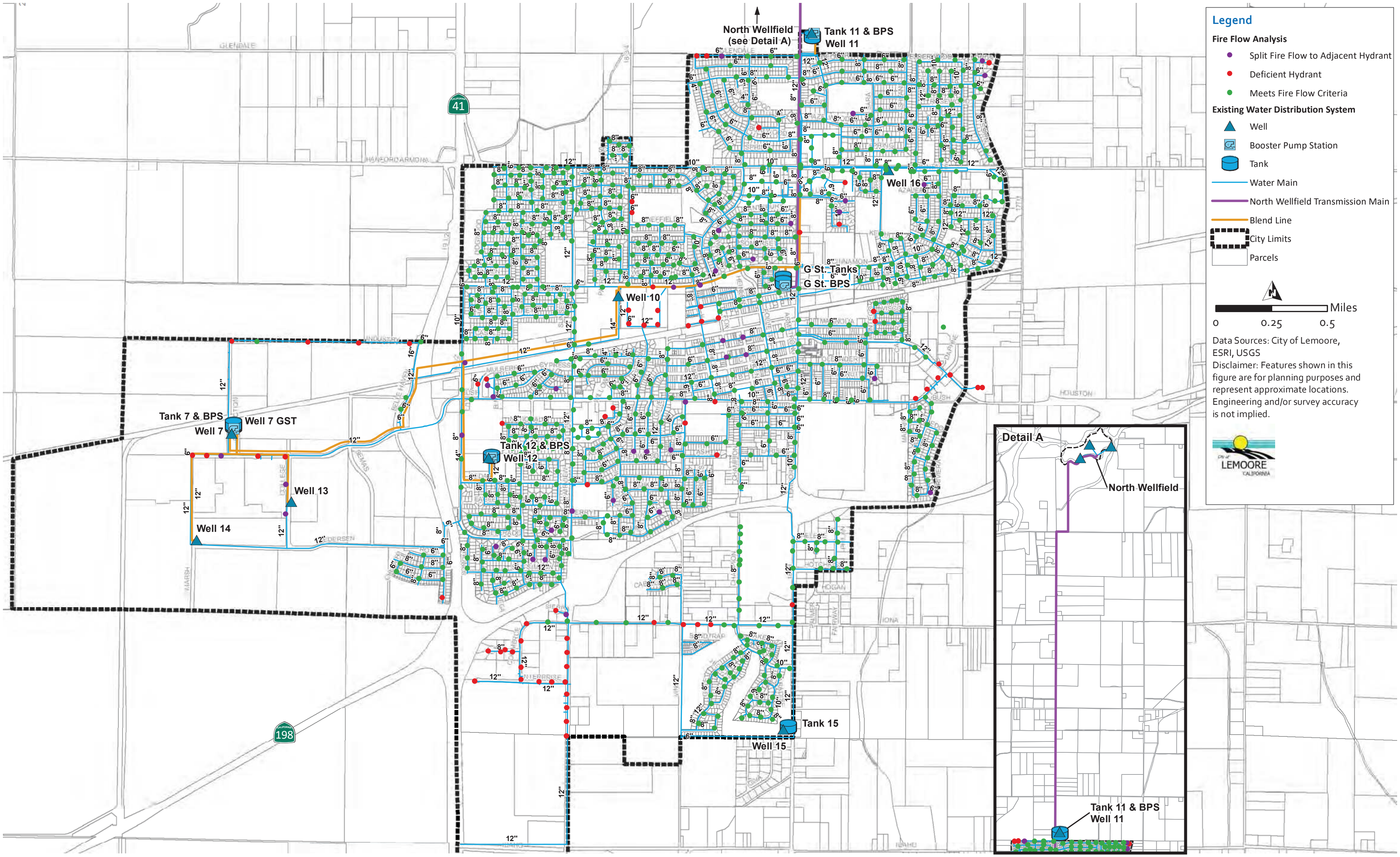

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Figure 6.6 Existing Maximum Day Demand Plus Fire Flow Analysis Results

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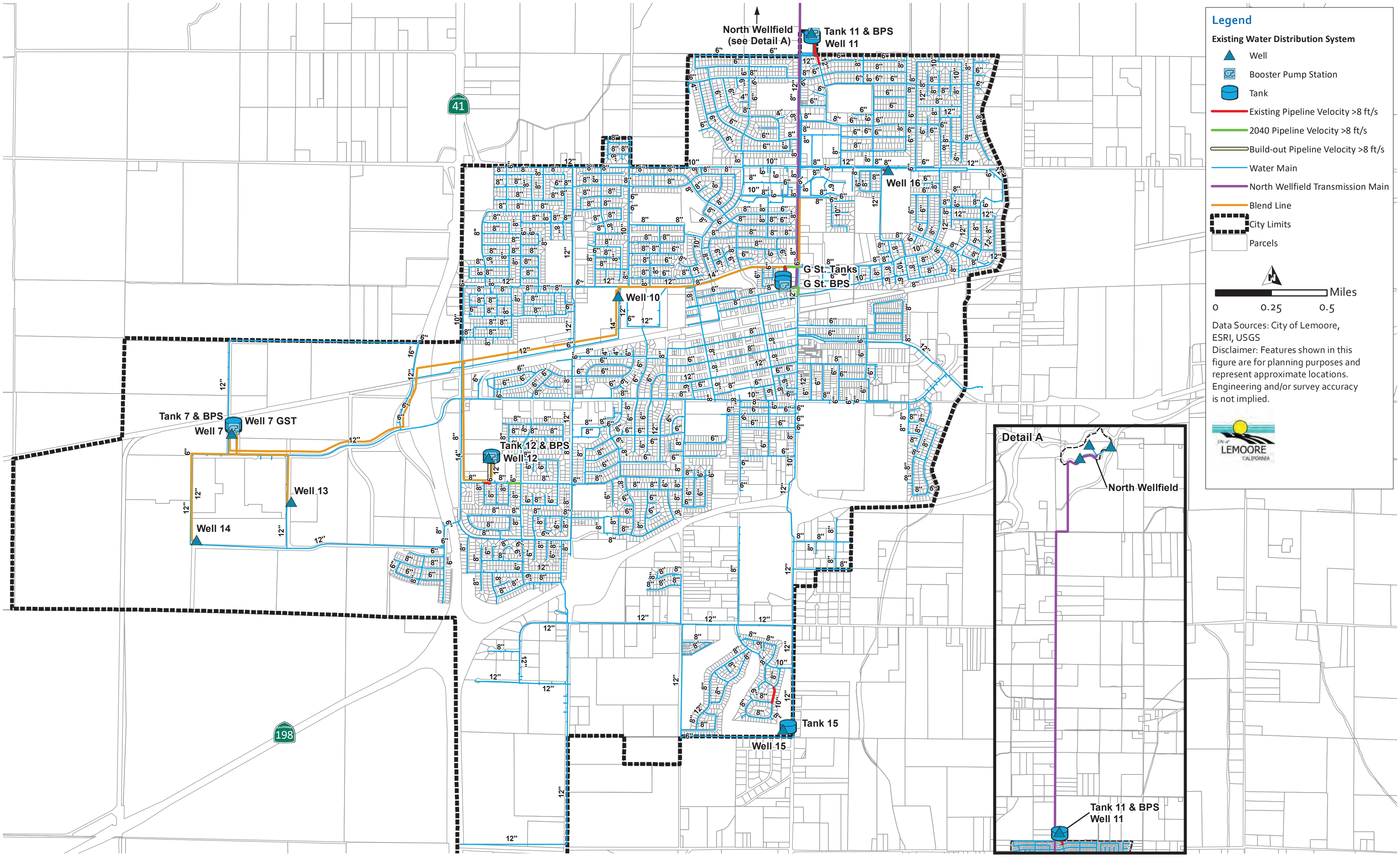

Figure 6.7 Peak Hour Demand Velocities

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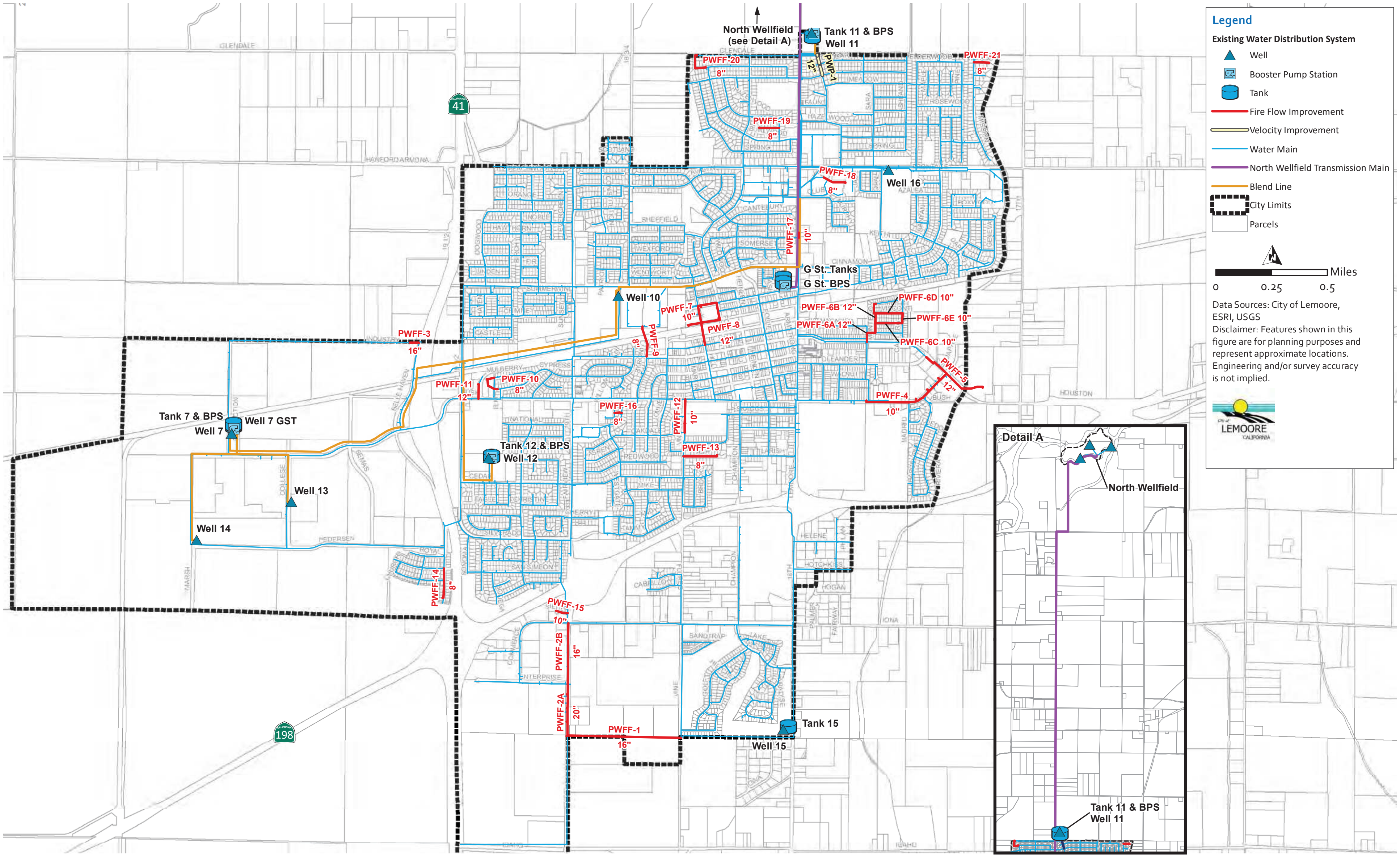

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Figure 6.8 Existing System Improvements

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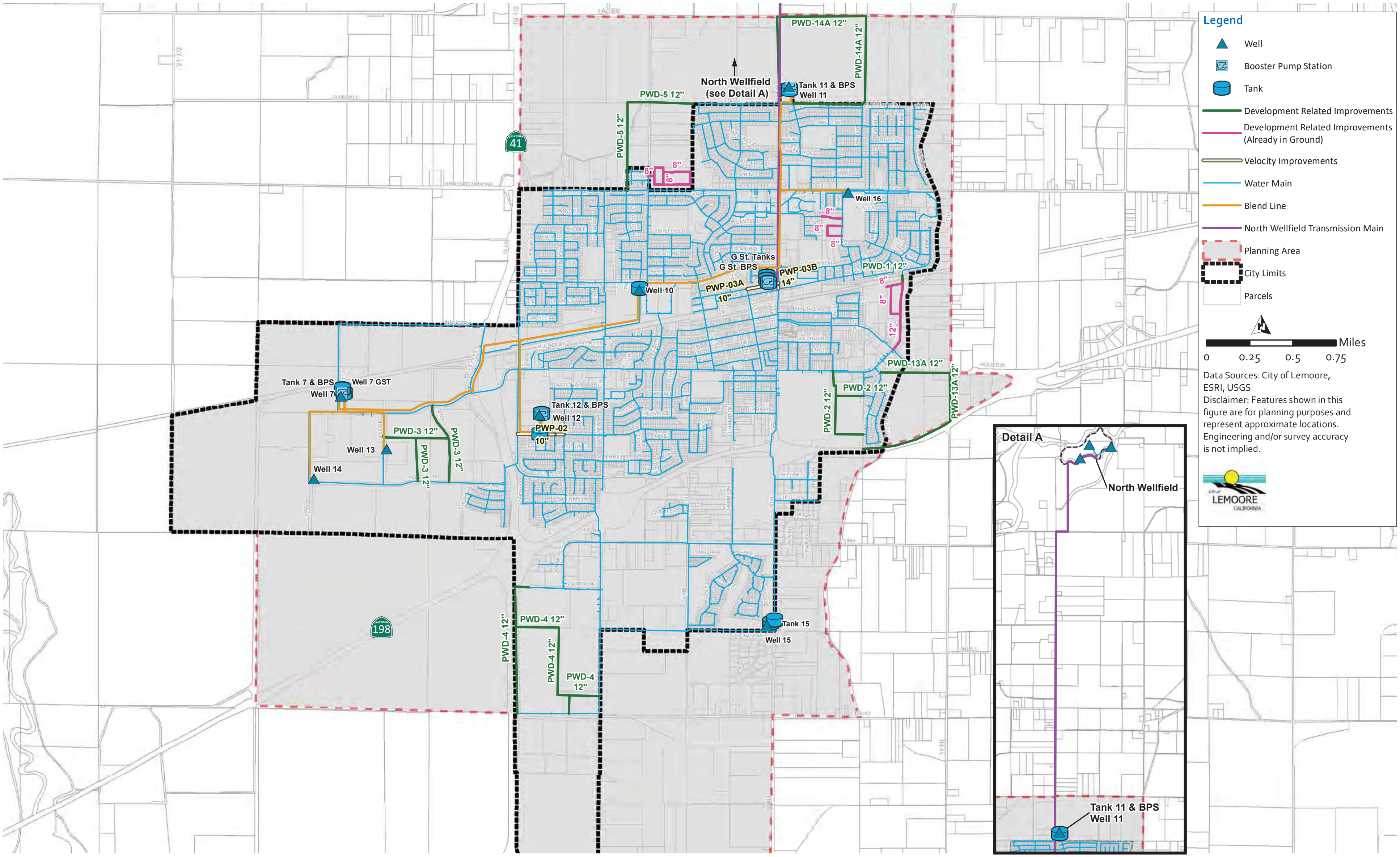

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Figure 6.9 2040 System Improvements

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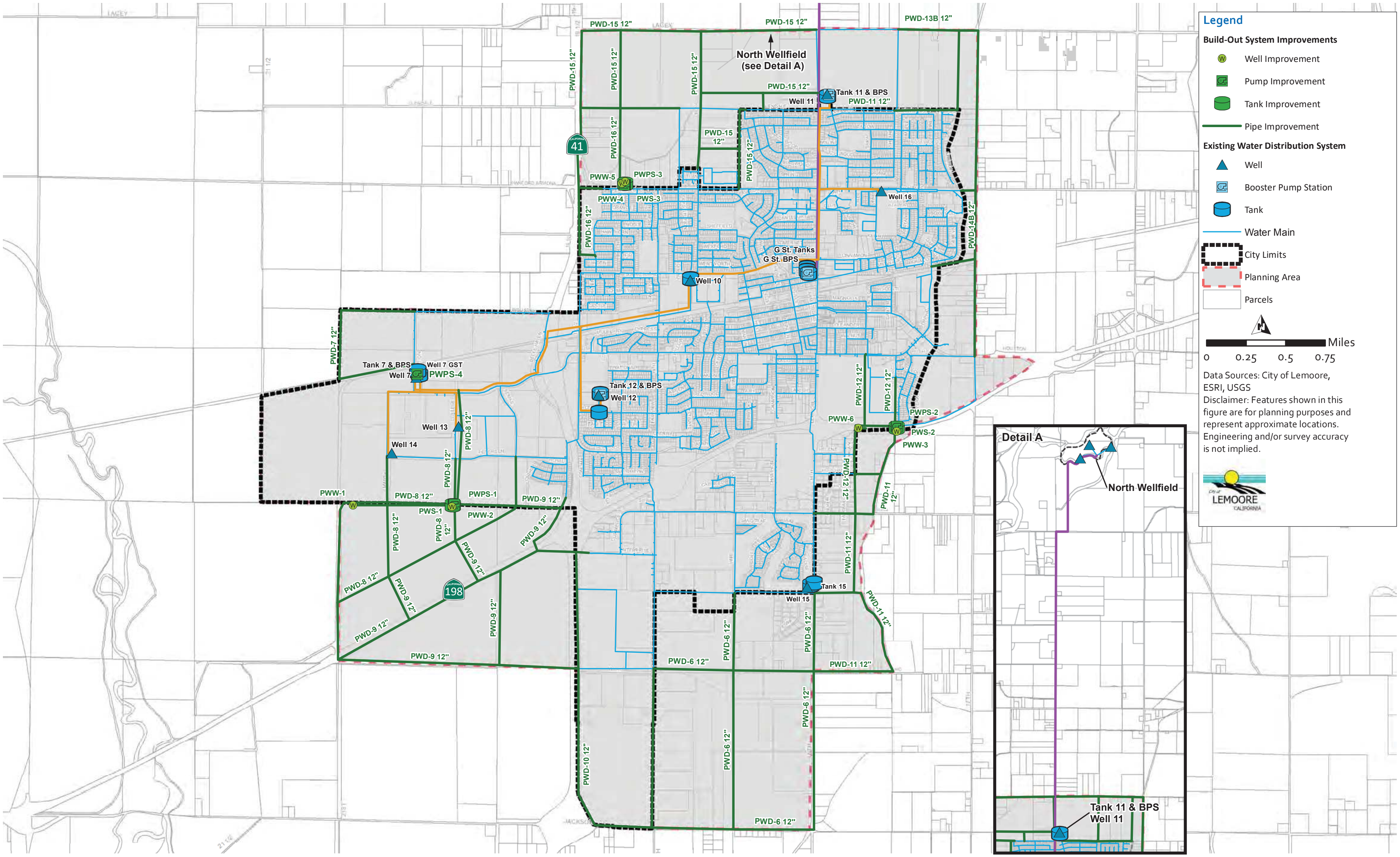

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Figure 6.10 **Buildout System Improvements**

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6.5.2 Supply/Pumping Improvements

The following supply and pumping improvements are recommended in order to meet existing demand requirements:

- *Well 15 (PWW-9):* This project includes the addition of Well 15. This well will provide an additional 2.5 mgd supply for the existing system. This project is already planned and funded.
- *Well 16 (PWW-10):* This project includes the addition of Well 15. This well will provide an additional 2.5 mgd supply for the existing system. This project is already planned and funded.

The following supply and pumping improvements are recommended in order to meet build out demand requirements:

- *Well 17 (PWW-1):* This project includes the addition of Well 17. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 2 mgd supply well be added in the southwest area of the City. This project is needed to supply Well 18 Tank.
- *Well 18 (PWW-2):* This project includes the addition of Well 18. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 2 mgd supply well be added in the southwest area of the City. This project is needed to supply Well 18 Tank.
- *Well 19 (PWW-3):* This project includes the addition of Well 19. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 2 mgd supply well be added in the southeast area of the City. This project is needed to supply Well 19 Tank.
- *Well 20 (PWW-4):* This project includes the addition of Well 20. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 2 mgd supply well be added in the northern area of the City. This project is needed to supply Well 21 Tank.
- *Well 21 (PWW-5):* This project includes the addition of Well 21. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 2 mgd supply well be added in the northern area of the City. This project is needed to supply Well 21 Tank.
- *Well 22 (PWW-6):* This project includes the addition of Well 22. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 2 mgd supply well be added in the southeast area of the City. This project is needed to supply Well 19 Tank.
- *Well 23 (PWW-7):* This project includes the addition of Well 23. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is

recommended that a 1.0 mgd supply well be added in the southeast area of the City. This project is needed to supply Well 19 Tank.

- *Well 24 (PWW-8):* This project includes the addition of Well 24. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 1.44 mgd supply well be added in the western area of the City. This project is needed to provide additional supply to Tank 7.
- *Well 18 Tank BPS (PWPS-1):* This project includes the addition of four pumps for the Buildout Tank 1 Pump Station. This pump station will pump water out of Buildout Tank 1 into the distribution system. At buildout, the City does not have the pumping capacity to supply PHD. To mitigate the capacity deficiency occurring under PHD conditions, it is recommended that the booster pump station with a firm capacity of 5.0 mgd be added.
- *Well 19 Tank BPS (PWPS-2):* This project includes the addition of four pumps for the Buildout Tank 2 Pump Station. This pump station will pump water out of Buildout Tank 2 into the distribution system. At buildout, the City does not have the pumping capacity to supply PHD. To mitigate the capacity deficiency occurring under PHD conditions, it is recommended that the booster pump station with a firm capacity of 6.5 mgd be added.
- *Well 21 Tank BPS (PWPS-3):* This project includes the addition of four pumps for the Buildout Tank 3 Pump Station. This pump station will pump water out of Buildout Tank 3 into the distribution system. At buildout, the City does not have the pumping capacity to supply PHD. To mitigate the capacity deficiency occurring under PHD conditions, it is recommended that the booster pump station with a firm capacity of 5.62 mgd be added.
- *Tank 7 BPS Upgrade (PWPS-4):* This project includes the addition of one pump at the Tank 7 Pump Station. At buildout, the City does not have the pumping capacity to supply PHD. To mitigate the capacity deficiency occurring under PHD conditions, it is recommended that one booster pump with the capacity of 1.44 mgd be added to the pump station, giving the pump station a firm capacity of 5.2 mgd.

6.5.3 Storage Improvements

As discussed in Section 6.8, the City will need to construct additional storage to meet the existing, 2040 and build-out demand requirements. A total of 3 new tanks are recommended for build out based on the analysis conducted for this Master Plan.

Similar to the City's current storage tanks, each tank will be located at ground level. The locations of the proposed tanks were identifies based on input from the City staff and local topography. A more detailed tank siting analysis should be performed during preliminary design of each tank. Below is a summary of the location and purpose of each of the proposed tanks:

- *Well 18 Tank (PWS-1):* This project consists of the construction of a 1.5 MG tank in the southwest area of the City. This project is needed to provide storage capacity at build out.
- *Well 19 Tank (PWS-2):* This project consists of the construction of a 2.5 MG tank in the eastern area of the City. This project is needed to provide storage capacity at build out.
- *Well 21 Tank (PWS-3):* This project consists of the construction of a 1.5 MG tank in the northern area of the City. This project is needed to provide storage capacity at build out.
- *Well 15 Tank (PWS-4):* This project consists of the construction of a 1.0 MG Tank at the Well 15 site. This project is already planned and funded.

6.5.4 Fire Flow Improvements

As discussed previously, a number of deficient fire flow nodes (residual pressures below 20 psi) were identified as part of the fire flow capacity analysis. To mitigate these deficiencies, recommendations for pipeline improvements were developed. These improvements generally consist of replacement of smaller diameter (≤ 6 inches) pipelines with larger (8 to 20 inch) diameter pipelines. In total, approximately 21,900 linear feet (4.1 miles) of fire flow improvements are recommended. Table 6.5 provides additional detail related to each fire flow improvement.

Table 6.5 Recommended Fire Flow Improvements

Improv. ID	Location	Extent	Diameter (inches)	Length (feet)
PWFF-1	Lemoore Golf Course	Vine St. to 19th Ave.	16	2,690
PWFF-2A	19th Ave.	PWFF-1 to Enterprise Dr.	20	1,550
PWFF-2B	19th Ave.	Enterprise Dr. to Iona Ave.	16	1,120
PWFF-3	Industry Way	West of Belle Haven Dr.	16	225
PWFF-4	Bush St.	Locust St. to D St.	10	2,200
PWFF-5	East D St.	Cantera Ave. to s/o Bush St.	12	1,610
PWFF-6A	Smith Ave. and Siena Way	D St to Siena Way, and Smith Ave. to Montego Way	12	420
PWFF-6B	Montego Way	Siena Way to n/o Visconti St,	12	770
PWFF-6C	Firenze St.	Montego Way to Cantera Ave.	10	640
PWFF-6D	Visconti St.	Montego Way to Cantera Ave.	10	640
PWFF-6E	Cantera Ave.	Visconti St. to Firenze St.	10	240
PWFF-7	Hill St., G St., Fox St.	F St. to G St., and Fox St. to Hill St.	10	2,230
PWFF-8	F St.	w/o Hill St.	12	330
PWFF-9	Byron Ct.	D St. to City of Lemoore Park and Recreation Department	8	730
PWFF-10	Kings River Apartments	Mulberry Ln. to Cypress Ln.	8	580
PWFF-11	West D St.	n/o Bush St.	12	360
PWFF-12	Vine St.	Bush St. to Oakdale Ln.	10	790
PWFF-13	Ash St.	Entire length of Ash St. e/o Vine St.	8	820
PWFF-14	Belle Haven Dr.	s/o Park Ln.	8	700
PWFF-15	Sierra Cir.	w/o 19th Ave.	10	280
PWFF-16	Sycamore Ln.	Linda Ln. to Ashley Ct.	8	170
PWFF-17	Lemoore Ln.	n/o Devon Dr.	10	120
PWFF-18	Janine Way	e/o and w/o Blake St.	8	550
PWFF-19	Hazelwood Pl.	w/o Hazelwood Dr.	8	480
PWFF-20	Deodar Ln.	Glendale Ave. to Burlwood Ln.	8	600
PWFF-21	Lords Ct.	Entire length of Lords Ct. e/o Mission Dr.	8	370

6.5.5 Transmission/Velocity Improvements

As discussed in Section 6.3.3, fourteen pipelines were identified that exceeded the pipeline velocity criteria under existing PHD conditions. By year 2040, three additional pipeline was identified, and no additional pipelines were identified at build-out. Several other transmission system improvements are recommended to either improve system operations or to increase system reliability. These projects are described below:

- *PWP-1:* This project consists of the replacement of approximately 470 feet of 8-inch diameter pipeline along Quandt Drive, between Glendale Avenue and Spruce Avenue with a 12-inch diameter pipeline. This is an existing improvement.
- *PWP-2:* This project consists of the replacement of approximately 1,430 feet of 8-inch diameter pipeline along Cedar Lane, between 19 ½ Avenue and Acacia Drive with a 10-inch pipeline. This is a year 2040 improvement.
- *PWP-3A:* This project consists of the replacement of approximately 660 feet of 8-inch diameter pipeline along G Street, between Follett Street and the G Street Tanks with a 10-inch pipeline. This is a year 2040 improvement.
- *PWP-3B:* This project consists of the replacement of approximately 480 feet of 8-inch diameter pipeline along G Street, between G Street Tanks and Lemoore Avenue, and along Lemoore Avenue from G Street to 200 feet south of G Street with a 14-inch pipeline. This is a year 2040 improvement.
- *North Wellfield Transmission Line (PWP-4):* This project consists of the replacement of approximately 6 miles of 18-inch diameter pipeline. The North Wellfield Transmission Line is in poor condition and is in need of replacement. To mitigate the risk of transmission line failure, it is recommended the existing pipeline be replaced. This project is already funded.

6.5.6 Distribution System Expansion to Serve Future Growth

With input from City staff, a variety of expansion improvement projects were developed to meet projected development areas by 2040 and also by ultimate buildout of the City. The following projects (PWD-1 through 6, PWD-13A, and PWD-14A) are developments that are projected to be online by 2040:

- *PWD-1:* This project consists of the addition of approximately 250 feet 12-inch diameter pipeline along Daphne Lane, between the Woodside Homes and Geneva Drive. To anticipate development in this area by 2040, it is recommended that a 12-inch diameter pipeline be added.
- *PWD-2:* This project consists of the addition of approximately 3,830 feet 12-inch diameter pipeline east of Lemoore High School, in the grove. To anticipate development in this area by 2040, it is recommended that these 12-inch diameter pipelines be added.
- *PWD-3:* This project consists of the addition of approximately 5,870 feet 12-inch diameter pipeline east of West Hills College. To anticipate development in this area by 2040, it is recommended that these 12-inch diameter pipelines be added.
- *PWD-4:* This project consists of the addition of approximately 9,540 feet 12-inch diameter pipeline east and south of Olam West Coast Inc. To anticipate development in this area by buildout, it is recommended that these 12-inch diameter pipelines be added.

- *PWD-5:* This project consists of the addition of approximately 32,830 feet 12-inch diameter pipeline in the southeast portion of the City. To anticipate development in this area by 2040, it is recommended that these 12-inch diameter pipelines be added.
- *PWD-6:* This project consists of the addition of approximately 4,920 feet 12-inch diameter pipeline along Glendale Avenue, between Deodar Lane to east of 18 3/4-Avenue, and extending south to Hanford Armona Road. To anticipate development in this area by 2040, it is recommended that these 12-inch diameter pipelines be added.
- *PWD-13A:* This project consists of the addition of approximately 6,450 feet 12-inch diameter pipeline located on the eastern edge of the City, along 17th Avenue north of Highway 198. To anticipate development in this area by 2040, it is recommended that these 12-inch diameter pipelines be added.
- *PWD-14A:* This project consists of the addition of approximately 10,220 feet of 12-inch diameter pipeline located along Lacey Boulevard and Glendale Avenue between 17th Avenue and 18th Avenue, and along 18th Avenue between Lacey Boulevard and Glendale Avenue. To anticipate development in this area by 2040, it is recommended that these 12-inch diameter pipelines be added.

The remainder of the projects (PWD-7 through 17) are areas of the City that are projected to be developed at ultimate buildout of the City. A description of these projects can be found in Appendix B.

6.5.7 Pipeline Rehabilitation and Replacement Projects

It is recommended that pipeline rehabilitation and replacement projects occur annually to ensure the distribution system continues to be reliable.

6.5.8 Other Improvements

A variety of other projects were identified in addition to the distribution system improvements. The recommended improvements are described below:

- *Water Master Plan Update (PWO-1):* It is recommended that the City update its water master plan every five years.
- *Water Treatment Plants (PWO-2):* The City is currently in the process of designing Water Treatment Plant Project for the Well 7 site and Well 11 site to address water quality issues throughout the system. This project is already funded.

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Chapter 7

CAPITAL IMPROVEMENT PLAN

This chapter presents the City of Lemoore (City) capital improvement projects, a summary of the capital costs, and a basic assessment of the possible financial impacts on the City. This chapter is organized to assist the City in making financial decisions. The Capital Improvement Plan (CIP) is based on the evaluation of the City's water distribution system as described in Chapter 6.

7.1 Project Prioritization

As discussed in Chapter 6, the capital projects identified will allow the water distribution system to reliably serve the City's peak water demand through the year 2040 and ultimate build-out. The improvement projects were prioritized based on the following factors:

- Upgrading existing facilities to mitigate current capacity deficiencies, and increasing the reliability of existing facilities.
- Upgrading existing facilities to accommodate increased water demands for the 2040 planning years.
- Expanding the cities distribution system infrastructure to serve existing vacant land areas.

Based on these factors, each project was categorized as either an Existing, Future (Year 2040), or Build-out project. This terminology defines the driver for each improvement project. Existing improvements are required to mitigate existing capacity deficiencies or to rehabilitate or repair an existing facility. Future (Year 2040) improvements are necessary to meet the projected peak demands in the year 2040. Build-out improvements are necessary to accommodate demand increases that are projected to occur after the year 2040.

7.2 Capital Improvement Project Costs

The capacity upgrades and other water system capital improvements set the foundation of the City's waste distribution system CIP. The cost estimates presented in this study are opinions developed from bid tabulations, cost curves, information obtained from previous studies, and Carollo Engineers, Inc. (Carollo) experience on other projects. The costs are based on an *Engineering News Record* Construction Cost Index (ENR CCI) 20-City Average of 11,183 (October 2018).

7.3 Cost Estimating Accuracy

The cost estimates presented in the CIP have been prepared for general master planning purposes and for guidance in project evaluation and implementation. Final costs of a project will depend on actual labor and materials costs, competitive market conditions, final project scope, implementation schedule, and other variable factors such as preliminary alignment generation, investigation of alternative routings, and detailed utility and topography surveys.

The Association for the Advancement of Cost Engineering (AACE) defines an Order of Magnitude Estimate, deemed appropriate for master plan studies as an approximate estimate made without detailed engineering data. It is normally expected that an estimate of this type would be accurate within plus 50 percent to minus 30 percent. This section presents the assumptions used in developing order of magnitude cost estimates for recommended facilities.

7.4 Construction Unit Costs

The construction costs are representative of water distribution system facilities under normal construction conditions and schedules. Costs have been estimated for public works construction.

7.4.1 Pipeline Unit Costs

Water distribution system pipeline improvements range in size from 8-inches to 20-inches in diameter in this master plan. Pipeline unit costs for relevant sized upgrades are shown in Table 7.1. The unit costs are for "typical" field conditions with construction in stable soil.

Table 7.1 Pipeline Unit Costs

Pipe Size (inches)	Replacement Unit Construction Cost(1) ($/linear foot)
8	180
10	225
12	235
14	310
16	310
20	390

Notes:
(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

7.4.2 Storage Tank, Booster Pump, and Well Unit Costs

This Master Plan includes storage tank, pump station, and well improvement projects. The costs for storage tank and pump station improvements were developed based on the unit costs shown in Table 7.2 and Table 7.3, respectively. A baseline construction cost of $0.50 per mgd was assumed for all new wells.

Table 7.2 Storage Tank Unit Costs

Tank Volume (MG)	Unit Construction Cost (1) ($/gallon)
<1	1.50
1 to 3	1.50
3 to 5	1.50
5 to 10	1.50

Notes:
(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

Table 7.3 Booster Pump Station Unit Costs

Horsepower (hp)	Unit Construction Cost (1) ($/hp)
100 hp and smaller	5,000
100 to 500 hp	3,000
600 to 1,000 hp	2,500
1,000 hp and larger	2,000

Notes:
(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

7.5 Project Costs and Contingencies

Project cost estimates are calculated based on elements, such as the project location, size, length, and other factors. Allowances for project contingencies consistent with an "Order of Magnitude" estimate are also included in the project costs prepared as part of this study, as outlined in this section.

7.5.1 Baseline Construction Cost

Baseline Construction Cost is the total estimated construction cost, in dollars, of the proposed improvements for pipelines, storage tanks, booster pump stations, and wells. Baseline Construction Costs were developed using the following criteria:

- *Pipelines:* Calculated by multiplying the estimated length by the unit cost.
- *Storage Tanks:* Calculated by multiplying the tank volume by the unit cost.
- *Booster Pump Stations:* Calculated by multiplying the required total pump horsepower by the unit cost.
- *Wells:* Calculated on a case-by-case basis depending on the type of work that is required.

7.5.2 Estimated Construction Cost

Contingency costs must be reviewed on a case-by-case basis because they will vary considerably with each project. Consequently, it is appropriate to allow for uncertainties associated with the preliminary layout of a project. Factors such as unexpected construction conditions, the need for unforeseen mechanical items, and variations in final quantities are a few of the items that can increase project costs for which it is wise to make allowances in preliminary estimates. To assist the City in making financial decisions for these future construction projects, contingency costs will be added to the planning budget as percentages of the total construction cost, divided into two categories: Estimated Construction Cost and Capital Improvement Cost.

Since knowledge about site-specific conditions of each proposed project is limited at the master planning stage, a 30 percent contingency was applied to the Baseline Construction Cost to account for unforeseen events and unknown conditions. A 30 percent contingency was used to account for unknown sit conditions such as unforeseen conditions, environmental mitigations, and other unknowns is typical for master planning projects.

7.5.3 Capital Improvement Cost

Other project construction contingency costs include costs associated with project engineering, construction phase professional services, and project administration. Engineering services associated with new facilities include preliminary investigation and reports, Right of Way (ROW) acquisition, foundation explorations, preparation of drawings and specifications during construction, surveying and staking, sampling of testing material, and start-up services. Construction phase professional services cover items such as construction management, engineering services, materials testing, and inspection during construction. Finally, there are project administration costs, which cover items such as legal fees, environmental/California Environmental Quality Act (CEQA) compliance requirements, financing expenses, administrative costs, and interest during construction.

The cost of these items can vary, but for the purpose of this study, it is assumed that the other project contingency costs will equal approximately 27.5 percent of the Estimated Construction Cost.

As shown in the following simple calculation of the Capital Improvement Cost, the total cost of all project construction contingencies (construction, engineering services, construction management, and project administration) is 65.8 percent of the Baseline Construction Cost. Note that contingencies were not applied to land acquisition costs. Calculation of the 65.8 percent is the overall mark-up on the Baseline Construction Cost to arrive at the Capital Improvement Cost. It is not an additional contingency.

Example:

Baseline Construction Cost	**$1,000,000**
Construction Contingency (30%)	$300,000
Estimated Construction Cost	**$1,300,000**
Engineering Cost (10%)	$130,000
Construction Management (10%)	$130,000
Project Administration (7.5%)	$97,500
Capital Improvement Cost	**$1,657,500**

A summary of the capital project costs is presented in Table 7.4. This table identifies the projects, provides a brief description of the project, identifies facility size (e.g. pipe diameter and length), and provides capital improvement cost. The columns used in Table 7.4 refer to the following:

- *ID:* Assigned number that corresponds to the Proposed Improvement Table. This is an alphanumeric number that starts with one letter indicating the type of improvement (PWFF = Fire Flow Related; PWP = Potable Water Transmission Related; PWD = Potable Water Development Related; PWPS = Water Pump Station Related; PWW = Water Wells) and continues with a number
- *Types of Improvements:* Pipelines, storage tanks, booster pumps, wells, rehabilitation and repair.
- *Description/Street:* Street in which the improvement is proposed.
- *Existing Size/Type:* This is the size of the existing pipeline/facility. It represents the diameter of the existing pipelines (in inches) or the size of the facility (e.g., storage tanks in MG, size of booster stations in gallons per minute (gpm), etc.).
- *Proposed Size/Type:* This is the size of the proposed improvement. It represents the diameter of the proposed pipeline (in inches) or the size of the proposed facility (e.g., storage tanks in MG, size of booster stations in gpm, etc.).
- *Replace/New:* Indicates whether the proposed improvement is a replacement pipeline, parallel pipeline, or a new facility.

- *Length:* Estimated length of the proposed improvement (in feet), if applicable. It should be noted that the length estimates do not account for re-routing the alignments to avoid unknown conditions.
- *Preliminary Project Schedule:* This is an estimated improvement project start year.

The tables also show the probable phase in which the projects would be implemented. The implementation timeframe was based on the priority of each project to correct existing deficiencies or to serve future users.

7.6 Capital Improvement Project Implementation

As outlined in Chapter 6, the proposed capital improvements are prioritized bases on their urgency to mitigate existing deficiencies and condition issues and for serving future growth. The capital improvements were phased according to the improvement categories described in Section 7.1 into one of the following phases:

- *Phase 1 (2019-2023):* This phase includes projects that are targeted as highest priority Existing improvements.
- *Phase 2 (2024-2028):* This phase includes medium priority Existing improvements.
- *Phase 3 (2029-2040):* This phase includes low priority Existing improvements.
- *Phase 4 (2041 and beyond):* This phase includes improvements related to ultimate buildout of the City.

Each project is itemized by phase in Table 7.4 and a summary by phase and project type is provided in

Table 7.4. As shown in Table 7.5, out of the $105.7 million in capital projects, $10.0 million (9 percent) are targeted for implementation in Phase 1 and an additional $2.3 million (2 percent) are targeted for Phase 2. A large portion of the capital projects are targeted for implementation in Phase 3 and 4. $9.3 million in capital projects (9 percent) are targeted for Phase 3 and the remaining $84.1 million (80 percent) of capital improvements has been included in Phase 4.

Table 7.5 shows the distribution of capital costs by project type. As shown on Figure 7.1, Development Related projects and Storage Reservoir projects account for the largest portions of capital improvement project costs at 62 percent and 13 percent, respectively. Well projects and fire flow improvement projects account for 11 percent and 6 percent of the total CIP costs, respectively. The remaining 6 percent of the CIP costs are associated with pump station projects, transmission and distribution main improvements, other projects, and rehabilitation and replacement projects.

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Table 7.4 20-Year Water Distribution System CIP

Improvements		Existing Size/Type	Proposed Size/Type	Proposed Amount	CIP Cost Estimate(1)(2)(3)(4) ($)	Existing User Cost ($)	Future User Cost ($)	CIP Phasing ($)							
								Near-Term						Long-Term	Build-Out
								2019	2020	2021	2022	2023	2024-2028	2029-2040	2041 & beyond
Capacity Improvements					$ 102,937,000	$ 11,009,000	$ 91,928,000	$ 1,048,000	$ 802,000	$ 725,000	$ 797,000	$ 5,953,000	$ 1,684,000	$ 7,825,000	$ 84,103,000
Fire Flow Improvements		Diameter (in)	Diameter (in)	Length (ft)	$ 6,037,000	$ 6,037,000	$ -	$ 1,048,000	$ 666,000	$ 725,000	$ 797,000	$ 1,117,000	$ 1,684,000	$ -	$ -
PWFF-1	Pipeline between Vine Street & 19th Avenue	--	16	2,690	$ 1,048,000	$ 1,048,000	$ -	$ 1,048,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
PWFF-2A	Pipeline along 19th Avenue	12	20	1,550	$ 681,000	$ 681,000	$ -	$ -	$ -	$ -	$ -	$ 681,000	$ -	$ -	$ -
PWFF-2B	Pipeline along 19th Avenue	12	16	1,120	$ 436,000	$ 436,000	$ -	$ -	$ -	$ -	$ -	$ 436,000	$ -	$ -	$ -
PWFF-3	Pipeline along Industry Way	12	16	225	$ 88,000	$ 88,000	$ -	$ -	$ -	$ -	$ 88,000	$ -	$ -	$ -	$ -
PWFF-4	Pipeline along Bush Street	8	10	2,200	$ 547,000	$ 547,000	$ -	$ -	$ 547,000	$ -	$ -	$ -	$ -	$ -	$ -
PWFF-5	Pipeline along East D Street	8	12	1,610	$ 467,000	$ 467,000	$ -	$ -	$ -	$ -	$ 467,000	$ -	$ -	$ -	$ -
PWFF-6A	Pipeline along Smith Avenue and Siena Way	8	12	420	$ 123,000	$ 123,000	$ -	$ -	$ -	$ 123,000	$ -	$ -	$ -	$ -	$ -
PWFF-6B	Pipeline along Montego Way	8	12	770	$ 224,000	$ 224,000	$ -	$ -	$ -	$ 224,000	$ -	$ -	$ -	$ -	$ -
PWFF-6C	Pipeline along Firenze Street	8	10	640	$ 159,000	$ 159,000	$ -	$ -	$ -	$ 159,000	$ -	$ -	$ -	$ -	$ -
PWFF-6D	Pipeline along Visconti Street	8	10	640	$ 159,000	$ 159,000	$ -	$ -	$ -	$ 159,000	$ -	$ -	$ -	$ -	$ -
PWFF-6E	Pipeline along Cantera Avenue	8	10	240	$ 60,000	$ 60,000	$ -	$ -	$ -	$ 60,000	$ -	$ -	$ -	$ -	$ -
PWFF-7	Pipeline along Hill Street, G Street, and Fox Street	8	10	2,230	$ 555,000	$ 555,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 555,000	$ -	$ -
PWFF-8	Pipeline along F Street	6	12	330	$ 96,000	$ 96,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 96,000	$ -	$ -
PWFF-9	Pipeline along Byron Court	6	8	730	$ 146,000	$ 146,000	$ -	$ -	$ -	$ -	$ 146,000	$ -	$ -	$ -	$ -
PWFF-10	Pipeline through Kings River Apartments parking lot	6	8	580	$ 116,000	$ 116,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 116,000	$ -	$ -
PWFF-11	Pipeline along west D Street	6	12	360	$ 104,000	$ 104,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 104,000	$ -	$ -
PWFF-12	Pipeline along Vine Street	8	10	790	$ 197,000	$ 197,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 197,000	$ -	$ -
PWFF-13	Pipeline along Ash Street	6	8	820	$ 162,000	$ 162,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 162,000	$ -	$ -
PWFF-14	Pipeline along Belle Haven Drive	6	8	700	$ 139,000	$ 139,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 139,000	$ -	$ -
PWFF-15	Pipeline along Sierra Circle	6	10	280	$ 70,000	$ 70,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 70,000	$ -	$ -
PWFF-16	Pipeline along Sycamore Lane	6	8	170	$ 33,000	$ 33,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 33,000	$ -	$ -
PWFF-17	Pipeline along Lemoore Lane	8	10	120	$ 30,000	$ 30,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000	$ -	$ -
PWFF-18	Pipeline along Janine Way	6	8	550	$ 109,000	$ 109,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 109,000	$ -	$ -
PWFF-19	Pipeline along Hazelwood Place	6	8	480	$ 96,000	$ 96,000	$ -	$ -	$ -	$ -	$ 96,000	$ -	$ -	$ -	$ -
PWFF-20	Pipeline along Deodar Lane	6	8	600	$ 119,000	$ 119,000	$ -	$ -	$ 119,000	$ -	$ -	$ -	$ -	$ -	$ -
PWFF-21	Pipeline along Lords Court	6	8	370	$ 73,000	$ 73,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 73,000	$ -	$ -
Transmission & Distribution Main		Diameter (in)	Diameter (in)	Length (ft)	$ 880,000	$ 136,000	$ 744,000	$ -	$ 136,000	$ -	$ -	$ -	$ -	$ 744,000	$ -
PWP-1	Pipeline along Quandt Drive	8	12	470	$ 136,000	$ 136,000	$ -	$ -	$ 136,000	$ -	$ -	$ -	$ -	$ -	$ -
PWP-2	Pipeline along Cedar Lane	8	10	1,430	$ 356,000	$ -	$ 356,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 356,000	$ -
PWP-3A	Pipeline along G Street and Lemoore Avenue	8	10	660	$ 164,000	$ -	$ 164,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 164,000	$ -
PWP-3B	Pipeline along G Street and Lemoore Avenue	8	14	660	$ 224,000	$ -	$ 224,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 224,000	$ -
PWP-4	North Wellfield Transmission Line	18	18	--	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Development Related		Diameter (in)	Diameter (in)	Length (ft)	$ 66,034,000	$ 4,836,000	$ 61,198,000	$ -	$ -	$ -	$ -	$ 4,836,000	$ -	$ 7,081,000	$ 54,117,000
PWD-1	Pipeline along Daphne Lane	--	12	250	$ 73,000	$ -	$ 73,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 73,000	$ -
PWD-2	Pipelines east of Lemoore High School	--	12	3,830	$ 1,111,000	$ -	$ 1,111,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,111,000	$ -
PWD-3	Pipelines east of West Hills College	--	12	5,870	$ 1,702,000	$ -	$ 1,702,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,702,000	$ -
PWD-4	Pipelines near of Olam West Coast Inc.	--	12	9,540	$ 2,768,000	$ -	$ 2,768,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,768,000	$ -
PWD-5	Pipelines along Glendale Avenue and near 18 3/4 Avenue	--	12	4,920	$ 1,427,000	$ -	$ 1,427,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,427,000	$ -
PWD-6	Pipelines in the southeast of the City	--	12	32,830	$ 9,522,000	$ -	$ 9,522,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 9,522,000
PWD-7	Pipelines west of Production Avenue	--	12	7,300	$ 2,118,000	$ -	$ 2,118,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,118,000
PWD-8	Pipelines south of West Hills College	--	12	28,250	$ 8,195,000	$ -	$ 8,195,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,195,000
PWD-9	Pipelines in the southwest are of the City	--	12	28,750	$ 8,339,000	$ -	$ 8,339,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,339,000
PWD-10	Pipelines south of Olam West Coast Inc.	--	12	7,250	$ 2,103,000	$ -	$ 2,103,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,103,000
PWD-11	Pipelines east and south of Lemoore Golf Course	--	12	14,440	$ 4,189,000	$ -	$ 4,189,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,189,000
PWD-12	Pipelines east and south of Lemoore High School	--	12	9,220	$ 2,675,000	$ -	$ 2,675,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,675,000
PWD-13A	Pipelines in the eastern area of the City	--	12	6,450	$ 1,871,000	$ 1,871,000	$ -	$ -	$ -	$ -	$ -	$ 1,871,000	$ -	$ -	$ -
PWD-13B	Pipelines in the eastern area of the City		12	7,490	$ 2,173,000	$ -	$ 2,173,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,173,000
PWD-14A	Pipelines in the northeastern area of the City	--	12	10,220	$ 2,965,000	$ 2,965,000	$ -	$ -	$ -	$ -	$ -	$ 2,965,000	$ -	$ -	$ -
PWD-14B	Pipelines in the northeastern area of the City		12	12,760	$ 3,701,000	$ -	$ 3,701,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,701,000
PWD-15	Pipelines in the northwestern area of the City	--	12	29,330	$ 8,508,000	$ -	$ 8,508,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,508,000
PWD-16	Pipelines in the northwestern area of the City	--	12	8,940	$ 2,594,000	$ -	$ 2,594,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,594,000

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Table 7.4 20-Year Water Distribution System CIP

Improvements	Existing Size/Type	Proposed Size/Type	Proposed Amount	CIP Cost Estimate(1)(2)(3)(4) ($)	Existing User Cost ($)	Future User Cost ($)	CIP Phasing ($)							
							Near-Term						Long-Term	Build-Out
							2019	2020	2021	2022	2023	2024-2028	2029-2040	2041 & beyond
Pump Station	Capacity (mgd)	Capacity (mgd)	Length (ft)	$ 4,342,000	$ -	$ 4,342,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,342,000
PWPS-1 Buildout Tank 1 Pump Station	--	5.00	--	$ 995,000	$ -	$ 995,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 995,000
PWPS-2 Buildout Tank 2 Pump Station	--	6.5	--	$ 1,740,000	$ -	$ 1,740,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,740,000
PWPS-3 Buildout Tank 3 Pump Station	--	5.62	--	$ 1,193,000	$ -	$ 1,193,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,193,000
PWPS-4 Upgrade Tank 7 Pump Station	--	1.44	--	$ 414,000	$ -	$ 414,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 414,000
Storage Reservoir	Capacity (MG)	Capacity (MG)	Length (ft)	$ 13,674,000	$ -	$ 13,674,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 13,674,000
PWS-1 Well 18 Tank	--	1.5	--	$ 3,729,000	$ -	$ 3,729,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,729,000
PWS-2 Well 19 Tank	--	2.5	--	$ 6,216,000	$ -	$ 6,216,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,216,000
PWS-3 Well 21 Tank	--	1.5	--	$ 3,729,000	$ -	$ 3,729,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,729,000
PWS-4 Well 15 Tank	--	1	--	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Wells	Capacity (mgd)	Capacity (mgd)	Length (ft)	$ 11,970,000	$ -	$ 11,970,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,970,000
PWW-1 Well 17	--	2.0	--	$ 1,658,000	$ -	$ 1,658,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,658,000
PWW-2 Well 18	--	2.0	--	$ 1,658,000	$ -	$ 1,658,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,658,000
PWW-3 Well 19	--	2.0	--	$ 1,658,000	$ -	$ 1,658,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,658,000
PWW-4 Well 20	--	2.0	--	$ 1,658,000	$ -	$ 1,658,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,658,000
PWW-5 Well 21	--	2.0	--	$ 1,658,000	$ -	$ 1,658,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,658,000
PWW-6 Well 22	--	2.0	--	$ 1,658,000	$ -	$ 1,658,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,658,000
PWW-7 Well 23	--	1.0	--	$ 829,000	$ -	$ 829,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 829,000
PWW-8 Well 24	--	1.4	--	$ 1,193,000	$ -	$ 1,193,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,193,000
Rehabilitation and Replacement Projects				$ 2,200,000	$ 2,200,000	$ -	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 500,000	$ 1,200,000	$ -
PWRR-1 Annual Water Line Replacement Program	1-16	> 6	--	$ 2,200,000	$ 2,200,000	$ -	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 500,000	$ 1,200,000	$ -
Other Projects				$ 600,000	$ 600,000	$ -	$ -	$ -	$ -	$ -	$ 150,000	$ 150,000	$ 300,000	$ -
PWO-1 Water Master Plan Update	--	--	--	$ 600,000	$ 600,000	$ -	$ -	$ -	$ -	$ -	$ 150,000	$ 150,000	$ 300,000	$ -
PWO-2 Water Treatment Plants	--	--	--	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CIP Total				**$ 105,737,000**	**$ 13,809,000**	**$ 91,928,000**	**$ 1,148,000**	**$ 902,000**	**$ 825,000**	**$ 897,000**	**$ 6,203,000**	**$ 2,334,000**	**$ 9,325,000**	**$ 84,103,000**
Annual Cost				**N/A**	**N/A**	**N/A**	**$ 1,148,000**	**$ 902,000**	**$ 825,000**	**$ 897,000**	**$ 6,203,000**	**$ 466,800**	**$ 777,083**	**N/A**

Notes:

(1) ENR 20 City Average Construction Cost Index for February 2018 is 10,889.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

(4) Total Mark-Up is 65.8% of the baseline construction costs.

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Table 7.5 CIP Cost by Project Type and Phase

Project Type	Phase 1 (2019-2023) ($)	Phase 2 (2024-2028) ($)	Phase 3 (2028-2040) ($)	Phase 4 (2041 & Beyond) ($)	Total ($)
Capacity/Storage Improvements					
Fire Flow Related	4,353,000	1,684,000	--	--	6,037,000
Pipeline Related	136,000	--	744,000	--	880,000
Development Related	4,836,000	--	7,081,000	54,117,000	66,034,000
Pump Stations	--	--	--	4,342,000	4,342,000
Storage Reservoir	--	--	--	13,674,000	13,674,000
Wells	--	--	--	11,970,000	11,970,000
Subtotal	9,325,000	1,684,000	7,825,000	84,103,000	102,937,000
Rehabilitation and Replacement Projects					
Pipeline R&R Program	500,000	500,000	1,200,000	--	2,200,000
Subtotal	500,000	500,000	1,200,000	--	2,200,000
Other Projects					
Other Projects	150,000	150,000	300,000	--	600,000
Subtotal	150,000	150,000	300,000	--	600,000
Total	**9,975,000**	**2,334,000**	**9,325,000**	**84,103,000**	**105,737,000**

Notes:
(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

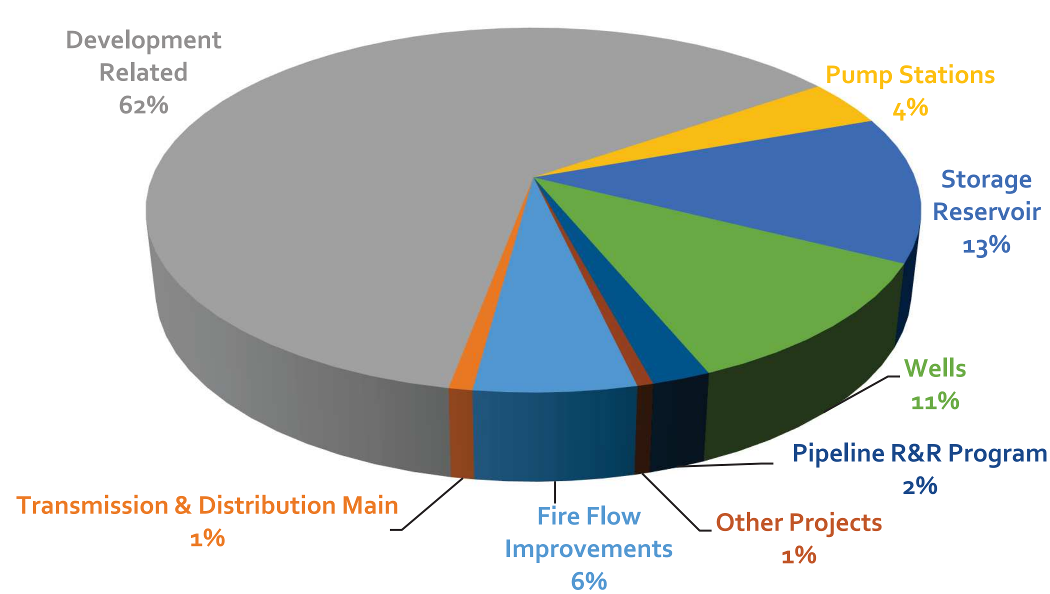


Figure 7.1 Capital Improvement Project Cost Summary by Project Type

7.7 Existing Versus Future Users Cost Share

The improvements proposed in this study either benefit existing users or are required to serve future users. Some of the projects provide benefits to both existing and future users. An opinion of benefit to future users by project is included in Table 7.4. A summary of existing and future user cost share for the proposed projects by phase is summarized in Table 7.6. The distribution of project cost by project type by customer class is provided in Table 7.7.

Table 7.6 CIP Cost by Reimbursement Category

Reimbursement Category	Phase 1 (2019-2023) ($)	Phase 2 (2024-2028) ($)	Phase 3 (2028-2040) ($)	Phase 4 (2041 & beyond) ($)	Total ($)
Existing Users	9,975,000	2,334,000	1,500,000	--	14,459,000
Future Users	--	--	7,825,000	84,103,000	91,928,000
Total	**9,975,000**	**2,334,000**	**9,325,000**	**84,103,000**	**105,737,000**

Notes:
(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

Table 7.7 CIP Costs by Project Type and Reimbursement Category

Project Type	Existing Users ($)	Future Users ($)	Total ($)
Capacity/Storage Improvements			
Fire Flow Related	6,037,000	--	6,037,000
Pipeline Related	136,000	744,000	880,000
Development Related	4,836,000	61,198,000	66,034,000
Pump Stations	--	4,342,000	4,342,000
Storage Reservoir	--	13,674,000	13,674,000
Wells	--	11,970,000	11,970,000
Subtotal	11,009,000	91,928,000	102,937,000
Rehabilitation and Replacement Projects			
Pipeline R&R Program	2,200,000	--	2,200,000
Subtotal	2,200,000	--	2,200,000
Other Projects			
Other Projects	600,000	--	600,000
Subtotal	600,000	--	600,000
Total	**13,809,000**	**91,928,000**	**105,737,000**

Notes:
(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

Appendix A

EXTENDED PERIOD SIMULATION HYDRAULIC MODEL CALIBRATION PACKET

City of Lemoore
Water Master Plan

WATER MASTER PLAN

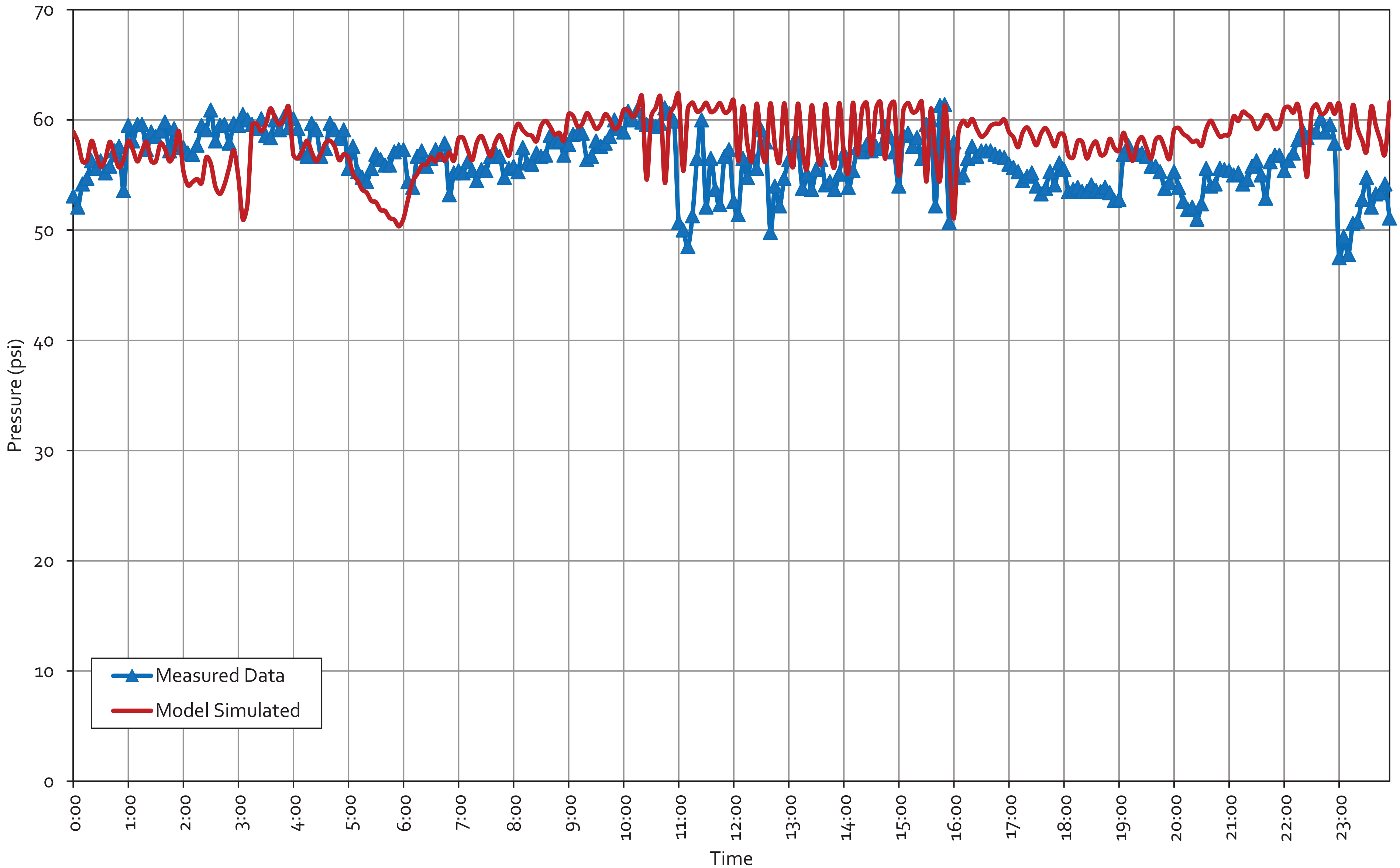
EXTENDED PERIOD SIMULATION HYDRAULIC MODEL CALIBRATION PACKET

City of LEMOORE CALIFORNIA

Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 30

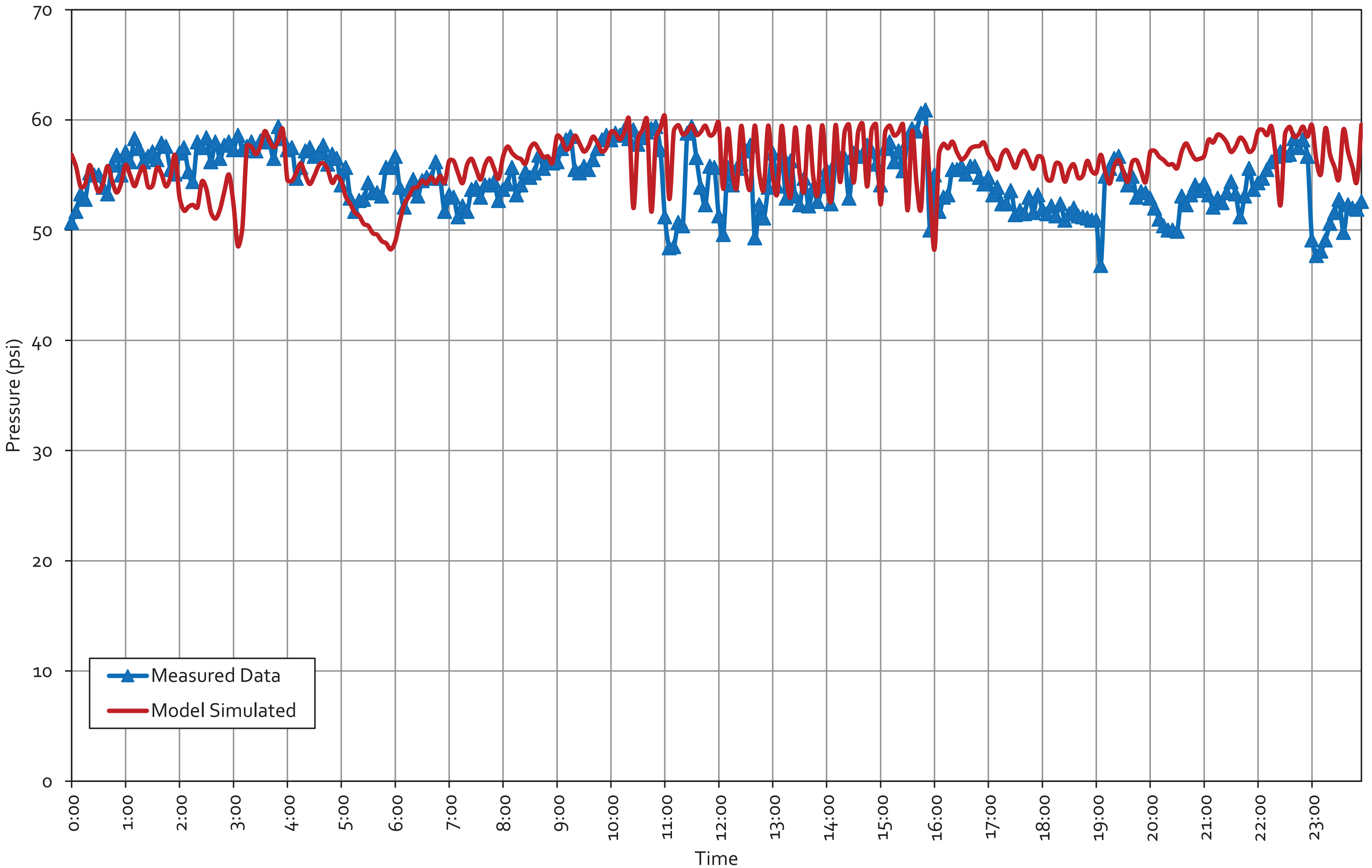
Calibration Date = 8/14/2017



Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 31

Calibration Date = 8/14/2017



Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 32

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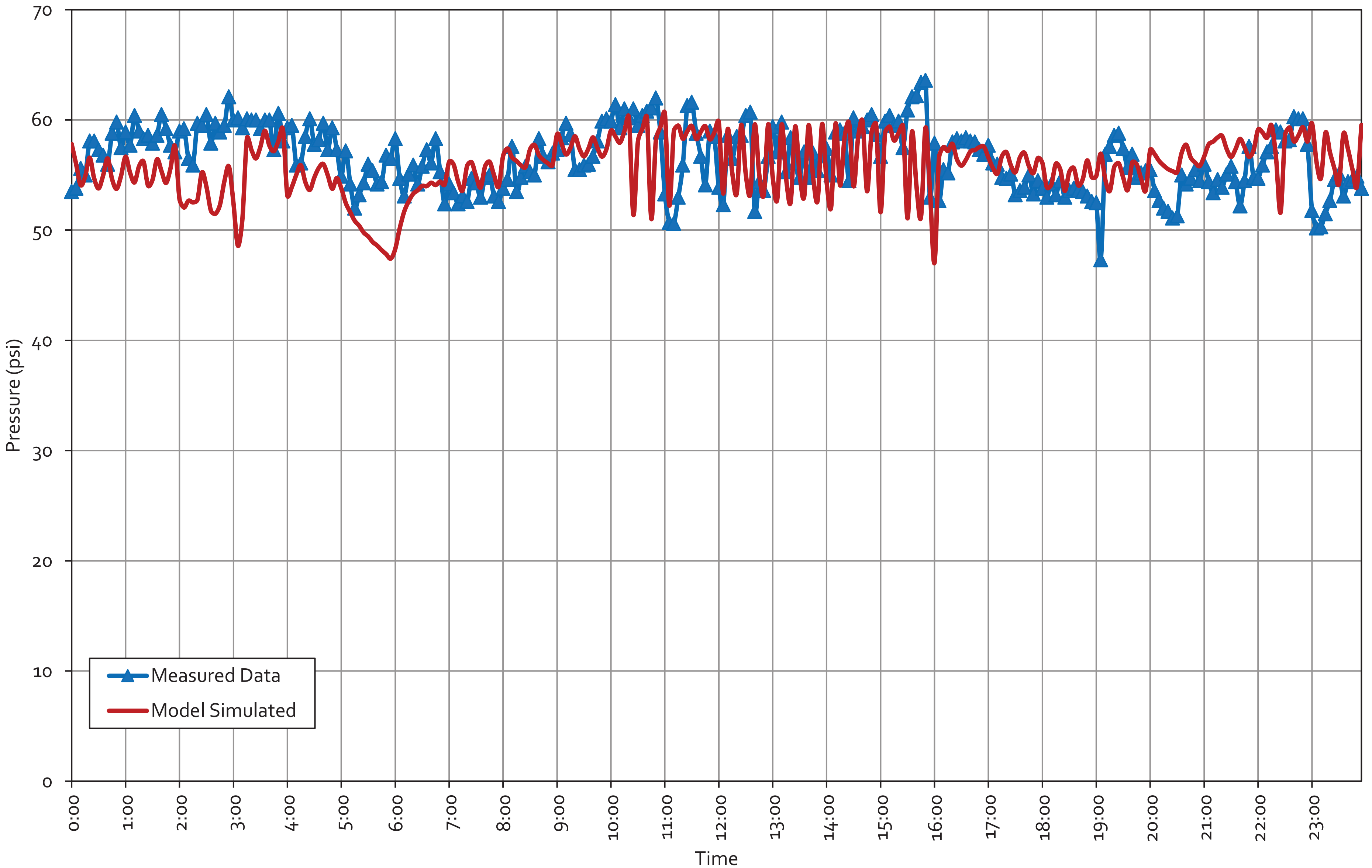

Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 33

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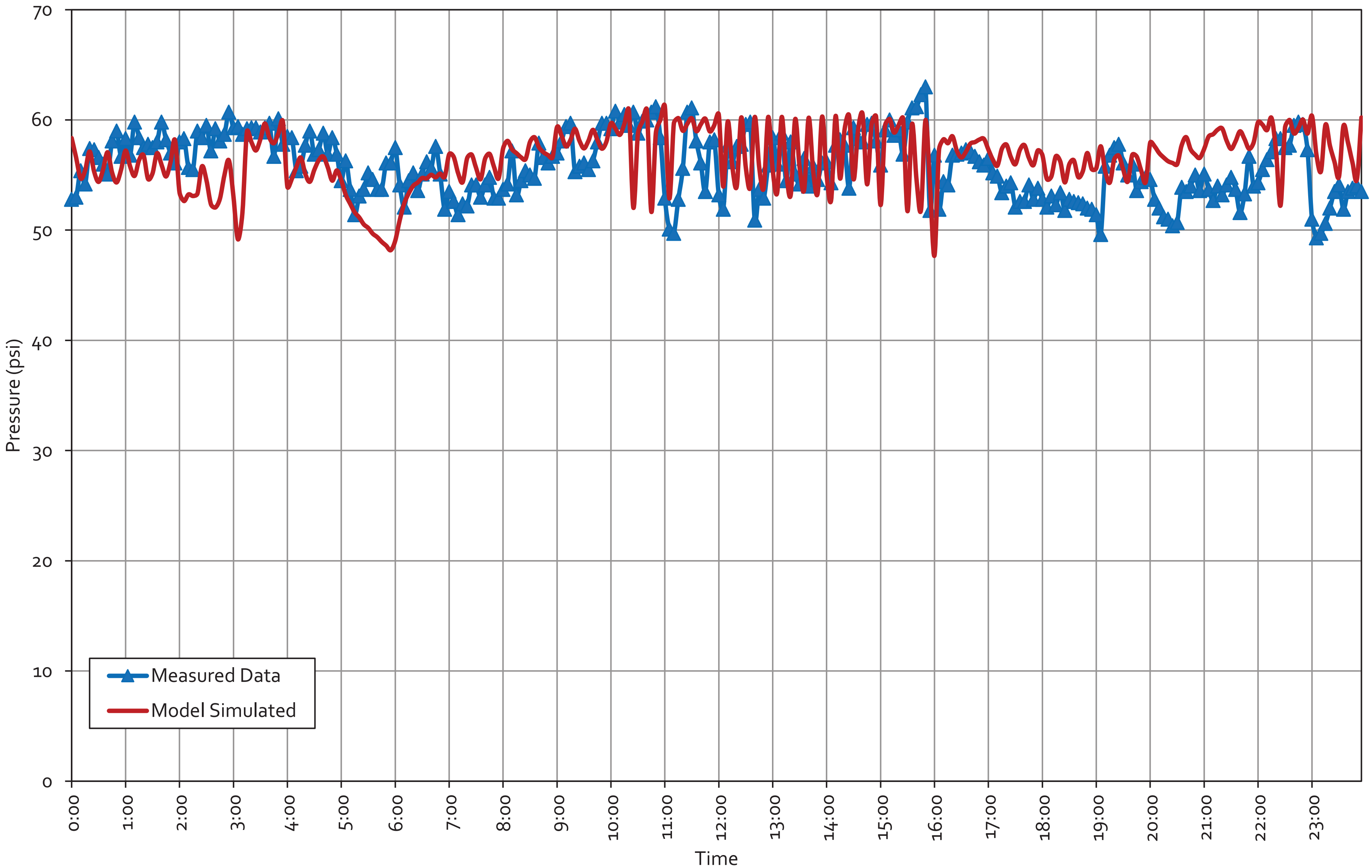

Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 34

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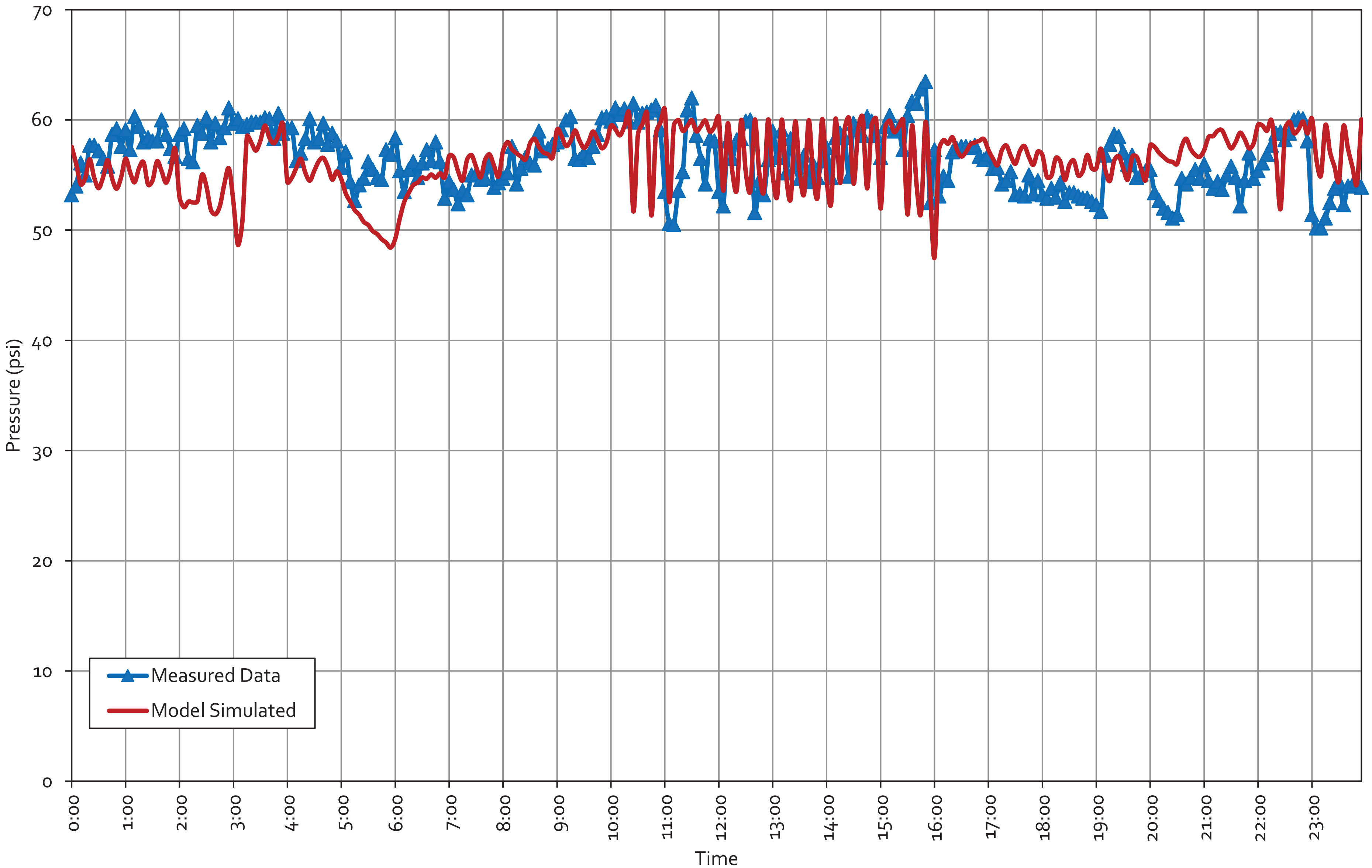

Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 35

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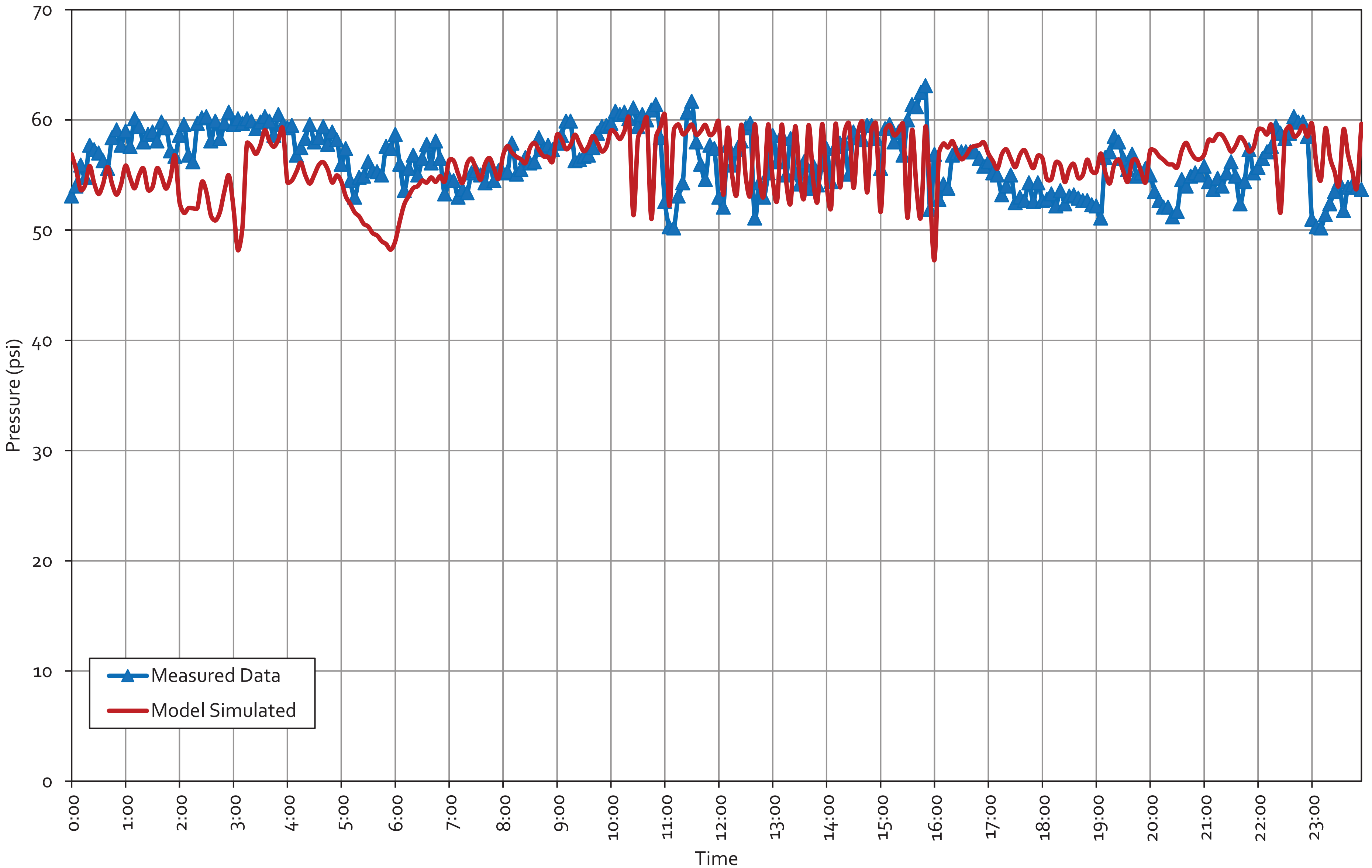

Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 36

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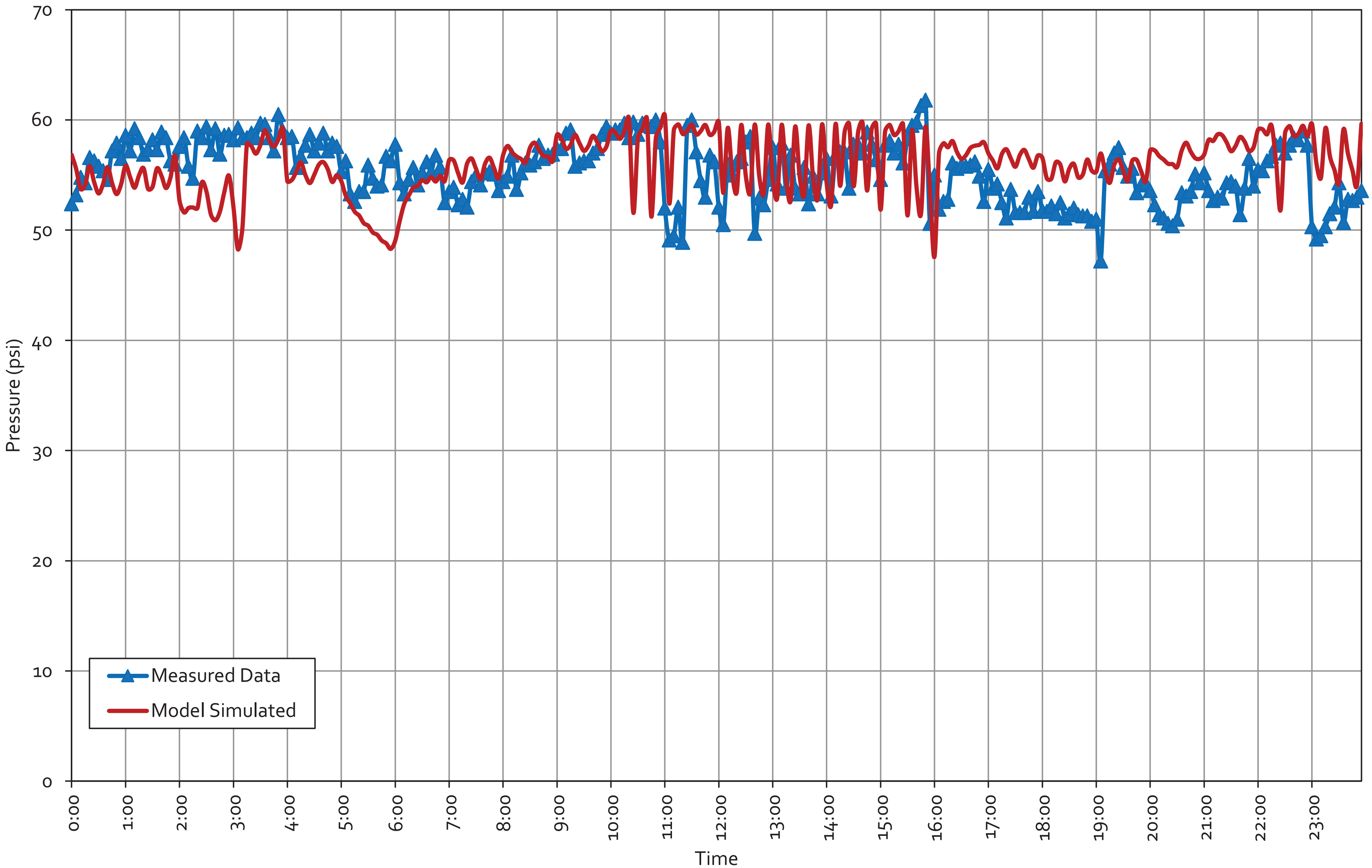

Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 37

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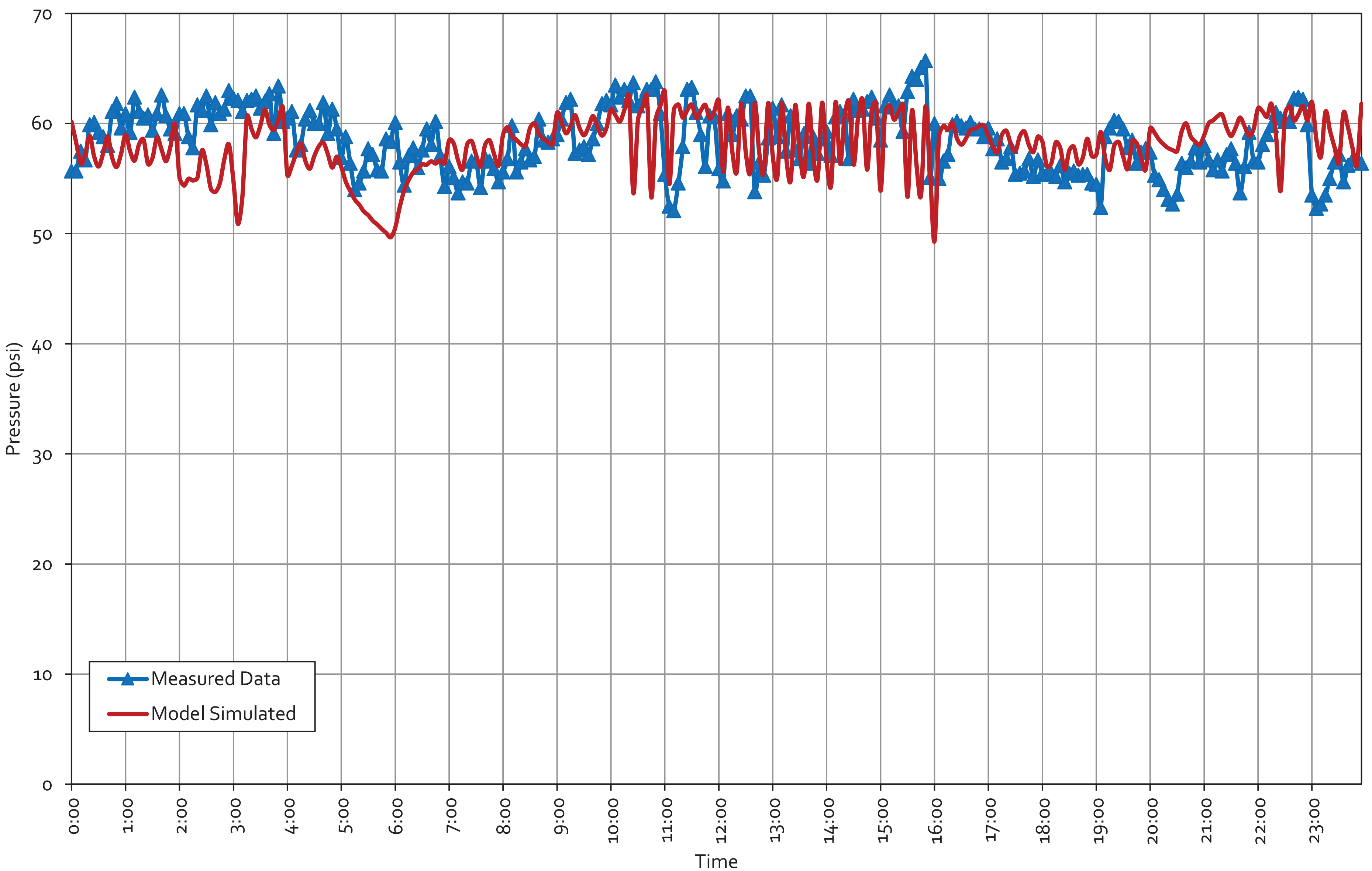

Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 38

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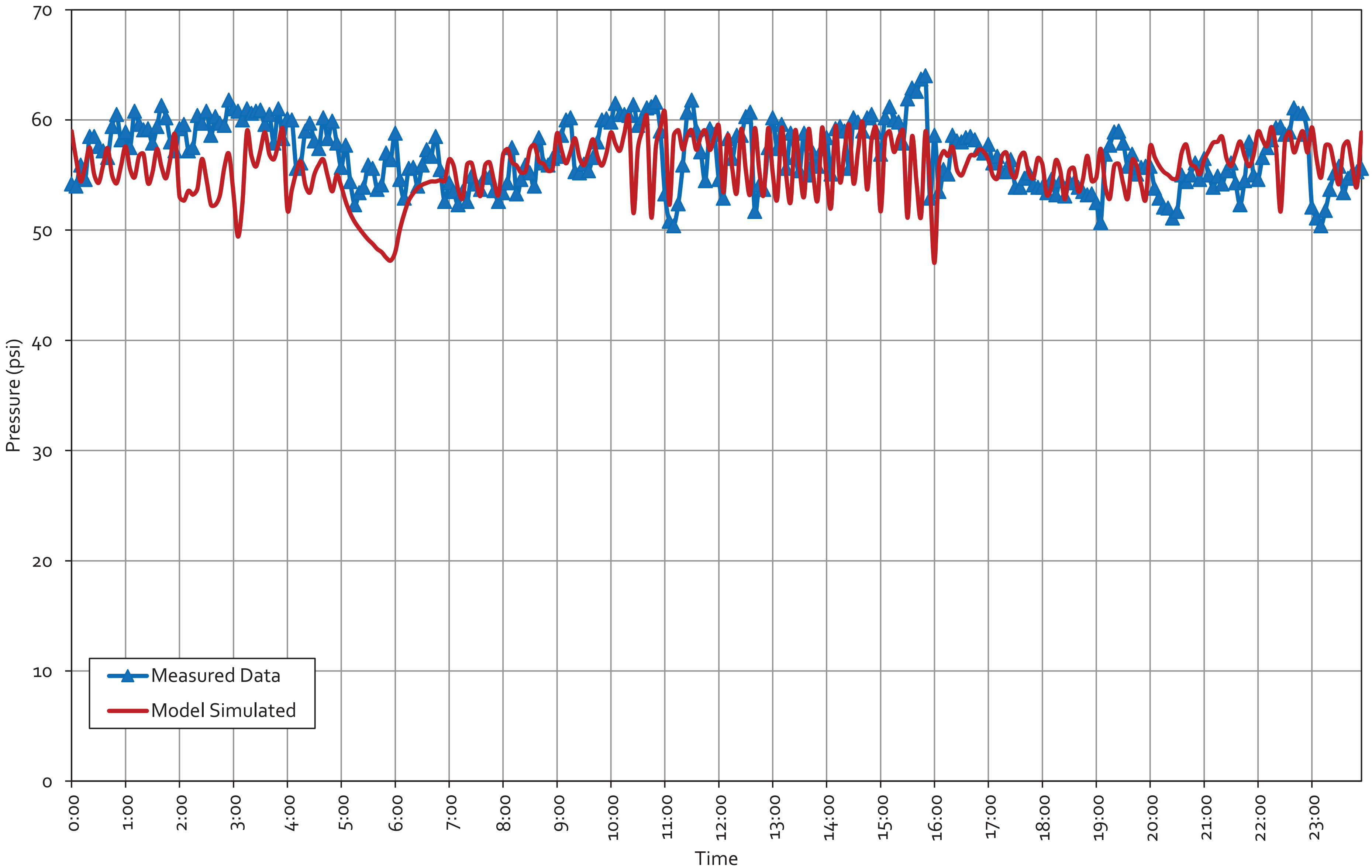

Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 39

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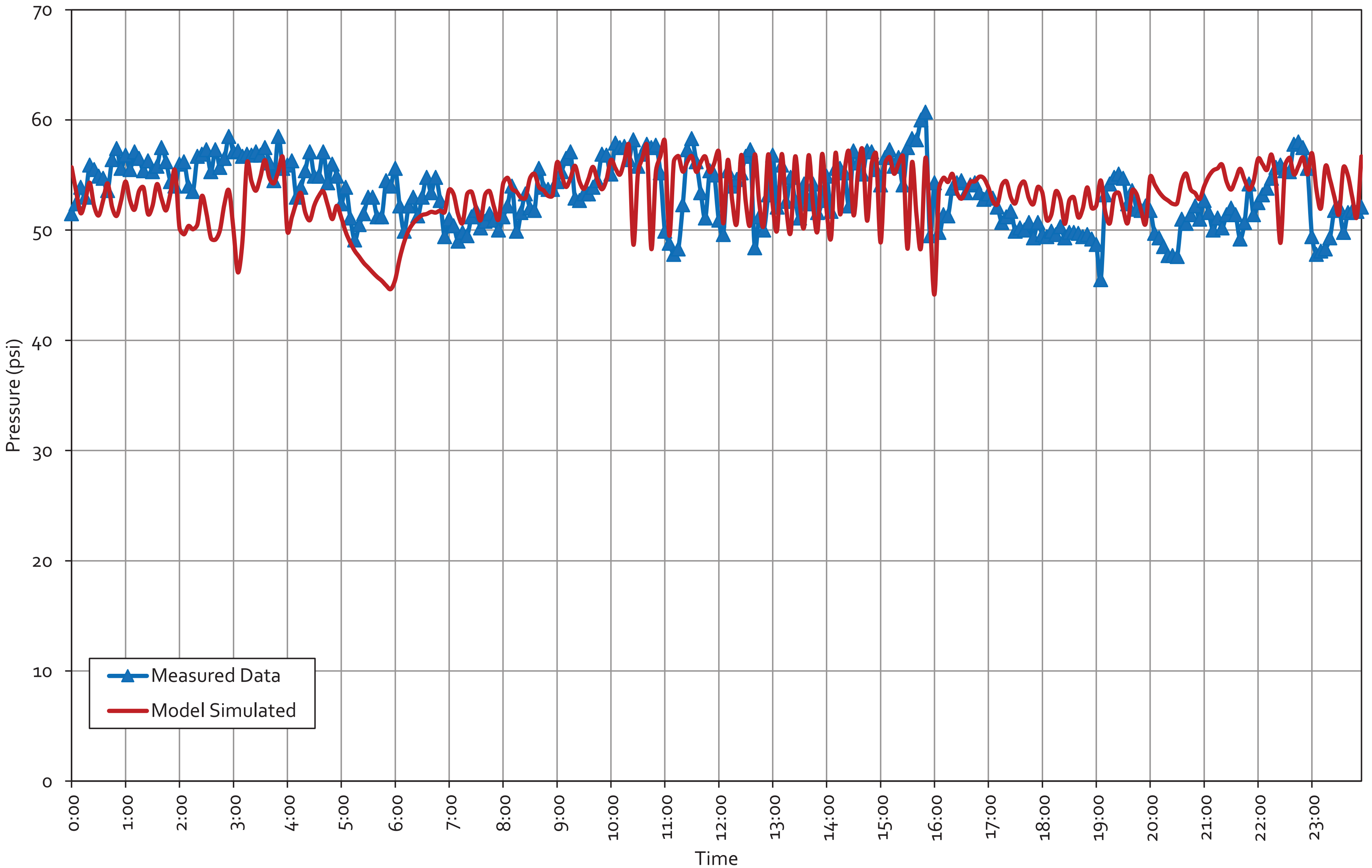
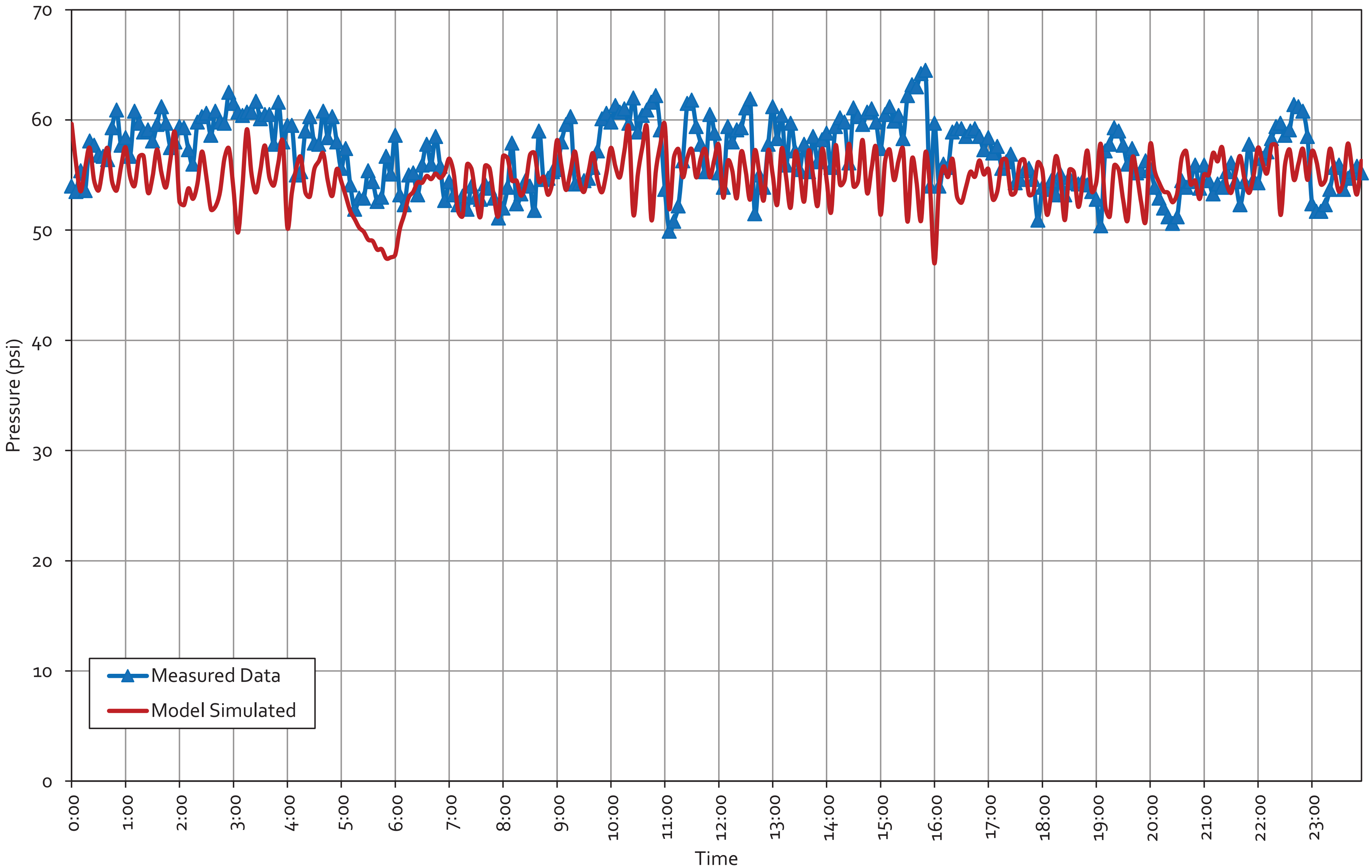


Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 40

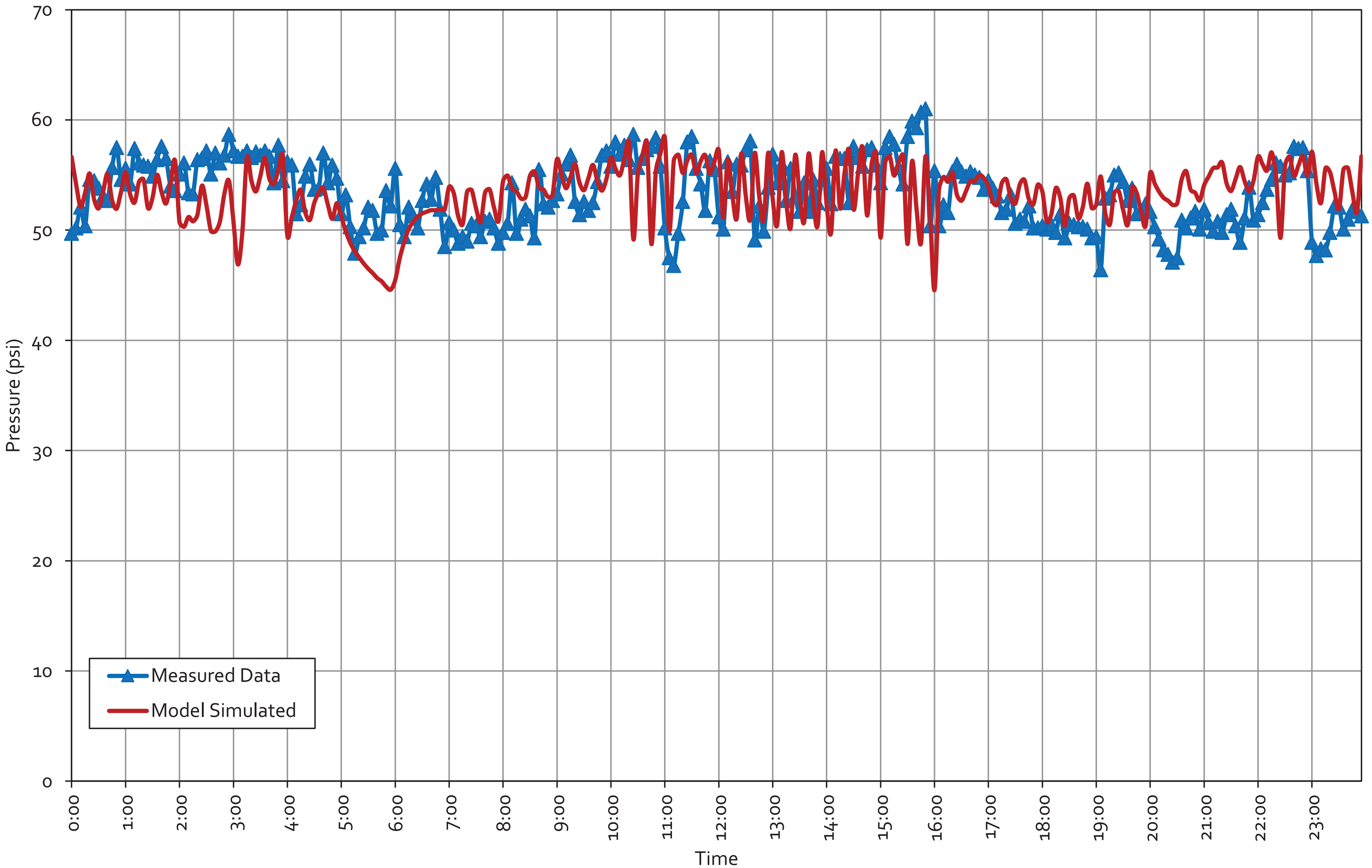
Calibration Date = 8/14/2017



Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 41

Calibration Date = 8/14/2017

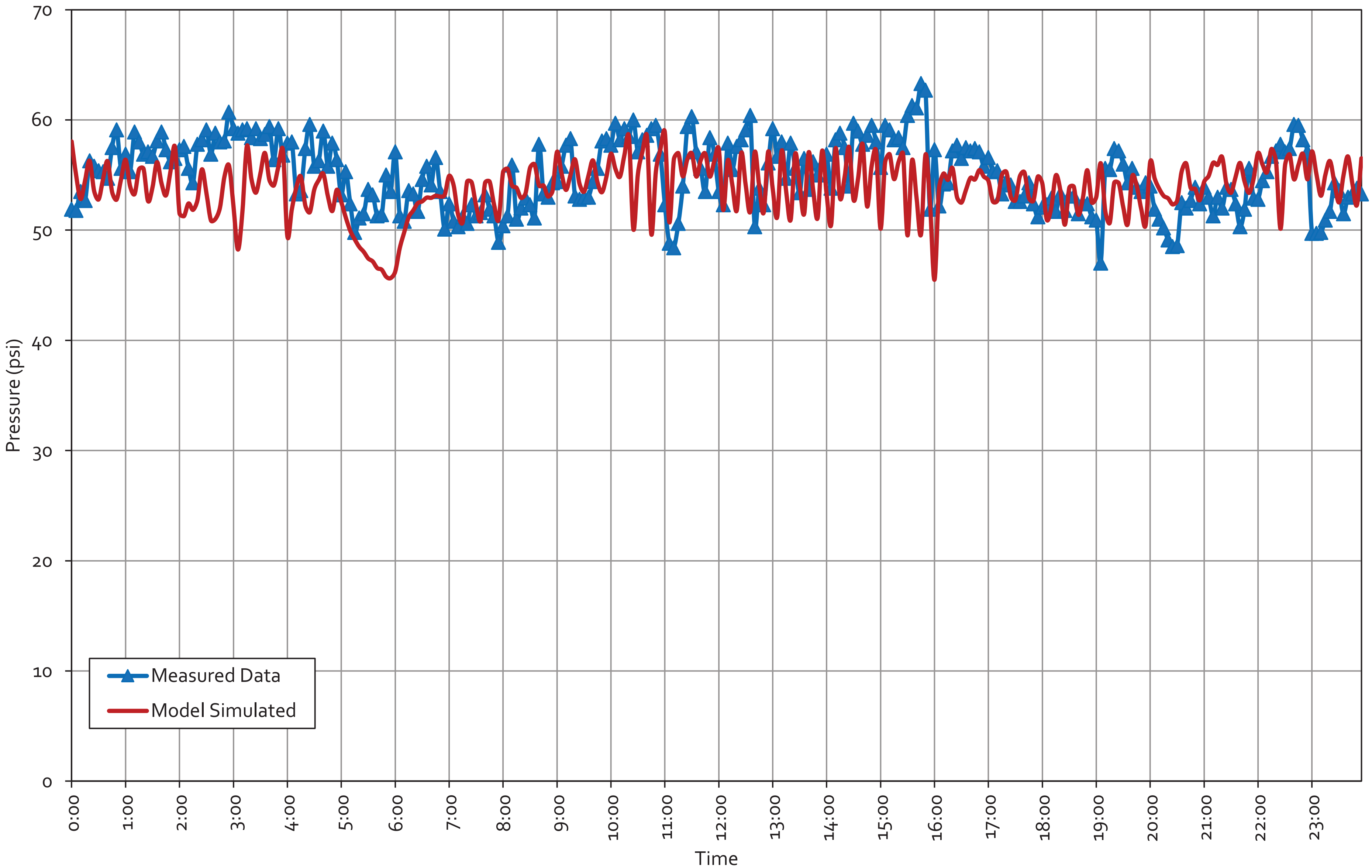


City of LEMOORE CALIFORNIA

Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 42

Calibration Date = 8/14/2017



Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 43

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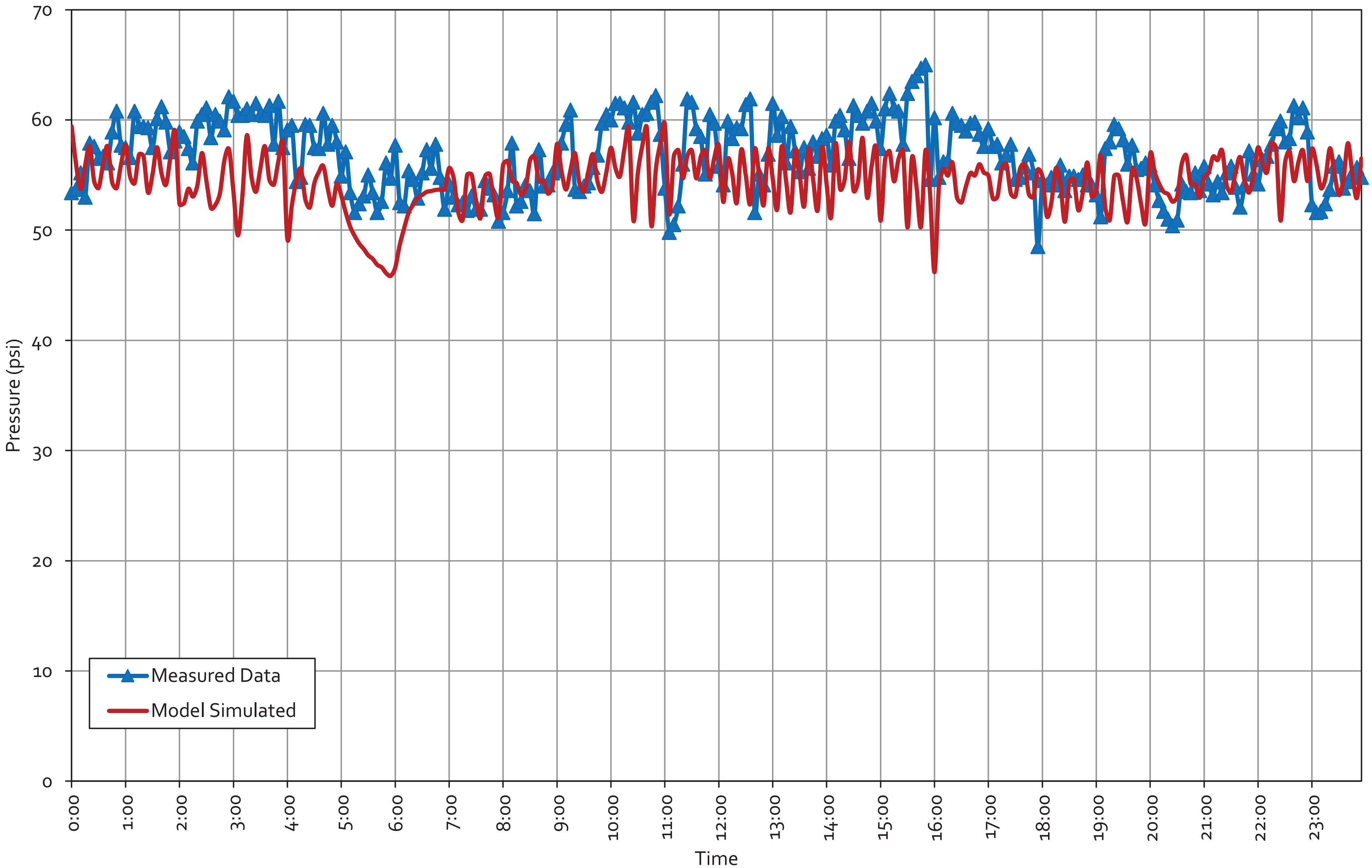

Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 44

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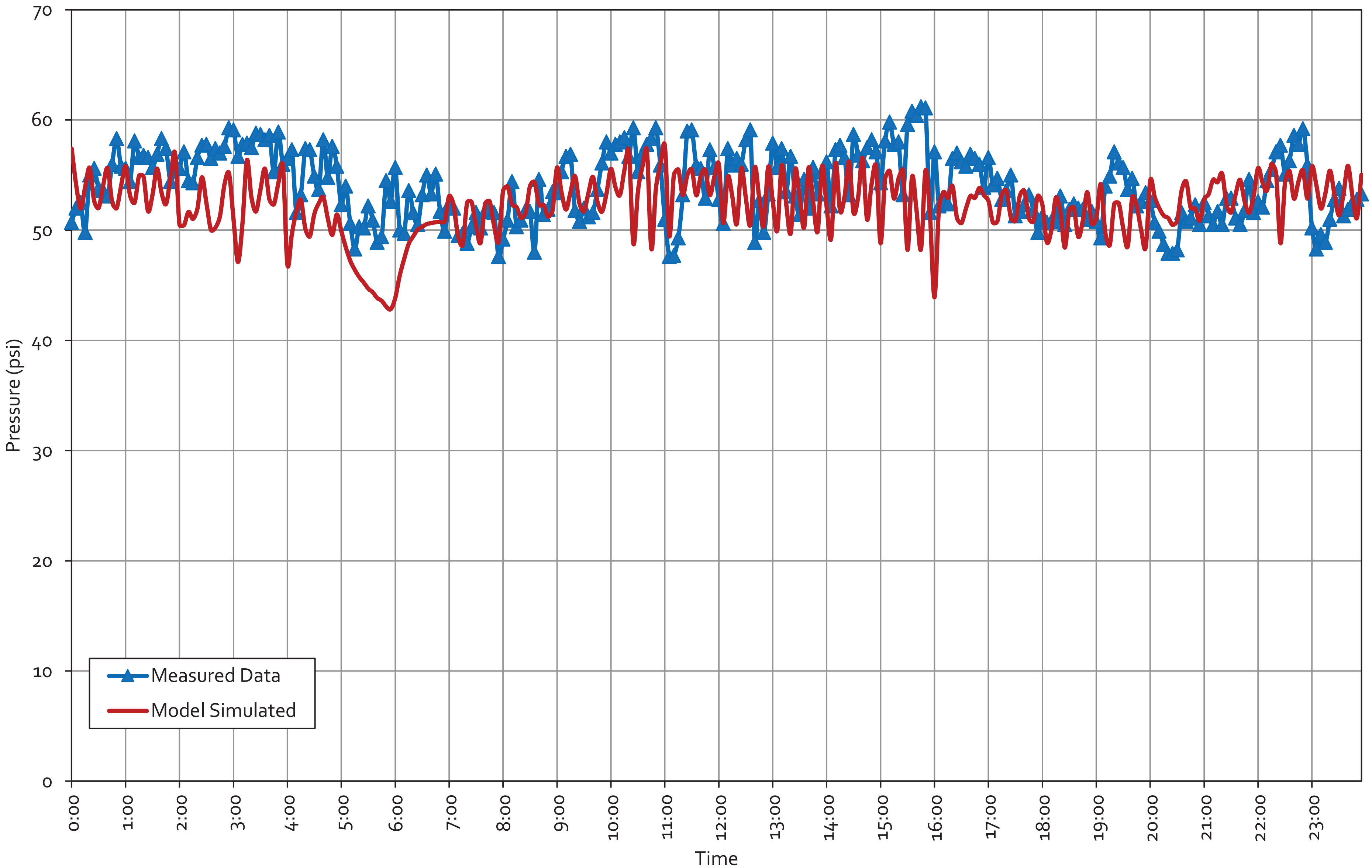

Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 45

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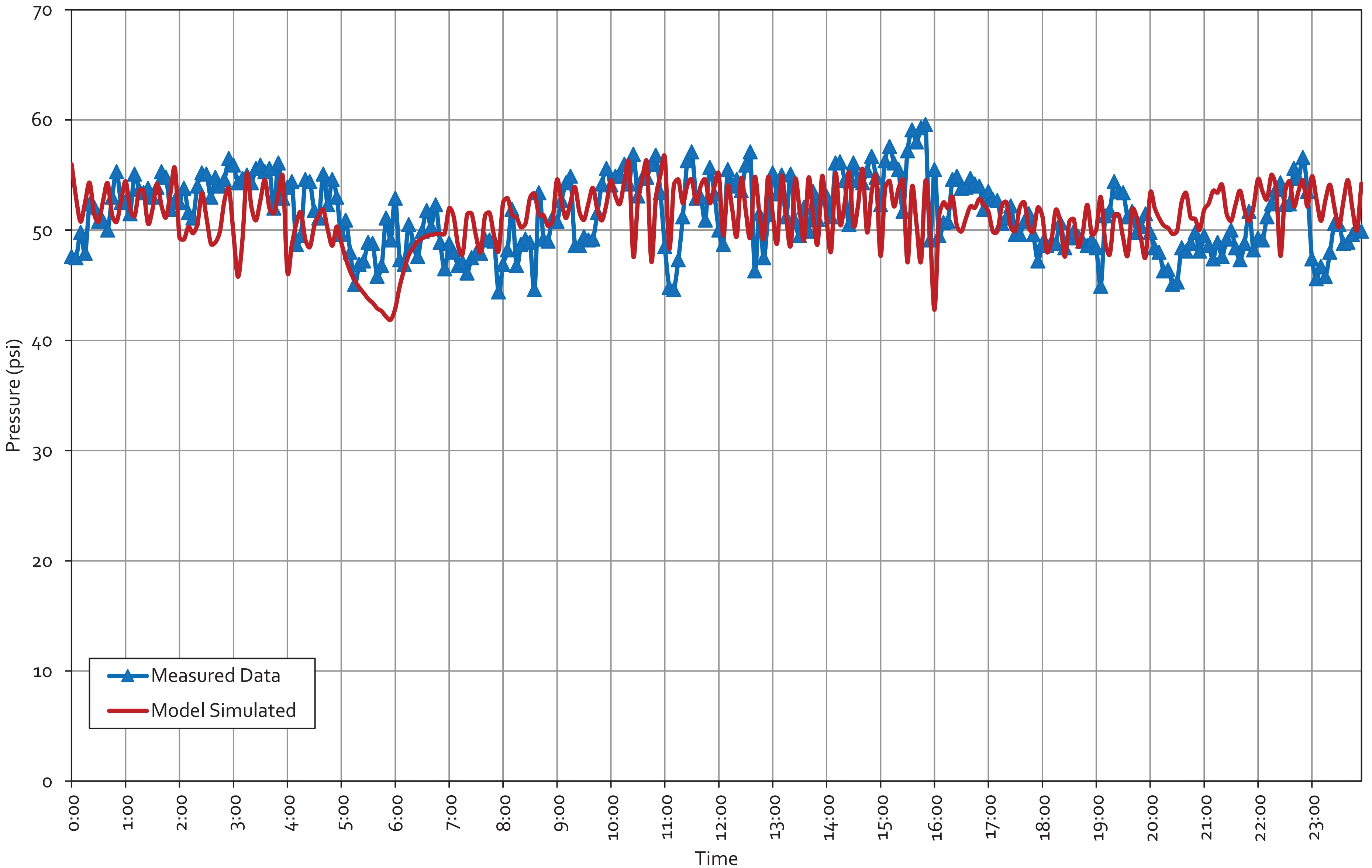

Integrated Master Plans

EPS CALIBRATION - PRESSURE LOGGER 46

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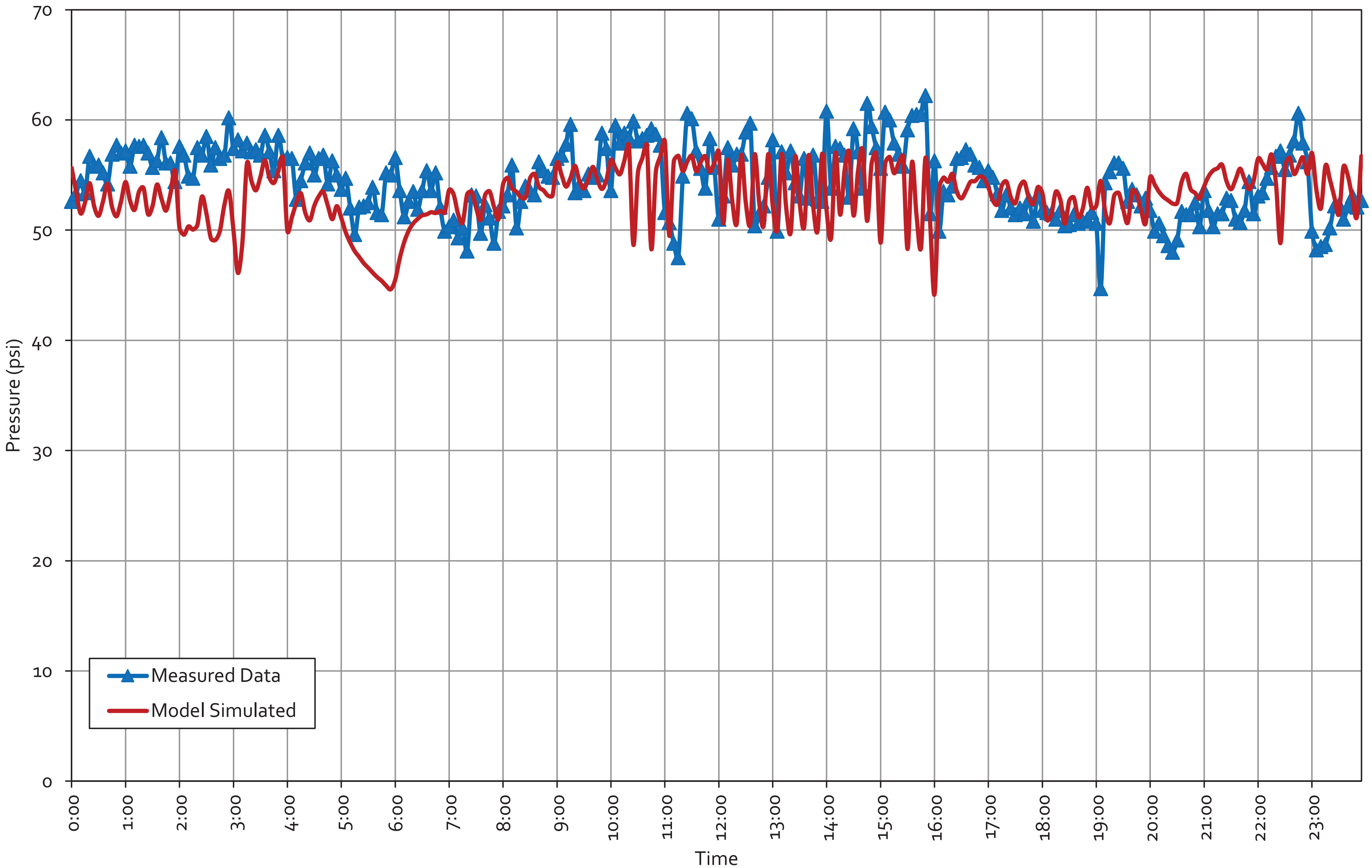
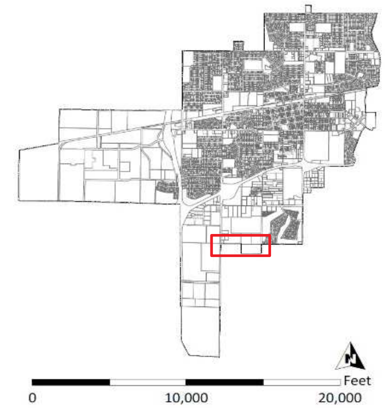


Appendix B

WATER DISTRIBUTION SYSTEM IMPROVEMENTS

Project Number:	PWFF-1
Project Name:	Pipeline between Vine Street & 19th Avenue
System Type:	Potable Water



Project Description:

This project includes the addition of approximately 2,690 feet of 16-inch diameter pipeline southwest of Lemoore Golf Course, between Vine Street & 19th Avenue. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that this 16-inch diameter pipeline be added in to create a loop.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pipe	--	16	New	2,690	$ 235	$ 632,000	$ 822,000	$ 1,048,000	2019

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

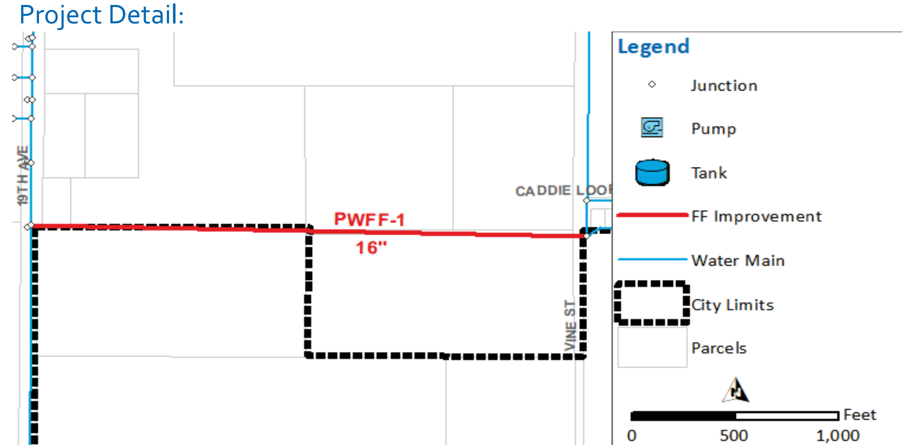
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 1,048,000
Future Users	0%	$ -
Total	100%	$ 1,048,000

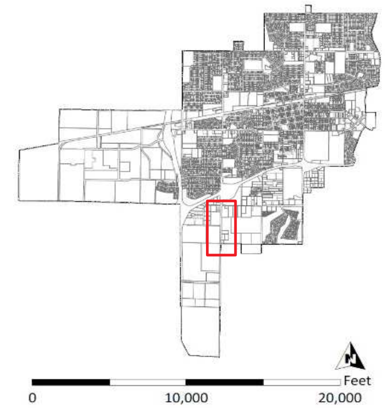
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number: PWFF-2A
Project Name: Pipeline along 19th Avenue
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 1,550 feet of 12-inch diameter pipeline along 19th Avenue, between PWFF-1 and Enterprise Drive. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 20-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	12	20	Replace	1,550	$ 265	$ 411,000	$ 534,000	$ 681,000	2023

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

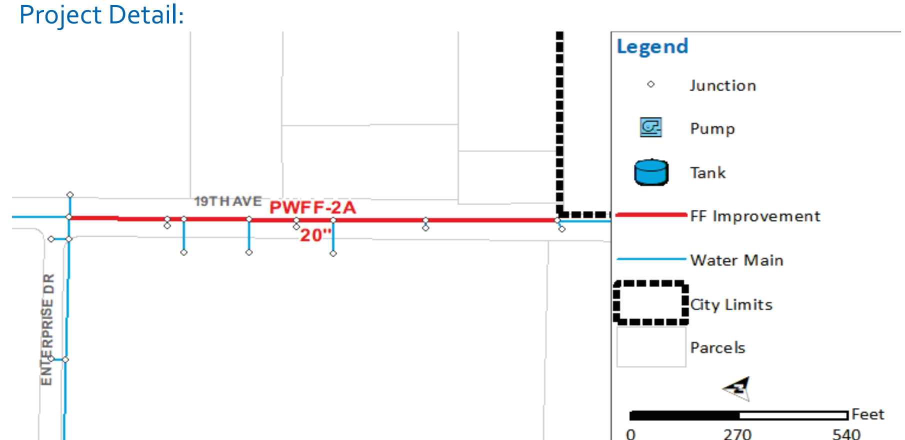
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 681,000
Future Users	0%	$ -
Total	100%	$ 681,000

Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

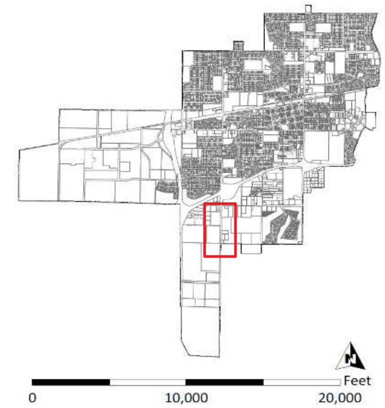
Project Detail:



LEMOORE CALIFORNIA

carollo

Project Number:	PWFF-2B
Project Name:	Pipeline along 19th Avenue
System Type:	Potable Water



Project Description:

This project includes the replacement of approximately 1,120 feet of 12-inch diameter pipeline along 19th Avenue, between Enterprise Drive and Iona Avenue. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 16-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pipe	12	16	Replace	1,120	$ 235	$ 263,000	$ 342,000	$ 436,000	2023

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

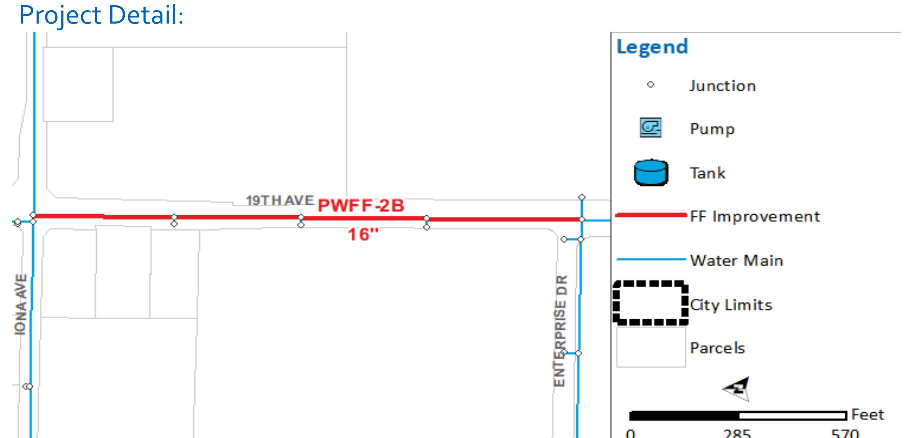
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 436,000
Future Users	0%	$ -
Total	100%	$ 436,000

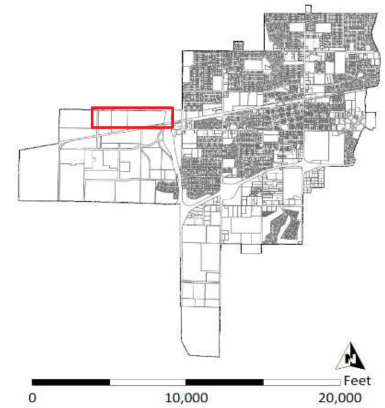
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number: PWFF-3
Project Name: Pipeline along Industry Way
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 225 feet of 12-inch diameter pipeline along Industry Way, just west of Belle Haven Drive. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 16-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	12	16	Replace	225	$ 235	$ 53,000	$ 69,000	$ 88,000	2022

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

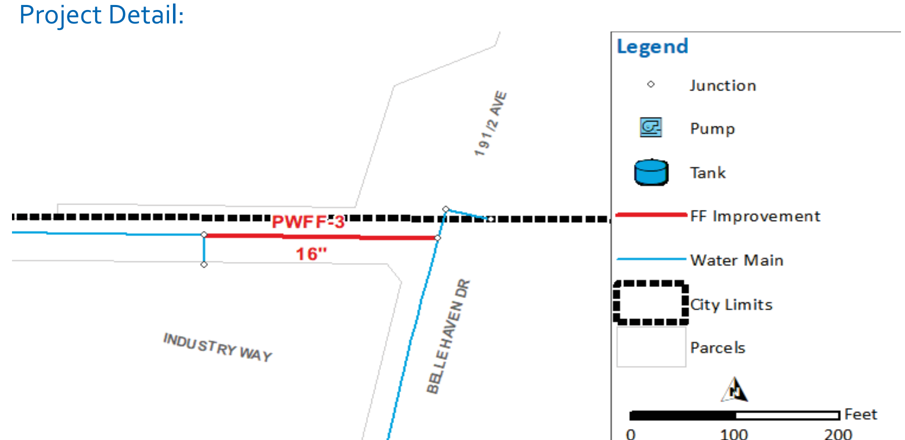
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 88,000
Future Users	0%	$ -
Total	100%	$ 88,000

Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

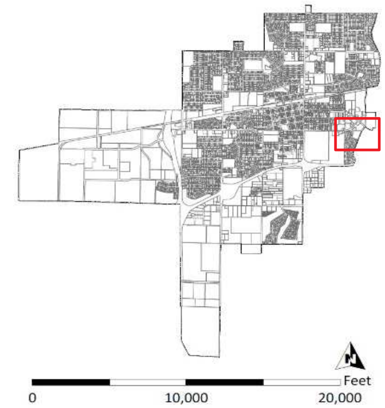
Project Detail:



LEMOORE CALIFORNIA

carollo

Project Number:	PWFF-4
Project Name:	Pipeline along Bush Street
System Type:	Potable Water



Project Description:

This project includes the replacement of approximately 2,200 feet of 8-inch diameter pipeline along Bush Street, between Locust Street and D Street. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 10-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	8	10	Replace	2,200	$ 150	$ 330,000	$ 429,000	$ 547,000	2020

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

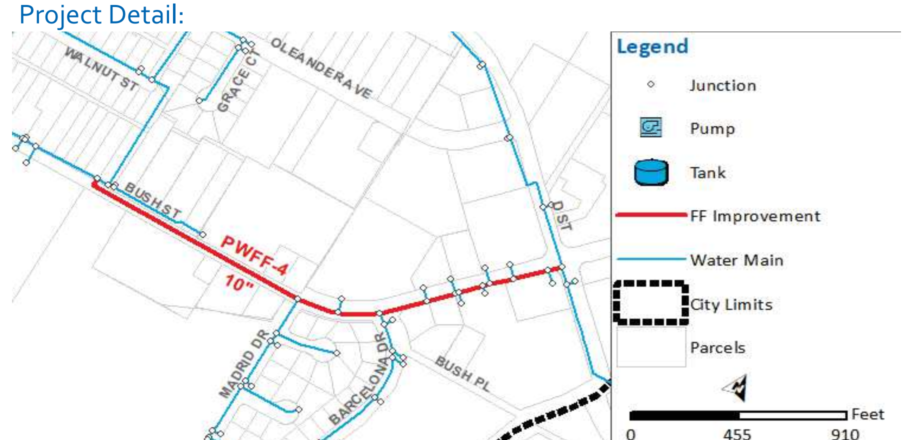
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 547,000
Future Users	0%	$ -
Total	100%	$ 547,000

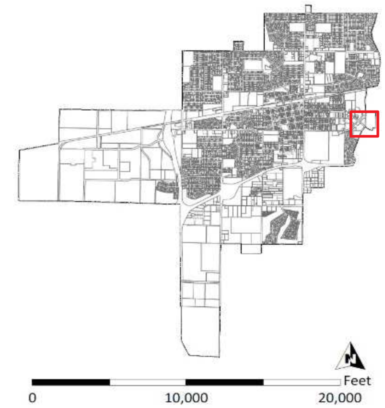
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number:	PWFF-5
Project Name:	Pipeline along East D Street
System Type:	Potable Water



Project Description:

This project includes the replacement of approximately 1,610 feet of 8-inch diameter pipeline along East D Street, between Cantera Avenue and south of Bush Street. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 12-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pipe	8	12	Replace	1,610	$ 175	$ 282,000	$ 367,000	$ 467,000	2022

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

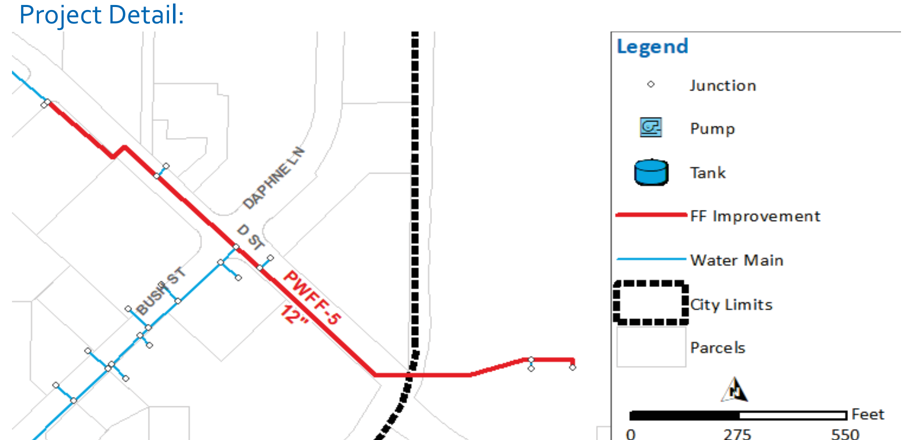
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 467,000
Future Users	0%	$ -
Total	100%	$ 467,000

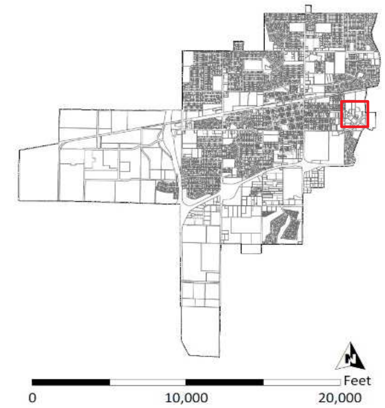
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number: PWFF-6A
Project Name: Pipeline along Smith Avenue and Siena Way
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 420 feet of 8-inch diameter pipeline along Smith Avenue, between D Street and Siena Way, and along Siena Way, between Smith Avenue and Montego Way. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 12-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pipe	8	12	Replace	420	$ 175	$ 74,000	$ 96,000	$ 123,000	2021

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

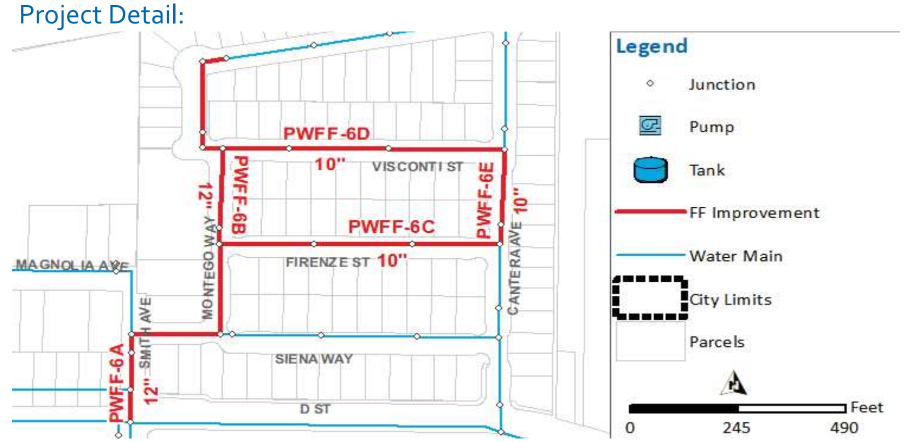
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 123,000
Future Users	0%	$ -
Total	100%	$ 123,000

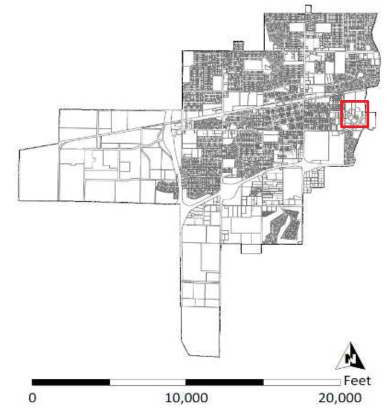
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number: PWFF-6B
Project Name: Pipeline along Montego Way
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 770 feet of 8-inch diameter pipeline along Montego Way, between Siena Way and north of Visconti Street. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 12-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	8	12	Replace	770	$ 175	$ 135,000	$ 176,000	$ 224,000	2021

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

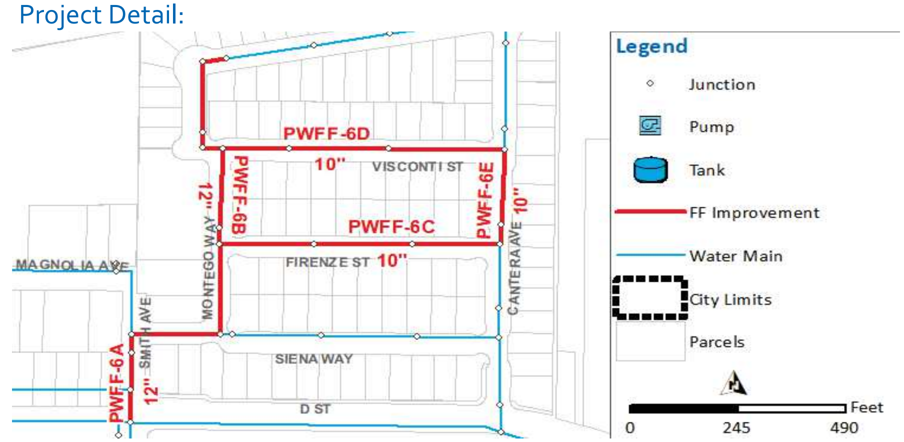
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 224,000
Future Users	0%	$ -
Total	100%	$ 224,000

Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

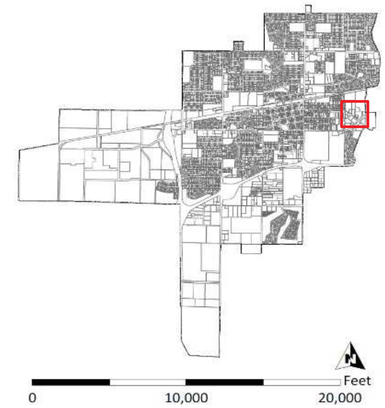
Project Detail:



Project Number: PWFF-6C

Project Name: Pipeline along Firenze Street

System Type: Potable Water



Project Description:

This project includes the replacement of approximately 640 feet of 8-inch diameter pipeline along Firenze Street, between Montego Way and Cantera Avenue. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 10-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	8	10	Replace	640	$ 150	$ 96,000	$ 125,000	$ 159,000	2021

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

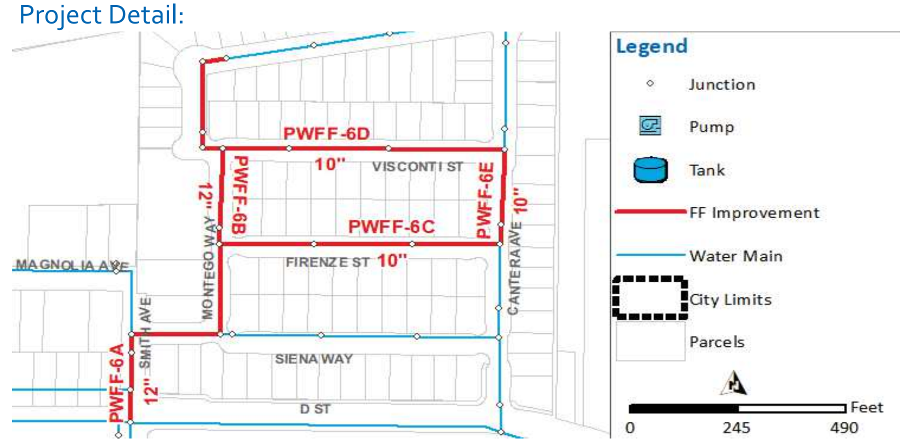
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 159,000
Future Users	0%	$ -
Total	100%	$ 159,000

Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

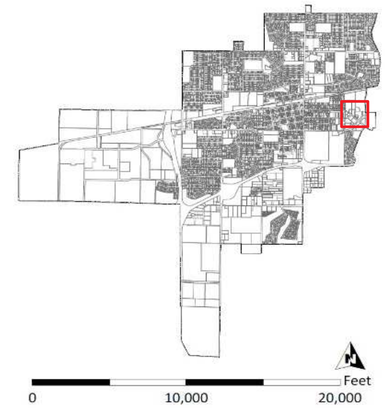
Project Detail:



LEMOORE CALIFORNIA

carollo

Project Number: PWFF-6D
Project Name: Pipeline along Visconti Street
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 640 feet of 8-inch diameter pipeline along Visconti Street, between Montego Way and Cantera Avenue. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 10-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	8	10	Replace	640	$ 150	$ 96,000	$ 125,000	$ 159,000	2021

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

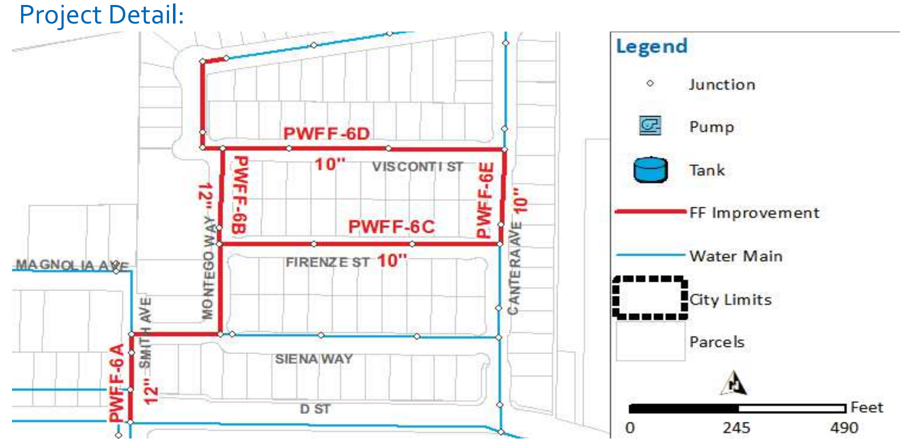
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 159,000
Future Users	0%	$ -
Total	100%	$ 159,000

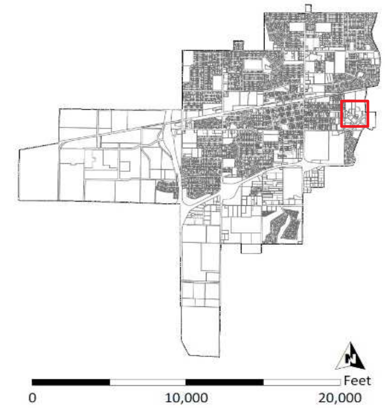
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number: PWFF-6E
Project Name: Pipeline along Cantera Avenue
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 240 feet of 8-inch diameter pipeline along Cantera Avenue, between Visconti Street and Firenze Street. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 10-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	8	10	Replace	240	$ 150	$ 36,000	$ 47,000	$ 60,000	2021

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

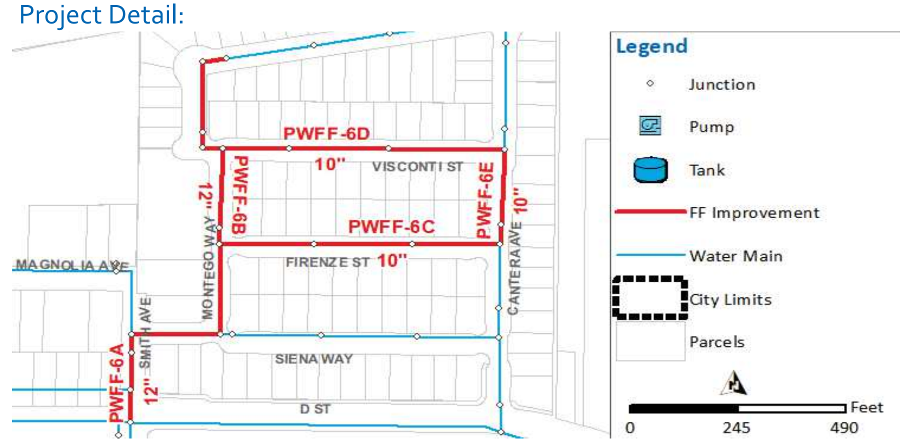
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 60,000
Future Users	0%	$ -
Total	100%	$ 60,000

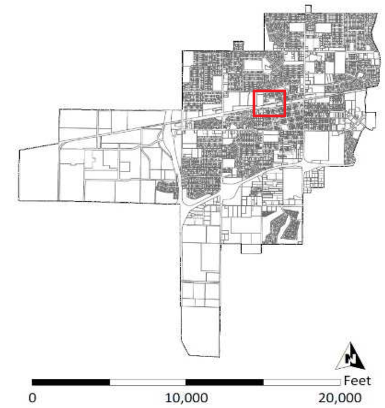
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number:	PWFF-7
Project Name:	Pipeline along Hill Street, G Street, and Fox Street
System Type:	Potable Water



Project Description:

This project includes the replacement of approximately 2,230 feet of 6-inch and 8-inch diameter pipeline along Hill street and Fox Street, between F Street and G Street, and along G Street and F Street, between Fox Street and Hill Street. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 10-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	8	10	Replace	2,230	$ 150	$ 335,000	$ 436,000	$ 555,000	2024

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

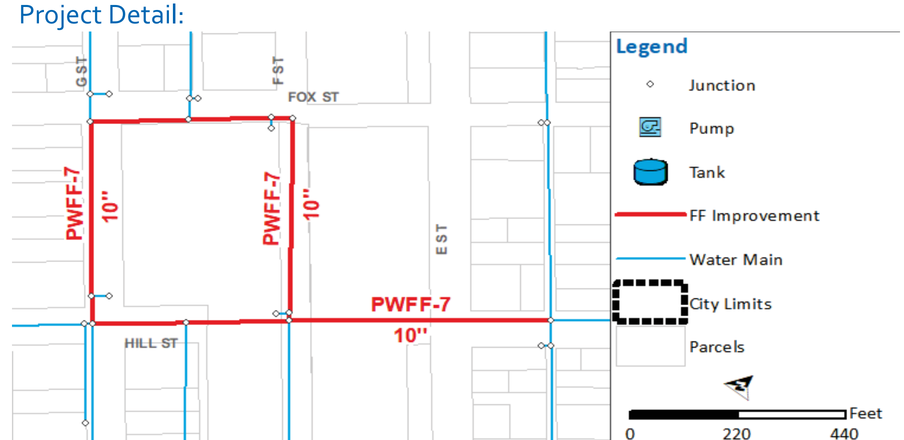
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 555,000
Future Users	0%	$ -
Total	100%	$ 555,000

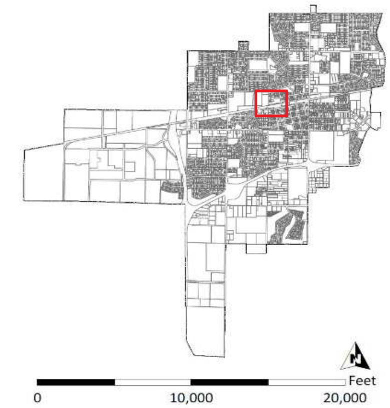
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number:	PWFF-8
Project Name:	Pipeline along F Street
System Type:	Potable Water



Project Description:

This project includes the replacement of approximately 330 feet of 6-inch diameter pipeline along F Street, west of Hill Street. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 12-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	6	12	Replace	330	$ 175	$ 58,000	$ 75,000	$ 96,000	2025

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

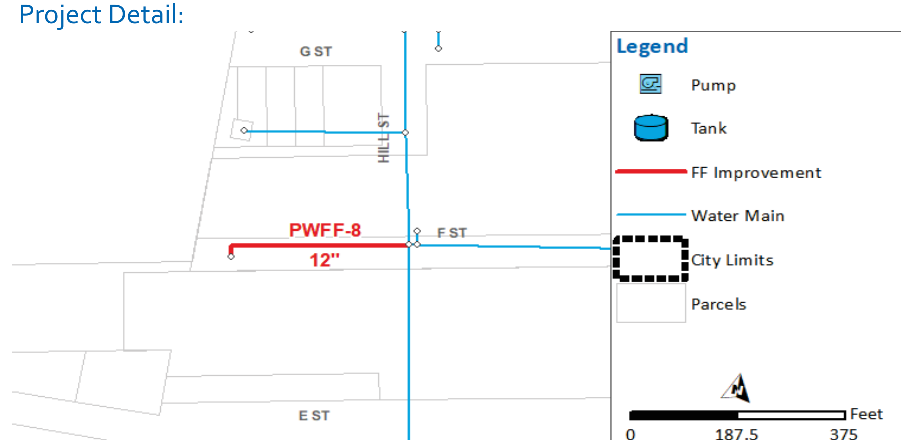
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 96,000
Future Users	0%	$ -
Total	100%	$ 96,000

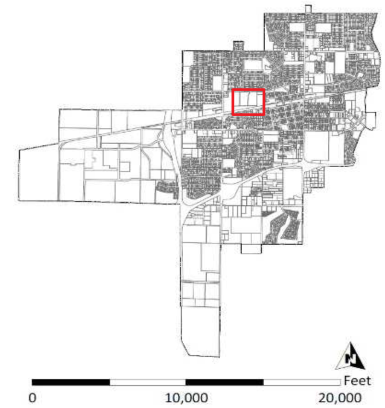
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number: PWFF-9
Project Name: Pipeline along Byron Court
System Type: Potable Water



Project Description:
This project includes the replacement of approximately 730 feet of 6-inch diameter pipeline along Byron Court, between D Street and the City of Lemoore Parks and Recreation Department. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with an 8-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	6	8	Replace	730	$ 120	$ 88,000	$ 114,000	$ 146,000	2022

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

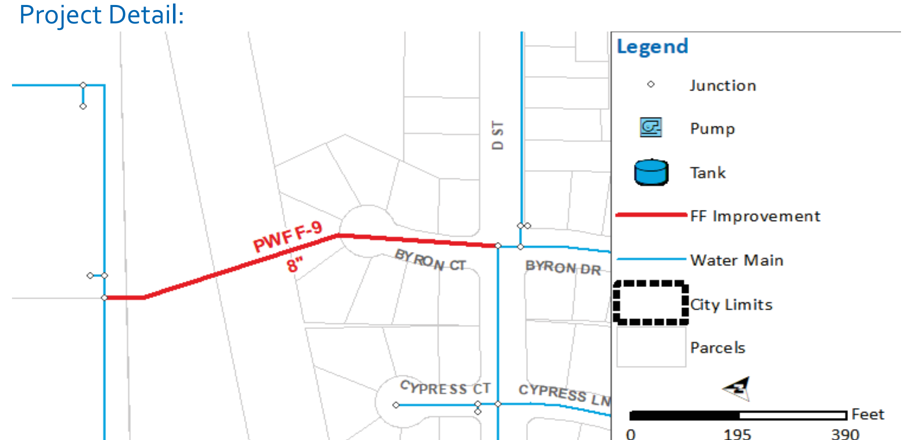
(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 146,000
Future Users	0%	$ -
Total	100%	$ 146,000

Notes on Cost Estimation:
This project is an existing improvement therefore 100% of cost are assigned to existing users.

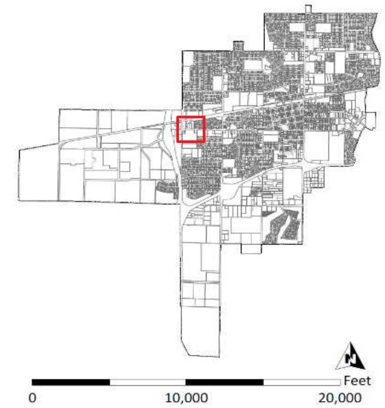
Project Detail:



LEMOORE CALIFORNIA

carollo

Project Number:	PWFF-10
Project Name:	Pipeline through Kings River Apartments parking lot
System Type:	Potable Water



Project Description:

This project includes the replacement of approximately 580 feet of 6-inch diameter pipeline through the Kings River Apartments parking lot, between Mulberry Lane and Cypress Lane. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with an 8-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	6	8	Replace	580	$ 120	$ 70,000	$ 91,000	$ 116,000	2024

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

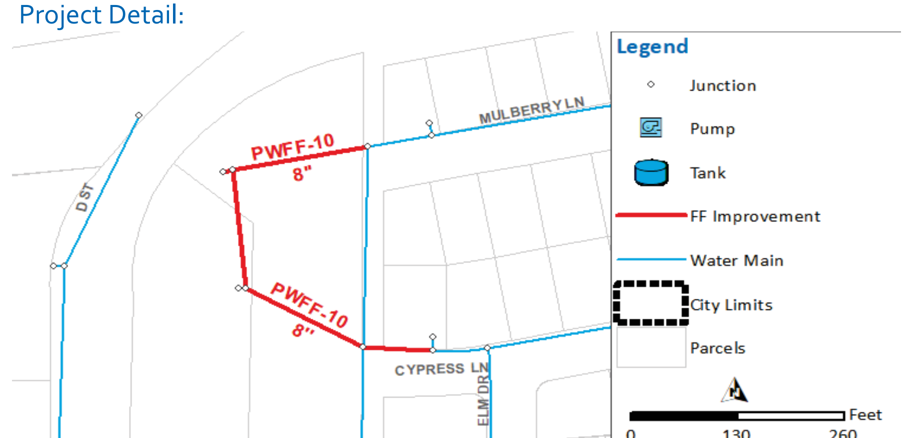
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 116,000
Future Users	0%	$ -
Total	100%	$ 116,000

Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

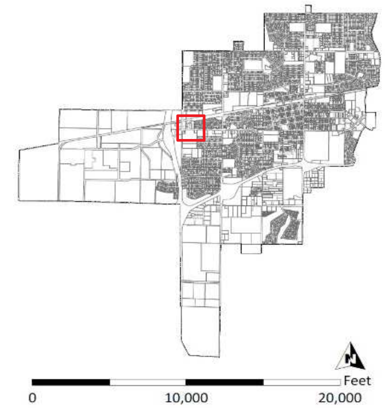
Project Detail:



LEMOORE CALIFORNIA

carollo

Project Number: PWFF-11
Project Name: Pipeline along west D Street
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 360 feet of 6-inch diameter pipeline along west D Street, north of Bush Street. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 12-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	6	12	Replace	360	$ 175	$ 63,000	$ 82,000	$ 104,000	2024

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

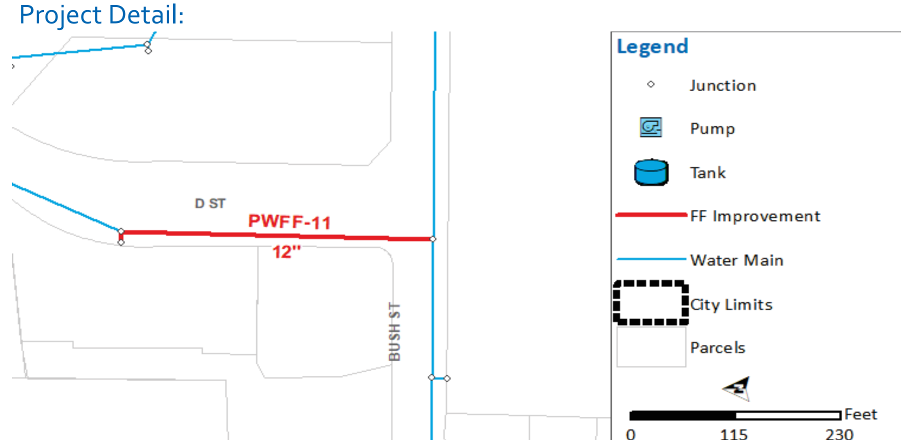
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 104,000
Future Users	0%	$ -
Total	100%	$ 104,000

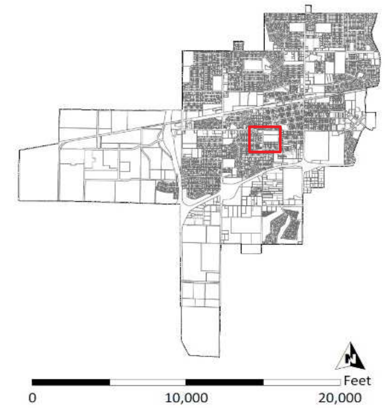
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number: PWFF-12
Project Name: Pipeline along Vine Street
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 790 feet of 8-inch diameter pipeline along Vine Street, between Bush Street and Oakdale Lane. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 10-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	8	10	Replace	790	$ 150	$ 119,000	$ 155,000	$ 197,000	2025

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

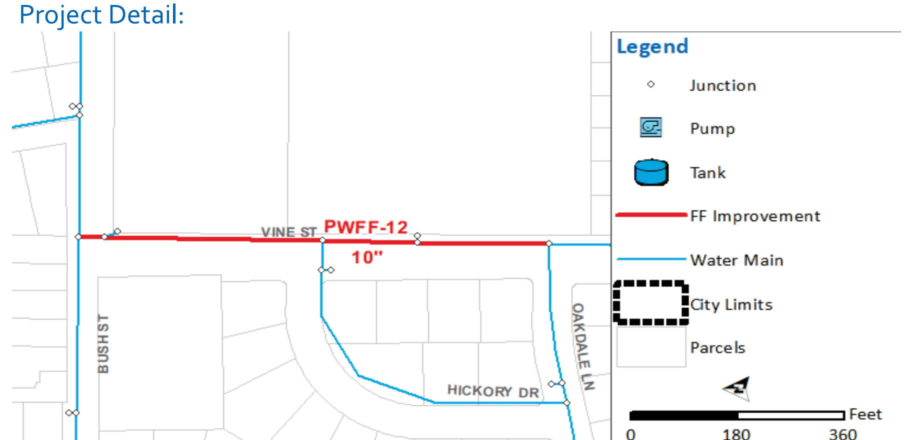
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 197,000
Future Users	0%	$ -
Total	100%	$ 197,000

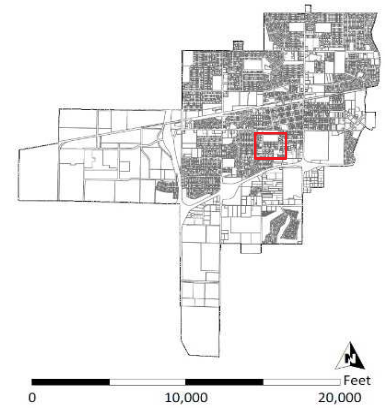
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number: PWFF-13
Project Name: Pipeline along Ash Street
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 820 feet of 6-inch diameter pipeline along the entire length of Ash Street, east of Vine Street. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with an 8-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	6	8	Replace	820	$ 120	$ 98,000	$ 127,000	$ 162,000	2025

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

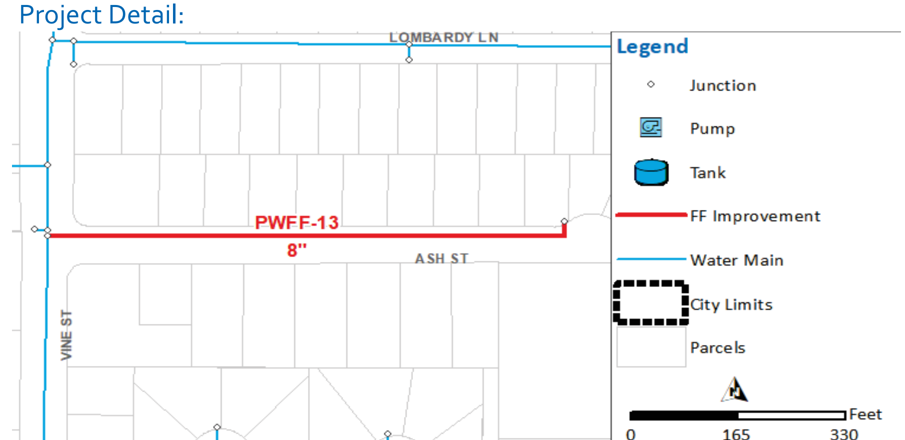
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 162,000
Future Users	0%	$ -
Total	100%	$ 162,000

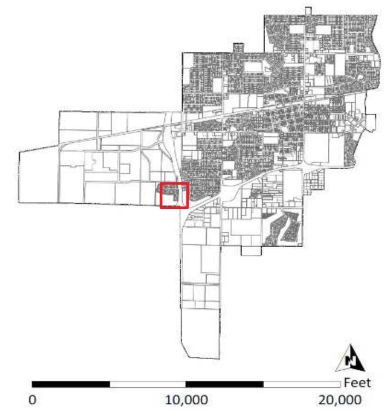
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number: PWFF-14
Project Name: Pipeline along Belle Haven Drive
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 700 feet of 6-inch diameter pipeline along Belle Haven Drive, south of Park Lane. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with an 8-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	6	8	Replace	700	$ 120	$ 84,000	$ 109,000	$ 139,000	2025

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

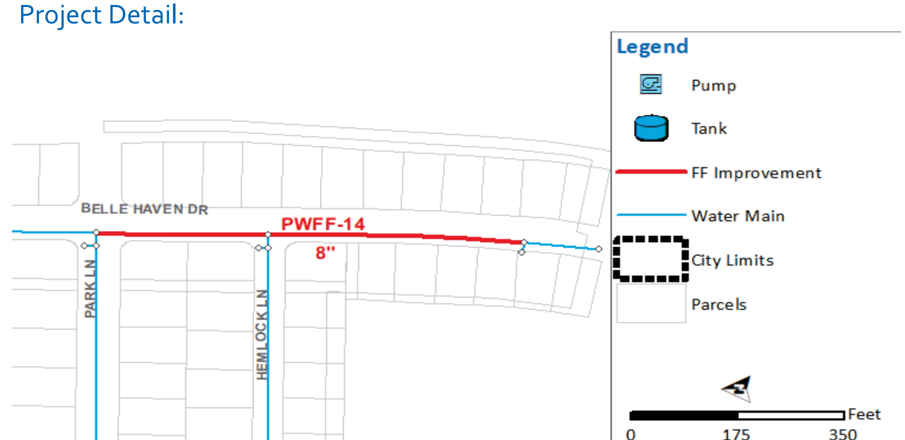
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 139,000
Future Users	0%	$ -
Total	100%	$ 139,000

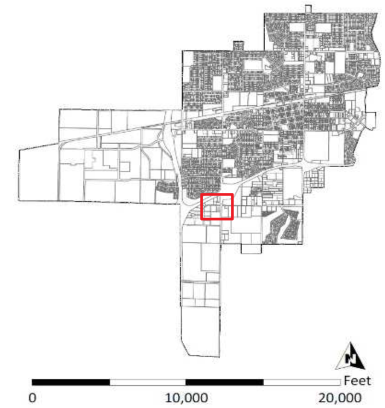
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number: PWFF-15
Project Name: Pipeline along Sierra Circle
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 280 feet of 6-inch diameter pipeline along Sierra Circle, west of 19th Avenue. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 10-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	6	10	Replace	280	$ 150	$ 42,000	$ 55,000	$ 70,000	2026

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

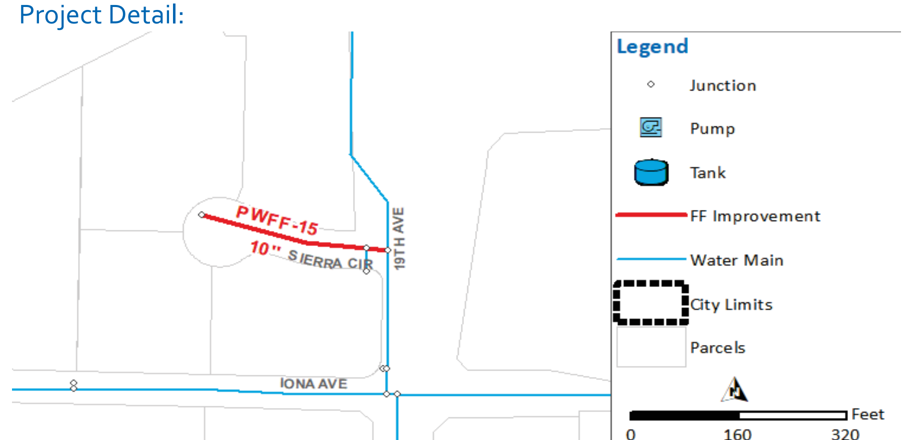
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 70,000
Future Users	0%	$ -
Total	100%	$ 70,000

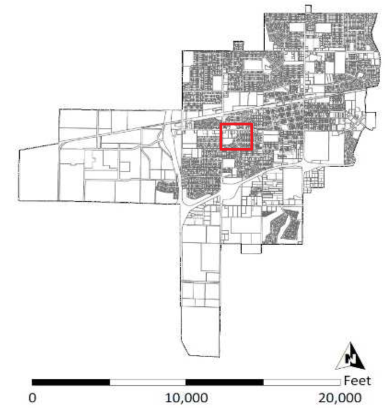
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number: PWFF-16
Project Name: Pipeline along Sycamore Lane
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 170 feet of 6-inch diameter pipeline along Sycamore Lane, between Linda Lane and Ashley Court. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with an 8-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pipe	6	8	Replace	170	$ 120	$ 20,000	$ 26,000	$ 33,000	2026

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

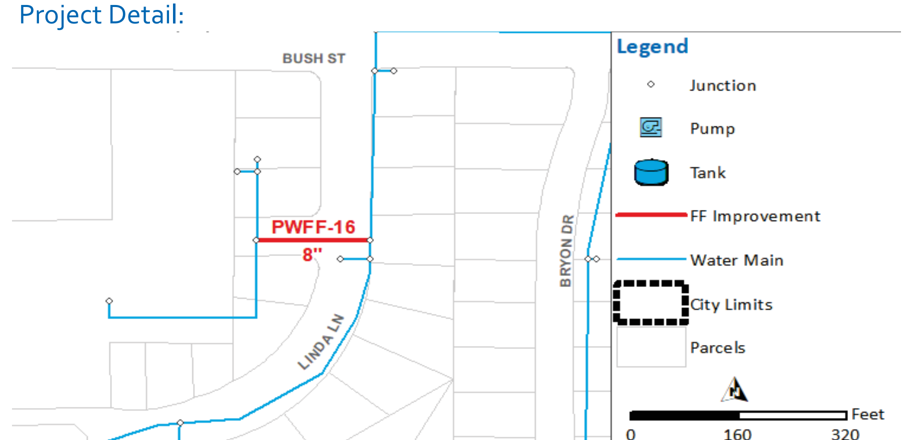
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 33,000
Future Users	0%	$ -
Total	100%	$ 33,000

Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

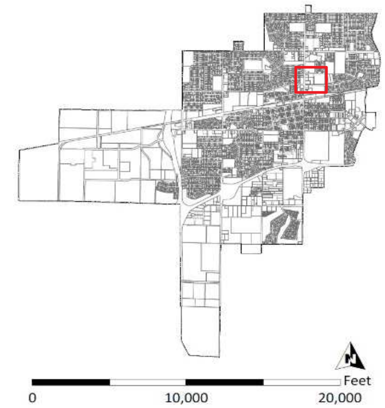
Project Detail:



LEMOORE CALIFORNIA

carollo

Project Number:	PWFF-17
Project Name:	Pipeline along Lemoore Lane
System Type:	Potable Water



Project Description:

This project includes the replacement of approximately 120 feet of 8-inch diameter pipeline along Lemoore Lane, just north of Devon Drive. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with a 10-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	8	10	Replace	120	$ 150	$ 18,000	$ 23,000	$ 30,000	2026

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

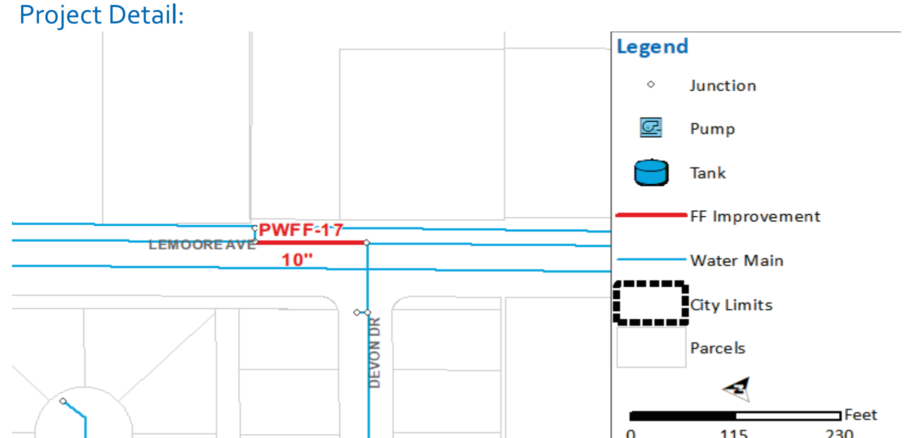
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 30,000
Future Users	0%	$ -
Total	100%	$ 30,000

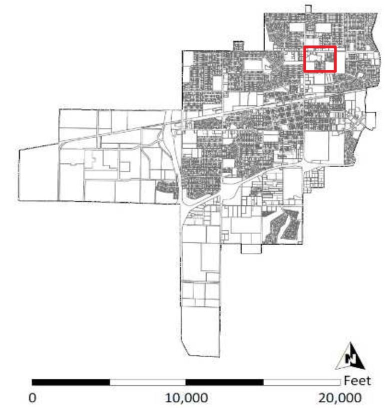
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number:	PWFF-18
Project Name:	Pipeline along Janine Way
System Type:	Potable Water



Project Description:

This project includes the replacement of approximately 550 feet of 6-inch diameter pipeline along Janine Way, east and west of Blake Street. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with an 8-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pipe	6	8	Replace	550	$ 120	$ 66,000	$ 86,000	$ 109,000	2026

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

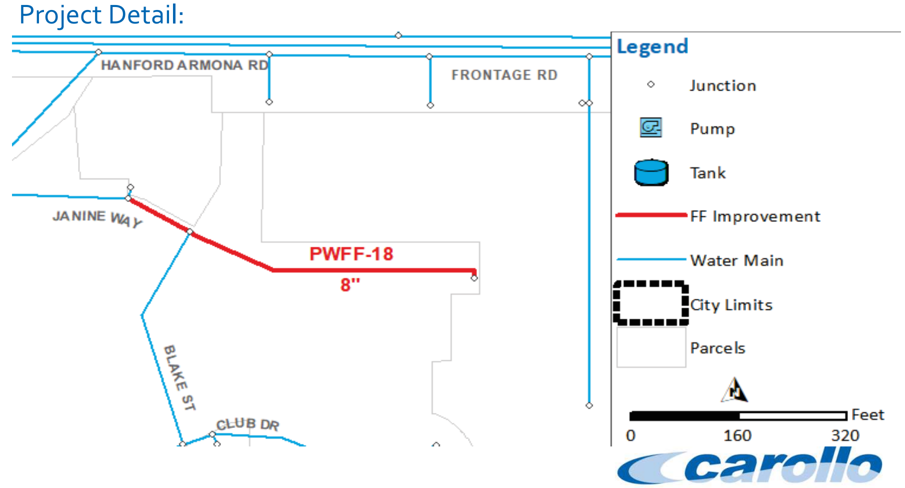
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 109,000
Future Users	0%	$ -
Total	100%	$ 109,000

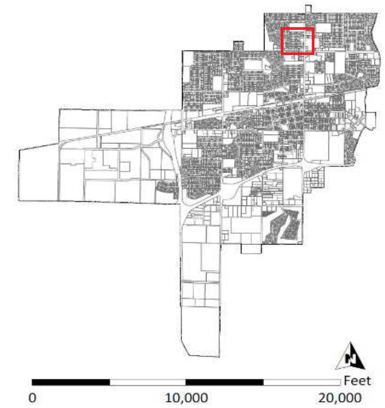
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number: PWFF-19
Project Name: Pipeline along Hazelwood Place
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 480 feet of 6-inch diameter pipeline along Hazelwood Place, west of Hazelwood Drive. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with an 8-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	6	8	Replace	480	$ 120	$ 58,000	$ 75,000	$ 96,000	2022

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

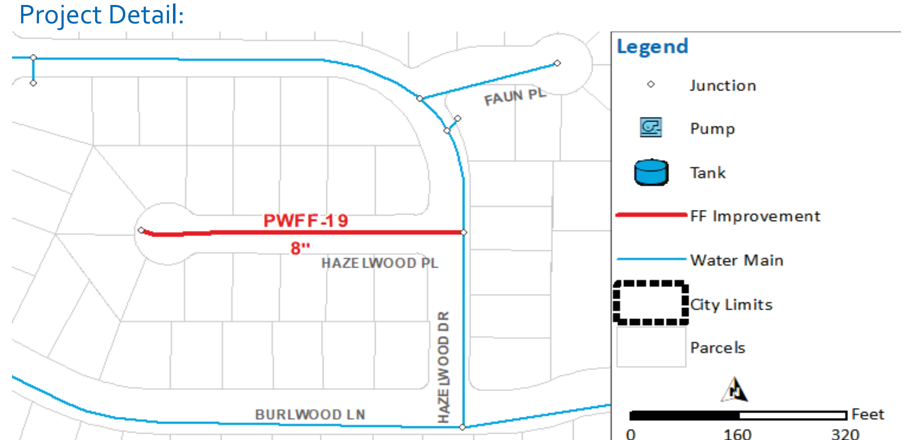
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 96,000
Future Users	0%	$ -
Total	100%	$ 96,000

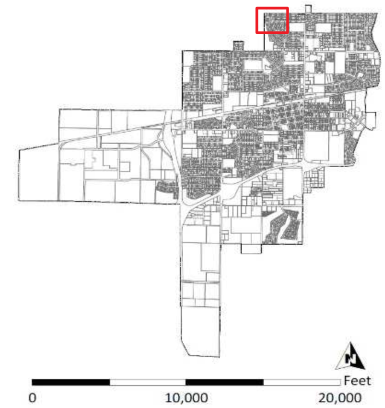
Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



Project Number:	PWFF-20
Project Name:	Pipeline along Deodar Lane
System Type:	Potable Water



Project Description:

This project includes the replacement of approximately 600 feet of 6-inch diameter pipeline along Deodar Lane, between Glendale Avenue and Burlwood Lane. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with an 8-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pipe	6	8	Replace	600	$ 120	$ 72,000	$ 94,000	$ 119,000	2020

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

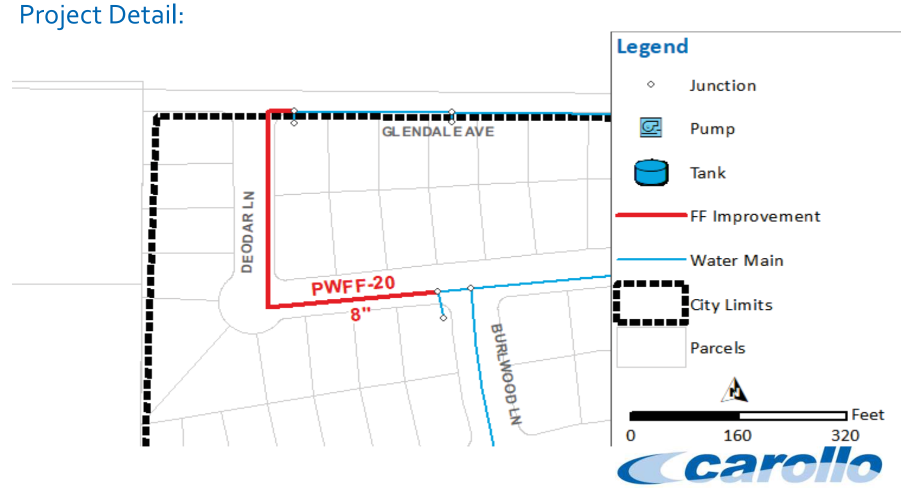
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 119,000
Future Users	0%	$ -
Total	100%	$ 119,000

Notes on Cost Estimation:

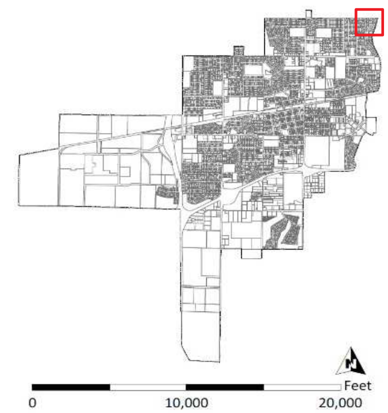
This project is an existing improvement therefore 100% of cost are assigned to existing users.

Project Detail:



LEMOORE
CALIFORNIA

Project Number: PWFF-21
Project Name: Pipeline along Lords Court
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 370 feet of 6-inch diameter pipeline along the entire length of Lords Court, east of Mission Drive. The residual fire hydrant pressures in this area are below 20 psi under MDD plus fire flow conditions. To mitigate the low residual pressure occurring under MDD plus fire flow conditions, it is recommended that the existing pipeline be replaced with an 8-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	6	8	Replace	370	$ 120	$ 44,000	$ 57,000	$ 73,000	2026

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

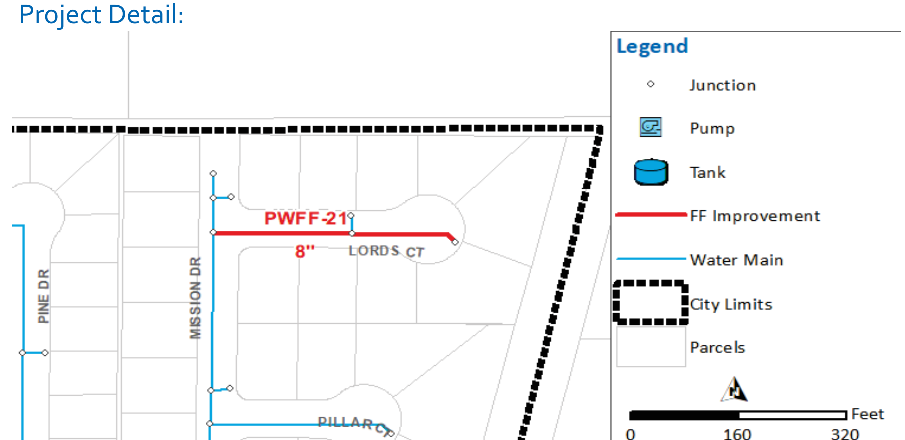
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 73,000
Future Users	0%	$ -
Total	100%	$ 73,000

Notes on Cost Estimation:

This project is an existing improvement therefore 100% of cost are assigned to existing users.

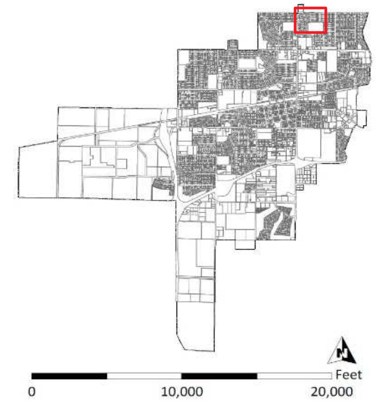
Project Detail:



LEMOORE
CALIFORNIA

carollo

Project Number: PWP-1
Project Name: Pipeline along Quandt Drive
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 470 feet of 8-inch diameter pipeline along Quandt Drive, between Glendale Avenue and Spruce Avenue. The velocity within this pipeline are approaching the maximum limit under PHD conditions. To mitigate the high velocities occurring under PHD conditions, it is recommended that the existing pipeline be replaced with a 12-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	8	12	Replace	470	$ 175	$ 82,000	$ 107,000	$ 136,000	2020

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

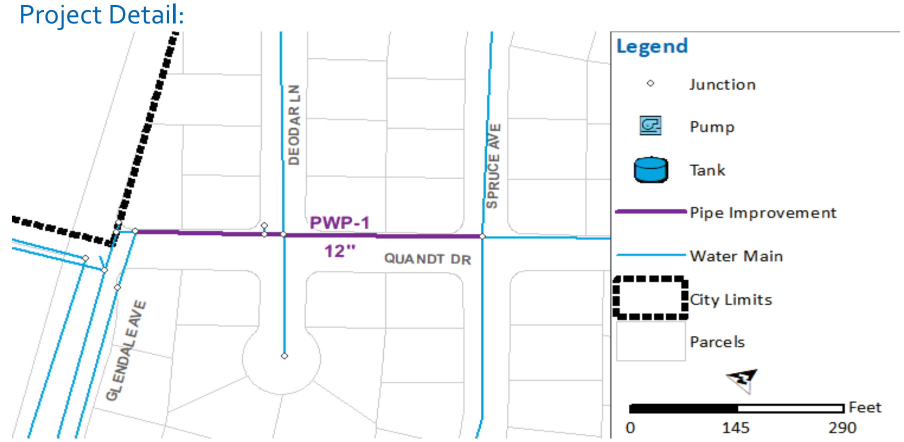
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 136,000
Future Users	0%	$ -
Total	100%	$ 136,000

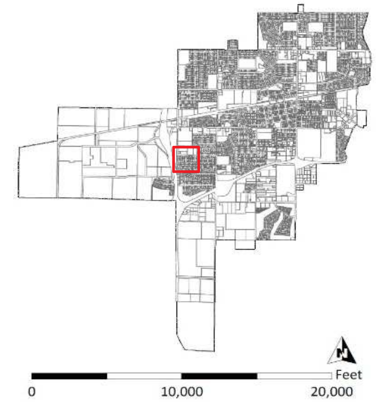
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWP-2
Project Name:	Pipeline along Cedar Lane
System Type:	Potable Water



Project Description:

This project includes the replacement of approximately 1,430 feet of 8-inch diameter pipeline along Cedar Lane, between 19 1/2 Avenue and Acacia Drive. The velocity within this pipeline are approaching the maximum limit under PHD conditions. To mitigate the high velocities occurring under PHD conditions, it is recommended that the existing pipeline be replaced with a 10-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	8	10	Replace	1,430	$ 150	$ 215,000	$ 280,000	$ 356,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

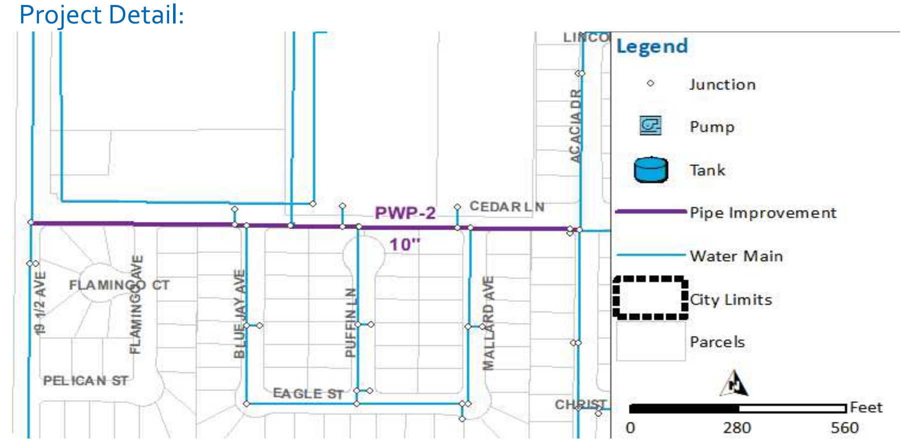
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 356,000
Total	100%	$ 356,000

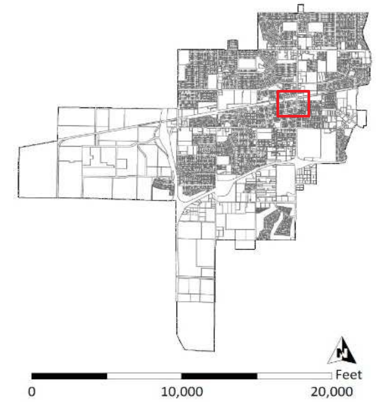
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWP-3A
Project Name:	Pipeline along G Street and Lemoore Avenue
System Type:	Potable Water



Project Description:

This project includes the replacement of approximately 660 feet of 8-inch diameter pipeline along G Street, between Follett Street and the G Street Tanks. The velocity within this pipeline are approaching the maximum limit under 2040 PHD conditions. To mitigate the high velocities occurring under 2040 PHD conditions, it is recommended that the existing pipeline be replaced with a 10-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	8	10	Replace	660	$ 150	$ 99,000	$ 129,000	$ 164,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

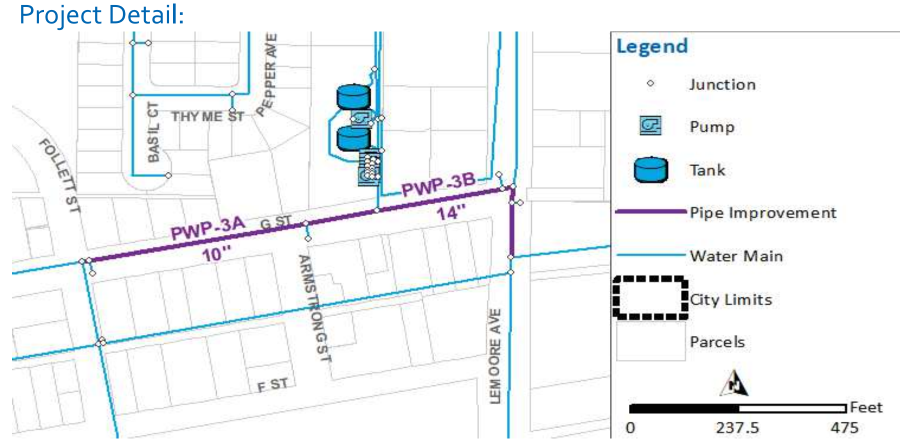
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 164,000
Total	100%	$ 164,000

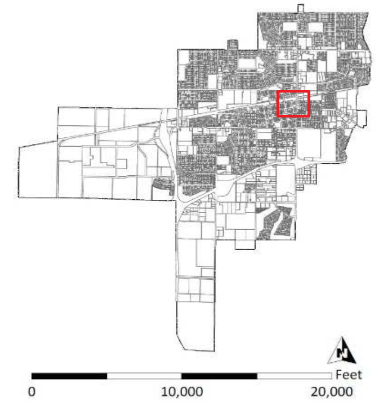
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWP-3B
Project Name:	Pipeline along G Street and Lemoore Avenue
System Type:	Potable Water



Project Description:

This project includes the replacement of approximately 480 feet of 8-inch and 12-inch diameter pipeline along G Street, between the G Street Tanks and Lemoore Avenue, and along Lemoore Avenue from G Street to 200 feet south of G Street. The velocity within this pipeline are approaching the maximum limit under 2040 PHD conditions. To mitigate the high velocities occurring under 2040 PHD conditions, it is recommended that the existing pipeline be replaced with a 14-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	8	14	Replace	660	$ 205	$ 135,000	$ 176,000	$ 224,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

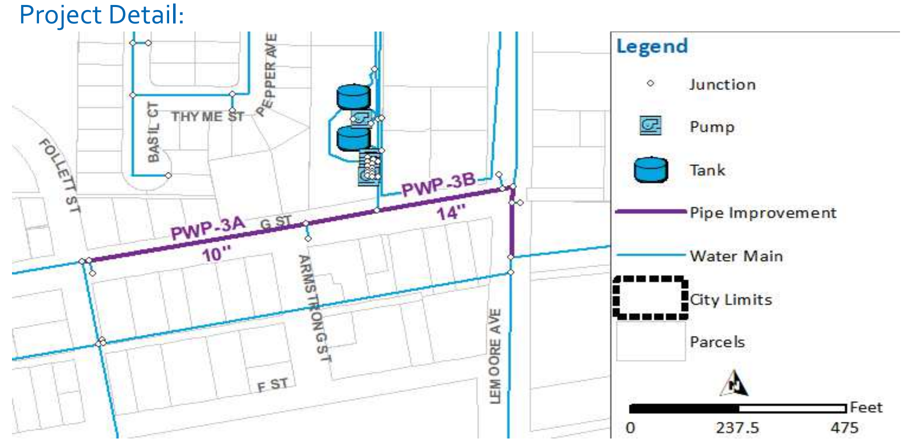
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 224,000
Total	100%	$ 224,000

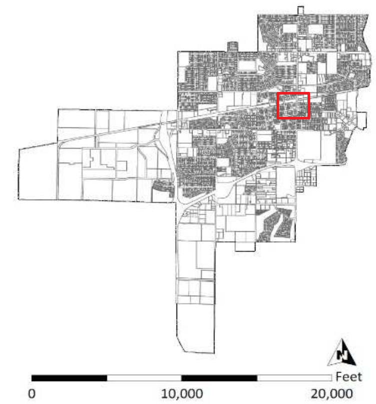
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number: PWP-4
Project Name: North Wellfield Transmission Line
System Type: Potable Water



Project Description:

This project includes the replacement of approximately 6 miles of 18-inch diameter pipeline. The North Wellfield Transmission Line is in poor condition and is in need of replacement. To mitigate the risk of transmission line failure, it is recommended that the existing pipeline be replaced with an 18-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	18	18	Replace	--	n/a	n/a	n/a	n/a	2020

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

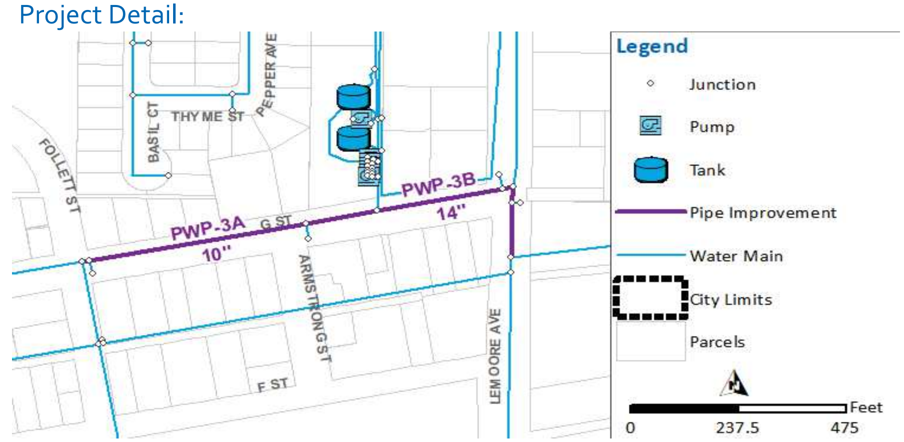
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ -
Total	100%	$ -

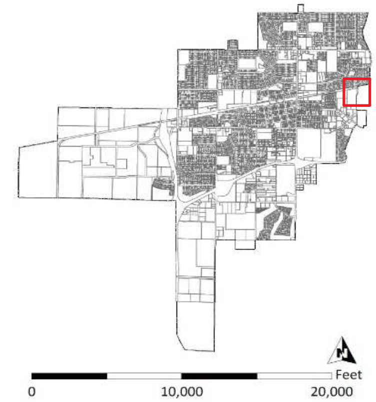
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWD-1
Project Name:	Pipeline along Daphne Lane
System Type:	Potable Water



Project Description:

This project includes the addition of approximately 250 feet 12-inch diameter pipeline along Daphne Lane, between the Woodside Homes and Geneva Drive. To anticipate development in this area by 2040, it is recommended that a 12-inch diameter pipeline be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	--	12	New	250	$ 175	$ 44,000	$ 57,000	$ 73,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

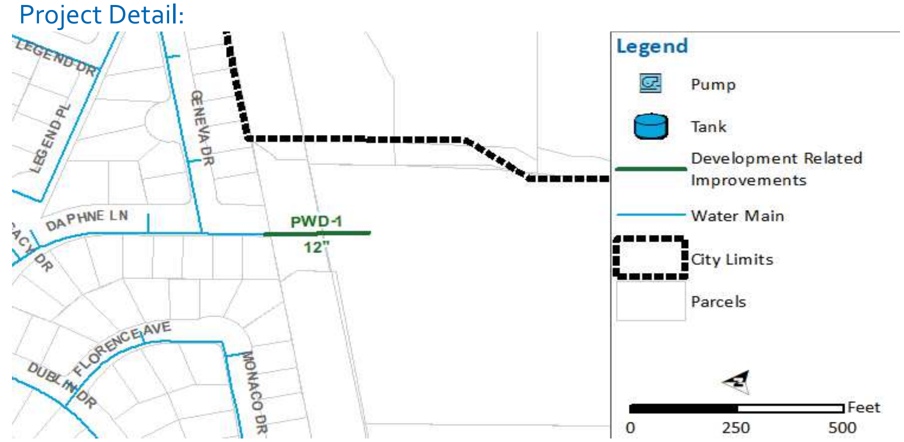
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 73,000
Total	100%	$ 73,000

Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

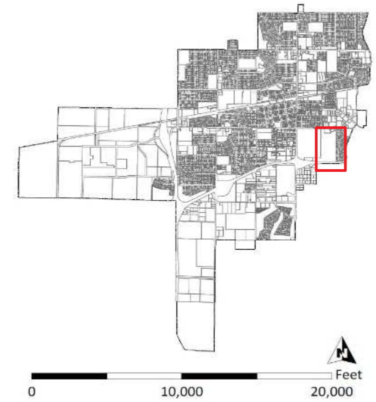
Project Detail:



LEMOORE CALIFORNIA

carollo

Project Number: PWD-2
Project Name: Pipelines east of Lemoore High School
System Type: Potable Water



Project Description:

This project includes the addition of approximately 3,830 feet 12-inch diameter pipeline east of Lemoore High School, in the grove. To anticipate development in this area by 2040, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	--	12	New	3,830	$ 175	$ 670,000	$ 871,000	$ 1,111,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

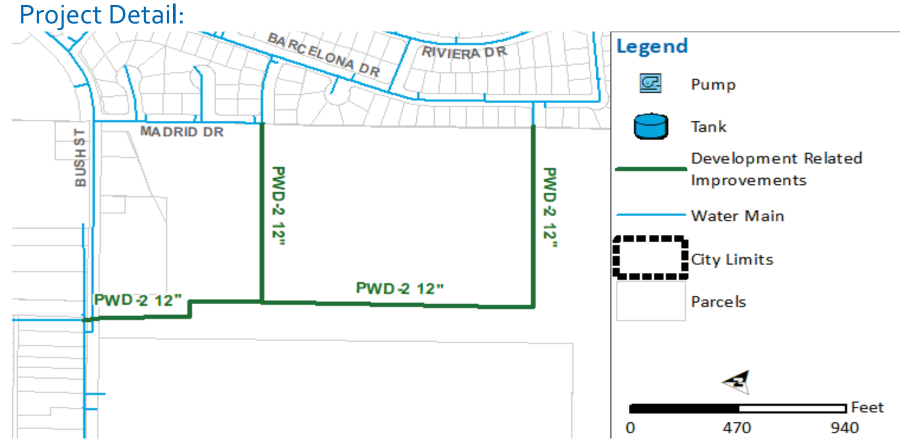
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,111,000
Total	100%	$ 1,111,000

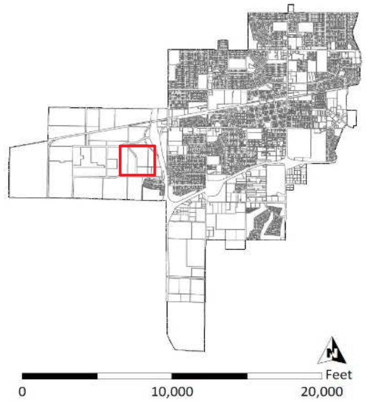
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWD-3
Project Name:	Pipelines east of West Hills College
System Type:	Potable Water



Project Description:

This project includes the addition of approximately 5,870 feet 12-inch diameter pipeline east of West Hills College. To anticipate development in this area by 2040, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	--	12	New	5,870	$ 175	$ 1,027,000	$ 1,335,000	$ 1,702,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

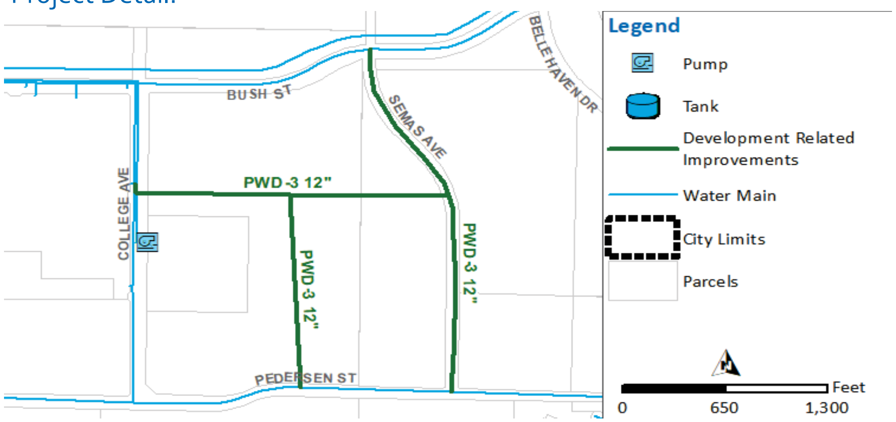
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,702,000
Total	100%	$ 1,702,000

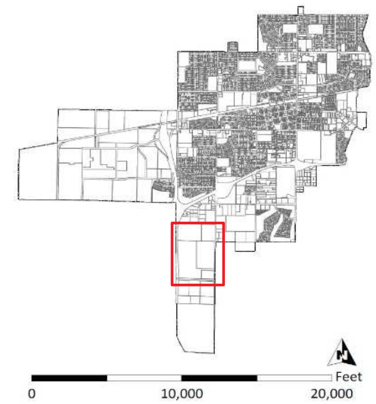
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number: PWD-4
Project Name: Pipelines near of Olam West Coast Inc.
System Type: Potable Water



Project Description:
This project includes the addition of approximately 9,540 feet 12-inch diameter pipeline east and south of Olam West Coast Inc.. To anticipate development in this area by buildout, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	--	12	New	9,540	$ 175	$ 1,670,000	$ 2,171,000	$ 2,768,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

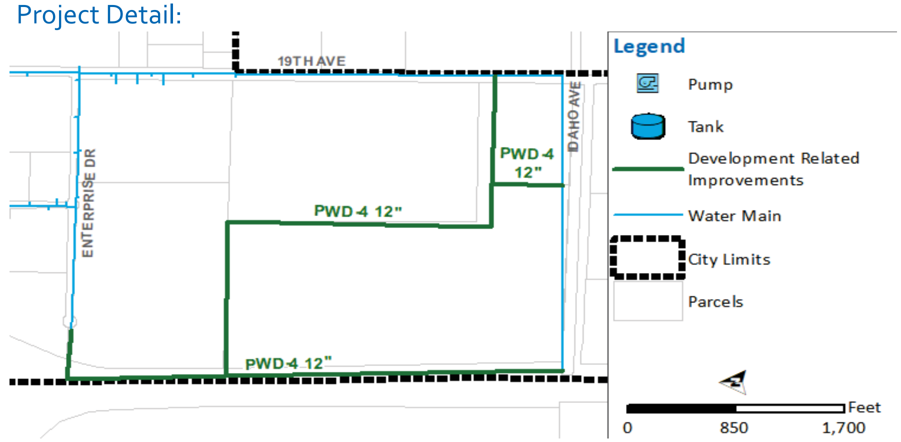
(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

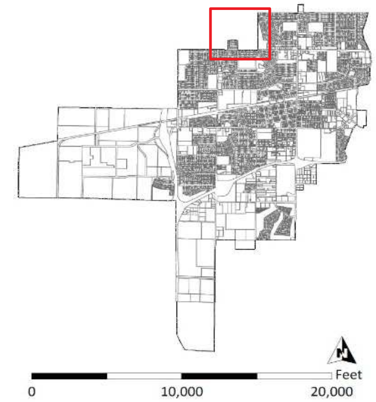
Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 2,768,000
Total	100%	$ 2,768,000

Notes on Cost Estimation:
This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number: PWD-5
Project Name: Pipelines along Glendale Avenue and near 18 3/4 Avenue
System Type: Potable Water



Project Description:

This project includes the addition of approximately 4,920 feet 12-inch diameter pipeline along Glendale Avenue, between Deodar Lane to east of 18 3/4 Avenue, and extending south to Hanford Armona Road. To anticipate development in this area by 2040, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pipe	--	12	New	4,920	$ 175	$ 861,000	$ 1,119,000	$ 1,427,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

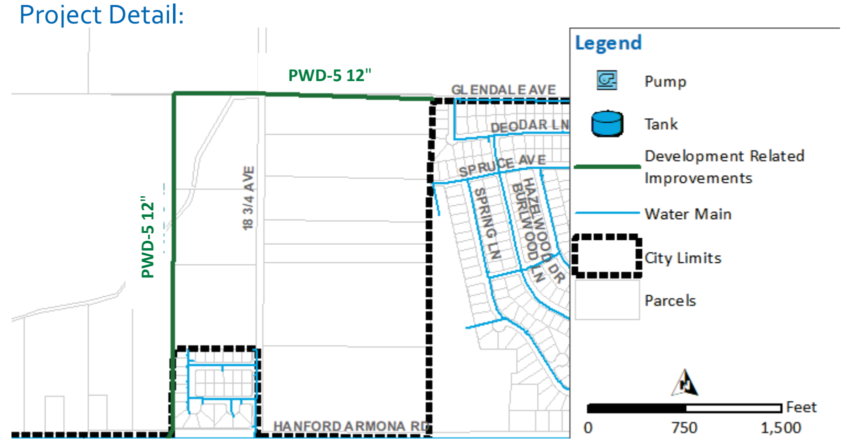
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,427,000
Total	100%	$ 1,427,000

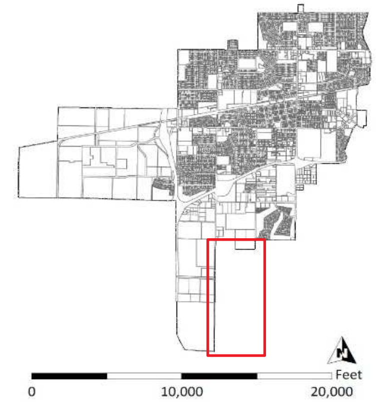
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWD-6
Project Name:	Pipelines in the southeast of the City
System Type:	Potable Water



Project Description:

This project includes the addition of approximately 32,830 feet 12-inch diameter pipeline in the southeast portion of the City. To anticipate development in this area by ultimate buildout of the City, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[(1)] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[(2)] ($)	Capital Improvement Cost[(3)] ($)	Project Schedule
Pipe	--	12	New	32,830	$ 175	$ 5,745,000	$ 7,469,000	$ 9,522,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

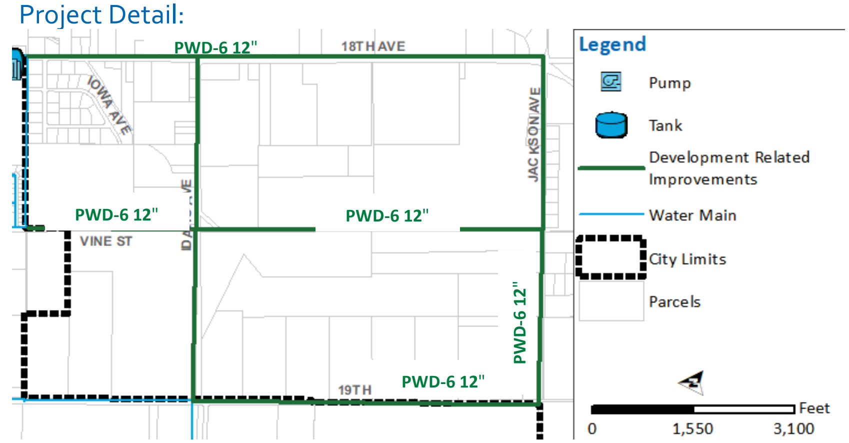
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 9,522,000
Total	100%	$ 9,522,000

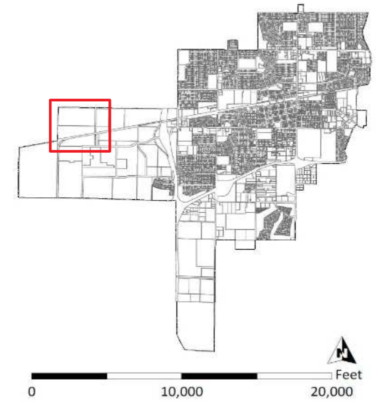
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWD-7
Project Name:	Pipelines west of Production Avenue
System Type:	Potable Water



Project Description:

This project includes the addition of approximately 7,300 feet 12-inch diameter pipeline west of Production Avenue. To anticipate development in this area by ultimate buildout of the City, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pipe	--	12	New	7,300	$ 175	$ 1,278,000	$ 1,661,000	$ 2,118,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

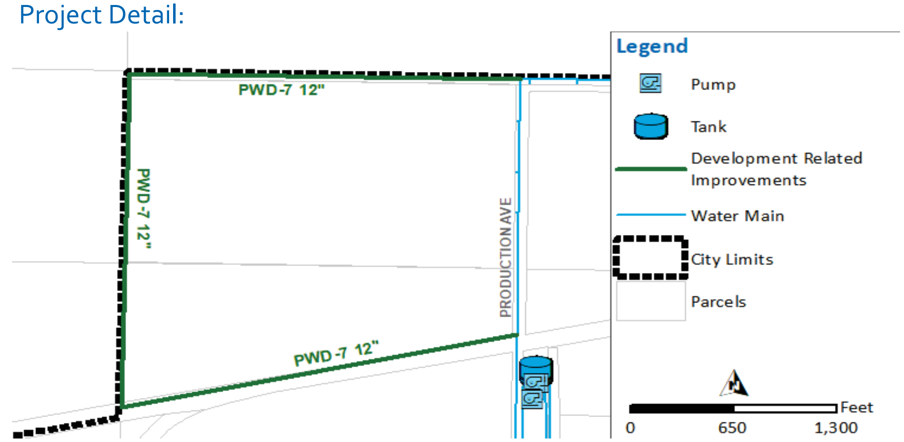
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 2,118,000
Total	100%	$ 2,118,000

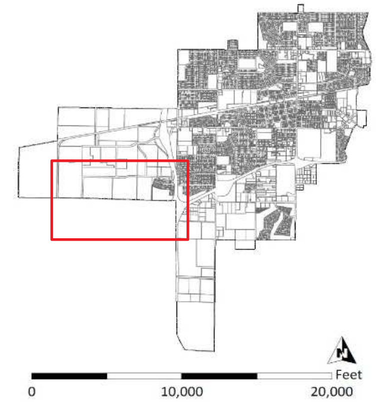
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number: PWD-8
Project Name: Pipelines south of West Hills College
System Type: Potable Water



Project Description:

This project includes the addition of approximately 28,250 feet 12-inch diameter pipeline in the southwest area of the City, south of West Hills College. To anticipate development in this area by ultimate buildout of the City, it is recommended that these 12-inch diameter pipelines be added. ***This project is needed to provide flow to the new tank for project PWS-1.***

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pipe	--	12	New	28,250	$ 175	$ 4,944,000	$ 6,427,000	$ 8,195,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

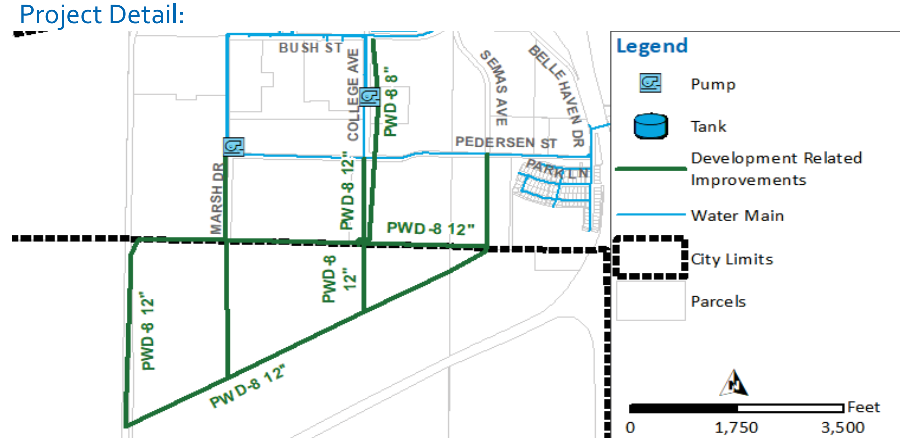
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 8,195,000
Total	100%	$ 8,195,000

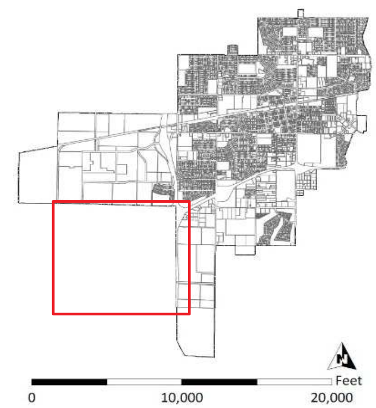
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number: PWD-9
Project Name: Pipelines in the southwest are of the City
System Type: Potable Water



Project Description:

This project includes the addition of approximately 28,750 feet 12-inch diameter pipeline in the southwest area of the City, south of West Hills College and west of Olam West Coast Inc. To anticipate development in this area by ultimate buildout of the City, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	--	12	New	28,750	$ 175	$ 5,031,000	$ 6,540,000	$ 8,339,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

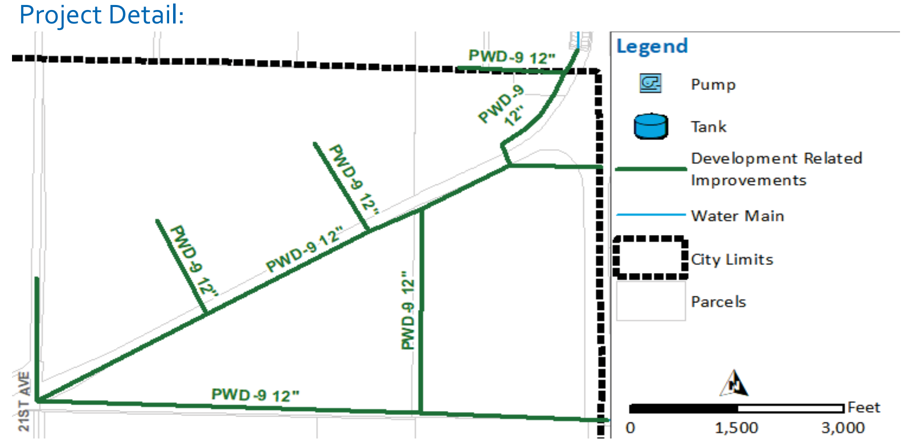
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 8,339,000
Total	100%	$ 8,339,000

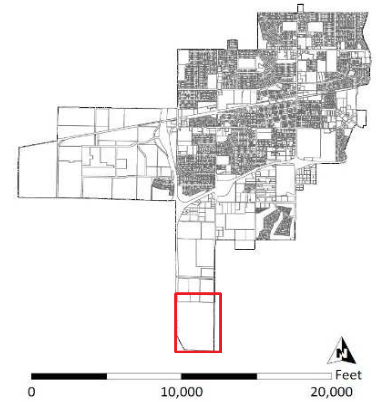
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number: PWD-10
Project Name: Pipelines south of Olam West Coast Inc.
System Type: Potable Water



Project Description:

This project includes the addition of approximately 7,250 feet 12-inch diameter pipeline located south of Olam West Coast Inc. To anticipate development in this area by ultimate buildout of the City, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	--	12	New	7,250	$ 175	$ 1,269,000	$ 1,650,000	$ 2,103,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

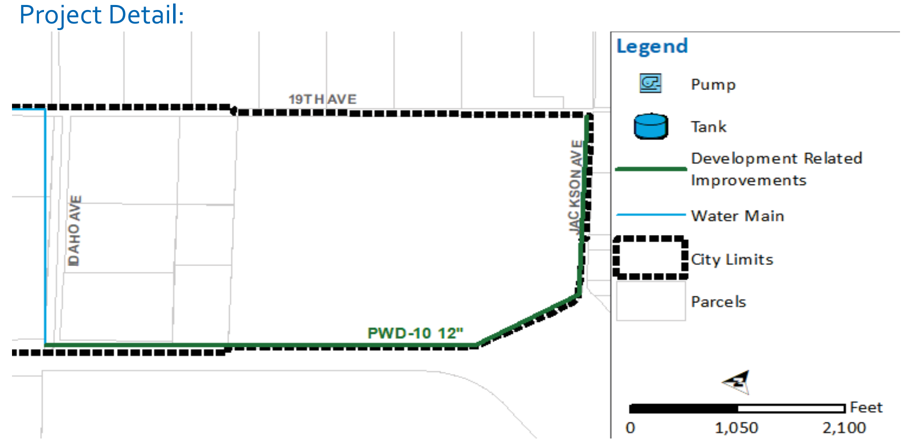
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 2,103,000
Total	100%	$ 2,103,000

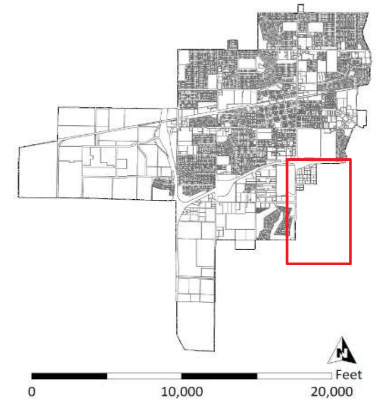
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number: PWD-11
Project Name: Pipelines east and south of Lemoore Golf Course
System Type: Potable Water



Project Description:

This project includes the addition of approximately 14,440 feet 12-inch diameter pipeline located east and south of Lemoore Golf Course. To anticipate development in this area by ultimate buildout of the City, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pipe	--	12	New	14,440	$ 175	$ 2,527,000	$ 3,285,000	$ 4,189,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

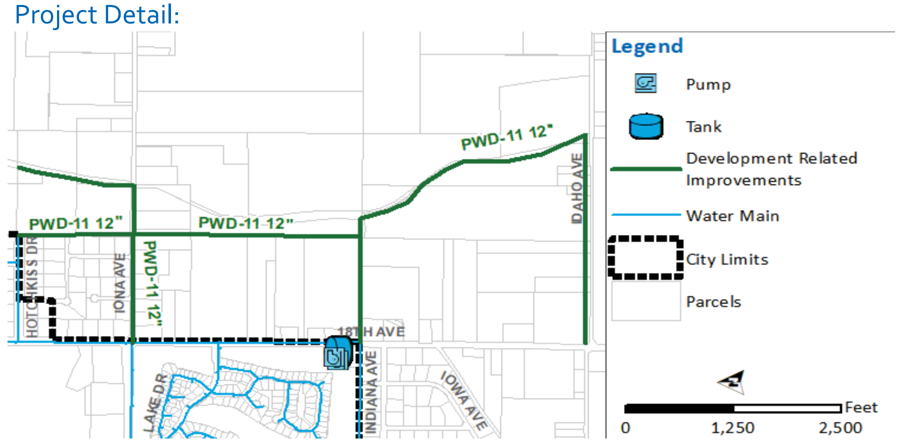
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 4,189,000
Total	100%	$ 4,189,000

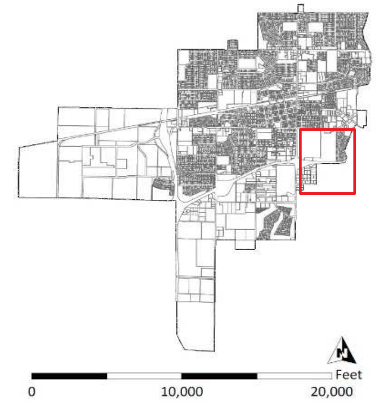
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWD-12
Project Name:	Pipelines east and south of Lemoore High School
System Type:	Potable Water



Project Description:

This project includes the addition of approximately 9,220 feet 12-inch diameter pipeline located east and south of Lemoore High School. To anticipate development in this area by ultimate buildout of the City, it is recommended that these 12-inch diameter pipelines be added. ***This project is needed to provide flow to the new tank for project PWS-2.***

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	--	12	New	9,220	$ 175	$ 1,614,000	$ 2,098,000	$ 2,675,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

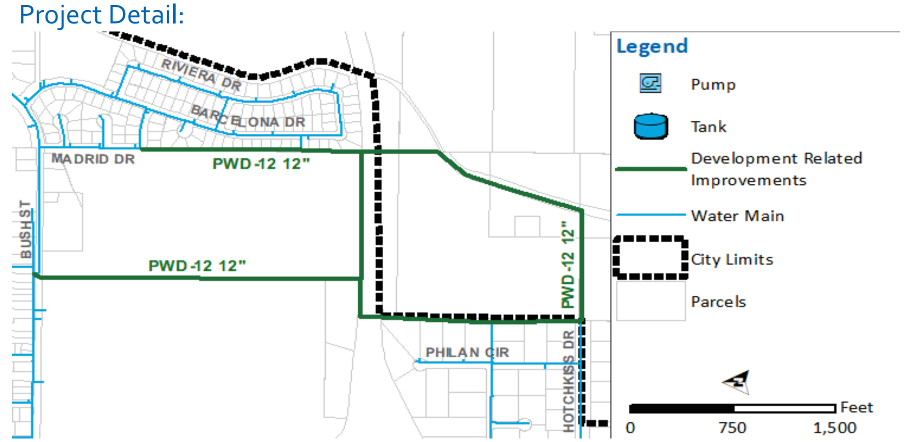
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 2,675,000
Total	100%	$ 2,675,000

Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

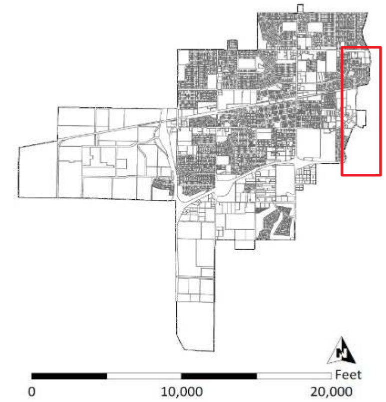
Project Detail:



LEMOORE CALIFORNIA

carollo

Project Number:	PWD-13A
Project Name:	Pipelines in the eastern area of the City
System Type:	Potable Water



Project Description:

This project includes the addition of approximately 6,450 feet 12-inch diameter pipeline located on the eastern edge of the City, along 17th Avenue north of Highway 198. To anticipate development in this area by 2040, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	--	12	New	6,450	$ 175	$ 1,129,000	$ 1,468,000	$ 1,871,000	2023

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

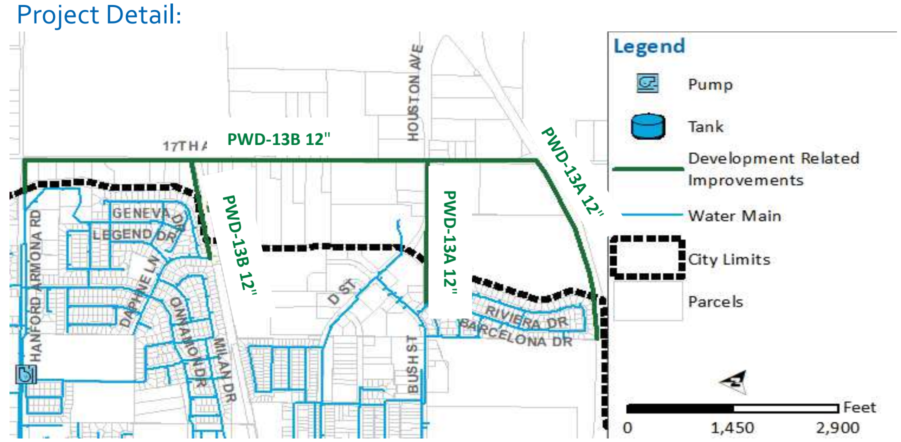
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 1,871,000
Future Users	0%	$ -
Total	100%	$ 1,871,000

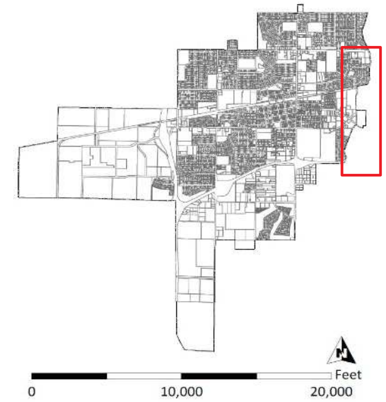
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWD-13B
Project Name:	Pipelines in the eastern area of the City
System Type:	Potable Water



Project Description:

This project includes the addition of approximately 7,490 feet 12-inch diameter pipeline located on the eastern edge of the City, along 17th Avenue north of Highway 198. To anticipate development in this area by ultimate buildout of the City, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	--	12	New	7,490	$ 175	$ 1,311,000	$ 1,704,000	$ 2,173,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

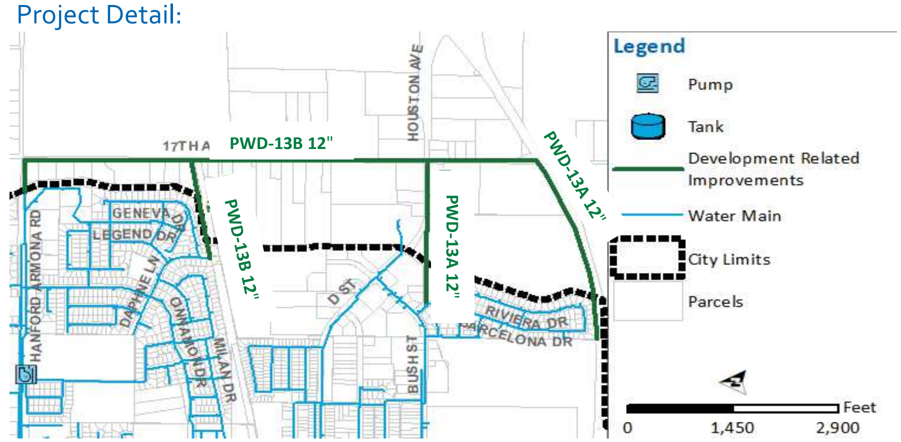
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 2,173,000
Total	100%	$ 2,173,000

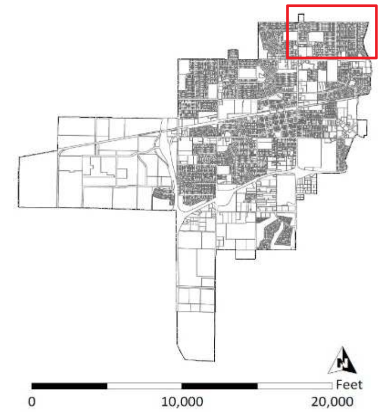
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWD-14A
Project Name:	Pipelines in the northeastern area of the City
System Type:	Potable Water



Project Description:

This project includes the addition of approximately 10,220 feet 12-inch diameter pipeline located along along Lacey Boulevard and Glendale Avenue between 17th Avenue and 18th Avenue, and along 18th Avenue between Lacey Boulevard and Glendale Avenue. To anticipate development in this area by 2040, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pipe	--	12	New	10,220	$ 175	$ 1,789,000	$ 2,326,000	$ 2,965,000	2023

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

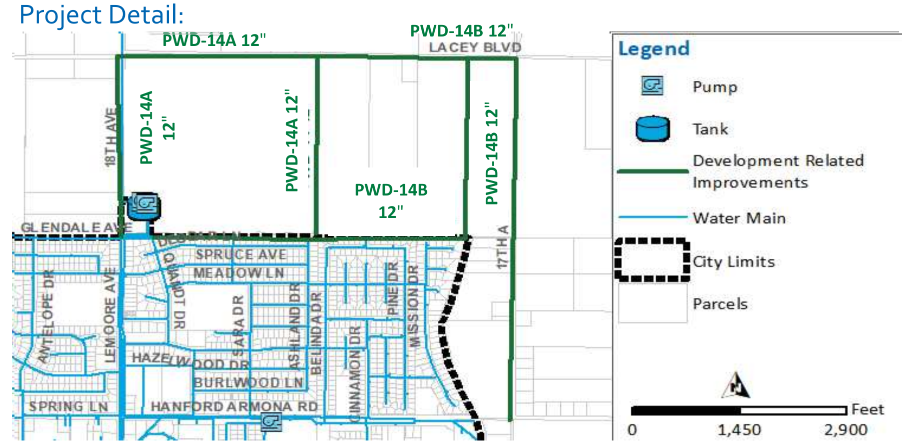
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 2,965,000
Future Users	0%	$ -
Total	100%	$ 2,965,000

Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

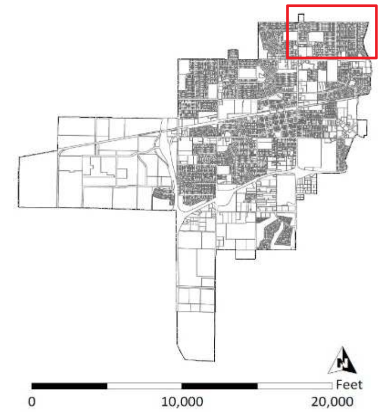
Project Detail:



Project Number: PWD-14B

Project Name: Pipelines in the northeastern area of the City

System Type: Potable Water



Project Description:

This project includes the addition of approximately 12,760 feet 12-inch diameter pipeline located along 17th Avenue between Hanford Armona Road, along Lacey Boulevard and Glendale Avenue between 17th Avenue and 18th Avenue, and along 18th Avenue between Lacey Boulevard and Glendale Avenue. To anticipate development in this area by ultimate buildout of the City, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	--	12	New	12,760	$ 175	$ 2,233,000	$ 2,903,000	$ 3,701,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

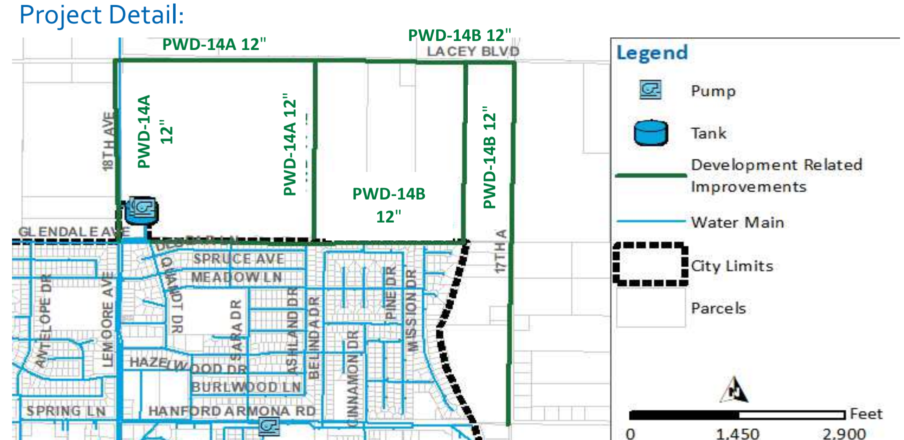
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 3,701,000
Total	100%	$ 3,701,000

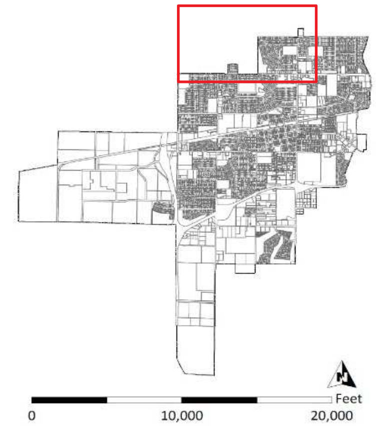
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWD-15
Project Name:	Pipelines in the northwestern area of the City
System Type:	Potable Water



Project Description:

This project includes the addition of approximately 29,330 feet 12-inch diameter pipeline in the northwestern area of the City with pipelines along Lacey Boulevard, 19 1/2 Avenue, and 18 3/4 Avenue. To anticipate development in this area by ultimate buildout of the City, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pipe	--	12	New	29,330	$ 175	$ 5,133,000	$ 6,673,000	$ 8,508,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

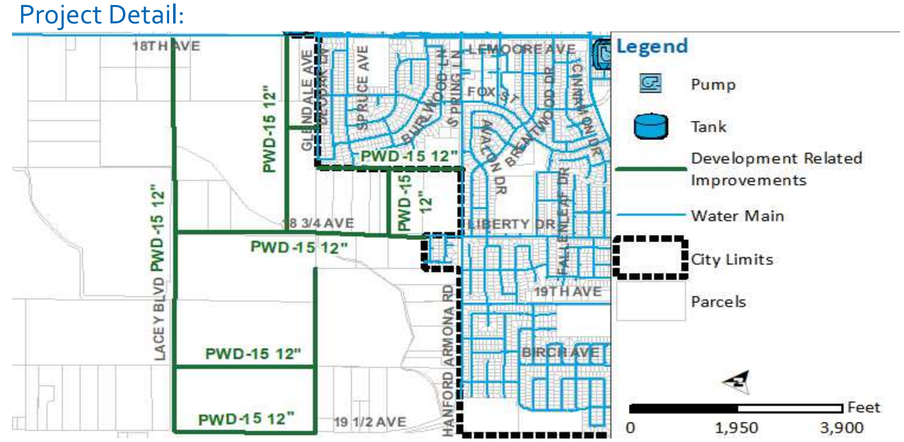
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 8,508,000
Total	100%	$ 8,508,000

Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

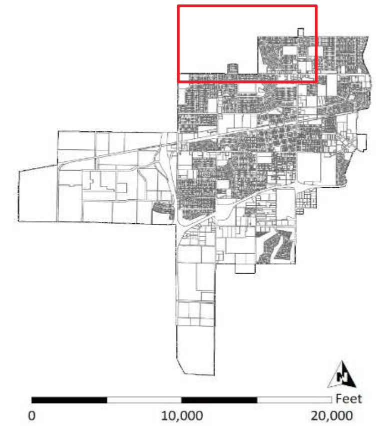
Project Detail:



Project Number: PWD-16

Project Name: Pipelines in the northwestern area of the City

System Type: Potable Water



Project Description:

This project includes the addition of approximately 8,940 feet 12-inch diameter pipeline in the northwestern area of the City with pipelines along 19 1/2 Avenue and Hanford Armona Road. To anticipate development in this area by ultimate buildout of the City, it is recommended that these 12-inch diameter pipelines be added.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pipe	--	12	New	8,940	$ 175	$ 1,565,000	$ 2,035,000	$ 2,594,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 2,594,000
Total	100%	$ 2,594,000

Notes on Cost Estimation:

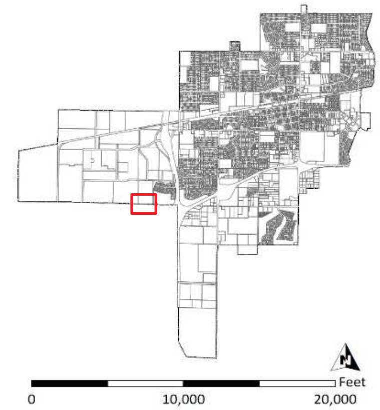
This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:

LEMOORE CALIFORNIA

carollo

Project Number:	PWPS-1
Project Name:	Buildout Tank 1 Pump Station
System Type:	Potable Water



Project Description:

This project includes the addition of four pumps for the Buildout Tank 1 Pump Station. This pump station will pump water out of Buildout Tank 1 into the distribution system. At buildout, the City does not have the pumping capacity to supply PHD. To mitigate the capacity deficiency occurring under PHD conditions, it is recommended that the booster pump station with a firm capacity of 5.0 mgd be added. ***This project is needed to serve the system water from Buildout Tank 1.***

Project Details:

Project Element	Existing Firm Capacity (mgd)	Proposed Firm Capacity (mgd)	Replace/ New	Total HP	Unit Cost(1) ($/HP)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pump	--	5.00	New	200	$ 3,000	$ 600,000	$ 780,000	$ 995,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

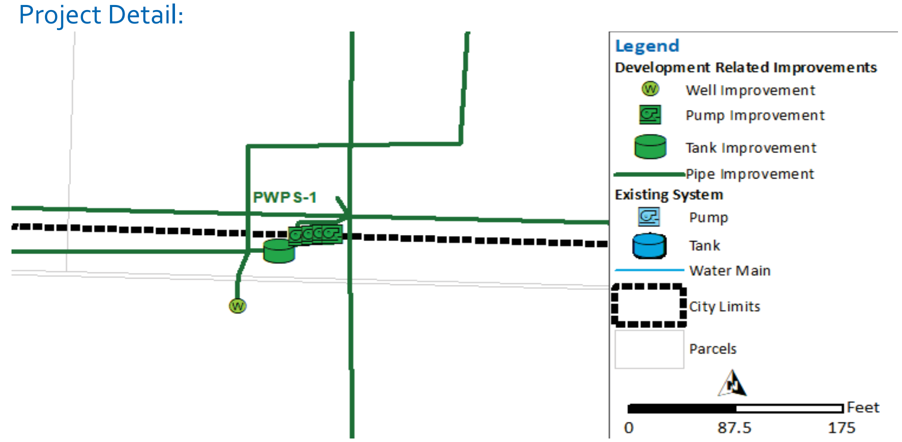
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 995,000
Total	100%	$ 995,000

Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

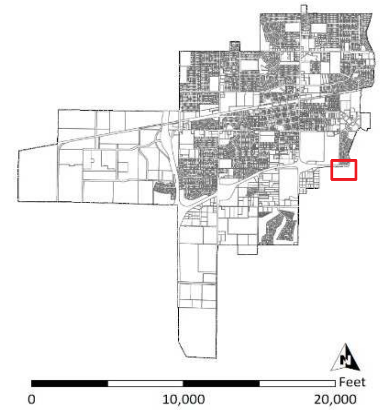
Project Detail:



Project Number: PWPS-2

Project Name: Buildout Tank 2 Pump Station

System Type: Potable Water



Project Description:

This project includes the addition of four pumps for the Buildout Tank 2 Pump Station. This pump station will pump water out of Buildout Tank 2 into the distribution system. At buildout, the City does not have the pumping capacity to supply PHD. To mitigate the capacity deficiency occurring under PHD conditions, it is recommended that the booster pump station with a firm capacity of 6.5 mgd be added. ***This project is needed to serve the system water from Buildout Tank 2.***

Project Details:

Project Element	Existing Firm Capacity (mgd)	Proposed Firm Capacity (mgd)	Replace/ New	Total HP	Unit Cost(1) ($/HP)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pump	--	6.50	New	350	$ 3,000	$ 1,050,000	$ 1,365,000	$ 1,740,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

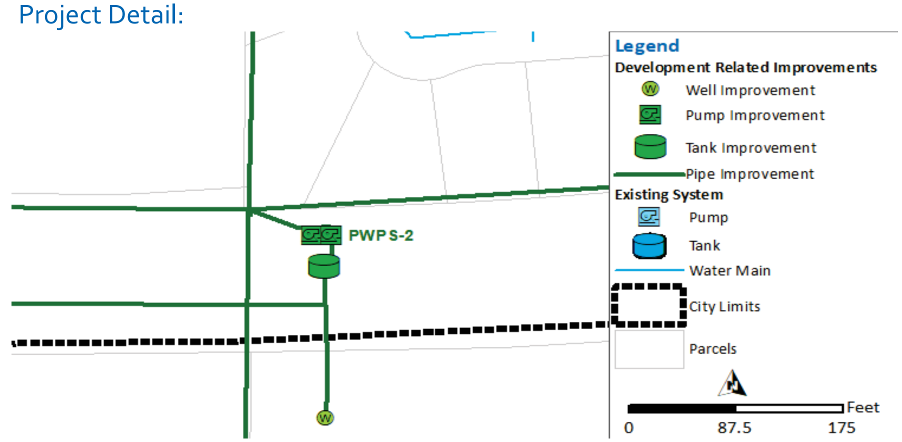
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,740,000
Total	100%	$ 1,740,000

Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

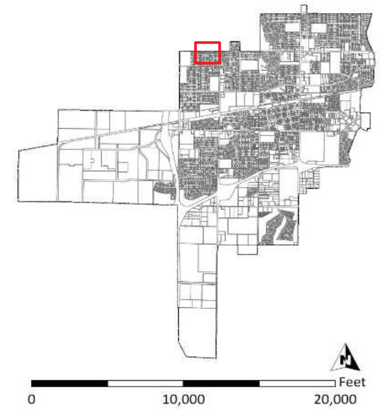
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	PWPS-3
Project Name:	Buildout Tank 3 Pump Station
System Type:	Potable Water



Project Description:

This project includes the addition of four pumps for the Buildout Tank 3 Pump Station. This pump station will pump water out of Buildout Tank 3 into the distribution system. At buildout, the City does not have the pumping capacity to supply PHD. To mitigate the capacity deficiency occurring under PHD conditions, it is recommended that the booster pump station with a firm capacity of 5.62 mgd be added. ***This project is needed to serve the system water from Buildout Tank 3.***

Project Details:

Project Element	Existing Firm Capacity (mgd)	Proposed Firm Capacity (mgd)	Replace/ New	Total HP	Unit Cost(1) ($/HP)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Pump	--	5.62	New	240	$ 3,000	$ 720,000	$ 936,000	$ 1,193,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

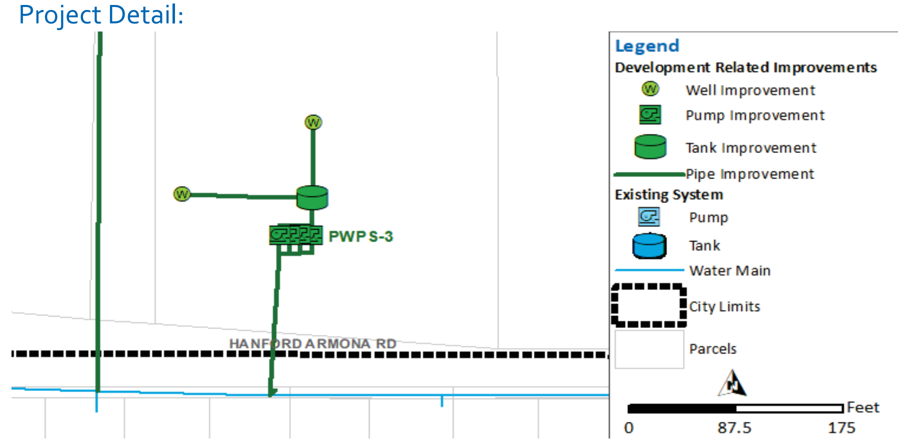
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,193,000
Total	100%	$ 1,193,000

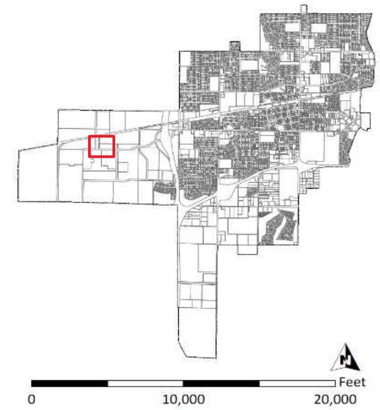
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWPS-4
Project Name:	Upgrade Tank 7 Pump Station
System Type:	Potable Water



Project Description:

This project includes the addition of one pump at the Tank 7 Pump Station. At buildout, the City does not have the pumping capacity to supply PHD. To mitigate the capacity deficiency occurring under PHD conditions, it is recommended that one booster pump with the capacity of 1.44 mgd be added to the pump station, giving the pump station a firm capacity of 5.2 mgd.

Project Details:

Project Element	Existing Firm Capacity (mgd)	Proposed Firm Capacity (mgd)	Replace/ New	Total HP	Unit Cost[1] ($/HP)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Pump	--	1.44	New	50	$ 5,000	$ 250,000	$ 325,000	$ 414,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

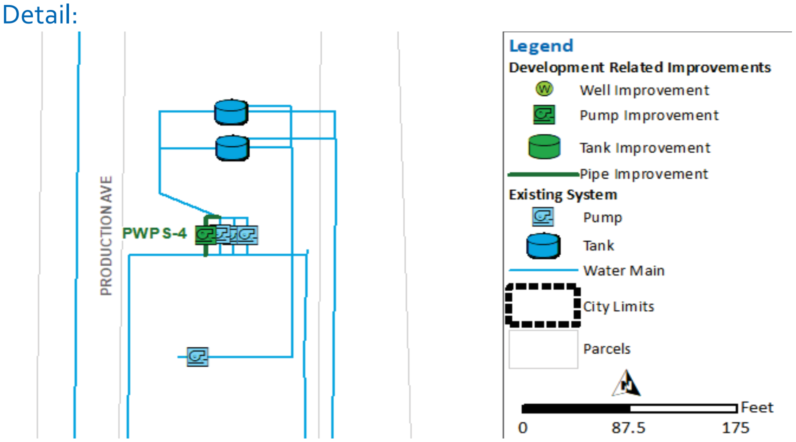
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 414,000
Total	100%	$ 414,000

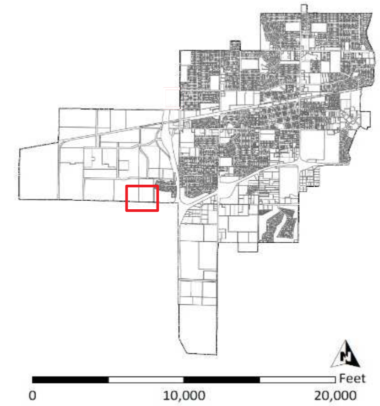
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWS-1
Project Name:	Well 18 Tank
System Type:	Potable Water



Project Description:

This project includes the addition of Well 18 Tank. The existing system does not have enough storage capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 1.5 MG tank be added in the southwest area of the City.

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Proposed Capacity (gal)	Unit Cost(1) ($/gal)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Storage Tank	--	1.5	New	1,500,000	$ 1.50	$ 2,250,000	$ 2,925,000	$ 3,729,000	041 & beyor

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

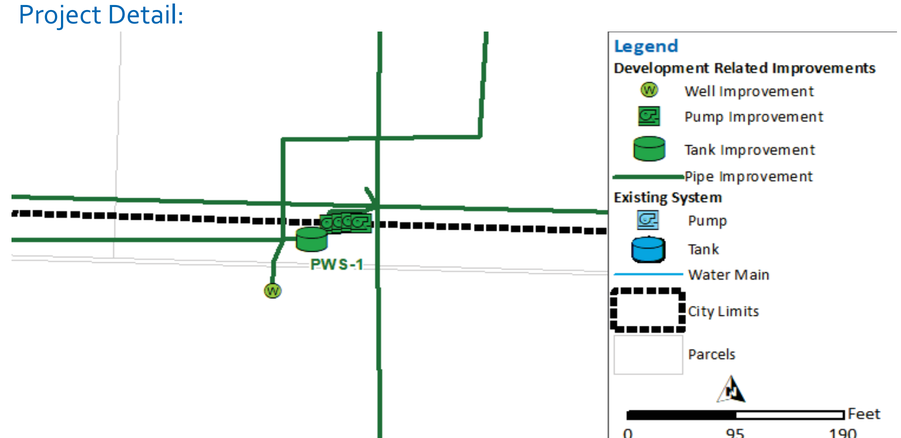
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 3,729,000
Total	100%	$ 3,729,000

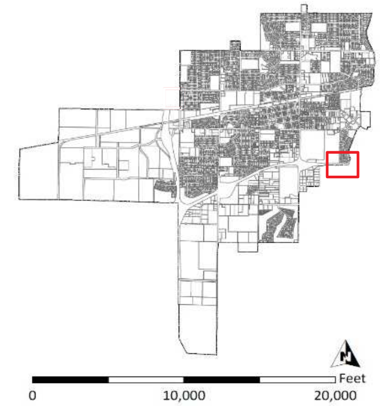
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWS-2
Project Name:	Well 19 Tank
System Type:	Potable Water



Project Description:

This project includes the addition of Well 19 Tank. The existing system does not have enough storage capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 2.5 MG tank be added in the eastern area of the City.

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Proposed Capacity (gal)	Unit Cost(1) ($/gal)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Storage Tank	--	2.5	New	2,500,000	$ 1.50	$ 3,750,000	$ 4,875,000	$ 6,216,000	041 & beyor

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

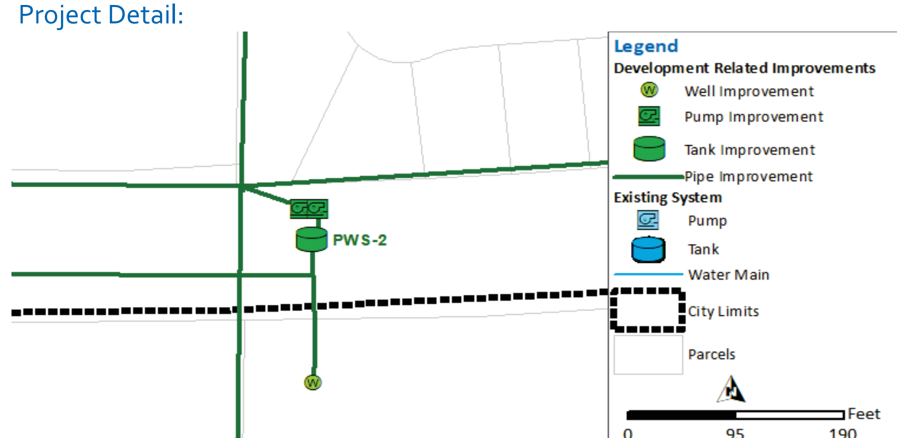
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 6,216,000
Total	100%	$ 6,216,000

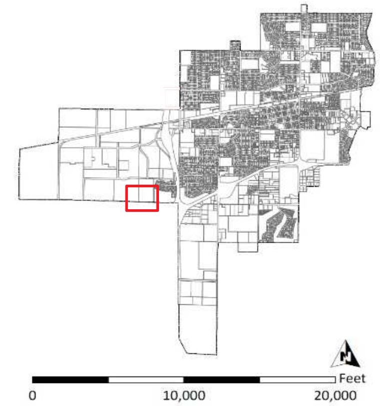
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWS-3
Project Name:	Well 21 Tank
System Type:	Potable Water



Project Description:

This project includes the addition of Well 21 Tank. The existing system does not have enough storage capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 1.5 MG tank be added in the northern area of the City.

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Proposed Capacity (gal)	Unit Cost(1) ($/gal)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Storage Tank	--	1.5	New	1,500,000	$ 1.50	$ 2,250,000	$ 2,925,000	$ 3,729,000	041 & beyor

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

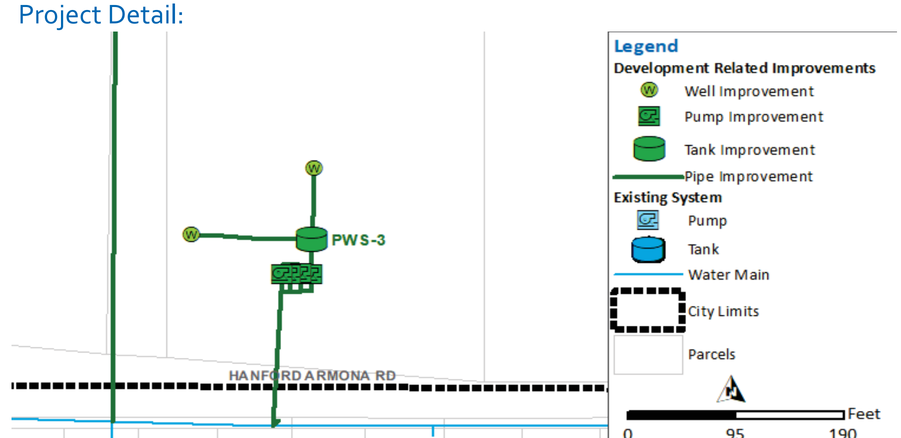
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 3,729,000
Total	100%	$ 3,729,000

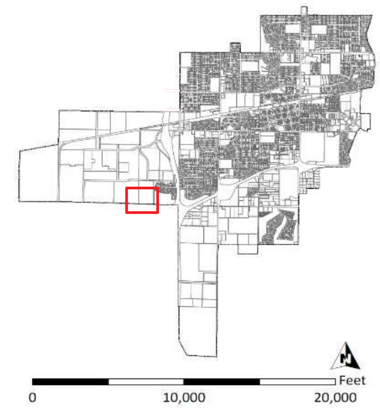
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number: PWS-4
Project Name: Well 15 Tank
System Type: Potable Water



Project Description:

This project includes the addition of Well 15 Tank. The existing system does not have enough storage capacity to supply the City under existing MDD conditions. To mitigate the capacity deficiency occurring under existing MDD conditions, it is recommended that a 1.0 MG tank be added at the Well 15 site. ***This project is already planned and funded.***

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Proposed Capacity (gal)	Unit Cost(1) ($/gal)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Storage Tank	--	1.0	New	1,000,000	$ 1.50	n/a	n/a	n/a	2020

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

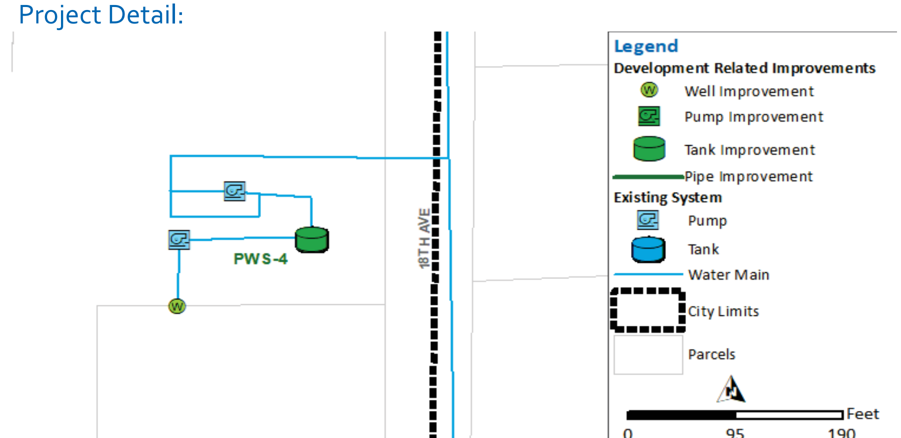
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ -
Total	100%	$ -

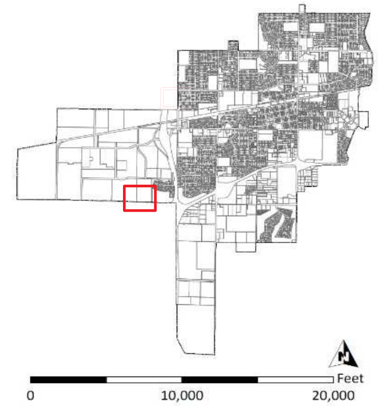
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWW-1
Project Name:	Well 17
System Type:	Potable Water



Project Description:

This project includes the addition of Well 17. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 2 mgd supply well be added in the southwest area of the City. ***This project is needed to supply Well 18 Tank.***

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Unit Cost[1] ($/MG)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
New Well	--	2.0	New	$ 500,000	$ 1,000,000	$ 1,300,000	$ 1,658,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

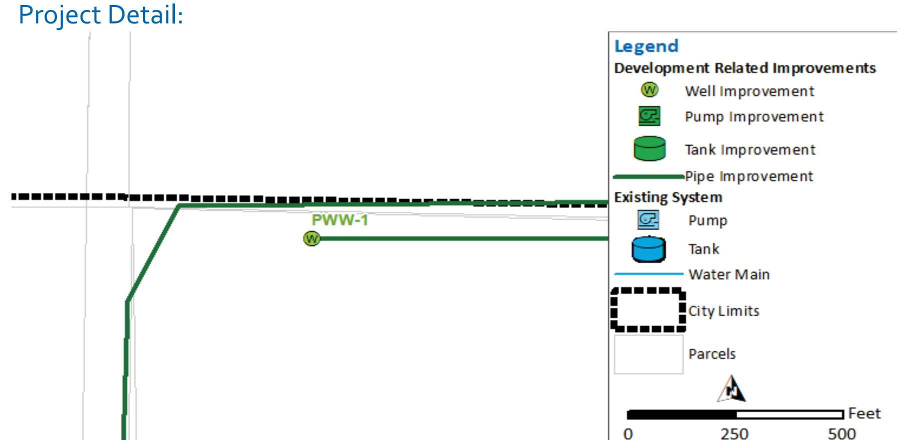
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	######
Total	100%	######

Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



LEMOORE CALIFORNIA

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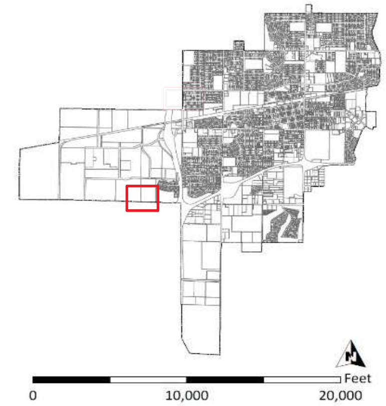
Project Number:	PWW-2
Project Name:	Well 18
System Type:	Potable Water



Project Description:

This project includes the addition of Well 18. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 2 mgd supply well be added in the southwest area of the City. ***This project is needed to supply Well 18 Tank.***

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Unit Cost[(1)] ($/MG)	Baseline Construction Cost ($)	Estimated Construction Cost[(2)] ($)	Capital Improvement Cost[(3)] ($)	Project Schedule
New Well	--	2.0	New	$ 500,000	$ 1,000,000	$ 1,300,000	$ 1,658,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

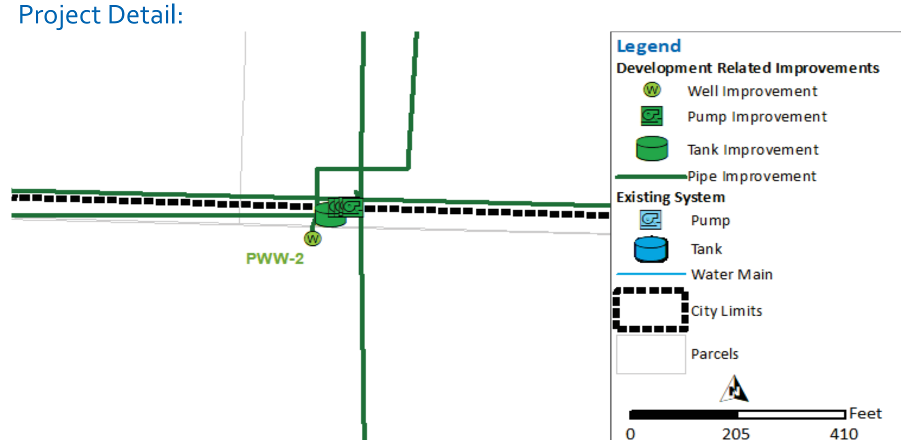
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	######
Total	100%	######

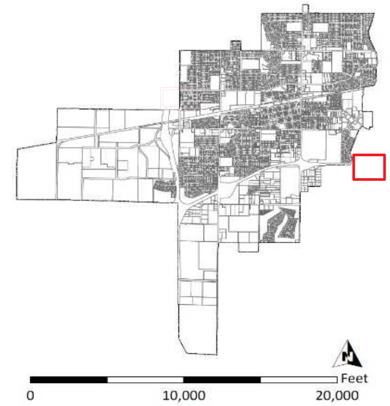
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWW-3
Project Name:	Well 19
System Type:	Potable Water



Project Description:

This project includes the addition of Well 19. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 2 mgd supply well be added in the southeast area of the City. ***This project is needed to supply Well 19 Tank.***

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Unit Cost(1) ($/MG)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
New Well	--	2.0	New	$ 500,000	$ 1,000,000	$ 1,300,000	$ 1,658,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

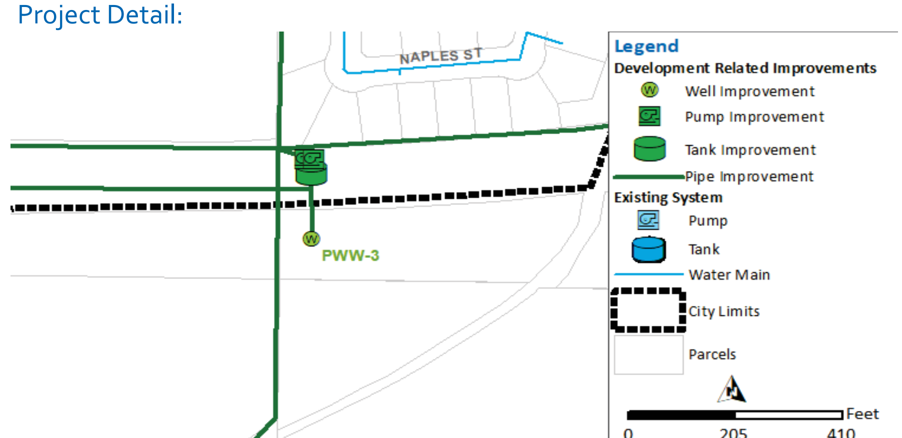
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	######
Total	100%	######

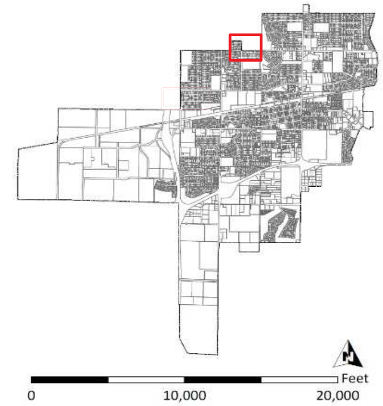
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number: PWW-4
Project Name: Well 20
System Type: Potable Water



Project Description:

This project includes the addition of Well 20. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 2 mgd supply well be added in the northern area of the City. ***This project is needed to supply Well 21 Tank.***

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Unit Cost[1] ($/MG)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
New Well	--	2.0	New	$ 500,000	$ 1,000,000	$ 1,300,000	$ 1,658,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

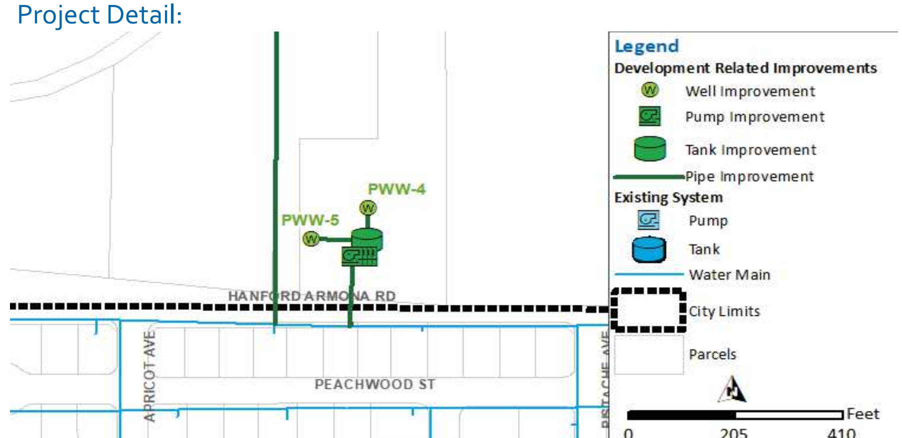
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	######
Total	100%	######

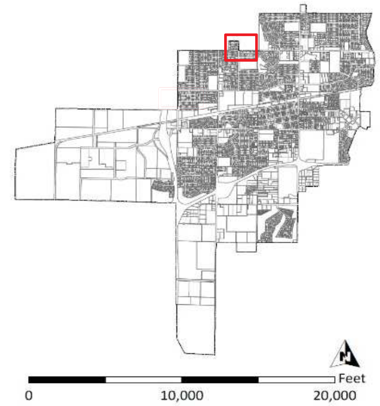
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWW-5
Project Name:	Well 21
System Type:	Potable Water



Project Description:

This project includes the addition of Well 21. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 2 mgd supply well be added in the northern area of the City. ***This project is needed to supply Well 21 Tank.***

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Unit Cost[(1)] ($/MG)	Baseline Construction Cost ($)	Estimated Construction Cost[(2)] ($)	Capital Improvement Cost[(3)] ($)	Project Schedule
New Well	--	2.0	New	$ 500,000	$ 1,000,000	$ 1,300,000	$ 1,658,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

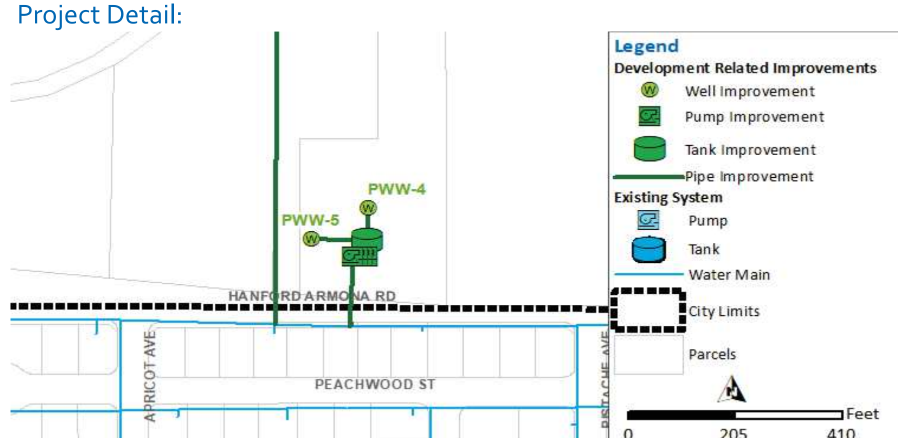
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	######
Total	100%	######

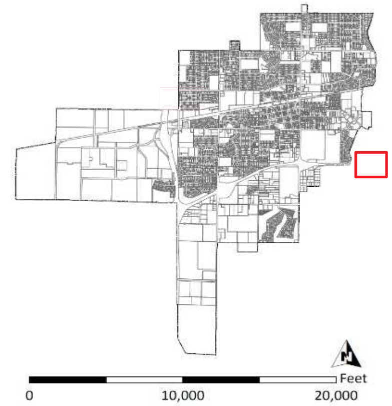
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWW-6
Project Name:	Well 22
System Type:	Potable Water



Project Description:

This project includes the addition of Well 22. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 2 mgd supply well be added in the southeast area of the City. ***This project is needed to supply Well 19 Tank.***

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Unit Cost(1) ($/MG)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
New Well	--	2.0	New	$ 500,000	$ 1,000,000	$ 1,300,000	$ 1,658,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

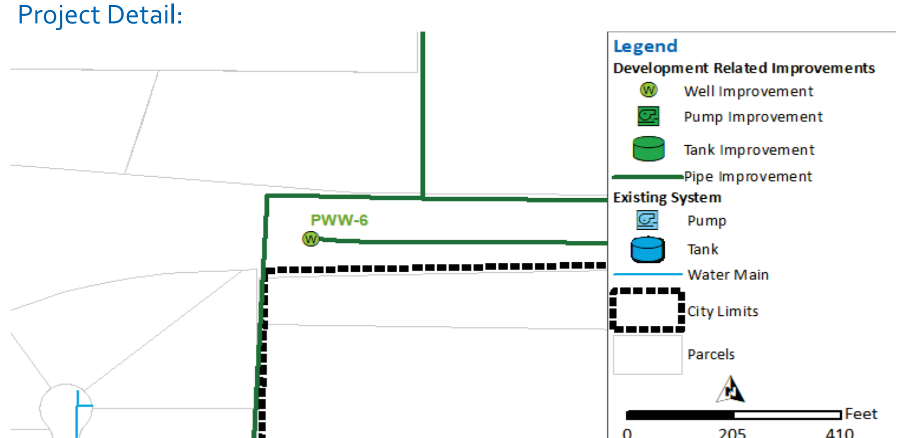
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	######
Total	100%	######

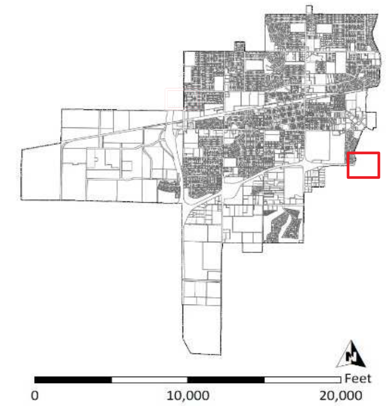
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWW-7
Project Name:	Well 23
System Type:	Potable Water



Project Description:

This project includes the addition of Well 23. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 1.0 mgd supply well be added in the southeast area of the City. ***This project is needed to supply Well 19 Tank.***

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Unit Cost[1] ($/MG)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
New Well	--	1.0	New	$ 500,000	$ 500,000	$ 650,000	$ 829,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

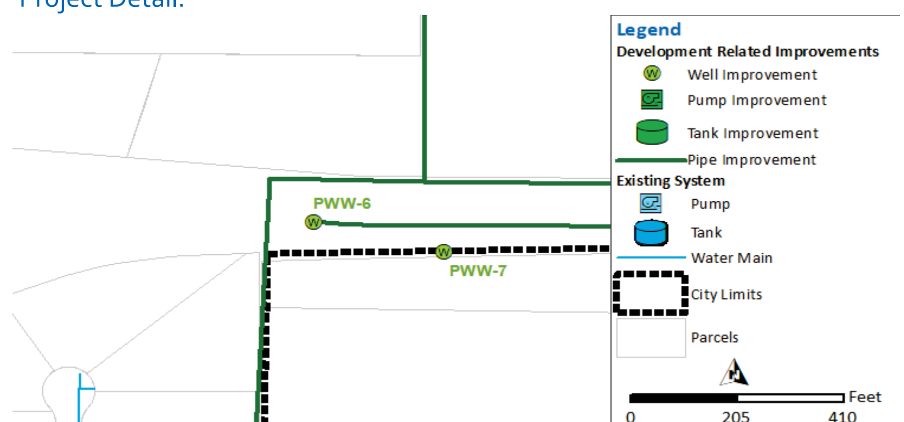
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 829,000
Total	100%	$ 829,000

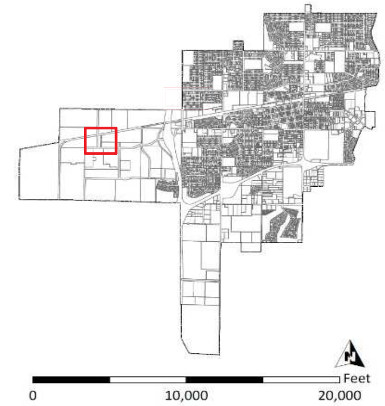
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number: PWW-8
Project Name: Well 24
System Type: Potable Water



Project Description:

This project includes the addition of Well 24. The existing system does not have enough supply capacity to supply the City under buildout MDD conditions. To mitigate the capacity deficiency occurring under buildout MDD conditions, it is recommended that a 1.44 mgd supply well be added in the western area of the City. ***This project is needed to provide additional supply to Tank 7.***

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Unit Cost[1] ($/MG)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
New Well	--	1.4	New	$ 500,000	$ 720,000	$ 936,000	$ 1,193,000	041 & beyon

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

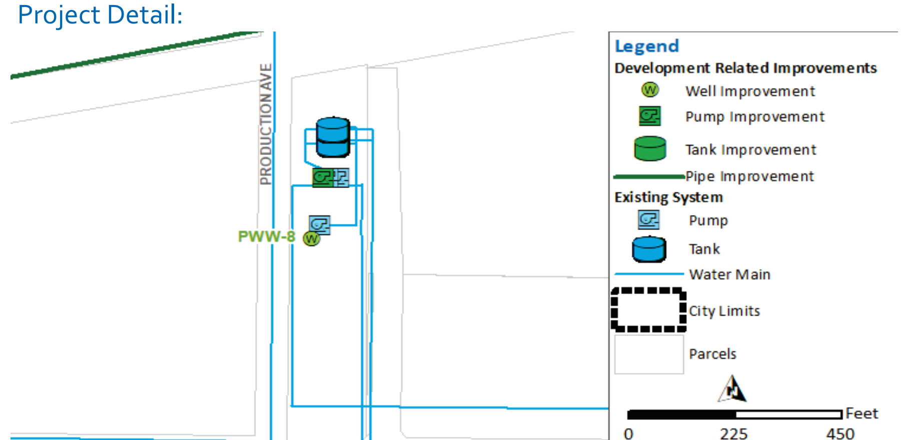
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	######
Total	100%	######

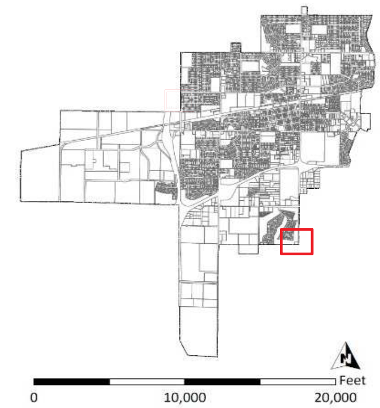
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number:	PWW-9
Project Name:	Well 15
System Type:	Potable Water



Project Description:

This project includes the addition of Well 15. The existing system does not have enough supply capacity to supply the City under existing MDD conditions. To mitigate the capacity deficiency occurring under existing MDD conditions, it is recommended that a 2.5 mgd supply well be added in the southeastern area of the City. ***This project is already planned and funded.***

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Proposed Capacity (gal)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
New Well	--	2.5	New	2,500,000	n/a	n/a	n/a	2019

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

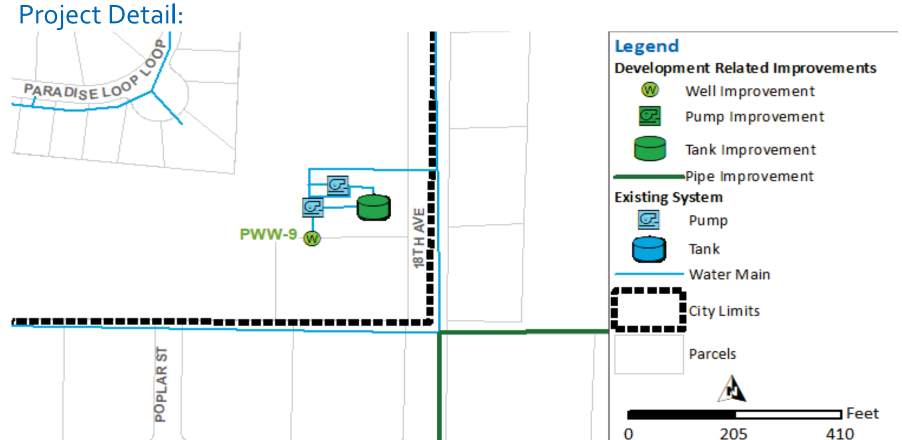
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ -
Total	100%	$ -

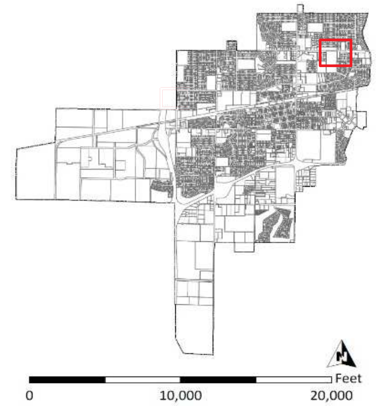
Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number: PWW-10
Project Name: Well 16
System Type: Potable Water



Project Description:

This project includes the addition of Well 16. The existing system does not have enough supply capacity to supply the City under existing MDD conditions. To mitigate the capacity deficiency occurring under existing MDD conditions, it is recommended that a 2.5 mgd supply well be added in the northeastern area of the City. ***This project is already planned and funded.***

Project Details:

Project Element	Existing Capacity (MG)	Proposed Capacity (MG)	Replace/ New	Proposed Capacity (gal)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
New Well	--	2.5	New	2,500,000	n/a	n/a	n/a	2019

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

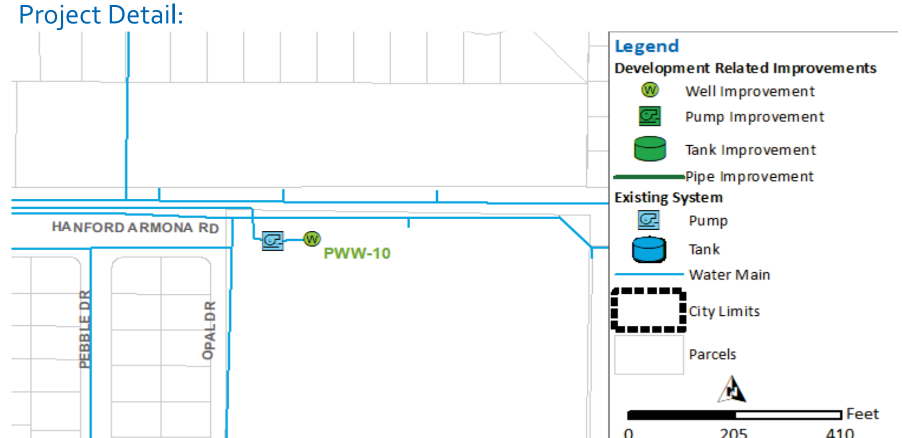
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ -
Total	100%	$ -

Notes on Cost Estimation:

This project is an existing improvement. A cost percentage has been assigned to future users as a combination of existing and future users contribute to the deficiency.

Project Detail:



Project Number: PWRR-1
Project Name: Annual Water Line Replacement Program
System Type: Potable Water

Project Description:
This project includes the rehabilitation or replacement of pipelines. This Master Plan assumes an allowance of $100,000 a year on rehabilitation or replacement related projects starting in 2019.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Annual Cost ($/yr)	Total Capital Improvement Cost(3) ($)	Project Schedule
Pipe R&R Program	1-16	> 6	R&R	Varies	$ 100,000	$ 100,000	2019
Pipe R&R Program	1-16	> 6	R&R	Varies	$ 100,000	$ 100,000	2020
Pipe R&R Program	1-16	> 6	R&R	Varies	$ 100,000	$ 100,000	2021
Pipe R&R Program	1-16	> 6	R&R	Varies	$ 100,000	$ 100,000	2022
Pipe R&R Program	1-16	> 6	R&R	Varies	$ 100,000	$ 100,000	2023
Pipe R&R Program	1-16	> 6	R&R	Varies	$ 100,000	$ 100,000	2024
Pipe R&R Program	1-16	> 6	R&R	Varies	$ 100,000	$ 100,000	2025
Pipe R&R Program	1-16	> 6	R&R	Varies	$ 100,000	$ 100,000	2026
Pipe R&R Program	1-16	> 6	R&R	Varies	$ 100,000	$ 100,000	2027
Pipe R&R Program	1-16	> 6	R&R	Varies	$ 100,000	$ 100,000	2028
Pipe R&R Program	1-16	> 6	R&R	Varies	$ 100,000	$ 1,200,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

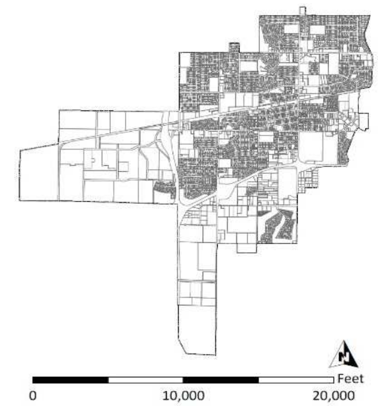
(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated c

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 2,200,000
Future Users	0%	$ -
Total	100%	$ 2,200,000

Notes on Cost Estimation:
As an existing R&R project, current users are assigned 100-percent of the project's cost.

Project Number: PWO-1
Project Name: Water Master Plan Update
System Type: Potable Water



Project Description:

It is recommended that the City undergoes a Water Master Plan Update every 5-years to evaluate wastewater collection system.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Water Master Plan Update	--	--	--	--	--	--	--	$ 150,000	2023
Water Master Plan Update	--	--	--	--	--	--	--	$ 150,000	2028
Water Master Plan Update	--	--	--	--	--	--	--	$ 150,000	2029-2040
Water Master Plan Update	--	--	--	--	--	--	--	$ 150,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

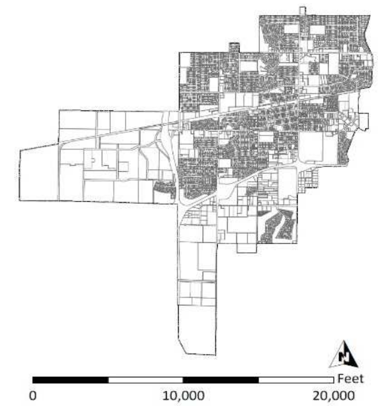
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ 600,000
Future Users	0%	$ -
Total	100%	$ 600,000

Notes on Cost Estimation:

As a Water Master Plan Update, current users are assigned 100-percent of the project's cost.

Project Number:	PWO-2
Project Name:	Water Treatment Plants
System Type:	Potable Water



Project Description:

The City is currently in the process of designing Water Treatment Plant Projects for the Well 7 site and Well 11 site to address water quality issues within the system. ***These projects are already funded.***

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Well 7 Site Water Treatment Plant	--	--	--	--	--	--	--	N/A	2022
Well 11 Site Water Treatment Plant	--	--	--	--	--	--	--	N/A	2022

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	100%	$ -
Future Users	0%	$ -
Total	100%	$ -

Notes on Cost Estimation:

As a Water Master Plan Update, current users are assigned 100-percent of the project's cost.

LEMOORE
CALIFORNIA

CITY OF LEMOORE

WASTEWATER TREATMENT AND COLLECTION SYSTEM MASTER PLAN

FINAL | February 2020

Digitally signed by Eric T Casares
Contact Info: Carollo Engineers, Inc.
Date: 2020.02.27 15:41:03-08'00'

REGISTERED PROFESSIONAL ENGINEER
ERIC T. CASARES
No. 73351
CIVIL
STATE OF CALIFORNIA

Digitally signed by Ryan F. Orgill
Date: 2020.03.02 13:07:29-08'00'

REGISTERED PROFESSIONAL ENGINEER
RYAN F. ORGILL
No. 75802
CIVIL
STATE OF CALIFORNIA

Contents

Appendices

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Figures

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Abbreviations

AAF	average annual flow
AB	Assembly Bill
ADC	Alternative Daily Cover
ADWF	average dry weather flow
AGR	agricultural supply
APLR	annual pollutant loading rate
ATCM	Airborne Toxic Control Measure
COP	advanced oxidation processed
Basin Plan	Water Quality Control Plan for the Tulare Lake Basin
BOD_5	Biochemical Oxygen Demand, 5-day
BWF	base wastewater flow
C	Celsius
CalRecycle	California Department of Resources Recycling and Recovery
CARB	California Air Resources Board
Carollo	Carollo Engineers, Inc.
CCL	ceiling concentration limits
CDFA	California Department of Food and Agriculture
CDPH	California Department of Public Health
CEC	constituents of emerging concern
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CFU	Colony Forming Unit
cf	cubic feet
cfs	cubic feet per second
CI	Compression Ignition
City	City of Lemoore
CO	carbon monoxide
CT	cycle threshold
CV-SALTS	Central Valley Salinity Alternatives for Long-Term Sustainability
CWA	Clean Water Act
CWEA	California Water Environment Association
DBP	disinfection byproducts
DWF	dry weather flow
DDW	Division of Drinking Water
DPR	Direct Potable Reuse
EC	electrical conductivity
EDR	electrodialysis reversal

ESB	engineered storage buffer
EPA	U.S. Environmental Protection Agency
EQ	Exceptional Quality
F	Fahrenheit
FDS	fixed dissolved solids
ft	feet
GHG	greenhouse gas
GIS	Geographic Information System
g/bhp-hr	gram per brake horsepower-hour
gpcd	gallons per capita day
gpd/ac	gallons per day per acre
gpm/sq ft	gallons per minute per square foot
GWDR	General Waste Discharge Requirements
GWI	groundwater infiltration
HCO_3	Bicarbonate
hp	horsepower
HC	hydrocarbon
I/I	infiltration/inflow
IND	industrial supply
IPR	indirect potable reuse
k_S	average species factor
k_d	density factor
k_{mc}	microclimate factor
Leprino	Leprino Foods Company
Leprino East	Leprino Foods cheese processing facility
MCL	maximum contaminant level
MDD	maximum day demand
MF	microfiltration
MG	million gallons
MPN	Most Probable Number
µg/L	micrograms per liter
mg/L	milligrams per liter
mgd	million gallons per day
mg/kg	milligram per kilogram
mg-min/L	milligram minutes per liter
MUN	municipal and domestic supply
MPN	most probably number
MPR	Monitoring and Reporting Program
N	Total Nitrogen

NaCl	sodium chloride
NASL	Naval Air Station of Lemoore
NCR	National Research Council
NMHC+NOx	non-methane hydrocarbon plus nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NTC	notice to comply
NTU	nephelometric turbidity units
NWRI	National Water Research Institute
OLAM	Olam SVI
PA	planning area
PCL	Pollutant concentration limit
PFU	Plaque Forming Unit
PHF	peak hour flow
PHD	peak hour demand
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
PSRP	Processes to Significantly Reduce Pathogens
PS	pump station
psi	pounds per square inch
QK	QK Incorporated
Regional Board	California Regional Quality Control Board-Central Valley Region
RO	reverse osmosis
ROWD	Report of Waste Discharge
RW	recycled water
SAR	sodium adsorption ratio
SCADA	supervisory control and data acquisition
SGMA	Sustainable Groundwater Management Act
SIP	State Implementation Plan
SJVAPCD	San Joaquin Valley Air Pollution Control District
State Antidegradation Policy	Statement of Policy with Respect to Maintaining High Quality Waters in California
State Board	State Water Resources Control Board
SSO	Sanitary Sewer Overflows
SWMM	Storm Water Management Model
TDS	total dissolved solids
TKN	Total Kjeldahl Nitrogen
TOC	total organic carbon
TPrCs	trace organic constituents
TSS	total suspended solids

USEPA	United States Environmental Protection Act
UV	ultraviolet light
V&A	V&A Consulting Engineers
WaPUG	Wastewater Planning Users Group
WDR	Waste Discharge Requirements
WMP	Water Master Plan
WWMP	Wastewater Treatment and Collection System Master Plan
WWF	wet weather flow
WWTF	wastewater treatment facility

EXECUTIVE SUMMARY

ES.1 Background

The City of Lemoore (City) contracted Carollo Engineers, Inc. (Carollo) and QK to develop a wastewater master plan (WWMP) covering the collection system and wastewater treatment facility (WWTF). The WWMP identifies constraints within the existing system, provides recommendations, and prioritizes necessary improvements through the development of a capital improvement plan (CIP).

ES.2 Introduction

The City has not had a master plan completed for their water or wastewater systems. Recognizing the importance of developing an integrated approach to prioritizing wastewater infrastructure upgrades, the City contracted Carollo and QK to identify constraints in the existing systems and recommend improvements.

Historically, the City's treated effluent combines with an industrial effluent, Leprino, and is discharged to Westlake Farms. Westlake no longer accepts the City's effluent. This WWMP addresses steps the City can take to eliminate dependency on third parties and control the destiny of their own effluent.

Another driver for this WWMP is the City's desire to produce recycled water (RW). Recycled water is the beneficial use of treated wastewater. This report identifies the feasibility and steps needed to achieve a RW system.

This WWMP also includes the steps recommended to increase system reliability and to serve future users. Along with the system analysis, a financial plan that distributes cost according to existing and future projects is provided to assist in funding.

ES.3 Study Area

The City's study area consists of two boundaries which are identified in the General Plan and defines the City's current and future limits. These boundaries include the City limits and Planning Area (PA). The City provides wastewater collection service to residents, businesses, industrial, and other institutions within City limits. The PA is land planned for long term growth and conservation. The total area of the wastewater study includes approximately 19 square miles.

Figure ES.1 shows the City's existing and future boundaries.

Some small isolated areas within the City are served by septic systems. As future development and new infrastructure is installed, it is assumed that all septic users will be eventually connected to the City's collection system.

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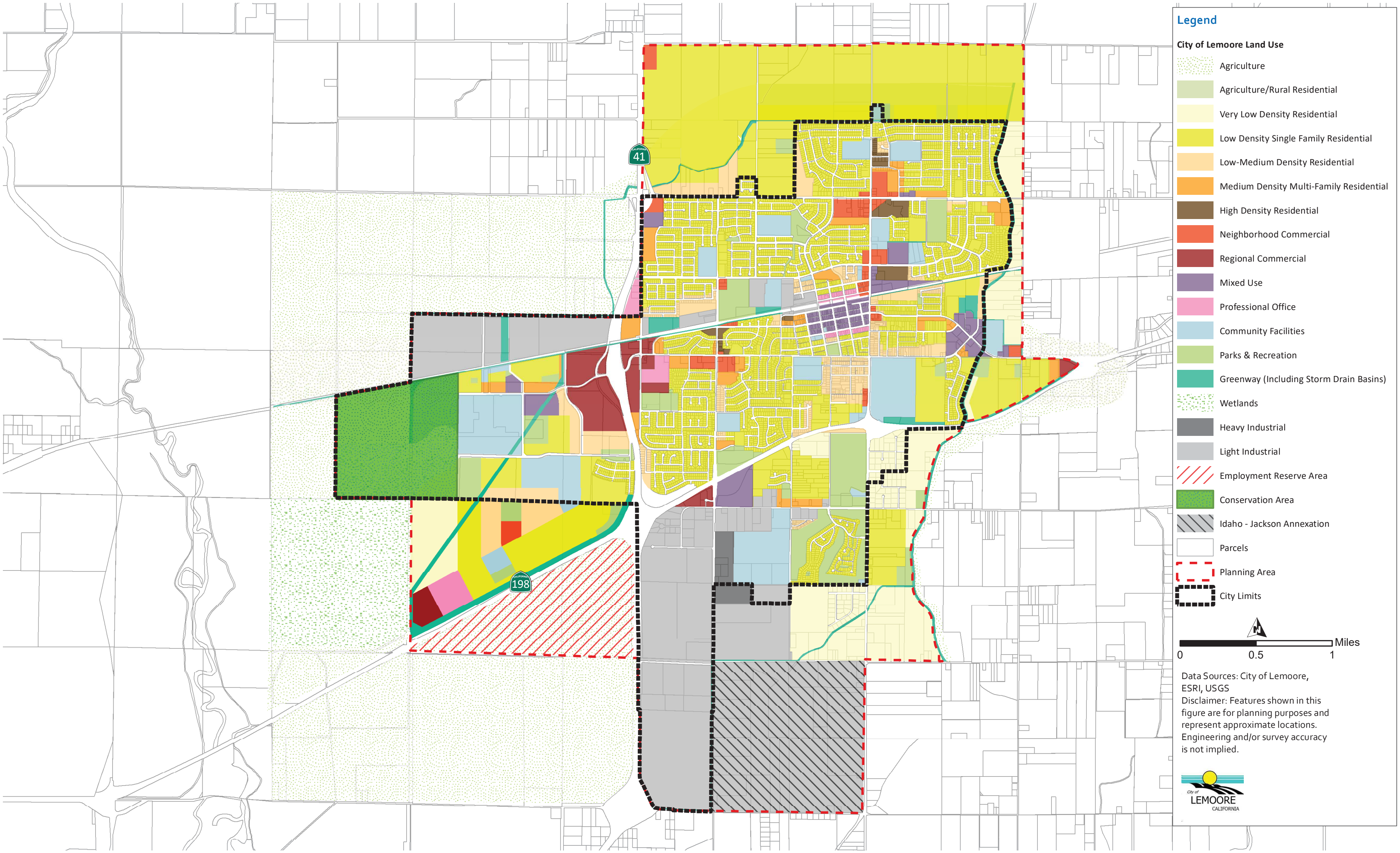

carollo
Last Revised: January 28, 2019\Carollo\Documents\Client\CA\Lemoore\10651A00\Data\GIS\Lemoore_Fig_2-1.mxd

Figure ES.1 General Plan Land Use

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ES.4 Planning Horizon

This WWMP is intended to serve as a guiding document for the planning and implementation of system improvements to accommodate future growth for the planning years of 2040 and Buildout. Population and land use are consistent with the City's planning outlined in the General Plan.

ES.5 Population

Figure ES.2 shows the City's historic and projected population. According to the projected growth outlined in the General Plan, the City is projected to experience an annual growth rate of 0.9-percent. Table ES.1 shows the estimated growth for the City.

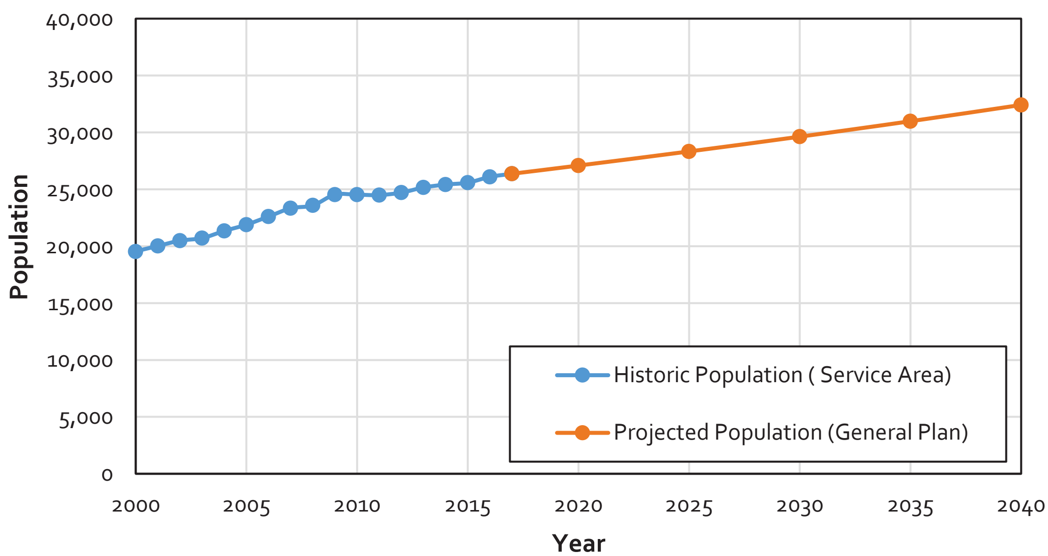

Figure ES.2 Citywide Historic and Projected Population

Table ES.1 Projected Population Growth

Year	Population	Net Increase	Growth from Previous Year
2017	26,369	276	1.06
2020	27,089	720	0.9
2025	28,332	1,244	0.9
2030	29,633	1,301	0.9
2035	30,993	1,360	0.9
2040	32,416	1,422	0.9

Notes:
(1) The General Plan estimates a total population of 32,416 by 2040. The growth rate is based on an average annual rate is based on an average annual rate from 2017 to 2040.

ES.6 Existing Collection System and Wastewater Treatment Facility

- Collection System: The existing wastewater collection system consists of approximately 82 miles of sanitary sewer pipelines ranging in diameter from 4 inches to 21 inches, as well as 17 wastewater lift stations. Figure ES.3 presents the City's existing wastewater collection system.
- Wastewater Treatment Facility (WWTF): The WWTF is equipped with an influent pump station, Old Headworks, New Headworks, four lagoon ponds, chlorine gas injection, and an effluent pump station. Figure ES.4 shows the layout of the WWTF.

ES.7 Existing and Projected Maximum Month and Peak Hourly Flow

A temporary flow monitoring study was performed on the collection system for three weeks in September 2017. The results of the study helped develop design flow and calibrate the hydraulic model. In addition, the City provided average daily domestic and industrial wastewater flows between 2006 and 2016. Significant industrial wastewater contributors include Olam, Agusa, and Leprino.

Table ES.2 presents a summary of existing and projected flows for average dry weather flow (ADWF), max month flow (MMF), and peak hour flow (PHF). For planning purposes a per capita flow of 70 gpcd was used for existing and projected ADWF. Since wet weather data was not available, a peaking factor of 2.5 was applied the ADWF. The product of the peaking factor and ADWF provided the PHF. The City's sewers and lift stations were evaluated based on their capacity to convey PHF. The wastewater treatment processes are evaluated based on the maximum month flow conditions because the processes need to be able to handle extended high loading conditions.

Table ES.2 Wastewater Peaking Factors and Flow Projections

Flow Condition	ADWF (mgd)	MMF (mgd)	MMF Peaking Factor	PHF (mgd)	PHF Peaking Factor
Existing	1.95	2.15	1.1	4.88	2.5
2040	2.38	2.61	1.1	5.95	2.5
Buildout	5.92	6.51	1.1	14.80	2.5

ES.8 Wastewater Loads

Wastewater loads were used to determine the performance of the WWTF and determine future capacity needs. Table ES.3 lists the BOD, TSS, and TKN loadings calculated through the planning horizon. Design loads are used to size future treatment processes.

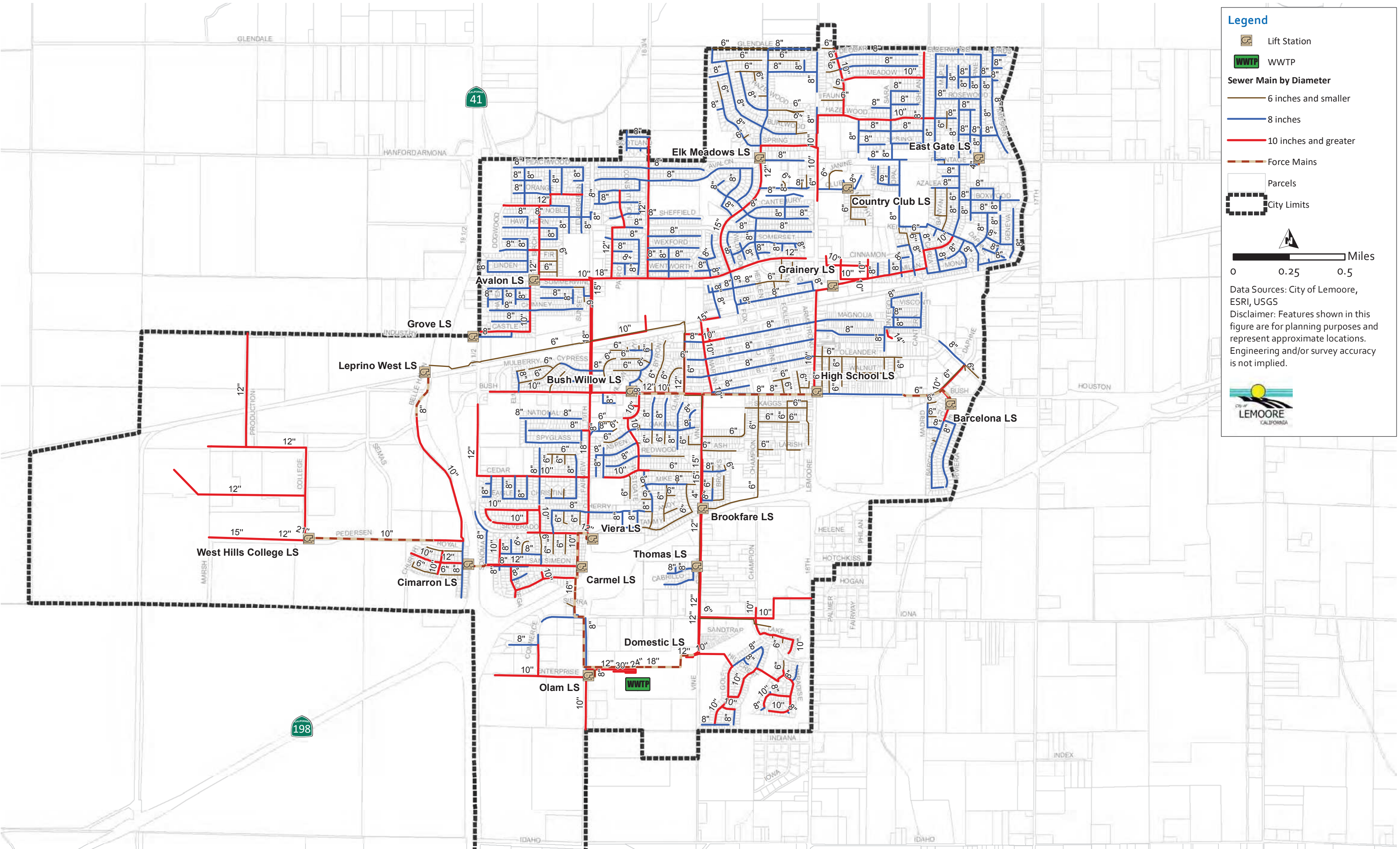

Figure ES.3 Existing Collection System

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Figure ES.4 City Wastewater Treatment Facility Process Flow Diagram

Table ES.3 Wastewater Flow and Load Projections

Year	AAF (mgd)	MMF (mgd)	BOD Loading (lb/day)	TSS Loading (lb/day)	TKN Loading (lb/day)
2017	1.95	2.13	4625	4327	866
2020	2.00	2.19	4748	4442	889
2025	2.09	2.29	4959	4639	929
2030	2.18	2.39	5179	4845	970
2035	2.28	2.49	5410	5061	1013
2040	2.38	2.61	5651	5287	1059

The City completed a sampling effort between January and May 2018 to determine representative influent biochemical oxygen demand (BOD), total suspended solids (TSS), and total Kjeldhal nitrogen (TKN) concentrations.

ES.9 Regulatory Requirements

Leprino Food Company (Leprino) treats the majority of their wastewater at their own WWTF, adjacent to the City WWTF. The City and Leprino combine their effluent, which is regulated by a Waste Discharge Requirements (WDR) enforced by the Regional Water Quality Control Board (Regional Board).

The combined effluent is out of compliance with the WDR with regards to electrical conductivity (EC). The Regional Board issued a Time Schedule Order, framing a timeline by which the effluent needs to be in compliance. Leprino purchased land East of the Naval Air Station of Lemoore referred to as Stone Ranch. The Regional Board has tentatively approved Stone Ranch as a discharge location for the combined effluent at current water quality concentrations.

The State Water Resources Control Board (State Board) is developing Water Quality Control Plans, or Basin Plans, to establish water quality objectives to ensure reasonable protection of beneficial uses. The Tulare Lake Basin Plan, which encompasses Lemoore, identifies the increase in groundwater salinity as the greatest long-term problem facing the region. Additionally, groundwater nitrate contamination is a primary focus. The Basin Plan establishes a Nitrate Control Program outlining necessary compliance measures and timelines. After the Tulare Lake Basin Plan becomes effective sometime in 2019, the City can expect to receive a notice to comply with the Nitrate Control Program within two to four years. Salt management practices will be implemented and enforced over a longer period, roughly ten to twenty years.

ES.10 Collection System Hydraulic Model

The City's wastewater collection system hydraulic model was developed using InfoSWMM, which was developed by Innovyze. The hydraulic model was constructed primarily with available drawings, as-builts and Geographic Information System (GIS) data. Physical and operational data such as wet well dimensions, lift stations, and other special features, were input manually into the model based on available information. The hydraulic model is a skeletonized representation of the City's collection system. Skeletonizing is the process of removing pipelines not considered to be essential for the purpose of the analysis. While skeletonizing a system minimizes the number of pipelines analyzed, an accurate representation of the collection system is maintained. For the City's hydraulic model, pipelines 10-inches in diameter or larger were included as well as some smaller diameter pipelines for connectivity. Otherwise, pipelines 8-inches or smaller were excluded.

For this project, dry weather flow monitoring was conducted at 15 metering sites for a period of approximately three weeks. The City's service area was broken up into 422 individual loading polygons. Existing wastewater flows were allocated into the model and adjusted as needed during model calibration to closely match the dry weather flows recorded during the flow monitoring program.

Dry weather flow (DWF) calibration provides an accurate depiction of base wastewater flow generated within the study area. Wet weather flow monitoring was not conducted, therefore, the hydraulic model didn't go through the wet weather calibration process.

ES.11 Collection System Capacity Analysis

The capacity analysis entailed identifying areas in the sewer system where flow restrictions occur or where pipe capacity is insufficient to convey PHF. Sewers that lack sufficient capacity to convey PHF create bottlenecks in the collection system that can potentially cause sanitary sewer overflows (SSOs).

In accordance with the established flow depth criteria for existing sewers, pipelines with a maximum flow depth to pipe diameter (d/D) ratio greater than 0.92 were identified as capacity deficient. Under existing conditions, the analysis showed that there are three gravity main alignments, five sewer lift stations, and two force mains that require upsizing to address capacity deficiencies under PHF conditions.

The analysis of the future system was performed in a manner similar to the existing system analysis. As part of the future system analysis, the planning year 2040 was evaluated. In addition, a preliminary analysis was performed to identify improvements under Build-Out PHF conditions. The future analysis also evaluated preliminary alignments for new development.

Figure ES.5 illustrates the recommended improvements to mitigate the collection system deficiencies under existing conditions while Figure ES.6 and Figure ES.7 shows future improvements. The following summarizes the improvements:

Existing Capacity Improvements:

- Three gravity main projects with a total length of 1.5 miles is recommended to mitigate capacity deficiencies.
- Five lift station capacity projects are recommended. The Carmel Lift Station Project is currently in design and will replace the Viera and existing Carmel Lift Station. The remaining four lift station projects have been identified as lacking firm capacity to convey peak flows from a 10-year design storm.
- Two force main capacity projects are recommended. The Carmel Lift Station Force Main Project is currently in design.

Future Capacity Improvements:

- Seven gravity main projects with a total length of 1. 9 miles is recommended to mitigate 2040 capacity deficiencies.
- Nine gravity main projects with a total length of 2.7 miles is recommended to mitigate buildout capacity deficiencies.
- Two lift station capacity projects have been identified to mitigate 2040 deficiencies.
- One Lift station capacity deficiency has been identified to mitigate buildout capacity deficiencies.
- Two force main capacity projects are recommended to mitigate buildout capacity deficiencies.

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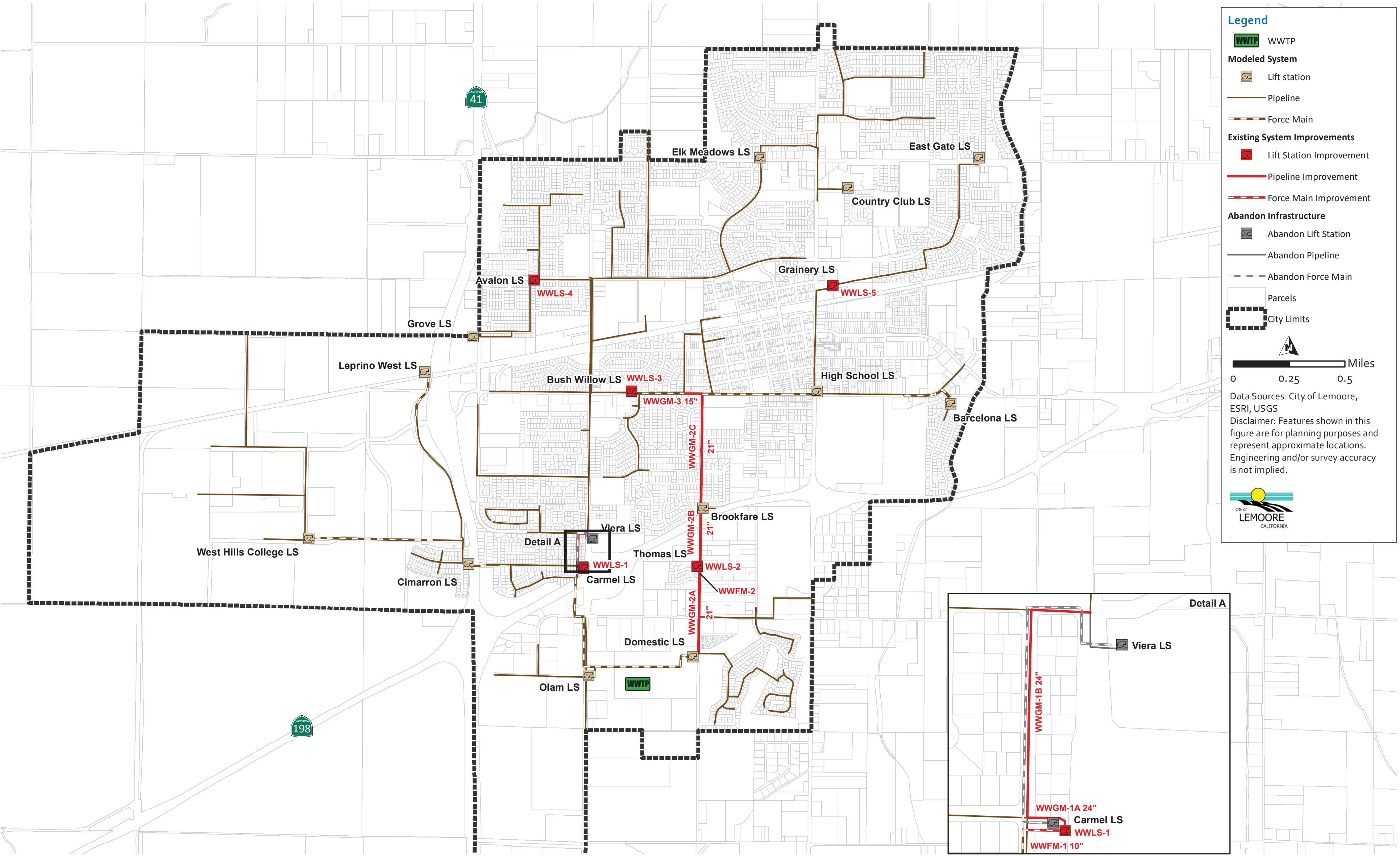

Figure ES.5 Existing System Improvements

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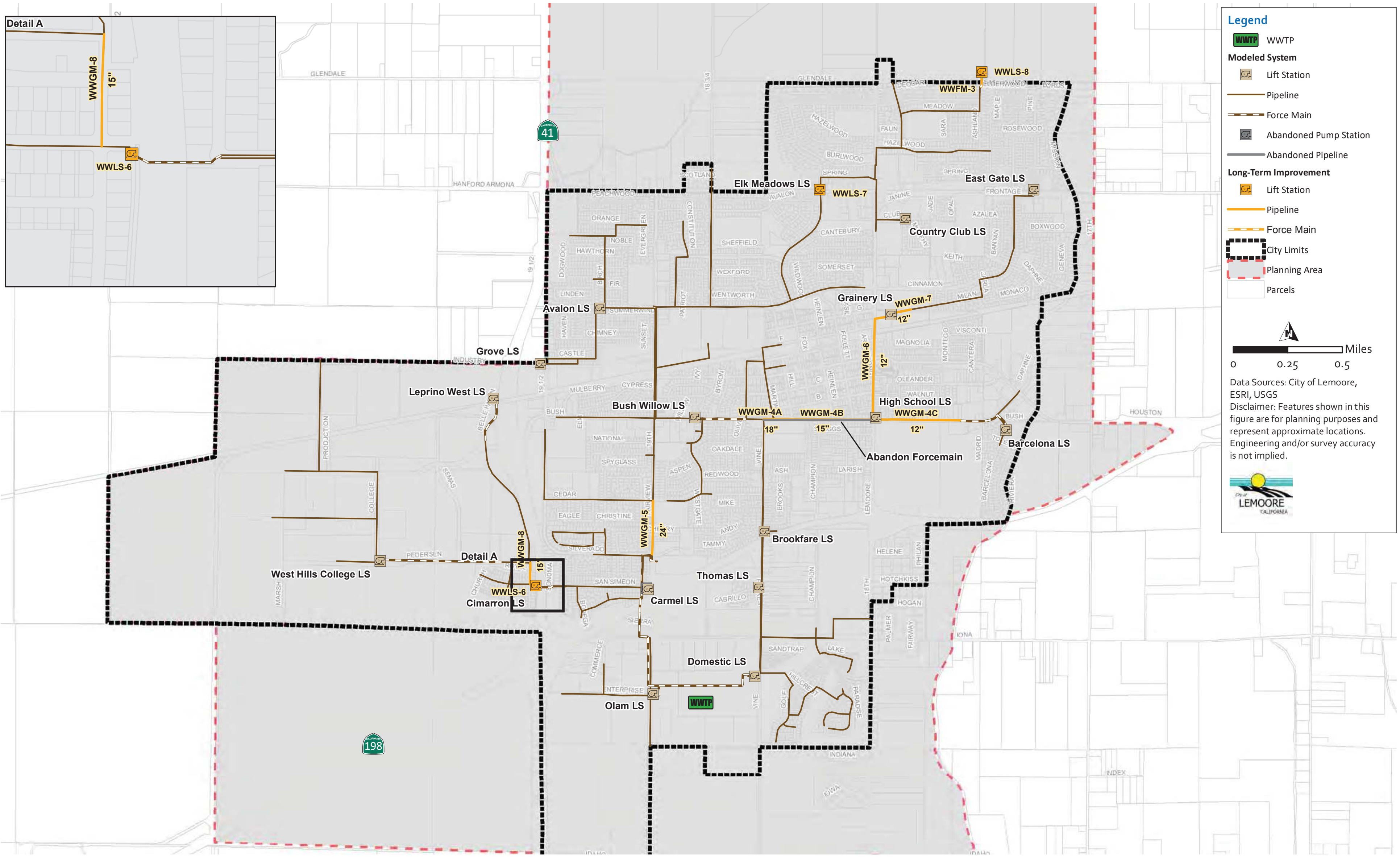

Figure ES.6 2040 System Improvements

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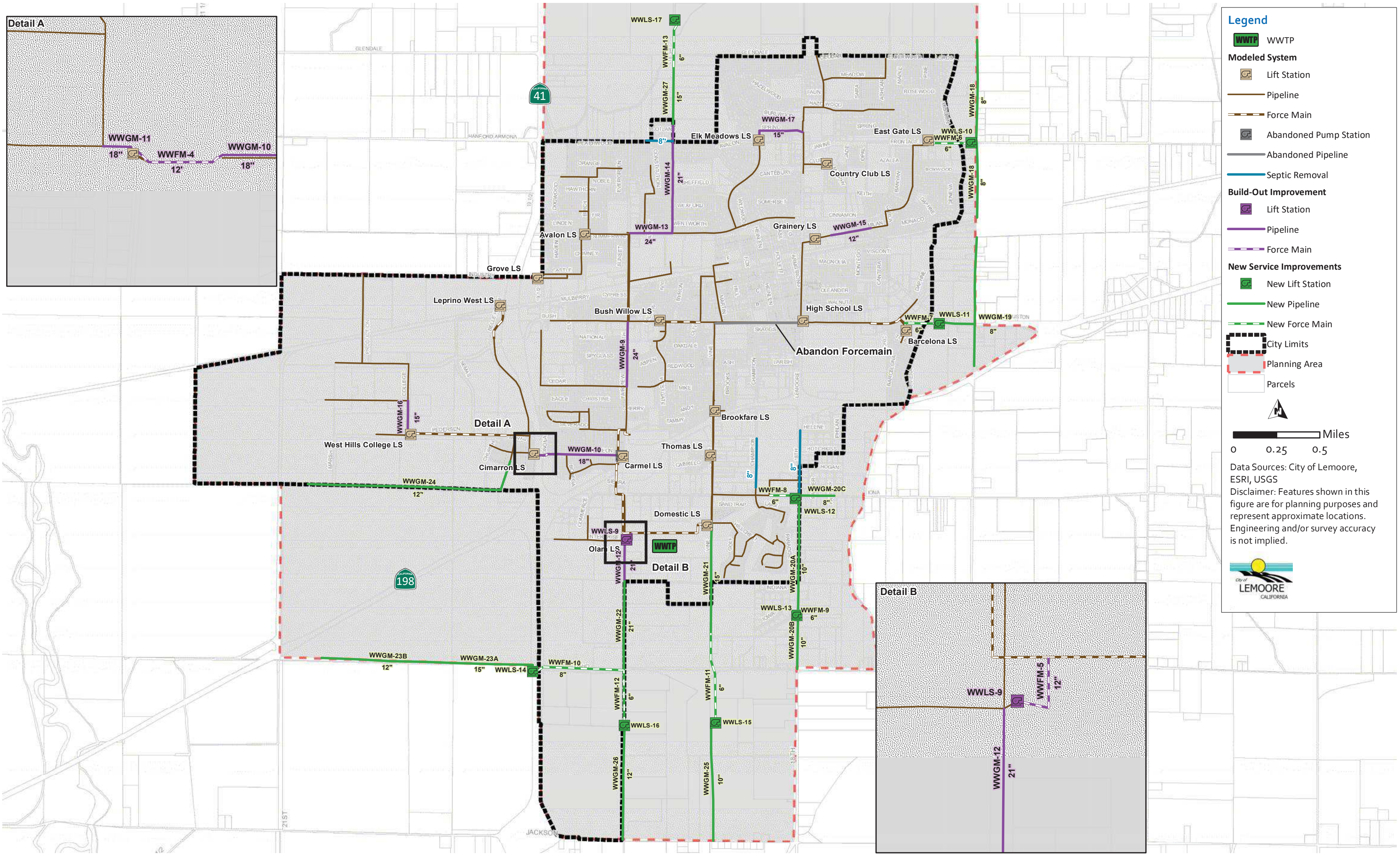

Figure ES.7 Buildout System Improvements

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New Service related Improvements

- A preliminary analysis recommends thirteen projects at approximately 9 miles of sewer trunk alignment to serve future growth. The location of the new trunks are conceptual and should be refined as more data becomes available.
- A preliminary analysis recommends 9 lift stations to serve future growth. The location of the lift stations are conceptual and should be refined as more data becomes available.

Other Projects

- An Annual Sewer Line Replacement Program is recommended to identify and replace sewer infrastructure susceptible to failure or showing corrosion and deterioration. This program will maintain operation of the collection system by replacing infrastructure prior to failure.
- A Sewer Master Plan Update is recommended every 5-years to evaluate wastewater collection system.
- Septic removal is recommended to connect septic users to the City's collection system.

ES.12 Recycled Water

The City has a desire to treat wastewater effluent to a quality capable of being applied on City landscape areas. Recycled water demand was determined based on regional precipitation and evapotranspiration rates. The Lemoore golf course and Lemoore High School campus were identified as ideal potential recycled water users based on their proximity to the WWTF and the projected wastewater flows closely matching irrigation demands during summer months.

As wastewater is generated throughout the collection system the salinity increases. Water with high salinity concentrations can cause soil dispersion, which prevents plants roots from being able to uptake nutrients and water, detrimentally impacting the health of the plant.

Several parameters analyzed in the City's wastewater, including sodium and chloride concentrations and the sodium adsorption ratio (SAR), are at levels much higher than the current golf course irrigation water and could negatively affect landscaping if used as irrigation water. The potential toxicity of irrigation water depends heavily on the plant species and soil type.

It is likely that wastewater will need demineralization treatment to be able to be used to irrigate turf grass. Demineralization treatment, most commonly reverse osmosis (RO), physically blocks minerals by pumping water through a porous membrane barrier. Minerals are concentrated in a waste brine stream that needs to be disposed of. The costs associated with demineralization treatment and brine disposal are prohibitive to implementing recycled water. Additional field testing could be done to confirm the effects of irrigating with effluent.

ES.13 Treatment Alternatives

Although the City's effluent is now in compliance through the issuance of a WDR to Stone Ranch, they are contracted with Leprino to ensure the City's effluent water quality does not degrade. In the future, the City may want to control the fate of their effluent without dependence on Leprino. Doing so would require a new WDR, which would likely include stricter discharge limits than those in the Stone Ranch WDR. Then, the WWTF will need to be upgraded to improve the reliability and performance of the treatment process. This master plan compares various treatment processes including secondary, filtration, disinfection, and solids handling (thickening, stabilization, dewatering), and discusses common improvements needed including headworks, pond demolition and conversion, and effluent pump station. Life cycle costs and non-economic factors were considered to develop a recommended alternative.

The recommended alternative includes:

- headworks replacement (includes mechanically cleaned bar screen, flow metering, influent wet well pumping, and flow splitting structure).
- secondary treatment: oxidation ditch and secondary clarifiers.
- disinfection: chlorine contact basin with sodium hypochlorite.
- solids dewatering: screw press.
- existing pond demolition and partial conversion to percolation ponds.
- effluent pump station.

The oxidation ditch was the recommended alternative because it has a lower capital cost and life cycle cost than conventional activated sludge and membrane bioreactors (MBR). Additionally, oxidation ditches are less complicated to maintain and require less operator attention.

The City's WDR requires that all effluent be disinfected prior to discharge. Chlorine disinfection is less expensive than ultraviolet (UV) and requires less maintenance. Sodium hypochlorite is recommended over chlorine gas injection due to safety concerns.

The oxidation ditch process has a longer solids residence time (SRT), 25 days, than the other secondary treatment alternatives. The longer SRT allows the biosolids to comply with pathogen and vector attraction reduction requirements, meaning solids thickening and stabilization processes are not needed. Solids dewatering is needed to reduce the moisture content and volume and biosolids. Although a screw press has a higher life cycle cost than sludge drying beds, they are ideal for smaller WWTFs because they can operate for extended periods with minimal to no operator attention and require less maintenance than other mechanical solids dewatering methods. Furthermore, sludge drying beds do not produce a consistent biosolids cake year-round and performance is weather-dependent.

With the construction of a new secondary treatment WWTF, the existing ponds should be drained and dredged. Half of the ponds can be converted to percolation ponds for emergency storage or as an alternative effluent disposal method. Roughly 20 acres of percolation ponds would be needed to reliably dispose of the City's effluent year-round. A new effluent pump station will be needed to route effluent to Stone Ranch or percolation ponds.

Table ES.4 presents the life cycle costs for the recommended facility improvements.

Table ES.4 Cost Summary for Recommended Facility Improvements

Process	Capital Construction Cost[1]	Annual O&M Cost[2]	Present Worth 20-year O&M Cost[3]	Present Worth Life Cycle Cost[4]
Headworks	$6,010,000	$58,600	$807,000	**$6,817,000**
Oxidation Ditch with Secondary Clarifiers	$22,650,000	$206,000	$2,835,000	**$25,485,000**
Chlorine Contact Basin	$4,970,000	$108,600	$1,495,000	**$6,465,000**
Screw Press	$4,410,000	$239,200	$3,292,000	**$7,702,000**
Pond Demolition	$2,710,000	--	--	**$2,710,000**
Effluent Pump Station	$740,000	$47,100	$649,000	**$1,389,000**
Total	**$41,490,000**	**$659,500**	**$9,078,000**	**$50,568,000**

Notes:
(1) Cost estimate is based on 2018 costs and includes 30 percent estimating contingency. See Appendix S for capital cost item details for each alternative.
(2) Annual Operation & Maintenance costs unique to each alternative were developed. See Appendix S for a summary of O&M cost details.
(3) Present worth is based on a 20-year life, a discount rate of 6 percent, and an inflation rate of 3 percent.
(4) Present worth of life cycle cost is equal to the sum of capital costs and present worth of 20-year O&M cost.

ES.14 Capital Improvement Program

This Section presents the recommended capital improvement program (CIP) for the wastewater collection system and Wastewater Treatment Facility. The proposed CIP presents improvement projects based on system evaluations described in Chapters 7 and 9.

The proposed capital improvements are prioritized bases on their urgency to mitigate existing deficiencies and condition issues and for serving future growth. The capital improvements were phased according to the following improvement categories:

- *Phase 1 (2019-2023):* This phase includes projects that are targeted as highest priority existing improvements.
- *Phase 2 (2024-2028):* This phase includes medium priority existing improvements.
- *Phase 3 (2029-2040):* This phase includes low priority existing improvements, as well as projects triggered by growth that is expected to occur by the year 2040.
- *Phase 4 (2041 and beyond):* This phase includes improvements related to ultimate buildout of the City.

Figure ES.8 illustrates the CIP cost summary by project type. As shown in Figure ES.8, capacity projects account for 37.5-percent of the recommended improvements. Table ES.5 provides a summary by phase and project type. Phase 1 improvements account for 10-percent ($13 million) of the total project cost, with Phase 3 having the largest cost share at 47-percent ($61 million), which can be attributed to the WWTF recommendations. Improvements to the WWTF account for 39-percent ($51 million) of the total CIP cost

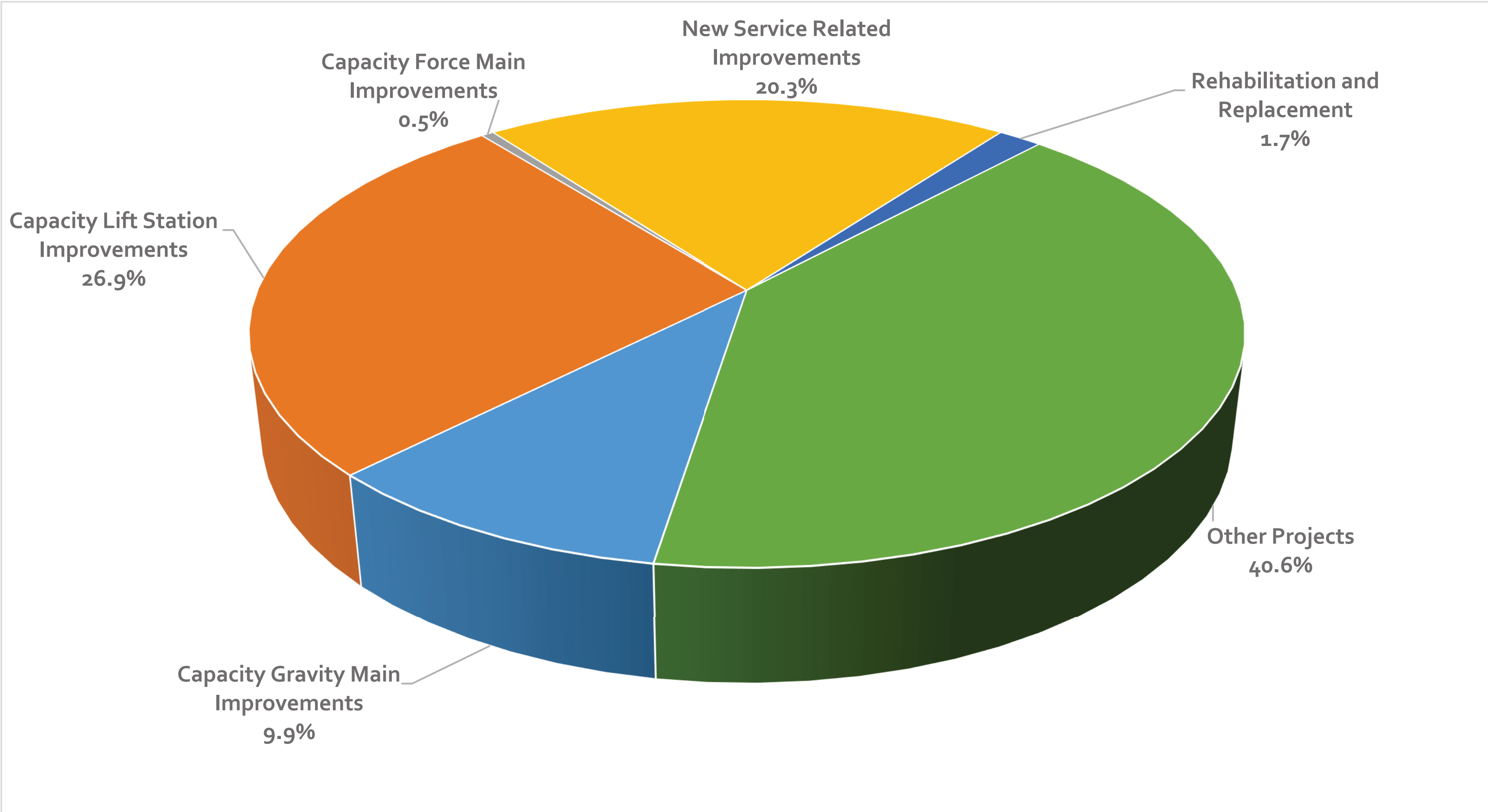

Figure ES.8 Project Cost Summary by Type

Table ES.5 CIP Cost by Project Type and Phase

Project Type	Phase 1 (2019-2023) ($)	Phase 2 (2024-2028) ($)	Phase 3 (2029-2040) ($)	Phase 4 (2041 & Beyond) ($)	Total ($)
Capacity Improvements					
Gravity Mains	$3,715,000	$133,000	$3,521,000	$5,552,000	$12,921,000
Lift Stations	$8,428,000	$2,371,000	$9,033,000	$14,917,000	$34,794,000
Force Mains	$45,000	$-	$-	$584,000	$629,000
Subtotal	$12,188,000	$2,504,000	$12,554,000	$21,053,000	$48,299,000
New Service Related Improvements					
Gravity Mains	-	-	-	$14,164,000	$14,164,000
Lift Stations	-	-	$663,000	$7,625,000	$8,288,000
Force Mains	-	-	$141,000	$3,652,000	$3,793,000
Subtotal	-	-	$804,000	$25,441,000	$26,245,000
Annual Sewer Line Replacement Program					
R&R Projects	$500,000	$500,000	$1,200,000	$-	$2,200,000
Subtotal	$500,000	$500,000	$1,200,000	-	$2,200,000
Other Projects					
Other Projects	$150,000	$5,207,000	$46,093,000	$987,000	$52,437,000
Subtotal	$150,000	$5,207,000	$46,093,000	$987,000	$52,437,000
Total	$12,838,000	$8,211,000	$60,651,000	$47,481,000	$129,181,000
Annual Cost	$3,209,500	$2,052,750	$5,513,727	-	-

Notes:
(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

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Chapter 1

INTRODUCTION

The City of Lemoore (City) has retained the QK Incorporated (QK)/Carollo Engineers, Inc. (Carollo) team to prepare master plans for the water, wastewater treatment and collection system, and storm drainage systems, with QK primarily responsible for the development of the Storm Drainage System Master Plan, and Carollo responsible for the development of the Wastewater Treatment and Collection System Master Plan (WWMP) and the Water Master Plan (WMP). This chapter presents the purpose, objective, and background of the WWMP.

1.1 Background

The City has not had a master plan completed for their water or wastewater systems. Recognizing the importance of developing an integrated approach to prioritizing wastewater infrastructure upgrades, the City contracted Carollo and QK to identify constraints in the existing systems and recommend improvements.

Historically, the City's treated effluent combines with an industrial effluent, Leprino, and is discharged to Westlake Farms. Westlake no longer accepts the City's effluent. This WWMP addresses steps the City can take to eliminate dependency on third parties and control the destiny of their own effluent.

Another driver for this WWMP is the City's desire to produce recycled water (RW). Recycled water is the beneficial use of treated wastewater. This report identifies the feasibility and steps needed to achieve a RW system.

This WWMP also includes the steps recommended to increase system reliability and to serve future users. Along with the system analysis, a financial plan that distributes cost according to existing and future projects is provided to assist in funding.

1.2 City Location

Lemoore is located in Kings County, California and resides in the heart of the agriculturally rich San Joaquin Valley. The City is located near the junction of Highway 41 and 198, which are two major highways within the region (Figure 1.1).

The City, which was incorporated in 1900, provides water, sewer, and storm drainage service to its customers. Sewer service is provided to a majority of the residential, commercial, and industrial customers in the City. The City limits comprise 8.5 square miles.

1.3 Wastewater Collection System Overview

The City provides wastewater services to approximately 26,000 residents, industrial and commercial users. The wastewater collection system includes approximately 82 miles of active gravity sewer lines, ranging from 6 to 21 inches in diameter, 17 lift stations and associated force mains. Wastewater generated in the sewer service area is conveyed to the Wastewater Treatment Plant (WWTP).

1.4 Wastewater Treatment Facilities Overview

The City's wastewater treatment facility (WWTF) treats municipal wastewater generated throughout the City to meet treatment standards and discharge requirements established by the Central Valley Regional Water Quality Control Board (RWQCB). These requirements are outlined in the City's Waste Discharge Requirements (WDR) (order No. 96-050), which was last renewed in 1996.

The wastewater routed to the WWTF includes all residential, commercial, and industrial wastewater generated within City limits, with the exception of the Leprino Foods Inc. (Leprino) industrial facility. Leprino is a cheese processing facility that generates over 1.5 mgd of wastewater. Leprino has their own sequencing batch reactor (SBR) treatment separate from the City's WWTF. The City's influent wastewater passes through a headworks structure with a mechanical bar screen to remove large debris then sent to ponds equipped with aerators, which promote biological oxidation and reduce organics. Additional ponds settle out solids before effluent is discharged. The plant has four ponds. Leprino's treated effluent combines with the City's effluent then disinfected by chlorine gas injection. Combined effluent is piped west of the City and discharged into a canal owned by Westlake Farms.

1.5 Goals and Objectives

The purpose of this WWMP is to provide a planning document for the City's wastewater treatment facilities and collection system. Overall, the WWMP will assist the City in their approach to optimize their collection system and treatment facilities. The objectives of this WWMP include:

1. Determine existing and buildout wastewater flows.
2. Define planning and evaluation criteria for the City's wastewater treatment facility (WWTF) and collection system.
3. Identify capacity deficiencies in the collection system and treatment facility under existing and buildout conditions.
4. Address regulatory requirements and develop strategies for future compliance.
5. Prepare a capital improvement plan (CIP) for the collection system.
6. Evaluate potential wastewater treatment technologies capable of reliably meeting discharge permit requirements year-round.
7. Analyze the feasibility of a recycled water treatment, storage, and distribution facility.
8. Identify capital and lifecycle costs associated with treatment and recycled water alternatives.
9. Provide recommended treatment facility alternative.

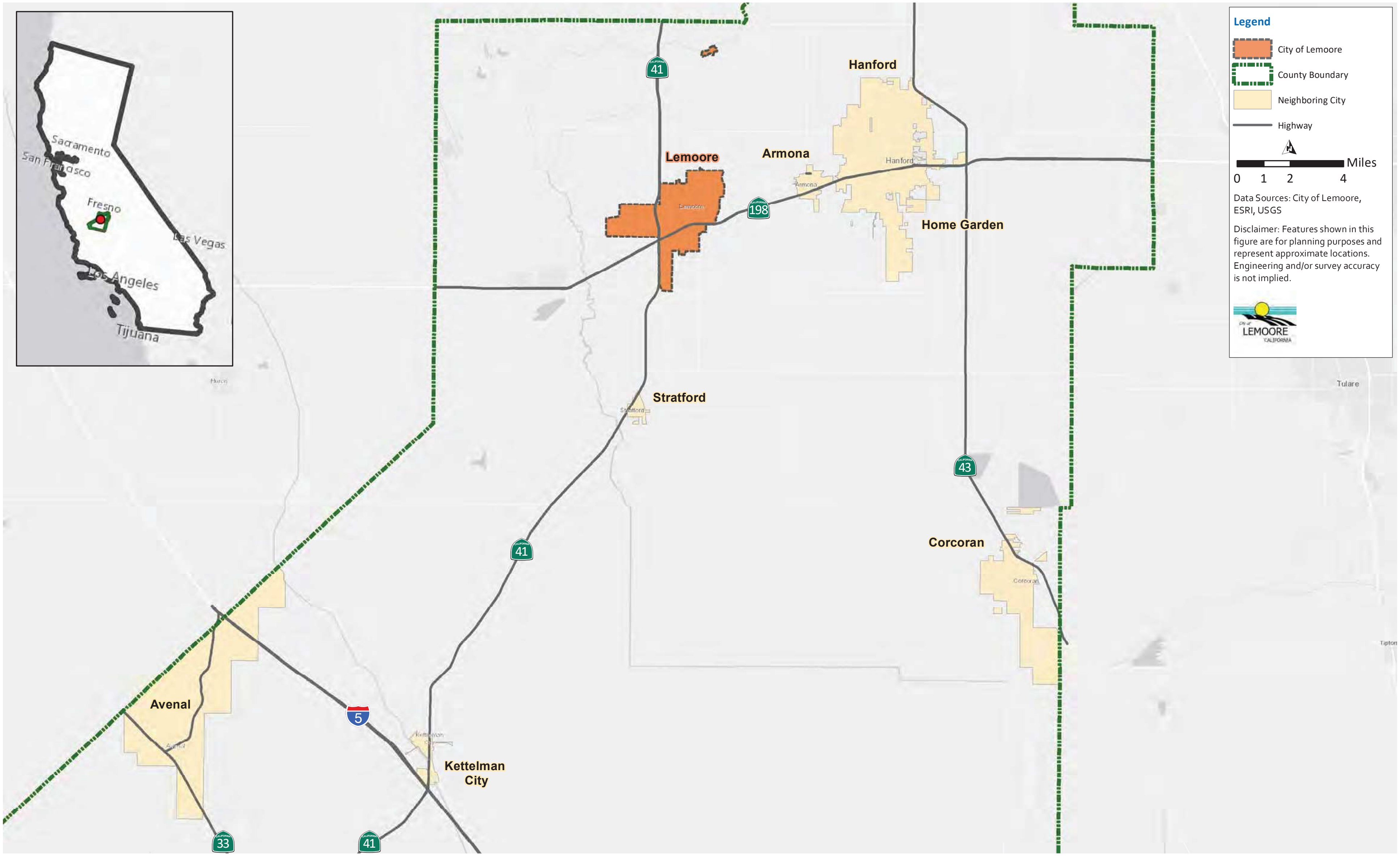

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Figure 1.1 Regional Location Map

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1.6 Report Organization

The Master Plan report contains nine chapters, followed by appendices that provide supporting documentation for the information presented in the report. The chapters are briefly described below:

Chapter 1 – Introduction. This chapter presents the project background, goals, and organization of this WWMP.

Chapter 2 – Land Use and Population. This chapter presents a discussion of the land use classifications, historical population trends, and projected populations for the planning period of this WWMP.

Chapter 3 – Existing Collection System and Treatment Facilities. This chapter provides an overview of the collection system and existing treatment facility.

Chapter 4 – Wastewater Flows and Loading. This chapter presents historical, existing, and future wastewater flows. The temporary flow monitoring program results are also summarized in this chapter.

Chapter 5 – Current and Future Regulatory Requirements. This chapter presents the planning criteria and methodologies for the analysis used to evaluate the wastewater collection system and treatment facility. The criteria described in this chapter are used to identify existing system deficiencies and size future improvements and expansion.

Chapter 6 – Wastewater Collection System Hydraulic Model. This chapter discusses the wastewater collection system hydraulic model, including modeling software, model elements and the model creation process.

Chapter 7 – Wastewater Collection System Evaluation Criteria and System Analysis. This chapter presents an overview of the systems existing and future analysis. Chapter identifies system deficiencies and provides recommendation to mitigate problematic areas.

Chapter 8 – Recycled Water. This chapter presents an integrated CIP for the City's wastewater collection system and treatment facility.

Chapter 9 – Wastewater Treatment Facilities Evaluation and Proposed Improvements. This chapter describes the drivers and limitations of recycled water. It also identifies potential recycled water users and their demands, and outlines water quality issues as a barrier to overcome in order to produce recycled water.

Chapter 10 – Capital Improvement Plan. This chapter provides a capacity and performance analysis of the existing WWTF. It identifies constraints within the system based on projected flows and loads, provides alternatives and recommendations to overcome process constraints, and provides an economic summary of treatment alternatives and a description of the recommended alternative.

1.7 Acknowledgements

We would like to thank the following City staff for their assistance and oversight of this project:

- Nathan Olson; City Manager
- John Souza; Utilities Manager
- Frank Rivera; Interim Public Works Director

- Rick Joyner, P.E.; City Engineer (QK)

The following Carollo staff members were principally involved in this project:

- Eric Casares, P.E.; Principal In Charge
- Ryan Orgill, P.E.; Project Engineer
- Joaquin Ramirez, P.E.; Staff Engineer
- John Witter, P.E.; Wastewater Treatment
- Tim Loper, P.E.; Quality Management
- Riley Powers; GIS/Graphics
- Candice Padilla/Stephanie McLaury; Document Processing

Chapter 2

LAND USE AND POPULATION

This chapter outlines the planning area for the wastewater collection system, defines land use classifications and described planned development within the City's service area. A summary of historical population trends, and population projections are presented in this chapter.

2.1 Study Area

The City's study area consists of two boundaries which are identified in the General Plan and defines the City's current and future limits. These boundaries include the City limits and Planning Area (PA). The City provides wastewater collection service to residents, businesses, industrial, and other institutions within City limits. The PA is land planned for long term growth and conservation. The total area of the wastewater study includes approximately 19 square miles. Figure 2.1 shows the City's existing and future boundaries.

Some small isolated areas within the City are served by septic systems. As future development and new infrastructure is installed, it is assumed that all septic users will be eventually connected to the City's collection system.

2.2 Planning Horizon

This WWMP is intended to serve as a guiding document for the planning and implementation of system improvements to accommodate future growth for the planning years of 2040 and Buildout.

2.3 Climate and Topography

Table 2.1 summarizes the study area's climate. As shown, the City's climate is characterized by hot dry summers and mild winters with an average annual rainfall of approximately 8.38 inches. Approximately 80-percent of the average annual precipitation occurs between November and March. The winter months are characterized by dense Tule fog. The City's elevation ranges from approximately 213-feet above sea level in the southwestern portion of the City to approximately 236-feet above sea level in the northeast corner of the City.

2.4 Land use

Land use information is an integral component in determining the wastewater generation within a given service area. The type of land use in an area will affect the volume and character of the wastewater generation. Adequately estimating wastewater flow from various land use types is important in sizing and maintaining effective system facilities.

The City is currently in the process of updating their General Plan (General Plan Update). The land use plan used for this WWMP is based on planning assumptions provided by QK and the City.

Table 2.1 Climate

Month	Average Temperature[1] (ºF)		Monthly Average ETo[2]	Average Total Precipitation[1]
	Min.	Max.	(inches)	(inches)
January	35.2	54.7	1.19	1.54
February	38.6	61.9	2.14	1.42
March	42.1	67.5	4.11	1.21
April	46.4	74.9	6.06	0.50
May	52.5	83.6	8.16	0.30
June	58.3	91.4	8.97	0.05
July	62.5	97.8	9.04	0.05
August	60.4	96.1	8.12	0.06
September	55.5	90.5	6.18	0.12
October	47.4	80.0	4.09	0.67
November	38.8	66.2	2.12	0.49
December	34.6	55.4	1.16	1.27
Avg. or Total	47.7	76.7	61.34	7.69

Notes:
(1) Source: Western Regional Climate Center Hanford (043747). Represents monthly average from July 1899 to June 2016.
(2) Source: California Irrigation Management Information System (CIMIS) Station 15 Stratford. Represents monthly average ETo from November 1982 to August 2017.

2.4.1 Existing Land use

Figure 2.1 shows the City's existing land use map within the City's service area. Table 2.2 provides a summary, by land use, of the amount of developed and developable land within the study area.

Table 2.2 Existing Land Use

Land Use Category	Area within the Service Area (acres)			
	Developed	Underdeveloped	Vacant	Total
Residential				
Very Low Density	39	0	20	59
Low Density Single Family	1,278	15	281	1,574
Low Medium Density	167	0	98	265
Medium Density	102	0	40	142
High Density	43	0	0	43
Commercial/Industrial				
Mixed-Use	55	6	96	157
Professional Office	11	15	2	28

Table 2.2 Existing Land Use (continued)

Land Use Category	Area within the Service Area (acres)			
	Developed	Underdeveloped	Vacant	Total
Neighborhood Commercial	57	6	18	81
Regional Commercial	17	10	125	152
Light Industrial(1)	132	23	573	728
Heavy Industrial	22	0	5	27
Employment Reserve	0	0	0	0
Significant Industrial User(2)	144	22	34	200
Other				
Community Facilities	370	15	101	486
Parks/Recreation	264	0	73	337
Greenway/Detention Basin	10	22	61	93
Wetlands	0	0	0	0
Agriculture	0	0	0	0
Agriculture/Rural Residential	0	0	0	0
Conservation	0	0	382	382
Total	2,711	134	1,909	4,754

Notes:
(1) Does not include Leprino, Olam, and Aqusa.
(2) Consists of Leprino, Olam, and Aqusa.

As shown in Table 2.2, there are approximately 2,711 acres of developed land within the City limits (excluding right-of –ways such as streets, highways, and railroads). Of the 2,711 developed acres, 1,629 acres (60-percent) are classified as residential, 438 acres (16-percent) are classified as commercial/industrial, and the remaining 644 acres (24-percent) are associated with community facilities, parks/recreation, greenway/detention basins, wetlands, or agriculture/rural residential. Leprino, Olam, and Agusa are separated into their own category because they discharge a large known amount of wastewater compared to the other light industrial users. Leprino is serviced by its own dedicated collection system, however, it's classified as a significant user in this WWMP. Leprino sends a smaller waste stream, referred to as cow water, directly to the City's WWTF.

2.4.2 Known Development

The City has plans for development of new residential communities, infill, and redevelopment of existing land. As shown Table 2.3, the City has currently identified eighteen residential and nine multi-purpose developments. These developments are assumed to be fully developed by planning year 2040. The number of units and area of each planned development is summarized in Table 2.3, while the location of each development is shown on Figure 2.2. The known developments are expected to result in roughly 1,200 new residential units. In addition to new development, the City plans on connecting the Lemoore Mobile Home Park on Hanford Armona Road by 2040. The mobile home park is shown on Figure 2.2 and listed in Table 2.3.

Known development data was obtained from the City's website under the Planning Commission Agendas for years 2018, 2017, and 2016. In addition, the City has a map of "Approved Subdivisions".

2.4.3 Future Land Use

Future land use includes the development of vacant or underdeveloped areas not defined as known development. This includes growth outside the current City limits and encompassed by the Planning Area. It is assumed that development and redevelopment will occur according to the land use designations as depicted on Figure 2.1.

Build-out is defined as development of all land including the Planning Area of the City. At build-out, the service area will encompass approximately 14.4 square miles (excluding wetlands and agriculture). The City has expressed interest in providing service to the area south of Idaho Avenue. As shown on Figure 2.1, this annexation covers approximately 645 acres and is considered light industrial.

Table 2.3 Known Developments

Tract/SPR	Subdivision/Developer	Land Use	Residential Units	Size (Acres)
		Residential		
781	Silva Estates Patio Homes	Multi-Family	30	4
793	Silva Estates	Single/Multi Family	42	18
797	Park View Estates	Single Family	90	18
816	Holly Oaks	Single Family	28	18
820	Fairway Courtyard	Multi-Family	39	3
827	Park Meadows	Single Family	20	6
839	G.J Gardner	Single Family	37	9
845	Victory Village	Single Family	51	14
908	Capistrano V	Single Family	20	0.3
920	Lennar Homes	Single Family	172	40
921	Woodside Homes	Single Family	64	20
2018-04	Cinnamon Villas	Single Family	28	2
2017-08	Granville Homes	Multi-Family	141	9
2009-01	Village at Acacia	Multi-Family	81	7
2006-20	Oleander Terrace	Multi-Family	66	5
_	Lennar West(2)	Mixed Use	-	32
-	Rugman(2)	Mixed Use	-	10.9
-	Lacy Ranch	Single Family	220	155
	17th Avenue	Single Family	-	50
-	Lemoore Mobile Home Park(3)	Multi-Family	70	10
Subtotal		**-**	**1,199**	**435**
		Community Facilities		
2017-09	Last Days Ministries	Community Facility	-	2

Table 2.3 Known Developments (continued)

Tract/SPR	Subdivision/Developer	Land Use	Residential Units	Size (Acres)
		Industrial/ Commercial		
-	Dollar General	Neighborhood Commercial	-	2
2017-06	Virgil Beard	Light Industry	-	3.8
2015-03	Fast and Friendly Market	Regional Commercial	-	1
2016-01	PG&E	Light Industrial	-	12
2018-08	Kashian Industrial	Light Industrial	-	80
-	Rodriguez	Light Industrial	-	0.6
-	Immediate Care Facility	Regional Commercial	-	9
-	Rugman	Commercial	-	4.6
Subtotal		**-**	**-**	**115**
Total		**NA**	**1,199**	**550**

Note:
(1) SPR – Site Plan Review.
(2) Housing units for development is unknown.
(3) Mobile Home Park is developed and will connect to City's collection system by 2040.

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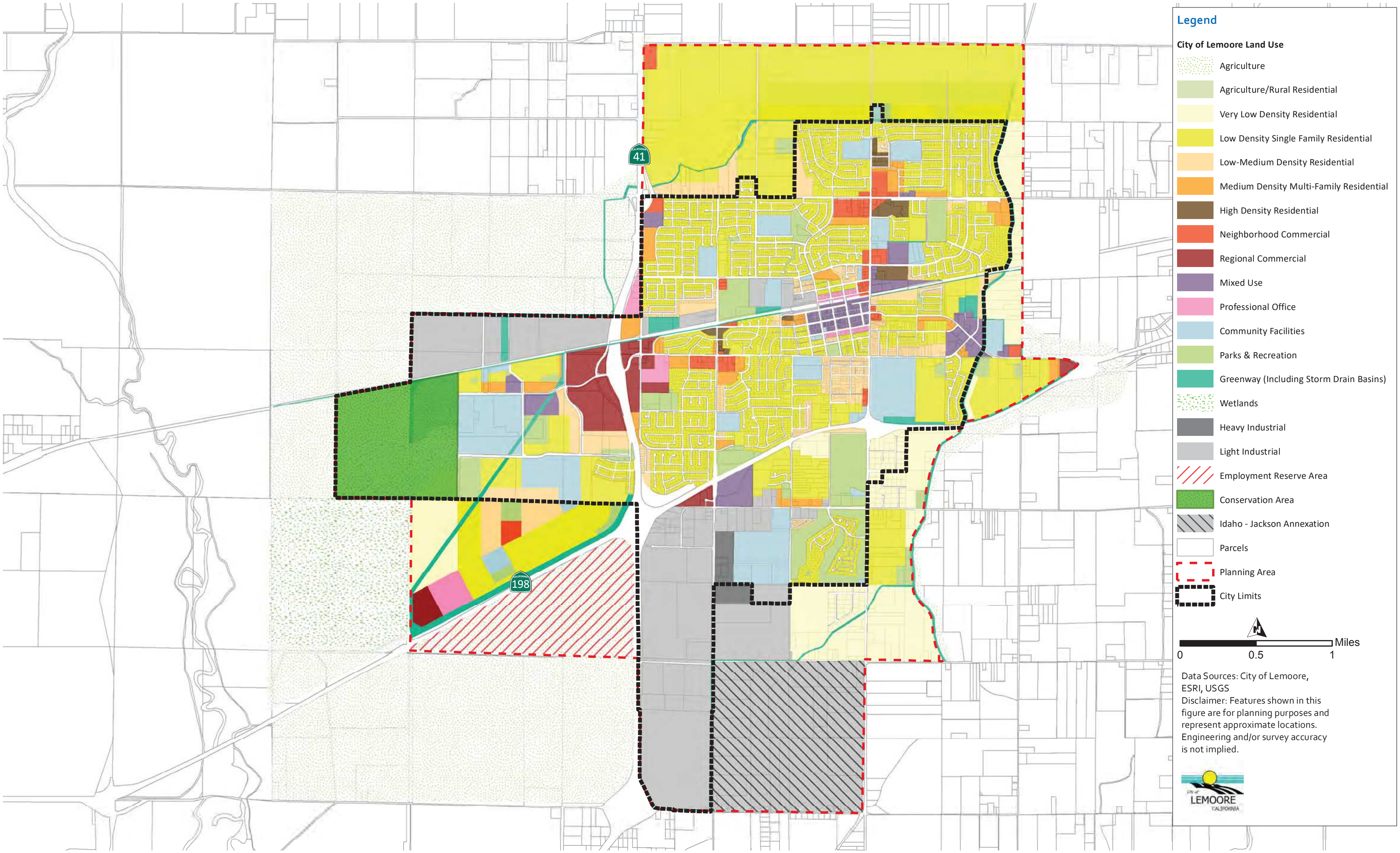

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Figure 2.1 General Plan Land Use

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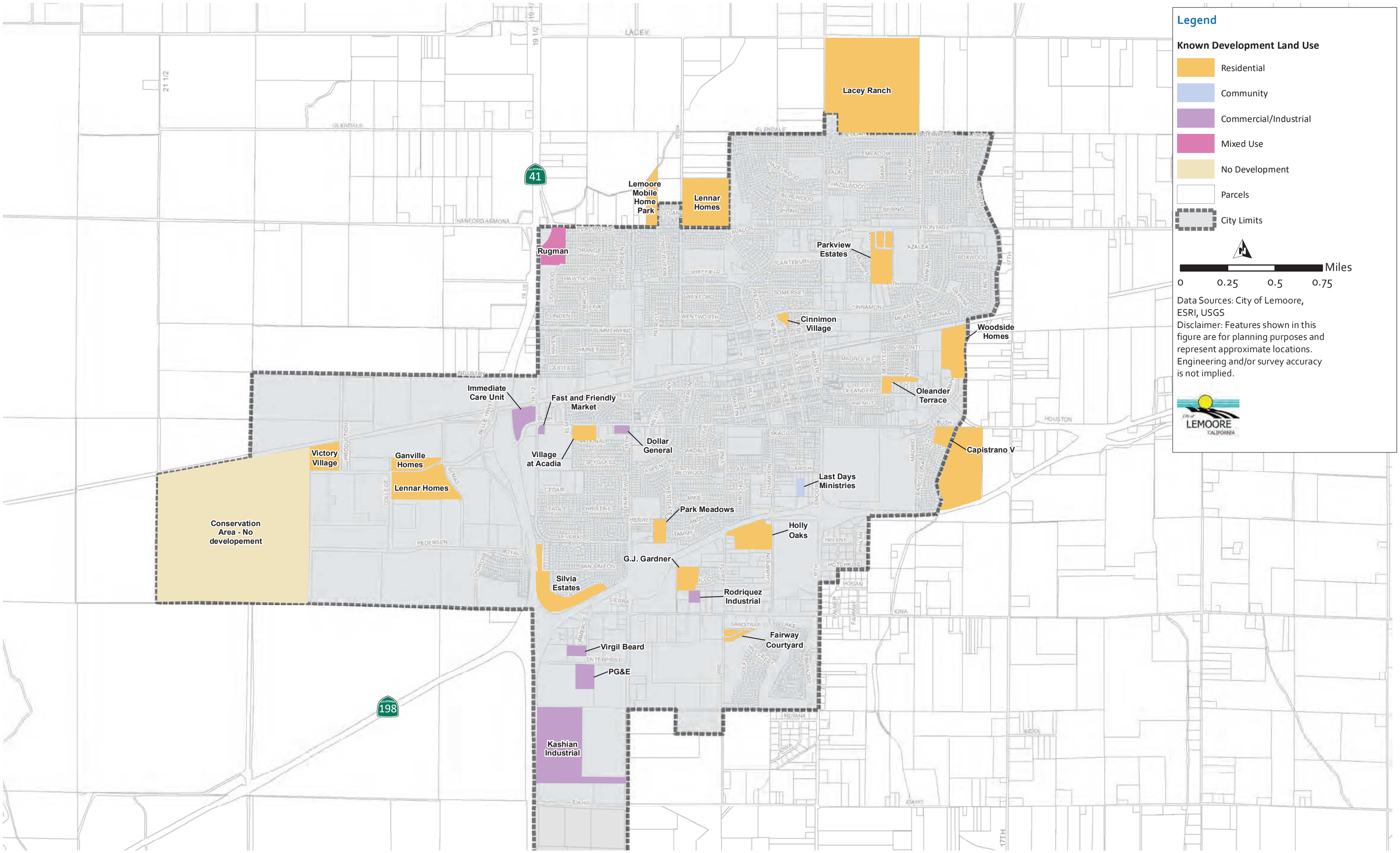

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Figure 2.2 Known Development

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2.5 Population

This section summarizes historical population trends, existing, and projected population.

2.5.1 Historical and Existing Population

Historical population estimates from the Department of Finance from years 1996 through 2017 are presented in Table 2.4 and depicted in Figure 2.3. As of 2017, the total existing population within the City's boundaries was estimated at 26,369 people. From 1997 to 2017 (20 years) the growth rate for the city has averaged 2.12-percent. With 2010 and 2011 excluded (negative growth), the City has experienced a 2.4-percent growth.

Table 2.4 Historic and Existing Population

Year	Population	Net Increase	Growth from Previous Year
1996	16,550	-	-
1997	17,358	808	4.88%
1998	18,108	750	4.32%
1999	18,804	696	3.84%
2000	19,525	721	3.83%
2001	20,021	496	2.54%
2002	20,487	466	2.33%
2003	20,714	227	1.11%
2004	21,340	626	3.02%
2005	21,893	553	2.59%
2006	22,607	714	3.26%
2007	23,331	724	3.20%
2008	23,589	258	1.11%
2009	24,531	942	3.99%
2010	24,531	0	0.00%
2011	24,493	-38	-0.15%
2012	24,711	218	0.89%
2013	25,163	452	1.83%
2014	25,418	255	1.01%
2015	25,585	167	0.66%
2016	26,093	508	1.99%
2017	26,369	276	1.06%
20 Year Average Growth			**2.12%**
20 year Average Growth Excluding Negative and No Growth			**2.37%**

Notes:
(1) Source: California Department of Finance.

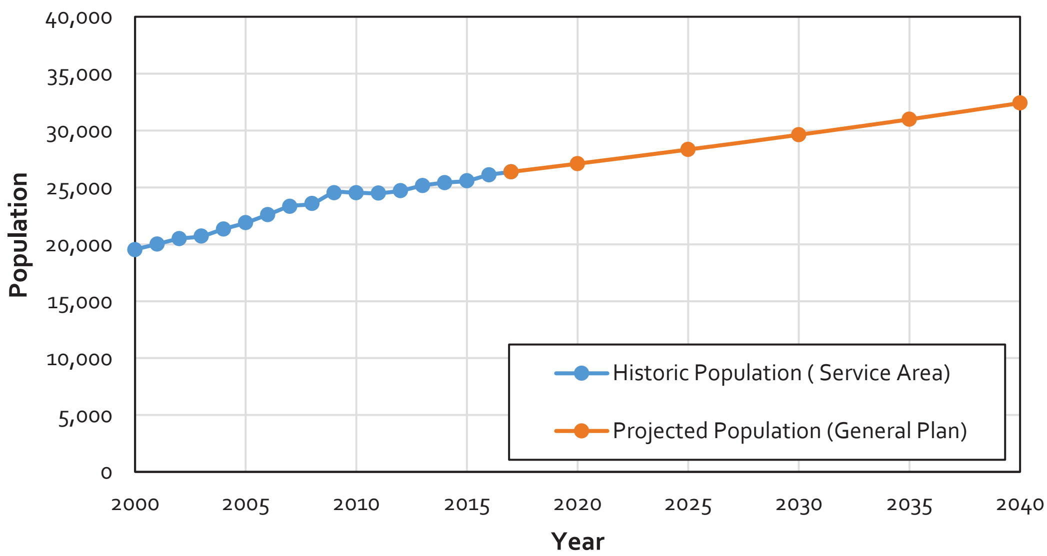

Figure 2.3 Citywide Historic and Projected Population

2.5.2 Projected Population

Figure 2.3 shows the projected population according to the projected growth outlined in the General Plan. The projected population growth is summarized in Table 2.5. As shown in Table 2.5, the City is projected to experience an annually growth rate of 0.9-percent.

Table 2.5 Projected Population Growth

Year	Population	Net Increase	Growth from Previous Year
2017	26,369	276	1.06
2020	27,089	720	0.9
2025	28,332	1,244	0.9
2030	29,633	1,301	0.9
2035	30,993	1,360	0.9
2040	32,416	1,422	0.9

Notes:
(1) The General Plan estimates a total population of 32,416 by 2040. The growth rate is based on an average annual rate from 2017 to 2040.

Chapter 3

EXISITING COLLECTION SYSTEM AND WASTEWATER TREATMENT PLANT

This Chapter presents an overview of the City of Lemoore's (City) existing wastewater collection system and wastewater treatment Facility (WWTF).

3.1 Existing Wastewater collection System

The existing wastewater collection system consists of approximately 82 miles of sanitary sewer pipelines ranging in diameter from 4 inches to 21 inches, as well as 17 wastewater lift stations. Figure 3.1 presents the City's existing wastewater collection system.

Leprino Foods (Leprino) is a large industrial user within the City and has two main cheese producing facilities within the City. Leprino has their own treatment facility that processes the majority of their industrial waste adjacent to the City's WWTF. A smaller portion of industrial wastewater, known as cow water, which is the condensate from milk processing, is piped directly to the City's Pond 1A.

3.1.1 Pipeline Distribution by Diameter

Table 3.1 summarizes the total length of pipeline for each diameter in the domestic collection system. The table is based on geographic information system (GIS) data and available drawings provided by City staff. The table excludes private sewer pipelines within the study area and does not account for pipelines within the WWTF.

As shown in Table 3.1 , nearly all the City's sewers pipelines are gravity. The majority of the City's gravity sewers are 8-inches in diameter, with the largest being 21-inches in diameter. Figure 3.2 illustrates the distribution of all pipeline diameters (gravity and force mains).

GIS data provided by the City did not contain pipeline material or age. The City should update the GIS to include Installation dates and pipeline material, which will allow them to perform an age-based analysis to provide an evaluation of pipeline decay and potential failure. This knowledge will assist the City in identifying critical areas.

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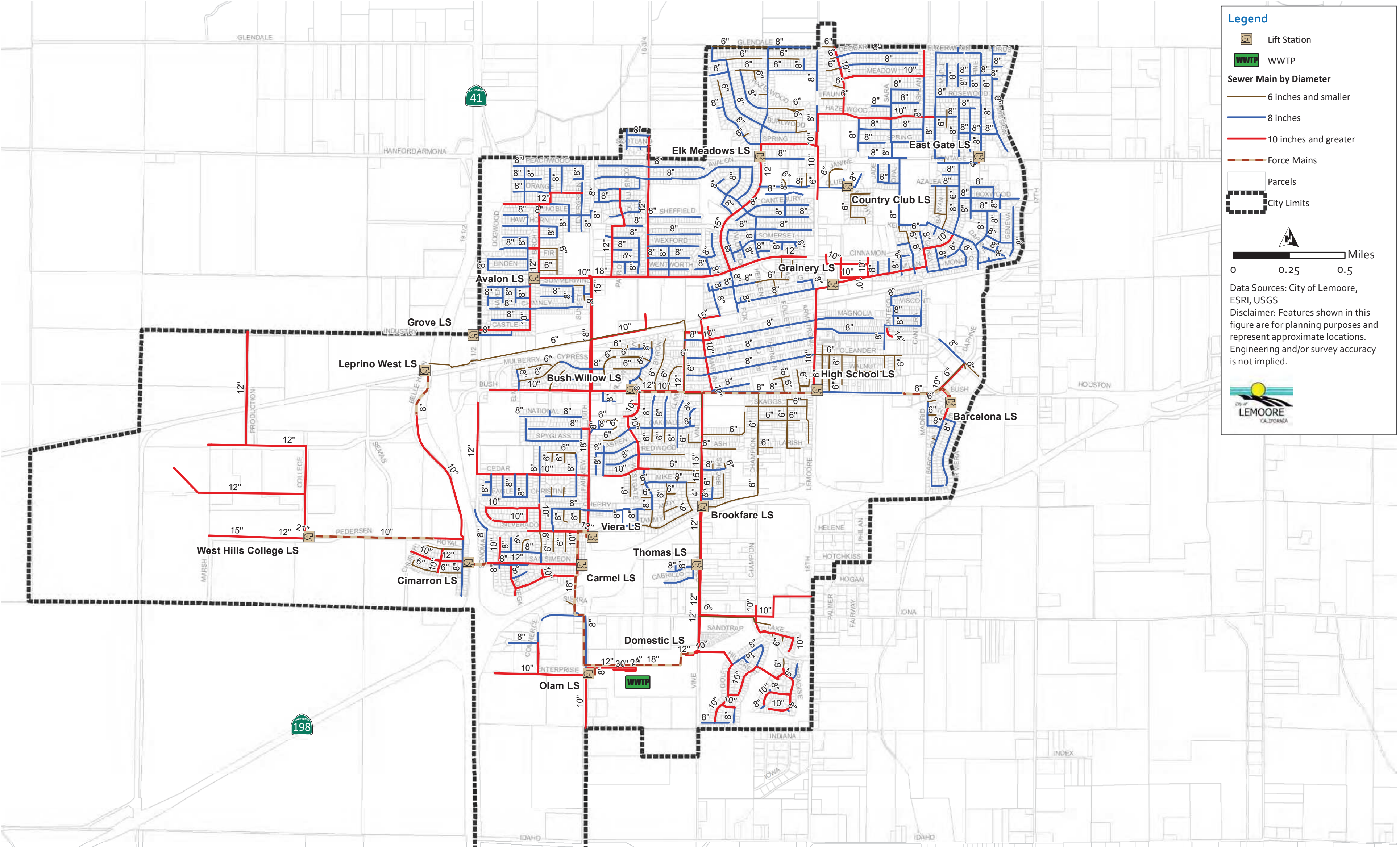

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Figure 3.1 Existing Collection System

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Table 3.1 Pipeline Diameter Overview

Diameter	Length (ft)	Length (mi)	Percent (%)
Gravity			
6	66,200	12.5	15.3%
8	215,000	40.7	49.7%
10	64,800	12.3	15.0%
12	48,200	9.1	11.1%
15	10,800	2.0	2.5%
18	10,200	1.9	2.4%
21	100	0.0	0.02%
Subtotal	**415,300**	**79**	**96.0%**
Force Main			
4	100	0.02	0.02%
6	1,400	0.3	0.33%
8	4,800	0.9	1.12%
10	4,500	0.2	1.03%
12	1,300	0.2	0.30%
15	40	0.01	0.01%
16	1,400	0.27	0.33%
18	4,000	0.8	0.92%
Subtotal	17,540	2	4.0%
Total	**432,840**	**82**	**100**

Notes
(1) Total only includes City owned pipelines.
(2) Pipelines dedicated to conveying Leprino waste are not included in Table.

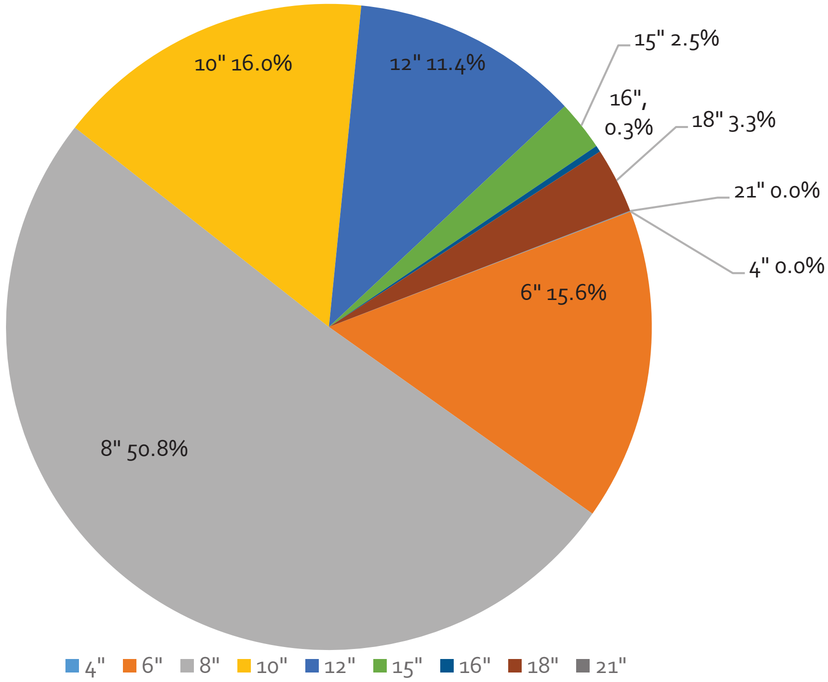

Figure 3.2 Pipelines by Diameter

3.1.2 Lift Station

The City owns and operates seventeen (17) lift stations that pump wastewater from low points in the collection system to manholes at higher elevation. Table 3.2 summarizes the available information on each lift station. Each of these lift stations include one duty pump and one standby pump.

Table 3.2 Lift Station Information

No.	Lift Station Name	Location	No. of Pumps	Capacity Per Pump (mgd)
1	Avalon	Cinnamon Drive Hearth way.	2	0.33
2	Brookfare(1)	North of Highway 198 and Vine Street.	2	--
3	Bush Willow	Bush Street and Willow Drive.	2	0.61
4	Capistrano(1)	Barcelona Drive, south of Bush Street.	2	--
5	Carmel(1)	San Simeon Drive and Carmel Drive.	2	0.43
6	Cimarron	East of Park Lane and Belle Haven.	2	0.36
7	Country Club	South of Club Drive and Murphy Drive.	2	0.14
8	East Gate(1)	East of Hanford-Armona Road and Cinnamon Drive.	2	--
9	Elk Meadows	Intersection of Hanford-Armona and Antelope Drive.	2	0.72
10	Grainery	East of Lemoore Avenue and F street.	2	0.58
11	Grove(1)	South of 19 ½ Avenue and Castle Way.	2	--
12	High School(1)	Bush Street and Lemoore Avenue.	2	--
13	Leprino(1)	Belle Haven Drive, north of Bush Street.	2	--
14	Olam (SK)	Enterprise Drive and 19th Avenue.	2	0.5
15	Thomas	North of Vine Street and Cabrillo Street.	2	0.72
16	Viera	South of Silverado Drive and 19th Avenue.	2	0.62
17	West Hills(1)	College Avenue, south east of West Hills College.	2	--

Notes:
(1) Capacity of Lift Station is Unknown.

3.2 Existing Wastewater Treatment Facility

The City owns and operates a wastewater treatment facility (WWTF) located at 1145 S. Vine Street. The WWTF is equipped with an influent pump station, Old Headworks, New Headworks, four lagoon ponds, chlorine gas injection, and an effluent pump station. Figure 3.3 shows the layout of the WWTF.

Raw wastewater from the collection system is pumped to the Old Headworks structure where it then flows by gravity to the New Headworks. A portion of the collection system pumps wastewater directly to the New Headworks. The New Headworks structure began screening wastewater in 2004. The New Headworks is equipped with a mechanical bar screen that removes large debris. Screenings are compacted and hauled to the landfill. During periods of maintenance, wastewater can bypass the mechanical bar screen and be routed through a manually cleaned bar screen.

Screened influent flows into a septage receiving station wet well, where four submersible pumps pump wastewater to the aerated ponds. Flow is split between Pond 1A and Pond 1B. Motor driven jet aerators increase the dissolved oxygen (DO) in the ponds and promote biological oxidation. Leprino pumps cow water directly to Pond 1A, bypassing the headworks. After reducing organic loading in Pond 1, wastewater flows to Ponds 2 and 3, which operate in series as quiescent settling ponds. The long detention time in the ponds and slow flows allow solids to settle. A brush aerator increases the DO as the final effluent leaves Pond 3. While it is expected that solids have accumulated at the bottom of each pond, solids have not been transferred out of the ponds since 1987.

Leprino has their own WWTF adjacent to the City's facility that consists of sequencing batch reactors. Leprino has the ability to send off-spec wastewater to the City's Pond 1A. Off-spec wastewater refers to when the process is not capable of meeting discharge requirements. Having an off-spec pipeline allows Leprino to send wastewater to the City for further treatment and maintain compliance.

The City and Leprino combine their treated wastewater effluent flows. Chlorine gas is injected into the combined effluent pipeline to disinfect the effluent per their permit requirement. The combined effluent is then pumped water just west of the Kings River and discharges into a canal owned by Westlake Farms. Westlake uses the effluent to supplement their water allocation and beneficially reuses it to irrigate fodder crops.

An analysis on the performance and capacity of the existing WWTF is provided in Chapter 9.

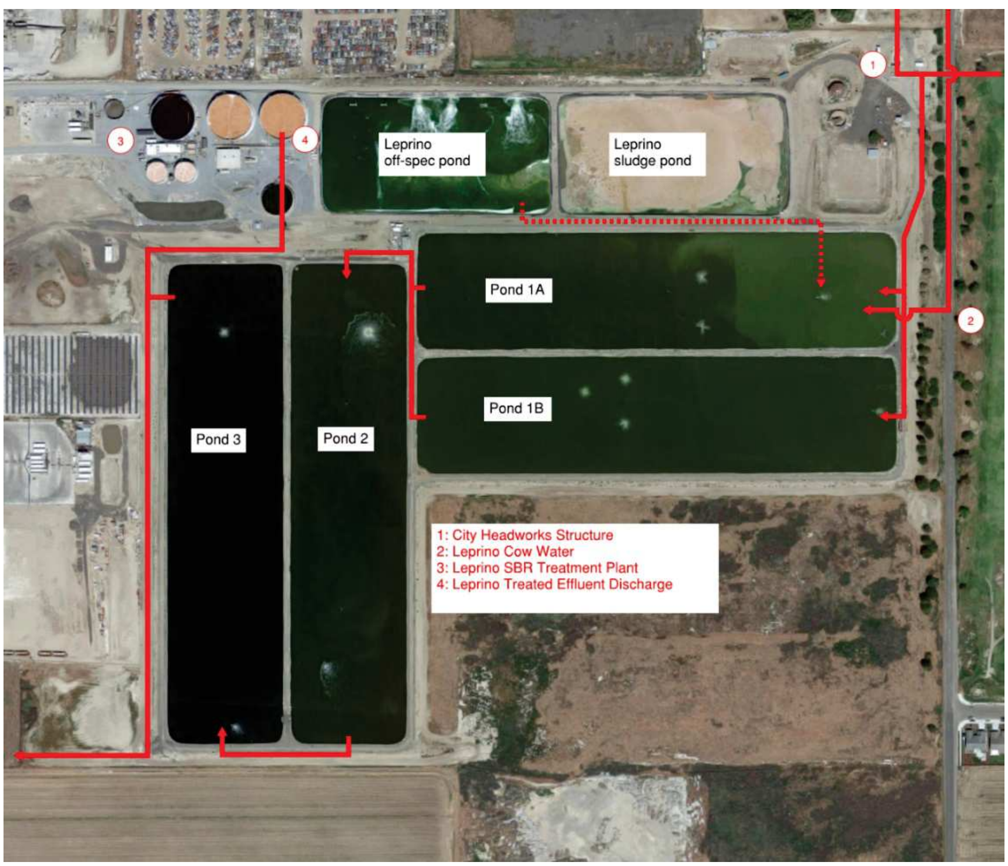

Figure 3.3 City Wastewater Treatment Facility Process Flow Diagram

Chapter 4

WASTEWATER FLOWS AND LOADING

This chapter establishes the flows and loading characteristics that will be used to evaluate the collection system and wastewater treatment facility (WWTF).

4.1 Wastewater Collection System

This section summarizes the City's historic and projected wastewater flows. Included is a discussion on various flow components present in wastewater and a summary of the flow monitoring data that was used as part of the WWMF.

4.1.1 Wastewater Flow Components

This section describes the terminology used for the hydraulic analysis of the wastewater collection system. Wastewater flows vary according to season and generally consist of dry weather flow (DWF) and wet weather flow (WWF).

Groundwater infiltration (GWI) is an additional component of DWF. GWI enters the sewer system when the pipeline depth is lower than the groundwater. Because the water table is several hundred feet below the ground surface, GWI should not be a significant contributor to the collection system under DWF conditions.

WWF includes inflow from storm water runoff and infiltration from saturated soil conditions. The storm water inflow and infiltration comprise the WWF component termed infiltration/inflow (I/I). The response in the sewer system to rainfall is seen immediately (as with inflow) or within hours after the storm (as with infiltration).

4.1.1.1 Base Wastewater Flow

The base wastewater flow (BWF) is synonymous with DWF and is generated by the City's customers independent of wet weather influences. BWF is estimated by measuring flows during dry weather conditions. The flow has a diurnal pattern that varies depending on the type of use. Commercial and industrial flows, though they vary depending on the type of use, are typically higher during business hours and lower at night. Furthermore, the diurnal flow pattern experienced during a weekend may vary from the diurnal flow experienced during a weekday.

4.1.1.2 Average Annual Flow

The average annual flow (AAF) is the average flow that occurs on a daily basis throughout the year, including both periods of dry and wet weather conditions.

4.1.1.3 Average Dry Weather flow

The average dry weather flow (ADWF) is the average flow that occurs on a daily basis during the dry weather season, considered June through August. The ADWF includes the BWF generated by the City's residential, commercial, and industrial users, plus the dry weather GWI component. For this report BWF, will be used synonymously with DWF as any significant ground water infiltration is unlikely during the summer months.

4.1.1.4 Maximum Month Flow

Maximum month flows are calculated as the highest consecutive 30-day average daily flow that occurs in a calendar year.

4.1.1.5 Peak Hour Flow

Peak hour flow is the maximum flow rate that occurs in a one hour period and immediately follows large storm events mainly due to inflow.

4.1.2 Flow Monitoring Data

This section describes the temporary flow monitoring program conducted as part of this study. The data and results from the flow monitoring program are summarized and discussed.

4.1.2.1 Flow Monitoring Sites

As part of the Scope of Services for this Master Plan, Carollo Engineers, Inc. (Carollo) contracted with V&A Consulting Engineers (V&A) to conduct a temporary flow monitoring program within the City's wastewater collection system. The purpose of the flow monitoring program was to assist in the development of design flow criteria and to correlate actual collection system flows to the hydraulic model predicted flows. The temporary flow monitoring program was conducted for a period of 3 weeks, from August 29, 2018 to September 19, 2018. The "Sewer Flow Monitoring and Inflow/Infiltration Study" prepared by V&A summarizes the flow monitoring program. A copy of the report is included in Appendix A.

4.1.2.2 Flow Monitoring Sites and Tributary Areas

A total of 15 open-channel flow meters were installed at locations selected by Carollo and the City. The meter sites were selected to best isolate and model critical areas and subareas within the sewer system. Table 4.1 lists the flow monitoring locations and the sewer diameters where the meters were installed. The 15 flow monitoring locations, as well as the tributary area to each site, are shown on Figure 4.1. Figure 4.2 provides a schematic illustration of the flow monitoring locations. As shown on Figure 4.2, upstream of Basin 14 and 15 an overflow diverts excess flow from Basin 15 into Basin 14.

Table 4.1 Flow Monitoring Locations

Site	Pipe Diameter (in)	Location
L-01	10	185 W. Spring Ln.
L-02	14.5	Fox St., 300' north of Cinnamon St.
L-03	17.25	Intersection of Cinnamon St. & N. 19th Ave.
L-04	9.75	Cinnamon St., 360' west of N. 19th Ave.
L-05	18	18 S. 19th St., 145' south of Silverado Dr.
L-06	11.5	Intersection of Carmel Dr. and San Simeon Dr.
L-07	NA	Site 7 n/a Intersection of Enterprise Dr. and S. 19th Ave.
L-08	10	Field 650' east of intersection of 18th Ave. & G St.
L-09	10	Intersection of Linda Ln & Sycamore Ln.
L-10	12	Intersection of W. Bush St. & Vine St.
L-11	15	190' south of intersection of W. Bush St. & Vine St.
L-12	15	Intersection of W. Bush St. & Vine St.
L-13	12	College Ave, opposite southeast corner of West Hills College
L-14	9.75	Inside east entrance to treatment plant
L-15	12	Inside east entrance to treatment plant

4.1.2.3 Flow Meter Installation and Flow Calculation

Teledyne Isco 2150 flow meters were used for this project. Isco 2150 meters use a pressure transducer to collect depth readings and ultrasonic Doppler sensors on the probe to determine the average fluid velocity. The ultrasonic sensor emits high frequency sound waves, which are reflected by air bubbles and suspended particles in the flow. The sensor receives the reflected signal and determines the Doppler frequency shift, which indicates the estimated average flow velocity. The sensor is typically mounted at a manhole inlet to take advantage of smoother upstream flow conditions. The sensor may be offset to one side to lessen the chances of fouling and sedimentation where these problems are expected to occur. Manual level and velocity measurements were taken during installation of the flow meters and again when they were removed and were compared to simultaneous level and velocity readings from the flow meters to verify proper calibration and accuracy. The pipeline diameter was also verified in order to accurately calculate the flow cross-section. The continuous depth and velocity readings were recorded by the flow meters on 5-minute intervals. The flow at each meter was calculated at 5-minute intervals based on the continuity equation:

$$Q = V \times A$$

where,

Q = Pipeline flow rate, cfs

V = Average velocity, ft/s

A = Cross sectional flow area, ft^2

Finally, the 5-minute flow, velocity, and level data were aggregated into 15-minute increments.

4.1.3 Flow Monitoring Results

This section summarizes the results of the flow monitoring program. Meter L-11 is presented throughout this chapter as an example.

4.1.3.1 Dry weather flow Data

Characteristic dry weather 24-hour diurnal flow patterns for each site were developed based on the hourly data. This hourly flow data was then used to calibrate the hydraulic model for the observed dry weather flows during the flow monitoring period.

Hourly patterns for weekday and weekend flows were analyzed separately to better understand dry weather flow. V&A provided estimates for the average weekday and weekend levels and velocities at each site, which are used in dry weather flow calibration. Table 4.2 summarizes the dry weather flows at each meter.

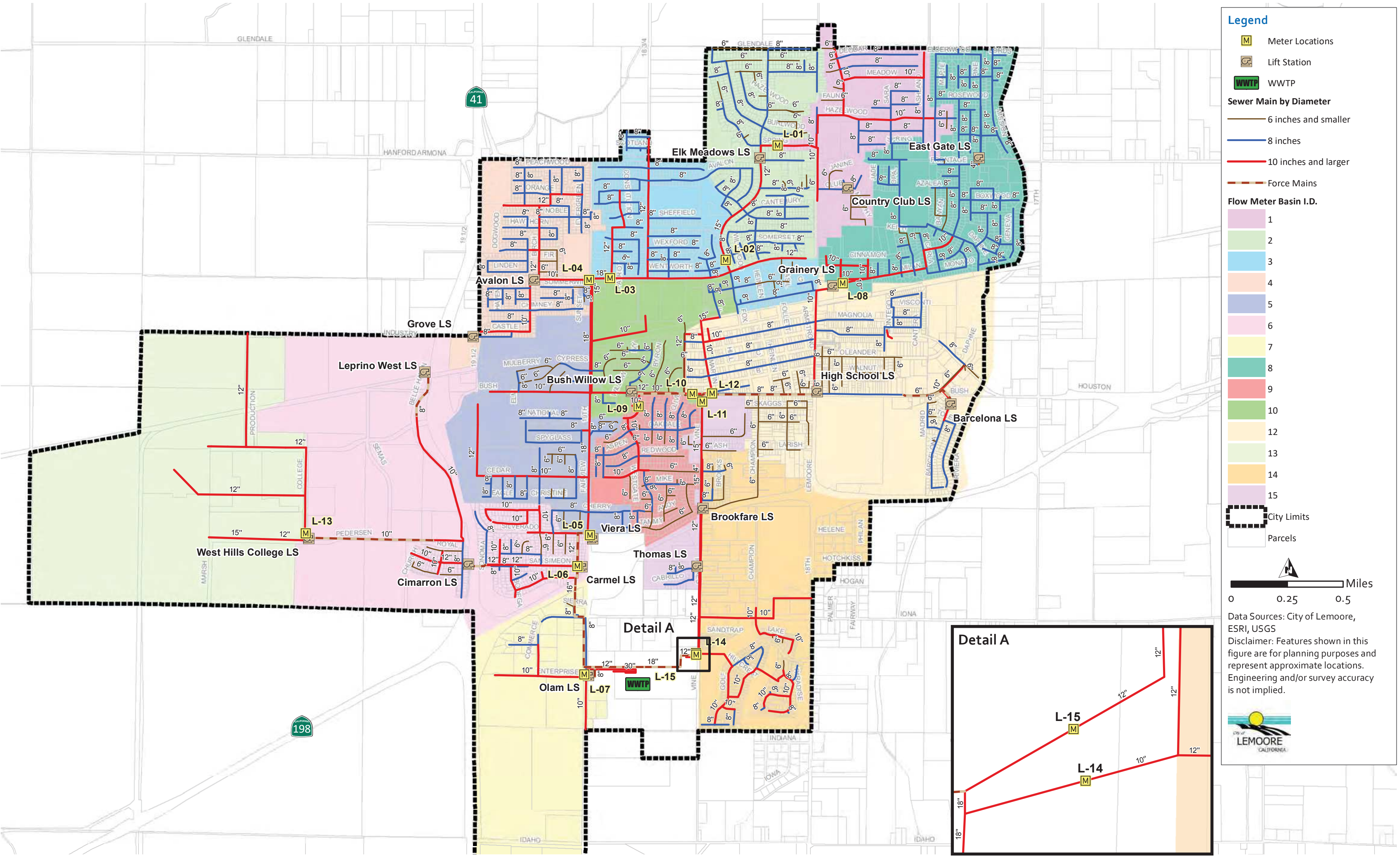

Figure 4.1 Flow Monitoring Locations

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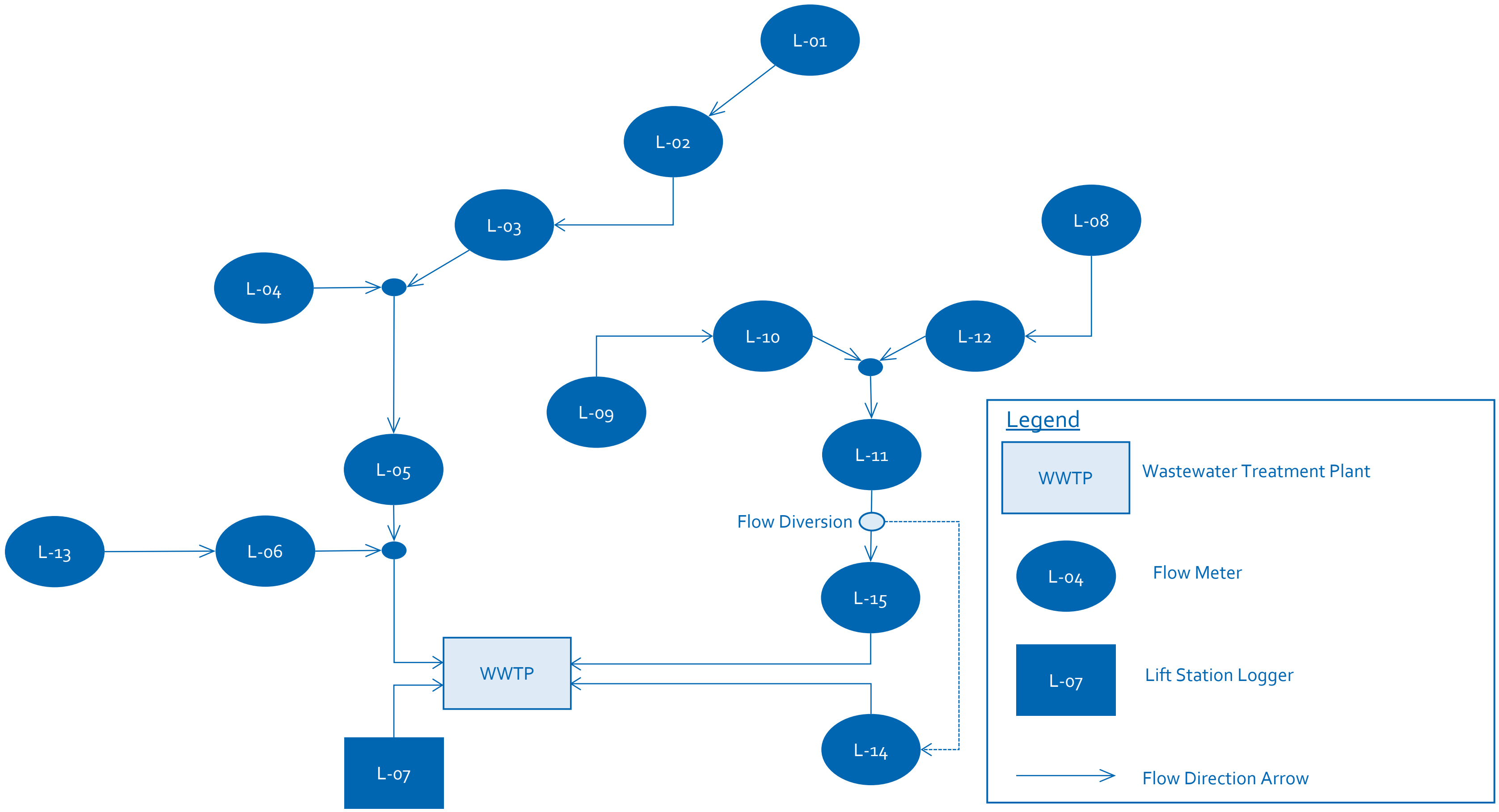

Figure 4.2 Flow Monitoring Schematic

Table 4.2 Dry Weather Flow Summary

Monitoring Site	Dry Weather Flow				
	(Mon – Thur) (mgd)	(Friday) (mgd)	(Saturday) (mgd)	(Sunday) (mgd)	Overall (mgd)
L-01	0.178	0.166	0.175	0.186	0.177
L-02	0.328	0.312	0.336	0.364	0.332
L-03	0.466	0.445	0.474	0.501	0.469
L-04	0.166	0.159	0.17	0.194	0.17
L-05	0.72	0.689	0.751	0.78	0.729
L-06	0.213	0.197	0.196	0.225	0.21
L-07	0.129	0.129	0.121	0.119	0.126
L-08	0.224	0.212	0.229	0.264	0.229
L-09	0.094	0.09	0.091	0.102	0.094
L-10	0.207	0.205	0.219	0.256	0.215
L-11	0.685	0.669	0.7	0.737	0.692
L-12	0.427	0.411	0.422	0.43	0.424
L-13	0.034	0.031	0.015	0.011	0.028
L-14	0.041	0.034	0.043	0.055	0.042
L-15	0.682	0.693	0.673	0.673	0.681
Total Influent	**1.785**	**1.742**	**1.784**	**1.852**	**1.788**

Notes:
(1) Source: Sanitary Sewer Flow Monitoring, V&A Consulting Engineers, Inc. (2017).
(2) Overall Dry Weather Flow = ((4 x Monday - Thursday) +(Friday)+(2 x Weekend))/7.
(3) Total Influent is flow entering WWTP and is equal to Sites 5+6+7+14+15.

Figure 4.3 illustrates a typical variation of wastewater flows in the City, which is based on the data collected from Meter 11. Similar graphics associated with the remaining sites are included in Appendix A.

As shown on Figure 4.3, flow patterns differ according to the day of the week. Dry weather flow for Monday through Thursday and Sunday experienced the greatest peak during evening hours, while Friday and Saturday show a decreased peak. A majority of the dry weather hydrographs display a similar pattern to Meter L-11.

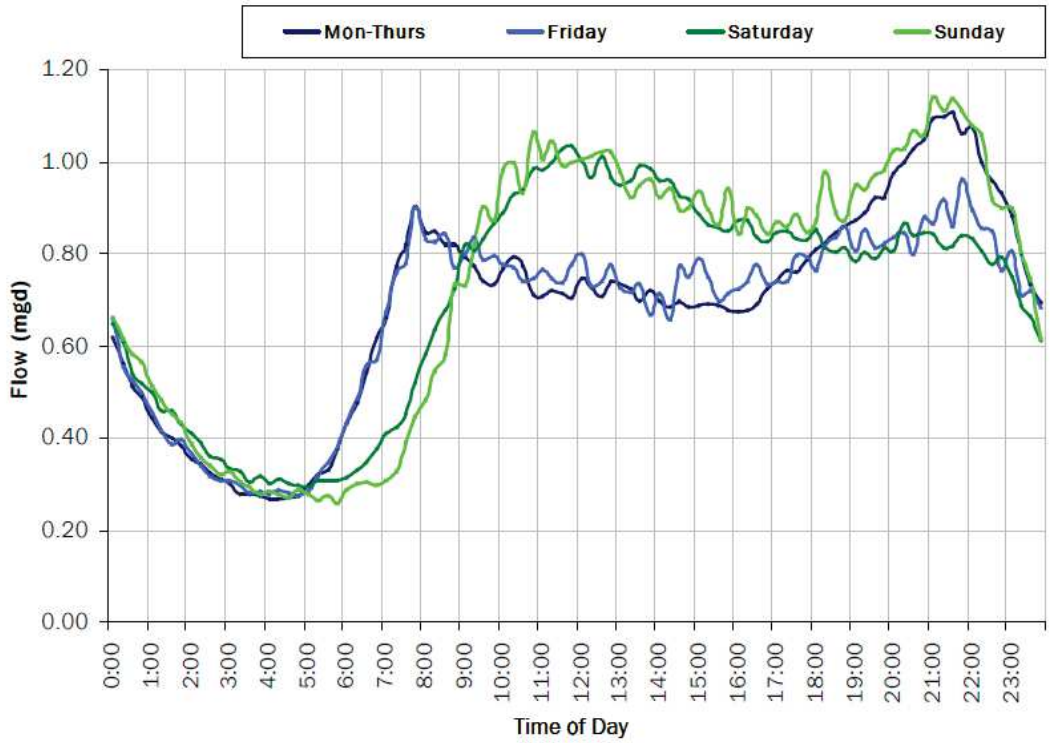

Figure 4.3 Typical Dry Weather Flow Variation (Meter L-11)

4.1.4 Site Flow Monitoring Capacity Analysis

V&A conducted a capacity analysis of each flow monitoring site under dry weather conditions. Table 4.3 presents a site-by-site anlaysis and shows the hydraulic condition of the pipeline under peak dry weather conditions.

Table 4.3 Capacity Analysis Summary (V&A)

Monitoring Site	ADWF (mgd)	Peak Measured DWF (mgd)	Peaking Factor	d/D Ratio	Level Surcharged (in)
L-01	0.177	0.355	2.0	0.53	-
L-02	0.332	0.602	1.8	0.44	-
L-03	0.469	0.824	1.8	0.71	-
L-04	0.17	0.349	2.1	0.63	-
L-05	0.729	1.172	1.6	2.16	1.75
L-06	0.21	0.411	2.0	1.24	0.23
L-07(3)	0.126	0.228	1.8	-	-
L-08	0.229	0.47	2.1	0.50	-
L-09	0.094	0.16	1.7	0.42	-
L-10	0.215	0.556	2.6	0.87	-
L-11	0.692	1.23	1.8	0.79	-
L-12	0.424	0.862	2.0	1.36	0.45
L-13	0.028	0.12	4.3	2.75	-
L-14(4)	0.042	0.166	-	-	-
L-15(4)	0.681	0.933	-	-	-

Notes:
(1) Source: Sanitary Sewer Flow Monitoring, V&A Consulting Engineers, Inc. (2017).
(2) Overall Dry Weather Flow = ((4 x Monday - Thursday) +(Friday)+(2 x Weekend))/7.
(3) Data for depth was not provided for L-07.
(4) Peaking factor and d/D not provided for L-14 and L-15 due to upstream flow split.

As shown, Sites L-05, L-06, and L-12 surcharged above the crown (top) of the monitored pipeline and the measured flow depths at sites L-10 and L-11 exceeded 75-percent of the pipelines capacity during dry weather conditions. After revieiwing the flow data and site photos, the following was observed:

- Sites L-05 and L-06 are directly upstream of a lift station. Analysis of the flow data indicates a backwater effect caused by the lift station. As shown on Figure 4.4, the flow depth during dry weather conditions cause the pipleline to surcharge. For Site L-05, the pipeline surcharged 21-inches above the crown. Site L-06 surcharged 3-inches above the crown, indicating the pump stations have operational or capacity constraints.
- Sites L-10, L-11, and L-12 are upstream of a pipeline that was identified as partially clogged during the flow monitoring program. However, flow level characteristics at Site L-12 appears to have additional issues beyond those experienced by the other two sites.
- Site L-12 had a peak measured flow of 20.4 inches and exceeded 75-percent capacity on a daily basis under dry weather conditions. The pipeline downstream of this monitoring site should be inspected for large obstructions.

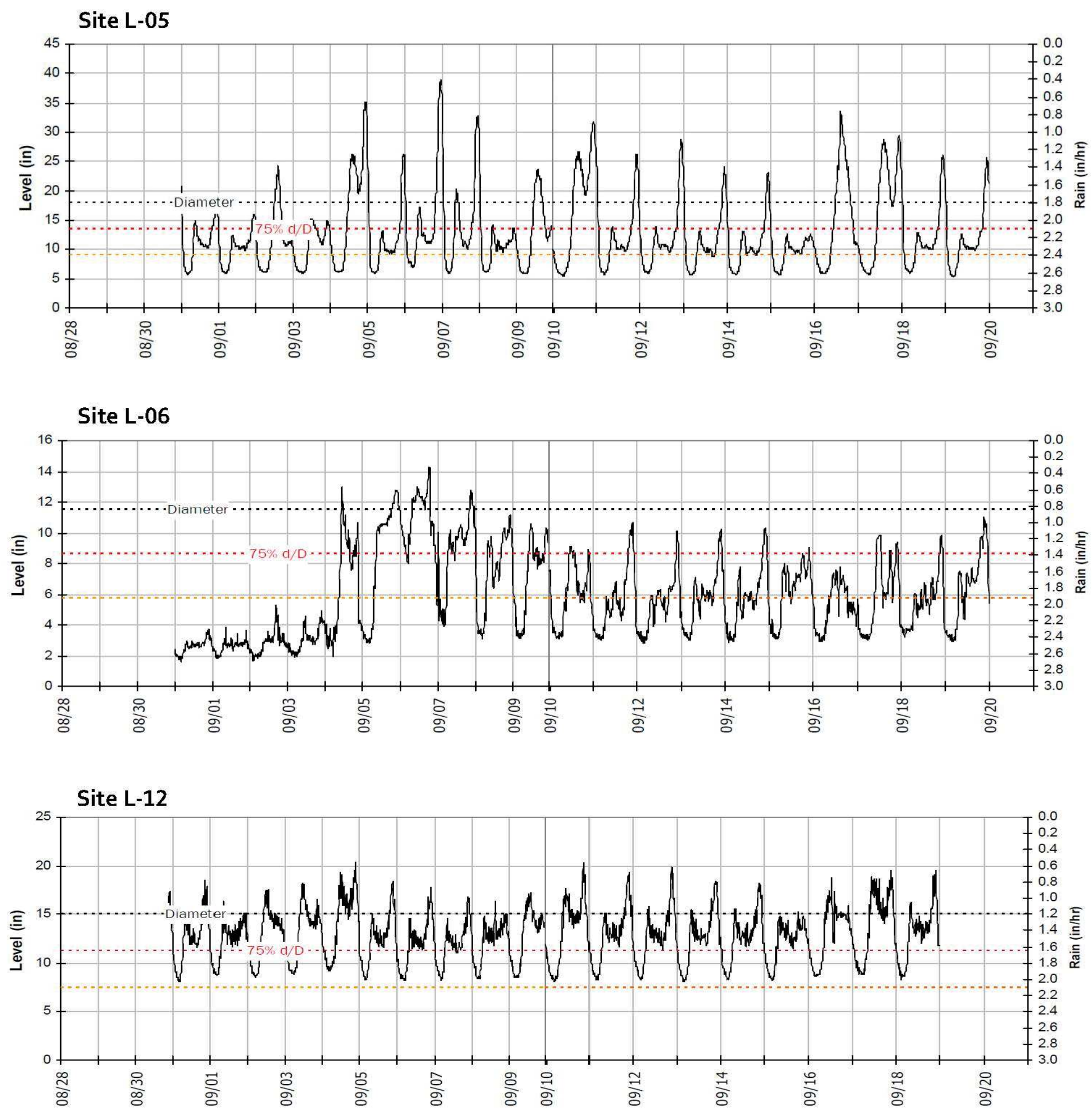

Figure 4.4 Real Time Flow Levels for metering sites L-05, L-06, and L12 (V & A Report)

4.2 Design Flows

This section summarizes the existing and projected flows for the City's wastewater collection system. Flow parameters used to evaluate capacities of treatment processes are also discussed.

4.2.1 Historical Wastewater Flows

The City provided historical daily influent flow data at the wastewater treatment facility (WWTF) from 2006 through 2016. In addition, the City provided historical flow data from the City's three significant industrial users (SIUs) – Leprino, Olam, and Agusa. Table 4.4 summarizes the City's historical average annual flow from 2006 to 2016. Figure 4.5 shows graphically the information presented in Table 4.4. As shown on Figure 4.5, the City's domestic wastewater flows have been somewhat variable with a slight decrease over time, whereas the City's industrial flows have shown a sharper decrease from 2006 to 2016.

Table 4.4 Historical Wastewater Flows

Year	Population	Domestic AAF (mgd)	Industrial AAF (mgd)	Total AAF (mgd)	Domestic Per Capita Generation (gpcd)
2006	22,607	1.58	0.54	2.12	70
2007	23,331	1.75	0.26	2.01	75
2008	23,589	1.75	0.24	1.99	74
2009	24,531	1.65	0.34	1.99	67
2010	24,531	1.80	0.16	1.95	73
2011	24,493	1.79	0.17	1.95	73
2012	24,711	1.67	0.20	1.88	68
2013	25,163	1.49	0.38	1.87	59
2014	25,418	1.62	0.18	1.80	64
2015	25,585	1.64	0.10	1.74	64
2016	26,093	1.64	0.11	1.74	63
Ten Year (2007-2016) Average	--	1.68	0.21	1.89	68
Five Year (2010 - 2014) Average	--	1.67	0.22	1.89	67
Five Year (2010-2014) Maximum		1.80	0.38	1.95	73
2015/2016 Average	--	1.64	0.10	1.74	63

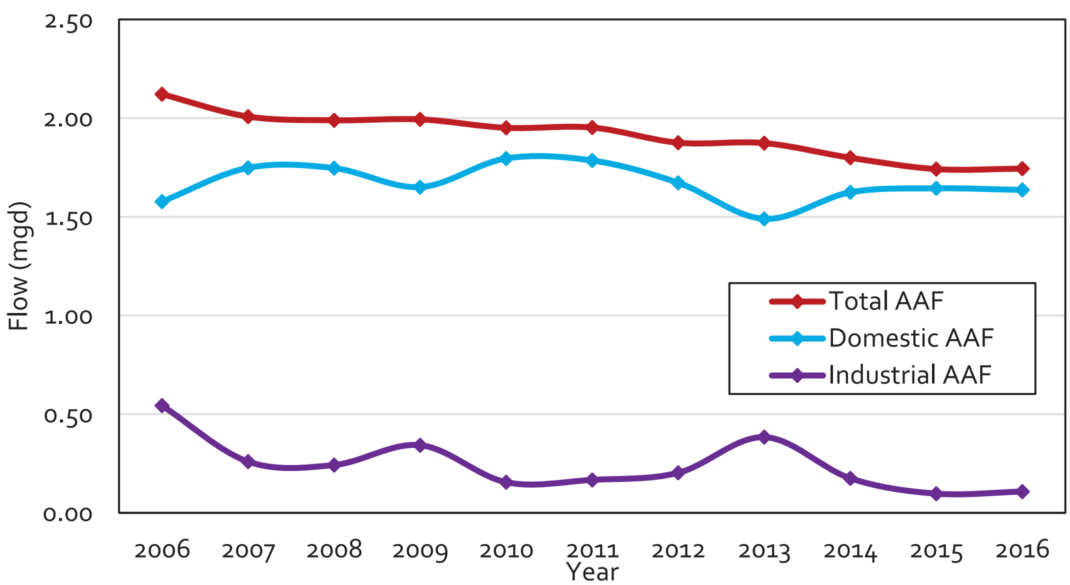

Figure 4.5 Historical Wastewater Flows

4.2.2 Per Capita Wastewater Generation

Table 4.4 summarizes the historical domestic per capita wastewater generation. As shown on Figure 4.6 the City's per capita wastewater flow has ranged from a high of 75 gallons per capita per day (gpcd) in 2007 to 59 gpcd in 2013. The reduction in per capita flow can be attributed to increased conservation by the City customers, as well as additional conservation associated with recent drought conditions.

For planning purposes, we assumed a per capita flow of 70 gpcd for future flow projections. This value was chosen because the 2013 through 2016 per capita flows may be artificially low due to state mandated water conservation, and the City may see a rebound in the per capita wastewater flow as drought conditions continue to ease. Figure 4.7 shows the projected and historical domestic wastewater flows through the year 2040.

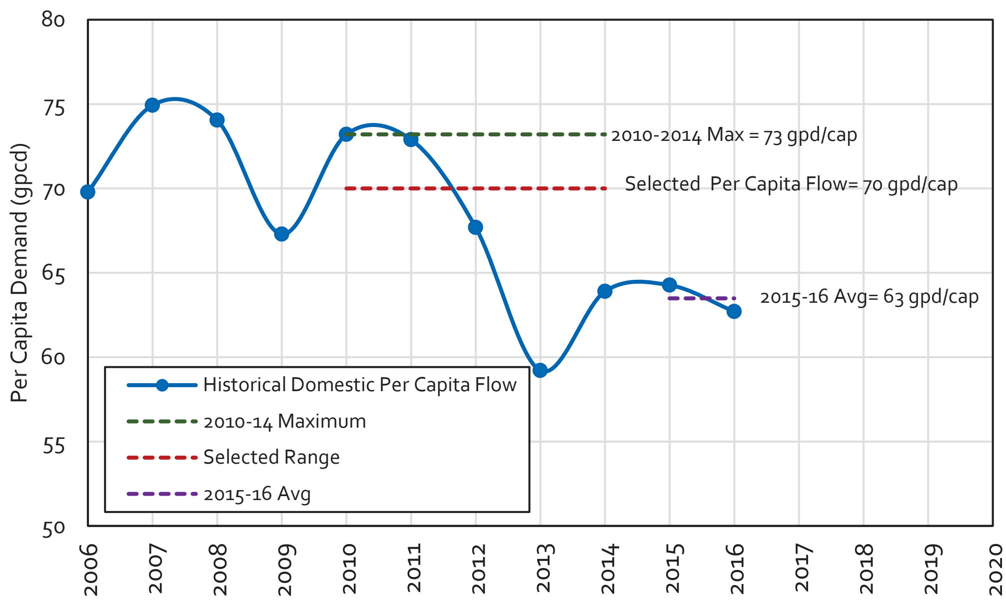

Figure 4.6 Historical Per Capita Wastewater Flow

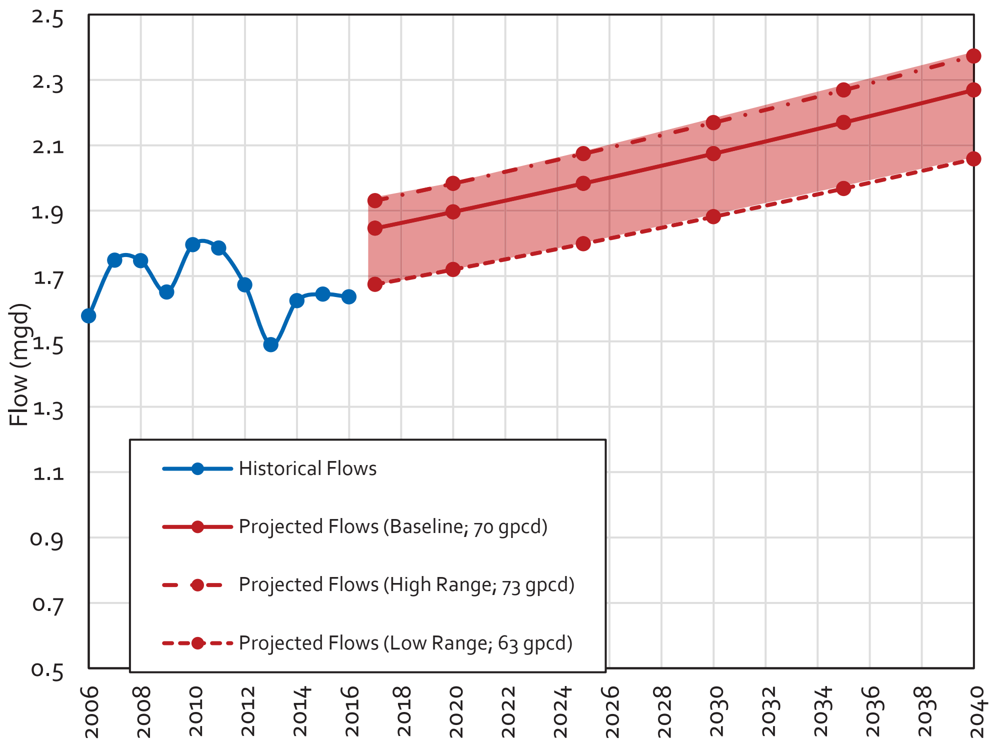

Figure 4.7 Projected and Historical Domestic Average Annual Flows

4.2.3 Significant Industrial Users

Three large industrial wastewater dischargers were identified within the City. Historical average annual influent flow data was provided for Leprino Foods Company (Leprino), Olam SVI (Olam), and Agusa. Combined, these three facilities averaged flows of 0.1 mgd. Two of the industrial users, Olam and Agusa, discharge directly into the City's collection system, with flows treated at the City's WWTF. Leprino has their own WWTF to treat the majority of their industrial flows. However, a smaller sidestream from their industrial process, referred to as cow water, which is the condensate from milk processing, is piped directly to the City's ponds. Table 4.5 shows the average day wastewater generation sent to the WWTF for significant users. Due to operational changes at the industrial facilities and discussions with the City, the last two years of data were used to determine average industrial flows.

Table 4.5 Wastewater Generation from Significant Industrial Users

Flow Type	Leprino (mgd)	Olam (mgd)	Agusa (mgd)	Total (mgd)
Baseline	0.043	0.014	0.045	0.103
2025	0.045	0.015	0.045	0.105
2040	0.050	0.016	0.045	0.111
Assumed Annual Growth	0.6%	0.6%	0.0%	--

Notes:
(1) Baseline flows are averages for years 2015 and 2016.

4.2.4 Naval Air Station Lemoore

A few miles west of the City, just north of Highway 198 is the Naval Air Station of Lemoore (NASL). Their facilities include an industrial and domestic treatment plant. The industrial treatment plant treats all industrial wastewater generated on site, primarily consisting of aircraft washdown, to secondary effluent quality and discharges it to their domestic treatment plant. All wastewater generated at NASL passes through a pond-based domestic treatment facility and is discharged to percolation/evaporation ponds.

NASL has expressed interest in retiring their domestic treatment facility and diverting their wastewater flows to the City. The NASL industrial treatment facility would still be operational as is required by their Waste Discharge Requirements permit (2002-0062). Figure 4.8 shows the NASL domestic WWTF average daily flows. There has not been an indication from the City that they plan on accepting NASL flows in the near future. Therefore, flows attributed to the NASL will not be included in modeling future treatment sizing included in this report.

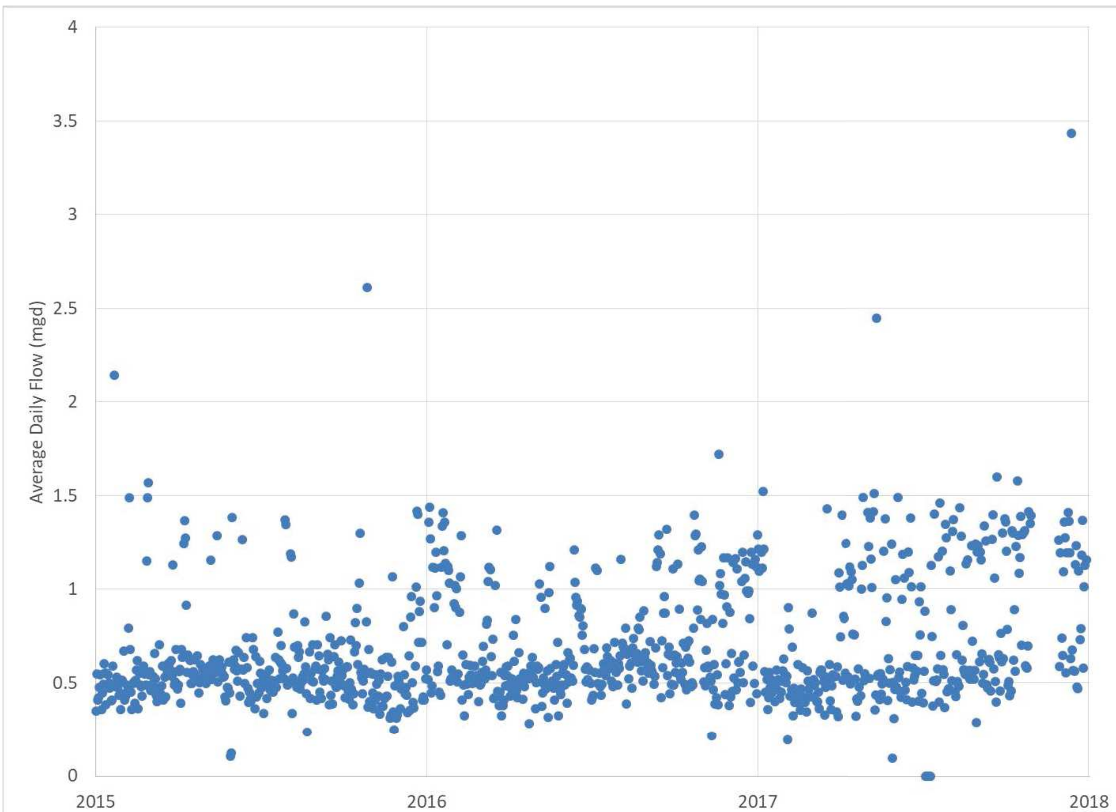

Figure 4.8 Naval Air Station Lemoore Domestic Average Daily Effluent Flows (mgd)

4.2.5 Wastewater Unit Flow Factors

To estimate the amount of flow per acre generated by each land use category, wastewater flow factors (WWFF) were developed and are a correlation between land use and sewer generation. These flow factors are based on the average wastewater flow generated for each land use type and were developed to project the ADWF for buildout of the City's General Plan.

WWFF provide a method to estimate the average quantity of flow per acre for each type of land use. The flow factors are expressed in gallons per day per acre (gpd/ac). The flow factors were developed using the following procedure:

- Average flows for each flow metering tributary area were derived from the flow monitoring data.
- Using GIS information, the acres for each existing land use type contained in each flow monitoring tributary area were calculated. Land use identified as vacant or on septic were excluded from existing estimates and added under future scenarios.
- Preliminary WWFF for each land use type were estimated based on the similar nearby cities.
- The WWFF for each flow metering tributary were then balanced (adjusted up or down) to match the calculated average flows from each tributary to the measured flows during the flow monitoring period.
- Once the WWFF for each flowmeter tributary area were balanced, the weighted average of the coefficients for each existing land use type was calculated based on the acreage contribution from each metering tributary area.
- The weighted average WWFF were then adjusted for the entire developed sewer service area until they matched the baseline DWF. The adjusted WWF are considered representative of the wastewater generation by land use for the entire City and are used to project Buildout average wastewater flows.

The calibrated WWFF developed for this WWMP are summarized in Table 4.6. Over the years, these factors can vary due to drought conditions, promotion of efficient plumbing fixtures, ongoing water restrictions, and water rate increases.

Table 4.6 Wastewater Flow Factors by Land Use Category

Land Use Category	City Limits (acres)			Wastewater Factors	
	Developed	Under-developed	Total	Factors gpd/acre	Existing Flow gpd
Residential					
Very Low Density	39	0	59	450	18,000
Low Density Single Family	1,278	15	1,574	750	964,000
Low Medium Density	167	0	265	950	159,000
Medium Density	102	0	142	1,470	151,000
High Density	43	0	43	2,210	95,000
Commercial/Industrial					
Mixed-Use	55	6	157	1,100	64,000
Professional Office	11	15	28	760	14,000
Neighborhood Commercial	57	6	81	760	46,000
Regional Commercial	17	10	152	760	17,000
Light Industrial(1)	132	23	728	850	122,000
Heavy Industrial	22	0	27	2,000	44,000
Employment Reserve				1,000	
Significant Industrial User(2)	144	22	200	--	103,000
Other					
Community Facilities	370	15	486	400	151,000
Parks/Recreation	264	0	337	0	0
Greenway/Detention Basin	10	22	93	0	0
Wetlands	0	173	0	0	0
Agriculture	0	0	0	0	0
Agriculture/Rural Residential	0	0	0	0	0
Conservation	0	0	382	0	0
Total	**2,711**	**134**	**4,754**		**1,948,000**

As with most cities in California, residential land use accounts for a majority of development and wastewater flow. For the City, residential customers account for 71 percent of current flow, commercial and industrial users account for 21 percent, and public facilities account for 8 percent of flows.

4.2.5.1 Existing Average Dry Weather Flow

To estimate existing ADWF, a combination of historical flow data from the WWTF and the temporary monitoring program were used. During the flow monitoring program dry weather flows averaged 1.79 mgd (Table 4.2). This flow rate is consistent with increased conservation.

Therefore, baseline flows were increased to match with the per capita rate of 70 gpcd. As shown in Table 4.2 baseline flows are estimated at 1.95 mgd.

4.2.5.2 Future Average Dry Weather flow

Based on review of available data, it was determined that the most accurate forecasting methodology for sewer flow included a combination of population and land use flow factors. Future development wastewater flow projections were based on Specific Plans, land use, per capita rates, and WWFF. These flows were then added to the appropriate planning year, based on input from the City.

For Long Term (2040) flows, a combination of projected population, and the baseline wastewater per capita flow rate were utilized to estimate infill. Known residential development flow projections were based on the per capita flow rate, residential units, and household occupancy. Known development other than residential used WWFFs to project ADWF. As shown in Table 4.7, known development within the City is projected at 0.44 mgd for planning year 2040 and will remain consistent to buildout.

Buildout flows were projected by multiplying the WWFFs by the projected land use acreage. Existing wastewater flows for the City are provided in Table 4.6. Wastewater flows for known developments are presented in Table 4.7.

Table 4.7 Known Development Flow Projections

Tract/SPR	Development /Developer	Development Size		Planning Year ADWF
		Area (acre)	Residential Units	2040 (gpd)
Residential				
781(1)(2)	Silva Estates Patio Homes	4	30	7,000
793(1)(2)	Silva Estates	18	42	9,000
797(1)(2)	Park View Estates	18	90	19,000
816(1)(2)	Holly Oaks	18	28	6,000
820(1)(2)	Fairway Courtyard	3	39	9,000
827(1)(2)	Park Meadows	6	20	5,000
839(1)(2)	G.J Gardner	9	37	8,000
845(1)(2)	Victory Village	14	51	11,000
908(1)(2)	Capistrano V	0.3	20	5,000
920(1)(2)	Lennar Homes	40	172	36,000
921(1)(2)	Woodside Homes	20	64	14,000
2018-04(1)(2)	Cinnamon Villas	2	28	6,000
2017-08(1)(2)	Granville Homes	9	141	30,000
2009-01(1)(2)	Village at Acacia	7	81	17,000
2006-20(1)(2)	Oleander Terrace	5	66	14,000
-	Lennar West(4)	32	-	35,000
-	Rugman(4)	10.9	-	12,000
-	Lacy Ranch	155	220	46,000

Table 4.7 Known Development Flow Projections (cont.)

Tract/SPR	Development /Developer	Development Size		Planning Year ADWF
		Area (acre)	Residential Units	2040 (gpd)
-	17th Avenue	50	-	37,500
-	Lemoore Mobile Home Park	10	70	15,000
Subtotal		**435**	**1,199**	**342,000**
Community Facility				
2017-09[3]	Last Days Ministries	2	-	800
Industrial/ Commercial				
-	Dollar General	2	-	1,600
2017-06[3]	Virgil Beard	3.8	-	3,300
2015-03[3]	Fast and Friendly Market	1	-	800
2016-01[3]	PG&E	12	-	10,200
2018-08	Kashian Industrial	80	-	68,000
	Rodriguez	0.6	-	500
	Immediate Care Facility	9	-	6,900
	Rugman	4.6	-	3,500
Subtotal		**115**	**-**	**96,000**
Total		**550**	**1,199**	**438,000**

Notes:
(1) Persons per household: 2012 – 2016 = 2.97. Source: US Census Quick Facts.
(2) Per Capita Rate of 70 gpcd. Flows rounded to nearest thousand.
(3) Wastewater Flow Factors used to determine flow rate.
(4) Number of Housing units for development is unknown.

4.2.6 Existing and Projected Maximum Month and Peak Hourly Flow

Peak hour flow (PHF) typically occurs during extreme wet weather conditions. Since wet weather data was not available, a peaking factor of 2.5 was applied the ADWF. The product of the peaking factor and ADWF provided the PHF. The City's sewers and lift stations were evaluated based on their capacity to convey PHF. The wastewater treatment processes are evaluated based on the maximum month flow conditions because the processes need to be able to handle extended high loading conditions.

The max month peaking factor was determined based on historical data. Ten years of flow data was used to analyze the ratio of maximum 30 day-average flow to annual average. A peaking value of 1.1 was selected because it is in the upper range of calculated factors.

Table 4.8 presents a summary of existing and projected flows for ADWF, MMF, and PHF. As shown, the existing PHF is estimated at 4.88 mgd and is projected to increase to 13.5 mgd at buildout.

Table 4.8 Flow Projections and Wastewater Peaking Factors

Flow Condition	ADWF (mgd)	MMF (mgd)	MMF Peaking Factor	PHF (mgd)	PHF Peaking Factor
Existing	1.95	2.15	1.1	4.88	2.5
2040	2.38	2.61	1.1	5.95	2.5
Buildout	5.92	6.51	1.1	14.80	2.5

4.3 WWTF Design Loads

In the event that the City receives a new discharge permit, the City will be mandated to comply with stricter discharge requirements. A new permit would likely set discharge requirements for biochemical oxygen demand (BOD), total suspended solids (TSS), and possibly nitrogen (nitrate and total nitrogen). Since the plant is not required to monitor TSS or nitrogen, a sampling effort was performed to determine representative influent concentrations. Composite samplers were installed at a lift station in the collection system and the Old Headworks at the WWTF. Thirty-five samples were taken between January 2018 and May 2018 and analyzed for BOD, TSS, and Total Kjeldahl Nitrogen (TKN). Samples at the lift station included settled solids at the bottom of the lift station, artificially inflating the BOD and TSS results. Consequently, only the Old Headworks composite sample results were used to calculate loads. Roughly 40% of influent flows through the Old Headworks. We assumed concentrations in the rest of the collection system were the same as those seen at the Old Headworks. Figure 4.9 shows the results of the sampling efforts. The average BOD, TKN, and TSS values from this period were 260, 49, and 243 mg/L, respectively.

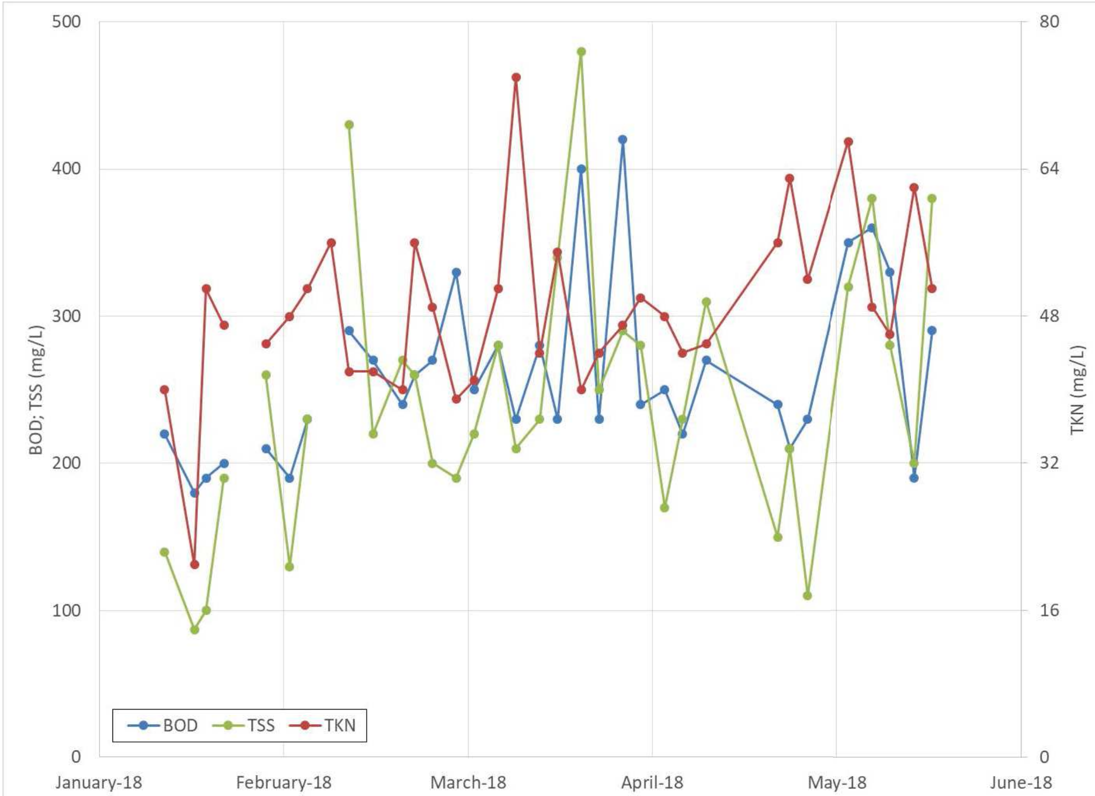

Figure 4.9 City Sampling Effort Influent Concentrations (mg/L)

These values, in conjunction with projected flows identified above, were used to determine future loading to the WWTF. The design load is based on future (2040) max month flow conditions. Table 4.9 lists the BOD, TSS, and TKN loadings calculated through the planning horizon. Design loads are used to size future treatment processes.

Table 4.9 Wastewater Flow and Load Projections Projections

Year	AAF (mgd)	MM (mgd)	BOD Loading (lb/day)	TSS Loading (lb/day)	TKN Loading (lb/day)
2017	1.95	2.13	4625	4327	866
2020	2.00	2.19	4748	4442	889
2025	2.09	2.29	4959	4639	929
2030	2.18	2.39	5179	4845	970
2035	2.28	2.49	5410	5061	1013
2040	2.38	2.61	5651	5287	1059

4.3.1 NASL Loads

A separate analysis was done to determine the load contribution from NASL. The NASL submits quarterly reports to the Regional Board for their domestic WWTF compliance that includes influent BOD and TSS. The results of 10 quarterly reports are summarized in Figure 4.10. The additional load from NASL has not been included in treatment alternative sizing. If the City decides to accept domestic wastewater from NASL, further analysis should be completed to understand the average and peak flows and loads.

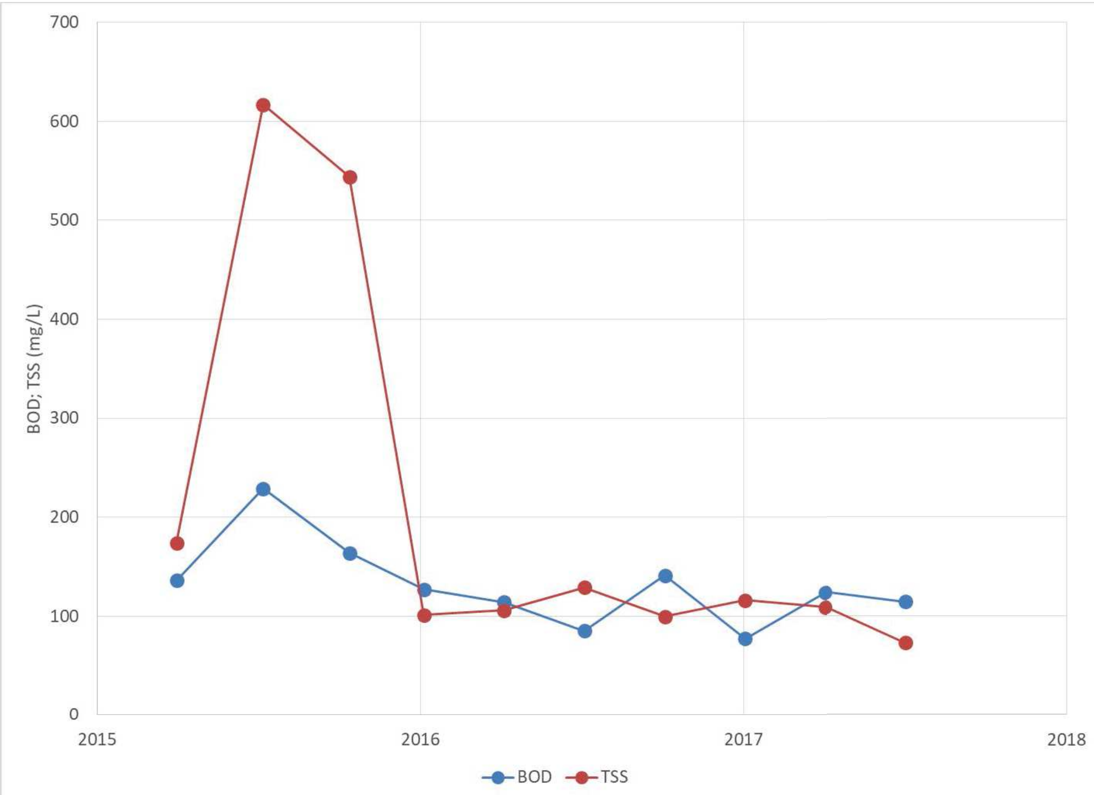

Figure 4.10 NASL Influent Wastewater Concentrations (mg/L)

Chapter 5

CURRENT AND FUTURE REGULATORY REQUIREMENTS

5.1 Introduction

This chapter summarizes currently known regulatory requirements that affect the operation of the City of Lemoore (City) Wastewater Treatment Facility (WWTF). This includes an overview of the regulations governing wastewater treatment, effluent reuse and disposal, biosolids handling, and air emissions. Potential impacts of future regulations are also considered. Consideration of current and future regulatory requirements is critical to the development of appropriate facility planning alternatives.

5.2 Governance

The state regulating agencies pertaining to wastewater treatment, discharge, and recycled water (RW) policies are introduced below. Their roles as they relate to specific regulations are discussed in the relevant sections.

5.2.1 State and Regional Water Boards

The mission of the State Water Resources Control Board (State Board) is "to preserve, enhance, and restore the quality of California's water resources and drinking water for the protection of the environment, public health, and all beneficial uses, and to ensure proper water resource allocation and efficient use, for the benefit of present and future generations." They do so by administering statewide water rights, water pollution control, and water quality functions. They are also the main regulatory agency governing water reuse in the State of California. The State Board establishes the general policies that govern the permitting of RW projects consistent with its role of protecting public health as it relates to water quality, and sustaining water supplies. The State Board exercises general oversight of RW projects including review of permitting practices.

The State Board oversees nine Regional Water Quality Control Boards (Regional Board). It is the responsibility of the State and Regional Boards to preserve and enhance the quality of the state's waters through the issuance of Waste Discharge Requirements (WDR) permits to treatment facilities that discharge to land (e.g., via percolation ponds or irrigation) and National Pollutant Discharge Elimination System (NPDES) permits for treatment facilities that discharge to surface waters of the U.S. The Regional Board is also responsible for issuing recycled water permits and approving biosolids applications for dischargers within the State of California.

5.2.2 Division of Drinking Water

Within the State Board is the Division of Drinking Water (DDW), formerly part of the California Department of Public Health (CDPH). The DDW is charged with protection of public health and drinking water supplies and with the development of uniform water recycling criteria appropriate to particular uses of water.

Although Regional Boards have permitting and ongoing oversight authority of RW projects, they rely on the expertise of the DDW for the guidance in the establishment of permit conditions needed to protect human health and surface and groundwater resources. Regional Board permits incorporate DDW requirements and recommendations.

This report details the criteria that DDW developed for nonpotable and potable reuse of recycled water.

5.3 State Laws and Policies for Wastewater Discharges

5.3.1 Porter-Cologne Act

Wastewater discharges are governed by both federal and state requirements. The primary laws regulating water quality are the Clean Water Act (CWA) and the California Water Code.

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) is California's comprehensive water quality control law. It is intended to protect water quality and beneficial uses of the state's water, and to maintain the highest water quality that is reasonable. The Porter-Cologne Act specifies that the State Board and each of the Regional Boards shall be the principal state agencies with primary responsibility for the coordination and control of water quality. It requires the adoption of water quality control plans by each Regional Board for watersheds within their regions.

The water quality control plans designate beneficial uses and water quality objectives for surface waters and groundwater basins. The objectives and standards in the water quality control plans are the foundation for the regulatory programs implemented by the state. The Water Quality Control Plan for the Tulare Lake Basin (Basin Plan) is applicable for the southern portion of the jurisdictional area of the Central Valley Regional Board. The boundaries of the Tulare Lake Basin include the City and surrounding area.

Chapter 7 of the Porter-Cologne Act addresses water reclamation, and includes the declaration that the people of the state have a primary interest in the development of facilities to recycle water to supplement existing surface and underground water supplies and to assist in meeting the future water requirements of the state. Requirements for water reclamation include compliance with adopted waste discharge requirements.

5.3.2 Antidegradation Policy

The Statement of Policy with Respect to Maintaining High Quality of Waters in California [Resolution 68- 16] (State Antidegradation Policy) was adopted in 1968 and requires that changes in surface water and groundwater quality not unreasonably affect beneficial uses. The State Antidegradation Policy defines “high quality” waters in California as waters where the quality meets, or is better than, water quality objectives. The State Antidegradation Policy allows lowering of water quality provided that conditions are met. Key statements in the State Antidegradation Policy include:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.
2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or purposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

The Federal Antidegradation Policy was adopted as a regulation by United States Environmental Protection Act (USEPA) in November 1983 (40 CFR § 131.12.). The federal policy requires protection of existing in-stream uses and maintenance of water quality necessary to protect existing uses. Where high quality waters constitute an outstanding national resource, that water quality shall be maintained and protected. As this policy applies only to discharges to surface waters, it is not pertinent to the proposed recycled water projects.

5.3.3 Recycled Water Policy

In 2009, the State Board adopted Resolution 2009-0011, a Recycled Water Policy (RW Policy). The RW Policy includes a mandate that the State increase the use of recycled water over 2002 levels by at least 200,000 acre feet per year (AFY) by 2020, and by an additional 300,000 AFY by 2030. The RW Policy also includes goals for stormwater reuse, conservation and potable water offsets by recycled water. The RW Policy states that the policy is intended to promote use of recycled water as a component of sustainable local water supplies and to encourage the beneficial use, rather than disposal, of recycled water.

The RW Policy was updated in 2013 to specify monitoring requirements for constituents of emerging concern (CECs) in recycled water, based on the recommendations of a science advisory panel. The panel meets every five years to update the recommendations on CEC monitoring. In April 2018, the reconvened science advisory panel published its recommendations. The RW Policy was amended in December 2018 to include the recommendations as well as to improve language and to clarify language regarding goals for reuse.

5.3.4 Drought State of Emergency Legislation

In January 2014, California's Governor proclaimed a "Drought State of Emergency" and directed state officials to take all necessary actions to prepare for drought conditions. In April 2014, the Governor proclaimed a continued state of emergency due to severe drought conditions and directed the State Board to adopt statewide general waste discharge requirements to facilitate the use of treated wastewater to reduce demand on potable water supplies.

The California Legislature has declared that a substantial portion of the future water requirements of the State may be economically met by beneficial use of recycled water.

In June 2016, the State Board adopted General Waste Discharge Requirements for Recycled Water Use, Order No. WQ 2016-0068-DDW (General Order). The General Order states that:

"When used in compliance with this Policy, Title 22 and all applicable state and federal water quality laws, the State Water Board finds that recycled water is safe for approved uses, and strongly supports recycled water as a safe alternative to potable water for such approved uses."

5.4 Tulare Lake Basin Plan Regulatory Considerations

The "Water Quality Control Plan for the Tulare Lake Basin, Third Edition (revised May 2018) (Basin Plan) designates beneficial uses, establishes water quality objectives, contains implementation plans and policies for protecting all waters of the Basin, and incorporated by reference plans and policies of the State Water Board mentioned above.

The Basin Plan lists the beneficial uses of the groundwater near the City's WWTF are municipal and domestic supply (MUN), industrial supply (IND), and agricultural supply (AGR).

The Basin Plan identifies the greatest long-term problem facing the entire Tulare Lake Basin as the increase in salinity in groundwater, which has accelerated due to the intensive use of soil and water resources by irrigated agriculture. The Basin Plan recognizes that degradation is unavoidable until there is a long-term solution to the salt imbalance. Until then, the Basin Plan establishes several salt management requirements, including:

1. The maximum electrical conductivity (EC) in the effluent discharged to land shall not exceed the EC of the source water supply plus 500 µmhos/cm. When the supply water is from more than one source, the EC shall be calculated as the weighted average of all sources.
2. Discharges to areas that may recharge to good quality groundwater shall not exceed an EC of 1,000 µmhos/cm, a chloride concentration of 175 mg/L, or a boron concentration of 1.0 mg/L.

5.4.1 Proposed Basin Plan Amendment

The Regional Board adopted Basin Plan amendments that incorporate new programs for addressing ongoing salt and nitrate accumulation in the Central Valley at its May 31, 2018 Board Meeting. These programs, once they become effective in 2019, could change how the Regional Board permits discharges of salt and nitrate.

The stakeholder-led Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) initiative has been coordinating efforts to implement new salt and nitrate management strategies for dischargers.

The Regional Board anticipates that the CV-SALTS initiative will result in regulatory changes that will be implemented through conditional prohibitions and modifications to many WDRs region-wide, including the WDRs that regulate discharges from the City of Lemoore and Leprino to Stone Ranch. The Regional Board expects dischargers that may be affected by new salt and nitrate management policies to coordinate with the CV-SALTS initiative. The Nitrate Control Program is prioritized to first address health risks associated with drinking water that exceeds the primary maximum contaminant level (MCL) for nitrate (10 mg/L as N). Priority Groundwater Basins/Sub-basins have been identified based on ambient groundwater nitrate conditions, and timelines have been established for implementation of the Nitrate Control Program in these prioritized basins and sub-basins.

Basins/sub-basins identified as Priority 1 and 2 have the most serious ambient water quality concerns for nitrate and the most aggressive timelines for compliance. Lemoore is located in

Priority Zone 2. The City can expect to receive a notice from the Regional Board to comply within 2 to 4 years after the effective date of the program. Lemoore should start planning now for the anticipated Nitrate Control Program and researching the permitting options for compliance.

Dischargers that are unable to comply with stringent nitrate requirements will be required to take on alternate compliance approaches that involve providing replacement drinking water to persons whose drinking water is affected by nitrate. Dischargers could comply with the new nitrate program either individually, under traditional permitting methods, or collectively with other dischargers under a new management zone permitting option.

The Salinity Control Program is a long term plan for salt management that will be implemented in three phases, each over 10 to 15 years. The program involves an interim permitting approach for dischargers with actions that may include:

- Continued implementation of existing pollution prevention, watershed, and salt reduction plans.
- Continued maintenance of current salinity discharge levels.
- Enforced compliance with Interim Permit Limits.
- Implementation of new salinity management practices or source control activities.
- Monitoring of salinity discharge activities where required.
- Participation in Phase 1 (Prioritization and Optimum Study), which will facilitate development of a long-term strategy for addressing salinity accumulation in the Central Valley.

All permitted dischargers will need to comply with the program, by selecting one of two pathways to compliance in Phase 1. These are:

- Conservative Salinity Permitting Approach, utilizes the existing regulatory structure and focuses on source control, conservative salinity limits, limited use of groundwater assimilative capacity and/or compliance time schedules.
- Alternative Salinity Permitting Approach, is an alternative approach to compliance through implementation of specific requirements, rather than application of conservative limits. Under Phase I, permittees must support facilitation and completion of the P&O Study through financial contributions and stakeholder activities.

Dischargers can expect to receive a Notice to Comply (NTC) from the Regional Board within one year of the effective date of the Basin Plan Amendments. Within 6 months of receiving the NTC, permittees must notify the Regional Board of their decision to be permitted under the Conservative Approach or the Alternative Approach. Lemoore should start planning now for the anticipated Salt Control Program and researching the permitting options for compliance.

5.5 Lemoore's Waste Discharge Requirements

The Central Valley Regional Board has jurisdiction over the City's WWTF. The purpose of the WDR is to prescribe requirements for treatment, and set discharge limitations for flow and pollutant limits for the approved point of discharge. The WDR also outlines the specific monitoring and reporting programs for the WWTF. The pollutant limits are designed to protect public health and the present and future beneficial uses of receiving waters.

5.5.1 Current WDR

The City's WDR permits land disposal via effluent discharge to the irrigation canal feeding Westlake Farms. Table 5.1 lists the effluent and receiving water limitations. The WDR requires that "the discharge, in combination with other sources, shall not cause underlying ground water to contain waste constituents in concentrations statistically greater than background water quality, excepting EC (Section E)".

Table 5.1 1996 Waste Discharge Requirements

Constituent	Units	Monthly Average	Maximum
Flow	mgd	2.5	--
BOD_5(1)	mg/L	40	80
Settleable Solids	mL/L	0.2	0.5
Coliform	MPN(2)/100mL	23(3)	500
pH(4)	--	--	6.0 – 9.0
Electrical Conductivity	umhos/cm	--	Source water + 500
Pond Dissolved Oxygen	mg/L	--	>1.0(5)
Receiving Water Dissolved Oxygen	mg/L	--	>5.0(6)

Notes:
(1) Biochemical Oxygen Demand, 5-day, 20 C
(2) Most Probable Number
(3) Monthly median
(4) pH shall be within this range at all times
(5) DO shall be above this limit in the upper one foot of wastewater ponds
(6) Measured at Westlake Canal.

The WDR originally established discharge requirements for the City's effluent. At that time, Leprino Foods discharged process wastewater from their cheese processing facility (Leprino East) to the WWTF for treatment. In 2001, in anticipation of construction of a second cheese plant (Leprino West) and a pretreatment facility at Leprino West, Leprino and the City submitted a Report of Waste Discharge (ROWD) to the Regional Board. Under the City's WDR, the Regional Board allowed Leprino to pretreat their industrial wastewater then combine it with the City's WWTF effluent before disinfection and discharge into the Westlake canals.

The current treatment and discharge program is covered under WDR Order NO. 96-050, adopted February 23, 1996, and Monitoring and Reporting Program (MRP) Order No. R5-2003-0807. Appendix B and C include the WDR and MRP. A discussion regarding compliance with their WDR occurs in a later chapter.

5.5.2 New WDR for Discharge to Stone Ranch

In 2017, Westlake, which has historically been the discharge location for the combined effluent, indicated that it would no longer accept the effluent due to elevated levels of salinity in the discharge. The Central Valley Regional Board issued a Time Schedule Order in March 2018 (TSO R5-2018-0900), included in Appendix D, that describes an interim discharge alternative and details tasks and deadlines by which the combined effluent must come into compliance with the 1996 WDR. Alternatively, the City may submit an ROWD with supporting technical information to discharge to an alternate location and address compliance with the effluent limits.

Leprino has purchased roughly 2,200 acres East of Naval Air Station, Lemoore (NASL), referred to as Stone Ranch, as a discharge location for the combined effluent. The City and Leprino have submitted a joint ROWD to the State. The City and Leprino would construct a new pipeline from the existing discharge location at Westlake Farms to Stone Ranch and send combined effluent to irrigate fodder crops such as alfalfa.

The Regional Board has issued a tentative order that defines discharge requirements for Stone Ranch. It is scheduled for adoption in February 2019. Due to the poor underlying groundwater quality, the Regional Board set a new combined effluent fixed dissolved solids (FDS) annual average limit of 1,400 mg/L. The FDS:TDS ratio is 0.77. Leprino's historical average FDS is 1,330 mg/L and the combined FDS is around 1,100 mg/L. Therefore, the new WDR puts the existing wastewater treatment processes for the City and Leprino into compliance. Appendix E and F include the 2018 tentative WDR and MRP. The WDR and MRP may change slightly as a result of public comments. Table 5.2 shows the new discharge limits for the combined effluent.

Table 5.2 2019 Waste Discharge Requirements

Constituent	Units	Annual Average	7-day Median	Monthly Average	Maximum
Flow	mgd	--	--	5.0	--
BOD_5(1)	mg/L	--	--	40	80
TSS(2)	mg/L	--	--	40	80
FDS(3)	mg/L	1,400	--	--	--
Coliform	MPN(4)/100mL	--	23	240(5)	--

Notes:
(1) Biochemical Oxygen Demand, 5-day, 20 C
(2) Total Suspended Solids
(3) Fixed Dissolved Solids
(4) Most Probable Number
(5) Not to exceed more than once in any 30-day period.

5.6 Overview of Recycled Water Regulations

The City would like to consider reusing effluent for urban irrigation when recycled water demand exists and seasonal land discharge (i.e., percolation ponds, groundwater recharge) when recycled water demand does not exist. Alternatives considered would need to incorporate the current and future (anticipated) requirements.

Recycled water can be utilized for various purposes, most commonly for irrigation or potable supplies. Effluent reuse for irrigation can either be agricultural or urban (landscape). Potable reuse is distinguished as indirect potable reuse (IPR) and direct potable reuse (DPR). Further discussion of these differences and the regulations that govern are outlined below.

5.6.1 Title 22 of the California Code of Regulations

The primary regulation governing recycled water use is published in Title 22, Division 4, Chapter 3 of the California Administrative Code (Title 22). Title 22 regulations define four categories of recycled water determined by the treatment level and effluent turbidity and disinfection levels, which are summarized in Table 5.3. The categories depend on the level of treatment and potential for public contact.

Table 5.3 Approved Uses of Recycled Water

Treatment Level	Approved Uses	Total Coliform Standard (median)
Disinfected Tertiary Recycled Water	Spray Irrigation of Food Crops Landscape Irrigation[1] Non-restricted Recreational Impoundment	2.2 MPH/100 mL
Disinfected Secondary – 2.2 Recycled Water	Surface Irrigation of Food Crops Restricted Recreational Impoundment	2.2 MPN/100 mL
Disinfected Secondary – 23 Recycled Water	Pasture for Milking Animals Landscape Irrigation[2] Landscape Impoundment	23 MPN/100 mL
Undisinfected Secondary Recycled Water	Surface Irrigation of Orchards and Vineyards[3] Fodder, Fiber, Seed Crops	N/A

Notes:
(1) Includes unrestricted access golf courses, parks, playgrounds, school yards, and other landscaped areas with similar access.
(2) Includes restricted access golf courses, cemeteries, freeway landscapes, and landscapes with similar public access.
(3) No fruit is harvested that has come in contact with irrigating water or the ground.

Currently, Lemoore's effluent meets the category of disinfected secondary 23 recycled water, and the effluent can be used for restricted irrigation on feed and fodder crops. In order for the City to use their effluent for unrestricted agricultural spray irrigation of food crops or landscape irrigation, the City's WWTF would need to be upgraded to meet the requirements for tertiary disinfected recycled water, which is the highest level of treatment defined by the State and allows for unrestricted reuse in virtually all recycled water applications. Domestic wastewater requires biological (secondary) treatment, filtration, and disinfection to Title 22 effluent limits before it can be considered tertiary recycled water.

In Title 22 tertiary disinfected recycled water, filtration through granular media must produce a daily average turbidity not exceeding 2 nephelometric turbidity units (NTU), a 95th percentile turbidity not exceeding 5 NTU, and a turbidity never exceeding 10 NTU. Colloidal and finely divided suspended matter must be "destabilized and agglomerated upstream from a filter by the addition of suitable floc forming chemical." The filtration rate cannot exceed 5 gallons per minute per square foot (gpm/sq ft). Floc-forming chemicals must be added continuously, or automatically when the influent turbidity is greater than 5 NTU. Membrane filtration facilities must produce a 95th percentile turbidity of 0.2 NTU and never exceed 0.5 NTU.

Chlorine disinfection facilities must provide a CT value (the product of chlorine residual and modal contact time) of 450 milligram-minutes per liter (mg-min/L) with a modal contact time of at least 90 minutes based on peak dry weather flow. Alternative disinfection systems such as ultraviolet (UV) disinfection must be approved by the State as providing a 5-log virus removal efficiency in combination with the filtration process. In addition, the median concentration of total coliform bacteria in the disinfected tertiary effluent cannot exceed 2.2 most probable number (MPN) per 100 milliliters, and no single sample can exceed 23 MPN per 100 milliliters.

5.6.2 Recycled Water General Order

The State Board adopted a General Order (WQ 2016-0068-DDW) on June 7, 2016 to streamline permitting for recycled water. Coverage under this General Order is limited to treated municipal wastewater for non-potable uses. It does not apply to the use of recycled water for groundwater recharge or the disposal of treated wastewater by means of percolation ponds. The General Order establishes standard conditions for the use of recycled water, relieving producers, distributors, and users of recycled water from the sometimes lengthy permit approval process and providing them with certainty around the requirements that they will be expected to meet.

If the City were to develop a new wastewater treatment facility to include production of recycled water, a new recycled water permit would be required. This would be accomplished through the General Order permitting process, conducted in conjunction with the separate permitting process for the new treatment facilities.

5.6.3 Indirect Potable Reuse: Groundwater Replenishment

One way of recycling effluent is through indirect potable reuse (IPR). IPR can be accomplished through surface spreading in basins or subsurface injection, both of which are regulated under CCR Title 22, Division 4, Chapter 3, Articles 5.1 and 5.2, respectively.

Subsurface injection is the addition of water to the groundwater other than through surface application. It typically involves direct connection to the water table and injection via a well. Surface application is typically achieved through groundwater recharge basins.

The level of treatment required for IPR is advanced treatment added to a tertiary, denitrified recycled water. Some of the requirements to achieve IPR are detailed below.

5.6.3.1 Total Organic Carbon Control

For IPR of RW to a drinking water aquifer, DDW requires that the RW have low-level total organic carbon (TOC). For projects that utilize microfiltration (MF) or ultrafiltration (UF), reverse osmosis (RO), and ultraviolet light/advanced oxidation processes (UV/AOP), 100 percent injection (no dilution) may be permitted as long as the TOC is maintained at or below 0.5 milligrams per liter (mg/L). Such a low TOC is readily accomplished with functioning RO membranes.

5.6.3.2 Pathogenic Microorganism Control

DDW requires that potable reuse projects for groundwater recharge provide a combined level of treatment resulting in 12-log virus reduction, 10-log Giardia reduction, and 10-log Cryptosporidium reduction from raw wastewater (12/10/10-log removal). No single process can receive more than 6-log reduction credit. DDW also states that at least three processes must provide at least 1-log reduction. Beyond those three key processes, processes which provide <1 log reduction can be included within the analysis. The treatment process for subsurface application is required to include RO, UV/AOP, at least three separate barriers earning 1-log of removal credit each, and a minimum of two months of subsurface travel time, from the time of injection to the time of extraction for use.

When properly coupled, these individual treatment processes are protective of public health for IPR projects. Because current analytical techniques are unable to detect pathogens at the extremely low level that is indicative of public health protection (as determined in NWRI [2013]), conservative estimations of pathogen log removal performance through various process trains must be used. Addition of the log removal credits for each process train allows for a confident prediction of final effluent quality that is protective of public health.

Per DDW (2014), utilities employing groundwater injection are granted 1-log virus removal credit per month of subsurface travel time, but are currently not granted credit for Giardia or Cryptosporidium removal. Recent work by the WateReuse Research Foundation, however, has documented the subsurface die-off rate of Cryptosporidium at 0.025 to 0.072-log reduction per day, with a mean of 0.039-log reduction per day (Drewes et al., 2014). Peng et al. (2008) reported 85 to 268 days of time for a 1-log die-off of Cryptosporidium in sterile water at 4 ºC elsuis (ºC). As a result of these referenced works, virus credit and protozoa log reduction credits can be applied to meet log reduction requirements. In order to evaluate the subsurface travel time and calculate subsurface pathogen removal credits, a hydrogeological analysis must be performed.

5.6.3.3 5.6.3.3 Regulated and Unregulated Contaminants

The DDW regulations include limits for chemical constituents, e.g., MCLs, NLs, and other constituents specified by DDW, and monitoring/removal requirements for constituents of emerging concern (CECs). These chemical constituents, including disinfection byproducts (DBPs), industrial chemicals, pesticides, metals, and other classes known to be detrimental to human health above certain concentrations, are regulated in drinking water by the U.S. Environmental Protection Agency (EPA) under the Safe Drinking Water Act (SDWA) through MCLs. Any wastewater effluent that is proposed for water supply augmentation should, therefore, meet all of these standards. A number of research studies have found that secondary or tertiary effluents meet most, if not all, MCLs without further treatment (Trussell et al., 2013). The fact that MCLs are met does not mean that additional treatment is not warranted for chemical constituents, such as that provided by advanced treatment trains. The National Research Council (NRC) (2012) demonstrated that from a risk standpoint, engineered potable water reuse projects create a better water quality and less risk (for pathogens and pollutants) compared to conventional drinking water supplies.

In addition to the chemical (and radiological) constituents explicitly regulated through MCLs, a number of unregulated trace organic constituents (TOrCs) can also be found in wastewater, including pharmaceuticals, ingredients in personal care products, consumer chemicals, coatings (e.g., perfluorinated compounds), flame retardants, and others – some of which have endocrine disrupting, carcinogenic, and/or other potentially harmful health effects if found at sufficiently high concentrations (Salveson et al., 2010; Trussell et al., 2015). Extensive research has been conducted on the attenuation of these constituents through conventional WWTPs and their further breakdown during advanced water treatment (Baronti et al., 2000; Lovins et al., 2002; Schäfer et al., 2005; Sedlak et al., 2006; Steinle-Darling et al., 2010; Linden et al., 2012; Salveson et al., 2010; Snyder et al., 2012; and many others). Monitoring and Response Retention Time

Over time, detection of trace pollutants in the monitoring wells and failures in equipment performance may occur. Depending upon the issue, the City may handle the issue internally, or, in the event of a regulatory exceedance, the City must provide the appropriate notification to DDW and Regional Board staff. These meetings and discussions will determine if the produced water remains protective of public health or if some form of mitigation is required.

5.6.3.4 Summary

Table 5.4 outlines some of the more relevant distinctions between surface application and subsurface application of IPR. Detailed information regarding the regulatory requirements for both IPR applications should be obtained from the relevant sections of the Title 22 regulations.

Table 5.4 Significant Differences between Surface and Subsurface Application of IPR Recycled Water

Regulation Citation	Surface	Subsurface
60320.108(b) and 60320.201	Reverse Osmosis (RO) treatment process not specifically required	All RW must be treated with RO with a minimum rejection of NaCl of 99.0 percent.
60320.110(a)(3)(C)	Additional nitrogen compound monitoring to determine potential MCL exceedances	---
60320.114(c)	Fewer restrictions for diluent water if it has historically been used to recharge the basin. Turbidity, color, and odor Secondary MCLs need not be met for diluent water	---
60320.116(c, d, e)	Initial recycled wastewater contribution (RWC) typically shall not exceed 0.2 (can be reviewed on a case-by-case basis). Increases to the RWC can be requested no more than once per year with submission of an updated engineering report, Operation Optimization Plan, and evidence of historical compliance.	RWC may be up to 1.0, as determined by Department review of engineering report, TOC concentration, among others.
60320.118(f, g, h) and 60320.201	Requires a study every 5 years to determine the occurrence of indicator compounds in the RW. At least three indicator compounds shall be monitored quarterly and shown to be reduced by at least 90 percent.	At least 9 indicator compounds shall be monitored with various log reduction requirements. Alternatively, demonstrate oxidation providing at least 0.5-log reduction of 1,4-dioxane.
60320.130(c)	TOC limit may be increased after ten consecutive years of operation and barring additional requirements	---

A summary of the applicable standards for potable reuse projects in California including drinking water standards such as MCLs, pathogens, AOP requirements (to remove trace CECs), and a few other constituents, is shown in Table 5.5.

Table 5.5 Title 22 Groundwater Reuse Replenishment Project Criteria

Parameter	Criteria
Pathogenic Microorganism Control	
Enteric virus	12 - log reduction
Giardia cysts	10 - log reduction
Cryptosporidium oocysts	10 - log reduction
Total Organic Carbon (TOC)	Maximum 0.25 mg/L in 95 percent of samples within first 20 weeks(2), Maximum 0.5 mg/L 20-week running average and average of the last four samples
Indicator compounds	various log reduction requirements(3)
NDMA	10 ng/L Notification Level (NL)
Total Nitrogen (TN)	10 mg/L

Notes
(1) 1-log is 90 percent reduction, 2-log is 99 percent reduction, 3-log is 99.9 percent reduction, etc.
(2) Only applies to subsurface application
(3) The type of indicator compounds and amount of log reduction is different for surface and subsurface application and varies by project.
(4) Other indicator compounds can be substituted for 1, 4-dioxane with approval from DDW.
(5) Abbreviations: µg/L = micrograms per liter.

5.6.4 Direct Potable Reuse

Direct Potable Reuse (DPR) is the incorporation of advanced treated water into the water supply system of a community without the use of an environmental buffer such as a groundwater aquifer for storage after purification. DPR substitutes an engineered storage buffer (ESB) for an environmental buffer between the treatment and distribution steps. DPR presents performance advantages compared to IPR, as a groundwater basin may in select cases have high salts and/or legacy contaminants, which then require retreatment. In terms of operations and cost, it has the advantage of much simplified delivery to customers, removing the need for long pipelines and injection and extraction wells. It does require more robust monitoring and treatment systems, providing additional layers of conservatism.

While DPR is an important potential future option for California water purveyors, it is not yet regulated in California, though both Texas and New Mexico have regulated projects. Within California, the state legislature has directed the DDW to develop a determination of feasibility by September 2016 as the first step towards regulation. Ongoing research, amounting to $6 million, is being conducted at the state and federal levels on how to properly implement DPR projects, which will inform decision-making.

The latest work on DPR is the Framework for Direct Potable Reuse (NWRI, 2015), which is a national effort by seven treatment and health experts, completed by the National Water Research Institute, WateReuse, Water Environment Federation, American Water Works Association, and peer reviewed by the US EPA. The Framework details the step by step process for successful implementation of DPR.

5.7 Biosolids Regulations

Sludge generated by a wastewater treatment facility is defined as biosolids once beneficial use criteria have been achieved, as determined by compliance with the EPA's Title 40 Part 503 regulations, through stabilization processes. Stabilization processes are described as those that help reduce pathogens and reduce vector attraction. Biosolids are defined as treated organic solid residuals resulting from the treatment of municipal sewage at a wastewater treatment facility. Biosolids are a product with a high carbon content and other beneficial use properties.

Several federal, state, and local regulations are in place that influence whether biosolids from municipal WWTFs can be beneficially used or disposed. Increased concern and debate over biosolids use/disposal and its associated environmental impacts have led to more stringent amendments to regulations. Changes in regulations affecting biosolids management are expected and make a flexible management program essential.

An overview of federal, state, and local biosolids regulations is discussed below. The specific relevance of pertinent biosolids regulations depends on the intended disposal method (i.e., on-site or off-site disposal) and the level of treatment achieved, whether unclassified, Class B, Class A, or Class A Exceptional Quality (EQ).

5.7.1 Federal Biosolids Regulations

Federal, state, and local agencies are responsible for regulating beneficial use/disposal of biosolids. The authority of each agency varies based on the beneficial use/disposal methods employed. However, key guidelines are established by the EPA. These guidelines are in turn implemented by state and local governments. Many state and local agencies in California have developed additional rules, guidelines, and criteria for biosolids management.

40 CFR 503 Regulations: In order to implement the long-term biosolids permitting program required by the Water Quality Act of 1987, the EPA initiated two rulemakings. The first rulemaking established requirements and procedures for including biosolids management in NPDES permits, procedures for granting state biosolids management programs primacy over federal programs, and federal programs to implement biosolids permits if a state so chooses.

The second rule-making to regulate and control biosolids permitting was 40 CFR Part 503 Standards for the Use and Disposal of Sewage Sludge ("40 CFR 503"). This rule addresses three general categories of beneficial use/disposal of biosolids including:

- Land application of sewage sludge for beneficial use of organic content.
- Surface disposal of biosolids in a monofill, surface impoundment, or other dedicated site.
- Incineration of sewage sludge with or without auxiliary fuel.

Biosolids are classified by the EPA's 40 CFR 503 regulations as Class B or Class A, according to the level of pathogen reduction. Biosolids must also meet vector attraction and metal concentration limits. All biosolids must meet the ceiling concentration limits (CCL) for pollutants. Land applied biosolids must also meet either the pollutant concentration limits (PCL), cumulative pollutant loading rate (CPLR) limits, or annual pollutant loading rate (APLR) limits. Table 5.6 summarizes these limits required by 40 CFR 503 for land applied biosolids. Pathogen reduction requirements of 40 CFR 503 for land applied biosolids are summarized in Table 5.7.

Table 5.6 Pollutant Limits for Land Applied Biosolids

Pollutant	EPA CCL, mg/kg dry weight basis	EPA PCL for EQ Biosolids , mg/kg dry weight basis	EPA CPLR Limits for Biosolids, kg per hectare	EPA APLR Limits for Biosolids, kg per hectare
Arsenic	75	41	41	2.0
Cadmium	85	39	39	1.9
Chromium	3,000	1,200	3,000	150
Copper	4,300	1,500	1,500	75
Lead	840	300	300	15
Mercury	57	17	17	0.85
Molybdenum	75	-	-	-
Nickel	420	420	420	21
Selenium	100	36	36	5
Zinc	7,500	2,800	2,800	140
Applies to:	All biosolids that are land applied	Bulk biosolids and bagged biosolids	Bulk biosolids	Bagged biosolids

In addition to reducing pollutant and pathogen levels, 40 CFR 503 requirements mandate that biosolids undergo treatment to reduce the risk of vectors such as flies, mosquitoes, fleas, rodents, and birds that are attracted to the biosolids. In order to prevent the spread of disease-laden pathogens, biosolids must be treated to reduce their attractiveness to these types of vectors. Alternatively, drying the biosolids to reduce the moisture content to 10 percent or lower also meets the requirement. Vector attraction reduction requirements are summarized in Table 5.8.

Table 5.7 40 CFR 503 Biosolids Regulations – Pathogen Reduction Requirements

Class A	Class B
• Either fecal coliform density is less than 1,000 MPN/gram of total dry solids, or the density of Salmonella species bacteria in the sludge is less than 3 MPN/4 grams of total dry solids. • Biosolids must be treated and/or meet one of the following alternatives before disposal. For more details on each treatment alternative, refer to 40 CFR 503.32(a): – Thermally treated. – High pH-high temperature treatment. – Treatment to reduce enteric virus to less than 1 PFU/4 grams of total dry solids) and viable helminth to less than 1/4 grams of total dry solids). – Treatment by composting, heat drying, heat treatment, thermophilic aerobic digestion, beta ray irradiation, gamma ray irradiation, or pasteurization process. Specific operating conditions for each process has been specified in 40 CFR 503.32(a). – Use of processes equivalent to the above (subject to authority approval).	• Comply with site restrictions of land application of Class B biosolids as specified in 40 CFR 503.32(b)(2), (b)(3), or (b)(4). In summary, these restrictions include harvesting of certain food crops, grazing of animals, turf harvesting, and public access to lands where Class B biosolids were applied. • Biosolids must be treated and/or meet one of the following alternatives before disposal. For more details on each treatment alternative, refer to 40 CFR 503.32(b): – Geometric mean of seven samples of treated biosolids collected at the time of disposal shall meet a fecal coliform density of 2 million CFU or MPN/gram of total dry solids. – Processes that significantly reduce pathogens which include aerobic digestion, air drying, anaerobic digestion, composting, or lime stabilization. Specific operating conditions for each process has been specified in 40 CFR 503.32(b). – Use of processes equivalent to the above (subject to authority approval).

Notes:
(1) CFU = Colony Forming Unit
(2) PFU = Plaque Forming Unit

Table 5.8 40 CFR 503 Biosolids Regulations – Vector Attraction Reduction Requirements

Alternative Number in 40 CFR 503.33(b)	Description
1	Mass of volatile solids shall be reduced by a minimum of 38 percent during biosolids treatment.
2	If the above requirement cannot be met, vector attraction reduction can be demonstrated by reducing volatile solids by a minimum of 17 percent by digesting a portion of previously digested biosolids anaerobically in the laboratory in a bench-scale unit for 40 additional days at a temperature between 30 and 37 °C .
3	If the above requirement cannot be met, vector attraction reduction can be demonstrated by reducing volatile solids by a minimum of 15 percent by digesting a portion of previously digested biosolids aerobically in the laboratory in a bench-scale unit for 30 additional days at a temperature of 20 °C .
4	Specific oxygen uptake rate for biosolids treated in an aerobic process is less than or equal to 1.5 mg of oxygen per hour per gram of total dry solids at a temperature of 20 °C .
5	Biosolids shall be treated in an aerobic process for 14 days or longer. During that time the temperature of biosolids shall be higher than 40 °C , with an average of 45 °C or higher.
6	The pH of biosolids shall be raised to 12 or higher by alkali addition and, without the addition of more alkali, shall remain at 12 or higher for 2 hours, and then at 11.5 or higher for an additional 22 hours at 25 °C .
7	The percent solids of material that does not contain unstabilized solids shall be equal to or greater than 75 percent based on moisture content and total solids prior to mixing with other materials.
8	The percent solids of material that contains unstabilized solids shall be equal to or greater than 90 percent based on moisture content and total solids prior to mixing with other materials.
9	Sewage sludge shall be injected below the surface of the land. No significant amount of the sewage sludge shall be present on the land surface within one hour after the sewage sludge is injected. When the sewage sludge that is injected below the surface of the land is Class A with respect to pathogens, the sewage sludge shall be injected below the land surface within eight hours after being discharged from the pathogen reduction process.
10	Sewage sludge applied to the land surface or placed on a surface disposal site shall be incorporated into the soil within six hours after application to or placement on the land. When sewage sludge that is incorporated into the soil is Class A with respect to pathogens, the sewage sludge shall be applied to or placed on the land within eight hours after being discharged from the pathogen treatment process.

Class B Biosolids: Class B biosolids can be produced through any of the 40 CFR 503-defined Processes to Significantly Reduce Pathogens (PSRP). The quantity and quality of the processed sludge and biosolids produced must be monitored and recorded by each biosolids producer. Quality parameters include pathogen reduction, vector attraction reduction, and inorganic content (e.g., heavy metals). The PSRPs include aerobic digestion, air drying, mesophilic anaerobic digestion and static aerated pile composting. To meet Class B standards, the aerobic digestion process is typically operated for a minimum of 40 days to 60 days at 20 to 15ºC, respectively. The air drying (sludge drying beds) process typically requires drying on sand beds or paved/unpaved basins for a minimum of three months, where the ambient average daily temperature is above 0ºC for two of the three months. The mesophilic anaerobic digestion process can meet Class B Standards when operated between 15 days at 35 to 55ºC and 60 days at 20ºC. Composting operations are required to raise the temperature of biosolids to 40ºC or higher for five days. The temperature in the compost pile must also exceed 55ºC for four hours during the five-day period.

Land appliers must follow application restrictions and pollutant load restrictions for Class B biosolids at the time of application with regard to public contact, animal forage, and production of crops for human consumption. For example, Class B biosolids may only be applied at sites where there is no possibility of contact with the general public. These sites include certain types of agriculture, landfills, etc. Additional restrictions associated with Class B prevent crop harvesting, animal grazing, and public access for a defined period of time until environmental conditions have further reduced pathogens.

Class A Biosolids: Class A biosolids can be produced through any of the 40 CFR 503-defined Processes to Further Reduce Pathogens (PFRP). Class A biosolids have more stringent treatment requirements than Class B biosolids for pathogen reduction and may be land applied where contact with the general public is possible (i.e., nurseries, gardens, golf courses, etc.).

The PFRPs include thermophilic anaerobic digestion, static aerated pile composting, heat drying, and pasteurization. To meet Class A standards, the thermophilic anaerobic digestion process must be operated at 50ºC or higher for 30 minutes or longer. Composting operations are required to operate at 55ºC or higher for three consecutive days. Heat drying must reduce the moisture content of the biosolids to 10 percent or lower. Pasteurization processes must maintain the temperature of the biosolids at 70ºC for 30 minutes or longer.

Exceptional Quality Biosolids: Biosolids that meet the high quality pollutant concentrations limits of Table 5.6, one of the Class A pathogen reduction requirements of Table 5.7, and one of options 1 through 8 of the vector attraction reduction alternatives in Table 5.8, may be identified as EQ biosolids. EQ biosolids may be used and distributed in bulk or bag form and are not subject to general requirements and management practices other than monitoring, recordkeeping, and reporting to substantiate that the quality criteria have been met.

40 CFR 258 Regulations: In addition to the regulations set forth to govern biosolids permitting, 40 CFR 258 Solid Waste Disposal Facility Criteria was promulgated October 1991 to control the disposal of biosolids classified as solid wastes. Wastewater sludge is exempt from the definition of solid waste unless the sludge is co-disposed with household solid wastes. The regulations set forth criteria for landfills with respect to: location, design, operation, groundwater monitoring, and closure with the intent of protection of ground and surface water from contamination. The main requirement of co-disposed sludge is that it must meet the Paint Filter Liquids Test (EPA Method 9095A). This method determines the presence of free liquids in a sample. Well-dewatered sludge, such as in the case of WWTF's sludge, typically passes this test as it does not contain any free liquid.

5.7.2 State Biosolids Regulations

State biosolids beneficial use/disposal is primarily regulated by California's State Board, the DDW Programs, and the Central Valley Regional Water Quality Control Board (RWQCB) regulates City of Lemoore.

The California Department of Resources Recycling and Recovery (CalRecycle) oversees and regulates California's solid waste disposal including co-disposal issues and biosolids use as a daily covering material. The main regulation dealing with land discharge of biosolids (and incineration ash) is CCR, Title 23, Division 3, Chapter 15. Other regulations and guidelines include Title 22, Division 4.5, Chapter 11; California Water Environment Association's (CWEA) Manual of Good Practice for Agricultural Land Application of Biosolids; and the California Environmental Quality Act (CEQA).

The State Board's General Waste Discharge Requirements (GWDRs) for the Discharge of Biosolids to Land for use as a Soil Amendment in Agriculture, Silviculture, Horticulture, and Land Reclamation Activities covers the discharge of sewage sludge as a soil amendment. In order for such a discharge to be allowed, the sludge must have been treated, tested, and shown to be capable of being used beneficially and legally as a soil amendment as specified under 40 CFR 503. This order is intended to help streamline the regulatory process for such discharges but may not be appropriate for all sites using biosolids due to particular site-specific conditions or locations. Such sites are not precluded from being issued individual WDRs.

5.7.3 Local Biosolids Regulations

Many counties in California have developed, or are developing, ordinances for biosolids land application. The stringency of these county regulations ranges from requirements for relatively high minimum insurance to the complete or partial banning of sludge land application. Currently, Kings County bans land application of Class B biosolids but allows land application of Class A EQ biosolids. Should the City need to haul biosolids to another county for land application, potential nearby options include:

- Santa Clara, Alameda, and Santa Barbara Counties - no regulations or ordinances currently enacted.
- Kern County - Class B land application allowed with conditions met.
- Monterey County – Class B land application allowed on case by case basis as approved by the County Director of Health.
- Fresno and San Luis Obispo Counties - current ban on Class B land application but land application of Class A EQ biosolids allowed.

Updates to these biosolids regulations may arise in the future.

5.7.4 Future Regulatory Considerations for Biosolids Disposal

Biosolids generated at the City's WWTF are currently removed from the ponds only during periodic maintenance, however, future upgrades and/or expansions to the plant will likely increase the amount of biosolids generated.

The State of California does not directly regulate beneficial use of biosolids. The Regional Water Boards have the option of adopting the State's General Order for biosolids, while providing additional management requirements with no additional biosolids quality requirements. Also, CalRecycle and the California Department of Food and Agriculture (CDFA) have jurisdiction over certain aspects of organics management that could affect the future management of biosolids in the State.

Traditionally, the role of CalRecycle in biosolids beneficial use has been to define biosolids management practices that are considered landfill diversion for the purpose of municipalities attempting to meet the 50 percent landfill diversion target set by Assembly Bill (AB) 939. Landfill Alternative Daily Cover (ADC) and land application are the more common biosolids markets since they have been considered landfill diversion. However, the following adopted and developing legislation is threatening the future viability of solids used as ADC:

- In 2012, AB 341 was adopted, which established a 75 percent landfill diversion goal. CalRecycle is in the process of defining and implementing the manner in which this goal will be achieved. This will include a decision on whether the use of biosolids as ADC will continue to be considered landfill diversion or if it will be classified as disposal.
  In 2014, AB 1594 was adopted and requires that green waste no longer qualify for diversion credit when used as ADC at a landfill. This bill may indirectly affect an agency's biosolids use/disposal program when it is fully implemented on January 1, 2020. Agencies that mix green waste with biosolids for use as ADC at landfills currently receive diversion credit under AB 939, but will no longer be able to do so for the green waste portion. It is expected that landfills will not accept biosolids (if not mixed with green waste) for ADC since they need the combination to achieve a workable moisture content.
- In 2014, Senate Bill (SB) 605 was adopted and requires the reduction of short-lived climate pollutants (including methane) to achieve statewide greenhouse gas (GHG) reduction targets. Since landfills represent 20 percent of the State's total methane emissions (a potent GHG) as a result of anaerobic degradation of organics, regulations are being developed requiring up to 90 percent diversion of organics sent to landfills by 2025. The California Air Resources Board (CARB) sees co-digestion of food waste and fats, oils, and grease with sewage sludge at WWTFs as a key strategy for achieving reductions in methane emissions across the state. The regulation requiring up to 90 percent diversion of organics from landfills is scheduled to be developed by 2018. There is concern that this or future legislation targeted at reducing statewide GHGs may eliminate the use of biosolids as ADC, may result in stricter permit requirements for biosolids (in other words required Class A disposal), and/or may eliminate the ability to dispose of biosolids at landfills altogether.

Should ADC be classified as disposal, this would end the practice of using biosolids and green waste as ADC, which would severely impact biosolids managers. However, CalRecycle may create rules specific to biosolids or help develop alternative routes (such as more extensive land application) for biosolids end-uses. Termination of landfill ADC would place capacity and price pressure on existing biosolids markets, such as compost and land application, increasing competition among utilities for available biosolids outlets.

While the state is limiting disposal options for biosolids, the state is also encouraging an increase in tracking and reporting of organic waste disposal and the eventual reduction in organic waste production. Legislation pertaining to these goals includes the following:

- Since April 2016, AB 1826 requires businesses and residential dwellings (of 5 units or more) generating 8 cubic yards (yd^3) or more of organic waste per week to arrange for recycling services. This phased implementation bill decreases the 8 yd^3 diversion cap over time through 2020. This bill will reduce organic waste production and create market certainty for the diversion of organic waste from businesses and multifamily dwellings to a recycling service, such as WWTF anaerobic digesters.
- AB 876 requires a county or regional agency to track and annually report the amount of organic waste it will generate over a 15-year period, the additional organic waste recycling facility capacity that will be needed to process that organic waste, and identify new or expanded organic waste recycling facilities (such as WWTF anaerobic digesters) capable of safely meeting that additional need. The first report required by this legislation is due in August 2017.
- In spring 2017, the final regulation developed under AB 901 is expected to be adopted. This legislation changes how disposal and recycling is reported to CalRecycle. Waste, recycling, and compost facilities, as well as exporters, brokers, and transporters of recyclables or compost will be required to submit information directly to CalRecycle on the types, quantities, and destinations of materials that are disposed of, sold, or transferred inside or outside of the state. CalRecycle also gains enforcement authority to collect this information.

In summary, use and disposal of biosolids is becoming progressively more difficult in California. Land application of biosolids is restricted by many California counties, and fewer landfills are accepting biosolids. Numerous counties in California have developed or are currently developing ordinances for biosolids land application.

5.8 Air Quality Regulations

The federal Clean Air Act (CAA) requires the EPA to set national ambient air quality standards to protect human health and welfare. The California Air Resources Board (CARB) is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementing the CAA.

The agencies relevant to the City's air requirements include:

- Federal – EPA.
- State – CARB.
- Local – San Joaquin Valley Air Pollution Control District (SJVAPCD).

These agencies issue air quality permits for the modification of existing facilities or the construction and operation of new facilities and establish new source pollutant levels and treatment requirements.

CARB has developed state air quality standards that are generally more stringent than federal standards. Other CARB duties include monitoring air quality in conjunction with local air districts, setting emissions standards for new motor vehicles, and reviewing agency input on the State Implementation Plan (SIP). The SIP consists of emission standards for vehicles and consumer related sources set by CARB and attainment plans and rules adopted by local air districts.

The following sections provide summaries of the state air quality standards applicable to City operations.

5.8.1 State Regulations

The WWTF in the future would likely operate a standby diesel engine. Any new engines would need to comply with the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition (CI) Engines. CARB originally approved the ATCM in 2004. Subsequent to the adoption of the original ATCM in 2004, the U.S. EPA promulgated federal "New Source Performance Standards for Stationary Compression Ignition Internal Combustion Engines" (NSPS). In October 2010, CARB approved amendments to the ATCM to closely align California's requirements with those in the federal NSPS. The amended ATCM became effective May 19, 2011.

The ATCM requires a 0.15 gram per brake horsepower-hour (g/bhp-hr) particulate matter (PM) emission limit for all new emergency standby stationary compression ignition engines greater than or equal to 50 horsepower (hp). Annual maintenance and testing hours are limited to no more than 50 hours per calendar year. Local air districts may impose more limited hours. New emergency standby engines are required to meet the applicable non-methane hydrocarbon plus nitrogen oxides (NMHC+NOx), hydrocarbon (HC), and carbon monoxide (CO) Tier 2 or Tier 3 non-road CI engine emission standards, and Tier 4 standards that do not require add-on controls. Table 5.9 shows emission limits for engine sizes comparable to those likely to be used at the WWTF.

Table 5.9 ATCM Emission Standards for New Stationary Emergency Standby Diesel-Fueled CI Engines(1)

Maximum Engine Powers	Particulate Matter	Non-Methane Hydrocarbon plus Nitrogen Oxides	Carbon Monxide
600<hp<750 (450<kW<560)	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)
hp>750 (kW>560)	0.15 (0.20)	4.8 (6.4)	2.6 (3.5)

Notes
(1) All units in g/bhp-hr (g/kW-hr). May be subject to additional emission limitations as specified in current applicable district rules, regulations, or policies. Applicable to model years 2008 and later.

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Chapter 6

COLLECTION SYSTEM HYDRAULIC MODEL DEVELOPMENT AND CALIBRATION

6.1 Sewer Collection System Hydraulic Model

A sewer collection system model is a simplified representation of the real sewer system. Sewer system models can assess the conveyance capacity for a collection system. In addition, sewer system models can perform "what if" scenarios to assess the impacts of future developments and land use changes. The City's collection system hydraulic model was constructed using a multi-step process utilizing data from a variety of sources. This chapter summarizes the hydraulic model development process, including a summary of the modeling software selection, a description of the modeled collection system, the hydraulic model elements, the model creation process, and the model calibration process.

6.1.1 Hydraulic Modeling Software

There are several software applications for network analysis with a variety of capabilities and features. The selection of a particular model is generally dependent upon user preference, the requirements of the particular collection system, and the cost associated with the software.

InfoSWMM®, developed by Innovyze (formerly MWH Soft), was selected as software platform for the development of the City's hydraulic model. The hydraulic modeling engine for InfoSWMM® uses the EPA's Storm Water Management Model (SWMM), which is widely used throughout the world for planning, analysis, and design related to stormwater runoff, combined sewers, sanitary sewers, and other drainage systems. InfoSWMM® routes flows through the model using the Dynamic Wave method, which solves the complete Saint Venant, one dimensional equations of fluid flow.

InfoSWMM® consists of multiple products that work together to bring a graphical approach to the analysis and design of wastewater and stormwater collection systems. The program includes seamless integration with GIS data.

6.1.2 Data Collection and Validation

The primary sources for the development of the hydraulic model were available drawings, as-builts, and Geographic Information System (GIS) data. The existing collection system was mainly constructed with drawings and as-builts, while the GIS was used for the collection system alignment and manhole placement. Figure 6.1 shows the skeletonized modeled wastewater collection system.

6.1.3 Skeletonizing

Skeletonizing is the process of removing pipelines not considered to be essential for the purpose of the analysis. While skeletonizing a system minimizes the number of pipelines analyzed, an accurate representation of the collection system is maintained. For the City's hydraulic model, pipelines 10-inches in diameter or larger were included as well as some smaller diameter pipelines for connectivity. Otherwise, pipelines 8-inches or smaller were excluded.

6.1.4 Elements of the Hydraulic Model

The following provides a brief overview of the major elements of the City's hydraulic model and the required input parameters associated with each:

- **Junctions:** Sewer manholes, cleanouts, as well as other locations where pipe sizes change or where pipelines intersect are represented by junctions in the hydraulic model. Required inputs for junctions include rim elevation, invert elevation, and surcharge depth (used to represent pressurized systems). Junctions are also used to represent locations where flows are split or diverted between two or more downstream links.
- **Pipes:** Gravity sewers and force mains are represented as pipes in the hydraulic model. Input parameters for pipes include length, friction factor (e.g., Manning's n for gravity mains, Hazen Williams C for force mains), invert elevations, diameter, and whether or not the pipe is a force main.
- **Storage Nodes:** For sewer system modeling, storage nodes typically are used to represent lift station wet wells (although other storage basins, etc. can be modeled as storage nodes). Input parameters for storage nodes include invert elevation, wet well depth, and wet well cross section.
- **Pumps:** Pumps are included in the hydraulic model as links. Input parameters for pumps include pump curves and operational controls.
- **Outfalls:** Outfalls represent areas where flow leaves the system. For sewer system modeling, an outfall typically represents the connection to the influent pump station or headworks of a wastewater treatment facility (WWTF).
- **Inflows:** The following are the two types of wastewater flow sources that can be injected into individual model junctions (and storage nodes):
  - <u>External</u>. External inflows can represent any number of sources entering the collection system, such as inflow and infiltration. External inflows are applied to a specific model junction by applying a baseline flow value and a pattern that varies the flow by hour, day, or month of the year. This option was used to simulate inflow.
  - <u>Dry Weather</u>. Dry weather inflows simulate base sanitary wastewater flows and represent the average flow. The dry weather flows can be multiplied by up to four patterns that vary the flow by month, day, hour, and day of the week (e.g., weekday or weekend). The dry weather diurnal patterns are adjusted during the dry weather calibration process.

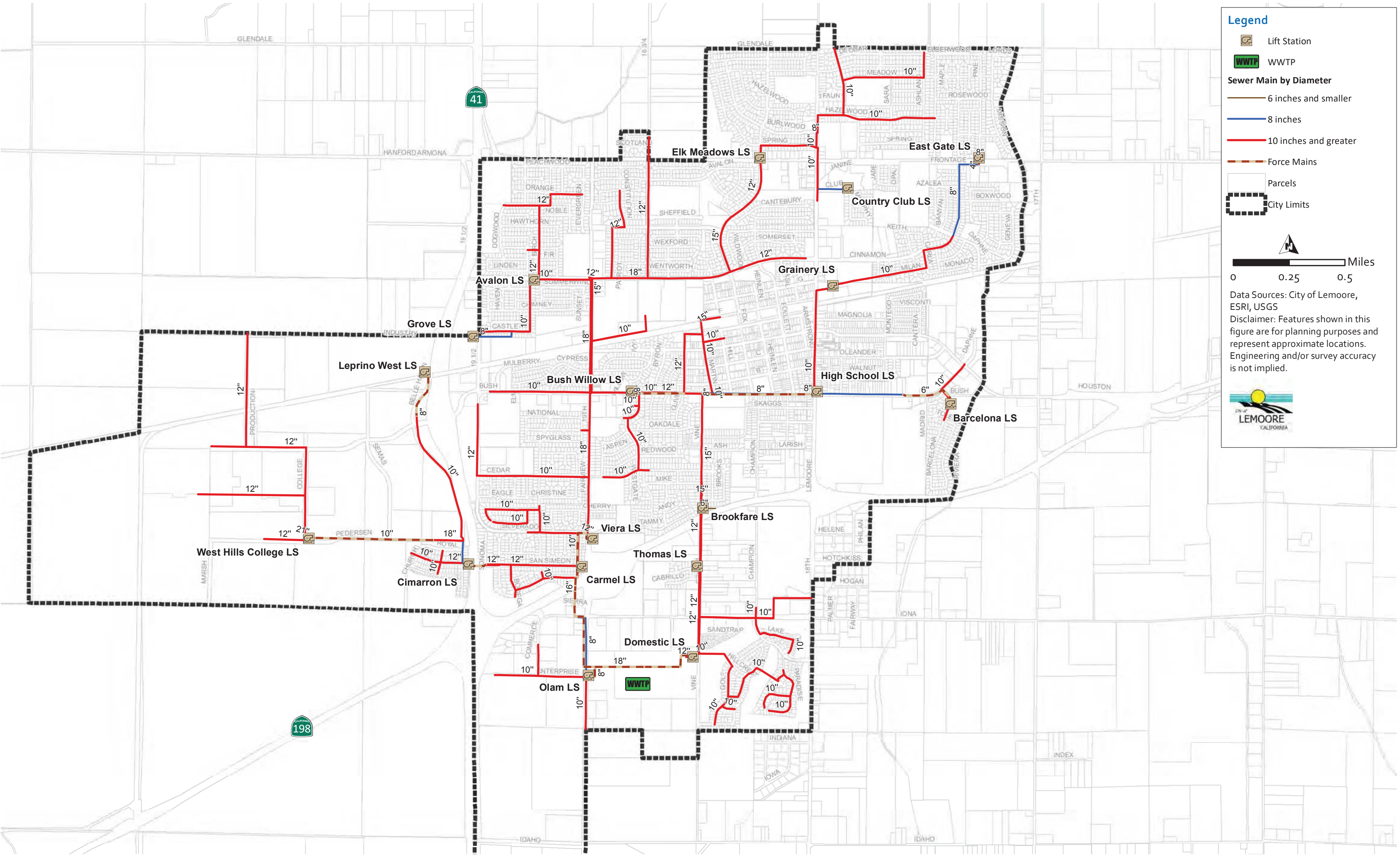

Figure 6.1 Modeled Collection System

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6.1.5 Hydraulic Model Construction

The City's hydraulic model combines information on physical and operational characteristics of the wastewater collection system and performs calculations to solve a series of mathematical equations to simulate flows in pipelines.

The model construction process consisted of six steps, as described below:

- Step 1: The City's drawings and GIS shapefiles for the sewer collection system were obtained.
- Step 2: The GIS data was reviewed and formatted to allow easy import into the InfoSWMM® modeling platform. The City's collection system alignment and manhole placement were imported into the modeling software.
- Step 3: Physical and operational data for the City's wastewater collection facilities was not available from the GIS data. Data, such as pipeline inverts, wet well dimensions, pump stations, and other special features, were input manually into the model based on available information. In addition, discrepancies with pipeline alignment and junction placement were reviewed and manually input or modified based on City records, field reconnaissance, and engineering judgment.
- Step 4: Once all the relevant data was input into the hydraulic model, the model was reviewed to verify that the model data was input correctly and that the flow direction and size of the modeled pipelines were logical. Additionally, the modeled lift stations were also checked to verify that they operated correctly.
- Step 5: Dry weather wastewater flows were then allocated to the appropriate model junctions. These flows were scaled up or down, as necessary, to match the dry weather flows recorded during the flow monitoring period.
- Step 6: The hydraulic model contains certain run parameters that need to be set by the user at the beginning of the project. These include run dates, time steps, reporting parameters, output units, and flow routing method. Once the run parameters were established, the model was debugged to ensure that it ran without errors or warnings.

6.2 Load Allocation

Determining the quantity of base wastewater flows generated by a municipality and how they are distributed throughout the collection system is a critical component of the hydraulic modeling process.

Various techniques can be used to assign wastewater flows to individual model junctions, depending on the type of data that is available. Adequate estimates of the volume of wastewater are important in maintaining and sizing sewer system facilities, both for present and future conditions. Baseline wastewater loads were allocated (assigned to specific nodes) in the hydraulic model based on land use data provided by the City, as well as the flow data from the temporary flow monitoring program. The following steps outline the wastewater load allocation process:

- Step 1: The City's service area was broken up into 422 individual loading polygons. In a "skeletonized" (i.e., truncated model) model, a loading polygon will usually encompass a particular subdivision or grouping of lots. However, a loading polygon could be as small as a few parcels. Each loading polygon represents the geographic area that contributes flows into a single model node (i.e., manhole), and was developed using GIS based on the City's parcel and sewer pipeline shapefiles.

- Step 2: One approach for estimating the existing dry weather wastewater flow associated with each loading polygon is based on land use designations, flow coefficients, and land use area.
- Step 3: Once the existing wastewater flows were allocated into the model, they were adjusted as needed during model calibration to closely match the dry weather flows recorded during the flow monitoring program.

6.3 Hydraulic Model Calibration

Hydraulic model calibration is a crucial component of the hydraulic modeling effort. Calibrating the model to match data collected during the flow monitoring program to achieve the most accurate results possible. The calibration process typically consists of calibrating to both dry and wet weather conditions.

For this project, dry weather flow monitoring was conducted at 15 metering sites for a period of approximately three weeks. Dry weather flow (DWF) calibration provides an accurate depiction of base wastewater flow generated within the study area. Wet weather flow monitoring was not conducted, therefore, the hydraulic model didn't go through the wet weather calibration process.

6.3.1 Wastewater Calibration Standards

The hydraulic model was calibrated in accordance with international modeling standards. The Wastewater Planning Users Group (WaPUG), a section of the Chartered Institution of Water and Environmental Management, has established generally agreed upon principles for model verification. The dry weather and wet weather calibration focused on meeting the recommendations on model verification contained in the "Code of Practice for the Hydraulic Modeling of Sewer Systems," published by the WaPUG (WaPUG 2002), as summarized below:

- Dry Weather Calibration Standards: Dry weather calibration should be carried out for two dry weather days and the modeled flows and depths should be compared to the field measured flows and depths. Both the modeled and field measured flow hydrographs should closely follow each other in both shape and magnitude.
  In addition to the shape, the flow hydrographs should also meet the following criteria as a general guide:
- The timing of flow peaks and troughs should be within one hour.
- The peak flow rate should be within the range of ±10 percent.
- The volume of flow (or the average rate of flow) should be within the range of ±10 percent. If applicable, care should be taken to exclude periods of missing or inaccurate data.

6.3.2 Dry Weather flow Calibration

The DWF calibration process consists of several elements, as outlined below:

- Divide the system into flow meter tributaries. The first step in the calibration process was to divide the City into flowmeter tributary areas. Fifteen tributary areas were created, one for each flow meter from the temporary flow monitoring program. A map showing the locations of each flow monitoring site and their associated tributary area are provided in Chapter 4 along with a schematic of the flow meters.

- Define flow volumes within each area. The next step was to define the flow volumes within each area, which was accomplished in the flow allocation step.
- Create diurnal patterns to match the temporal distribution of flow. A diurnal curve is a pattern of hourly multipliers that are applied to the base flow to simulate the variation in flow that occurs throughout the day. Two diurnal curves were developed for each flow monitoring tributary area, one representing weekday flow and one representing weekend flow. The diurnal patterns were initially developed based on the flow monitoring data and adjusted as part of the calibration process until the model simulated flows matched the field measured flows as closely as possible. Figure 6.2 shows the calibrated weekday and weekend diurnal patterns for the area tributary to Meter L-11. Similar diurnal curves were developed for each of the meters and its tributary area. The dry weather flow calibration curves are provided in Appendix G.
- Adjust model variables to match field-measured velocity and flow depths. After the model-simulated flows satisfactorily matched the field-measured flows, the model-simulated velocity and flow depth were compared to the field-measured velocity and flow depth. Adjustments were then made to various model parameters until the modeled and measured velocity and depth closely matched each other. For this process, the primary varied parameters were pipeline roughness (Manning's n) and sediment buildup in the pipe, although other parameters can also be adjusted as calibration results are generated.

Manning's roughness coefficients, or n values, have industry-accepted ranges based on a number of variables. Roughness coefficients increase over time depending on the construction methods, installation quality, system maintenance, and other environmental factors. Additionally, certain factors within the City's collection system can result in roughness coefficients that differ from the typical range. For example, pipeline bellies, joint misalignment, cracks, and debris (e.g., root intrusion) lead to increased turbulence in a pipe, which in turn increases the apparent Manning's n factor.

If the model is unable to reasonably match the field-measured flow depth and velocity without leaving the acceptable range of Manning's roughness coefficients, further investigation is conducted to determine the cause of the discrepancy. Causes of the discrepancy can include errors in a pipeline's slope or diameter, downstream blockages, pipeline sags, and, in some cases, influences from downstream lift station operations.

Table 6.1 provides a summary of the dry weather flow calibration using the average and daily peak flow results for both weekday and weekend conditions. As shown in Table 6.1, the model simulated average and peak flows for a majority of both weekday and weekend DWF within 10 percent.

- Meter L-14 average and peak flows exceeded the recommended range for percent error. This meter is downstream of an overflow and lift station. Pump curve data was not available for the upstream lift station, which made calibration of this site difficult. This meter captures and average flow rate of 0.04 mgd, within a system that conveys and average flow of 1.79 mgd. Therefore this site wasn't considered significant to the overall model calibration.

Appendix G contains a detailed dry weather flow calibration summary sheet for each of the fifteen metering sites. Each calibration sheet provides plots that compare the model simulated and field measured flow, velocity, and level data for both weekday and weekend conditions. Figure 6.3 shows an example of the dry weather calibration.

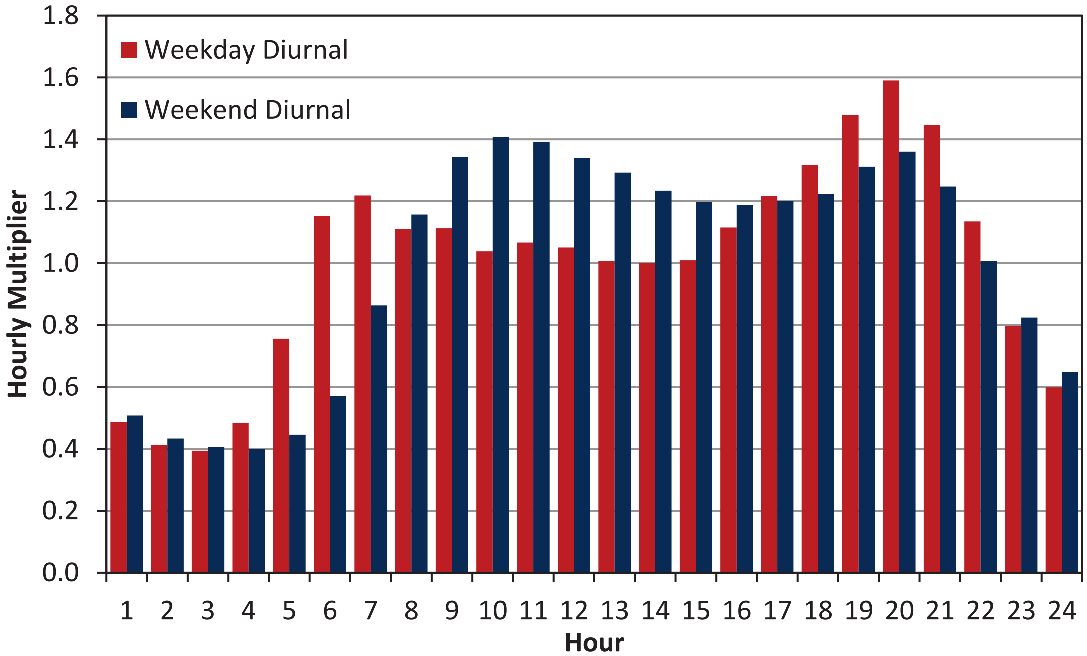

Figure 6.2 Meter Diurnal Pattern (Meter L-11)

Table 6.1 Dry Weather Flow Calibration Summary

Meter No.	Pipe Diameter (in)	Weekday									Weekend									Overall ADWF		
		Measured Data[1]			Modeled Data[1]			Percent Error[2]			Measured Data[1]			Modeled Data[1]			Percent Error[2]					
		Avg. Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (%)	Avg. Velocity (%)	Avg. Level (%)	Avg. Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (%)	Avg. Velocity (%)	Avg. Level (%)	Measured (mgd)	Modeled (mgd)	Percent Error (%)
L-01	10	0.18	1.61	3.4	0.178	1.54	3.5	1.0%	-3.9%	3.9%	0.18	1.61	3.4	0.18	1.55	3.6	0.0%	-3.9%	3.1%	0.18	0.18	0.7%
L-02	14.5	0.32	1.74	4.2	0.340	1.60	4.6	4.6%	-8.2%	9.1%	0.35	1.76	4.4	0.36	1.61	4.8	3.9%	-8.2%	8.2%	0.33	0.35	4.4%
L-03	17.25	0.46	1.57	5.6	0.460	1.66	5.5	-0.3%	5.7%	-1.2%	0.49	1.60	5.7	0.49	1.68	5.6	-0.6%	5.1%	-0.9%	0.47	0.47	-0.4%
L-04	9.75	0.16	1.10	4.3	0.166	1.12	4.3	0.7%	1.9%	-1.9%	0.18	1.13	4.5	0.18	1.15	4.4	-0.1%	1.6%	-2.3%	0.17	0.17	0.4%
L-05	18	0.71	1.03	11.7	0.722	1.25	10.1	1.2%	21.5%	-14.1%	0.77	1.00	15.4	0.76	1.07	15.0	-0.4%	6.6%	-2.5%	0.73	0.73	0.7%
L-06	11.5	0.21	1.17	5.7	0.216	1.39	4.6	2.9%	18.6%	-18.0%	0.21	1.16	5.5	0.21	1.40	4.5	-1.0%	20.6%	-19.1%	0.21	0.21	1.8%
L-07	PS	0.13	0.00	0.0	0.127	3.74	1.3	-1.7%	--	--	0.12	0.00	0.0	0.12	3.66	1.3	-1.3%	--	--	0.13	0.12	-1.6%
L-08	10	0.22	2.04	3.4	0.221	1.90	3.5	-0.4%	-6.8%	5.3%	0.25	2.10	3.5	0.24	1.95	3.7	-1.1%	-7.5%	5.5%	0.23	0.23	-0.6%
L-09	10	0.09	0.87	3.3	0.093	0.85	3.4	-1.6%	-2.6%	2.0%	0.10	0.89	3.3	0.10	0.85	3.4	0.1%	-3.7%	3.0%	0.09	0.09	-1.1%
L-10	12	0.21	1.34	4.0	0.222	1.32	4.2	7.7%	-1.7%	3.9%	0.24	1.26	4.7	0.26	1.36	4.4	8.0%	7.7%	-4.4%	0.22	0.23	7.8%
L-11	15	0.68	1.42	8.6	0.662	1.48	8.3	-2.9%	4.1%	-4.2%	0.72	1.47	8.7	0.69	1.49	8.5	-3.3%	1.1%	-2.2%	0.69	0.67	-3.0%
L-12	15	0.42	0.63	12.6	0.438	0.79	9.1	3.4%	23.8%	-28.2%	0.43	0.63	13.3	0.44	0.77	9.1	2.3%	23.4%	-31.4%	0.42	0.44	3.1%
L-13	12	0.03	0.58	1.8	0.033	0.54	1.9	-1.0%	-7.4%	6.4%	0.01	0.35	1.4	0.01	0.42	1.3	-1.6%	20.7%	-9.1%	0.03	0.03	-1.1%
L-14	9.75	0.04	0.83	1.8	0.067	0.89	2.4	69.0%	7.3%	35.5%	0.05	0.93	1.9	0.11	1.22	2.7	125.9%	31.2%	40.2%	0.04	0.08	87.8%
L-15	12	0.68	2.24	6.9	0.682	2.29	6.7	-0.4%	2.1%	-2.0%	0.67	2.23	6.8	0.67	2.27	6.7	0.4%	1.8%	-1.4%	0.68	0.68	-0.2%

Notes:
(1) Source: City of Lemoore 2017 Temporary Flow Monitoring Program, V&A Consulting Engineers. Average flows are calculated from flow monitoring data.

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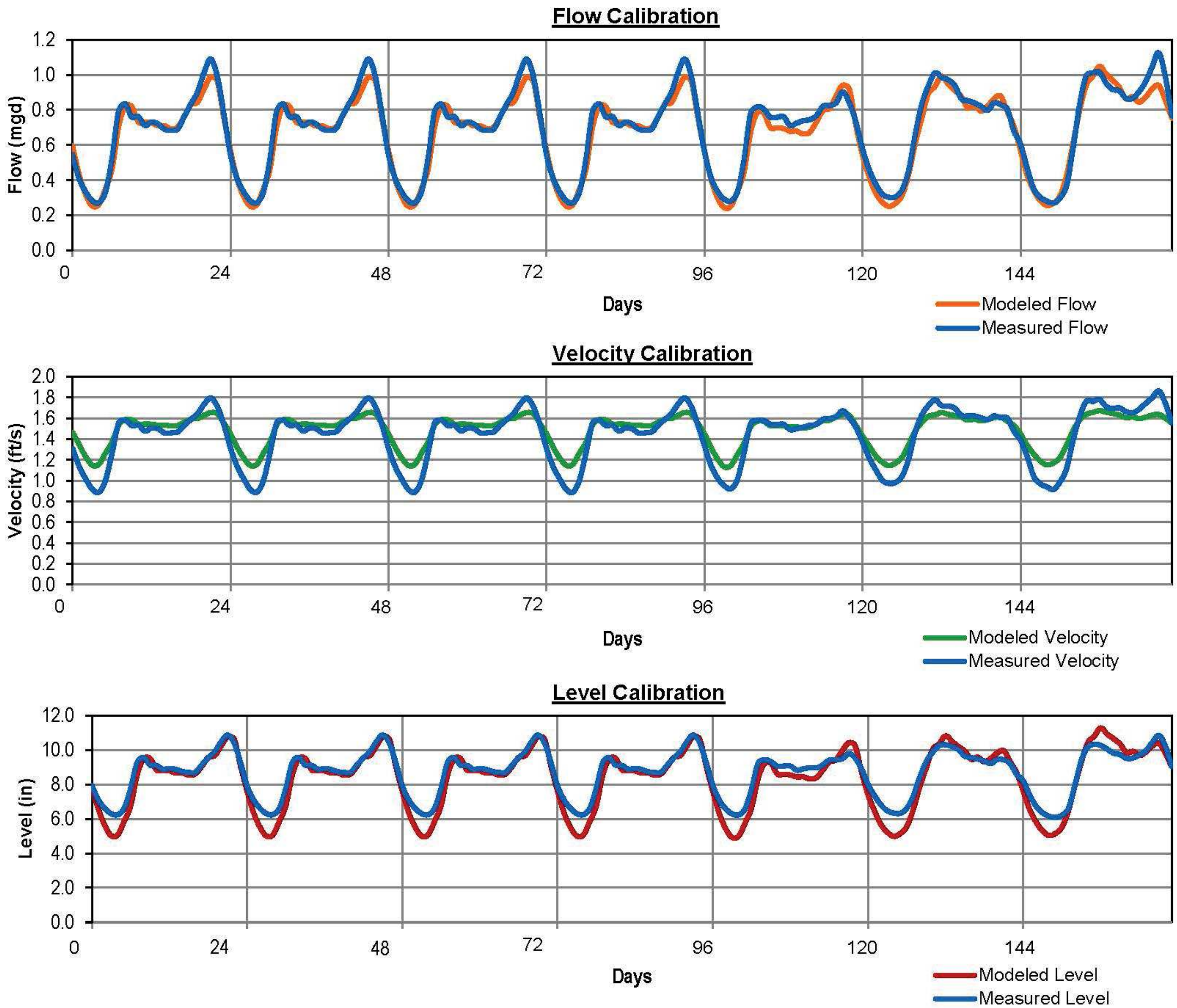

Figure 6.3 Example of Dry Weather Calibration (Meter L-11)

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Chapter 7

WASTEWATER COLLECTION SYSTEM EVALUATION CRITERIA AND SYSTEM ANALYSIS

This chapter presents the planning criteria used to evaluate the existing infrastructure and size future improvements. Results of the capacity evaluation and recommended improvements to mitigate system deficiencies and serve future users are also presented in this Chapter.

7.1 Collection System Evaluation Criteria

The capacity of the City's sanitary sewer collection system was evaluated based on the planning criteria defined in this section. The planning criteria address the collection system capacity, gravity sewer pipe slopes, and maximum allowable depth of flow within a sewer. The evaluation criteria used for the evaluation of the City's sewer system are summarized in Table 7.1.

7.1.1 Mannings Equation

The Manning's n coefficient is a friction coefficient that varies with respect to pipe material, size of pipe, depth of flow, smoothness of joints, root intrusion, and other factors. For gravity pipelines, the Manning's n coefficient value is typically 0.013. The Manning's n factor was refined as necessary during model calibration to accurately simulate field-measured levels and velocities.

7.1.2 Flow Depth Criteria

The primary criterion used to identify capacity-deficient sewers or to size new sewer improvements is the maximum flow depth-to-pipe diameter ratio (d/D). The d/D value is defined as the depth of flow (d) in a pipe during peak (design) flow conditions divided by the pipe's diameter (D). Based on Carollo's experience and industry standards, the following criteria were recommended.

- Flow Depth for Existing Sewers. Maximum flow-depth criteria for existing sanitary sewers are established based on a number of factors, including the acceptable risk tolerance of the utility, local standards and codes, and other factors. Using a conservative d/D ratio when evaluating existing sewers may lead to unnecessary replacement of existing pipelines. Conversely, lenient flow-depth criteria could increase the risk of sanitary sewer overflows (SSOs). Ultimately, the maximum allowable flow-depth criteria should be established to be as cost-effective as possible, while at the same time reducing the risk of SSOs to the greatest extent possible. The maximum flow depth for an existing sewer was defined as 0.92 for this Master Plan.

- Flow Depth for New Sewers. When sizing new sewer pipelines, it is common practice to adopt variable flow depth criteria for various pipe sizes. Design d/D ratios typically range from 0.5 to 0.92, with the lower values typically used for smaller pipes, which may experience flow peaks greater than design flow or blockages from debris, paper, or rags. For pipelines 12-inches in diameter and smaller, the maximum d/D value is 0.67 or 67 percent of the pipeline depth. For Pipelines 15-inches and larger, the maximum d/D is 0.75.

Table 7.1 Wastewater System Evaluation Criteria

Minimum Slopes for New Circular Pipes		
	Pipe Size (in)	**Minimum Slope (ft/ft)**
	6	0.0049
	8	0.0033
	10	0.0025
	12	0.002
	15	0.0015
	18	0.0012
	21	0.0009
	24	0.0008
	27	0.0007
	30	0.0006
	36	0.0005
Flow Depth, d/D		
Maximum Flow Depth for Existing Sewers		
Pipe Diameter		Maximum d/D Ratio (Peak Flow)
12" and Smaller		0.92
15" and Larger		0.92
Maximum Flow Depth for New Sewers		
Pipe Diameter		Maximum d/D Ratio (Peak Flow)
12" and Smaller		0.67
15" and Larger		0.75
Head Loss in Pipelines		
Gravity Pipeline	Manning's n =	0.013
Pressure Pipelines	Hazen William's C =	120
Lift Stations and Force Mains		
Minimum Velocity		3 ft/s
Maximum Velocity		8 ft/s
Lift Station Capacity		Firm Capacity under Peak flows

Note:
(1) Minimum Slope values are based on pipeline flowing half full at 2 ft/s.
(2) Firm capacity represents the lift stations capacity with the largest pump out of service.

7.1.3 Design Velocities and Minimum Slope

In order to minimize the settlement of sewage solids, it is standard practice in the design of gravity sewers to specify that a minimum velocity of 2 feet per second (ft/s) be maintained when the pipeline is half-full at least on a daily basis. At this velocity, the sewer flow will typically provide self-cleaning for the pipe. Due to hydraulics of a circular conduit, velocity of half-full flow in pipes approaches the velocity of nearly full flow in pipes.

Table 7.1 lists the recommended minimum slopes and their corresponding pipeline diameter for maintaining self-cleaning velocities (equal to or greater than 2 ft/s) when the pipe is flowing at half of the pipelines depth.

7.1.4 Change in Pipe Diameter

When a smaller sewer joins a larger pipe, the soffit of each pipeline should be matched to maintain the same energy gradient. For planning purposes and designing new pipes, and in the absence of field data, sewer crowns were matched at the manholes.

7.1.5 Lift Stations and Force Mains

Industry standard practice is to require that sewage lift stations have sufficient capacity to pump the peak flow with the largest pump out of service (firm capacity).

Force main piping should be sized to provide a minimum velocity of 3 ft/s at the design flow rate of the lift station and no more than 8 ft/s. For the determination of head loss, the Hazen Williams Equation is used with a C-factor of 120. These factors are typical for sewer system master planning purposes.

7.2 Wastewater Collection System Analysis

The analysis involved identifying areas within the collection system where pipe capacity is inadequate to convey design flows. Sewers that lack sufficient capacity create bottlenecks in the sewer and potentially contribute to sanitary sewer overflows (SSOs). The City's sewer system was evaluated with a hydraulic computer model, which provides a platform for effectively identifying and managing capacity deficiencies within the sewer system.

This section discusses the locations of current and projected hydraulic deficiencies resulting from flows exceeding the maximum allowable flow depth criteria.

7.2.1 Gravity System Evaluation

In accordance with the established flow depth criteria for existing sewers, pipelines with a maximum flow depth to pipe diameter (d/D) ratio greater than 0.92 were identified as capacity deficient.

It is important to understand that not all of the existing pipelines with a d/D greater than 0.92 are necessarily capacity deficient. In some cases, a surcharged condition within a given pipeline segment is due to backwater effects created by a downstream bottleneck (i.e., upstream surcharging is caused by downstream pipeline deficiencies). An illustration of backwater effects is shown on Figure 7.1. For this reason, the hydraulic model was analyzed to identify the pipeline segments that are the cause of the surcharged conditions. These capacity deficient sewers are shown on Figure 7.2.

Following the completion of the existing system analysis, improvement projects and alternatives were identified to mitigate pipeline capacity deficiencies while maintaining a maximum d/D for new sewers (0.67 for pipes 12" and smaller, 0.75 for pipes 15" and larger). These sewers will need to be replaced by larger-diameter sewers or constructed in parallel to bypass flow around hydraulically deficient sewers. The decision on whether to upsize or parallel a particular sewer should be confirmed during the preliminary design of each proposed project and is based on a number of factors, including the condition of the existing pipeline, pipeline velocities during dry-weather flow conditions, pipeline slopes, and other relevant factors.

The goal of the future system analysis is to evaluate the collection system under projected future peak flow and to ensure existing improvements are sized to convey Buildout flows and identify future deficiencies. As part of the future system analysis, the planning years 2040 and Buildout were evaluated. The term future is a general reference to planning years 2040 and Buildout.

The future system analysis of the gravity system was performed in a manner similar to the existing system evaluation. Figure 7.3 shows the locations of deficiencies under future flow conditions for the planning horizon of the Master Plan. Preliminary projects for expansion to serve future growth is also summarized, with conceptual locations for new trunks and lift stations.

7.2.2 Lift Station and Force Main Evaluation

The City's hydraulic model includes each of the seventeen operational lift stations. Data for each lift station was not available, therefore, a capacity analysis was performed on ten lift stations. The lift stations were evaluated to determine if they have capacity to convey peak flow. Lift stations with an influent peak flow above the existing firm capacity were flagged as deficient. Table 7.2 summarizes the results of the City's lift stations.

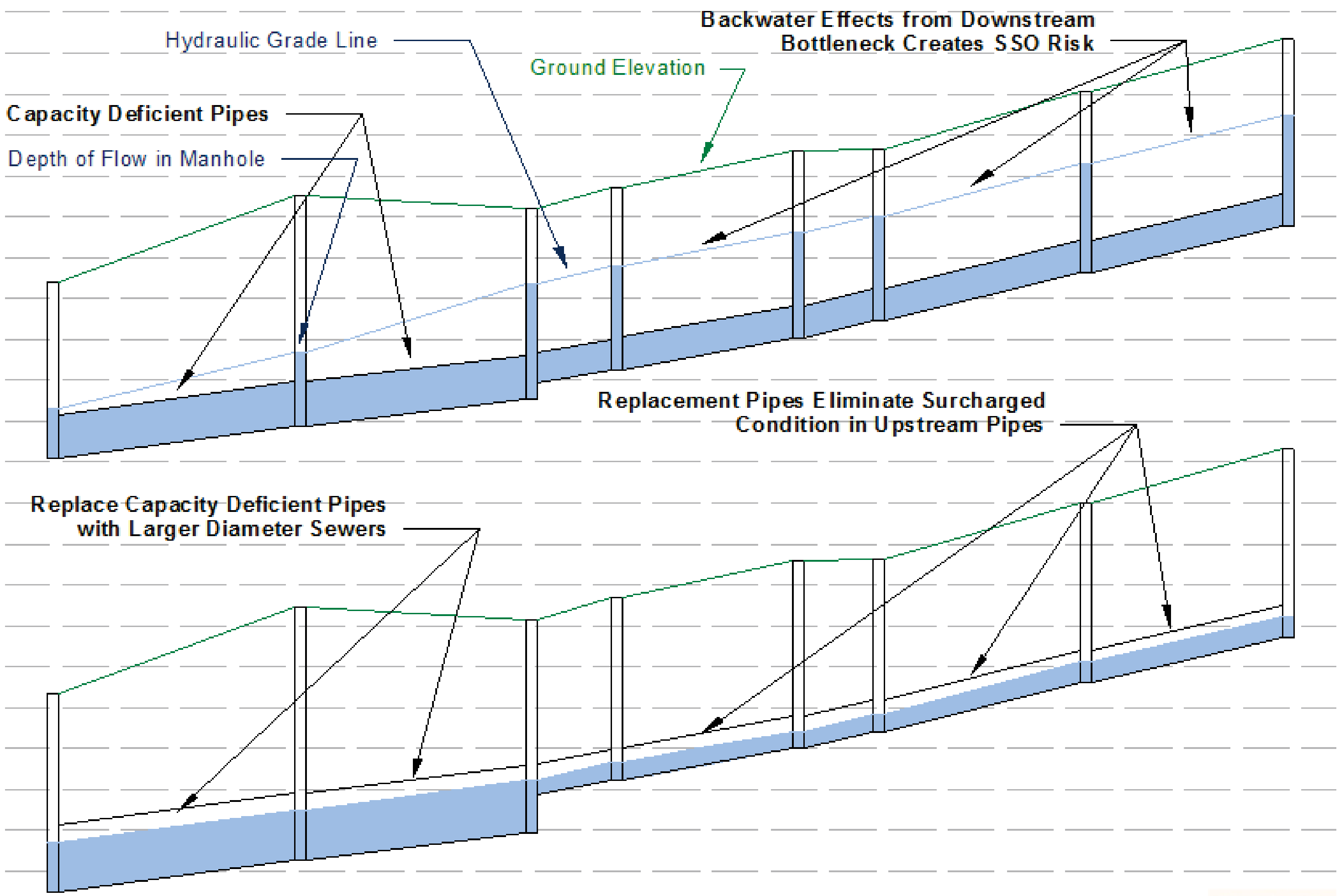

Figure 7.1 Sample Illustration of Back Water Effects in a Sewer

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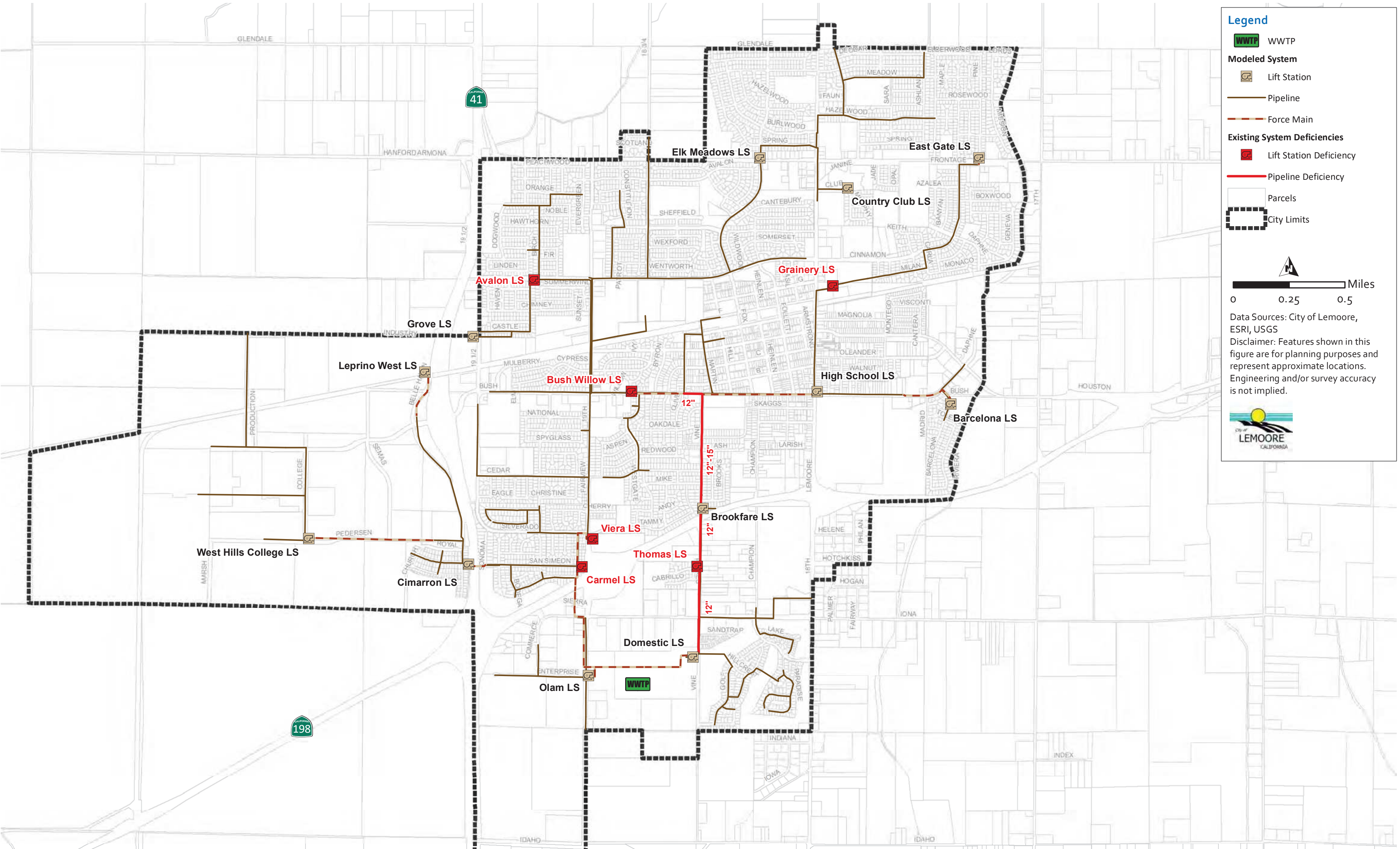

Figure 7.2 Existing Capacity Deficiencies

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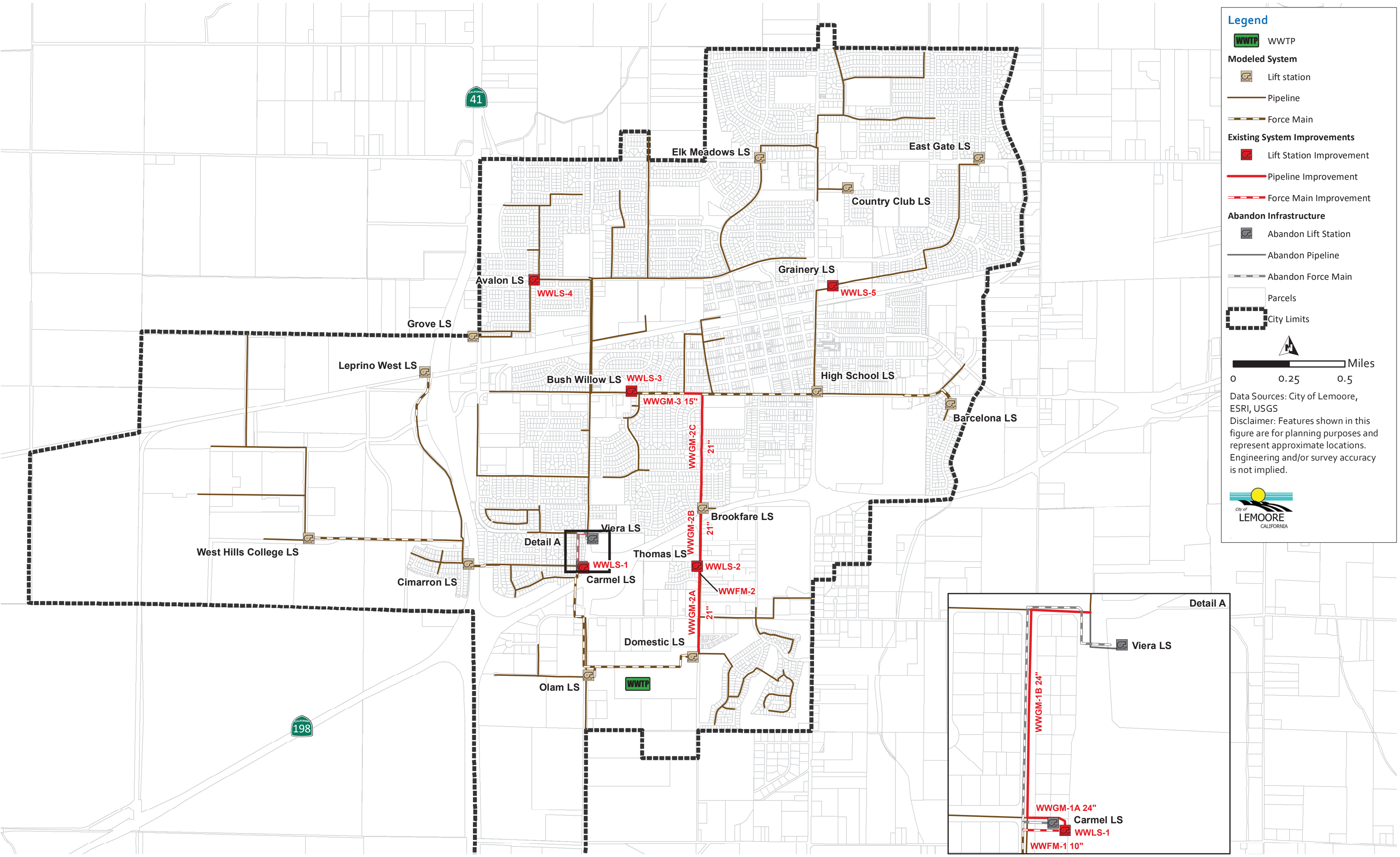

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Figure 7.3 Existing System Improvements

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Table 7.2 Lift Station Evaluation

Lift Station Name	Firm Capacity (mgd)	Peak Hourly Flows			Capacity Deficient
		Existing (mgd)	2040 (mgd)	Buildout (mgd)	
Avalon	0.33	0.50	0.53	0.55	Yes
Brookfare(1)	--	0.03	0.05	0.05	--
Bush Willow	0.61	0.94	1.04	2.08	Yes
Capistrano(1)	--	0.12	0.21	0.22	--
Carmel(1)	0.43	0.61	1.05	2.65	Yes
Cimarron	0.36	0.30	0.70	2.32	Yes
Country Club	0.14	0.03	0.03	0.03	No
East Gate(1)	--	0.17	0.17	0.17	--
Elk Meadows	0.72	0.77	0.87	1.13	Yes
Grainery	0.58	0.68	0.78	0.88	Yes
Grove(1)	--	0.06	0.06	0.09	--
High School(1)	--	0.72	0.83	0.83	--
Leprino(1)	--	0.09	0.11	0.11	--
Olam (SK)	0.5	0.32	0.59	3.5	Yes
Thomas(2)	0.72	1.00	2.73	4.20	Yes
Viera	0.62	1.68	1.89	3.03	Yes
West Hills(1)	--	0.14	0.53	0.95	--

Notes:
(1) Capacity of Lift Station is Unknown.
(2) Thomas lift station peak flow for existing is prior to recommended improvement. With improvement, parallel pipeline would be abandoned and one pipeline would convey upstream flows to Thomas LS. With improvement, existing flows would increase.

As shown in Table 7.2, six lift stations have been identified as capacity deficient under existing peak flow conditions. Five of the deficient lift station's total capacity is sufficient to convey peak flow, however, the firm capacity is insufficient. Viera's influent peak flow is greater than the lift stations total capacity. Two lift stations have been identified as capacity deficient under 2040 and one lift station under buildout flows. In addition, the Thomas lift Station's 8-inch diameter force main has been flagged as an existing deficiency, while the Cimarron and Olam force mains have been identified as future deficiencies

7.3 Recommended Improvements

This section summarizes the improvements recommended for the wastewater collection system. Figures 7.4, 7.5, and 7.6 illustrates the recommended improvements to mitigate capacity deficiencies and to serve future growth. Detailed improvement sheets for the recommended improvements can be found in Appendix H.

7.3.1 Existing Gravity Main Improvements

The following gravity main improvements are recommended to address deficiencies identified under existing conditions.

- 19th Avenue Main Project (WWGM-1): This project requires the construction of a 24-inch diameter gravity main. The Viera and Carmel lift stations will be abandoned along with their associated force mains. This project will convey flows from the intersection of 19th Avenue and Silverado Drive to a proposed lift station located at the intersection of Milan Drive and San Simeon.
  - Project WWGM-1A: A segment of pipeline will require 100 feet of 24-inch gravity main to convey flows from the north (Viera Basin) and the West Hills College area (Carmel Basin).
  - Project WWGM-1B: The 24-inch sewer will extend 1,000 feet from the existing system at the intersection of 19th Avenue and Silverado Drive and continue south on Milan Drive to San Simeon. This segment will convey flows from the Viera subbasin.
- Vine Street Main Project (WWGM-2): Vine Street's gravity main extends south from Bush Street and continues to the WWTP. The Vine street main has a parallel overflow pipeline which conveys flow to the Brookfare Lift Station. The lift station pumps overflow and adjacent residential flow into a parallel pipeline in Vine Street. The main pipeline (parallel to Brookfare LS) is conveyed to the Thomas lift station. Both pipelines continue to the WWTP. Based on observation from the temporary flow monitoring program, the overflow pipeline conveys significantly less amount of flow under dry weather conditions, indicating the pipeline is not fully utilized under dry weather and also limited by the capacity of the upstream lift station. Utilizing one sewer main for conveyance flows will remove the constraints of parallel pipelines.
  - Project WWGM-2A: This segment is located south of Highway 198 and extends to the WWTP. Under existing peak flow, the 12-inch diameter pipeline surcharges. To mitigate the capacity deficiency, this project replaces 3,200 feet of the existing main with a 21-inch diameter pipeline.
  - Project WWGM-2B: A segment of the project extends under Highway 198 and requires a steel encasement. This project replaces 400 feet of the existing main with a 21-inch diameter gravity pipeline and 42-inch encasement.
  - Project WWGM-2C: This project extends from Bush Street to the north of Highway 198. Under existing peak flow, the 15-inch and 12-inch diameter pipelines surcharge. To mitigate the capacity deficiency, this project replaces 3,000 feet of the existing main with a 21-inch diameter pipeline. In addition, the project abandons the parallel overflow pipeline and connects the Brookfare Lift Station to the proposed 21-inch pipeline.
- Central Bush Street Sewer Project (WWGM-3): This project consists of replacing the existing 12-inch diameter sewer in Bush Street from Olive Street to Vine Street with a 15-inch pipeline. Approximately 400 feet of replacement pipeline is recommended.

7.3.2 Future Gravity Main Improvements

The following gravity main improvements are recommended to address deficiencies identified under Future conditions.

- East Bush Street Project (WWGM-4A): The project will replace approximately 300 feet of 15-inch diameter pipeline in Vine Street and Bush Street. Improvement Plans show this segment of pipeline has an inverse slope. To mitigate capacity deficiencies under 2040 peak flow, it is recommended that the existing 15-inch pipeline be replaced with an 18-inch diameter and the slope of the pipeline adjusted.
- East Bush Street Main Project (WWGM-4B): This project will replace approximately 2,500 feet of 8-inch diameter pipeline in Bush Street and extends from Lemoore Street to Martin Street. In addition, the project recommends abandoning the 8-inch diameter force main running parallel in Bush Street. The High School Lift Station would convey flows into the upsized gravity main. To mitigate deficiencies identified under the 2040 peak flow scenario, it is recommended that the existing pipeline be replaced with a 15-inch diameter pipeline, which is sized to convey flows from the original tributary and flows from the High School Lift Station.
- East Bush Street Main Project (WWGM-4C): This project will replace approximately 2,100 feet of 8-inch diameter pipeline in Bush Street and extends from West of Barcelona Street to Lemoore Street. To mitigate deficiencies identified under 2040 peak flow, it is recommended to replace the existing pipelines with a 12-inch diameter pipeline.
- 19th Street Main Project (WWGM-5): The project will replace 1,300 feet of 18-inch diameter pipeline in 19th Avenue, from Cedar Lane to Silverado Drive. To mitigate deficiencies identified under 2040 peak flow, it is recommended that the existing pipeline be replaced with a 24-inch diameter pipeline.
- Lemoore Avenue Main Project (WWGM-6): This project will replace 3,000 feet of 10-inch diameter pipeline in Lemoore Avenue and extends from the Grainery Lift Station to the High School Lift Station. To mitigate deficiencies under 2040 peak flow, it is recommend that the existing pipeline be replaced with a 12-inch diameter pipeline.
- Milan Drive Sewer Project (WWGM-7): This project will replace 500 feet of 10-inch diameter pipeline directly upstream of the Grainery Lift Station. The flow levels in the identified pipelines create a bottle neck effect and cause the upstream pipelines to surcharge. To mitigate deficiencies under 2040 peak flow, it is recommended that the existing pipeline be replace with a 12-inch diameter pipeline.
- Bell Haven Drive Sewer Project (WWGM-8): This project will replace 500 feet of 8-inch sewer in Belle Haven Drive and extends from Pedersen Avenue to Park Lane. To mitigate deficiencies under 2040 peak flow, it is recommended to replace the existing pipeline with a 15-inch diameter pipeline.
- 19th Street Main Project (WWGM-9): This project will replace approximately 2,000 feet of 18-inch diameter pipeline and extends from Bush Street to Cedar Lane. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with a 24-inch diameter sewer.
- San Simeon Main Project (WWGM-10): This project will replace approximately 2,300 feet of 12-inch diameter pipeline in San Simeon and extends from Sonoma Avenue to Carmel Drive. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with an 18-inch diameter sewer.
- Park Street Main Project (WWGM-11): This project will replace approximately 200 feet of 12-inch diameter pipeline in Park Street, west of Highway 41. The project extends from Belle Haven Drive to the Cimarron Lift Station. This project is recommended to

mitigate buildout deficiencies and will require an 18-inch diameter pipeline. This project assumes that all new development west of Highway 41 and north of Highway 198 will be conveyed to the Cimarron Lift Station.

- South 19th Street Sewer Project (WWGM-12): This project will replace approximately 1,200 feet of 10-inch diameter pipeline in South 19th Avenue. The project targets the pipeline near Olam and extends to the Olam Lift Station. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with an 21-inch diameter sewer. This project assumes that all sewer flows from future development along South 19th Avenue and land designated as Employee Reserve, west of Highway 41, will be conveyed to the Olam Lift Station via the south 19th Avenue sewer.
- Cinnamon Drive Main Project (WWGM-13): This project will replace approximately 1,300 feet of 18-inch diameter pipeline in Cinnamon Avenue and extends from Liberty Drive to 19th Avenue. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with a 24-inch diameter sewer. This project assumes that all future flows north of Glendale Avenue will be convey to Liberty Avenue.
- Liberty Drive Main Project (WWGM-14): This project will replace approximately 3,400 feet of 12-inch diameter pipeline in Liberty Drive and extends from Makenna Street to Cinnamon Avenue. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with an 18-inch diameter sewer. This project assumes that additional flow from future development north of the City's current limits (north of Hanford Armona Road) will be conveyed to the Liberty Drive sewer.
- Milan Drive Sewer Project (WWGM-15): This project will replace approximately 1,300 feet of 10-inch diameter pipeline in Milan Drive and extends from Balboa Avenue to north east of Grainery Lift Station. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with a 12-inch diameter sewer. This project assumes that all flows generated northeast of Lemoore Canal are conveyed through the Milan Sewer.
- College Avenue Sewer Project (WWGM-16): This project will replace approximately 1,000 feet of 12-inch diameter pipeline in College Avenue and extends to the West Hills Lift Station. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with a 15-inch diameter sewer. This project assumes all future flows west of Semas Avenue are conveyed through the College Avenue sewer.
- Spring Lane Sewer (WWGM-17): This project will replace approximately 1,600 feet of 10-inch diameter pipeline in Spring Lane and extends from Lemoore Avenue to the Elk Meadows Lift Station. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with a 15-inch diameter sewer. This project is triggered by projected growth.

7.3.3 Existing Lift Station and Force Main Improvements

The following lift station and force main improvements are recommended to address existing deficiencies.

- Carmel Lift Station Project (WWLS-1): Under existing conditions, the Viera and Carmel lift stations have been identified as lacking the capacity to convey existing peak flow. The City has identified the construction of a single lift station to mitigate both deficiencies. The new lift station is currently being designed by QK Engineering and is at 30-percent design (December 2018). The lift station will be designed with an initial total capacity of 1.9 mgd to convey existing flows from the Viera and Carmel sewer basins. As flows increase pumps will need to be replaced to increase capacity. The proposed lift station is located at the intersection of San Simeon Drive and Carmel Drive. This project will abandon the Viera and Carmel lift station along with associated force mains.
  - WWLS-1A is based on capacity and cost information provided by QK Engineering during 30-percent design.
  - WWLS1B provides additional pumping capacity as flows increase. Peak flows are estimated to increase to 2.9 mgd by 2040 and 6.4 by buildout.
- Thomas Lift Station Project (WWLS-2): The Thomas lift station is located south of Highway 198 on Vine Street and conveys flow from an adjacent residential development and one of two parallel pipelines in Vine Street. Under current conditions, this lift station has been identified as lacking the firm capacity to convey peak flow. In addition, project WWGM-2 will abandon the parallel pipelines in Vine Street and combine flows into a larger diameter sewer. To provide reliable capacity for current and future peak flow, this project will increase the firm capacity of the Thomas Lift Station from 0.72 mgd to 4.4mgd.
  - WWLS2A is the initial capacity recommended to convey peak flows to 2040.
  - WWLS2B is the recommended capacity to convey buildout flows.
- Bush Willow Lift Station Project (WWLS-3): The firm capacity of this lift station is not adequate to convey the existing peak flow. It is recommended that the lift stations firm capacity be upgraded from 0.61 mgd to 2.1 mgd to accommodate existing and future flows.
- Avalon Lift Station Project (WWLS-4): The firm capacity of this lift station is not adequate to convey the existing peak flow. It is recommended that the lift stations firm capacity be upgraded from 0.33 mgd to 0.55 mgd to accommodate existing and future flows.
- Grainery Lift Station Project (WWLS-5): The firm capacity of this lift station is not adequate to convey the existing peak flow. It is recommended that the lift stations firm capacity be upgraded from 0.58 mgd to 0.88 mgd to accommodate existing and future flows.
- Carmel Lift Station Force Main Project (WWFM-1): Dual force mains are recommended to convey flows into the existing 16-inch force main. A 10-inch and 12-inch diameter force mains are recommended to convey existing and future flows. Under existing and 2040 flow conditions the 10-inch will convey dry weather and wet weather flows. To convey flows beyond 2040, a second force main (12-inch diameter) is recommended.
- Thomas Lift Station Force Main Project (WWFM-2): This project will replace approximately 100 feet of 8-inch diameter force main. To mitigate capacity deficiencies under existing conditions, it is recommended the pipeline be replaced with a 10-inch diameter force main to accommodate existing and 2040 flows. To convey flows beyond 2040, a second force main (10-inch diameter) is recommended under future conditions.

7.3.4 Future Lift Station and Force Main Improvements.

The following lift station and force main improvements are recommended to address Future deficiencies.

- Cimarron Lift Station Project (WWLS-6): The firm capacity of this lift station is not adequate to convey 2040 peak flow. It is recommended that the lift stations firm capacity be upgraded from 0.36 mgd to 2.3 mgd to accommodate future flows. This lift station provides service to the Wet Hills Area, which has potential for significant growth.
- Elk Meadows Lift Station Project (WWLS-7): The firm capacity of this lift station is not adequate to convey 2040 PWWF. It is recommended that the lift stations firm capacity be upgraded from 0.72 mgd to 1.2 mgd to accommodate future flows. This lift station provides service to the north east and will convey flows from future development.
- Glendale Lift Station Project (WWLS-8): This project is identified as collection system expansion and discussed in Section 7.3.5.
- Olam (SK) Lift Station Project (WWLS-9): The firm capacity of this lift station is not adequate to convey Buildout peak flow. It is recommended that the lift stations firm capacity be upgraded from 0.5 mgd to 3.5 mgd to accommodate existing and future flows. Under buildout it was assumed that that all sewer flows from future development along South 19th Avenue and land designated as Employee Reserve, west of Highway 41, will be conveyed to the Olam Lift Station.
- Glendale Avenue Lift Station Force main Project (WWFM-3): This project is identified as collection system expansion and discussed in Section 7.3.5.
- Cimarron Lift Station Force Main Project (WWFM -4): This project will replace approximately 450 feet of 8-inch diameter force main under Highway 41. To mitigate capacity deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with a 12-inch diameter force main. Because the pipeline crosses a highway, the force main will require a 24-inch steel casing.
- Olam (SK) Lift Station Force Main Project (WWFM-5): This project will replace approximately 400 feet of 8-inch diameter force main. To mitigate capacity deficiencies under buildout conditions, it is recommended the existing pipeline be replaced with a 12-inch diameter force main. Under buildout it's assumed that all sewer flows from future development along South 19th Avenue and land designated as Employee Reserve, west of Highway 41, will be conveyed to the Olam Lift.

7.3.5 Collection System Expansion to Serve Future Growth.

The following recommendations are preliminary sewer trunk alignments and lift stations that will serve future growth. The location of the new trunks and lift stations are conceptual and should be refined as more data becomes available.

–

- Glendale Sewer Projects (WWFM-3, WWLS-8): This project will serve growth in the northeast quadrant. This project is planned to address long term phasing (2029 – 2040), with initial development identified as Lacy Ranch.
  - WWFM-3 Is a 6-inch force main and extends approximately 500 feet to the existing system.

   - WWLS—7 will serve future growth within the north east quadrant of the planning area and will have an initial firm capacity of 0.15 mgd (Total capacity 0.3 mgd). A preliminary analysis indicated a lift station is required due to the topography, minimum slope requirements, and for crossing an irrigation canal. The project is located near the intersection of Glendale Avenue and Ashland Drive. Capacity is available in both the Ashland Drive sewer trunk and the Quandt Drive sewer trunk. As development to the east occurs, pumps will need to be replaced or added to increase capacity. Peak flows are estimated to increase 0.24 mgd at buildout (Total Firm Capacity 0.39 mgd).
- 17th Avenue Sewer Project (WWGM 18, WWFM-6, and Hanford Armona LS WWLS-10): These projects will serve future growth and potentially existing users northeast of the City's current city limits. This project will require the construction of gravity sewers, a lift station and associated force main. This project is separated into the following segments:
   - WWGM-18 consists of 5,600 feet of 8-inch diameter pipeline in 17th Avenue. The project will convey flow from growth and existing users north and south of Hanford Armona Road.
   - WWFM-5 is a 6-inch force main and extends approximately 1,300 feet to the existing system.
   - WWLS-10 is recommended to convey flows under the Lemoore Canal. The lift station is estimated to have a firm capacity of 0.10 mgd. The proposed lift station would be located near the intersection of Hanford Armona Road and 17th Avenue.
- Houston Avenue Sewer Projects (WWGM-19, WWFM-7, and D Street LS WWLS-11): These projects will serve future growth and potentially existing users east of the City's current limits. This project will require the construction of gravity trunk sewers, as well as a lift station and its associated force main. This project is separated into the following segments:
   - WWGM-19 consists of 5,100 feet of 8-inch diameter pipeline in D Street, Houston Avenue, and 17th Avenue. The project will convey flows from growth and existing users.
   - WWLS-11 will have a firm capacity of 0.30 mgd to convey future peak flow. A lift station and force main were recommended to convey flows under the Lemoore canal.
   - WWFM-7 is a 6-inch force main and extend approximately 1,000 feet to the existing force main in Barcelona Drive.
- 18th Avenue Sewer Projects (WWGM-20A, WWGM-20B, WWGM-20C, WWFM-8, WWFM-9 18th Avenue Lift Station WWLS-12, and South 18th Avenue Lift Station WWLS-13): This projects will serve future growth within the south east quadrant of the City. The project extends along 18th Avenue and is bounded by Idaho Avenue and Iona Avenue. This project will require a lift station, force main, and gravity mains. The project is separated into the following segments:
   - WWGM-20A consists of 3,400 feet of 10-inch diameter pipeline in 18th Avenue. The project extends south of Indiana Road to Iona Avenue.WWGM-20B consists of 1,700 feet of 8-inch diameter pipeline in 18th Avenue and extends from Idaho Avenue to a canal south of Indiana Avenue.

  - WWGM-20B consists of 1,700 feet of 8-inch diameter pipeline in 18th Avenue. The project extends from Idaho Avenue to the proposed WWLS-13.
  - WWGM-20C consists of 1,000 feet of 8-inch diameter pipeline in Iona Avenue. The project extends from Fairway Drive to 18th Avenue in Iona Avenue.
  - WWFM-8 is a 6-inch diameter force main and extends 900 feet from 18th Avenue to the existing system in Iona Avenue.
  - WWLS-12 will have a firm capacity of 0.52 mgd. A preliminary analysis indicated a lift station is required due to the topography of the area. The project is located near the intersection of Iona Avenue and 18th Avenue.
  - WWFM-9 is a 6-inch diameter force main will extend 300 feet in 18th Avenue and cross a canal.
  - WWLS-13 will have a firm capacity of 0.24 mgd. A preliminary analysis indicated a lift station is required due to the topography, extensive length, minimum slope of proposed gravity mains and canal crossing required. The project is located near the intersection of Indiana Avenue and 18th Avenue.
- Vine Street Sewer Project (WWGM-21): This projects will serve future growth within the south quadrant of the City. This project will construct 3,500 feet of 15-inch diameter pipeline in South Vine Street. The project will extend the service area south of the WWTP and provide service to residential and industrial users along South Vine Street.
- South 19th Avenue Main Project (WWGM-22): This projects will serve future growth within the southwest quadrant of the City. The project extends from Idaho Avenue, continues north along 19th Avenue and connects to the existing system. This segments consists of 2,700 feet of 21-inch diameter pipeline and will convey flows form the Employment Reserve area, industrial users along south 19th Avenue, and Idaho-Jackson Annexation Area.
- Idaho Avenue Main Projects (WWGM-23A, WWGM-23B, WWFM-10 and Idaho Avenue LS WWLS-14): This project will service future growth within the Employment Reserve area in the southwest. The project requires a lift station, force main and gravity mains. The project is separated into the following segments:
  - WWGM-23A is located in Idaho Road and consists of 2,600 feet of 15-inch diameter, west of Highway 41.
  - WWGM-23B is located in Idaho Road, west of Highway 41. This reach will consist of 4,100 feet of 12-inch diameter pipeline.
  - WWLS-14 is estimated to require a firm capacity of 1.0 mgd to convey peak flow from the Reserve Employment Area.
  - WWFM-10 will cross Highway 41 and connect to a proposed pipeline in 19th Avenue. This reach of pipeline consists of an 8-inch diameter force main and extends 2,700 feet. The segment that crosses Highway 41 will require a steel casing.
- Iona Avenue Main Project (WWGM-24): This project extends along an unimproved area of agricultural land. This segment of pipeline consists of 7,100 feet of 12-inch diameter pipeline. The project will connect to the existing system in Park Lane.
- Idaho – Jackson Annexation East (WWGM-25, WWFM-11, and South Vine Street WWLS-15): This area is assumed to be light industrial and is considered east of the irrigation canal, extending from Idaho Avenue to Jackson Avenue. This project will service future

growth within the eastern Annexation area in the south and will require gravity mains, a lift station, and force main. The project is separated into the following segments:

  - WWGM-25 consists of 3,700 feet of 10-inch diameter pipeline.
  - WWFM-11 requires a 6-inch diameter force and extends 2,700 feet.
  - WWLS-13 is estimated to require a firm capacity of 0.85 mgd.

- Idaho – Jackson Annexation West (WWGM-26, WWFM-12, and South 19th Ave WWLS-16): This area is assumed to be light industrial and will convey flows west of the canal to Highway 41. This project will service future growth within the western Annexation and industrial along 19th Avenue. The project is separated into the following segments:
  - WWGM-26 consists of 3,500 feet of 12-inch diameter pipeline.
  - WWFM-12 requires a 6-inch force main and extends 1,700 feet.
  - WWLS-14 is estimated to require a firm capacity of 0.75 mgd.
- North Liberty Drive (WWGM-27, WWFM-13, WWLS-17): This project will serve future growth northwest of the City's limits. Improvements consist of a lift station, force main, and gravity mains. The project will connect to the existing system in Liberty Drive. This project is separated into the following segments:
  - WWGM-27 segment of pipeline consists of 1,700 feet of 15-inch diameter pipeline and will connect to the existing system in Liberty Drive.
  - WWFM-13 consists of a 6-inch diameter pipeline and extends 1,400 feet.
  - WWLS-17 is estimated to require a firm capacity of 0.87 mgd.

Other miscellaneous projects have been recommended to expand and optimize the operation of the City's sewer system. These projects include:

- Annual Sewer Line Replacement Program (WWRR-1): The purpose of the program is to identify and replace sewer infrastructure susceptible to failure or showing corrosion and deterioration. This program will maintain operation of the collection system by replacing infrastructure prior to failure.
- Sewer Master Plan Update (WWO-1): It is recommended that the City undergoes a Sewer Master Plan Update every 5-years to evaluate wastewater collection system.
- Septic removal (WWO-2): These projects are recommended to connect septic users to the City's collection system:
  - 1,000 feet of 8-inch diameter pipeline is recommended to connect the Lemoore Mobile Home Park on Hanford Armona Road to the existing System.
  - 2,000 feet of 8-inch sewer is recommended to connect the community east of the Lemoore Golf Course on 18th Avenue.
  - 1,500 feet of 8-inch sewer is recommend to connect users along Champion Street.

7.3.6 Hydraulic Model Wet Weather Calibration

The City's hydraulic model was calibrated to dry weather flow conditions based on flow monitoring data at 15 locations throughout the City. Wet weather flow monitoring was not conducted, and therefore the model's wet weather calibration was not performed, instead Carollo used the best available data to establish a wet weather peaking factor. With wet weather flow monitoring data, Infiltration and Inflow (I/I) parameters in the model could be established and help to define the wet weather responses through various basins within the City. This would help to identify locations of high I/I in the City. For this reason, it is recommended that the City plan to conduct a future wet weather flow monitoring program in the rainy season.

7.3.7 Collection System GIS Update

The City may consider updating their GIS data to include pipeline inverts, diameter, material and pipeline age. A pipeline age and material summary can be accomplished with a combination of installation dates and approved dates outlined in drawings. To further expand on probable installation dates, the City may utilize upstream and downstream pipelines with known data to approximate or review nearby utilities such as water lines. Having this data available will assist the City in identifying pipelines approaching their probable useful life. An age-based analysis can be performed to provide a statistical evaluation of decay and potential failure of pipelines based on material. This type of analysis typically uses assumed "useful life" values, which are based on industry literature.

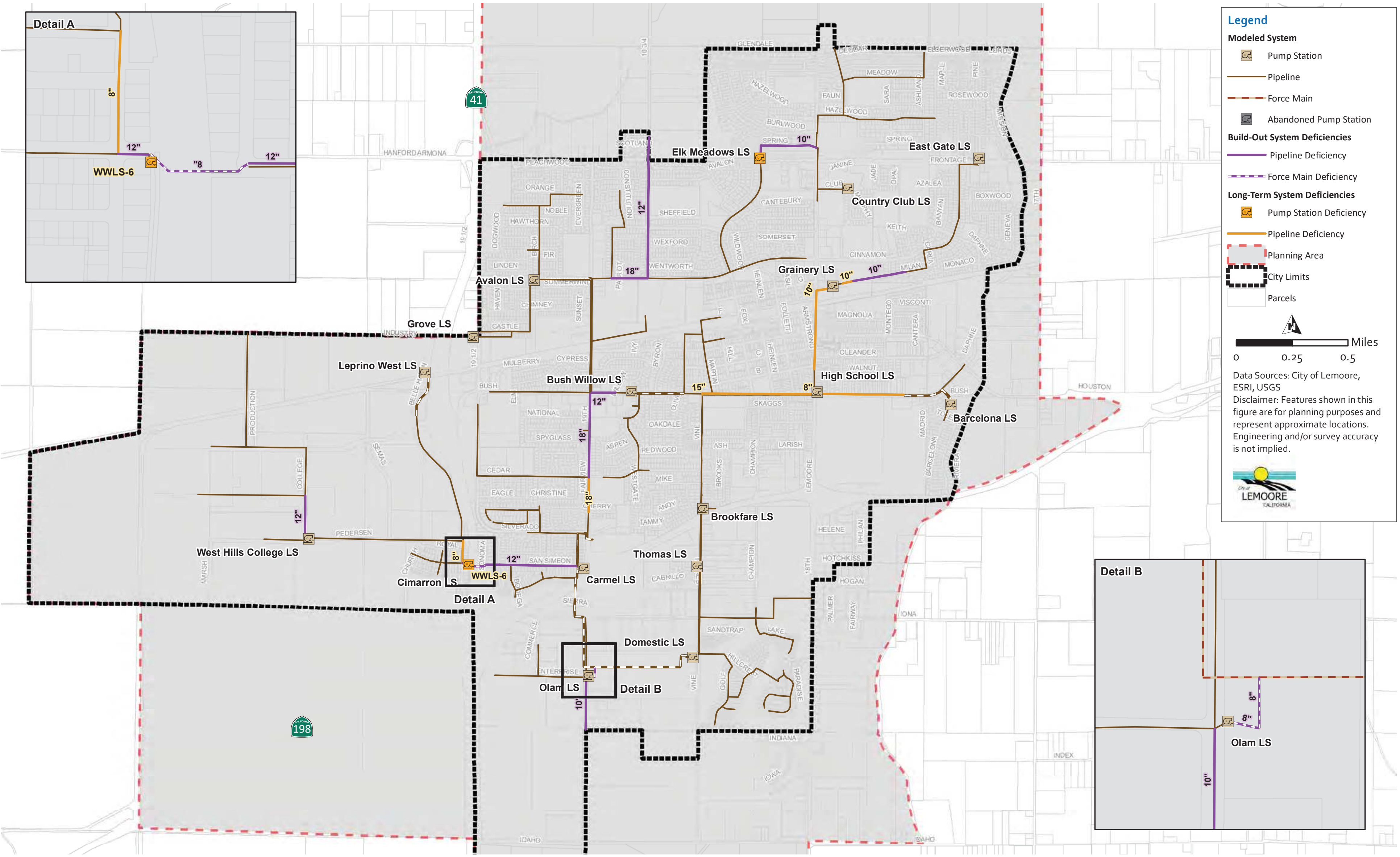

Figure 7.4 **Future Capacity Deficiencies**

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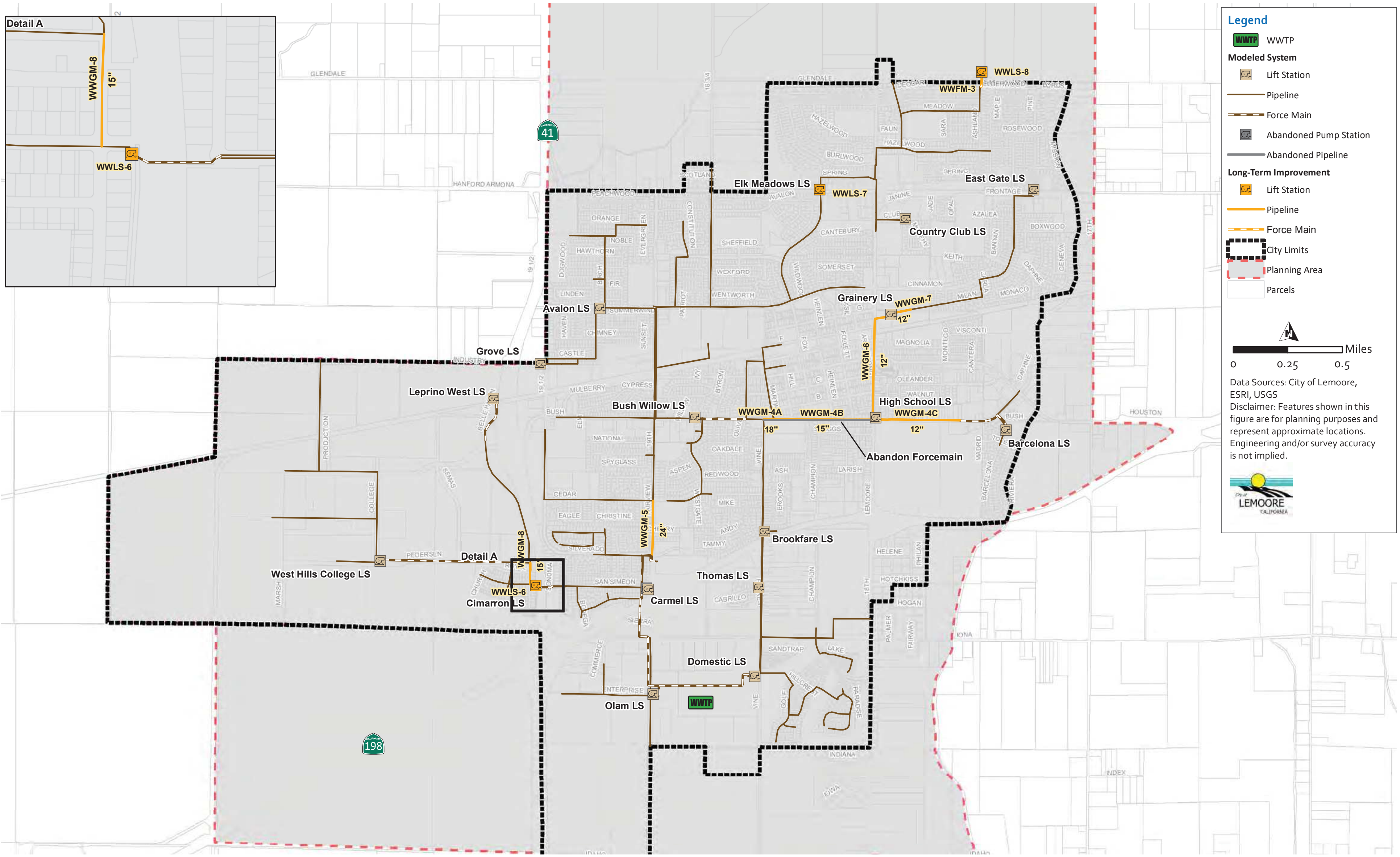

Figure 7.5 2040 System Improvements

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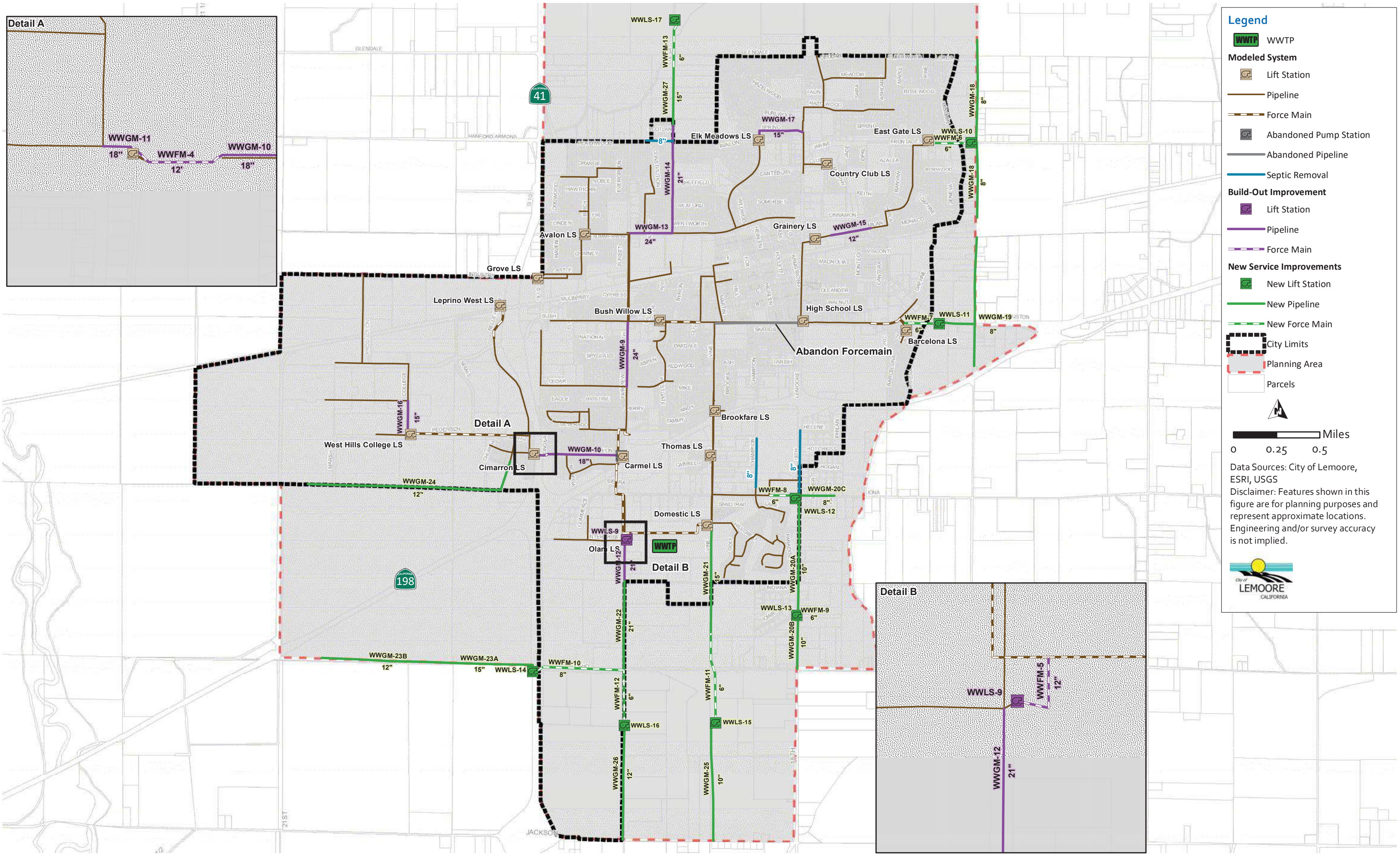

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Figure 7.6 **Buildout System Improvements**

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Chapter 8

RECYCLED WATER

8.1 Background

The City is interested in determining the feasibility of constructing a recycled water (RW) system to replace or augment existing groundwater supplies throughout the City. Drivers for recycled water include achieving a more sustainable and reliable groundwater supply, controlling effluent discharge mechanisms, and aiding the State in achieving urban water use reduction goals.

The City relies on groundwater while nearby agricultural entities rely on a combination of groundwater and surface water. Over the years, groundwater in the Central Valley has become increasingly taxed to meet urban and agricultural demands. As a result, the need to procure alternative water supplies has increased, which includes recycling treated wastewater.

In September 2014, California passed the Sustainable Groundwater Management Act (SGMA), which provides the framework for sustainable groundwater management. SGMA requires governments and water agencies in high- and medium-priority groundwater basins to reduce and eventually eliminate overdraft to bring groundwater basins into balanced levels of pumping and recharge. The Tulare Lake Basin is the source of Lemoore's groundwater supply and is categorized as high priority, which further justifies the push for recycled water.

Furthermore, the City has historically relied on Westlake Farms, and will rely on Leprino in the future, to accept their treated effluent from the wastewater treatment facility (WWTF). It is in the City's best interest to have an alternative method of discharge that provides them with reliability and assurance for planning purposes. Recycling water within the City creates additional potential discharge opportunities under the control of the City that would otherwise be unattainable.

This chapter describes potential RW facilities, water quality, users, and their demands.

8.2 Wastewater Production

8.2.1 Current and Projected and Wastewater Generation

Chapter 4: Wastewater Flows and Loading describes the daily and maximum wastewater generation within the collection system. Table 8.1 summarizes the various current and future flows.

Table 8.1 Flow Projections

Flow Condition	ADWF (mgd)	MMF (mgd)	MMF Peaking Factor	PWWF (mgd)	PWWF Peaking Factor
Existing	1.95	2.15	1.1	4.88	2.5
2040	2.38	2.61	1.1	5.95	2.5
Buildout	5.92	6.51	1.1	14.80	2.5

Recycled water treatment systems are sized around the 2040 maximum month flows of 2.61 mgd as a way to capture and recycle the over 90 percent of influent flows without being oversized to capture all wet weather flows.

8.3 Recycled Water Demand

8.3.1 Landscape Irrigation Requirements

A recycled water system size is based on local hydrologic properties such as precipitation and evapotranspiration, which defines the irrigation requirement. Expected landscape irrigation requirements for the City were calculated based on monthly average evapotranspiration and rainfall data collected from the Stratford weather station.

To calculate the amount of evapotranspiration occurring in the study area, the following formula was used:

$$ET_L = K_L * ET_o$$

Where: ET_L = Evapotranspiration of landscaped areas (inches).

K_L = Landscaped area crop coefficient.

ET_o = Reference evapotranspiration (inches).

The reference Evapotranspiration was obtained from the California Irrigation Management Information System (CIMIS) database. The City is located in Zone 16: Westside San Joaquin Valley and Mountains East and West of Imperial Valley.

To calculate the landscape evapotranspiration, the landscaped area crop coefficient was estimated using information contained in the Guide to Estimating Irrigation Water Needs of Landscape Plantings in California by the California Department of Water Resources. The landscaped area crop coefficient is the product of an average species factor (k_s), density factor (k_d), and microclimate factor (k_{mc}). These were each estimated to be 1.0, with the assumption that urban irrigation will primarily consist of turf grasses, which have ET_L values close to the reference ET_o. The amount of precipitation, evapotranspiration, and irrigation required for the geographical area are listed in Table 8.2. The net annual average landscape irrigation requirement in the study area is just greater than 6 feet, 75 percent of which occurs between May and September.

Table 8.2 Average Monthly Landscape Irrigation Requirements

Month	Landscape Area Evapotranspiration(1) (inches)	Average Rainfall(2) (inches)	Net Irrigation Requirement(3) (inches)	Percent of Annual Net Irrigation Requirement (4) (%)
January	1.19	1.54	0	0%
February	2.14	1.42	0.98	1%
March	4.11	1.21	3.92	5%
April	6.06	0.50	7.52	10%
May	8.16	0.30	10.63	15%
June	8.97	0.05	12.07	16%
July	9.04	0.05	12.17	17%
August	8.12	0.06	10.90	15%
September	6.18	0.12	8.20	11%
October	4.09	0.67	4.62	6%
November	2.12	0.49	2.20	3%
December	1.16	1.27	0	0%
Total	**61.3**	**7.7**	**73.21**	**100%**

Notes:

(1) Evapotranspiration (ETL) = Reference Evapotranspiration (ET_o) x Landscaped Crop Area Coefficient (KL). Reference evapotranspiration values obtained from the California Irrigation Management Information System Reference Evapotranspiration Zone Map and rates included in the Guide to Estimating Irrigation Water Needs of Landscape Plantings in California by the California Department of Water Resources (Guide). The City is located in Zone 16 (Westside San Joaquin Valley and Mountains East and West of Imperial Valley). Landscape crop coefficient (KL) = Average Species Factor (Ks) x Density Factor (Kd) x Microclimate Factor (Kmc). Ks, Kd, Kmc estimated using data in the Guide.

(2) Source: Stratford Station #015 Data from the California Irrigation Management Information System, November 1982 – August 2017.

(3) Net Irrigation Requirement = (Evapotranspiration – Rainfall)*1.15/0.85. Where 0.85 = 85 percent Irrigation Factor (Average Value from Carlos and Guitjens, University of Nevada) and 1.15 = 15 percent Leaching Fraction (Average value from Ayers and Westcot, "Water Quality for Agriculture," Food and Agriculture Organization of the United Nations).

(4) Current month net irrigation requirement divided by total net irrigation requirement.

8.3.2 Potential Recycled Water Users and Distribution System

An initial list of potential recycled water users was compiled by identifying open green spaces in the City. This included Lemoore Golf Course, West Hills College, Lemoore Cemetery, BMX Raceway, and most schools, parks, and churches. The total acreage of all potential RW users is 430 acres. After discussions with the City and an initial water balance, the list of recycled water users was limited to the Lemoore Golf Course and Lemoore High School, due to their proximity to the WWTF and irrigation demands closely matching projected effluent flows. The proposed recycled water use area is just under 200 acres. Figure 8.1 shows the potential recycled water areas and their proximity to the WWTF. The golf course has a 1.5 acre pond that is used as a storage pond for irrigation. The golf course has their own groundwater well for irrigation separate from the City's water distribution system. The City's water distribution system supplies the Lemoore High School irrigation system. A recycled water distribution pipe would need to be constructed between the WWTF and the golf course pond. A separate pipeline would connect the Lemoore High School irrigation system to the golf course pond.

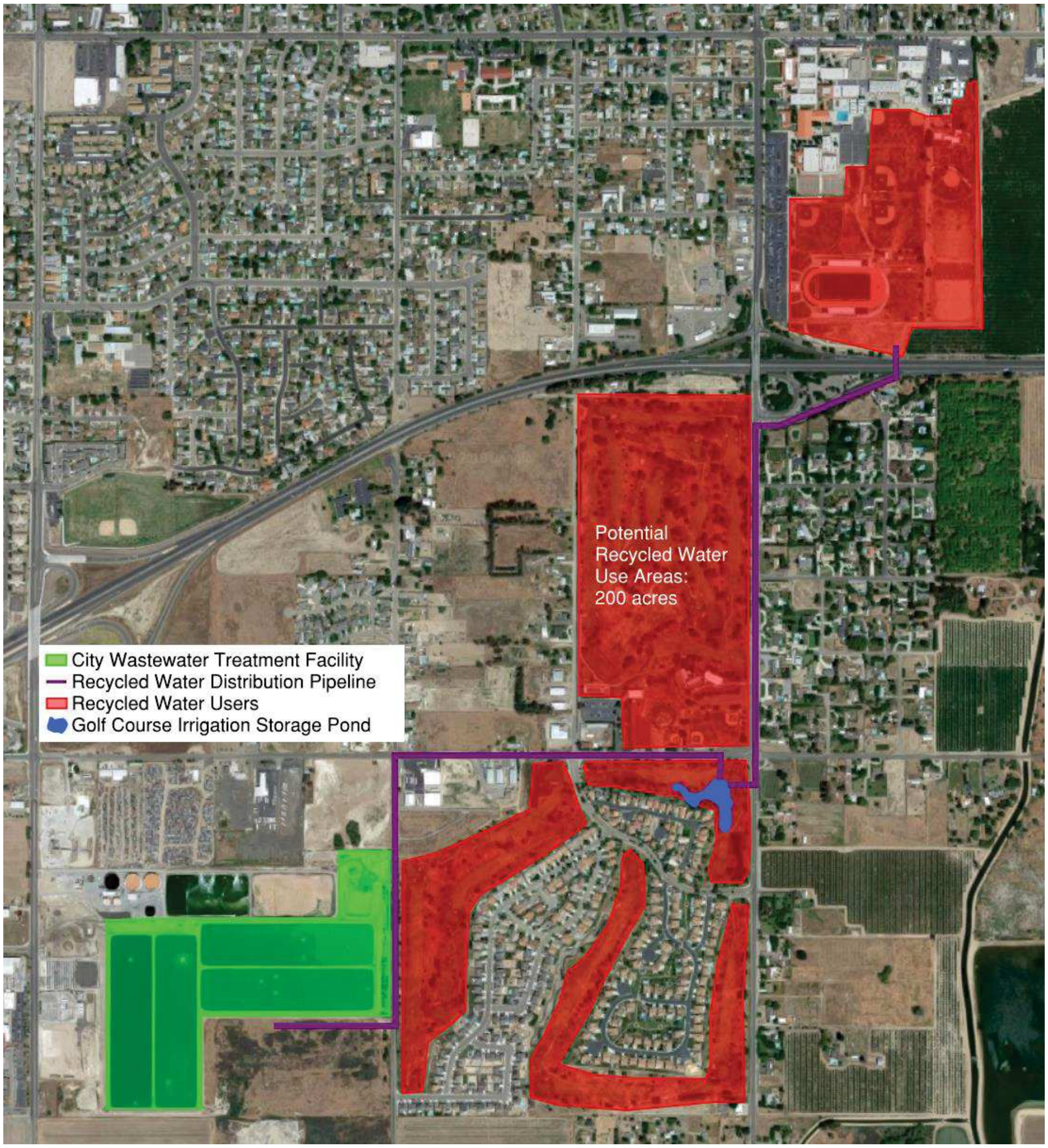


Figure 8.1 Potential Recycled Water Users and Distribution System

A water balance was compiled by calendar month based on the typical landscape irrigation requirements for the identified recycled water users and the 2040 wastewater effluent flows. The water balance is included in Appendix I. In 2040 the recycled water demand in July nearly matches the projected maximum month wastewater generated, as shown in Figure 8.2. Due to the seasonal variability of recycled water demand, a tertiary filtration and disinfection system could be used seasonally. In the summer months the recycled water treatment system can treat nearly all wastewater flows and be fully utilized. The RW treatment system would likely not operate at all during periods of low RW demand. Secondary effluent storage may be needed in order to provide flow equalization to the tertiary system, which would improve effluent quality reliability. Flow equalization can be addressed during design phase based on diurnal flow monitoring data.

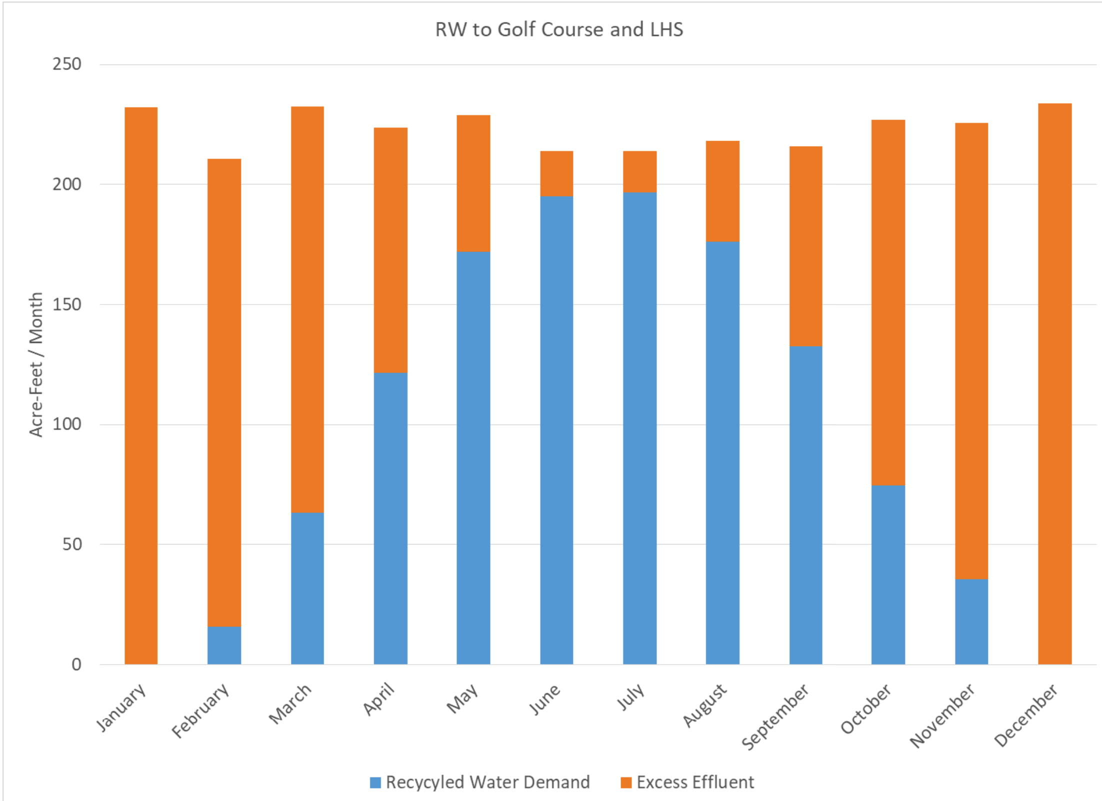


Figure 8.2 Identified Recycled Water Demands and 2040 Excess Effluent

The storage pond at the golf course is likely not large enough to provide all storage needed for the golf course and high school irrigation needs. A storage pond is needed on site at the WWTF to store recycled water until the users irrigate the use areas. The storage pond is sized to store the amount of recycled water treated between watering. Therefore, if the golf course is watered every day the storage pond will be sized to store the volume of recycled water produced in one day. It is assumed that the golf course and high school irrigate three days per week, which puts the RW storage needs at 6.4 MG, which includes a 30 percent contingency. Assuming a depth of six feet, four acres, or roughly half of one of the existing treatment ponds can be converted to a recycled water storage pond. The pond will provide operational flexibility between the recycled water treatment system and irrigation schedule. Table 8.3 shows the estimated construction costs and scope for a recycled water distribution and storage system. Appendix J provides more details regarding the recycled water infrastructure costs.

Table 8.3 Estimate of Recycled Water Distribution and Storage Construction Cost

Parameter	Estimated Construction Cost(1)	Includes
Recycled Water Distribution	$2,943,000	16-inch pipe from WWTF to golf course; 8-inch pipe from golf course to high school; jack and bore under HWY 198
Recycled Water Storage	$235,000	4 acres of pond liner; earthwork for berm to convert existing pond into storage pond
Total	**$3,178,000**	

Notes:
(1) Cost estimate is based on 2018 costs and includes 30 percent estimating contingency. See Appendix J for capital cost item details

8.4 Recycled Water Discharge Requirements

Development of a recycled water program will necessitate stricter discharge requirements. The City would need to construct a new tertiary WWTF, which will result in a new Waste Discharge Requirement issued by the RWQCB. Table 8.4 lists some of the likely effluent requirements for a new recycled water treatment facility.

Table 8.4 Disinfected Tertiary Effluent Recycled Water Treatment Objectives

Parameter	Units	Effluent Limit
BOD	mg/L	10
TSS	mg/L	10
Total Nitrogen as N	mg/L	10
Total Coliform	MPN(1)/100 mL	2.2(2)
Turbidity	NTU	0.2(3)

Notes:
(1) Most Probable Number
(2) Disinfected tertiary effluent with total coliform < 2.2 MPN/100 mL is approved for spray irrigation of food crops, landscape irrigation, and non-restricted recreational impoundments.
(3) Effluent turbidity will be less than 0.2 NTU 95 percent of the time and never to exceed 0.5 NTU. Monitored continuously.

8.5 Recycled Water Quality

The electrical conductivity in recycled water, in addition to high concentrations of other mineral compounds, can have a detrimental effect on the crops onto which recycled water is applied. The City's effluent wastewater mineral concentration was compared to agronomic application guidelines to determine the potential impacts or restrictions to use for irrigation (Table 8.5). Because traditional secondary and tertiary treatment processes do not remove electrical conductivity (EC) or minerals, future effluent concentrations are assumed to be the same as current effluent concentrations. Table 8.5 also compares the City's effluent quality to golf course irrigation water quality.

Table 8.5 Recycled Water Quality and Comparison to Salinity Guidelines

Parameter	Units	Degree of Use Restriction[1, 2]			City Effluent[3]	Golf Course Wells	
		None	Slight	Severe		#12 Fairway	#2 Fairway
Salinity							
Electrical Conductance	dS/m	<0.7	**0.7-3.0**	>3.0	1.2	0.75	0.83
Total Dissolved Solids (TDS)	mg/L	<450	**450-2000**	>2000	710	450	470
Permeability							
aSAR = 0 - 3 and EC		>0.7	0.7-0.2	<0.2			
= 3 - 6 and EC		>1.2	1.2-0.3	<0.3			
= 6 - 12 and EC		>1.9	1.9-.5	<0.5			
= 12 - 20 and EC		>2.9	2.9-1.9	<1.9			
= 20 - 40 and EC		>5.0	5.0-2.9	**<2.9**	aSAR=22; EC=1.2	aSAR=28; EC=0.75	aSAR=3.9; EC=0.83
Sodium							
Root Absorption	SAR	<3	3-9	**>9**	16.3	26	2.8
Foliar Absorption	mg/L	<70	**>70**		210	180	94
Chloride							
Root Absorption	mg/L	**<140**	140-355	>365	117	29	71
Foliar Absorption	mg/L	<100	**>100**		117	29	71
Boron	mg/L	<0.7	**0.7-3.0**	>3.0	0.82	1.2	0.27
pH	–		**6.5-8.4 (normal range)**		7.7	8.5	7.8
Total Nitrogen (N)[4]	mg/L	<5	**5-30**	>30	8		
Bicarbonate (HCO_3)[5]	mg/L	<90	**90-500**	>500	450	300	230

Notes:
(1) Adapted from University of California Committee of Consultants (1974) and Water Quality for Agriculture (Ayers and Westcot, 1984). These are general guidelines and do not take into account crop-specific or site-specific conditions.
(2) Definition of the "Degree of Use Restriction" terms:
None = Recycled water can be used similar to the best available irrigation water.
Slight = Some additional management will be required above that with the best available irrigation water in terms of leaching salts from the root zone and/or choice plants.
Severe = Typically cannot be used due to limitations imposed by the specific parameters.
(3) The City's effluent data is calculated as the average effluent quality based on monthly samples taken between October 2017 and September 2018.
(4) Effluent total nitrogen concentration estimated based on modeling efforts of proposed treatment alternatives.
(5) Presence of bicarbonate can result in unsightly foliar deposits.

The City's effluent water quality has high concentrations of sodium and chloride. Because the calcium and magnesium concentrations are relatively low, the sodium adsorption ratio (SAR), which is the ratio of sodium to calcium and magnesium, is very high. A high SAR generally inhibits the plants ability to uptake water and nutrients and prevents healthy root growth.

The golf course, identified as an ideal recycled water user, has three irrigation water supplies: the Lemoore Canal, and two wells, located on hole 12 and hole 2. During the summer when irrigation demands are highest, the golf course primarily irrigates using canal water, barring availability. The Lemoore Canal originates from the surface waters of the Kings River. Surface water inherently has lower mineral concentrations than groundwater, which is more suitable for irrigation. The water qualities of the golf course irrigation wells were sampled to compare the viability of recycled water for the City's effluent. Although some characteristics of the well water indicate possible restrictions for irrigation, overall the well water is more suitable for irrigation than the City's effluent due to the high mineral content of the effluent.

Given the SAR value and sodium concentration in the City's wastewater, the effluent, if not treated to remove salts, will likely be detrimental for many crops, including landscape irrigation of turf grass.

8.5.1 General Recycled Water Management Practices to Control Salinity Impacts

The successful long-term use of recycled irrigation water depends on many factors beyond just water quality, including the salinity of the RW, rainfall, leaching, soil drainage, irrigation water management, salt tolerance of plants, and soil management practices. While not the sole factor, a minimum level of water quality is also necessary.

Because salinity problems may eventually develop from the use of any water due to its mineral content, the following measures can be implemented to manage salinity in either agricultural or landscape irrigation:

- Irrigate more frequently to maintain an adequate soil water supply.
- Select plants that are tolerant of an existing or potential salinity level.
- Routinely use extra water to satisfy the leaching requirements.
- Direct the spray pattern of sprinklers away from foliage. To reduce foliar absorption, don't water during periods of high temperature and low humidity or high winds. Change time of irrigation to early morning, late afternoon, or night.
- Maintain good downward water percolation by using deep tillage or artificial drainage to prevent the development of a perched water table.

On-site maintenance concerns include additional conversion costs from potable irrigation valves and appurtenances to equipment that is more compatible with recycled water, due to higher salinity and salt build up in sprinkler heads.

A small-scale demonstration project utilizing salinity control measures would allow the City to observe the impacts of irrigating turf grass with recycled water quality effluent.

8.5.2 Salinity Reduction Alternatives

Conventional secondary and tertiary treatment processes are capable of removing organics and solids, however, they do not remove inorganic ions such as sodium and chloride. As was identified in the previous section, for recycled water to be viable as a water supply to irrigate a wide range of crops, urban landscaping and turf, salts will need to be reduced in the wastewater.

Salt reduction can occur by two fundamentally different means, discharge prevention or active treatment. A salinity audit is needed to identify and quantify the salinity source contributors to the wastewater. One way to reduce salts is to implement a source quality control program. The City could identify industrial and commercial dischargers to the collection system and require salt reduction at the point of discharge. The sources of salt can come from industrial processes or industrial uses of the source water (boilers, water softeners, chemical additives, etc.). This could mean that industries that never had pre-treatment would now be required to implement a capital project and maintain a wastewater treatment process to remove salts from the discharge. Additionally, industries would be encouraged to identify ways to improve their process efficiency as a way to reduce waste discharge.

Based on the City's 2018 Consumer Confidence Report from 2017 sampling efforts (Appendix K), the average sodium concentration is 160 mg/L. This value, in addition raw water SAR of 36 indicate that source prevention alone is most likely not sufficient in attaining satisfactory recycled water quality. Therefore, recycled water production requires advanced treatment processes to remove salts.

Salt ions, sodium and chloride, are inert and inorganic, meaning they cannot be converted or destroyed, unlike BOD or nitrate. The only way to remove them from water is to precipitate them out of solution or physically block them. Common treatment options include electrodialysis reversal (EDR) and reverse osmosis (RO). EDR uses a current to pull salts in the source water through an ion exchange membrane to separate the water from the salts. RO uses membrane barriers with pore sizes small enough to block the passage of salt ions but allows water molecules to pass through. Both technologies have relatively high unit costs compared to conventional treatment processes due to high energy consumption. RO is the most common demineralization treatment process and has been granted conditional approval for recycled water by the State. A preliminary treatment sizing and cost estimate was completed for an RO system capable of providing acceptable recycled water quality.

In addition to the higher cost of demineralization treatment, another important consideration is the production of a concentrated waste brine. Because salt ions cannot be destroyed, they come out of the process as a waste stream. Typical RO recovery rates are around 80 percent, meaning nearly all of the salt is concentrated in a waste stream four times stronger than the influent. Additional brine concentration treatment processes produce a zero or near zero liquid discharge meaning the resulting waste stream mineral concentration can be greater than 10,000 mg/L. Common ways to dispose of the brine include deep well injection, evaporation ponds, or hauling to the landfill. Evaporation ponds typically cost $1.5M/acre and can only be loaded with a few thousand gallons of brine per day per acre. Deep well injection requires construction of a new well facility capable of pumping brine solution into the subsurface, well below the groundwater, often several thousand feet below grade.

8.6 Conclusion

In order to produce recycled water the City would need to upgrade the WWTF to tertiary treatment, including filtration, disinfection, and demineralization. This would provide a water quality suitable for application on a range of crops including turf grass, landscape plants, shrubs, and trees.

The recommended recycled water users are the Lemoore Golf Course and Lemoore High School because of their proximity to the WWTF and irrigation demands. In addition to treatment upgrades, a recycled water system will require new infrastructure, including a distribution pipeline and on-site storage.

Chapter 9 presents the various treatment technologies for each of the processes required to produce recycled water. A comparison of capital and operation and maintenance costs for each technology is provided as well as an overall treatment process recommendation.

Chapter 9

WASTEWATER TREATMENT FACILITIES EVALUATION AND PROPOSED IMPROVEMENTS

9.1 Introduction

This chapter discusses the capacity and performance, including compliance, of the existing treatment plant. Drivers for treatment alternative improvements include the following:

- City's objective to produce tertiary-treated effluent meeting Title 22 unrestricted reuse requirements to offset demand on the drinking water supply.
- Additional plant capacity required to accommodate anticipated growth in the City.
- Increasing difficulty meeting existing treatment objectives and anticipated permit requirements with existing pond-based system.
- Need to repair or rehabilitate aging infrastructure.
- Provide treatment that prevents or eliminates odors.

This chapter describes the project alternatives and the methodology for selection of the recommended alternative that best meets the goals of the City.

9.2 Existing and Future Capacity and Performance Analyses

Chapter 5 includes a description of the existing WWTF components and the treatment process. This section discusses the capacity of the existing equipment and performance of the ponds. Capacity analysis is based on five years of historical influent flow data from 2012 through 2016. The performance analysis of the treatment process is based on various effluent samples taken between 2014 and 2018.

A future capacity and performance analysis is also provided below based on the projected flows and loads described in Chapter 4.

9.2.1 Headworks

The wastewater generated throughout the collection system is pumped to the treatment plant and discharges at the Old Headworks structure. The raw wastewater then flows by gravity to the New Headworks structure, where the mechanical bar screen removes large debris. Screened influent then flows to a wet well equipped with four submersible pumps that feed Ponds 1A and 1B. The headworks capacity is compared to the historical and projected peak hour flow, because the structure needs to be able to handle the maximum observed flows. Table 9.1 provides the design criteria of the mechanical bar screen and submersible pumps and summarizes their current and future capacities.

Table 9.1 Headworks Equipment Analysis

Parameter+	Units	Design Capacity	Current		Future	
			Operating Capacity	Sufficient Capacity	Operating Capacity	Sufficient Capacity
Mechanical Bar Screen						
Peak Hour Flow(1)	mgd	10	4.88	Yes	5.95	Yes
Influent Submersible Pumps						
Number		2				
Design Flow, each	mgd	1.67				
Number		2				
Design Flow, each	mgd	3.17				
Firm Capacity(2)	mgd	6.51	4.88	Yes	5.95	Yes

Notes:
(1) Bar screen capacity assumes 50 percent blockage.
(2) Firm pump capacity is based on peak hour flow and assumes three duty pumps with one larger pump in standby.

The mechanical bar screen and influent pumps have sufficient capacity to handle the projected peak hour wet weather flows through 2040.

9.2.2 Existing Treatment

The WWTF has four ponds. Screened influent is split among Ponds 1A and 1B, which are aerated to promote biological oxidation and reduce BOD. Flow from Ponds 1A and 1B then combine and are sent to Pond 2, then Pond 3. Ponds 2 and 3 have minimal aeration and allow solids to settle out, which reduces TSS.

Table 9.2 indicates the physical characteristics of the ponds.

Table 9.2 Pond Characteristics

Parameter	Units	Design Criteria
Size, each	Acres	8.8
Depth	Feet	5-8
Volume, total	MG	80
Mixing Jet Aerators, total	HP	755
Design Criteria(1)		
Flow	mgd	2.0
BOD Loading	lb/d	14,000

Notes:
(1) Design criteria values based on 1990 design report, as stated in the 2001 capacity evaluation (Appendix L).

A capacity evaluation of the ponds was completed in 2001. Domestic flows used to complete the 2001 capacity analysis were around 2.0 mgd, which is higher than flows analyzed for this report between 2012 and 2016. The capacity evaluation, provided in Appendix L, showed that the installed aerators were nearing capacity based on flows in 2000. Mixing requirements govern sizing rather than aeration. Flows projected for 2040 would exceed the installed mixing capacity of the existing plant. Although the current flows and loads are below the design criteria listed in Table 9.2, the plant still struggles to reliably meet discharge limits. There may be an opportunity to marginally improve plant reliability by evaluating capacity of each pond individually and making operational changes.

The WDR sets limits for the City's and Leprino's combined effluent. A description of the regulatory requirements is provided in Chapter 5 and the WDR is included in Appendix B.

Table 9.3 summarizes the effluent quality from the City, Leprino, and combined effluent from samples taken between January 2014 and December 2016. The average is the upper number and the range is shown below in parentheses.

Table 9.3 Combined Effluent Performance

Parameter	Units	City Effluent	Leprino Effluent	Combined Effluent
Electrical Conductivity	µmhos/cm	1,190 (994 – 1,616)	2,691 (1,886 – 3,960)	2,133 (1,140 – 2,702)
BOD	mg/L	28 (5.4 – 73)	11 (1 – 45)	12 (1.3 – 38)
TSS	mg/L	42 (1 – 160)	15 (1 – 98)	24 (6.6 – 120)

Leprino's effluent is low in organics but high in EC. Due to the dilution from blending, the combined effluent has no issue meeting BOD or coliform discharge requirements. However, the EC of the combined effluent is above the threshold set in the WDR of source water plus 500 µmhos/cm. The source water is roughly 700 µmhos/cm, which sets the combined effluent limit at around 1,200 µmhos/cm.

In 2017, Westlake, which has historically been the discharge location for the combined effluent, indicated that it would no longer accept the effluent due to elevated levels of salinity in the discharge. The Central Valley Regional Board issued a Time Schedule Order in March 2018 (TSO R5-2018-0900), included in Appendix D, that describes an interim discharge alternative and details tasks and deadlines by which the combined effluent must come into compliance with the 1996 WDR. Alternatively, the City may submit a Report of Waste Discharge (ROWD) with supporting technical information to discharge to an alternate location and address compliance with the effluent limits.

Leprino has purchased roughly 2,200 acres East of NASL, referred to as Stone Ranch, as a discharge location for the combined effluent. The City and Leprino have submitted a joint ROWD to the State. The City and Leprino would construct a new pipeline from the existing discharge location at Westlake Farms to Stone Ranch and send combined effluent to irrigate fodder crops such as alfalfa.

The Regional Board has issued a tentative order that defines discharge requirements for Stone Ranch. It is scheduled for adoption in February 2019. Due to the poor underlying groundwater quality, the Regional Board set a new combined effluent fixed dissolved solids (FDS) annual average limit of 1,400 mg/L. The FDS: TDS ratio is 0.77. Leprino's historical average FDS is 1,330 mg/L and the combined FDS is around 1,100 mg/L. Therefore, the new WDR puts the existing wastewater treatment processes for the City and Leprino into compliance.

Leprino had the City sign an agreement stating that the City's effluent quality cannot worsen from the time the agreement was signed (July 2018).

Although the new discharge location and effluent limits enacted by the WDR eliminate the immediate drivers to upgrade the City's wastewater treatment process, the City now lacks independent control of their effluent. Without a capital improvement project for replacement of the existing pond treatment facility, there is a risk that effluent quality will worsen with increased loads from a growing population.

If the City were to separate from Leprino in the future and pursue a WDR strictly for their own effluent, the existing treatment process would not comply with their existing WDR. Furthermore, if the City were to upgrade their existing treatment facility, the Regional Board would likely set stricter effluent limits with regards to BOD and TSS. The City's effluent data provided between June 2017 and August 2018 shows that the plant has failed to comply with discharge requirements 5 out of the 15 months. Non-compliance is due to the inability to meet EC, daily maximum total coliform, monthly average BOD, and/or daily maximum BOD requirements. Failure to meet discharge requirements could be due to uneven loading of ponds relative to their capacity or inconsistent aeration throughout the ponds. Additionally, pond-based treatment is typically less reliable than other conventional secondary treatment processes. The plant consistently meets the pH and settleable solids requirements of their permit. Table 9.4 summarizes the effluent performance in relation to the WDR for June 2017 through August 2018.

Table 9.4 City's Effluent Performance

Parameter	Units	Monthly Average(1)	WDR Limit	Exceedance Frequency	Max(1)	WDR Limit	Exceedance Frequency
BOD	mg/L	59	40	2	110	80	2
Settleable Solids	mL/L	0	0.2	0	0	0.5	0
Coliform Organisms	MPN(2)/ 100mL	58(3)	23(3)	1	1600	500	3
Electrical Conductivity	umhos/ cm	1293	N/A	N/A	1325	source +500	12(4)

Notes:
(1) Highest reported value between June 2017 and August 2018
(2) Most Probably Number
(3) Monthly median
(4) Maximum value reported in a calendar month was greater than 1,200 µmhos/cm on twelve occasions between June 2017 and August 2018. Assumes a source water EC concentration of 700 µmhos/cm.

9.3 Alternatives Analysis

Although the City may be able to comply with the new WDR sending effluent to Stone Ranch, the treatment ponds have limited additional capacity and there is a risk the effluent quality will worsen as flows and loads increase from a growing population. Furthermore, if the City pursues a new discharge location and separates from Leprino, the Regional Board will likely enforce stricter discharge requirements, necessitating improved treatment processes.

The following sections present various treatment alternatives that reliably remove BOD and TSS. Additionally, the EC in the City's effluent is consistently near or above the discharge specification of source water plus 500 µmhos/cm. A discussion on demineralization treatment and considerations is also included. Recommended process elements and facility size are based around the design flows and loads and effluent targets, summarized in Table 9.5.

Table 9.5 Design Criteria

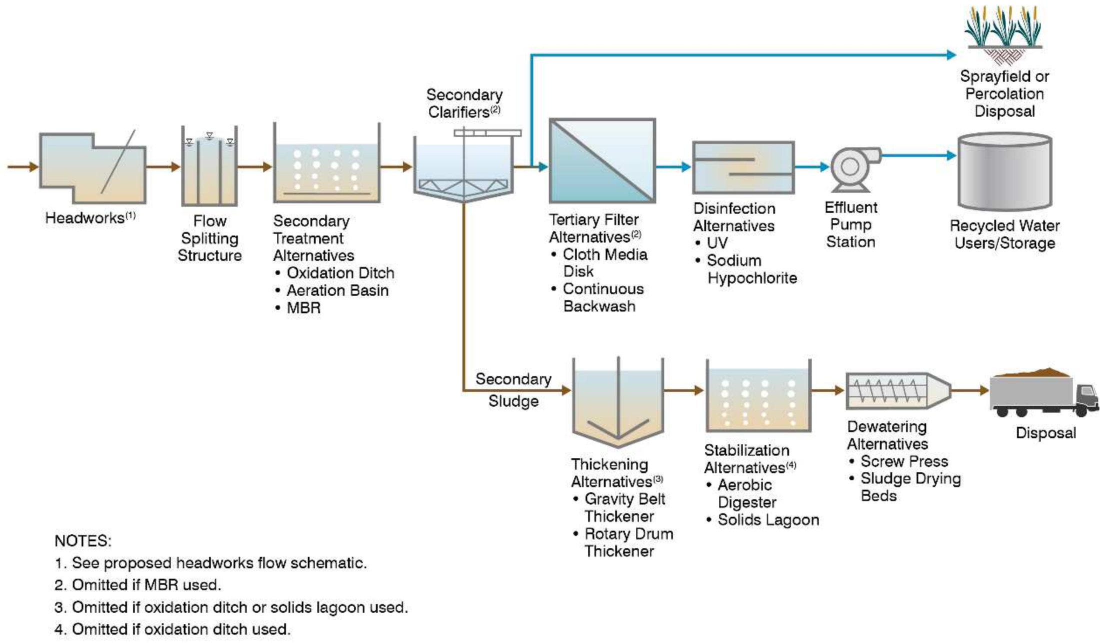
Parameter	Units	Result
Average Annual Flow	mgd	2.38
Average Day Max Month Flow	mgd	2.61
Peak Hour Flow	mgd	5.95
Design Max Month Influent BOD Load	lb/d	5,651
Design Max Month Influent TSS Load	lb/d	5,287
Minimum Design Water Temperature	Celsius	16.5
Effluent BOD	mg/L	10
Effluent TSS	mg/L	10
Effluent Total Nitrogen	mg/L	10

9.3.1 Summary of Common Improvements Needed

Based on the age of the existing facilities and the drivers and objectives for the future wastewater treatment facility, the majority of existing treatment facilities must be replaced. A proposed tertiary facility flow schematic outlining each of the process alternatives is shown in Figure 9.1. Of the new elements, there are several common processes that are required for every treatment alternative. Additional common improvements are discussed below.

9.3.1.1 Headworks and Influent Pumping

It is recommended that the headworks structure be replaced to accommodate improvements such as grit removal, flow metering, and flow splitting. Detailed components are described below. Figure 9.2 shows the proposed headworks flow schematic.



lem0119rf1-10651.ai

Figure 9.1 Proposed Tertiary Facility Flow Schematic

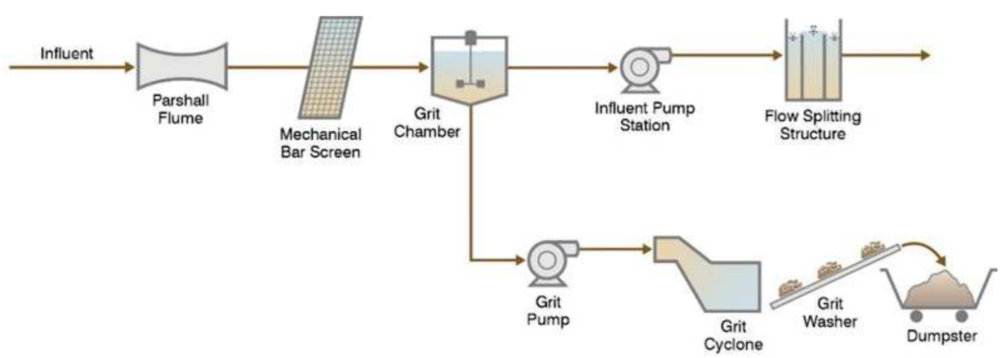


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Figure 9.2 Proposed Headworks Flow Schematic

Parshall Flume

It is recommended that a new headworks structure include a Parshall flume for flow measurements. A Parshall flume includes an ultrasonic level measurement device transmitting to a new plant supervisory control and data acquisition (SCADA) system for remote indication and reporting. To maintain accuracy, the level measurement should be calibrated at least once a year.

Mechanical Bar Screen

The cost analysis provided later looks at replacing the existing bar screen with a new bar screen with 1/4-inch spacing. The bar screen would operate automatically based on either time or differential water level across the screen. Screenings removed could then be collected in a mobile dumpster and sent to the landfill. Alternatively, the existing screening compactor could be relocated to the new bar screen.

Grit Removal

The City's existing mechanical bar screen filters out rags and debris. However, the installation of a vortex grit chamber at the headworks would remove larger particles not removed by the bar screen. As wastewater passes through the unit, heavier particles such as grit and sand settle to the bottom. To aid in this process, each unit is equipped with a paddle mechanism that is driven by an electric motor and gearbox. The grit that is removed is periodically pumped from the bottom of the vortex units to one of two classifiers. Each classifier has a cyclone, which removes the majority of the liquid prior to discharging the slurry into the classifiers. Once in the classifiers, the organics pass over a weir as the grit is washed and travel up an inclined screw conveyor. The washed and dewatered grit is then deposited into a dumpster for disposal. The liquid that is removed in the cyclones and classifiers continues on to further treatment.

Influent Pump Station

A new influent pump station is recommended for the WWTF to improve hydraulic performance. The influent pump station would be capable of handling peak hour flows with redundancy. There may be an opportunity to relocate existing influent pumps to a new influent pump station. Modifications would need to be made to ensure full functionality through SCADA.

Flow Splitter Structure

A new flow splitter structure would be required after the influent pump station to evenly distribute the flow to the new secondary treatment process.

9.3.2 Effluent Disposal and Effluent Pump Station

Regardless of the treatment alternatives the City pursues, the existing treatment ponds will need to be drained. Sludge accumulated on the bottom of the basins will need to be dredged and the bottom soil/clay layer will need to be excavated. Sludge hauling costs are not included. Hauling costs can be reduced by stockpiling solids and drying to reduce hauling volume.

Tertiary treatment processes will be sized around the average day maximum month flows. During periods of wet weather when daily flows are higher than the maximum month flows the tertiary processes will be beyond capacity. Effluent storage allows the facility to be able to handle these peak flows and during times when recycled water demand is low. Effluent percolation ponds can reliably dispose of peak flows. The City has sufficient space at the WWTF to convert a portion of the existing ponds to percolation ponds.

An effluent flow splitter structure would be required to ensure that peak flows are diverted from tertiary treatment to percolation ponds. Additionally, an effluent pump station is needed to pump recycled water to the recycled water users.

9.3.3 Construction Cost Summary of Common Improvements

The costs associated with treatment facility upgrades common to all alternatives are provided below and in Appendix M. This includes a new headworks (structure, bar screen, grit removal, Parshall flume, influent pump station), pond demolition, and effluent pump station.

Headworks: **$6,010,000.**

Pond demolition: **$2,710,000.**

Effluent Pump Station: **$740,000.**

9.4 Identification of Secondary Treatment Alternatives

Identification of secondary treatment options is needed to address the current and future treatment objectives and permit compliance requirements discussed earlier in this chapter.

9.4.1 Preliminary Screening of Secondary Treatment Alternatives

Several treatment processes can be used to provide secondary treatment capacity, either as standalone processes or in combination. Table 9.6 provides a list of secondary treatment processes that are commonly considered, along with the ability to remove certain constituents.

Table 9.6 Secondary Processes Meeting Permit Discharge Requirements

Process	Organics (BOD)(1)	Ammonia(1)	Total Nitrogen(1)
Suspended Growth			
Activated Sludge	✓	✓	✓
Attached Growth			
Trickling Filters (1-Stage)	✓		
Nitrifying Trickling Filters		✓	
Denitrifying Filters			✓
Land Based Systems			
Ponds (Aerated)	✓	Summer Only	

Notes:
(1) Effluent concentration limits anticipated with future discharge permit.

Although there are variations of suspended growth, activated sludge processes – such as oxidation ditches, conventional activated sludge basins, sequencing batch reactors, and membrane bioreactors – the biological treatment process is essentially the same. Similarly, variations of attached growth processes incorporate different types of media to which biofilms attach. However, the biological process is essentially identical, regardless of media type.

The common categories of secondary treatment are discussed below.

Adding new ponds or converting the existing ponds could provide additional biochemical oxygen demand (BOD) and total suspended solids (TSS) treatment, however, a pond system would have difficulty meeting the secondary effluent quality needed to support downstream processes associated with producing Title 22 unrestricted reuse quality tertiary effluent. Furthermore, ponds would not provide year-round ammonia or total nitrogen removal since the natural removal process is dependent on temperature and sunlight. Historical effluent data from the existing ponds indicates issues reliably meeting discharge limits year-round. Therefore, maintaining or expanding the existing pond based system was not considered as a viable future treatment technology.

Trickling filters, while a proven and effective treatment process, do not have the flexibility to remove ammonia or total nitrogen unless more than one unit is installed in series (2-stage). They are poor processes to include upstream of filtration or ultraviolet (UV) disinfection since they generate small colloidal particles and are prone to intermittent high effluent total suspended solids (TSS) due to sloughing, which negatively impacts UV transmittance (UVT), a key design parameter for UV disinfection. UV is one of two recommended disinfection alternatives needed to produce Title 22 unrestricted reuse-quality tertiary effluent. A weakness of nitrifying trickling filters is that they are sensitive to temperature with potentially unreliable performance in the winter months. Additionally, lightly loaded trickling filters (e.g., nitrifying trickling filters) are prone to attracting snails that strip the attached biological growth from the media. Additional operational expenses are required to control the snails. For these reasons, Carollo does not recommend trickling filters or any other attached growth process.

Activated sludge processes provide reliable, year-round BOD, ammonia, and total nitrogen removal and provide the most flexibility for meeting increasingly stringent discharge requirements. The main disadvantage of these processes is they typically have a high power cost due to process aeration air demand. Carollo recommends moving forward with the activated sludge treatment options.

Three of the most common suspended growth, activated sludge processes are described below.

9.4.1.1 Conventional Activated Sludge

One configuration of the conventional activated sludge process is the Modified Ludzack-Ettinger (CAS with MLE). This option typically consists of rectangular concrete, open-air basins which include a smaller anoxic zone followed by larger aerobic zones. Process air is supplied in the aerobic zones by an aeration system consisting of mechanical blowers and fine bubble membrane diffusers. Aeration allows for organics removal and ammonia removal (nitrification) while keeping the mixed liquor in suspension. Nitrate produced during the nitrification step is then recycled from the last aerobic zone to the front of the anoxic zone by a mixed liquor return (MLR) pump where it is mixed with raw wastewater. The combination of BOD in the raw wastewater and nitrate in the MLR encourages nitrate removal (denitrification) in the anoxic basin. The anoxic zone is unaerated and requires mixers to keep the mixed liquor in suspension. The typical conventional activated sludge process includes secondary clarifiers, which allow activated sludge flocs to settle from the main liquid stream via gravity. A portion of the settled activated sludge, known as RAS, is returned to the beginning of the aeration basin to maintain the mixed liquor concentration in the aeration basins. A portion of activated sludge is removed from the system, known as WAS, and sent to the solids handling process area.

The CAS with MLE option is a common, proven technology that can be used in a wide range of climates to reliably remove organics, ammonia, and total nitrogen. It can also be easily expanded or modified in the future to increase overall capacity or improve the process to additionally remove phosphorus. Disadvantages of the CAS with MLE option are the use of more complicated process controls and mechanical equipment as compared to oxidation ditches. This increased operational complexity and additional maintenance associated with the diffusers, mechanical blowers, and MLR pumps result in greater operator attention and periodic shutdowns, to clean, replace, and repair the equipment. This contributes to higher O&M costs. Figure 9.3 shows an example of a CAS with MLE system.

Figure 9.3 Example of a Conventional Activated Sludge with Modified Ludzack Ettinger Secondary Treatment Process.

Figure 9.4 Example of an Oxidation Ditch Secondary Treatment Process.

9.4.1.2 Oxidation Ditch

Oxidation ditches are typically oval-shaped concrete, open air basins consisting of one or more concentric rings. Flow is recirculated in a racetrack configuration with a smaller anoxic volume upstream to facilitate denitrification, similarly to the CAS with MLE process. Organics removal and nitrification occurs in the larger aerobic volume. The anoxic zone typically includes mixers to keep the mixed liquor in suspension. Oxygen in the aerobic zone is supplied by brush or mechanical aerators that agitate the surface of the water to introduce oxygen. The typical oxidation ditch process includes secondary clarifiers, which allow activated sludge flocs to settle from the main liquid stream. A portion of the settled activated sludge is returned to the beginning of the oxidation ditch (RAS), and the remaining activated sludge is removed from the system (WAS) and sent to the solids handling portion of the plant.

The advantages of an oxidation ditch process compared with the CAS with MLE and MBR options are that it is simpler to operate, has fewer parts that require maintenance (no membranes, blowers, diffusers), and provides a higher degree of reliability in handling shock loads and avoiding process upsets. Also, oxidation ditches do not typically require a standby basin since the ditch typically does not need to be taken out of service for maintenance. Disadvantages of the oxidation ditch process include a larger footprint and slightly increased aeration costs due to the reduced efficiency of mechanical aeration compared to diffused aeration. Figure 9.4 shows an example of a proposed oxidation ditch process.

9.4.1.3 Membrane Bioreactor

The membrane bioreactor (MBR) process consists of CAS with MLE followed by porous membranes that block solids from passing. The MBR basins replace secondary clarifiers in the CAS with MLE process. The membranes are capable of reducing turbidity to the levels required by Title 22 for unrestricted reuse quality effluent. Therefore, no filter is required downstream of an MBR process to produce tertiary treated effluent. Because solids separation is performed with membranes instead of gravity settling, the mixed liquor suspended solids (MLSS) concentration can be much higher, up to 8,000 mg/L, compared to that of CAS with MLE, which is around 3,000 mg/L. the higher MLSS concentration results in reduced aeration basin volume required compared to CAS with MLE. Since secondary clarifiers and tertiary filters are not required with the MBR process, the overall secondary treatment facility footprint is smaller compared to other suspended growth processes.

Considerations unique to the MBR process are described below:

- Screening requirements for MBRs are more stringent than the other options, requiring headworks screen spacing to be no larger than 2 mm.
- Additional blowers are needed for MBR, for process air and membrane air scouring. Air scouring is required under the MBR cassettes to prevent solids from fouling the membrane. If the blowers are housed in a common building, the MBR blower building will have a larger footprint than the CAS with MLE blower building.
- Similar to the CAS with MLE option, MLR pumps are needed to return the accumulated solids from the MBR tank to the aeration basins. However, RAS pumps are not required.
- Additional tanks and a mechanical building are required to house the membrane equipment including the membranes, permeate pumps, recirculation pumps, and membrane cleaning facilities.
- Upstream flow equalization was not included but may be considered during preliminary design to maintain consistent filter feed flow.

The primary advantages of the MBR option are that it is a compact, proven technology with numerous municipal installations nation-wide, and it produces a high quality effluent for reuse applications without the need for an additional filtration process. Disadvantages are that membranes require fine screening pretreatment and periodic cleaning with chemicals to mitigate fouling. The MBR option also has an increased energy cost associated with the additional aeration and pumping requirements. Figure 9.5 shows an example of a proposed MBR process flow diagram.

Figure 9.5 Example of a Membrane Bioreactor Secondary Treatment Process.

9.4.1.4 Comparison of Alternatives

A steady-state BioWin process model was used to determine the preliminary design criteria for each secondary treatment option. Table 9.7 presents a summary of the design criteria.

Table 9.7 Preliminary Design Criteria for Secondary Treatment Alternatives

Parameter	Units	CAS with MLE	Oxidation Ditch	MBR
Number of Basins(1)	-	3+1	3	3+1
Volume of Basins, each	MG	0.67	1.23	0.26
Total Active Basin Volume(2)	MG	2.0	3.7	0.79
Design Solids Residence Time	days	10	25	10
Design Mixed Liquor Suspended Solids	mg/L	2900	3000	7900
Oxygen Demand	lb/d	7,680	8,064	8,208
Number of Secondary Clarifiers(1)	-	3+1	3+1	-
Clarifier Overflow Rate	gpd/sf	700	700	-
Clarifier Diameter	ft	60	60	-
Return Activated Sludge Flow Rate	% of influent	65	65	-
Target Effluent BOD	mg/L	10	10	10
Target Effluent TSS	mg/L	10	10	<5
Target Effluent Total Nitrogen	mg/L	10	10	10

Notes:
(1) Indicates Duty + Standby
(2) 20 to 25 percent of the total basin volume for each treatment option is dedicated to a pre anoxic treatment basin.

The oxidation ditch process is more reliable due to the fact that it has a longer solids residence and higher nitrification safety factor than the other treatment alternatives. Nitrification safety factor is defined as the design SRT divided by the SRT at which the model predicts an effluent ammonia concentration of 1.0 mg/L. The nitrification safety factor for the CAS and MBR processes are around two, whereas the oxidation ditch is near four.

Evaluation of the secondary treatment options includes a number of considerations including performance, footprint, constructability, operation and maintenance requirements, as well as economic factors. Table 9.8 outlines a summary of the non-economic evaluation.

Each of the secondary treatment alternatives evaluated can effectively operate without primary clarifiers, which are not included in this comparative analysis due to additional capital and O&M costs. However, they may be evaluated as an option during preliminary design in order to reduce the required treatment capacity of the recommended secondary treatment process.

Table 9.8 Evaluation of Non-Economic Factors for Secondary Treatment Options

Parameter	CAS with MLE	Oxidation Ditch	MBR
Safety	2	2	1
Meets Permit	3	3	3
Ease of O&M	2	3	1
Constructability	2	2	3
Reliability	3	3	3
Ammonia Removal	3	3	3
Odor	2	2	3
Total	**17**	**18**	**17**

Notes:
(1) Criteria Scale: 1 (Least Favorable) to 3 (Most Favorable)

9.4.2 Construction Cost Comparison of Secondary Treatment Alternatives

Planning level cost estimates were developed for both capital (construction) costs and comparative O&M costs for the treatment alternatives under the following assumptions:

- Where required or recommended, process units and equipment would have one standby unit for each size unit provided.
- New facilities are proposed to be sited on or adjacent to existing facilities, primarily within Ponds. Required sitework may include process water drainage from the ponds, tilling, solar drying, dredging, and hauling of existing sludge, removal of existing clay liners, and backfill and compaction. It is assumed that there is no contaminated soil excavation disposal or pile foundation required. During preliminary design, further subsurface investigation will need to be conducted to better define the scope and cost associated with sitework and structural foundation improvements.
- The total direct capital costs include the following components:
  - Structural, equipment, and piping with adjustments for 20 cities ENR Construction Cost Index from November 2018 and Location Factor of Fresno, CA.
  - Sitework allowance of 20 percent for the items described above.
  - Yard piping allowance of 10 percent.

  - Electrical, instrumentation, and control (EI&C) allowance of 30 percent to include a new electrical service and plant-wide SCADA system.
- The following components were added to the total direct costs in order to arrive at the total construction cost for each alternative evaluated:
  - Estimating contingency of 30 percent.
  - Contractor general conditions of 15 percent and overhead and profit of 12 percent.
  - Sales tax on 50 percent of the total direct cost subtotal at a rate of 7.25 percent.
  - Escalation to midpoint of construction, estimated to be December 2021.
- Planning level O&M costs were developed between alternatives to identify process requirements.
- Annual O&M costs include:
  - Power assumed to be $0.12/kWh.
  - Maintenance requirements such as parts replacement.
  - Chemical usage and delivery.
  - Sludge dredging and hauling.
  - Costs do not include labor.
- Annual O&M costs were brought to present worth over a 20-year life cycle assuming 6 percent interest and 3 percent inflation.

Planning level capital and O&M cost estimates for each of the treatment alternatives are summarized at the end of each alternative comparison discussion, beginning with Table 9.9 for secondary treatment. The detailed capital construction cost breakdowns are shown in Appendix N and the O&M cost breakdowns are shown in Appendix R. Secondary clarifiers are included in the cost comparison below for CAS with MLE and oxidation ditch. MBR does not require clarifiers.

Table 9.9 Economic Comparison of Secondary Treatment Alternatives

Parameter	CAS with MLE	Oxidation Ditch	MBR
Capital Construction Costs(1)	$24,580,000	$22,650,000	$29,560,000
Comparative Annual O&M Costs(2)	$235,400	$206,000	$468,100
Present Worth of Comparative 20-year O&M Cost(3)	$3,334,000	$2,835,000	$6,629,000
Present Worth of Comparative Life-Cycle Cost(4)	**$27,914,000**	**$25,485,000**	**$36,189,000**

Notes:
(1) Cost estimate is based on 2018 costs and includes 30 percent estimating contingency. See Appendix N for capital cost item details for each alternative.
(2) Annual Operation & Maintenance costs unique to each alternative were developed. See Appendix R for a summary of O&M cost details.
(3) Present worth is based on a 20-year life, a discount rate of 6 percent, and an inflation rate of 3 percent.
(4) Present worth of life cycle cost is equal to the sum of capital costs and present worth of 20-year O&M cost.

9.5 Identification of Tertiary Treatment Alternatives

Identification of tertiary treatment options is needed to address the future facility objectives and permit compliance requirements, described previously. Tertiary treatment consists of filtration and disinfection. All of the tertiary processes evaluated for this project have been accepted by the State of California as being capable of meeting the Title 22 requirements to produce recycled water. Two filtration alternatives and two disinfection alternatives were selected based on water quality requirements, future flow capacity of the facility, demonstrated reliability, and relative ease of operation and maintenance. These alternatives were evaluated and compared based on economic and non-economic factors.

The tertiary treatment options were sized average day max month flows rather than peak hour flows to reduce the overall size of the tertiary process. When flows exceed the max month of 2.61 mgd, the excess secondary effluent flows will bypass the tertiary treatment processes.

9.5.1 Preliminary Screening of Filtration Treatment Alternatives

There are several processes that can be used for filtration, either alone or in combination with other processes, in order to achieve desired effluent water quality. Filtration technologies that are commonly considered include membrane filters, surface filters, and granular media filters. While there are variations within each filtration technology (e.g. metal mesh vs. cloth media disk filters), the filtered effluent quality produced by each filtration technology will meet the requirements for Title 22 unrestricted reuse-quality effluent. For the MBR secondary treatment option, an additional tertiary filtration process would not be required. However, both the CAS with MLE and oxidation ditch secondary options would require a tertiary filtration step.

Of the filtration options considered, Carollo recommends evaluating cloth media disk filters and granular media filters. Hollow fiber membrane filters are not further considered because of higher cost and complexity compared to other technologies.

9.5.1.1 Cloth Media Disk Filters

Cloth media disk filters remove solids by sedimentation as well as filtration. The heavier solids settle out before reaching the filter cloth and an intermittent sludge pump removes the settled solids from the bottom of the tank. As secondary effluent flows through the filters, solids accumulate on and within the depth of the filter cloth forming a mat across the surface. As the mat forms, headloss through the cloth increases, causing the liquid level in the tank to rise.

Automatic filter backwash typically begins based on liquid level. Flow is reversed which removes the majority of particles accumulates on the surface of the filter cloth. Depending on the filter media type automated cleaning can also be achieved through high-pressure spray wash or chemical cleaning.

Advantages of the cloth media disk filter are the small footprint, minimal energy and pumping requirement and minimal operator attention. A disadvantage of the cloth media disk filter is the potential for media clogging and scaling, affecting operational run time as well as O&M time and labor.

9.5.1.2 Granular Media Filters

Granular media filters include conventional single and multimedia filters, deep-bed filters, and continuous backwash filters. Conventional single and multimedia filters typically utilize sand or anthracite media and have a media depth of two to four feet. Deep-bed filters use larger sized media, usually anthracite, and have a depth of four to eight feet of media. In continuous backwash filters, the water flows upward through a three to six foot deep sand bed.

The continuous backwash filter was evaluated as the granular media filtration alternative for the City. Other granular media filters are not further considered based on the applicability for this size of facility.

An advantage of the continuous backwash filter is there is no need to construct backwash water holding basins, waste backwash water holding basins, or backwash pumps since the media is continuously backwashed. This can significantly reduce the filter construction cost and leads to increased ease of operation. With this type of filter, the media is continuously cleaned by recycling the sand internally through an airlift pipe and sand washer, which reduces operator attention required. A disadvantage of the continuous backwash filter is higher power cost due to the continuous operation of an air compressor.

9.5.1.3 Comparison of Alternatives

If recycled water is not produced, then filtration is not needed and the City can comply with their WDR with only secondary treatment. The alternatives presented below are sized around the maximum month flows assuming recycled water production.

Table 9.10 presents a summary of the design criteria for each of the filtration options. Evaluation of the filtration options includes several considerations including performance, footprint, constructability, operation and maintenance requirements, and economic factors. Table 9.11 outlines a summary of the non-economic evaluation.

Table 9.10 Preliminary Design Criteria for Tertiary Filtration Alternatives

Parameter	Units	Cloth Media Disk	Continuous Backwash
Number(1)	-	6+2	8+2
Filter Loading Rate(2)	gpm/sf	5.6	4.5
Number of Filter Units, total	-	8	10
Surface Area, each	sf	54	50
Total Surface Area	sf	430	400

Notes:
(1) Indicates duty + standby.
(2) Filter loading rates must be below 6.0 and 5.0 gpm/sf for the cloth media disk and continuous backwash filter, respectively, in order to provide Title 22 RW.

The cloth media filters are cartridges that are submerged in an open tank. The 1+1 configuration provides a fully redundant treatment train, which increases capacity and reduces filter replacement. A redundant treatment train is not provided for the continuous backwash filters because the units are modular with additional units added to handle peak flows.

Table 9.11 Evaluation of Non-Economic Factors for Tertiary Filtration Alternatives

Parameter	Cloth Media Disk	Continuous Backwash
Safety	2	2
Meets Permit Requirements	3	3
Ease of O&M	2	3
Constructability	2	2
Reliability	2	3
Odor	2	2
Total	**13**	**15**

Notes:
(1) Criteria Scale: 1 (Least Favorable) to 3 (Most Favorable)

9.5.2 Demineralization Treatment Alternatives

Due to the mineral content of the City's water, discussed in Chapter 8: Recycled Water, additional treatment beyond conventional secondary and tertiary is needed to produce acceptable recycled water. There are limited demineralization treatment technologies, which include electrodialysis reversal and reverse osmosis (RO). Due to the fact that RO is the most established and widely used technology it is the only demineralization treatment technology that has been analyzed.

9.5.2.1 Reverse Osmosis

Reverse Osmosis is a physical treatment process that filters out larger molecules such as salt ions and other impurities. RO membranes are commonly constructed from either spiral wound semi permeable membrane sheets or polymer hollow fibers grouped in a cartridge. Water with a high concentration of minerals is pumped through the membrane creating a lower concentration permeate. The compounds larger than the pore size of the membrane are blocked from entering the permeate and rejected into a concentrated brine stream. RO systems require significant pumping, and therefore energy costs, because of the headloss through the small pore membrane and overcoming osmotic pressure.

The treatment objectives for RO are to remove minerals in the tertiary effluent to levels suitable for agronomic application. The permeate concentration targets are:

- Sodium < 70 mg/L.
- Chloride < 100 mg/L.
- SAR < 3.
- TDS < 450 mg/L.
- EC < 1200 umhos/cm.

A portion of tertiary filtered effluent can bypass RO treatment and blend with the RO permeate. The RO system is sized so that the blended effluent is able to meet these treatment objectives. This will allow recycled water to have minimal application restrictions. The permeate objectives above are conservative, allowing for application of recycled water on all crops, regardless of salinity sensitivity. As a way to reduce RO costs, piloting could be done to analyze salinity sensitivity of crops intended to be irrigated with recycled water. Even though the objectives are stringent, lesser permeate concentration objectives would still require RO treatment.

As shown in Table 8.3, given the EC of the effluent, the SAR needs to be below 3 in order to apply recycled water on any crop type. Application restrictions are sometimes needed in order to leach salts from the root zone and prevent toxicity to plants. This can be done through occasional overwatering to flush salts or choosing more salt tolerant crop types. Alternatively, farm management practices such as gypsum addition can help prevent crop salinity toxicity. Chemicals are needed for pH and mineral adjustment to achieve an SAR value lower than 8. Sulfuric acid and lime are both dosed around concentrations of 70 mg/L in the blended effluent to produce an SAR value of 3, which provides no crop restrictions. A cost estimate is shown below for a proposed RO system.

The brine rejected by the RO membrane is sent to a brine concentrator for further processing. The brine concentrator recovers over 95 percent of the brine flow and blends with the RO permeate and bypass flows. The recovered brine concentrator flow is demineralized to concentrations similar to the RO permeate. Based on max month flow RO system sizing, the concentrated brine is less than 6 gpm with a TDS concentration greater than 150,000 mg/L. For this analysis we assumed the concentrated brine would be sent to evaporation ponds. The City has the ability to convert existing ponds on site for RO brine evaporation. Roughly 5 acres of evaporation ponds are needed to dispose of the brine. The life span of the ponds is 50 years, after which the ponds need to be dredged to remove and dispose of accumulated minerals.

9.5.3 Preliminary Screening of Disinfection Treatment Alternatives

The disinfection technologies available for recycled water systems include ozone, ultraviolet (UV) light, pasteurization, and chlorination. Of the disinfection options considered for this size of facility, Carollo recommends evaluating UV and chlorination since both are proven, reliable disinfection processes that can safely follow the evaluated filtration technologies and meet Title 22 unrestricted reuse quality effluent. Ozone is not recommended for further evaluation because while it is commonplace for potable water disinfection, the use for wastewater disinfection is scarce. Ozone also typically has the highest lift cycle cost of the four technologies. Pasteurization is also not recommended for further evaluation because it is uncommon for use in wastewater disinfection (other than biosolids generation) and requires significant power consumption and heat generation equipment. Furthermore, the turbine associated with this process would require an air emissions permit.

9.5.3.1 UV Disinfection

Several configurations of UV disinfection exist for recycled water including open channel, in-vessel, and microwave. In-vessel UV is used downstream of RO treatment due to the hydraulics and compatibility between technologies. Therefore, in-vessel was the only UV configuration analyzed for this report. Five different UV systems from four different manufacturers were compared, four low pressure, high output lamps and one medium pressure lamp type. In-vessel UV has been approved by the State Department of Public Health for recycled water disinfection. It also has a small footprint requirement, requires minimal operator attention and reduced maintenance compared with chlorination and is not known to form disinfection byproducts (DBPs). Figure 9.6 shows an example of an in-vessel UV system.

UV design criteria is based primarily on UV transmittance (UVT) and UV dose. UVT is a measure of the quantity of UV light transmittable through wastewater, which could be reduced by color, turbidity, certain metals, TDS, TSS, and other factors. UV dose is determined for each target organism, bacteria and/or virus in the case of wastewater disinfection, according to Title 22 regulations. Because UVT data for future filtered secondary effluent is not available, an assumption of 55 percent UVT for post-media filtration was made based on the National Water Research Institute (NWRI) guidelines. If membrane filtration is used, a design UVT of 65 percent could be used per NWRI 2012 guidelines. This could reduce the sizing of the UV system by as much as 40 percent, in turn reducing the O&M requirements. If RO is used upstream of UV, which is recommended in order to produce RW due to the mineral content, the UVT is 90 percent.

The minimum required UV dose for Title 22 tertiary recycled water applications is significantly lower for effluent that has received membrane filtration compared to media filtration (80 millijoules per square centimeter [mJ/cm^2] vs 100). RO effluent has a required dose of 50 mJ/cm^2. Based on the blending requirements to produce RW, a UVT of 65 percent and dose of 80 mJ/cm^2 was assumed in order to perform the analysis.

Equipment reliability must be considered when designing a UV system. For open channel system the NWRI guidelines recommend a standby bank per channel or a standby channel to ensure the specified UV dose is provided under worst case conditions with one bank of lamps out of service. For in-vessel systems, Carollo recommends a standby reactor be provided.

Because UV system sizing is specific to the manufacturer and model, a refinement of the UV disinfection design criteria should be made during preliminary design based on the selected filtration alternative. Up to three manufacturers should be considered during this process. At that time, an open channel installation could also be considered to determine the most cost-effective alternative for the City.

An advantage of UV disinfection is that it is a physical process rather than a chemical process. Therefore, no chemicals are used to disinfect the water meaning no disinfection byproducts that could negatively impact the receiving water. UV disinfection also typically requires a smaller footprint than sodium hypochlorite disinfection. Disadvantages include higher power usage than sodium hypochlorite disinfection and increased O&M due to bulb replacement and cleaning. Safety considerations associated with UV disinfection include operator exposure to UV light and the potential for mercury release from lamp bulbs if damaged.

Figure 9.6 Example of In-Vessel UV Disinfection

9.5.3.2 Chlorination

Wastewater chlorination can be achieved through open concrete basin or in-pipe configurations using chlorine gas, delivered sodium hypochlorite, or onsite-generated sodium hypochlorite. For the size of this facility, an open concrete basin using delivered sodium hypochlorite is recommended. The existing chlorine gas system has additional O&M and safety considerations compared to the recommended alternative. Onsite-generated sodium hypochlorite requires additional equipment and increased power consumption.

The major components of a sodium hypochlorite/sodium bisulfite disinfection system are a chlorine contact basin, chemical storage tanks for bulk deliveries, chemical metering pumps, chemical piping, chemical mixing and/or injector units, and a chemical feed control system. It is assumed that the new metering pumps and controls would be located in a Chemical Feed Building located adjacent to the chlorine contact basin. Figure 9.7 shows an example of a chlorine contact basin.

Advantages of a sodium hypochlorite system are that it is a proven, reliable process and has the ability to maintain a disinfectant residual in the recycled water distribution system. Although not required by Title 22, disinfectant residual in the effluent is recommended to prevent biological growth within the pipes. With an automatic chemical feed control system, a disinfection system would require little operator attention. Disadvantages includes periodic chlorine contact basin cleaning, reliance on chemical deliveries, and chemical feed and mixer/injector equipment maintenance. Sodium hypochlorite could also generate DBPs, degrade and become less effective in sunlight, and generate sodium which could impact recycled water quality. A two-week storage basin is recommended to prevent stagnant and degraded effluent water quality. Chlorine is highly corrosive and toxic in all forms, therefore, storage, shipping, and handling requires additional safety and O&M considerations.

Figure 9.7 Example of Chlorine Contact Basin Disinfection

9.5.3.3 Comparison of Disinfection Options

All effluent must be disinfected in order to comply with the City's WDR. Therefore, two disinfection analyses were performed, one sized for the max month flows to produce RW and another sized for the peak hour flow to disinfect all effluent. We recommend RW disinfection to take place by UV or chlorination, whereas chlorination is the only recommended alternative for plant-wide disinfection.

Table 9.12 presents a summary of the design criteria for each of the disinfection options. An evaluation of the disinfection options includes performance, footprint, constructability, operation and maintenance requirements, and economic factors. Table 9.13 summarizes the non-economic considerations.

Table 9.12 Preliminary Design Criteria for Tertiary Disinfection Alternatives

Parameter	Units	Chlorination	UV
Number of Reactors	-	1	3+1
Total Volume	ft^3	35,650	-
Reactor Diameter	In	-	54
CT	mg-min/L	450	-
Modal Contact Time at PHF	min	90	-
Required Chlorine Residual	mg/L	5	-
Design UV Transmittance	%	-	65
Minimum UV Dose	mJ/cm2	-	102
Safety Factor	-	1.3	-
Total Coliform Bacteria	MPN/100 mL	<2.2(1) <23(2) <240(3)	<2.2(1)

Notes:
(1) 7-day median
(2) Shall not be exceeded in more than one sample in any 30-day period
(3) No sample shall exceed 240 MPN/100 mL

Table 9.13 Evaluation of Non-Economic Factors for Tertiary Disinfection Alternatives

Parameter	Chlorination	UV
Safety	2	3
Meets Permit Requirements	3	3
Ease of O&M	3	1
Constructability	2	3
Reliability	3	3
Odor	2	3
Total	**15**	**16**

Notes:
(1) Criteria Scale: 1 (Least Favorable) to 3 (Most Favorable)

9.5.4 Economic Comparison of Tertiary Treatment Alternatives

Table 9.14 summarizes the economic comparison of the filtration, demineralization, and disinfection alternatives, sized around the maximum month flows, assuming recycled water production. Appendix O includes a construction cost estimate breakdown of the tertiary treatment, and Appendix R shows the estimated O&M for the alternatives. Due to the water quality issues, RO is the most expensive treatment component. The most significant portion of cost is from the brine concentrator and evaporation ponds, with an estimated direct cost of roughly $15M and $7.3M, respectively. An alternative brine disposal would be to commingle the brine with the combined effluent. Doing so would cause no mass increase of minerals or EC. However, by separating the water from the minerals the effluent EC concentration would increase. The Regional Board would need to approve of this disposal mechanism based on no increase in mineral mass in the effluent. This alternative would eliminate the need for a brine concentrator and evaporation ponds, reducing the total construction cost of demineralization from $61M to $16M. If the City's water quality improved, disinfected tertiary recycled water could be produced to Title 22 standards without RO.

A comparison was performed of five UV systems, four low-pressure, high-output and one medium pressure, to estimate construction and life cycle costs. Life cycle costs ranged from $1,646,000 to $3,327,000. The system with the third highest life cycle cost was selected to compare disinfection alternatives. Direct equipment cost was multiplied by 4 to account for ancillary disciplines, contingency, contractor overhead, sales tax, etc. Appendix P provides a breakdown of the UV systems comparison.

Table 9.14 Economic Comparison of Tertiary Treatment Alternatives

Parameter	Filtration		Demineralization	Disinfection	
	Cloth Media Disk	Continuous Backwash Filter	Reverse Osmosis	Chlorination	UV
Capital Construction Costs(1)	$1,980,000	$5,560,000	$61,120,000	$2,780,000	$3,820,000
Comparative Annual O&M Costs(2)	$64,100	$54,200	$1,880,000	$108,600	$91,000
Present Worth of Comparative 20-year O&M Cost(3)	$883,000	$746,000	$25,870,000	$1,495,000	$1,365,000
Present Worth of Comparative Life-Cycle Cost(4)	**$2,863,000**	**$6,306,000**	**$86,990,000**	**$4,275,000**	**$5,185,000**

Notes:
(1) Cost estimate is based on 2018 costs and includes 30 percent estimating contingency. See Appendix O for capital cost item details for each alternative.
(2) Annual Operation & Maintenance costs unique to each alternative were developed. See Appendix R for a summary of O&M cost details.
(3) Present worth is based on a 20-year life, a discount rate of 6 percent, and an inflation rate of 3 percent.
(4) Present worth of life cycle cost is equal to the sum of capital costs and present worth of 20-year O&M cost.

9.6 Identification of Solids Handling Alternatives

An evaluation of solids treatment options is needed to address the regulatory objectives for biosolids as discussed in the Chapter 5 regulatory chapter. A new City WWTF would be designed to achieve production of Class B biosolids.

9.6.1 Preliminary Screening of Solids Handling Alternatives

Solids collected in the existing treatment system currently accumulate in the pond system. Solids were last dredged and removed from the ponds roughly 20 years ago. With the proposed new facility the majority of solids will be generated from waste activated sludge (WAS) from the secondary treatment process. A smaller amount of solids will be generated in the tertiary filtration process.

Several solids treatment and handling processes can be used to thicken, stabilize, and dewater wastewater sludge. The recommended solids treatment process is based on the type of secondary sludge produced and intended disposal method. Whether biosolids are disposed of on-site or off-site will dictate the level of treatment necessary whether to produce Class A EQ, Class A, Class B, or less than Class B (unclassified). Currently in Kings County, land application of Class B biosolids is not acceptable. For this evaluation it is assumed that the new facility will produce Class B biosolids. Most common disposal methods for Class B biosolids is land application or composting. The City will need a hauling contract to transport biosolids to a composting facility or to another county that accepts land application of Class B biosolids. Costs provided in this chapter do not include biosolids hauling, which is typically $40-50 per wet ton.

Table 9.15 shows the solids handling requirements for each of the secondary treatment alternatives.

Table 9.15 Solids Handling Requirements for Secondary Treatment Alternatives

Secondary Treatment Alternatives	Thickening	Stabilization	Dewatering
CAS with MLE	✓	✓	✓
Oxidation Ditch(1)			✓
MBR	✓	✓	✓

Notes:
(1) WAS generated by the 25-day solids retention time in the oxidation ditch is anticipated to comply with the pathogen reduction and vector attraction reduction requirements of the 40 CFR 503 biosolids regulations, eliminating the need for thickening or stabilization.

9.6.2 Preliminary Screening of Solids Thickening Options

Waste activated sludge that is removed from the CAS with MLE and MBR systems contains an average of 0.5 percent solids. To minimize the hydraulic loading and aeration requirements on the downstream stabilization process, the WAS is typically thickened by mechanical means. For this size facility recommended thickening options are a gravity belt thickener (GBT) or a rotary drum thickener (RDT). Other types of thickening options, such as dissolved air flotation thickeners (DAFT) or gravity thickeners (GT), are typically only cost-effective for facilities larger than 5 mgd.

9.6.2.1 Gravity Belt Thickeners

Gravity Belt Thickeners are metal framed mechanical units that rely on separating liquid from solids by gravity drainage through a porous filter belt. Thickened WAS from GBTs is typically between four and five percent solids. An advantage of GBTs is that they are a reliable and relatively low maintenance process with low energy consumption. A GBT is typically placed inside a building equipped with ventilation and odor control with equipment at floor level to improve ease of operation and visual inspection. A disadvantage of GBTs is a potential O&M concern as a result of the emissions of solids, liquids, corrosive gases, and odors within the building. Figure 9.8 shows an example of a GBT.

Figure 9.8 Example of Gravity Belt Thickening

9.6.2.2 Rotary Drum Thickeners

Rotary Drum Thickeners are metal framed mechanical units with a screened rotating drum supported by a center shaft. The screen material can be filter cloth, perforated plate, or wire mesh. Performance of an RDT is similar to a GBT with additional advantages such as an enclosed drum environment, potentially smaller footprint, and lesser operator attention required. An RDT is typically installed in a building similar to a GBT, however, emissions of solids, liquids, corrosive gases, and odors within the building is anticipated to be less of a concern.

9.6.2.3 Comparison of Solids Thickening Options

Table 9.16 summarizes the design criteria for solids thickening options. Evaluation of solids thickening options includes performance, footprint, constructability, operation and maintenance requirements, and economic factors. Table 9.17 summarizes the non-economic considerations.

Table 9.16 Preliminary Design Criteria for Solids Thickening Alternatives

Parameter	Units	GBT and RDT
Number(1)	-	1+1
Feed Solids Concentration (WAS)	%	0.75
Cake Solids Concentration (TWAS)	%	2 to 4
Target Solids Capture	%	95
Feed Volume	gal/week	500,000
Weekly Dry Solids Processed	dry lb/week	30,000
Hydraulic Loading, 12 hr/d, 7 d/wk	gpm	100
Solids Loading, 12 hr/d, 7 d/wk	lb/hr	360
TWAS Flow	gpm	14
Filtrate Volume	gal/week	400,000

Notes:
(1) Indicates duty + standby

Table 9.17 Evaluation of Non-Economic Factors for Solids Thickening Alternatives

Parameter	GBT	RDT
Safety	2	3
Meets Permit Requirements	3	3
Ease of O&M	1	3
Constructability	2	3
Reliability	3	3
Odor	1	3
Total	**12**	**18**

Notes:
(1) Criteria Scale: 1 (Least Favorable) to 3 (Most Favorable)

9.6.3 Preliminary Screening of Stabilization Options

Solids stabilization options approved to meet the pathogen reduction requirements of 40 CFR 503 include aerobic digestion, air drying, anaerobic digestion, composting, or lime stabilization. Specific operation conditions for each of these processes is described in 40 CFR 503.32(b). For the new facility, aerobic digestion and solids lagoons are the recommended solids stabilization options.

Anaerobic digestion is not recommended for this facility because no primary sludge is generated. There are also significant additional capital and O&M costs and increased process complexity associated with anaerobic digesters. On-site composting is not recommended at this time because of the additional O&M considerations required. However, off-site composting could be considered as part of the disposal options explored during preliminary design. Lime stabilization is not recommended at this time since it increases the volume treated biosolids. However, lime stabilization can achieve Class A quality biosolids especially when used in combination with other dewatering techniques and therefore, could be explored during preliminary design if Class A biosolids is desired.

9.6.3.1 Aerobic Digestion

Conventional aerobic digestion stabilizes sludge after meeting a minimum solids detention time to prevent odors, minimize vector attraction, and reduce pathogens. The amount of solids will also be reduced during aerobic digestion, which results in decreased solids handling requirements and costs. An additional benefit of aerobic digestion is improvement of the sludge dewatering characteristics, which allows for better solid/liquid separation in turn reducing hauling volumes.

Aerobic digesters are typically open-air concrete basins similar to an aeration basin. Figure 9.9 shows an example of an aerobic digestions system. Aerobic digesters should have an operating temperature between 15 and 20 degrees Celsius and a total hydraulic residence time between 40 and 60 days in order to meet Class B pathogen reduction requirements. The digesters can be operated in two stages to reduce the combined hydraulic residence time required. The process includes mechanical blowers and coarse bubble diffusers that provide oxygen through aeration to help bacteria decompose the sludge, prevent odors, and keep the digester mixed. Pump mixers may be included to improve mixing conditions within the basin.

Advantages of aerobic digesters compared with solids lagoons are the increased process control capability, reduced facility footprint, and reduced potential for odors. Disadvantages include increased power cost and maintenance associated with the aeration and mixing system as well as periodic cleaning and inspection requirements of the basins.

Figure 9.9 Example of Aerobic Digestion Solids Stabilization

9.6.3.2 Solids Lagoon

Solids lagoons are earthen waste stabilization ponds usually four to eight feet deep. Figure 9.10 shows an example of a solids lagoon. They are not mechanically mixed or aerated. Rather, a layer of water at the surface (surface cap) contains dissolved oxygen due to atmospheric reaeration and algal respiration, which supports aerobic and facultative organisms that stabilize the organic solids. The sludge layer at the bottom of the lagoon supports anaerobic fermentation by anaerobic organisms. The intermediate layer is the anoxic, facultative zone.

Advantages of solids lagoons are that they are reliable, easy to operate, and require little energy. Disadvantages include significant land requirements, possibility of odors, particularly during spring or fall when temperature fluctuations invert the aerobic and anaerobic layers. Odors can be mitigated by maintaining a water cap at all times. As solids accumulate in the lagoons, hydraulic capacity is reduced until the solids are dredged and removed.

Figure 9.10 Example of Solids Lagoon Stabilization

9.6.3.3 Comparison of Stabilization Options

Table 9.18 presents a summary of the design criteria for both stabilization options. Evaluation of the stabilization options includes performance, footprint, constructability, operation and maintenance requirements, and economic factors. Table 9.19 summarizes the non-economic evaluation.

Table 9.18 Preliminary Design Criteria for Solids Stabilization Options

Parameter	Units	Aerobic Digestion	Solids Lagoon
Number of Basins/Stages	-	2	-
Number of Zones	-	4	-
Feed Rate	gpd	20,000	20,000
Design Digested Solids Concentration	%	2.0	-
Zone Dimensions, each	feet	38 x 38	-
SRT	days	21(1)	5 years(2)
Side Water Depth	feet	20	10
Total Volume	MG	0.86	52
Storage Volume	%	-	70(3)

Notes:
(1) 40 CFR 503 biosolids regulations require a total aerobic digester SRT of 60 days at 15 C to meet Class B biosolids. If aerobic digesters are placed in series, only 70 percent of the required total SRT is needed, or 42 days. With two stages, each stage requires a 21 day SRT.
(2) Solids accumulate in the bottom of the lagoon and are dredged roughly every five years
(3) Assumes 10 foot depth with 2 feet of freeboard and a 1 foot water cap.

Table 9.19 Evaluation of Non-Economic Factors for Solids Stabilization Options

Parameter	Aerobic Digestion	Solids Lagoon
Safety	3	2
Meets Permit Requirements	3	2
Ease of O&M	1	3
Constructability	1	2
Reliability	3	2
Odor	3	1
Total	**14**	**12**

Notes:
(1) Criteria Scale: 1 (Least Favorable) to 3 (Most Favorable)

9.6.4 Preliminary Screening of Dewatering Options

With limited land application options and an increasingly stringent regulatory climate for biosolids, sludge dewatering is typically an economically required step to reduce the moisture content of the biosolids prior to truck hauling and disposal (e.g. landfill disposal). The two most common dewatering options are solar drying through sludge drying beds and mechanical dewatering. Mechanical dewatering options include screw presses, belt filter presses, and centrifuges. For this size facility and because of land availability due to conversion of existing ponds, the two recommended options to consider are sludge drying beds and screw presses. Due to the additional operator attention and odors associated with belt filter presses and additional power consumption associated with centrifuges we do not recommend moving forward with these dewatering alternatives.

9.6.4.1 Sludge Drying Beds

Sludge drying beds are a simple and effective method of sludge dewatering. This method relies on solar energy for evaporation of moisture from the sludge. Drying beds do not require a separate thickening process upstream. Both stabilization and dewatering can be achieved with drying beds. There are three common ways to determine the area of sludge beds needed which include mass loading represented as pounds of solids applied per day per unit area, unit area of sludge drying beds per unit of influent flow, and liquid depth of sludge applied per unit area. Mass loading is used in this analysis.

Stabilized sludge from either aerobic digesters or solids lagoon would be pumped to the sludge drying beds. Sludge is typically maintained at a shallow depth, roughly 18 inches. While the biosolids are drying the liquid is decanted and typically collected and pumped back to the headworks. Class B biosolids production requires drying beds to achieve 75 percent vector attraction reduction and stabilize for at least 90 days. After achieving Class B biosolid status the biosolids are then removed from the sludge drying beds with a front end loader and stockpiled. Final solids concentrations are approximately 60 to 80 percent solids. The biosolids are then hauled offsite for reuse or disposal.

City staff would conduct all sludge transfer and drying operations. The City could contract with a private contractor who has a Regional Water Quality Control Board permit for biosolids land application (e.g. Synagro, Engel & Gray, Liberty Compost) to haul away stockpiled biosolids. Federal regulations 40 CFR 503.16 require routine sampling and monitoring of biosolids samples based on the amount of sludge produced annually to demonstrate vector attraction and pathogen reduction.

Dewatered biosolids could be stockpiled in a lined, designated area, which will reduce hauling costs, protect the groundwater underlying the facility site, and give the City flexibility when dealing with biosolids disposal. The liner material is typically HDPE or concrete, but conversion of the existing clay-lined ponds is acceptable as long as the City can prove the permeability is less than $1x10^{-6}$ cm/s.

9.6.4.2 Screw Press

A new mechanical dewatering process could be installed rather than constructing sludge drying beds, due to rising land value and concerns over groundwater protection from biosolids decant liquid or runoff. Figure 9.11 shows a typical screw press. For CAS with MLE and MBR alternatives a screw press would follow thickening and stabilization processes. For oxidation ditches, the biosolids are stabilized because of the longer SRT, meaning no solids thickening or stabilization is required ahead of dewatering.

A screw press consists of a horizontally mounted screw conveyor that moves biosolids down a reduced diameter bowl, thereby increasing pressure along the length of the screw press, squeezing water out of the biosolids. The main advantages of a screw press are their mechanical simplicity, low power requirements, and ability to be operated on a 24-hour schedule, without supervision. Screw presses also require minimal operator attention and have the ability to contain odors. They are typically housed in a dewatering building or shade structure at an elevated height to allow dewatered sludge cake to drop into a hopper that loads directly into hauling trucks. If Class A quality biosolids is desired the required additional components should be considered during preliminary design.

Figure 9.11 Example of Screw Press Solids Dewatering

9.6.4.3 Comparison of Dewatering Options

Table 9.20 presents a summary of the design criteria for each of the dewatering options. The comparison between drying beds and screw press assumes no upstream thickening or stabilization occurs. Evaluation of the dewatering options includes performance, footprint, constructability, operation and maintenance requirements, and economic factors. Table 9.21 summarizes the non-economic considerations.

Table 9.20 Preliminary Design Criteria for Solids Dewatering Options

Parameter	Units	Sludge Drying Beds	Screw Press
Number(1)	-	1	1+1
Area	acres	1.8	-
Feed Solids Concentration	%	0.5 – 1.0	0.5 – 1.0
Feed Volume	gal/week	500,000	500,000
Weekly Dry Solids Processed	dry lb/week	30,000	30,000
Operation	-	Continuous	12 hr/d; 4 d/wk
Hydraulic Loading Rate	gpm	60	50
Solids Loading Rate	dry lb/hr	180	500
Filtrate Flow	gal/week	-	140,000

Notes:
(1) Indicates duty + standby

Table 9.21 Evaluation of Non-Economic Factors for Solids Dewatering Options

Parameter	Drying Beds	Screw Press
Safety	2	2
Meets Permit Requirements	3	3
Ease of O&M	2	3
Constructability	3	3
Reliability	3	3
Odor	1	3
Total	**14**	**17**

Notes:
(1) Criteria Scale: 1 (Least Favorable) to 3 (Most Favorable)

9.6.5 Economic Comparison of Solids Handling Alternatives

Table 9.22 provides a breakdown of the life cycle costs for solids handling processes. Appendix Q shows a breakdown of the construction cost estimates for each solids handling alternative. O&M cost estimate breakdown is included in Appendix R.

The thickening alternatives have a similar life cycle cost. The gravity belt has slightly higher maintenance costs than the rotary drum due to the power cost associated with a larger motor. For solids stabilization, the solids lagoon is much cheaper than aerobic digestion since it is assumed we can convert the existing ponds. Aerobic digestion would require new structures to be constructed. However, aerobic digestion is a more reliable treatment process with a consistent end product, whereas the solids lagoon process is dependent on weather. Similarly for dewatering, the screw press is more expensive than drying beds, but provides a more consistent cake quality. It was assumed ponds could be converted into sludge drying beds. The drying bed process is also weather dependent.

Table 9.22 Economic Comparison of Solids Handling Treatment Alternatives

Parameter	Thickening		Stabilization		Dewatering	
	Gravity Belt	Rotary Drum	Aerobic Digestion	Solids Lagoon	Drying Beds	Screw Press
Capital Construction Costs(1)	$2,230,000	$2,600,000	$5,780,000	$1,400,000	$1,630,000	$4,410,000
Comparative Annual O&M Costs(2)	$18,800	$8,200	$188,400	$95,300	$196,800	$239,200
Present Worth of Comparative 20-year O&M Cost(3)	$259,000	$113,000	$2,593,000	$1,312,000	$2,709,000	$3,292,000
Present Worth of Comparative Life-Cycle Cost(4)	**$2,489,000**	**$2,713,000**	**$8,373,000**	**$2,712,000**	**$4,339,000**	**$7,702,000**

Notes:
(1) Cost estimate is based on 2018 costs and includes 30 percent estimating contingency. See Appendix Q for capital cost item details for each alternative.
(2) Annual Operation & Maintenance costs unique to each alternative were developed. See Appendix R for a summary of O&M cost details.
(3) Present worth is based on a 20-year life, a discount rate of 6 percent, and an inflation rate of 3 percent.
(4) Present worth of life cycle cost is equal to the sum of capital costs and present worth of 20-year O&M cost. Recycled Water Alternative Treatment Configurations

9.7 Recycled Water Alternative Treatment Configuration

As has been discussed throughout this chapter, recycled water can be accomplished through a variety of treatment processes. In every case, wastewater undergoes secondary treatment prior to tertiary. Three alternatives are discussed below.

Given the current water quality, demineralization is needed to enhance the desirability of recycled water, protect beneficial uses, and increase market opportunities. Reverse osmosis (RO) is the recommended demineralization process. In order to prevent fouling of the RO membrane, micro and ultra-filtration (MF/UF) is needed upstream of RO. MF/UF provides a higher degree of filtration than continuous backwash or cloth media filters discussed previously. The RO brine can be handled by either discharge to the effluent line or brine concentration and evaporation ponds.

Alternative 1 assumes the water quality of conventional treatment processes is sufficient for recycled water on salt tolerant crops. Alternative 2 assumes RO brine can be disposed of in the combined effluent routed to Stone Ranch and no additional brine concentration or disposal infrastructure is needed. Alternative 3 includes demineralization and brine disposal.

Table 9.23 provides the construction costs associated with the recycled water alternatives. These alternatives do not include costs common to all alternatives such as headworks and secondary treatment and recycled water storage and distribution construction costs.

Table 9.23 Construction Cost Comparison of Recycled Water Alternatives

Parameter	Alternative 1		Alternative 2		Alternative 3	
	Process	Construction Cost	Process	Construction Cost	Process	Construction Cost
Filtration	Cloth Media	$1,980,000	MF/UF	Included with RO	MF/UF	Included with RO
Demineralization	--	--	RO	$16,400,000	RO	$16,400,000
Disinfection	UV	$3,820,000	UV	$3,820,000	UV	$3,820,000
Brine Disposal	N/A	--	To Stone Ranch	--	Evap. ponds	$45,170,000
Total		$5,800,000		$20,220,000		$65,390,000

Brine disposal is the majority of cost associated with recycled water due to the high energy costs of brine concentration and evaporation pond construction. There may be an opportunity for the City to dispose of their brine in the combined effluent. Although the brine has a much higher concentration of salts than the effluent, there would be no mineral mass increase in the effluent compared to not producing recycled water. In order to avoid brine disposal costs, the Regional Board would need to approve of the increased EC concentration in the effluent based on no mass increase.

Given the mineral composition in the City's wastewater, advanced treatment, namely RO, is needed to maximize irrigation uses for recycled water, including on salt-sensitive crops. RO treatment has a higher unit cost than conventional treatment and produces a mineral brine that is costly to dispose or haul. Because the City is not mandated to produce disinfected tertiary recycled water, the barriers to implementation are currently too large to overcome. Furthermore, because disinfected tertiary recycled water production is not recommended, the filtration treatment process is not needed. The proposed secondary treatment alternatives are robust and capable of reliably meeting strict effluent limits.

9.8 Recommended Alternative

The recommend facility improvements include the following:

- Administration and Operation Facilities Building.
- Headworks replacement.
- Secondary Treatment: Oxidation Ditches with Secondary Clarifiers.
- Disinfection: Chlorine Contact Basin with Sodium Hypochlorite.
- Solids Dewatering: Screw Press.
- Existing Pond Demolition and Conversion to Percolation Ponds.
- Effluent Pump Station.

A description of the proposed improvements and construction C\costs and 20-year life cycle costs are provided below.

9.8.1 Headworks

A new headworks structure would include mechanically cleaned bar screen, grit removal, flow monitoring, pumping, and a flow splitting structure. As a cost savings, the existing headworks structure and influent pump station may possibly be salvaged and retrofitted to function with the new facility. However, if improvements are made to the rest of the treatment facility it is recommended to replace the headworks structure, which will help with the hydraulics of the plant. Eliminating grit removal could be explored as a cost savings during preliminary design. Grit causes less of an issue for oxidation ditches than CAS or MBR.

9.8.2 Oxidation Ditches and Secondary Clarifiers

Oxidation ditches would include an upstream anoxic zone to improve denitrification. Surface brush aerators would maintain dissolved oxygen concentrations. Secondary clarifiers would be circular with a center drive mechanism to collect settled solids and floating scum.

Oxidation ditches have a lower capital cost and lower operation and maintenance costs than either conventional activated sludge or MBR. Furthermore, oxidation ditch plants are less complicated to maintain and require less operator attention.

9.8.3 Chlorine Contact Basin

In order to comply with the City's WDR, effluent must be disinfected before discharge. Chlorination is the recommended disinfection alternative over UV. Without filtration, the required design UVT is 55 percent and UV dose is 100 mJ/cm2, requiring a significantly larger UV system, up to 40 percent larger, than if filtration was implemented. Furthermore, UV disinfection requires significant maintenance in order to periodically manually clean and replace bulbs. Disinfection with sodium hypochlorite is a simpler process and requires less operator attention. Sodium hypochlorite is recommended over the current chlorine gas disinfection application due to safety concerns. Disinfection costs below are based on the peak hour flow.

9.8.4 Screw Press

It is anticipated that the City does not need solids thickening or stabilization processes because of the longer solids residence time in the oxidation ditches. The longer SRT will allow the biosolids to comply with the pathogen reduction and vector attraction reduction requirements of the 40 CFR 503 federal biosolids regulations.

Compared to other active methods of solids dewatering, mainly belt filter presses and centrifuges, screw presses require less operator attention and less power consumption. Screw presses are common in smaller wastewater treatment plants without 24/7 staff because they can run for hours at a time without any operator attention. Screw press is recommended over sludge drying beds because drying beds cannot produce a consistent cake year-round and performance depends on weather.

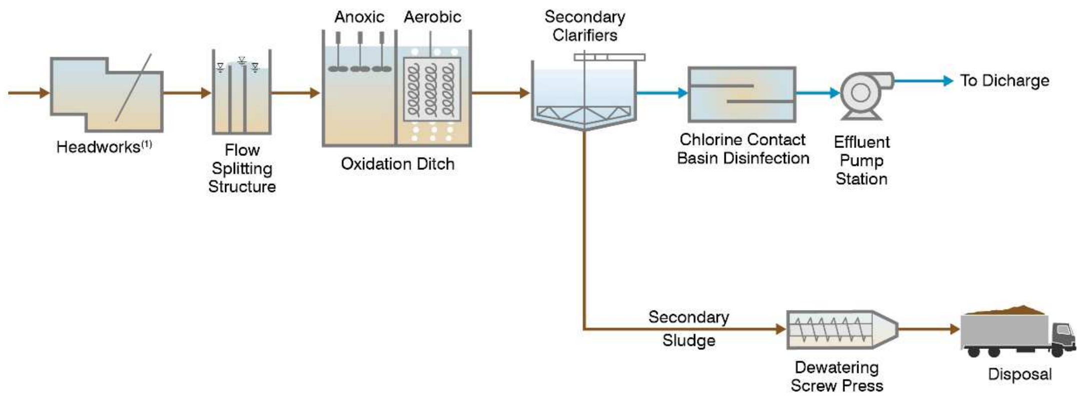
9.8.5 Effluent Discharge

Although effluent storage and percolation ponds are not required because it is assumed the City has a reliable discharge to Stone Ranch, the existing space can be converted to provide operational flexibility. Also, once the ponds are no longer in service they will need to be drained and dredged. Dredged solids will be dried on site before disposal. There will be minimal additional effort to convert the abandoned ponds to effluent storage ponds. The ponds will provide an alternative discharge mechanism and allow for on-site storage during emergency conditions or off-spec effluent. Off-spec effluent occurs when the process is not capable of meeting discharge requirements and the City would violate their WDR. Based on the water balance included in Appendix I, 20 acres of percolation ponds are needed to be able to handle effluent flows year-round through 2040.

An effluent pump station is needed to discharge effluent from the WWTF to Stone Ranch. The estimated needed capacity of the effluent pump station is 60 hp.

Table 9.24 provides an economic summary of the recommended treatment alternatives and improvements. Annual O&M costs do not include labor. Figure 9.12 shows the proposed process flow diagram and Figure 9.13 shows the proposed site layout.

In order to maintain treated effluent during construction, Pond 1B could remain in service while Pond 1A is drained and construction started on the new treatment facility.



NOTES:
1. See proposed headworks flow schematic.

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Figure 9.12 Recommended Secondary Facility Flow Schematic.

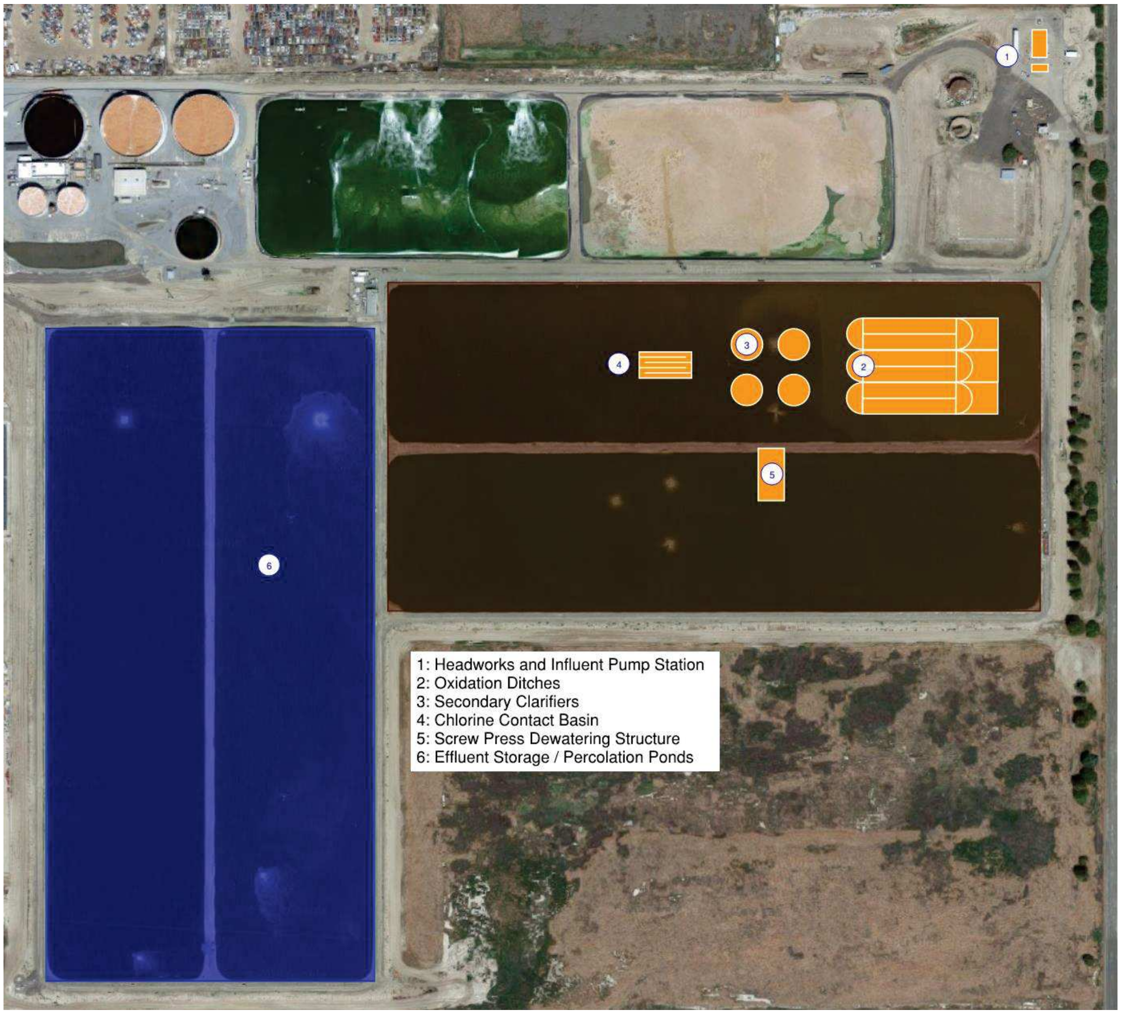

Figure 9.13 Proposed Site Layout

Table 9.24 Cost Summary for Recommended Facility Improvements

Process	Capital Construction Cost(1)	Annual O&M Cost(2)	Present Worth 20-year O&M Cost(3)	Present Worth Life Cycle Cost(4)
Headworks	$6,010,000	$58,600	$807,000	**$6,817,000**
Oxidation Ditch with Secondary Clarifiers	$22,650,000	$206,000	$2,835,000	**$25,485,000**
Chlorine Contact Basin	$4,970,000	$108,600	$1,495,000	**$6,465,000**
Screw Press	$4,410,000	$239,200	$3,292,000	**$7,702,000**
Pond Demolition	$2,710,000	--	--	**$2,710,000**
Effluent Pump Station	$740,000	$47,100	$649,000	**$1,389,000**
Total	**$41,490,000**	**$659,500**	**$9,078,000**	**$50,568,000**

Notes:
(1) Cost estimate is based on 2018 costs and includes 30 percent estimating contingency. See Appendix S for capital cost item details for each alternative.
(2) Annual Operation & Maintenance costs unique to each alternative were developed. See Appendix S for a summary of O&M cost details.
(3) Present worth is based on a 20-year life, a discount rate of 6 percent, and an inflation rate of 3 percent.
(4) Present worth of life cycle cost is equal to the sum of capital costs and present worth of 20-year O&M cost.

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Chapter 10

CAPITAL IMPROVEMENT PROGRAM

This chapter presents the recommended capital improvement program (CIP) for the wastewater collection system and Wastewater Treatment Facility. The proposed CIP presents improvement projects based on system evaluations described in Chapters 7 and 9.

10.1 Project Prioritization

Prioritizing the required capital improvements for the City is an important part of this study. Improvement projects were prioritized in the following order.

- Upgrade existing facilities to mitigate current capacity deficiencies.
- Upgrade existing facilities to accommodate increased wastewater flows associated with long term planning (2040) and build out.
- Construct new infrastructure required to serve future users.

Based on these factors, each project was categorized as either a Near Term, Future (Year 2040), or Build-out project. Near term projects are targeted for implementation by year 2028. Long term projects are targeted for implementation between years 2029 and 2040. Buildout projects are targeted beyond 2040 and are outside of the planning period.

Implementation of future capacity and growth improvements ultimately depends on growth. For this reason, the phasing assumptions presented in this report are estimates, and changes in the City's planning assumptions or growth projections may shift priority of each project.

10.2 Capital Improvement Project Costs

The cost estimates presented in this master plan are opinions developed from bid tabulations, cost curves, information obtained from previous studies, and Carollo's experience on other similar projects. The costs are based on an Engineering News Record Construction Cost Index (ENR CCI) 11,183 (20-City Average, October 2018).

10.3 Cost Estimating Accuracy

The cost estimates presented in the CIP have been prepared for general master-planning purposes and for guidance in project evaluation and implementation. Final costs of a project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors such as preliminary alignment generation, investigation of alternative routings, and detailed utility and topography surveys.

The Association for the Advancement of Cost Engineering (AACE) defines an Order of Magnitude Estimate, deemed appropriate for master plan studies, as an approximate estimate made without detailed engineering data. It is normally expected that an estimate of this type would be accurate within plus 50 percent to minus 30 percent. This section presents the assumptions used in developing order-of-magnitude cost estimates for the recommended facilities. As projects proceed into the preliminary design and design stages, estimates are refined when conditions become known.

10.4 Construction Unit Cost

The construction costs are representative of sewer system facilitates under normal construction conditions and schedules.

10.4.1 Gravity Pipeline Cost

Sewer pipeline improvements range in size from 6-inches to 24-inches in diameter in this study. Pipe casings are included for major crossings (e.g., creeks, canals, highways, and railroad) of the trunk sewers. Unit costs for the construction of pipelines and appurtenances (e.g., manholes) are shown on Table 10.1. The construction cost estimates are based upon these unit costs. The unit costs are for "typical" field conditions with construction in stable soil at a depth ranging between 10 feet to 15 feet.

Table 10.1 Gravity Pipeline Unit Construction Cost

Pipe Diameter (inches)	Replacement Unit Construction Cost ($/linear foot)	Pipe Diameter (inches)	Replacement Unit Construction Cost ($/linear foot)
Gravity Mains			
8	170	21	275
10	175	24	300
12	185	27	335
15	200	30	370
18	215	36	465
Force Mains			
6	170	12	180
8	175	-	-
Gravity Main Interstate Crossing			
12/24	$495	18/30	$575
15/30	$530	21/42	$735

Notes:
(1) ENR CCI = 11,183 (20-City Average, October 2018).

10.4.2 Lift Station Replacement Unit Cost

The estimated costs for projects to increase the pumping capacity of a lift station assume complete replacement of the lift station. Lift station cost estimates are based on a rate of $0.50 per gallon. Cost estimates for the Carmel Lift Station were provided by QK engineering and are at 30 percent design level.

10.4.3 Wastewater Treatment Facility Cost

Detailed cost estimates for the recommended wastewater treatment alternatives are provided in Chapter 9 and Appendix S. Table 10.2 provides a line item for the cost associated with the recommend treatment alternative.

10.5 Project Costs and Contingencies

Project cost estimates are calculated based on elements, such as the project location, size, length, and other factors. Allowances for project contingencies consistent with an "Order of Magnitude" estimate are also included in the project costs prepared as part of this study, as outlined in this section.

10.5.1 Baseline Construction

This is the total estimated construction cost, in dollars, of the proposed improvement projects. Baseline construction costs were calculated by multiplying the estimated number of units by the unit cost, such as length of pipeline times the average cost per lineal foot of pipeline.

- *Pipelines:* Calculated by multiplying the estimated length by the unit cost.
- *Force Mains:* Calculated by multiplying the estimated length by the unit cost.
- *Lift Station:* Calculated by multiplying the estimated required total capacity by the unit cost.

10.5.2 Estimated Construction Cost

Contingency costs must be reviewed on a case-by-case basis because they will vary considerably with each project. Consequently, it is appropriate to allow for uncertainties associated with the preliminary layout of a project. Such factors as unexpected construction conditions, the need for unforeseen mechanical items, and variations in final quantities are a few of the items that can increase project costs for which it is wise to make allowances in preliminary estimates. To assist the City in making financial decisions for these future construction projects, contingency costs will be added to the planning budget as percentages of the total construction cost, divided into two categories: Estimated Construction Cost and Capital Improvement Cost.

Since knowledge about site-specific conditions of each proposed project is limited at the master-planning stage, a 30-percent contingency was applied to the Baseline Construction Cost to account for unforeseen events and unknown conditions. This contingency accounts for unknown site conditions such as poor soil, unforeseen conditions, environmental mitigations, and other unknowns and is typical for master planning projects. The Estimated Construction Cost for improvements consists of the Baseline Construction Cost plus the 30-percent construction contingency.

10.5.2.1 Capita Improvement Cost

Other project contingency costs include costs associated with engineering, construction-phase professional services, and project administration. Engineering services associated with new facilities include preliminary investigations and reports, right-of-way (ROW) acquisition, foundation explorations, preparation of drawings and specifications during construction, surveying and staking, sampling of testing material, and start-up services. Construction-phase professional services cover such items as construction management, engineering services, materials testing, and inspection during construction. Finally, there are project administration costs, which cover such items as legal fees, environmental/California Environmental Quality Act (CEQA) compliance requirements, financing expenses, administrative costs, and interest during construction.

The cost of these items can vary, but, for the purpose of this study, it is assumed that the other project contingency costs will equal approximately 27.5 percent of the Estimated Construction Cost.

As shown in the following sample calculation of the capital improvement cost, the total cost of all project construction contingencies (construction, engineering services, construction management, and project administration) is 65.8 percent of the baseline construction cost. Calculation of the 65.8 percent is the overall markup on the baseline construction cost to arrive at the capital improvement cost. It is not an additional contingency.

Example:

Baseline Construction Cost	**$1,000,000**
Construction Contingency (30%)	$300,000
Estimated Construction Cost	**$1,300,000**
Engineering Cost (10%)	130,000
Construction Management (10%)	130,000
Project Administration (7.5%)	$97,500
Capital Improvement Cost	**$1,657,500**

10.6 Capital Improvement Project Implementation

The proposed capital improvements are prioritized bases on their urgency to mitigate existing deficiencies and condition issues and for serving future growth. The capital improvements were phased according to the following improvement categories:

- *Phase 1 (2019-2023):* This phase includes projects that are targeted as highest priority existing improvements.
- *Phase 2 (2024-2028):* This phase includes medium priority existing improvements.
- *Phase 3 (2029-2040):* This phase includes low priority existing improvements, as well as projects triggered by growth that is expected to occur by the year 2040.
- *Phase 4 (2041 and beyond):* This phase includes improvements related to ultimate buildout of the City.

A summary of the capital project costs is presented in Table 10.2. This table identifies the projects, provides a brief description of the project, identifies facility size (e.g. pipe diameter and length), and provides capital improvement cost. The table also shows the probably phase in which the project would be implemented. The implementation timeframe was based on the priority of each project to correct existing deficiencies or to serve future users. Detailed improvement sheets can be found in Appendix H.

Figure 10.1 illustrates the CIP cost summary by project type. As shown in Figure 10.1, capacity projects account for 37-percent of the recommended improvements. Table 10.3 provides a summary by phase and project type. Phase 1 improvements account for 10-percent ($13 million) of the total project cost, with Phase 3 having the largest cost share at 47-percent ($61 million), which can be attributed to the WWTF recommendations. Improvements to the WWTF account for 39-percent ($51 million) of the total CIP cost

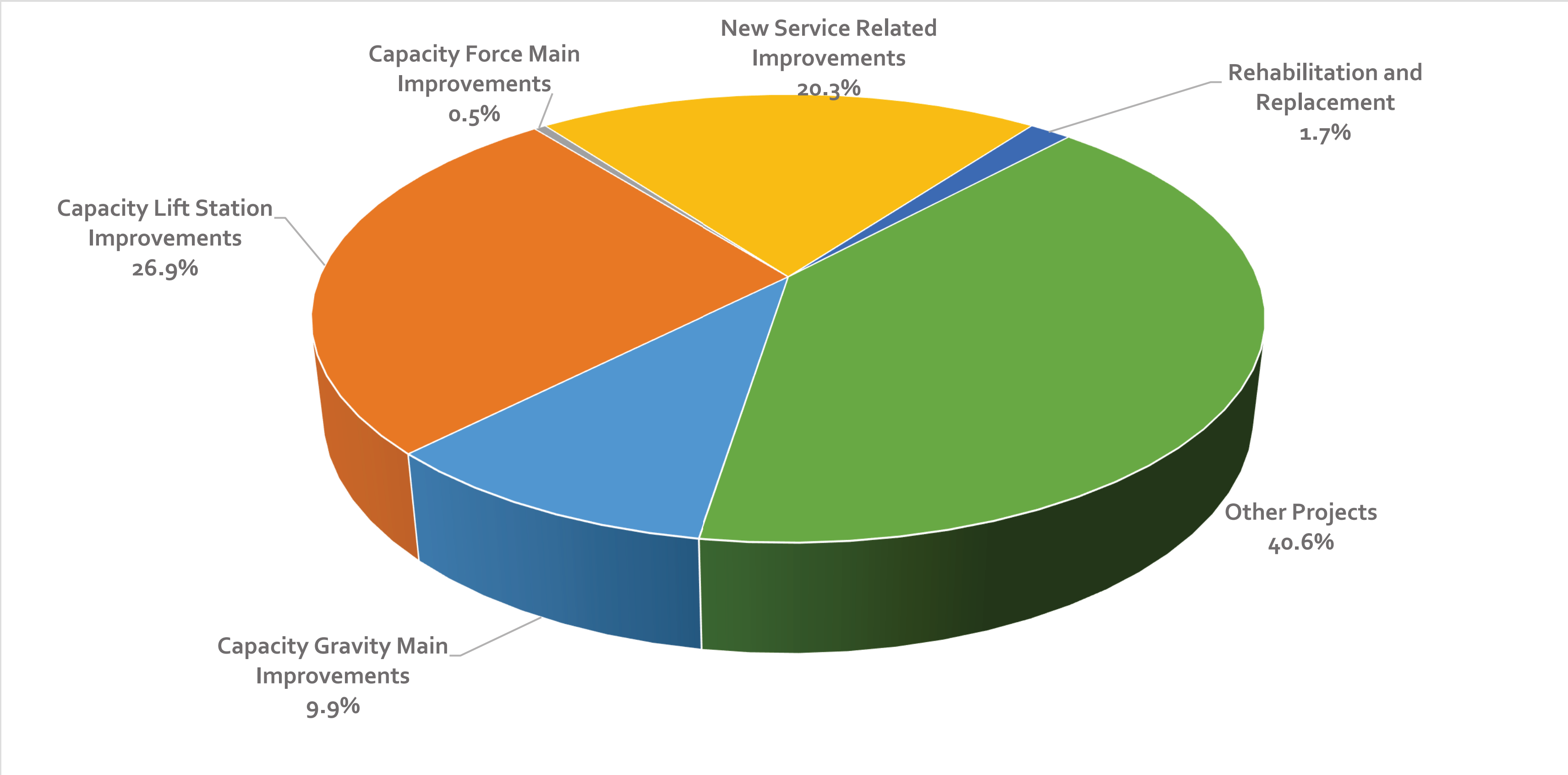

Figure 10.1 Project Cost Summary by Type

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Table 10.2 Collection System Capital Improvement Plan

Project		Existing Size/Type	Proposed Size/Type	Proposed Amount	CIP Cost Estimate(1)(2)(3)(4) ($)	Existing User Cost ($)	Future User Cost ($)	CIP Phasing ($)							
								Near-Term						Long-Term	Build-Out
								2019	2020	2021	2022	2023	2024-2028	2029-2040	2041 & beyond
Capacity Related Improvements					$48,299,000	$11,223,000	$37,076,000	$1,361,000	$356,000	$1,489,000	$4,134,000	$4,848,000	$2,504,000	$12,554,000	$21,053,000
Gravity Mains		Diameter (in)	Diameter (in)	Length (ft)	$12,921,000	$3,122,000	$9,799,000	$46,000	$356,000	$1,459,000	$487,000	$1,367,000	$133,000	$3,521,000	$5,552,000
WWGM-1A	19th Avenue Trunk	-	21	100	$46,000	$36,000	$10,000	$46,000	$-	$-	$-	$-	$-	$-	$-
WWGM-1B	19th Avenue Trunk	-	18	1,000	$356,000	$317,000	$39,000	$-	$356,000	$-	$-	$-	$-	$-	$-
WWGM-2A	Vine Street Trunk	12	21	3,200	$1,459,000	$1,167,000	$292,000	$-	$-	$1,459,000	$-	$-	$-	$-	$-
WWGM-2B	Vine Street Trunk Pipe Casing	12	21/42	400	$487,000	$390,000	$97,000	$-	$-	$-	$487,000	$-	$-	$-	$-
WWGM-2C	Vine Street Trunk	12/15	21	3,000	$1,367,000	$1,094,000	$273,000	$-	$-	$-	$-	$1,367,000	$-	$-	$-
WWGM-3	Central Bush Street Sewer	12	15	400	$133,000	$118,000	$15,000	$-	$-	$-	$-	$-	$133,000	$-	$-
WWGM-4A	East Bush Street Sewer	15	18	300	$108,000	$-	$108,000	$-	$-	$-	$-	$-	$-	$108,000	$-
WWGM-4B	East Bush Street Sewer	8	15	2,500	$829,000	$-	$829,000	$-	$-	$-	$-	$-	$-	$829,000	$-
WWGM-4C	East Bush Street Sewer	8	12	2,100	$645,000	$-	$645,000	$-	$-	$-	$-	$-	$-	$645,000	$-
WWGM-5	19th Street Main	18	24	1,300	$646,000	$-	$646,000	$-	$-	$-	$-	$-	$-	$646,000	$-
WWGM-6	Lemoore Avenue Main	10	12	3,000	$973,000	$-	$973,000	$-	$-	$-	$-	$-	$-	$973,000	$-
WWGM-7	Millan Drive Sewer	10	12	500	$154,000	$-	$154,000	$-	$-	$-	$-	$-	$-	$154,000	$-
WWGM-8	Bell Haven Drive Sewer	8	15	500	$166,000	$-	$166,000	$-	$-	$-	$-	$-	$-	$166,000	$-
WWGM-9	19th Street Main	18	24	2,000	$995,000	$-	$995,000	$-	$-	$-	$-	$-	$-	$-	$995,000
WWGM-10	San Simeon Main	12	18	2,300	$820,000	$-	$820,000	$-	$-	$-	$-	$-	$-	$-	$820,000
WWGM-11	Park Street Main	12	18	200	$71,000	$-	$71,000	$-	$-	$-	$-	$-	$-	$-	$71,000

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Table 10.2 Collection System Capital Improvement Plan (continued)

Project		Existing Size/Type	Proposed Size/Type	Proposed Amount	CIP Cost Estimate[1][2][3][4] ($)	Existing User Cost ($)	Future User Cost ($)	CIP Phasing ($) Near-Term 2019	2020	2021	2022	2023	2024-2028	Long-Term 2029-2040	Build-Out 2041 & beyond
WWGM-12	South 19th Street Sewer	10	21	1,200	$547,000	$-	$547,000	$-	$-	$-	$-	$-	$-	$-	$547,000
WWGM-13	Cinnamon Drive Main	18	24	1,300	$646,000	$-	$646,000	$-	$-	$-	$-	$-	$-	$-	$646,000
WWGM-14	Liberty Drive Main	12	18	3,400	$1,212,000	$-	$1,212,000		$-	$-	$-	$-	$-	$-	$1,212,000
WWGM-15	Milan Drive Sewer	10	12	1,300	$399,000	$-	$399,000	$-	$-	$-	$-	$-	$-	$-	$399,000
WWGM-16	College Avenue Sewer	12	15	1,000	$332,000	$-	$332,000	$-	$-	$-	$-	$-	$-	$-	$332,000
WWGM-17	Spring Lane Sewer	10	15	1,600	$530,000	$-	$530,000	$-	$-	$-	$-	$-	$-	$-	$530,000
Lift Stations			Capacity (mgd)	Capacity (mgd)		$34,749,000	$8,056,000	$26,693,000	$1,300,000	$-	$-	$3,647,000	$3,481,000	$2,371,000	$9,033,000
WWLS-1A	Carmel Lift Station	-	1.9	N/A	$1,300,000	$1,014,000	$286,000	$1,300,000	$-	$-	$-	$-	$-	$-	$-
WWLS-1B	Carmel Lift Station	-	10.9	N/A	$9,033,000	$-	$9,033,000	$-	$-	$-	$-	$-	$-	$3,232,000	$5,801,000
WWLS-2A	Thomas Lift Station	1.44	4.4	N/A	$3,647,000	$1,905,000	$1,742,000	$-	$-	$-	$3,647,000	$-	$-	$-	$-
WWLS-2B	Thomas Lift Station	-	4	N/A	$3,315,000	$-	$3,315,000	$-	$-	$-	$-	$-	$-	$-	$3,315,000
WWLS-3	Bush Willow Lift Station	1.22	4.2	N/A	$3,481,000	$3,063,000	$418,000	$-	$-	$-	$-	$3,481,000	$-	$-	$-
WWLS-4	Avalon Lift Station	0.66	1.1	N/A	$912,000	$848,000	$64,000	$-	$-	$-	$-	$-	$912,000	$-	$-
WWLS-5	Grainery Lift Station	1.2	1.76	N/A	$1,459,000	$1,226,000	$233,000	$-	$-	$-	$-	$-	$1,459,000	$-	$-
WWLS-6	Cimarron Lift Station	0.72	4.6	N/A	$3,812,000	$-	$3,812,000	$-	$-	$-	$-	$-	$-	$3,812,000	$-
WWLS-7	Elk Meadows Lift Station	0.72	2.4	N/A	$1,989,000	$-	$1,989,000	$-	$-	$-	$-	$-	$-	$1,989,000	$-
WWLS-9	Olam (SK) Lift Station	1	7	N/A	$5,801,000	$-	$5,801,000	$-	$-	$-	$-	$-	$-	$-	$5,801,000
Force Main		Diameter (in)	Diameter (in)	Length (ft)	$629,000	$45,000	$584,000	$15,000	$-	$30,000	$-	$-	$-	$-	$584,000
WWFM-1	Carmel Lift Station Force Main	-	10/12	50	$32,000	$15,000	$17,000	$15,000	$-	$-	$-	$-	$-	$-	$17,000
WWFM-2	Thomas Lift Station Force Main	8	10/10	100	$60,000	$30,000	$30,000	$-	$-	$30,000	$-	$-	$-	$-	$30,000

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Table 10.2 Collection System Capital Improvement Plan (continued)

Project		Existing Size/Type	Proposed Size/Type	Proposed Amount	CIP Cost Estimate(1)(2)(3)(4) ($)	Existing User Cost ($)	Future User Cost ($)	CIP Phasing ($)							
								Near-Term						Long-Term	Build-Out
								2019	2020	2021	2022	2023	2024-2028	2029-2040	2041 & beyond
WWFM-4	Cimarron Lift Station Force Main	8	12/24	500	$411,000	$-	$411,000	$-	$-	$-	$-	$-	$-	$-	$411,000
WWFM-5	Olam (SK) Lift Station Force Main	8	12	400	$126,000	$-	$126,000	$-	$-	$-	$-	$-	$-	$-	$126,000
New Service Related Improvements					$26,245,000	$-	$26,245,000		$-	$-	$-	$-	$-	$804,000	$25,441,000
Gravity Mains		Diameter (in)	Diameter (in)	Length (ft)	$14,164,000	$-	$14,164,000	$-	$-	$-	$-	$-	$-	$-	$14,164,000
WWGM-18	17th Avenue Main	-	8	5,600	$1,578,000	$-	$1,578,000	$-	$-		$-	$-	$-	$-	$1,578,000
WWGM-19	Houston Avenue Sewer	-	8	5,100	$1,437,000	$-	$1,437,000	$-	$-	$-	$-	$-	$-	$-	$1,437,000
WWGM-20A	18th Avenue Sewer	-	10	3,400	$986,000	$-	$986,000	$-	$-	$-	$-	$-	$-	$-	$986,000
WWGM-20B	18th Avenue Sewer	-	8	1,700	$479,000	$-	$479,000	$-	$-	$-	$-	$-	$-	$-	$479,000
WWGM-20C	18th Avenue Sewer	-	8	1,000	$282,000	$-	$282,000	$-	$-	$-	$-	$-	$-	$-	$282,000
WWGM-21	Vine Street Sewer Sewer	-	15	3,500	$1,160,000	$-	$1,160,000	$-	$-	$-	$-	$-	$-	$-	$1,160,000
WWGM-22	South 19th Avenue Main	-	21	2,700	$1,232,000	$-	$1,232,000	$-	$-		$-	$-	$-	$-	$1,232,000
WWGM-23A	Idaho Avenue Main	-	15	2,600	$862,000	$-	$862,000	$-	$-	$-	$-	$-	$-	$-	$862,000
WWGM-23B	Idaho Avenue Main	-	12	4,100	$1,258,000	$-	$1,258,000	$-	$-	$-	$-	$-	$-	$-	$1,258,000
WWGM-24	Iona Avenue Main	-	12	7,100	$2,178,000	$-	$2,178,000	$-	$-	$-	$-	$-	$-	$-	$2,178,000
WWGM-25	Idaho Jackson Annexation East	-	10	3,700	$1,074,000	$-	$1,074,000	$-	$-	$-	$-	$-	$-	$-	$1,074,000
WWGM-26	Idaho Jackson Annexation West	-	12	3,500	$1,074,000	$-	$1,074,000	$-	$-	$-	$-	$-	$-	$-	$1,074,000
WWGM-27	North Liberty Drive Main	-	15	1,700	$564,000	$-	$564,000	$-	$-	$-	$-	$-	$-	$-	$564,000

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Table 10.2 Collection System Capital Improvement Plan (continued)

Project		Existing Size/Type	Proposed Size/Type	Proposed Amount	CIP Cost Estimate(1)(2)(3)(4) ($)	Existing User Cost ($)	Future User Cost ($)	CIP Phasing ($)							
								Near-Term						Long-Term	Build-Out
								2019	2020	2021	2022	2023	2024-2028	2029-2040	2041 & beyond
Lift Stations		Capacity (mgd)	Capacity (mgd)		$8,288,000	$-	$8,288,000	$-	$-	$-	$-	$-	$-	$663,000	$7,625,000
WWLS-8	Glendale Lift Station	-	0.8	N/A	$663,000	$-	$663,000	$-	$-	$-	$-	$-	$-	$663,000	$-
WWLS-10	Hanford Armona Lift Station	-	0.2	N/A	$166,000	$-	$166,000	$-	$-	$-	$-	$-	$-	$-	$166,000
WWLS-11	D Street Lift Station	-	0.6	N/A	$497,000	$-	$497,000	$-	$-	$-	$-	$-	$-	$-	$497,000
WWLS-12	18th Avenue Lift Station	-	1	N/A	$829,000	$-	$829,000	$-	$-	$-	$-	$-	$-	$-	$829,000
WWLS-13	South 18th Avenue Lift Station	-	0.5	N/A	$414,000	$-	$414,000	$-	$-	$-	$-	$-	$-	$-	$414,000
WWLS-14	Idaho Avenue Lift Station	-	2	N/A	$1,658,000	$-	$1,658,000	$-	$-	$-	$-	$-	$-	$-	$1,658,000
WWLS-15	South Vine Street Lift Station	-	1.7	N/A	$1,409,000	$-	$1,409,000	$-	$-	$-	$-	$-	$-	$-	$1,409,000
WWLS-16	South 19th Avenue Lift Station	-	1.5	N/A	$1,243,000	$-	$1,243,000	$-	$-	$-	$-	$-	$-	$-	$1,243,000
WWLS-17	Liberty Drive Lift Station	-	1.7	N/A	$1,409,000	$-	$1,409,000	$-	$-	$-	$-	$-	$-	$-	$1,409,000
Force Main		Diameter (in)	Diameter (in)	Length (ft)	$3,793,000	$-	$3,793,000	$-	$-	$-	$-	$-	$-	$141,000	$3,652,000
WWFM-3	Glendale Avenue Lift Station Force Main		6	500	$141,000	$-	$141,000	$-	$-	$-	$-	$-	$-	$141,000	$-
WWFM-6	Hanford Armona Lift Station Force Main		6	1,300	$366,000	$-	$366,000	$-	$-	$-	$-	$-	$-	$-	$366,000
WWFM-7	D Street Lift Station Force Main		6	1,000	$282,000	$-	$282,000	$-	$-	$-	$-	$-	$-	$-	$282,000
WWFM-8	18th Avenue Lift Station Force Main		6	900	$254,000	$-	$254,000	$-	$-	$-	$-	$-	$-	$-	$254,000
WWFM-9	South 18th Avenue Lift Station Force Main		6	300	$85,000	$-	$85,000	$-	$-	$-	$-	$-	$-	$-	$85,000
WWFM-10	Idaho Avenue Lift Station Force Main		8/24	2,700	$1,031,000	$-	$1,031,000	$-	$-	$-	$-	$-	$-	$-	$1,031,000
WWFM-11	South Vine Street Lift Station Force Main		6	2,700	$761,000	$-	$761,000	$-	$-	$-	$-	$-	$-	$-	$761,000
WWFM-12	South 19th Avenue Lift Station Force Main		6	1,700	$479,000	$-	$479,000	$-	$-	$-	$-	$-	$-	$-	$479,000
WWFM-13	Liberty Drive Lift Station Force Main		6	1,400	$394,000	$-	$394,000	$-	$-	$-	$-	$-	$-	$-	$394,000

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Table 10.2 Collection System Capital Improvement Plan (continued)

Project		Existing Size/Type	Proposed Size/Type	Proposed Amount	CIP Cost Estimate(1)(2)(3)(4) ($)	Existing User Cost ($)	Future User Cost ($)	CIP Phasing ($)							
								Near-Term						Long-Term	Build-Out
								2019	2020	2021	2022	2023	2024-2028	2029-2040	2041 & beyond
Rehabilitation and Replacement Projects					$2,200,000	$1,000,000	$1,200,000	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000	$1,200,000	$-
Gravity Mains		Diameter (in)	Diameter (in)	Length (ft)	$2,200,000	$1,000,000	$1,200,000	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000	$1,200,000	$-
WWRR-1	Annual Sewer Line Replacement Program	--	--	--	$2,200,000	$1,000,000	$1,200,000	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000	$1,200,000	$-
Other Projects					$52,437,000	$42,984,000	$9,453,000	$-	$-	$-	$-	$150,000	$5,207,000	$46,093,000	$987,000
WWO-1	Sewer Master Plan Update	--	--	--	$600,000	$300,000	$300,000	$-	$-	$-	$-	$150,000	$150,000	$300,000	$-
WWO-2	Septic Removal	-	8	4,500	$1,269,000	$1,269,000	$-	$-	$-	$-	$-	$-	$-	$282,000	$987,000
WWO-3	WWTF	0	0	0	$50,568,000	$41,415,000	$9,153,000	$-	$-	$-	$-	$-	$5,057,000	$45,511,000	$-
CIP Total					$129,181,000	$55,207,000	$73,974,000	$1,461,000	$456,000	$1,589,000	$4,234,000	$5,098,000	$8,211,000	$60,651,000	$47,481,000
Annual Cost					N/A	N/A	N/A	$1,461,000	$456,000	$1,589,000	$4,234,000	$5,098,000	$1,642,000	$5,054,000	N/A

Notes:
(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.
(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.
(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.
(4) Total Mark-Up is 65.8% of the baseline construction costs.

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Table 10.3 CIP Cost by Project Type and Phase

Project Type	Phase 1 (2019-2023) ($)	Phase 2 (2024-2028) ($)	Phase 3 (2029-2040) ($)	Phase 4 (2041 & Beyond) ($)	Total ($)
Capacity Improvements					
Gravity Mains	$3,715,000	$133,000	$3,521,000	$5,552,000	$12,921,000
Lift Stations	$8,428,000	$2,371,000	$9,033,000	$14,917,000	$34,794,000
Force Mains	$45,000	$-	$-	$584,000	$629,000
Subtotal	$12,188,000	$2,504,000	$12,554,000	$21,053,000	$48,299,000
New Service Related Improvements					
Gravity Mains	-	-	-	$14,164,000	$14,164,000
Lift Stations	-	-	663,000	$7,625,000	$8,288,000
Force Mains	-	-	141,000	$3,652,000	$3,793,000
Subtotal	-	-	$804,000	$25,441,000	$26,245,000
Annual Sewer Line Replacement Program					
R&R Projects	$500,000	$500,000	$1,200,000	$-	$2,200,000
Subtotal	$500,000	$500,000	$1,200,000	-	$2,200,000
Other Projects					
Other Projects	$150,000	$5,207,000	$46,093,000	$987,000	$52,437,000
Subtotal	$150,000	$5,207,000	$46,093,000	$987,000	$52,437,000
Total	$12,838,000	$8,211,000	$60,651,000	$47,481,000	$129,181,000
Annual Cost	$3,209,500	$2,052,750	$5,513,727	-	-

Notes:
(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

10.7 Existing Versus Future Users Cost Share

Improvement costs within this study can be categorized as beneficial to existing users or future users, with some of the costs distributed between both categories. Costs are assigned to existing users if the improvement is related to an existing deficiency. Existing projects also benefit future users, which are assigned a portion of the cost. Projects that solely benefit future users such as new development will be assigned 100-percent of the cost. A summary of existing and future user cost share for the proposed projects by phase is summarized in Table 10.4, while Table 10.5 summarizes user cost by project type.

Table 10.4 CIP Cost by Reimbursement Category

Reimbursement Category	Phase 1 (2019-2023) ($)	Phase 2 (2024-2028) ($)	Phase 3 (2028-2040) ($)	Phase 4 (2041 & beyond) ($)	Total ($)
Existing Users	$9,681,000	$6,984,000	$37,556,000	$987,000	$55,208,000
Future Users	$3,157,000	$1,227,000	$23,095,000	$46,494,000	$73,937,000
Total	$12,838,000	$8,211,000	$60,651,000	$47,481,000	$129,181,000

Table 10.5 CIP Cost by Project Type and Reimbursement Category

Project Type	Existing User ($)	Future User ($)	Total ($)
Capacity Improvements			
Gravity Mains	$3,122,000	$9,799,000	$12,921,000
Lift Stations	$8,056,000	$26,693,000	$34,749,000
Force Mains	$45,000	$584,000	$629,000
Subtotal	$11,223,000	$37,076,000	$48,299,000
New Service Related Improvements			
Gravity Mains	-	$14,164,000	$14,164,000
Lift Stations	-	$8,288,000	$8,288,000
Force Mains	-	$3,793,000	$3,793,000
Subtotal	-	$26,245,000	$26,245,000
Annual Sewer Line Replacement Program			
R&R Projects	$1,000,000	$1,200,000	$2,200,000
Subtotal	$1,000,000	$1,200,000	$2,200,000
Other Projects			
Other Projects	$42,984,000	$9,453,000	$52,437,000
Subtotal	$42,984,000	$9,453,000	$52,437,000
Total	$55,207,000	$73,974,000	$129,181,000

Appendix A

2017 SEWER FLOW MONITORING STUDY

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City of Lemoore

2017 Sewer Flow Monitoring Study

Prepared for:

Carollo Engineers
1 East Liberty, Suite 424
Reno, NV 89501

carollo
Engineers...Working Wonders With Water™

Date:

October 2017

Prepared by:

V&A consulting engineers

V&A Project No. 16-0201

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Tables

Figures

Photo Log

Abbreviations and Acronyms

Abbreviations/Acronyms	Definition
ADWF	Average Dry Weather Flow
AVG.	Average
CCTV	Closed-Circuit Television
CDEC	California Data Exchange Center
CIP	Capital Improvement Plan
CO	Carbon Monoxide
CWOP	Citizen Weather Observing Program
DIA.	Diameter
d/D	Depth/Diameter Ratio
FT.	Feet
FM	Flow Monitor
GPD	Gallons per Day
GPM	Gallons per Minute
GWI	Groundwater Infiltration
H2S	Hydrogen Sulfide
IN.	Inch
I/I	Inflow and Infiltration
IDM	Inch-Diameter Mile
IDW	Inverse Distance Weighting
LEL	Lower Explosive Limit
MAX.	Maximum
MGD	Million Gallons per Day
MIN.	Minimum
NOAA	National Oceanic and Atmospheric Administration
N/A	Not applicable
PF	Peaking Factor
PS	Pump Station
Q	Flow Rate
RDI/I	Rainfall-Dependent Infiltration and Inflow
RG	Rain Gauge
SSO	Sanitary Sewer Overflow
V&A	V&A Consulting Engineers, Inc.
WEF	Water Environment Federation
WRCC	Western Regional Climate Center

Terms and Definitions

Term	Definition
Average dry weather flow (ADWF)	Average flow rate or pattern from days without noticeable inflow or infiltration response. ADWF usage patterns for weekdays and weekends differ and must be computed separately. ADWF is expressed as a numeric average and may include the influence of normal groundwater infiltration (not related to a rain event).
Basin	Sanitary sewer collection system upstream of a given location (often a flow meter), including all pipelines, inlets, and appurtenances. Also refers to the ground surface area near and enclosed by pipelines. A basin may refer to the entire collection system upstream from a flow meter or exclude separately monitored basins upstream.
Depth/diameter (*d/D*) ratio	Depth of water in a pipe as a fraction of the pipe's diameter. A measure of fullness of the pipe used in capacity analysis.
Peaking factor (PF)	PF is the ratio of peak measured flow to average dry weather flow. This ratio expresses the degree of fluctuation in flow rate over the monitoring period and is used in capacity analysis.
Surcharge	When the flow level is higher than the crown of the pipe, then the pipeline is said to be in a **surcharged** condition. The pipeline is surcharged when the *d/D* ratio is greater than 1.0.

Executive Summary

Scope and Purpose

V&A Consulting Engineers (V&A) has completed sanitary sewer flow monitoring within the City of Lemoore, CA (City). Flow monitoring was performed from August 29, 2017 to September 19, 2017 at 15 open-channel flow monitoring sites. The purpose of this project was to establish the baseline sanitary flows at the flow monitoring sites during the monitoring period.

Site Flow Monitoring and Capacity Results

Peak measured flows and the corresponding flow levels (depths) are important to understand the capacity limitations of a collection system. The peak flows and flow levels reported are from the peak measurements as taken across the entirety of the flow monitoring period. Peak flows and levels may not correspond to a rainfall event.

The following capacity analyses terms are defined as follows:

- **d/D Ratio:** The d/D ratio is the peak measured depth of flow (d) divided by the pipe diameter (D). The d/D ratio for each site was computed based on the maximum depth of flow for the study.
- **Peaking Factor:** Peaking factor is defined as the peak measured flow divided by the ADWF. Peaking factors are influenced by many factors including size and topography of tributary area and the amount and characteristics of I/I entering the collection system. Flow attenuation and flow restrictions will also affect the peaking factor.

Table ES-1 summarizes the flow monitoring and capacity results for the flow monitoring sites. Figure ES-1 shows the peak flow schematic for meters. Results of note have been shaded in RED. Capacity analysis data is presented on a site-by-site basis and represents the hydraulic conditions only at the site locations; hydraulic conditions in other areas of the collection system will differ.

Table ES-1. Capacity Analysis Summary

Site	ADWF (mgd)	Peak Measured Flow (mgd)	Peaking Factor	Diameter (in)	Peak Level (in)	*d/D* Ratio	Level Surcharged above Crown (ft)
Site 1	0.177	0.355	2.0	10	5.31	0.53	
Site 2	0.332	0.602	1.8	14.5	6.45	0.44	
Site 3	0.469	0.824	1.8	17.25	12.25	0.71	
Site 4	0.170	0.349	2.1	9.75	6.14	0.63	
Site 5	0.729	1.172	1.6	18	38.96	2.16	1.75
Site 6	0.210	0.411	2.0	11.5	14.22	1.24	0.23
Site 7	0.126	0.228	1.8	n/a		n/a	

Site	ADWF (mgd)	Peak Measured Flow (mgd)	Peaking Factor	Diameter (in)	Peak Level (in)	d/D Ratio	Level Surcharged above Crown (ft)
Site 8	0.229	0.470	2.1	10	4.99	0.50	
Site 9	0.094	0.243	2.6	10	13.04	1.30	0.25
Site 10	0.215	0.556	2.6	12	10.41	0.87	
Site 11	0.692	1.230	1.8	15	11.8	0.79	
Site 12	0.424	0.862	2.0	15	20.43	1.36	0.45
Site 13	0.028	0.120	4.4	12	2.75	0.23	
Site 14	0.042	0.166	3.9	9.75	3.32	0.34	
Site 15	0.681	0.933	1.4	12	7.69	0.64	

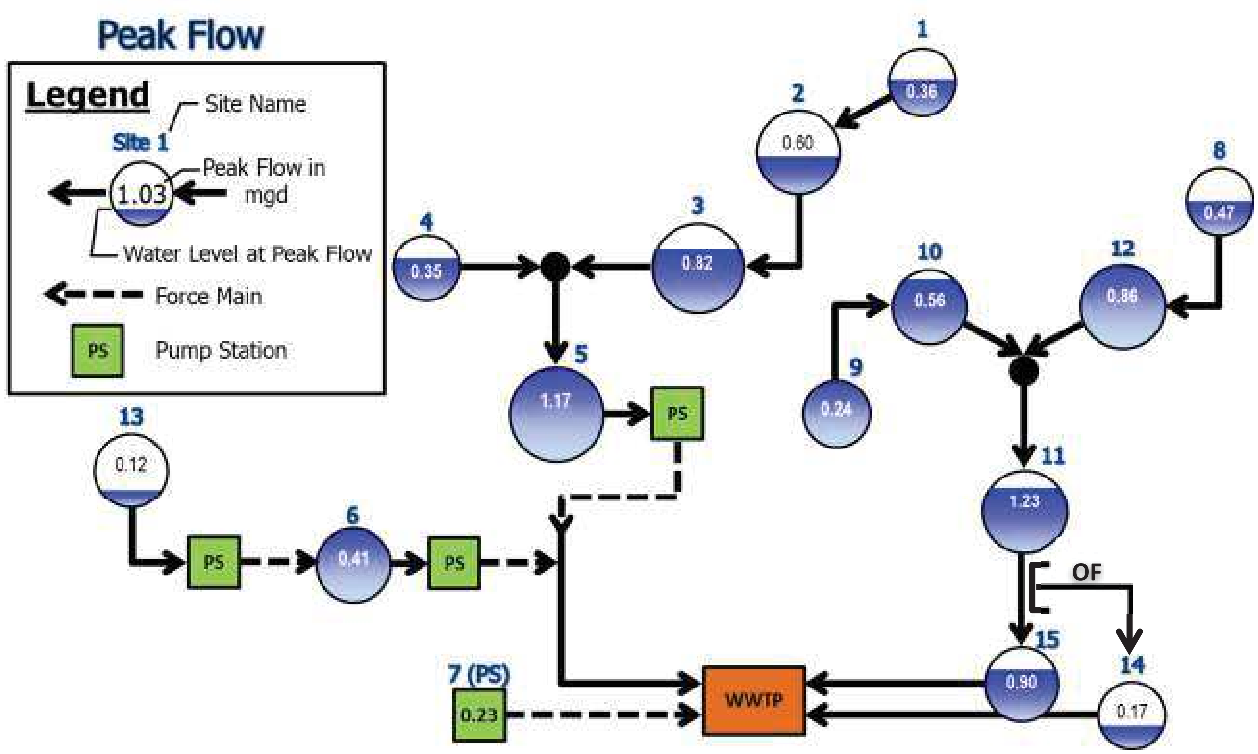

Figure ES-1. Peak Flow Schematic – V&A Sites

The following capacity analysis results are noted:

- **Peaking Factor:** Site 13 had a peaking factor that exceeded 4. Site 14 had a peaking factor that exceeded 3.0.
- **d/D Ratio:** Six of the fourteen open channel flow monitoring sites, Sites 5, 6, 9, 10, 11, and 12, had d/D ratios that were above the common threshold value of 0.75 d/D. Four of these sites, 5, 6, 9, and 12, reached a surcharge condition during the study.

1 Introduction

1.1 Scope and Purpose

V&A Consulting Engineers (V&A) has completed sanitary sewer flow monitoring within the City of Lemoore, CA (City). Flow monitoring was performed from August 29, 2017 to September 19, 2017 at 15 open-channel flow monitoring sites. The purpose of this project was to establish the baseline sanitary flows at the flow monitoring sites during the monitoring period.

The flow monitoring sites are listed in Table 1-1 and shown in Figure 1-1.

Table 1-1. List of Flow Monitoring Locations

Monitoring Site	Measured Pipe Diameter (in)	Location
Site 1	10	185 W. Spring Ln.
Site 2	14.5	Fox St., 300' north of Cinnamon St.
Site 3	17.25	Intersection of Cinnamon St. & N. 19th Ave.
Site 4	9.75	Cinnamon St., 360' west of N. 19th Ave.
Site 5	18	S. 19th St., 145' south of Silverado Dr.
Site 6	11.5	Intersection of Carmel Dr. and San Simeon Dr.
Site 7	n/a	Intersection of Enterprise Dr. and S. 19th Ave.
Site 8	10	In field 650' east of intersection of 18th Ave. & G St.
Site 9	10	Intersection of Linda Ln & Sycamore Ln.
Site 10	12	Intersection of W. Bush St. & Vine St.
Site 11	15	190' south of intersection of W. Bush St. & Vine St.
Site 12	15	Intersection of W. Bush St. & Vine St.
Site 13	12	College Ave, opposite southeast corner of West Hills College campus
Site 14	9.75	Inside east entrance to treatment plant
Site 15	12	Inside east entrance to treatment plant

Figure 1-1. Map of Flow Monitoring Sites

2 Methods and Procedures

2.1 Confined Space Entry

A confined space (Photo 2-1) is defined as any space that is large enough and so configured that a person can bodily enter and perform assigned work, has limited or restricted means for entry or exit and is not designed for continuous employee occupancy. In general, the atmosphere must be constantly monitored for sufficient levels of oxygen (19.5% to 23.5%), and the presence of hydrogen sulfide (H_2S) gas, carbon monoxide (CO) gas, and lower explosive limit (LEL) levels. A typical confined space entry crew has members with OSHA-defined responsibilities of Entrant, Attendant and Supervisor. The Entrant is the individual performing the work. He or she is equipped with the necessary personal protective equipment needed to perform the job safely, including a personal four-gas monitor (Photo 2-2). If it is not possible to maintain line-of-sight with the Entrant, then more Entrants are required until line-of-sight can be maintained. The Attendant is responsible for maintaining contact with the Entrants to monitor the atmosphere using another four-gas monitor and maintaining records of all Entrants, if there is more than one. The Supervisor is responsible for developing the safe work plan for the job at hand prior to entering.

Photo 2-1. Confined Space Entry

Photo 2-2. Typical Personal Four-Gas Monitor

2.2 Flow Meter Installation

Isco 2150 flow meters were installed by V&A in the sewer lines listed in Table 1-1. Isco 2150 meters use submerged sensors with a pressure transducer to collect depth readings and an ultrasonic Doppler sensor to determine the average fluid velocity. The ultrasonic sensor emits high-frequency sound waves, which are reflected by air bubbles and suspended particles in the flow. The sensor receives the reflected signal and determines the Doppler frequency shift, which indicates the estimated average flow velocity. The sensor is typically mounted at a manhole inlet to take advantage of smoother upstream flow conditions. The sensor may be offset to one side to lessen the chances of fouling and sedimentation where these problems are expected to occur. Manual level and velocity measurements were taken during installation of the flow meters and again when they were removed and were compared to simultaneous level and velocity readings from the flow meters to ensure proper calibration and accuracy. The pipe diameter was also verified in order to accurately calculate the flow cross-section. The continuous depth and velocity readings were recorded by the flow meters on 5-minute intervals. Figure 2-1 shows a typical installation for a flow meter with a submerged sensor.

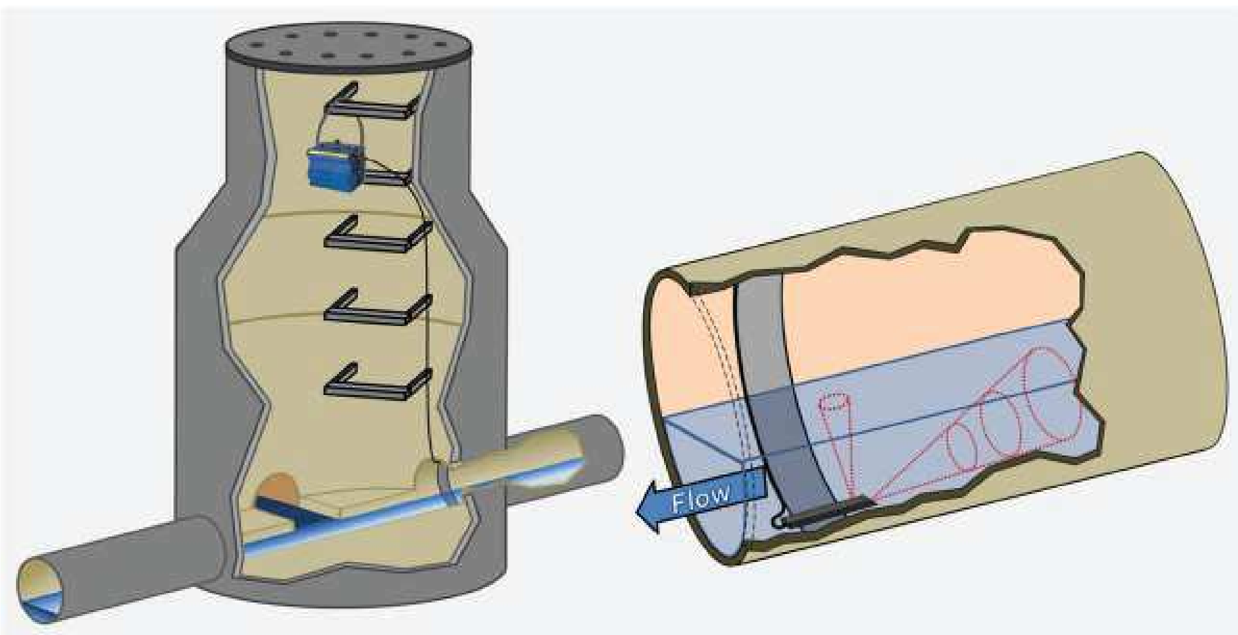

Figure 2-1. Typical Installation for Flow Meter with Submerged Sensor

2.3 Flow Calculation

Data retrieved from the flow meter was placed into a spreadsheet program for analysis. Data analysis includes data comparison to field calibration measurements, as well as necessary geometric adjustments as required for sediment (sediment reduces the pipe's wetted cross-sectional area available to carry flow). Area-velocity flow metering uses the continuity equation,

$$Q = v \cdot A = v \cdot (A_T - A_S)$$

where Q: volume flow rate

v: average velocity as determined by the ultrasonic sensor

A: cross-sectional area available to carry flow

A_T: total cross-sectional area with both wastewater and sediment

A_S: cross-sectional area of sediment.

For circular pipe,

$$A_T = \left[\frac{D^2}{4}\cos^{-1}\left(1 - \frac{2d_W}{D}\right)\right] - \left[\left(\frac{D}{2} - d_W\right)\left(\frac{D}{2}\right)\sin\left(\cos^{-1}\left(1 - \frac{2d_W}{D}\right)\right)\right]$$

$$A_S = \left[\frac{D^2}{4}\cos^{-1}\left(1 - \frac{2d_S}{D}\right)\right] - \left[\left(\frac{D}{2} - d_S\right)\left(\frac{D}{2}\right)\sin\left(\cos^{-1}\left(1 - \frac{2d_S}{D}\right)\right)\right]$$

where d_W: distance between wastewater level and pipe invert

d_S: depth of sediment

D: pipe diameter

2.4 Average Dry Weather Flow Determination

For this study, four distinct average dry weather flow curves were established for each site location:

- Mondays – Thursdays
- Fridays
- Saturdays
- Sundays

Flows for many sites differ on Friday evenings compared to Mondays through Thursdays. Starting around 7 pm, the flows are often decreased (compared to Monday through Thursday). Similarly, flow patterns for Saturday and Sunday were also separated due to their unique evening flow pattern. This type of differentiation can be important when determining I/I response, especially if a rain event occurs on a Friday, Saturday or Sunday evening.

Figure 2-2 illustrates a sample of varying flow patterns within a typical week dry week.

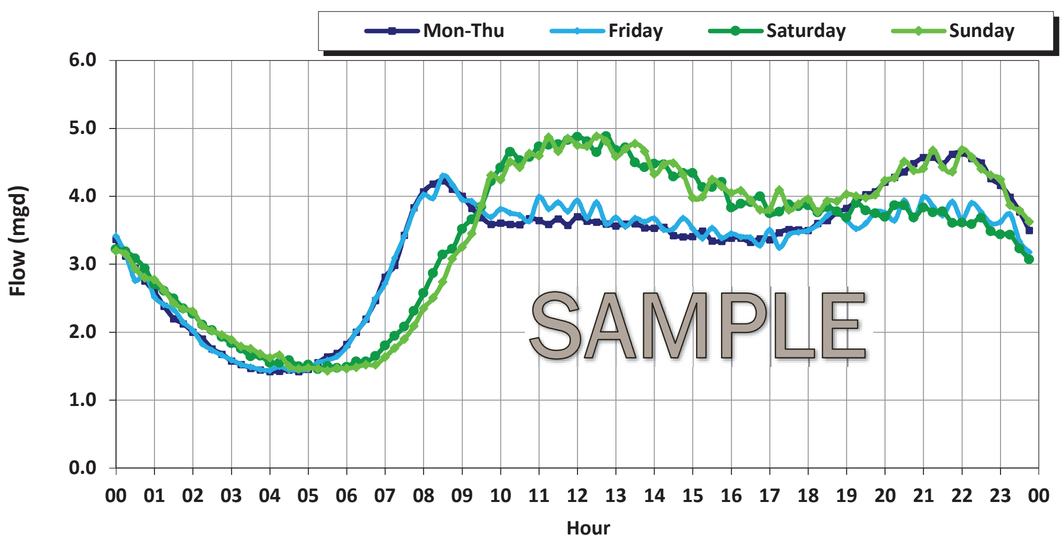

Figure 2-2. Sample ADWF Diurnal Flow Patterns

ADWF curves are taken from “Dry Days”, when RDI had the least impact on the baseline flow. For this study, the ADWF curves were also taken from days that did not have major holidays and the resultant tourist traffic. The overall average dry weather flow (ADWF) was calculated per the following equation:

$$ADWF = \left(ADWF_{Mon-Thu} \times \frac{4}{7}\right) + \left(ADWF_{Fri} \times \frac{1}{7}\right) + \left(ADWF_{Sat} \times \frac{1}{7}\right) + \left(ADWF_{Sun} \times \frac{1}{7}\right),$$

2.5 Flow Attenuation

Flow attenuation in a sewer collection system is the natural process of the reduction of the peak flow rate through redistribution of the same volume of flow over a longer period of time. This occurs as a result of friction (resistance), internal storage and diffusion along the sewer pipes. Fluids are constantly working towards equilibrium. For example, a volume of fluid poured into a static vessel with no outside turbulence will eventually stabilize to a static state, with a smooth fluid surface without peaks and valleys. Attenuation within a sanitary sewer collection system is based upon this concept. A flow profile with a strong peak will tend to stabilize towards equilibrium, as shown in Figure 2-3.

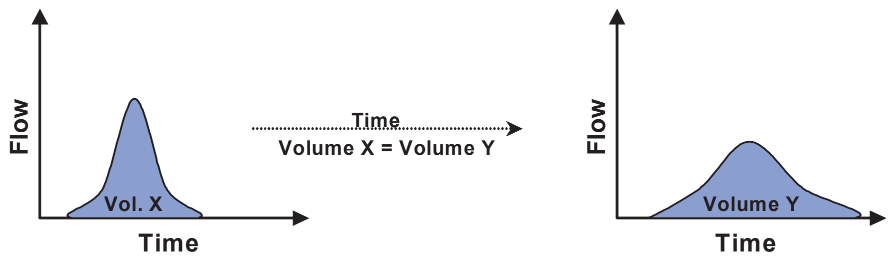

Figure 2-3. Attenuation Illustration

Within a sanitary sewer collection system, each individual basin will have a specific flow profile. As the flows from the basins combine within the trunk sewer lines, the peaks from each basin will (a) not necessarily coincide at the same time, and (b) due to the length and time of travel through the trunk sewers, peak flows will attenuate prior to reaching the treatment facility. The sum of the peak flows of the individual basins within a collection system will usually be greater than the peak flows observed at the treatment facility.

3 Flow Monitoring Results

3.1 Average Flow Analysis

Table 3-1 summarizes the dry weather flow data measured for this study. ADWF curves for each site can be found in *Appendix A.* Figure 3-1 shows a flow schematic highlighting the average daily flows and levels of the flow sites.

Table 3-1. Dry Weather Flow

Monitoring Site	Monday-Thursday ADWF (mgd)	Friday ADWF (mgd)	Saturday ADWF (mgd)	Sunday ADWF (mgd)	Overall ADWF (mgd)
Site 1	0.178	0.166	0.175	0.186	0.177
Site 2	0.328	0.312	0.336	0.364	0.332
Site 3	0.466	0.445	0.474	0.501	0.469
Site 4	0.166	0.159	0.170	0.194	0.170
Site 5	0.720	0.689	0.751	0.780	0.729
Site 6	0.213	0.197	0.196	0.225	0.210
Site 7	0.129	0.129	0.121	0.119	0.126
Site 8	0.224	0.212	0.229	0.264	0.229
Site 9	0.094	0.090	0.091	0.102	0.094
Site 10	0.207	0.205	0.219	0.256	0.215
Site 11	0.685	0.669	0.700	0.737	0.692
Site 12	0.427	0.411	0.422	0.430	0.424
Site 13	0.034	0.031	0.015	0.011	0.028
Site 14	0.041	0.034	0.043	0.055	0.042
Site 15	0.682	0.693	0.673	0.673	0.681

The following information should be noted:

- Site 7 is located at a pump station and the flow exiting this pump station operates at two rates, depending on when an upstream pump station is operating. When the upstream pump station is on, the flow is approximately 0.17 mgd and is approximately 0.07 mgd when it is off.
- There was virtually no rainfall during the flow monitoring period. The morning of August 30, 2017, there were some isolated thundershowers, though no measurable rainfall was recorded. The impact of inflow and infiltration was not evaluated as this is a dry weather study. Under wet weather flow conditions, the available capacity may be less due to inflow and infiltration.

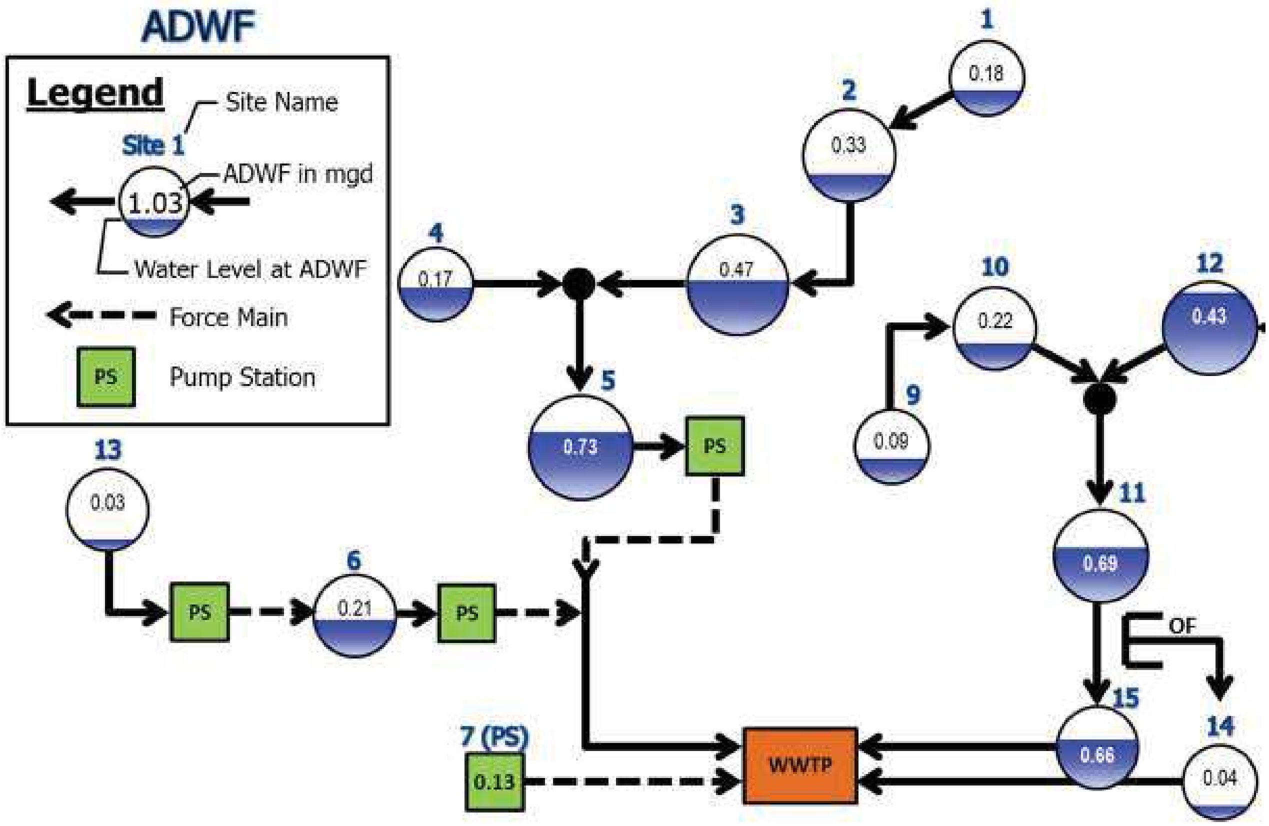

Figure 3-1. Dry Weather Flow Schematic – V&A Sites

3.2 Capacity Analysis: Peaking Factor and d/D Ratio

Peak measured flows and the corresponding flow levels (depths) are important to understand the capacity limitations of a collection system. The peak flows and flow levels reported are from the peak measurements as taken across the entirety of the flow monitoring period. Peak flows and levels may not correspond to a rainfall event. There were several instances of backflow conditions (detailed below) due to capacity constraints and the inability of the local collection system to handle peak wet weather flows.

The following capacity analysis terms are defined as follows:

- **Peaking Factor:** Peaking factor is defined as the peak measured flow divided by the average dry weather flow (ADWF). Peaking factors are influenced by many factors including size and topography of tributary area and the amount and characteristics of I/I entering the collection system. Flow attenuation and flow restrictions will also affect the peaking factor. Ideally wet weather peaking factors would be approaching 3 for new systems.
- **d/D Ratio:** The d/D ratio is the peak measured depth of flow (d) divided by the pipe diameter (D). Standards for d/D ratio vary from agency to agency, but typically range between d/D ≤ 0.5 and d/D ≤ 0.75. The d/D ratio for each site was computed based on the maximum depth of flow for the flow monitoring study.

Table 3-2 summarizes the peak recorded flows, levels, *d/D* ratios, and peaking factors per site during the flow monitoring period. Results of note have been shaded in RED. Capacity analysis data is presented on a site-by-site basis and represents the hydraulic conditions only at the point site locations. Hydraulic conditions in other areas of the collection system will differ.

Table 3-2. Capacity Analysis Summary

Site	ADWF (mgd)	Peak Measured Flow (mgd)	Peaking Factor	Diameter (in)	Peak Level (in)	*d/D* Ratio	Level Surcharged above Crown (ft)
Site 1	0.177	0.355	2.0	10	5.31	0.53	
Site 2	0.332	0.602	1.8	14.5	6.45	0.44	
Site 3	0.469	0.824	1.8	17.25	12.25	0.71	
Site 4	0.170	0.349	2.1	9.75	6.14	0.63	
Site 5	0.729	1.172	1.6	18	38.96	2.16	1.75
Site 6	0.210	0.411	2.0	11.5	14.22	1.24	0.23
Site 7	0.126	0.228	1.8	n/a		n/a	
Site 8	0.229	0.470	2.1	10	4.99	0.50	
Site 9	0.094	0.243	2.6	10	13.04	1.30	0.25
Site 10	0.215	0.556	2.6	12	10.41	0.87	
Site 11	0.692	1.230	1.8	15	11.8	0.79	
Site 12	0.424	0.862	2.0	15	20.43	1.36	0.45
Site 13	0.028	0.120	4.4	12	2.75	0.23	
Site 14	0.042	0.166	3.9	9.75	3.32	0.34	
Site 15	0.681	0.933	1.4	12	7.69	0.64	

The following capacity analysis results are noted:

- **Peaking Factor:** Site 13 had a peaking factor that exceeded 4. Site 14 had a peaking factor that exceeded 3.0.
- **d/D Ratio:** Six of the fourteen open channel flow monitoring sites, Sites 5, 6, 9, 10, 11, and 12, had d/D ratios that were above the common threshold value of 0.75 d/D. Four of these sites, 5, 6, 9, and 12, reached a surcharge condition during the study.

Figure 3-2 and Figure 3-3 show bar graphs summarizing the site-by-site d/D ratios, surcharge levels and peaking factors, respectively. Figure 3-4 shows a flow schematic showing the peak flow levels for the flow meters.

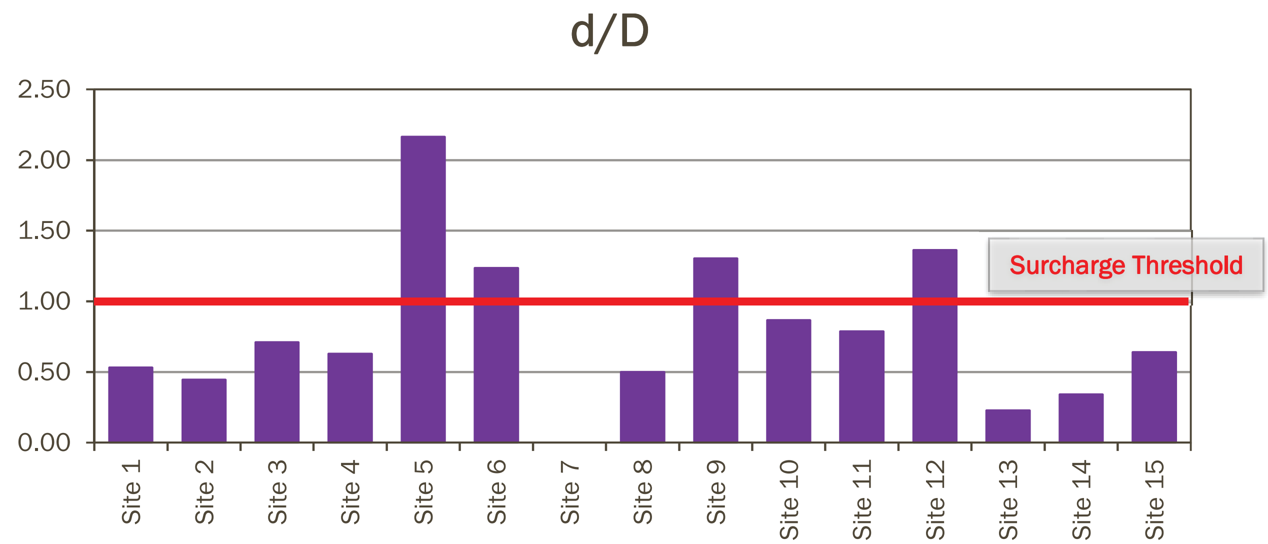

Figure 3-2. Capacity Summary: d/D Ratios

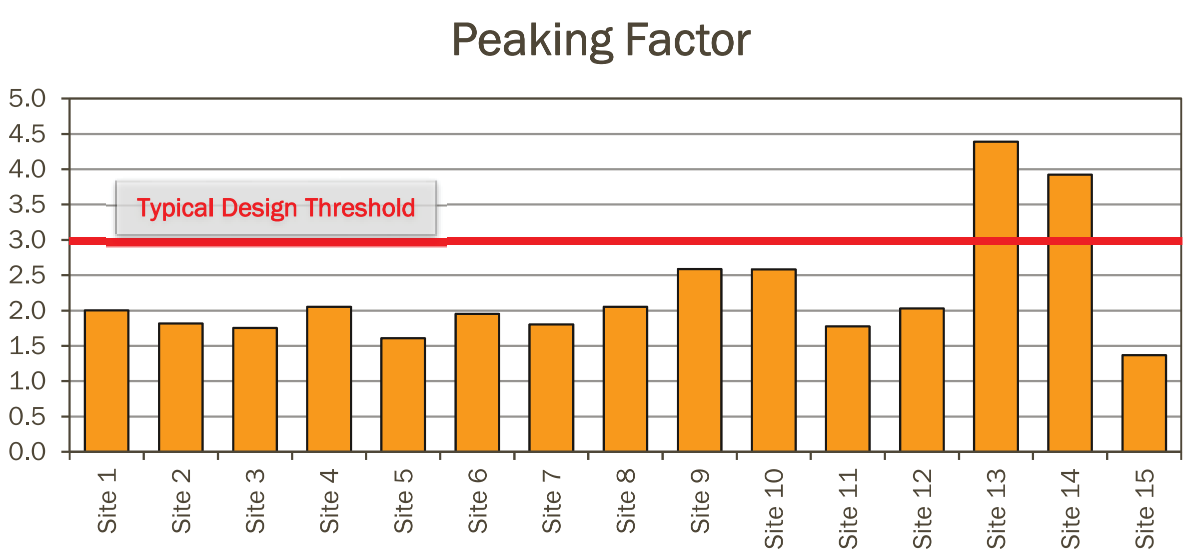

Figure 3-3. Capacity Summary: Peaking Factors

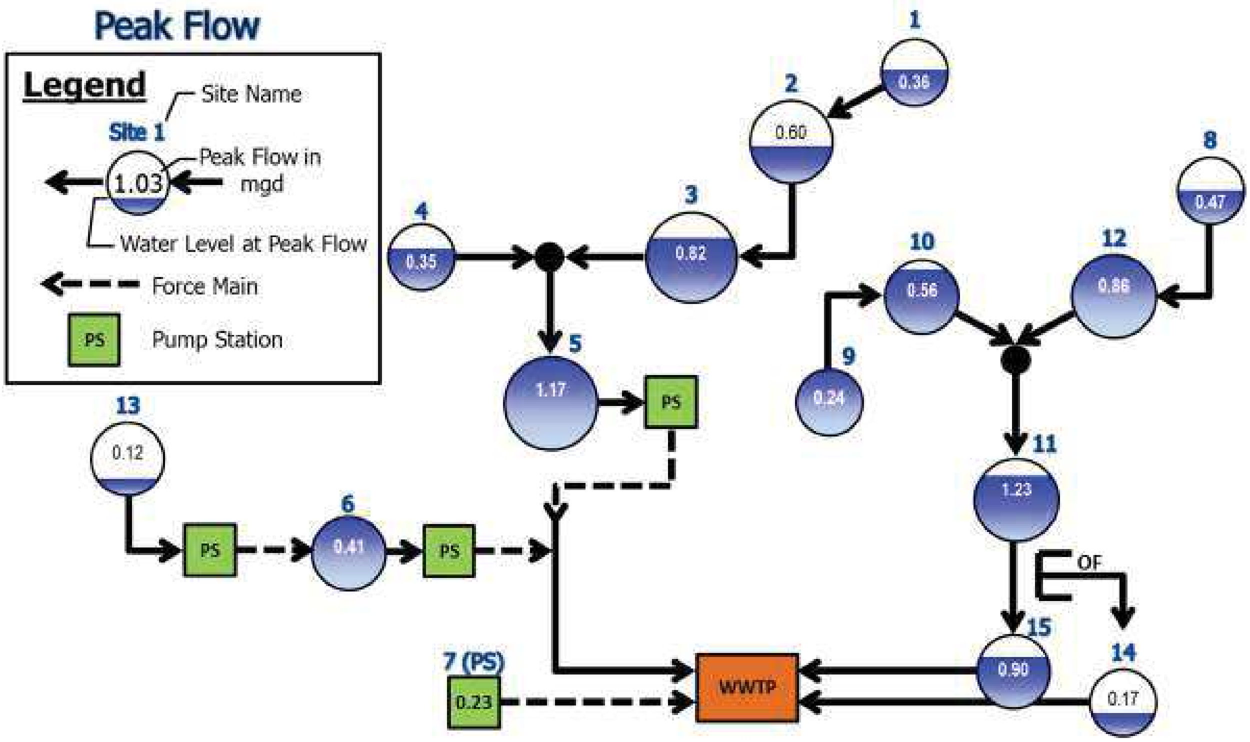

Figure 3-4. Peak Flow Schematic – V&A Sites

Appendix B

1996 WASTE DISCHARGE REQUIREMENTS

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. 96-050

WASTE DISCHARGE REQUIREMENTS
FOR
CITY OF LEMOORE
WASTEWATER TREATMENT FACILITY
KINGS COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Board) finds that:

1. The City of Lemoore (hereafter Discharger) submitted a Report of Waste Discharge and a site evaluation report dated 25 October 1990, in support of a proposed flow increase and a change in the method of treatment at its wastewater treatment facility (WWTF). The property of approximately 83 acres (Assessor's Parcel Nos. 024-052-73, 024-052-74, and 024-052-80) is owned by the City of Lemoore.

2. Waste Discharge Requirements Order No. 78-89, adopted by the Board on 28 July 1978, prescribes requirements for a discharge of 2.0 million gallons per day (mgd) from the WWTF to the Westlake Farms main irrigation canal through a six-mile pipeline. The wastewater supplements irrigation of approximately 50,000 acres of crops, including grain for animal feed and cotton on Westlake Farms. No vegetable crops are grown.

3. Order No. 78-89 must be revised to reflect the flow increase, the change in method of waste treatment, and current plans and policies of the Board.

4. The WWTF was completed in September 1974 with the aid of a Clean Water Grant. The completed WWTF consisted of four aerated lagoons, with Hinde diffused air systems, and a fifth pond for storage of stormwater and emergency storage of effluent. Plant improvements that included removal of the Hinde diffused air system and installation of floating aerators were completed in 1990, increasing the plant treatment and hydraulic capacity from 2.0 mgd to 4.4 mgd. The Report of Waste Discharge indicates that the 4.4 mgd capacity is based on influent waste characteristics, treatment pond sizing, and the assumption that an adequately sized outfall line for discharge of treated effluent would be constructed. The existing 12-inch diameter effluent outfall line limits the ability of the WWTF to discharge water to a maximum of 2.5 mgd, below the potential plant treatment and hydraulic capacityof 4.4 mgd.

5. Wastewater includes industrial and domestic components. The domestic wastewater discharge averages 0.50 mgd. The industrial wastewater discharge includes discharges from the Leprino Foods cheese processing plant (0.65 mgd), the Candlewick Yarns

textile plant (0.03 to 0.06 mgd), and the S-K Foods tomato processing plant (0.07 to 0.3 mgd). Wastewater from S-K Foods varies seasonally, with peak flows of 0.3 mgd occurring in the months of June through October. Effluent from the industrial and domestic aerated lagoons is combined in the third and fourth ponds of the system (Pond 2 and Pond 3, connected in series) and conveyed via pipeline to the Westlake Canal about 6 miles to the southwest. The total WWTF discharge flow averages 2.2 mgd from November through May of each year and 2.5 mgd from June through October. The plant is currently operating at the maximum flow capacity of the outfall line, 2.5 mgd, for part of the year.

Sludge from the treatment process is contained in the aerated lagoons and has not been removed for disposal since the plant was constructed in 1974. Sludge was transferred from two of the aerated lagoons to the storage pond in 1987.

6. Title 23, California Code of Regulations (CCR), Section 2232, specifies that whenever a publicly owned WWTF will reach capacity within four years, the Board shall notify the Discharger that the Board will consider adopting a time schedule order or other enforcement order unless the Discharger can demonstrate that adequate steps are being taken to address the capacity problem.

7. The WWTF is in Section 15, T19S, R20E, MDB&M, with surface water drainage to the Kings River by sheet flow, as shown in Attachment A, which is attached hereto and part of this Order by reference. The site lies within the Hanford-Lemoore Hydrologic Area (No.551.90), as depicted on interagency hydrologic maps prepared by the Department of Water Resources in August 1986. The WWTF is outside of any designated 100-year floodplain.

8. The outfall location for discharge of the effluent is the beginning of the Westlake Canal in Section 25, T19S, R19E, MDB&M, as shown in Attachment B. Pumped groundwater is discharged to the canal and mixed with wastewater effluent about 50 feet downstream of the outfall. In all years except for some drough years, the canal water is supplemented with water from the Kings River provided by the Lemoore Canal Company through an agreement with Westlake Farms. The Westlake canal is full year-round, providing a 2:1 to 25:1 (canal water: effluent) range of dilution, but sometimes provides less (as in three of 24 recent months). In the fall (September through November), undiluted effluent is stored in the canal until irrigation resumes.

9. The Westlake Canal connects with the Blakely Canal (collectively hereafter canals) approximately 8 miles downstream of the effluent outfall. The Blakely Canal originates at Empire Weir No. 2 on the Kings River. Both canals are entirely on Westlake Farms

property, have no outlet to other surface waters, and are waters of the State. The Westlake Canal crosses under several county roads where it is accessible to the public. The Blakely Canal parallels State Route 41 for approximately 6 miles. The Westlake Canal is posted at all road access points to indicate that it contains undisinfected wastewater; however, the Blakely Canal downstream of the Westlake Canal is readily accessible to the public along State Route 41 and is not posted to indicate that it contains undisinfected wastewater. The Blakely Canal also receives 0.12 mgd of disinfected wastewater effluent from the Kettleman City Sanitary District WWTF at a downstream location, approximately 7 miles from its connection with the Westlake Canal.

10. The Board adopted a Water Quality Control Plan for the Tulare Lake Basin (hereafter Basin Plan), which designates beneficial uses and contains water quality objectives for all waters of the Basin. These requirements implement the Basin Plan.

11. The canals are considered valley floor waters. As listed in the Basin Plan, the beneficial uses of these waters are industrial and agricultural supply; water contact and non-contact water recreation; warm fresh water habitat; wildlife habitat; preservation of rare and endangered species; and ground water recharge. Unlike other valley floor waters, actual beneficial uses of the canals are limited to agricultural supply, non-contact water recreation, warm fresh water habitat, wildlife habitat, and ground water recharge. The California Department of Fish and Game reports that warm water fish migrate to the canals by way of an upstream connection of the Blakely Canal to the Kings River at Empire Weir No. 2. The Department recommends a chlorine residual limitation of 0.01 mg/l and minimum dissolved oxygen concentration of 5 mg/l in the water of the canals to protect the water water fish population.

12. According to the Department of Water Resources, shallow ground water is unconfined, at a depth of approximately 10 feet below ground surface and of unknown quality. Deeper ground water, at a depth of 83 to 145 feet bgs, is of good quality with electrical conductivity (EC) of 660 to about 1,200 μmhos/cm. This deeper ground water moves in a southwesterly direction.

13. The beneficial uses of underlying ground water are domestic, industrial, and agricultural supply.

14. Soils at the site of the WWTF are sandy loams of the Grangeville series with moderate soil permeabilities. Based on testing of site soils with various mixtures of bentonite clay, 1.5 lbs of bentonite per square foot of wetted area were combined with the upper 4 inches of native soil and compacted in place in each pond to limit seepage losses. A water balance submitted for the ponds indicates seepage from the ponds is minimal.

15. City of Lemoore WWTF is identified as SIC 4952; which would need to obtain a NPDES stormwater permit due to flows greater than 1.0 mgd except that stormwater from the WWTF is contained in an on-site pond.

16. Statewide plans and policies applicable to this discharge and not referenced in the Basin Plan include the "Policy Statement on Wastewater Discharge to Watercourses in Water Deficient Areas, Resolution No. 79-45" and the "Policy with respect to Water Reclamation in California, Resolution No. 77-1".

17. The California Department of Health Services has established statewide reclamation criteria in Title 22, CCR, Section 60301, et seq. (hereafter Title 22) for use of reclaimed water, and has developed guidelines for specific uses. The Board consulted with the Department in developing appropriate conditions for this Order. To protect public health the Department recommends that the wastewater effluent be disinfected prior to discharge to the Westlake Canal such that the median number of coliform organisms does not exceed 23 MPN/100 ml.

18. On 3 January 1989, the City of Lemoore certified a final environmental impact report (EIR) in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000, et seq.) and the State CEQA Guidelines for a flow of 3.3 mgd. The project as approved will not have a significant effect on water quality.

19. The permitted discharge is consistent with the antidegradation provisions of State Water Resources Control Board Resolution No. 68-16.

20. The Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

21. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED that Order No. 78-89 is rescinded and the City of Lemoore, its agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall comply with the following:

A. Discharge Prohibitions:

1. Discharge of wastes to surface waters or surface water drainage courses other than the irrigation canal specified in Finding No. 8 is prohibited.

2. Bypass or overflow of untreated or partially treated waste is prohibited.

3. Discharge of waste classified as 'hazardous' or 'designated', as defined in Sections 2521(a) and 2522(a) of Title 23, CCR, is prohibited.

B. Discharge Specifications:

1. The monthly average discharge shall not exceed 2.5 mgd.

2. Objectionable odors originating at this facility shall not be perceivable beyond the limits of the wastewater treatment and disposal areas.

3. The treatment facilities shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.

4. The effluent from the treatment facility shall not exceed the following limits:

Constituent	Units	Monthly Average	Maximum
BOD_5[1]	mg/l	40	80
Settleable Solids	ml/l	0.2	0.5

[1] 5-day, 20° Celsius biochemical oxygen demand.

5. Effective 15 February 1997, effluent from the treatment facility shall not exceed the following limits:

Constituent	Units	Monthly Median	Maximum
Coliform Organisms	MPN[1]/100 ml	23	500

[1] Most Probable Number.

6. The dissolved oxygen content in the upper zone (1 foot) of wastewater in ponds shall not be less than 1.0 mg/l.

7. The discharge shall not have a pH less than 6.0 or greater than 9.0.

8. The maximum electrical conductivity (EC) of the discharge shall not exceed the average EC of the source water plus 500 μmhos/cm.

9. Ponds shall be managed to prevent breeding of mosquitos. In particular:

   a. An erosion control program should assure that small coves and irregularities are not created around the perimeter of the water surface.

   b. Weeds shall be minimized through control of water depth, harvesting, or herbicides.

   c. Dead algae, vegetation, and debris shall not accumulate on the water surface.

10. Public contact with wastewater at the WWTF and in the canal shall be precluded through such means as fences, signs, or other acceptable alternatives.

C. Sludge Disposal Specifications:

1. Collected screenings, sludges, and other solids removed from liquid wastes shall be disposed of in a manner that is consistent with Title 23, CCR, Section 2510, et seq. (Chapter 15) and approved by the Executive Officer.

2. Any proposed change in sludge use or disposal practice shall be reported to the Executive Officer at least 90 days in advance of the change.

3. Use and disposal of sewage sludge shall comply with existing Federal and State laws and regulations, including permitting requirements and technical standards included in 40 CFR 503.

   If the State Water Resources Control Board and the Regional Water Quality Control Boards accept primacy to implement regulations contained in 40 CFR 503, the Order may be reopened to incorporate appropriate time schedules and technical standards. (The Discharger must comply with the standards and time schedules contained in 40 CFR 503 whether or not they have been incorporated into this Order.)

D. Receiving Water Limitations:

In receiving water, the discharge shall not cause:

1. Concentrations of dissolved oxygen to fall below 5.0 mg/l.
2. Oils, greases, waxes, or other materials to form a visible film or coating on the water surface or on the stream bottom.
3. Oils, greases, waxes, floating material (liquids, solids, foams, and scums) or suspended material to create a nuisance or adversely affect beneficial uses.
4. Chlorine to be detected in concentrations equal to or greater than 0.01 mg/l.
5. Toxic substances to increase to concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.
6. Esthetically undesirable discoloration.
7. Fungi, slimes, or other objectionable growths.
8. The normal ambient pH to fall below 6.5 or exceed 8.3.
9. The fecal coliform concentration in any 30-day period to exceed a geometric mean of 200 MPN/100 ml or cause more than 10 percent of total samples to exceed 400 MPN/100 ml.
10. Deposition of material that causes nuisance or adversely affects beneficial uses.

11. Taste or odor-producing substances to impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin or to cause nuisance or adversely affect beneficial uses.

12. Violation of any applicable water quality standard for receiving waters adopted by the Board or the State Water Resources Control Board pursuant to the CWA and regulations adopted thereunder.

E. Ground Water Limitations:

The discharge, in combination with other sources, shall not cause underlying ground water to contain waste constituents in concentrations statistically greater than background water quality, excepting EC. The incremental increase of EC in any five-year period shall not exceed 15 μmhos/cm.

F. Provisions:

1. The Discharger shall not allow pollutant-free wastewater to be discharged into the collection, treatment, and disposal system in amounts that significantly diminish the system's capability to comply with this Order. Pollutant-free wastewater means rainfall, ground water, cooling waters, and condensates that are essentially free of pollutants.

2. The Discharger shall comply with Monitoring and Reporting Program No. 96-050, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.

3. The Discharger shall comply with all items of the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements," dated 1 March 1991, which are part of this Order. This attachment and its individual paragraphs are commonly referenced as "Standard Provision(s)."

4. By **1 July 1996**, the Discharger shall submt a technical report consisting of plans and specifications for compliance with the disinfection requirements of Discharge Specifications No. B.5. The report shall include a time schedule for full compliance by **15 March 1997** and must be prepared by a properly qualified engineer registered in California and experienced in the field of watewater treatment.

5. In the event of any change in control or ownership of land or waste discharge facilities described herein, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office.

   To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the State of incorporation if a corporation, the name and address and telephone number of the persons responsible for contact with the Board, and a statement. The statement shall comply with the signatory paragraph of Standard Provision B.3 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer shall be approved or disapproved by the Executive Officer.

6. At least 90 days prior to termination or expiration of any lease, contract, or agreement involving disposal or reclamation areas or off-site reuse of effluent, used to justify the capacity authorized herein and assure compliance with this Order, the Discharger shall notify the Board in writing of the situation and of what measures have been taken or are being taken to assure full compliance with this Order.

7. Prior to making any change in the discharge point, place of use, or purpose of use of the wastewater, the Discharger shall obtain approval of or clearance from the State Water Resources Control Board, Division of Water Rights.

8. By 1 July 1996, the Discharger shall submit a technical report for achieving compliance with Title 23, CCR, Section 2232, as described in Finding No. 6. The report shall include plans, specifications, and a time schedule for providing treatment and outfall capacity for anticipated flows through the year 2000. Alternatively, the technical report can include a demonstration of how flow volumes will be prevented from exceeding the existing capacity.

   Pursuant to Section 2232, the report shall conform with the following:

   a. The required technical report shall be reviewed, approved and jointly submitted by all planning and building departments having jurisdiction in the area served by the waste collection, treatment, or disposal facilities.

b. Public participation shall be required during the preparation of the technical report. The report shall be accompanied by a statement outlining how interested persons were involved in the preparation of the technical report.

9. The Discharger shall use the best practicable, cost-effective control technique currently available to comply with this Order.

10. The Discharger must comply with all conditions of this Order, including timely submittal of technical and monitoring reports as directed by the Executive Officer. Violations may result in enforcement action, including Regional Board or court orders requiring corrective action or imposing civil monetary liability, or in revision or rescission of this Order.

11. A copy of this Order shall be kept at the discharge facility for reference by operating personnel. Key operating personnel shall be familiar with its contents.

12. The Board will review this Order periodically and will revise requirements when necessary.

I, WILLIAM H. CROOKS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 23 February 1996.

William H. Crooks

WILLIAM H. CROOKS, Executive Officer

LML:lml/fmc

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. 96-050

FOR
CITY OF LEMOORE
WASTEWATER TREATMENT FACILITY
KINGS COUNTY

Specific sample station locations shall be established with concurrence of the Board's staff, and a description of the stations shall be submitted to Board and attached to this Program.

INFLUENT MONITORING

Influent samples shall be collected at the inlet of the headworks and at approximately the same time as effluent samples. Influent monitoring shall include at least the following:

Constituents	Units	Type of Sample	Sampling Frequency
BOD_5[1]	mg/l	grab	Monthly
Settleable Solids	ml/l	grab	Monthly

1 Five-day, 20° Celsius biochemical oxygen demand.

EFFLUENT MONITORING

Effluent samples shall be collected prior to discharge to the canal. The following is the effluent monitoring program:

Constituents	Units	Type of Sample	Frequency[1]
Flow	mgd	Metered	Continuous
Settleable Solids	ml/l	Grab	2/Week
pH	pH Units	Grab	2/Week
BOD_5[2]	mg/l	Grab	Weekly
Total Suspended Solids	mg/l	Grab	Weekly
Electrical Conductivity	µmhos/cm	Grab	2/month
Total Coliform Organisms	MPN/100 ml	Grab	2/week

* See footnotes next page

1 If results of monitoring a pollutant appear to violate effluent limitations, but monitoring frequency is not sufficient to validate violation (e.g., the monthly average for BOD), or indicate a violation and potential upset of the treatment process (e.g., less than minimum D.O.), the frequency of sampling shall be increased to confirm the magnitude and duration of violation, if any, and aid in identification and resolution of the problem.

2 Five-day, 20° Celsius biochemical oxygen demand.

3 Sample shall be collected at the outfall to the canal.

SLUDGE MONITORING

When sludge is removed from treatment ponds, but prior to disposal, a composite sample of sludge shall be analyzed, on a dry weight basis, for Total Solids (%), Nitrogen (total, NH_4-N, and NO_3-N), Total phosphorous, Total Potassium, Total PCBs, and totals of specific metals (Pb, Zn, Cu, Ni, Cd, and Ag). Analytical results shall be submitted to the Executive Officer. Analysis of soluble concentration of these specific metals shall be included as needed. If disposal is to land, a technical report analyzing application rates and procedures relative to Department of Health Services' Manual of Good Practices for Landspreading of Sewage Sludge and EPA's Process Design Manual for Land Application of Municipal Sludges and Title 23, California Code of Regulations, Section 2511 (f), shall be completed and submitted to the Executive Officer for approval. The report shall be prepared by a California registered civil engineer experienced in wastewater treatment and disposal.

Sampling records shall be retained for a minimum of five years. A log shall be kept of sludge quantities generated and of handling and disposal activities. The frequency of entries is discretionary; however, the log should be complete enough to serve as a basis for part of the annual report.

POND MONITORING

The freeboard shall be monitored in each pond to the nearest tenth of a foot. Pond water monitoring shall include the following:

Constituent	Unit	Type of Sample	Frequency
Freeboard	feet	Measurement	Weekly
Dissolved Oxygen[1]	mg/l	Grab	Daily

1 Samples shall be collected at a depth of one foot from each pond, opposite the inlet, and analyzed for dissolved oxygen. Samples shall be collected between 0800 and 0900 hours.

Permanent markers shall be placed in the pond with calibration indicating the water level at design capacity and available operational freeboard.

In addition, the Discharger shall inspect the condition of the ponds once per week and write visual observation in a bound log book. Notations shall include observations of whether weeds are developing in the water or along the bank, and their location; whether dead algae, vegetation, scum, or debris are accumulating on the pond surface and their location; whether burrowing animals or insects are present; and the color of the pond (e.g., dark sparkling green, dull green, yellow, grey, tan, brown, etc.). A copy of the entries made in the log during each month shall be submitted along with the monitoring report the following month. Where the O&M manual indicates remedial action is necessary, the Discharger shall briefly explain in the transmittal what action has been taken or is scheduled to be taken.

WATER SUPPLY MONITORING

A sampling station shall be established where a representative sample of the water supply can be obtained. Water supply monitoring shall include at least the following:

Constituents	Unit	Sample Frequency
Electrical Conductivity @ 25°C	µmhos/cm	Quarterly

If the source water is from more than one well, the EC shall be reported as a weighted average and include copies of supporting calculations.

RECEIVING WATER MONITORING

Constituent	Unit	Type of Sample	Frequency
Dissolved Oxygen[1]	mg/l	Grab	Weekly
Electrical Conductivity[1]	µmhos/cm	Grab	Weekly
pH[1]	pH Units	Grab	Weekly
Chlorine Residual[1,2]	mg/l	Grab	Weekly
Fecal Coliform Organisms[1]	MPN/100 ml	Grab	Weekly

[1] Samples shall be collected within 300 feet downstream of the point of discharge.
[2] Samples shall be collected effective 15 February 1997.

REPORTING

Monthly monitoring reports shall be submitted to the Board by the **20th day of the month** following sample collection. Quarterly and annual monitoring results shall be submitted by the **20th day of the month** following each calendar quarter and year, respectively.

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly whether the discharge complies with waste discharge requirements.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the discharge monitoring report form. Such increased frequency shall be indicated on the discharge monitoring report form.

The Discharger may also be requested to submit an annual report to the Board with tabular and graphical summaries of the monitoring data obtained during the previous year. Any such request shall be made in writing. The report shall discuss the corrective actions taken and planned to bring the discharge into full compliance with the waste discharge requirements.

By **31 January of each year**, the Discharger shall submit a written report to the Executive Officer containing the following:

a. The names, titles, certificate grade (if any) and general responsibilities of persons operating and maintaining the wastewater treatment plant.

b. The names and telephone numbers of persons to contact regarding the plant for emergency and routine situations.

c. A certified statement of when the flow meter and other monitoring instruments and devices were last calibrated, including identification of who did the calibration (Standard Provision C.4).

d. A statement whether the current operation and maintenance manual, and contingency plan, reflect the wastewater treatment plant as currently constructed and operated, and the dates when these documents were last reviewed for adequacy.

e. The total quantity of sludge disposed of during the previous year and ultimate disposal site(s).

All reports submitted in response to this Order shall comply with the signatory requirements in Standard Provision B.3.

The Discharger shall implement the above monitoring program on the first day of the month following adoption of this Order.

Ordered by: William H. Crooks
WILLIAM H. CROOKS, Executive Officer

23 February 1996
(Date)

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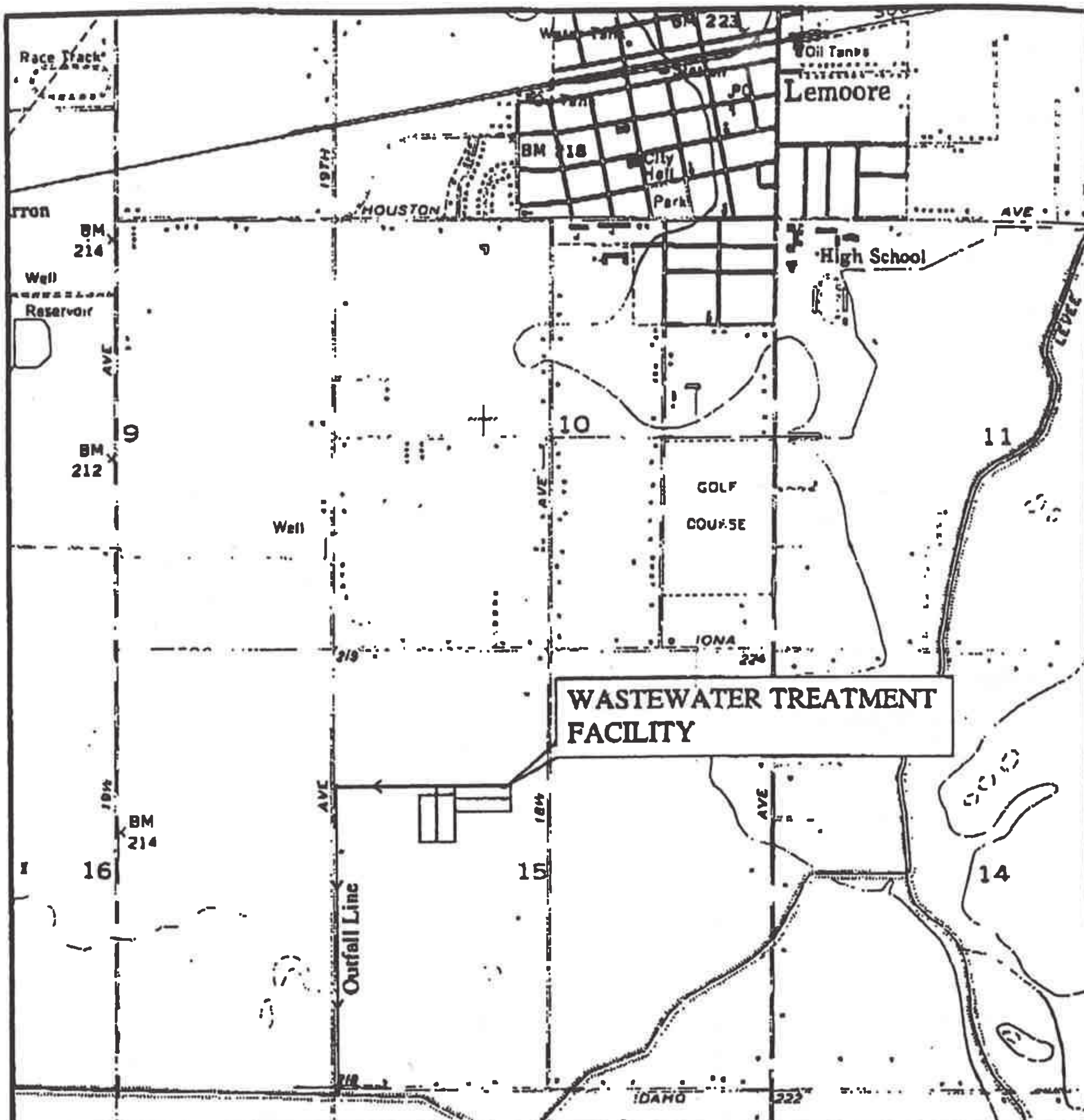
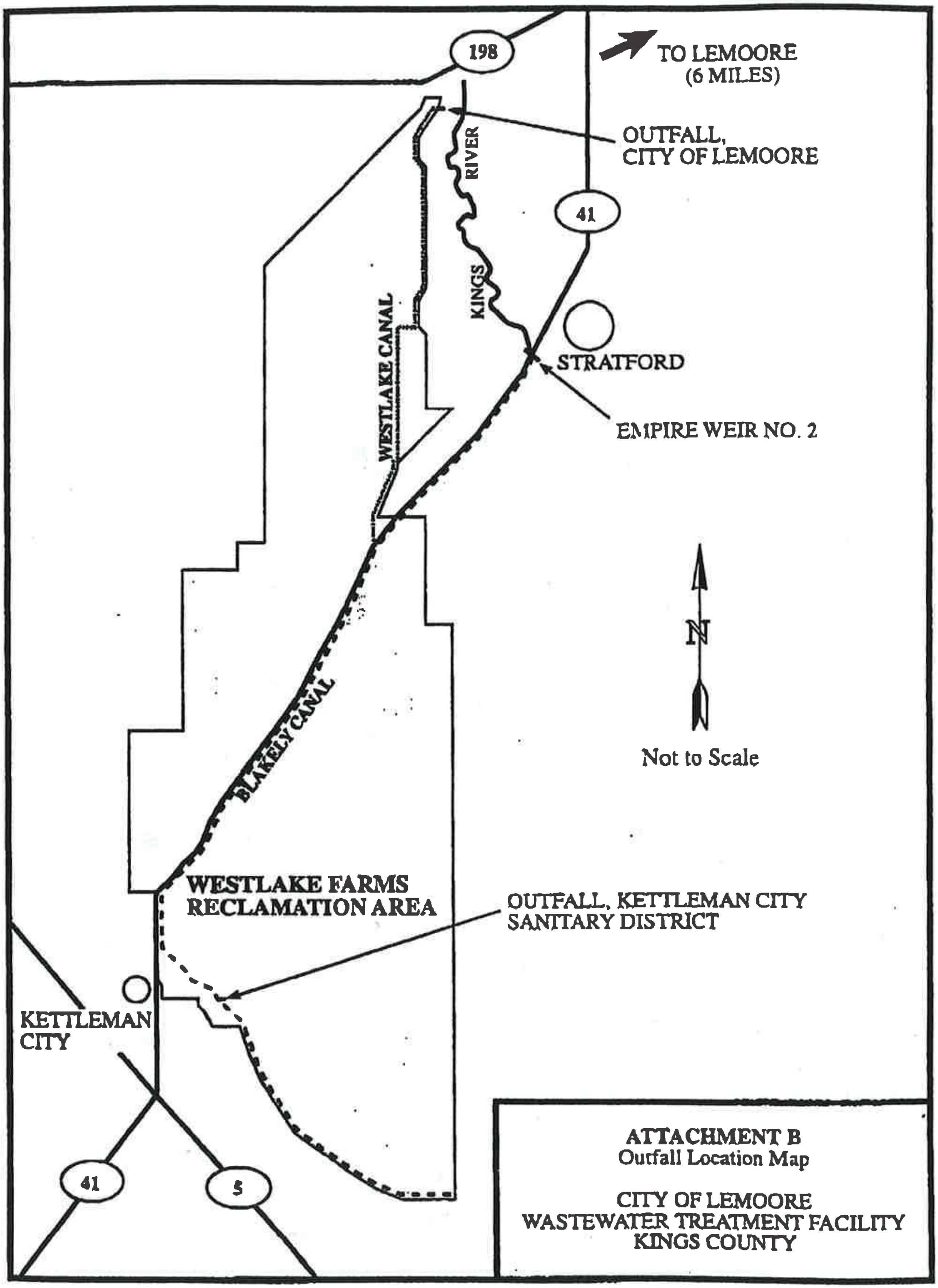


Scale: 1"=2000'

ATTACHMENT A
Vicinity Map

CITY OF LEMOORE
WASTEWATER TREATMENT FACILITY
KINGS COUNTY

Section 15, T19S, R20E, MDB&M
Lemoore, 7 1/2' USGS Quad, 1954



ATTACHMENT B
Outfall Location Map

CITY OF LEMOORE
WASTEWATER TREATMENT FACILITY
KINGS COUNTY

INFORMATION SHEET

CITY OF LEMOORE
WASTE WATER TREATMENT FACILITY
KINGS COUNTY

The City of Lemoore operates a wastewater treatment facility (WWTF) in Kings County. The WWTF consists of four aerated lagoons, and a fifth pond for storage of stormwater and emergency storage of effluent with plant treatment and hydraulic capacity of 4.4 mgd. The existing 12-inch diameter effluent outfall line limits the ability of the WWTF to discharge water to a maximum of 2.5 mgd, well below the WWTF capacity.

Wastewater includes industrial and domestic components. The domestic wastewater discharge averages 0.50 mgd. The total WWTF discharge flow averages 2.2 mgd from November through May of each year and 2.5 mgd from June through October. The plant is currently operating at the maximum flow capacity of the outfall line.

The wastewater supplements irrigation of approximately 50,000 acres of crops, including cotton and grain for animal feed on Westlake Farms. No vegetable crops are grown. Tentative water reclamation requirements for Westlake Farms are being considered concurrently with this Order.

The outfall location for discharge of the effluent is the beginning of the Westlake Canal. About 50 feet downstream of the outfall the effluent is mixed with irrigation well water. In all years, except for some drought years, the canal water is also supplemented with water from the Kings River provided by the Lemoore Canal Company through an agreement with Westlake Farms. The Westlake Canal is full year-round providing a typical 2:1 to 25:1 (canal water: effluent) range of dilution, but sometimes provides less (as in three of 24 recent months). In the fall (September through November), effluent is not supplemented with well or surface waters and is stored in the canal and not used for irrigation.

The Westlake Canal connects with the Blakely Canal (collectively hereafter canals) approximately 8 miles downstream of the effluent outfall. The Blakely Canal originates at Empire Weir No. 2 on the Kings River. Both canals are entirely on Westlake Farms property, have no outlet to other surface waters, and are waters of the State. The Westlake canal crosses under several county roads where it is accessible to the public. The Blakely Canal parallels State Route 41 for approximately 6 miles.

The Westlake Canal is posted at all road access points to indicate that is contains undisinfected wastewater, however, the Blakely Canal downstream of the Westlake Canal is readily accessible to the public along State Route 41 and is not posted to indicate that it contains undisinfected wastewater. The Blakely canal also receives 0.12 mgd of disinfected wastewater effluent from the Kettleman City Sanitary District WWTF at a downstream location, approximately 7 miles from its connection with the Westlake Canal.

The California Department of Health Services recommends that the wastewater effluent be disinfected prior to discharge to the Westlake canal such that the median number of coliform organisms does not exceed 23 MPN/100 ml, to protect public health. These requirements include effluent limits for coliform organisms to facilitate protection of public health.

The California Department of Fish and Game reports that warm water fish migrate to the canals by way of an upstream connection of the Blakely canal with the Kings River at Empire Weir No. 2 and recommends a chlorine residual limitation of 0.01mg/l and minimum dissolved oxygen concentration of 5 mg/l in the water of the canals to protect the warm water fish population. These requirements include receiving water limits for chlorine residual and dissolved oxygen that facilitate protection of the warm water fish population.

The Water Quality Control Plan for the Tulare Lake Basin (Basin Plan) specifies that wastewater treatment facilities which discharge in excess of 1 mgd and utilize land disposal (includes irrigation) provide a minimum of secondary treatment. The Basin Plan defines secondary treatment as 80 percent removal of 5-day BOD and suspended solids or reduction to 40 mg/l, whichever is more restrictive. The WWTF provides secondary treatment through aerated lagoons. These requirements include an effluent limitation for BOD.

Algal growth in aerated lagoons, if excessive, may result in elevated suspended solids above 40 mg/l in the final effluent. To assess the WWTF's ability to provide consistent suspended solids removal these requirements include monitoring for total suspended solids. When WWTF flows are proposed to increase above 2.5 mgd, these requirements will be revised and will include an effluent limitation for suspended solids. Prior to revision of the requirements, we will request that the City of Lemoore provide us with a Report of Waste Discharge that includes a demonstration that the existing facility has consistently provided adequate reduction of suspended solids, or alternatively, a plan for new treatment facilities that will provide adequate treatment to comply with the Basin Plan specification for suspended solids.

The canal is considered a valley floor water. The beneficial uses of these waters are industrial and agricultural supply; water contact and non-contact water recreation; warm fresh water habitat; wildlife habitat; preservation of rare and endangered species; and ground water recharge. Unlike other valley floor waters, actual beneficial uses of the canal are limited to agricultural supply, non-contact water recreation, warm fresh water habitat, wildlife habitat, and ground water recharge.

According to the Department of Water Resources, shallow ground water is unconfined, at a depth of approximately 10 feet below ground surface and of unknown quality. Deeper ground water, at a depth of 83 to 145 feet bgs, is of good quality with electrical conductivity (EC) of 660 to about 1,200 μmhos/cm. This deeper ground water moves in a southwesterly direction.

The beneficial uses of underlying ground water are domestic, industrial, and agricultural supply.

Soils at the site of the WWTF are sandy loams of the Grangeville series with moderate soil permeabilities. Based on testing of site soils with various mixtures of bentonite clay, 1.5 lbs of bentonite per square foot of wetted area were combined with the upper 4 inches of native soil and compacted in place in each pond to limit seepage losses. A water balance submitted for the ponds indicates seepage from the ponds is minimal.

Surface drainage is to the Kings River by sheet flow. The beneficial uses of the Kings River are agricultural supply; recreation; esthetic enjoyment; navigation; ground water recharge; and preservation and enhancement of fish, wildlife, and other aquatic resources.

Average annual precipitation in the area is approximately 6 inches and average annual evaporation is roughly 60 inches.

The City of Lemoore has certified a final environmental impact report (EIR) in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000, et seq.) and the State CEQA Guidelines. The project as approved will not have a significant effect on water quality.

LML:lml/fmc:2/23/96

Appendix C

2003 CITY OF LEMOORE AND LEPRINO MONITORING AND REPORTING PROGRAM

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM ORDER NO. R5-2003-0807

FOR
LEPRINO FOODS COMPANY
WASTEWATER TREATMENT FACILITY
AND
CITY OF LEMOORE
KINGS COUNTY

This Monitoring and Reporting Program (MRP) is required pursuant to California Water Code section 13267. The Leprino Food Company (Leprino) and the City of Lemoore (City) (hereafter referred to jointly as Discharger) shall not implement any changes to this MRP unless and until the Regional Board adopts or the Executive Officer issues a revised MRP.

Background

Waste Discharge Requirements (WDRs) Order No. 96-050 regulates the discharge of up to 2.5 mgd of disinfected effluent from the City of Lemoore's wastewater treatment facility (WWTF) to Westlake Canal (hereafter Canal), a water of the State. Historically, wastewater from Leprino's cheese processing facility (East Plant) was discharged to the City WWTF. In October 2001, the Discharger submitted a Report of Waste Discharge (RWD) in support of Leprino constructing its own "pretreatment" wastewater treatment facility (Leprino WWTF) to "pre-treat" the wastewater generated by Leprino's existing cheese processing facility (Lemoore East Plant) and new processing facility (Lemoore West Plant) prior to discharging to the City's WWTF. To accommodate Leprino's increase in discharge, the City initially intended to request a flow increase for the discharge from the City WWTF to the Canal. By letter dated 8 May 2002, we indicated that the Leprino's discharge would be covered under separate waste discharge requirements with the City listed as a co-discharger.

Leprino's WWTF consists of two moving bed biofilm reactors (MBBRs), two sequencing batch reactors (SBRs), and a two lined facultative lagoons. Wastewater will be treated in the MBBRs at Leprino's West Plant and then discharged into a newly constructed 12,000-foot pipeline to the City of Lemoore's municipal WWTF. Wastewater will be further treated by Leprino's SBRs, effluent from which will discharge to the Canal via the City of Lemoore's WWTF outfall. Solids removed from Leprino's WWTF will be treated and stored in one of the facultative lagoons. The other facultative lagoon will be used for emergency storage of treated or partially treated wastewater, as appropriate. Leprino recently converted the City's storm water pond into the lined facultative lagoons. Solids from the sludge facultative lagoon will later be applied to land for disposal. A process flow diagram is depicted in Attachment A. The following MRP is intended to collect monitoring data until the Regional Board adopts wastewater discharge requirements for Leprino's discharge.

Monitoring

Field test instruments (such as pH) may be used provided that:

1. the operator is trained in the proper use of the instrument;
2. the instruments are calibrated prior to each use;
3. instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and

4. field calibration reports are submitted as described in the "Reporting" section of this MRP.

Each laboratory report shall clearly identify the following:

5. analytical method;
6. measured value;
7. units;
8. what constituent a value is reported as;
9. method detection limit (MDL);
10. reporting limit (RL) (i.e., a practical quantitation limit or PQL); and
11. documentation of cation/anion balance for general minerals analysis of supply water and groundwater samples.

All laboratory results shall be reported down to the MDL. Non-detected results shall be reported as less than the MDL (<MDL). Results above the MDL, but below the concentration of the lowest calibration standard for multipoint calibration methods or below the reporting limit for other methods shall be flagged as estimated.

Analytical procedures shall comply with the methods and holding times specified in (a) *Methods for Chemical Analysis of Water and Wastes* (EPA-600/4-79-020, 1983); (b) *Methods for Determination of Inorganic Substance in Environmental Samples* (EPA/600/R-93/100, 1993); (c) *Standard Methods for the Examination of Water and Wastewater, 20th Edition* (WEF, APHA, AWWA); and (d) *Western States Laboratory Proficiency Testing Program, Soil and Plant Analytical Methods* (Version 4.10, 1998).

INFLUENT MONITORING

Influent samples shall be collected prior to wastewater entering the MBBR as shown on Attachment A. Time of a collection of grab sample shall be recorded. Influent monitoring shall include at least the following:

Constituent	Units	Type of Sample	Frequency
EC[1]	µmhos/cm	24-hr Composite[2]	2/Week[3]
Total Alkalinity (as $CaCO_3$)	mg/L	24-hr Composite	1/Month
BOD_5[4]			
Concentration	mg/L	24-hr Composite	2/Month
Monthly Average	mg/L	Calculated	1/Month
TSS[5]			
Concentration	mg/L	24-hr Composite	2/Month
Monthly Average	mg/L	Calculated	1/Month

Total Nitrogen

Constituent	Units	Type of Sample	Frequency
Concentration	mg/L	24-hr Composite	2/Month
Monthly Average	mg/L	Calculated	1/Month
Oil and Grease			
Concentration	mg/L	Grab	2/Month
Monthly Average	mg/L	Calculated	1/Month

1 Conductivity at 25°C
2 Composite samples, as used in this program, shall be flow weighted
3 2/Week on nonconsecutive days
4 Five-day, 20° Celsius biochemical oxygen demand
5 Total suspended solids

EFFLUENT MONITORING

Effluent samples shall be collected immediately after treatment in the SBRs but prior to commingling with effluent from the City of Lemoore WWTF before its discharge to the Westlake Canal. Time of collection of a grab sample shall be recorded. Effluent monitoring shall include the following:

Constituent	Units	Type of Sample	Frequency
Flow	mgd[1]	Metered	Continuous
Temperature	°C	Grab	1/Day
SS[2]	mL/L	Grab	1/Day
pH	pH Units	Metered	Continuous
Turbidity	NTU	Grab	1/Day
BOD_5			
Concentration	mg/L	24-hr Composite	2/Week[3]
Monthly Average	mg/L	Calculated	1/Month
Percent Removal	percent	Calculated	1/Month
TSS			
Concentration	mg/L	24-hr Composite	2/Week[3]
Monthly Average	mg/L	Calculated	1/Month
Percent Removal	percent	Calculated	1/Month
EC	µmhos/cm	Metered	Continuous

Constituent	Units	Type of Sample	Frequency
Total Dissolved Solids (TDS)[4]	mg/L	24-hr Composite	2/Month[5]
Ammonia (as NH_3-N)	mg/L	24-hr Composite	1/Week[6]
Nitrate (as NO_3-N)	mg/L	24-hr Composite	1/Week
Total Kjeldahl Nitrogen (TKN)	mg/L	24-hr Composite	1/Week
Total Nitrogen			
Concentration	mg/L	Calculated	1/Week
Monthly Average	mg/L	Calculated	1/Month
Percent Removal	percent	Calculated	1/Month
Oil and Grease			
Concentration	mg/L	Grab	2/Week[3,7]
Monthly Average	mg/L	Calculated	1/Month
Percent Removal	percent	Calculated	1/Month
General Minerals[8]	mg/L	24-hr Composite	1/Month[9]
SAR[10]	unitless	Cacluated	1/Month
Priority Pollutants[11]	µg/L	Grab	2/Year[12]

1 Million gallons per day
2 Settleable solids
3 On nonconsecutive days
4 TDS referenced hereafter in this program shall be determined using Environmental Protection Agency (EPA) Method No. 160.1 for combined organic and inorganic TDS and EPA Method No. 160.4 for inorganic TDS or equivalent analytical procedures specified in 40 Code of Federal Regulations (CFR) Part 136.
5 One week between sample dates
6 Coincident with pH and temperature
7 Coincident with influent oil and grease monitoring
8 General Minerals referenced hereafter in this program shall include the constituents in the General Minerals Analyte List presented below.
9 1/Month for four months and semiannual (January and July) thereafter
10 Sodium adsorption ratio $(SAR) = \frac{Na}{\sqrt{\frac{Ca + Mg}{2}}}$, where Na, Ca, and Mg are in meq/L
11 Reporting shall conform with Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California Reporting Requirements, section 2.4 et seq.
12 January and July and coincident with General Minerals

General Minerals Analyte List

Alkalinity (as $CaCO_3$)	Carbonate (as $CaCO_3$)	Manganese
Aluminum	Chloride	Phosphate
Bicarbonate (as $CaCO_3$)	Hardness (as $CaCO_3$)	Potassium
Boron	Iron	Sodium
Calcium	Magnesium	Sulfate

RECEIVING SURFACE WATER MONITORING

All receiving surface water samples shall be grab samples. Each specific location shall be marked with a monument. Any proposed change in specific sampling locations after monument establishment shall require written concurrence of Regional Board staff. Receiving surface water monitoring shall include at least the following:

Station	Description
R-1	Approximately 300 feet upstream of the head of the Westlake Canal and discharge point.
R-2	Not to exceed 300 feet downstream from the discharge point to Westlake Canal.

Constituents	Units	Sampling Frequency
Dissolved Oxygen	mg/L	1/Week
pH	pH units	1/Week
pH Change (R1 – R2)	pH units	1/Week
Monthly Average pH Change (R1-R2)	pH units	1/Month
Turbidity	NTU	1/Week
Temperature	°C (°F)	1/Week
EC	µmhos/cm	1/Week
Fecal Coliform Organisms	MPN/100 mL	1/Week
Ammonia[1]	mg/L	1/Week
Un-ionized Ammonia as N	mg/L	1/Week
Chlorine Residual[2]	mg/L	1/Week
Lead	mg/L	1/Month
Hardness (as $CaCO_3$)	mg/L	1/Month
Priority Pollutants	µg/L	2/Year[3,4]

1 Temperature and pH shall be determined at the time of sample collection for the calculation of un-ionized ammonia

2 Minimum detection limit shall be no greater than 0.01 mg/L

3 Sampling shall be coincident with hardness monitoring and effluent priority pollutant monitoring. Sampling for the July event shall occur when R1 flows are comprised of Kings River deliveries.

4 January and July

In conducting the receiving water monitoring, a log shall be kept of the receiving water conditions throughout the reaches bounded by Stations R-1 and R-2. The Discharger shall indicate in each monthly monitoring report the presence or absence of upstream flow during the discharge. Notes on receiving water conditions shall be summarized in the monitoring report. Attention shall be given to the presence or absence of:

a. Floating or suspended matter
b. Discoloration
c. Bottom deposits
d. Aquatic life
e. Visible films, sheens or coatings
f. Fungi, slimes, or objectionable growths
g. Potential nuisance conditions

Additionally, the Discharger shall at least once monthly inspect reaches of Westlake Canal that are accessible to the public to note whether there is evidence of water contact and water noncontact recreation, and, if so, to describe the evidence in monthly monitoring reports.

THREE SPECIES CHRONIC TOXICITY MONITORING

Chronic toxicity monitoring shall be conducted for the last three quarters of 2003 (i.e., April, July, and October) and annually thereafter to determine whether the commingled discharge (Leprino and City effluent) is contributing toxicity to Westlake Canal. The testing shall be conducted as specified in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms* (EPA 600/4-91-002, or latest edition). Chronic toxicity samples of commingled effluent from the City's WWTF and Leprino's SBRs shall be representative of the combined discharge to the Westlake Canal. A record of sample collection times, sample collection locations, and compositing procedures shall be included with the results of each chronic toxicity monitoring event.

Chronic toxicity monitoring shall include the following species: *Pimephales promelas*, *Ceriodaphnia dubia*, and *Selenastrum capricornutum*. The Discharger shall conduct quarterly chronic toxicity testing using 100 percent effluent and two controls. If toxicity is found in any of the 100 percent tests, the Discharger must immediately perform a retest using the effluent from Leprino's SBRs only and using the full sampling protocol of the five dilutions listed below:

	Dilutions (%)					Control
Dilution Series:	100	75	50	25	12.5	Lab Water
% WWTF Effluent	100	75	50	25	12.5	0
% Lab Water	0	25	50	75	87.5	0

LAGOON MONITORING

The facultative lagoon shall be sampled systematically for the parameters specified below. Freeboard shall be monitored for the pond when in use to the nearest one tenth of a foot. Facultative lagoon monitoring shall include at least the following:

Constituent/Parameter	Units	Type of Sample	Sampling Frequency
Dissolved Oxygen (DO)	mg/L	Grab[1]	1/Week[2]
Freeboard	Feet[3]	Observation	1/Week[2]

1 Samples shall be collected at a depth of one foot from the facultative lagoon, opposite the inlet, and analyzed for DO. Samples shall be collected between 0700 and 0900 hours.

2 When the facultative lagoons contains liquid waste (i.e., either partially treated wastewater or waste solids which, when settled, forms an discernable supernatant liquid layer.

3 Freeboard shall be monitored to the nearest tenth of a foot.

The Discharger shall make notations in a bound logbook when solids or wastewater is discharged to the facultative lagoon. In addition, the Discharger shall inspect the condition of the facultative lagoon once per week and write visual observations in the logbook. Notations shall include observations of whether weeds are developing in the solids/water or along the bank, and their location; whether dead algae, vegetation, scum, or debris are accumulating on the facultative lagoon surface and their location; whether burrowing animals or insects are present; and the color of the solids/water in the facultative lagoon (e.g., dark sparkling green, dull green, yellow, gray, tan, brown, etc.). A summary of the entries made in the log during each month shall be submitted along with the monitoring report the following month.

SOLIDS MONITORING

Leprino's WWTF will generate solids from various treatment units (primarily the SBRs). The solids will not contain waste of domestic origin. To characterize the solids prior to disposal, a composite sample of sludge shall be collected and tested for the following metals:

Arsenic	Copper	Nickel
Cadmium	Lead	Selenium
Molybdenum	Mercury	Zinc

A log shall be kept of solids handling, disposal, and quantities generated. The frequency of entries is discretionary; however, the log should be complete enough to serve as a basis for part of the annual report. If solids monitoring for the above constituents consistently shows no significant variation in magnitude after at least three monitoring events, the Discharger may submit a written proposal to revise the MRP to reduce frequency or eliminate solids disposal monitoring. The proposal must include justification (e.g., solids characteristics from similar facilities) for modifications and is subject tot the Executive Officer approval.

SUPPLY WATER MONITORING

The source water for each Leprino processing facility (East and West Plants) shall be monitored for the following:

Constituent	Units	Frequency
EC	µmhos/cm	1/Month
General Minerals	mg/L	Quarterly[1]

[1] January, April, July, and October

REPORTING

Monitoring results shall be submitted to the Regional Board by the **1st day of the second month** following sample collection. Quarterly monitoring results shall be submitted by the **1st day of the second month** following each calendar quarter. Annual monitoring results shall be submitted by **1 February** of each year.

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly characterize the discharge and the treatment performance of Leprino's WWTF. The highest daily maximum for the month, monthly and weekly averages, and medians, and removal efficiencies (%) for specified constituents (e.g., BOD_5, TSS, oil and grease, total nitrogen) should be determined and recorded.

If the Discharger monitors any waste constituent at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the discharge monitoring report form. Such increased frequency shall be indicated on the discharge monitoring report form.

By **1 February of each year**, the Discharger shall submit a written report to the Executive Officer containing the following:

1. The names and general responsibilities of all persons in charge of wastewater treatment and disposal.
2. The names and telephone numbers of persons to contact regarding the WWTF for emergency and routine situations.
3. A statement certifying when the flow meter and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration.
4. A statement whether the current operation and maintenance manual, and contingency plan, reflect the wastewater treatment facility as currently constructed and operated, and the dates when these documents were last reviewed for adequacy.
5. The most recent annual water supply report for the City of Lemoore.

6. A summary of solids monitoring, including:
   a. Annual solids production in dry tons and percent solids.
   b. A schematic diagram showing solids handling facilities and solids flow diagram.
   c. A description of disposal methods, including the following information related to the disposal methods used at the WWTF. If more than one method is used, include the percentage of annual sludge production disposed of by each method.
      i. For **landfill disposal**, include: (a) the Order numbers of WDRs that regulate the landfill(s) used, (b) the present classifications of the landfill(s) used, and (c) the names and locations of the facilities receiving sludge.
      ii. For **land application**, include: (a) the locations of the site(s), and (b) the Order numbers of any WDRs that regulate the site(s).
      iii. For **incineration**, include: (a) the names and location of the site(s) where sludge incineration occurs, (b) the Order numbers of WDRs that regulate the site(s), (c) the disposal method of ash, and (d) the names and locations of facilities receiving ash (if applicable).
      iv. For **composting**, include: (a) the location of the site(s), and (b) the Order numbers of any WDRs that regulate the site(s).

All reports submitted in response to this Program shall comply with the following signatory requirements.

1. All reports shall be signed by persons identified below:

   a. For a corporation: by a principal executive officer of at least the level of senior vice-president.

   b. For a Partnership or sale proprietorship: by a general partner or the proprietor.

   c. For a municipality state, federal or other public agency: by either a principal executive officer or ranking elected or appointed official.

   d. A duly authorized representative of a person designated in 3a, 3b or 3c of this requirement if;

      (1) the authorization is made in writing by a person described in 3a, 3b, or 3c of this provision;
      (2) the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a waste management unit, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named Position); and
      (3) the written authorization is submitted to the Board.

Any person signing a document under this MRP shall make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted if this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The Discharger shall implement the above Monitoring and Reporting Program effective immediately.

Ordered by: ______________________
for THOMAS R. PINKOS, Executive Officer

2-25-2003
(Date)

SJK LeprinoMRP-R5-2003-0807
NON15/ A / LEPRINO FOODS COMPANY / CHEESE PROCESSING WWTF / 5C16NC00018
NON15/ A / LEMOORE, CITY OF / WWTF / 5D16014001

Appendix D

2018 TIME SCHEDULE ORDER

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

TIME SCHEDULE ORDER R5-2018-0900
WESTLAKE FARMS, INC., SANDRIDGE PARTNERS LP, CITY OF LEMOORE,
AND LEPRINO FOODS COMPANY,
KINGS COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (Central Valley Water Board or Board) finds that:

The City of Lemoore's Discharge

1. Waste Discharge Requirements (WDRs) Order 96-050 authorizes the discharge of disinfected effluent from the City of Lemoore's (City) wastewater treatment facility (WWTF) to the Westlake Canal. The City's WWTF was designed to treat both domestic and industrial wastes. Industrial wastes include wastewater from cheese processing plants, a textile plant, and a tomato processing plant. The domestic and industrial waste streams are commingled and discharged at the head of the Westlake Canal, which is about 6 miles from the WWTF.

2. The Leprino Foods Company (Leprino) historically relied on the WWTF to treat the wastewater generated at its Lemoore cheese processing plants. However, Leprino currently treats its process wastewater at its processing facility. After treatment, Leprino's wastewater is transported to the WWTF, where it is combined with the WWTF's domestic waste stream before the combined waste streams ("Combined Discharge") are disinfected and discharged to the Westlake Canal.

3. The discharge to the Westlake Canal was increased to approximately 4.5 million gallons per day (mgd) in accordance with the complete Report of Waste Discharge submitted by the City and Leprino in October 2001, following completion of Leprino's treatment system upgrade and construction of a new outfall pipeline to handle the increased flows.

4. Westlake Farms, Inc. (Westlake) receives the Combined Discharge under an agreement with the City dated 8 January 1996. Westlake recycles the wastewater, using the treated wastewater to irrigate crops grown on agricultural lands as shown in Attachment A, which is attached hereto and made a part of this Order by reference. This land is now owned as part of a tenancy in common consisting of Westlake Farms, Inc. and Sandridge Partners, LP.

5. As described in the findings below, the salinity in the Combined Discharge does not meet the limit set by WDRs Order 96-050.

Compliance Issues

6. WDRs Order 96-050 contains Discharge Specification B.8, which states, in relevant part:

   > The maximum electrical conductivity (EC) of the discharge shall not exceed the average EC of the source water plus 500 umhos/cm.

   The average EC of the City's source water is about 700 umhos/cm, and therefore the Combined Discharge to the Westlake Canal is required to meet a limit of about 1,200 umhos/cm.

7. The effluent quality for the discharge from the City's WWTF and the Leprino facility (prior to the comingling of the two waste streams) is summarized in Table 1, below. The results for biochemical oxygen demand (BOD), EC, and total suspended solids (TSS) were collected from January 2014 through December 2016. The EC results for the WWTF are from weekly sampling events, while the BOD and TSS results are from twice-weekly sampling events. Leprino's EC and TSS results are from daily sampling events and the BOD results were collected twice a week. The upper number is the average and the range is shown below in parentheses.

Table 1 - Lemoore WWTF & Leprino Effluent Water Quality

Constituents	Units[1]	WWTF Effluent	Leprino Effluent
Electrical Conductivity	umhos/cm	1,190 (994 – 1,616)	2,691 (1,886 – 3,960)
Biochemical Oxygen Demand	mg/L	28 (5.4 – 73)	11 (1 – 45)
Total Suspended Solids	mg/L	42 (1 – 160)	15 (1 – 98)

[1.] umhos/cm = micromhos per centimeter, mg/L = milligrams per liter.

8. The Combined Discharge quality is summarized in Table 2, below. The results are from January 2014 through December 2016, and the sampling frequency and the presentation of the data is the same as discussed in Finding 7.

Table 2 – Combined Discharge Effluent Water Quality

Constituents	Units[1]	Effluent
Electrical Conductivity	umhos/cm	2,133 (1,140 – 2,702)
Biochemical Oxygen Demand	mg/L	12 (1.3 – 38)
Total Suspended Solids	mg/L	24 (6.6 – 120)

[1.] umhos/cm = micromhos per centimeter, mg/L = milligrams per liter.

9. Comparing the results shown in Table 1 to those in Table 2 shows that the BOD and TSS results are lower when the City's treated domestic wastewater is combined with Leprino's treated wastewater. However, the commingled EC has increased to over 2,100 micromhos per centimeter (umhos/cm). This exceeds the limit set by Discharge Specification B.8 of WDRs Order 96-050 (see Finding No. 6).

10. WDRs Order 96-050 contains Discharge Prohibition A.1, which states, in relevant part:

> Discharge of wastes to surface waters or surface water drainage courses other than the irrigation canal [Westlake Canal] specified in Finding No. 8 is prohibited.

Due to the excessive salinity in the Combined Discharge, Westlake has indicated that it will discontinue its use of the Combined Discharge for irrigation purposes. However, routing the Combined Discharge to alternate land application areas for disposal, as described below, may result in violations of WDRs Order 96-050 Discharge Prohibition A.1.

Interim Solution

11. This Order describes steps that the Dischargers will take in order to correct potential violations of Discharge Prohibition A.1 and Discharge Specification B.8. This Order is being issued to provide regulatory coverage for an interim solution to wastewater disposal issues while a long-term permitting solution is being developed.

12. As an interim solution, until the salinity issues are resolved, Sandridge Partners, LP (Sandridge), Leprino and the City propose to isolate and route the Combined Discharge to a new discharge point through Westlake's canal network to an area (the "Interim Application Area") just outside of the existing land application area identified in WDRs 96-050.

13. The proposed Interim Application Area is owned by Sandridge, and comprises approximately 2,900 net acres of farmland legally described as all of that real property, situated in the County of Kings, State of California, described as follows: all of Sections 30 and 31, and the south half of Section 32, in Township 22 South, Range 20 East Mount Diablo Baseline and Meridian (MDB&M), together with all of Sections 5, 6, and 8, in Township 23 South, Range 20 East MDB&M, lying northerly of the Blakeley Canal; excepting therefrom the east half of the east half of the east half of the east half of the east half of said Section 32; also excepting therefrom that portion of the north half of said Section 6 lying southwesterly of the Meander Line of Tulare Lake surveyed by W.H. Norway, according to the U.S. Government Plat dated 14 October 1884 as shown in Attachment B and made a part of this Order by reference.

14. To reach the Interim Application Area, the Combined Discharge will be isolated and routed from the current discharge point south along the path as shown on Attachment C [i.e., generally, via the existing drainage canal/ditch that runs down the eastern edge of Sections 13, 24, 25, and 36 of Township 21 South, Range 19 East MDB&M, and the eastern edge of Sections 1, 12, 13, 24, 25, and 36 of Township 22 South, Range 19 East MDB&M (the "Westlake Main Drain")]. Portions of this route are owned or controlled by others including the Tulare Lake Reclamation District 761 and County Sanitation Districts No. 2 of Los Angeles County (Sanitation District). The TSO requires the Dischargers to provide copies of all leases, agreements, or easements needed to cross lands not owned or controlled by the Dischargers prior to routing the Combined Discharge to the Interim Application Area. A portion of this path (i.e., the portion that crosses Section 13, Township 22 South, Range 19 East MDB&M) is owned by the Sanitation District. A License Agreement will be obtained from the Sanitation District for that portion of the path. As part of this License Agreement, Sandridge will construct necessary improvements to handle tile drainage water from Sanitation District's lands to keep it separate and ensure that it can reach the South Evaporation Basins regulated by WDRs 97-263 without comingling with the Combined Discharge.

15. The proposed Interim Application Area is currently fallow, but has been farmed in the past. Leprino, in conjunction with Sandridge, proposes to apply the Combined Discharge to the Interim Application Area at agronomic rates to irrigate salt-tolerant fodder crops (e.g., Jose

tall grass, barley/oats, or similar crops) and to either harvest the crop or use it for grazing of non-milking cattle.

16. Water Code section 13300, states:

    Whenever a regional board finds that a discharge of waste is taking place or threatening to take place that violates of will violate requirements prescribed by the regional board, or the state board … the board may require the discharger to submit for approval of the board, with such modifications as it may deem necessary, a detailed time schedule of specific actions the discharger shall take in order to correct or prevent a violation of requirements.

17. Westlake Farms, Inc., Sandridge Partners, LP, the City of Lemoore, and Leprino Foods Company are named in this order because the named entities are either regulated under WDRs Order 96-050 or own or will lease land where the wastewater regulated by WDRs Order 96-050 will be discharged.

18. At 4.5 million gallons per day, the City and Leprino generate roughly 14 acre-feet of wastewater per day or about 5,110 acre-feet per year. With approximately 2,900 acres, the hydraulic load from the wastewater would be about 21 inches per acre per year. Based on the water balance and Nutrient Management Plan signed by Michael J. Ransom (RCE C77157), a California registered civil engineer and Louis Oliveira a certified crop advisor (#17275) with JM Lord, Inc., it appears that the Interim Application Area will have sufficient acreage to handle wastewater flows from the City and Leprino at reasonable agronomic rates.

19. The proposed interim discharge will be temporary (i.e., two years) and is consistent with the discharge allowed by WDRs 96-050 on land adjacent to and of similar quality.

20. The proposed Interim Application Area is in an area of poor quality groundwater within the historic Tulare Lake Bed. A Basin Plan amendment to remove the Municipal and Domestic supply (MUN) and Agricultural (AGR) beneficial uses for groundwater within this portion of the historic Tulare Lake Bed was approved by the Central Valley Water Board on 6 April 2017 and by the State Water Resources Control Board on 6 September 2017, and received final approval from the Office of Administrative Law (OAL) on 26 December 2017.

21. The Tulare Lake Bed may flood during very wet years. However, there are levees and flood control features to minimize flooding in the area. Historical aerial photographs of the area show that during the last historical floods in 1969 and 1983 no flood waters were reported in the area of the proposed Interim Application Area west of the South Central Levee. This Order prohibits discharge to surface waters and requires the Dischargers to prevent runoff from leaving the Interim Application Area.

22. This Order provides for an interim disposal option that is protective of public health and water quality and establishes a time schedule to bring the Combined Discharge into compliance with applicable effluent limitations that is as short as practicable, taking into account the technological, operational, and economic factors that affect the design, development, and implementation of the control measures that are necessary to comply with the effluent limitations.

23. This Order is accompanied by a Monitoring and Reporting Program, **R5-2018-0900** which contains specific monitoring and reporting requirements for the City, Leprino, and Sandridge.

24. Water Code section 13267, states, in part, that:

> In conducting an investigation … the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region … shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.

The technical reports required by this Order are necessary to ensure compliance with this Time Schedule Order, and to assure protection of the public health and safety. The persons named in this Order own and/or operate the facilities that discharge the wastes subject to this Order.

25. In accordance with California Business and Professions Code sections 6735, 7835, and 7835.1, engineering and geologic evaluations and judgments shall be performed by or under the direction of registered professionals competent and proficient in the fields pertinent to the required activities. All technical reports specified herein that contain work plans for investigations and studies, that describe the conduct of investigations and studies, or that contain technical conclusions and recommendations concerning engineering and geology shall be prepared by or under the direction of appropriately qualified professional(s), even if not explicitly stated. Each technical report submitted by the Dischargers shall bear the professional's signature and stamp.

26. The issuance of this Order is an enforcement action by a regulatory agency, and therefore, is exempt from the provisions of the California Environmental Quality Act, pursuant to California Code of Regulations, title 14, section 15321(a) (2).

IT IS HEREBY ORDERED that, pursuant to sections 13300 and 13267 of the California Water Code, Westlake Farms, Inc., Sandridge Partners LP, the City of Lemoore, and Leprino Foods Company, their agents, successors, and assigns, shall:

1. The City and Leprino shall comply with WDRs Order 96-050, including Discharge Prohibition A.1 and Discharge Specification B.8, **by 26 March 2020 in accordance with the following compliance schedule**.

Task	Task Description
a.	**By 26 March 2019:** the City and Leprino shall provide an update on the status of the Project.
b.	**By 26 March 2020:** 1. The City and Leprino shall ensure the Combined Discharge complies with the EC limits prescribed in WDRs Order 96-050, Discharge Specification B.8 (source water plus 500 umhos/cm) and begin discharging in compliance with WDRs Order 96-050 or any revision authorized by changes to the Water Quality Control Plan for the Tulare Lake Basin that were effectuated by the CV-SALTS process; or 2. The City and Leprino together or separately shall submit a complete Report(s) of Waste Discharge (RWD) with supporting technical information to discharge to an alternate discharge location at least **140 days** prior to the end of this Time Schedule Order or receive Waste Discharge Requirements authorizing such a discharge. The RWD needs to address compliance with the Basin Plan limit for EC of 500 umhos/cm over source water or demonstrate that it meets an exemption to the limit.

2. **Prior to initiating the discharge** to the Interim Application Area the City shall submit an addendum to its Title 22 Engineering Report for use of the proposed lands and receive approval from the State Water Resources Control Board's Division of Drinking Water (or DDW).

3. **Prior to initiating the discharge,** the Dischargers shall submit copies of the signed agreements and certification of the completion of all necessary improvements allowing the discharge and movement of the Combined Discharge to the Interim Application Area to the Central Valley Water Board. This includes all agreements, leases, or easements to cross any land not owned or controlled by the Dischargers (i.e., Tulare Lake Reclamation District 761 and LA County Sanitation District No. 2).

4. For the life of this Time Schedule Order, the Dischargers (i.e., Sandridge, Leprino, and the City) shall manage the discharge of secondary disinfected wastewater from the City and Leprino (i.e., Combined Discharge or recycled water) to the Interim Application Area in accordance with the following prohibitions and specifications:

    a. The discharge of recycled water to surface waters other than the open canals/ditches described in Finding 14 used to route the discharge to the Interim Application Area is prohibited.

    b. The monthly average discharge shall not exceed 4.5 mgd.

    c. The discharge of recycled water to lands other than the Interim Application Area as defined in this Time Schedule Order or the land identified in WDRs 96-050 is prohibited.

    d. The comingling of tile drainage water and the Combined Discharge is prohibited.

e. The comingling of the Combined Discharge with water not intended for use in the Interim Application Area is prohibited.

f. The use of recycled water shall be limited to flood irrigation of fodder, fiber, and seed crops for non-human consumption, or for grazing of non-milking cattle. Alternate methods of irrigation may be allowed upon the written approval of the Executive Officer. Requests for authorization of alternative irrigation practices must be accompanied by a workplan demonstrating that such methods are consistent with the applicable requirements of Title 22 of the California Code of Regulations.

g. Recycled water shall be applied at reasonable agronomic rates to preclude the creation of nuisance or odor conditions considering the crop, soil, climate, and method of irrigation.

h. Cattle within the land application area shall be provided with fresh drinking water and will not be allowed to graze on land being actively irrigated with recycled water.

i. All recycled water and supplemental irrigation water shall be controlled and managed (i.e., tail water ponds, berms, etc.) to prevent runoff from leaving the land application areas.

5. The Dischargers (i.e., Sandridge, Leprino, and the City) shall ensure public contact with recycled water is controlled using signs and/or other appropriate means. Signs of a size no less than four inches high by eight inches wide with proper wording (shown below) shall be placed at all areas of public access and around the perimeter of all areas used for effluent disposal or conveyance to alert the public of the use of recycled water.

"RECYCLED WATER – DO NOT DRINK"

"AGUA DE DESPERDICIO RECLAMADA – POR FAVOR NO TOME"

6. The Dischargers (i.e., Sandridge, Leprino, and the City) shall maintain the following setback distances from areas irrigated with recycled water:

Setback Distance (feet)	To
50	Property Line
50	Public Roads
50	Drainage courses
100	Irrigation wells
100	Domestic wells

If, for any reason, any Discharger is unable to perform any activity or submit any document in compliance with the time schedule set forth herein, or in compliance with any work schedule submitted pursuant to this Order and approved by the Executive Officer, that Discharger may request, in writing, an extension of the time specified not to exceed one year. The extension request shall include justification for the delay. An extension may be granted by revision of this Order or by letter from the Executive Officer.

If, in the opinion of the Executive Officer, the Dischargers violate this Order, the Executive Officer may refer the matter to the Attorney General for judicial enforcement or alternately issue a formal complaint for Administrative Civil Liability.

Any person aggrieved by this action of the Central Valley Water Board may petition the State Water Resources Control Board (State Water Board) to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, sections 2050 and following. The petition must be received by the State Water Board Office of the Chief Counsel, P.O. Box 100, Sacramento, California 95812-0100, within 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at:

http://www.waterboards.ca.gov/public_notices/petitions/water_quality/

or will be provided upon request.

This Order is issued under authority delegated to the Executive Officer and her deputies by the Central Valley Water Board pursuant to Resolution R5-2009-0027 and is effective upon signature.

Original Signed by

____
PAMELA C. CREEDON, Executive Officer

27 March 2018
____
(Date)

Attachments

Attachment A: Site Vicinity Map
Attachment B: Interim Application Area Map
Attachment C: Route of Combined Discharge to Interim Application Area
Information Sheet
Monitoring and Reporting Program R5-2018-0900

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM R5-2018-0900
FOR
WESTLAKE FARMS, INC., SANDRIDGE PARTNERS, LP, CITY OF LEMOORE
AND LEPRINO FOODS COMPANY
KINGS COUNTY

This Monitoring and Reporting Program (MRP) is being issued pursuant to Water Code section 13267.

Water Code section 13267 states, in part:

> "In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region … shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports."

Westlake Farms, Inc., Sandridge Partners, LP, the City of Lemoore, and Leprino Foods Company (collectively referred to as "Dischargers") are named in this monitoring and reporting program because this MRP is intended to provide information to the Board regarding compliance with Waste Discharge Requirements (WDRs) Order 96-050[1], and the named entities are either regulated under WDRs Order 96-050 or own land where the wastewater regulated by WDRs Order 96-050 will be discharged. The Dischargers shall not implement any changes to this MRP unless and until the Central Valley Water Board adopts, or the Executive Officer issues, a revised MRP. Changes to sample location(s) shall be established with concurrence of Central Valley Water Board staff, and a description of the revised stations shall be submitted for approval by the Executive Officer.

All samples shall be representative of the volume and nature of the discharge or matrix of material sampled. The name of the sampler, sample type (grab or composite), time, date, location, bottle type, and any preservative used for each sample shall be recorded on the sample chain of custody form. The chain of custody form must also contain all custody information including date, time, and to whom samples were relinquished. If composite samples are collected, the basis for sampling (time or flow weighted) shall be approved by Regional Water Board staff. All analyses shall be performed in accordance with Standard Provisions and Reporting Requirements for Waste Discharge Requirements dated 1 March 1991 (Standard Provisions).

Field test instruments (such as those used to test pH, dissolved oxygen, and electrical conductivity) may be used provided that they are used by a State Water Resources Control Board (State Water Board) Environmental Laboratory Accreditation Program certified laboratory, or:

[1] The Central Valley Water Board understands that the point at which the wastewater will be disposed of is anticipated to change from lands owned or operated by Westlake Farms, Inc. and Sandridge Partners, LP as part of a tenancy in common to lands owned solely by Sandridge Partners, LP.

1. The user is trained in proper use and maintenance of the instruments;
2. The instruments are field calibrated prior to monitoring events at the frequency recommended by the manufacturer;
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are maintained and available for at least three years.

If monitoring consistently shows no significant variation in magnitude of a constituent concentration or parameter after at least 12 months of monitoring, the Discharger may request this MRP be revised to reduce monitoring frequency. The proposal must include adequate technical justification for reduction in monitoring frequency.

A glossary of terms used within this MRP is included on page 7.

The Discharger shall monitor the following locations to demonstrate compliance with the requirements of this Order:

Monitoring Point Name	Monitoring Location Description
Combined Discharge (CBD-01)	Location where a representative sample of the "Combined Discharge" from the City of Lemoore and Leprino Foods Company can be obtained prior to discharge to the land application area.
LAA-001	Land Application Area.

DISCHARGE MONITORING

The Dischargers shall monitor the quality of the "Combined Discharge" at CBD-01 after being combined but prior to discharge at the land application area. The wastewater samples shall be representative of the volume and nature of the discharges. Time of collection of the samples shall be recorded. Discharge monitoring shall include at least the following:

Frequency	Constituent/Parameter	Units	Sample Type
Monthly	Total Dissolved Solids	mg/L	Grab
Monthly	Fixed Dissolved Solids	mg/L	Grab
Monthly	Nitrate as Nitrogen	mg/L	Grab
Monthly	Nitrite as Nitrogen	mg/L	Grab
Monthly	Ammonia as Nitrogen	mg/L	Grab
Monthly	Total Kjeldahl Nitrogen	mg/L	Grab
Monthly	Total Nitrogen	mg/L	Grab
Monthly	Sodium	mg/L	Grab
Monthly	Chloride	mg/L	Grab

LAND APPLICATION AREA MONITORING

The Dischargers shall perform the following monitoring and loading calculations for each field within the land application area at LAA-01. The data shall be collected and presented in both a graphical (map) and tabular format and submitted in quarterly monitoring reports that shall include at least the following:

Frequency	Constituent/Parameter	Units	Sample Type
Daily	Application area (i.e., Field #)	Acres	n/a
Daily	Wastewater flow	Gallons	Metered
Daily	Wastewater loading	Inches/day	Metered
Daily	Fresh water	Inches/day	Metered
Daily	Precipitation	Inches	Rain gage[1]
Month	Total Hydraulic loading[2]	Inches/acre-month	Calculated
BOD_5 loading[3]			
Monthly	From wastewater	lbs/ac/month	Calculated
Nitrogen loading[4]			
Monthly	From wastewater	lbs/ac/month	Calculated
Monthly	From fertilizers	lbs/ac/month	Calculated
Salt loading[4]			
Monthly	From wastewater	lbs/ac/month	Calculated

1. National Weather Service or CIMIS data from the nearest weather station is acceptable.
2. Combined loading from wastewater, fresh water, and precipitation for the month.
3. BOD_5 loading shall be calculated monthly using the applied volume of wastewater, applied acreage, and monthly average effluent BOD_5 concentrations for the Combined Discharge taken as part of the monitoring and reporting requirements for Order 96-050.
4. Nitrogen, and salt loading shall be calculated monthly using the applied volume of wastewater, applied acreage, and monthly effluent concentrations for total nitrogen, and FDS, respectively, for the month.

The quarterly monitoring reports shall also identify the type of crops grown on each parcel and when the fields are planted and the crops harvested. In addition, the Discharger shall inspect the land application areas weekly for evidence of erosion, field saturation, runoff, or the presence of nuisance conditions (i.e., flies, ponding, etc.). The results shall be noted in field logs and included as part of the quarterly monitoring reports.

REPORTING

All monitoring results shall be reported in **Quarterly Monitoring Reports,** which are due by the first day of the second month after the calendar quarter. Therefore, monitoring reports are due as follows:

First Quarter Monitoring Report:	**1 May**
Second Quarter Monitoring Report:	**1 August**
Third Quarter Monitoring Report:	**1 November**
Fourth Quarter Monitoring Report:	**1 February**.

The Central Valley Water Board has gone to a Paperless Office System. All regulatory documents, submissions, materials, data, monitoring reports, and correspondence shall be converted to a searchable Portable Document Format (PDF) and submitted electronically. Documents that are less than 50MB should be mailed to: centralvalleyfresno@waterboards.ca.gov. Documents that are 50MB or larger should be transferred to a disc and mailed to the appropriate regional water board office, in this case 1685 E Street, Fresno, CA, 93706.

To ensure that your submittals are routed to the appropriate staff, the following information block should be included in any email used to transmit documents to this office:

Program: Non-15, WDID: 5D160104001, Facility Name: Interim Application Area,
Time Schedule Order: R5-2018-0900.

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. In addition to the details specified in Standard Provision C.3, monitoring information shall include the method detection limit (MDL) and the Reporting limit (RL) or practical quantitation limit (PQL). If the regulatory limit for a given constituent is less than the RL (or PQL), then any analytical results for that constituent that are below the RL (or PQL) but above the MDL shall be reported and flagged as estimated.

Laboratory analysis reports do not need to be included in the monitoring reports; however, the laboratory reports must be retained for a minimum of three years in accordance with Standard Provision C.3.

All monitoring reports shall comply with the signatory requirements in Standard Provision B.3. For a Discharger conducting any of its own analyses, reports must also be signed and certified by the chief of the laboratory.

All monitoring reports that involve planning, investigation, evaluation, or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared by or under the direction of persons registered to practice in California pursuant to California Business and Professions Code sections 6735, 7835, and 7835.1.

A. **All Quarterly Monitoring Reports** shall include the following:

Discharge Monitoring Reporting:

1. Tabulated results of sampling required of the “Combined Discharge” specified on page 2.

Land Application Area Monitoring Reporting:

1. The results of monitoring and loading calculations specified on page 3.
2. Calculation of the hydraulic load for wastewater and fresh irrigation water to the land application area in gallons and/or acre-inches.
3. A summary of the notations made in the log book during each quarter. The entire contents of the log do not need to be submitted.

4. A map identifying the fields receiving wastewater and what crops are being grown for each month in the quarter.

B. **Fourth Quarter Monitoring Reports**, in addition to the above, shall include the following:

Facility Information:

1. The names and telephone numbers of persons to contact regarding the discharge for emergency and routine situations.
2. A statement certifying when the flow meter and other monitoring instruments and devices were last calibrated, including identification of who performed the calibrations (Standard Provision C.4).
3. A summary of any changes in processing that might affect waste characterization and/or discharge flow rates.

Discharge Monitoring Reporting:

1. A summary of tabulated results of effluent monitoring specified on page 2.

Land Application Area Reporting:

1. The type of crop(s) grown growing within the land application area by field including planting and harvest dates, and the quantified nitrogen and fixed dissolved solids uptakes including potassium (as estimated by technical references or, preferably, determined by representative plant tissue analysis).
2. The monthly and annual discharge volumes by field during the reporting year expressed as million gallons and inches.
3. The total pounds of biochemical oxygen demand (BOD_5) applied to the land application areas as wastewater in lbs/acre/day for each field, as calculated from the sum of the monthly mass loadings.
4. The total pounds of nitrogen applied to the land application area as wastewater and fertilizer in lbs/acre-year for each field, as calculated from the sum of the monthly mass loadings.
5. The total pounds of fixed dissolved solids (FDS) that have been applied to the land application areas in lbs/acre-year for each field, as calculated from the sum of the monthly mass loadings.

A letter shall accompany each monitoring report. The letter shall report violations found during the reporting period, and actions taken or planned to correct the violations and prevent future violations. The transmittal letter shall contain the following penalty of perjury statement and shall be signed by the Discharger or the Discharger's authorized agent:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of the those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The Dischargers shall implement the above monitoring program as of the date of this MRP.

Ordered by: Original Signed by

PAMELA C. CREEDON, Executive Officer

27 March 2018

(Date)

GLOSSARY

BOD_5	Five-day biochemical oxygen demand
CBOD	Carbonaceous BOD
DO	Dissolved oxygen
EC	Electrical conductivity at 25° C
FDS	Fixed dissolved solids
NTU	Nephelometric turbidity unit
TKN	Total Kjeldahl nitrogen
TDS	Total dissolved solids
TSS	Total suspended solids
Continuous	The specified parameter shall be measured by a meter continuously.
24-Hour Composite	Unless otherwise specified or approved, samples shall be a flow-proportioned composite consisting of at least eight aliquots.
Daily	Samples shall be collected every day.
Twice Weekly	Samples shall be collected at least twice per week on non-consecutive days.
Weekly	Samples shall be collected at least once per week.
Twice Monthly	Samples shall be collected at least twice per month during non-consecutive weeks.
Monthly	Samples shall be collected at least once per month.
Bimonthly	Samples shall be collected at least once every two months (i.e., six times per year) during non-consecutive months
Quarterly	Samples shall be collected at least once per calendar quarter. Unless otherwise specified or approved, samples shall be collected in January, April, July, and October.
Semiannually	Samples shall be collected at least once every six months (i.e., two times per year). Unless otherwise specified or approved, samples shall be collected in April and October.
Annually	Samples shall be collected at least once per year. Unless otherwise specified or approved, samples shall be collected in October.
mg/L	Milligrams per liter
mL/L	Milliliters [of solids] per liter
µg/L	Micrograms per liter
µmhos/cm	Micromhos per centimeter
mgd	Million gallons per day
MPN/100 mL	Most probable number [of organisms] per 100 milliliters
General Minerals	Analysis for General Minerals shall include at least the following:

Alkalinity	Chloride	Sodium
Bicarbonate	Hardness	Sulfate
Calcium	Magnesium	TDS
Carbonate	Potassium	

General Minerals analyses shall be accompanied by documentation of cation/anion balance.

INFORMATION SHEET

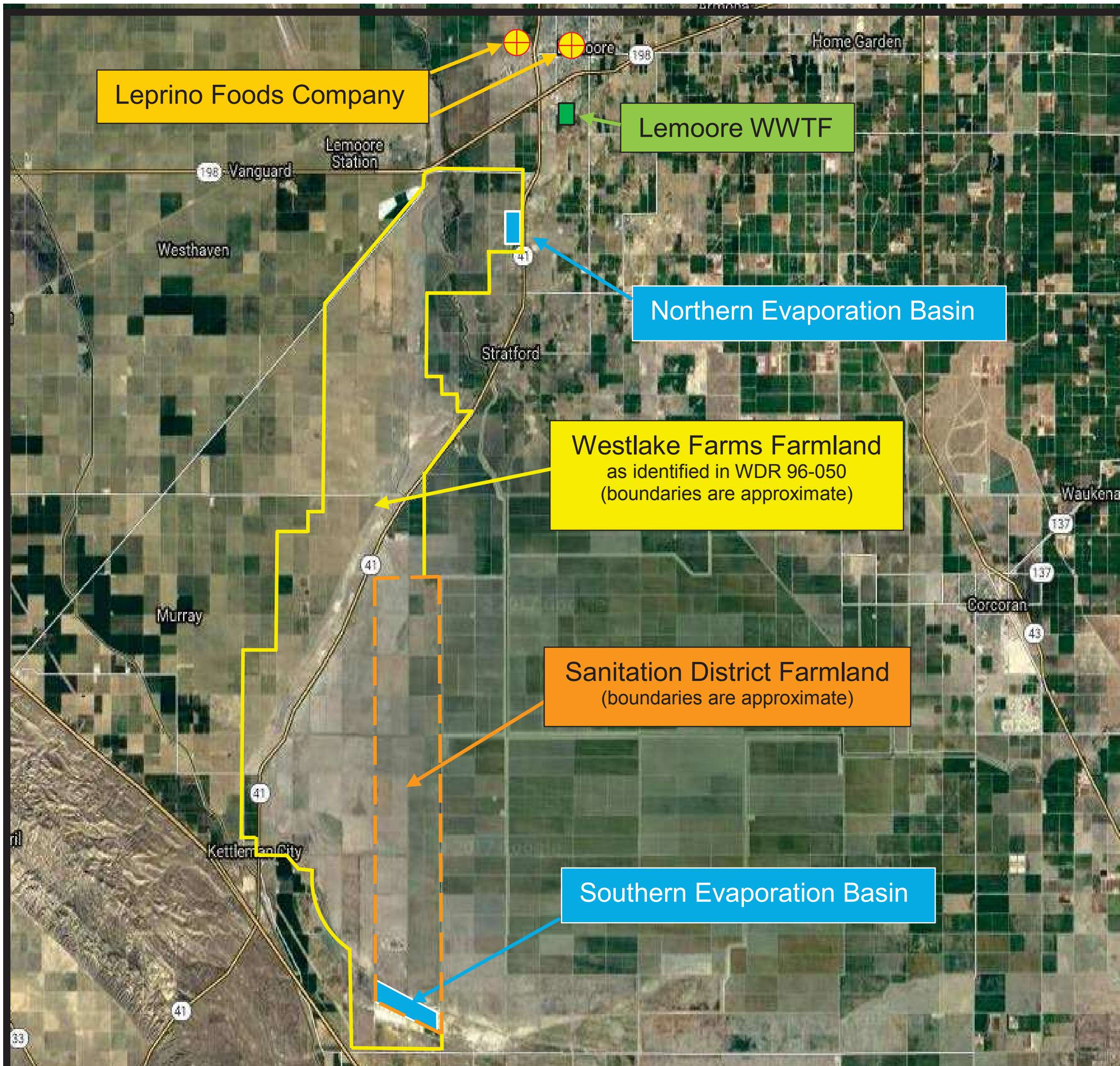
TIME SCHEDULE ORDER R5-2018-0900
WESTLAKE FARMS, INC., SANDRIDGE PARTNERS LP,
CITY OF LEMOORE, AND LEPRINO FOODS COMPANY
KINGS COUNTY

Waste Discharge Requirements (WDRs) Order 96-050 authorizes the Combined Discharge of disinfected effluent from the City of Lemoore's (City) wastewater treatment facility (WWTF) and Leprino Food Company's (Leprino) industrial process wastewater to the Westlake Canal for irrigation of fiber and grain crops not intended for human consumption on property owned by Westlake Farms, Inc. (Westlake). Westlake has indicated that it will discontinue its use of the effluent for irrigation due to the increased salinity of the Combined Discharge, which exceeds the limit for electrical conductivity (EC) specified in WDRs 96-050, and could damage salt sensitive crops. Westlake has proposed to route the Combined Discharge separately and apply it to approximately 3,800 acres outside of those areas specified in WDRs 96-050 owned by Sandridge Partners LP (Sandridge) for irrigation of salt tolerant fodder crops (e.g., Jose tall grass, barley/oats, or similar corps). The proposed Interim Application Area is in an area under lain by poor quality groundwater within the historic Tulare Lake Bed. A Basin Plan amendment to remove the Municipal and Domestic supply (MUN) and Agricultural (AGR) beneficial uses for groundwater within this portion of the Tulare Lake Bed has been adopted and approved.

This Time Schedule Order would provide for the proposed interim disposal option and sets a two-year time schedule for the City and Leprino to bring the Combined Discharge into compliance with applicable effluent limits in WDRs 96-050 or to arrange for an alternative disposal option.

One issue with the interim disposal is obtaining the necessary approvals to route the Combined Discharge through lands not owned or controlled by the Dischargers including those owned by the County Sanitation District No. 2 of Los Angeles County (Sanitation District) and Tulare Lake Reclamation District 761, and ensure that the use of the canals for transport of wastewater is separate from water including tile drainage water not being sent to the Interim Application Area. The Parties are currently working on Agreements to ensure this. The Combined Discharge would not be routed through the Sanitation District's land or others until these agreements are finalized.

Concerns were expressed by an adjacent property owner (J.G. Boswell) that the proposed Interim Application Area is prone to flooding and use of these lands for application of wastewater during flood events could impact adjacent crops used for human consumption (e.g., tomatoes). The Tulare Lake bottom including the Interim Application Area may flood during major flood events. However, major flood events are rare and there are levees and flood control features in place to minimize flooding in the area. This Time Schedule Order requires that all wastewater be kept within the Interim Application Area at all times. In addition, the agreement between Leprino and Sandridge includes a provision requiring Sandridge to arrange for an alternate disposal area for the Combined Discharge in the event of a major flood event within the lands regulated by WDRs 96-050 that are owned by Sandridge. J.G Boswell also expressed concerns, that poor farming practices on the adjacent lands have caused problems to their operations in the past and that the proposed farming of the interim land application area so close to their property may make things worse. This Time Schedule Order requires that the wastewater be applied at agronomic rates to preclude the creation of nuisance or odor conditions. Failure to comply with the conditions in the Time Schedule Order could result in further enforcement and/or fines.



SITE VICINITY MAP

TIME SCHEDULE ORDER R5-2018-0900
FOR
WESTLAKE FARMS, INC., SANDRIDGE PARTNERS, LP, CITY OF LEMOORE,
AND
LEPRINO FOODS COMPANY

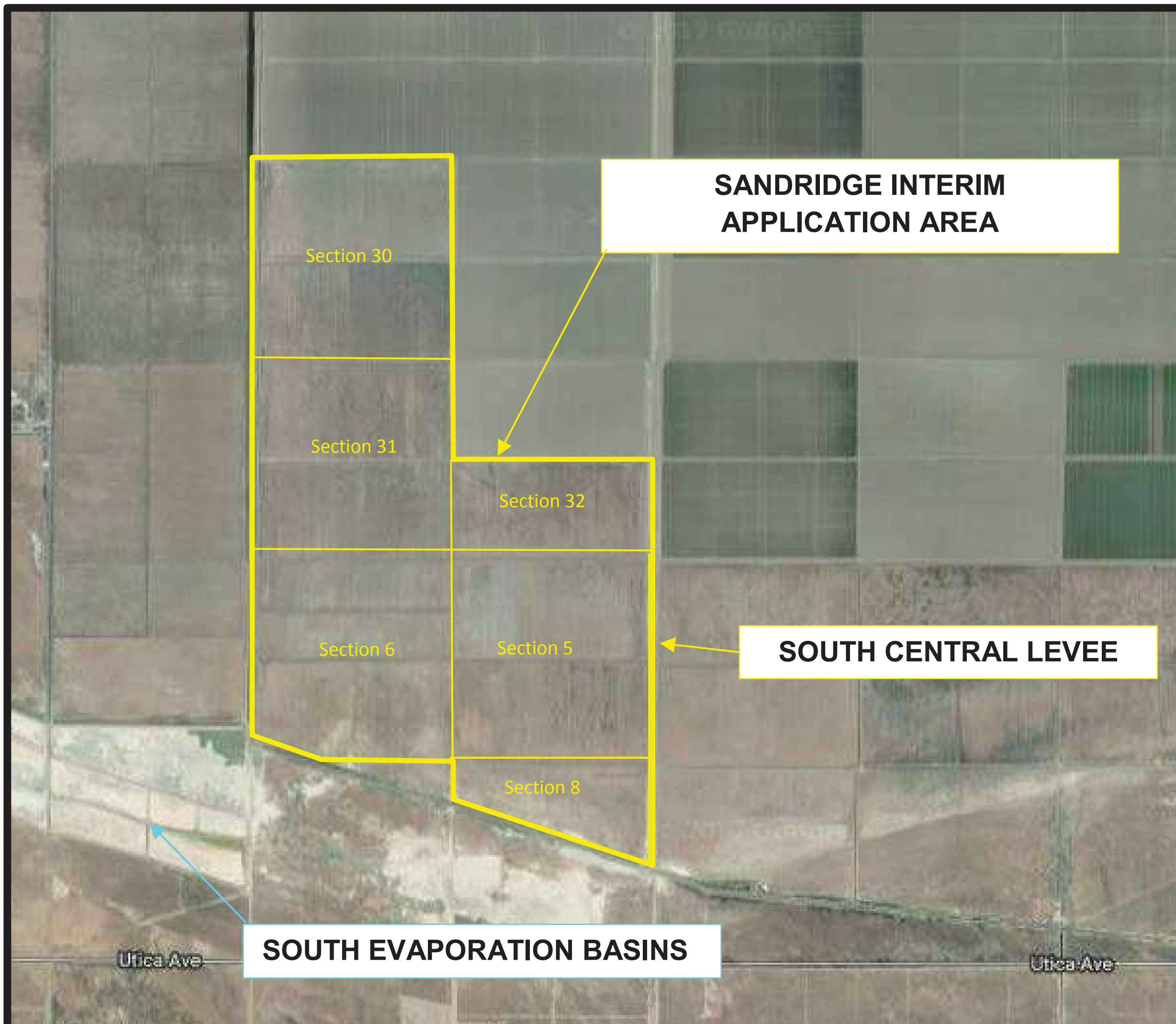
KINGS COUNTY

Approximate Scale in Miles

0 2 4 6 8 10

N W E S

ATTACHMENT A



INTERIM APPLICATION AREA MAP

TIME SCHEDULE ORDER R5-2018-0900
FOR
WESTLAKE FARMS, SANDRIDGE PARTNERS, LP, CITY OF LEMOORE,
AND
LEPRINO FOODS COMPANY

KINGS COUNTY

Approximate Scale in Miles

0 0.5 1 1.5 2.0 2.5

N
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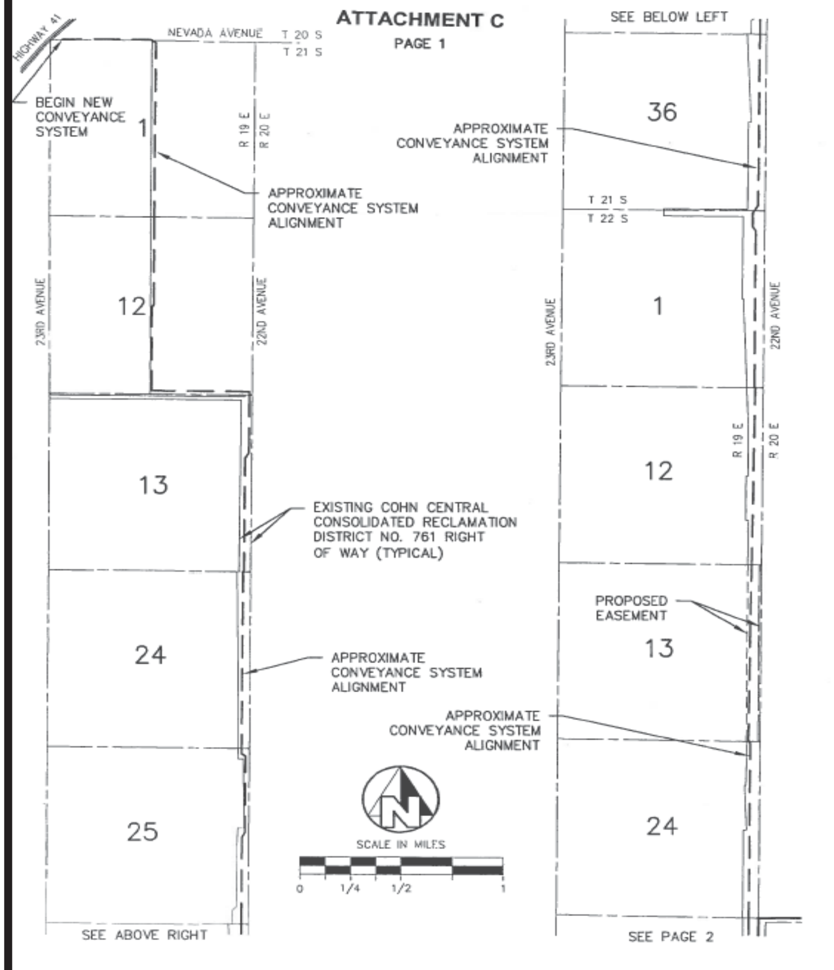
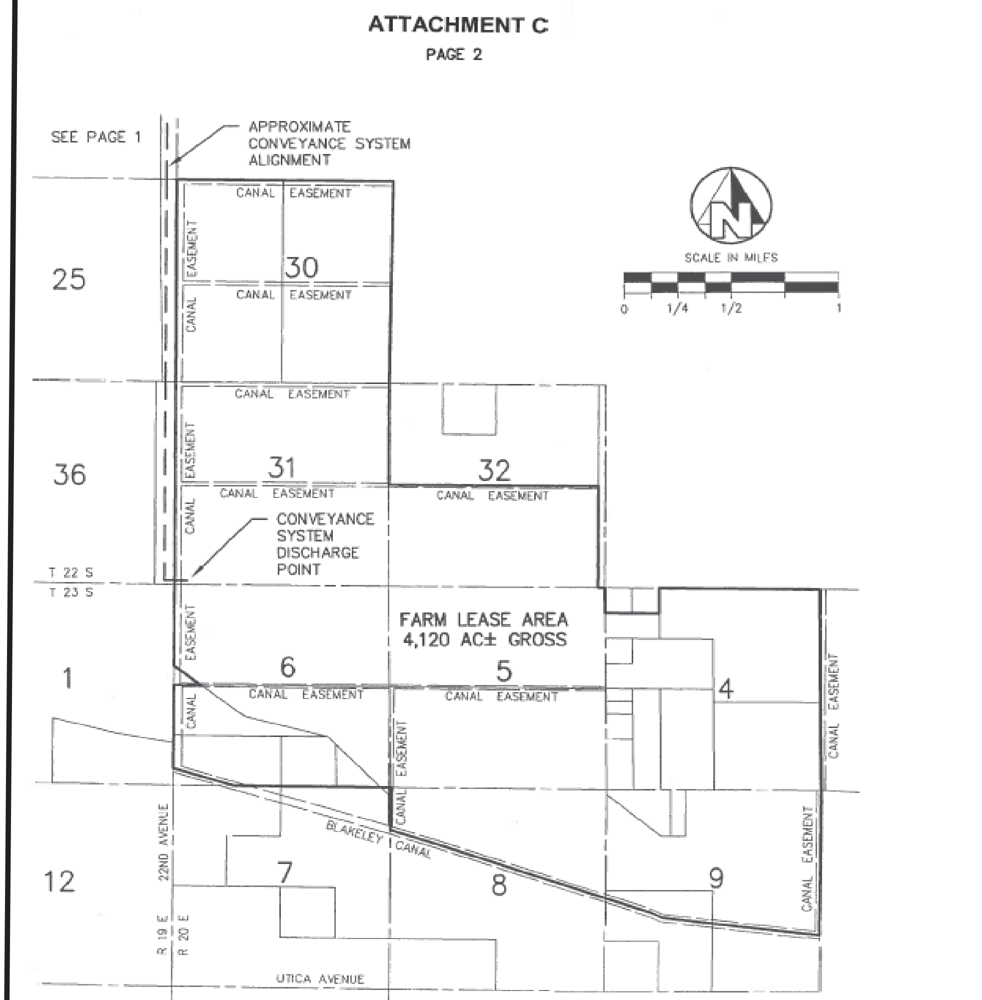
ATTACHMENT B





ROUTE OF COMBINED DISCHARGE TO INTERIM APPLICATION AREA

TIME SCHEDULE ORDER R5-2018-0900

FOR

WESTLAKE FARMS, INC, SANDRIDGE PARTNERS LP, CITY OF LEMOORE,
AND LEPRINO FOODS COMPANY
KINGS COUNTY

ATTACHMENT C

Appendix E

2018 STONE RANCH TENTATIVE WASTE DISCHARGE REQUIREMENTS

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER R5-2019-xxxx
WASTE DISCHARGE REQUIREMENTS

FOR
CITY OF LEMOORE AND LEPRINO FOODS COMPANY
STONE RANCH PROPERTY
KINGS COUNTY

The California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board or Board) finds that:

1. The City of Lemoore (City) provides sanitary wastewater treatment for its 26,000 residents at its wastewater treatment facility (WWTF) at 1145 South 18 1/2 Avenue, Lemoore, California. Waste Discharge Requirements (WDRs) Order 96-050 authorizes the discharge of up to 2.5 million gallons per day (mgd) of secondary disinfected effluent from the City's WWTF to the head of the Westlake Canal and then south to the discharge point on 50,000 acres owned by Westlake Farms, Inc. (Westlake). The City's WWTF was designed to treat both domestic and industrial wastes that historically included process wastewater from The Leprino Foods Company (Leprino) cheese processing plants.

2. Leprino owns and operates two cheese production facilities within the City known as the Leprino West Plant and the Leprino East Plant at 351 North Belle Haven Drive and 490 F Street, respectively. The two Leprino facilities process approximately 14 million pounds of milk and produce an average of 1.5 million pounds of mozzarella cheese per day.

3. Starting in 2002, process water from Leprino's two facilities is temporarily stored for flow equalization at the Leprino West Plant, then conveyed to Leprino's treatment facility, built adjacent to the City's WWTF, at 1250 South 19th Avenue for further treatment.

4. After treatment, Leprino's process water is combined with the City's treated effluent before the combined waste streams (combined effluent) are disinfected to comply with disinfected secondary-23 recycled water requirements as defined in section 60301.225 of California Code of Regulations, Title 22 (Title 22).

5. After treatment and disinfection, the combined effluent is conveyed via pipeline about six miles west to where it is discharged at the head of the Westlake Canal. Westlake received the combined effluent under an agreement with the City (8 January 1996) and WDRs Order 96-050; Westlake recycled the wastewater by using it to irrigate crops grown on Westlake's farmland.

6. The combined effluent discharged to the Westlake Canal was increased to approximately 4.5 mgd in accordance with a complete Report of Waste Discharge (RWD) submitted by the City and Leprino in October 2001, following completion of Leprino's treatment system upgrade and construction of a new outfall pipeline to handle the increased flows.

7. WDRs Order 96-050 contains Discharge Specification B.8, which states "*The maximum electrical conductivity (EC) of the discharge shall not exceed the average EC of the source water plus 500 µmho/cm".* The average EC of the City's source water is about 700 µmho/cm, and therefore the combined effluent discharge to the Westlake Canal was required to meet a limit of about 1,200 µmho/cm.

8. The combined effluent EC level from January 2014 through December 2016 averaged around 2,100 µmho/cm, which exceeds the limit set by Discharge Specification B.8 of WDRs Order 96-060. As a result, in early 2017 Westlake indicated that it would no longer accept the combined effluent. In 2018, Leprino entered an agreement with Sandridge Partners, LP (Sandridge) dated 11 January 2018 to discharge the combined effluent to land owned by Sandridge just south of Westlake Farms, in accordance with Time Schedule Order (TSO) R5-2018-0900 issued by the Central Valley Water Board's Executive Officer on 27 March 2018. TSO Order R5-2018-0900 requires the City and Leprino to come into compliance with Order 96-050 by 26 March 2020 or submit a RWD to discharge to an alternate location.

   Because there is uncertainty as to how long these arrangements will last, Leprino arranged to buy 2,200 acres of farmland north of the head of the Westlake Canal known as Stone Ranch.

9. On 8 June 2018, Leprino and the City submitted a RWD prepared by Kennedy/Jenks Consultants (Kennedy/Jenks) to discharge the combined effluent to the Stone Ranch property. The RWD proposes to discharge up to 5.0 mgd of combined effluent (monthly average) from the City and Leprino for reuse on approximately 1,900 acres of farmland at Stone Ranch. The combined effluent will be blended with existing irrigation water and applied to Stone Ranch to irrigate feed and fodder crops. The locations of the City's WWTF, Leprino's facilities, and Stone Ranch are depicted on **Attachments A and B** (incorporated herein).

10. Leprino and the City will use a portion of its existing effluent disposal pipeline to convey the combined effluent to Stone Ranch from the WWTF. However, a new pipeline will need to be constructed to connect the existing pipeline to the irrigation canal system at Stone Ranch, approximately four miles to the north.

11. The City and Leprino are named as co-dischargers in this Order and are responsible for compliance with these WDRs. The City and Leprino are collectively hereafter referred to as Dischargers.

Stone Ranch Property

12. The Stone Ranch property (or Stone Ranch) is approximately four miles west of the City Latitude 36°19'11.44"N, Longitude 119°53'34.98"W (Sections 3, 10, and 11, Township 19 South, Range 19 East, MDB&M), and comprises approximately 2,200 acres that has historically been used to grow crops such as cotton, alfalfa, wheat, tomatoes, and garlic.

13. The Crescent Bypass and a small section of the South Fork of the Kings River (or South Fork) border Stone Ranch to the east **(Attachment B)**. Flows in the South Fork are controlled by releases from Pine Flat Dam. The Crescent Bypass is a man-made channel constructed in the 1930's between a control structure on the North Fork of the Kings River and the South Fork and

is designed to convey flood waters to the Tulare Lake Basin under extreme flow conditions. According to the 2018 RWD, the Crescent Bypass has only been used twice since 1969.

14. Stone Ranch has approximately 1,900 acres of land available for irrigation (land application area or LAA). A subsurface drainage collection and evaporation basin system for the property was installed in 1984 and 1985. The LAA fields have subsurface drain lines, and the fields and evaporation basin are surrounded by interceptor drains and/or tailwater ditches that capture excess flows and prevent runoff and seepage into the Crescent Bypass. Drainage flows are collected in sumps and pumped to the evaporation basin at Stone Ranch.

15. Discharge of tile drainage water to the evaporation basin at Stone Ranch is currently regulated by WDRs Order 98-229. The evaporation basin covers approximately 200 acres adjacent to the Crescent Bypass, with a storage capacity of approximately 710 acre-feet with two feet of freeboard. The basin is divided into three cells (north cell, east cell, and west cell). Maximum depth of the basin is 5.75 feet with a maximum water depth of 3.75 feet and side slopes of approximately 8:1 (horizontal: vertical). A permeability test performed within the foot print of the basin prior to construction showed a seepage rate of 1.0×10^{-6} centimeters per second (cm/sec).

16. An Environmental Impact Report (EIR) was prepared in 1993 for the Stone Ranch evaporation basin. The EIR concluded that the evaporation basin presents a minimal risk of adverse effects on water bird reproduction due to selenium. In 1997, the State Water Resources Control Board (State Water Board) Resolution 97-09 modified a previous Stone Ranch WDR (Order 93-156) to require, if selenium contamination exists, the use of US Fish and Wildlife Service (USFWS) protocols to determine the amount and type of wildlife habitat necessary to mitigate wildlife impacts. Use of these protocols for Order 98-229 determined that no wildlife compensation habitat was required.

17. Annual monitoring requirements for Stone Ranch (Order 98-229) include monitoring of selenium in evaporation basin water and sediment, in invertebrates collected from the basin cells, and in grebe eggs, when present. Bird counts and nest egg surveys are also required.

    This Order carries over requirements for selenium monitoring of water, soil, and invertebrates within the evaporation basin, as well as wildlife monitoring including bird counts and nest egg surveys.

Facilities

18. Process water from Leprino's two facilities is combined in equalization tanks and conveyed through a 12,000-foot pipeline to the Leprino treatment facility adjacent to the City's WWTF. The Leprino treatment system utilizes two High-Rate Activated Sludge (HRAS) reactors, two Dissolved Air Flotation (DAF) units, and three Sequencing Batch Reactors (SBRs), as shown in **Attachment C** (incorporated herein). The HRAS system is used to remove 75% or more of soluble chemical oxygen demand. The DAF units act as clarifiers to remove activated sludge from the effluent stream to pump it back into the HRAS reactors. The SBRs are used to remove additional BOD, and for nitrification and denitrification. The wastewater then goes through final filtration before it is discharged to an existing pipeline where it is (a) combined with the City's treated sanitary effluent and (b) disinfected using gas chlorination. Leprino's treatment system also includes two lined facultative lagoons used for off-spec wastewater and wasted solids.

19. Average water quality of Leprino's treated effluent (not combined with the City's effluent) is presented in Table 1 below.

Table 1 – Leprino Effluent Quality[1]

Constituent/Parameter	Units	Average
Electrical Conductivity	µmhos/cm	2,657
Total Dissolved Solids	mg/L	1,561
Fixed Dissolved Solids[2]	mg/L	1,331
Nitrate as Nitrogen	mg/L	3.8
Ammonia as Nitrogen	mg/L	0.8
Total Kjeldahl Nitrogen	mg/L	2.7
Biochemical Oxygen Demand	mg/L	10
Chloride	mg/L	396
Boron	mg/L	0.37
Sodium	mg/L	384
Sulfate	mg/L	21

1. Average of data from January 2013 to January 2018.
2. Average based on four samples collected between January and March 2018.

20. The City's WWTF treatment process consists of two clay-lined aerated ponds (Ponds 1A and 1B) and two partially aerated storage ponds (Ponds 2 and 3). Average water quality of the City's treated effluent prior to disinfection (not combined with Leprino's effluent) is presented in Table 2 below.

Table 2 – City's Effluent Quality[1]

Constituent/Parameter	Units	Average
Electrical Conductivity	µmhos/cm	1,168
Biochemical Oxygen Demand	mg/L	33.5
pH	s.u.	7.0
Total Suspended Solids (TSS)	mg/L	43.5

1. Average based on data collected from January 2013 through January 2018.

21. Average water quality of the combined effluent after disinfection is presented in Table 3 below.

Table 3 – Combined Effluent Water Quality

Constituent/Parameter	Units	Average
Electrical Conductivity	µmhos/cm	2,141[1]
Total Dissolved Solids	mg/L	1,405[3]
Fixed Dissolved Solids	mg/L	1,093[3]
Nitrate as Nitrogen	mg/L	3.2[2]
Ammonia as Nitrogen	mg/L	7.8[1]
Total Kjeldahl Nitrogen	mg/L	13.6[2]
Total Nitrogen	mg/L	16.8[2]
Biochemical Oxygen Demand	mg/L	12.7[1]
Total Suspended Solids	mg/L	22[1]
Chloride	mg/L	353[2]
Boron	mg/L	0.56[2]
Sodium	mg/L	318[1]
Sulfate	mg/L	14.5[2]
Arsenic	µg/L	4.03[4]
Selenium	µg/L	2.02[4]

1. Average based on data collected from January 2013 through January 2018.
2. Average based on three samples collected in March 2018.
3. Average based on four samples collected between January and March 2018.
4. Average based on three samples collected in March 2018, one in September 2018, and two in October 2018.

22. The source water used in the Leprino facilities is supplied by the City. Average source water quality data is presented in Table 4 below.

Table 4 – Source Water Quality[1]

Constituent/Parameter	Units	Average
Electrical Conductivity	µmhos/cm	742
Total Dissolved Solids	mg/L	463
Chloride	mg/L	91
Sodium	mg/L	156
Sulfate	mg/L	1.4
Arsenic	µg/L	5.67[2]
Selenium	µg/L	1.30[2]

1. Average based on five semi-annual samples collected at the Leprino West Facility between 2015 - 2017.
2. Average based on one sample collected in September 2018 and two collected in October 2018.

23. Based on daily flow data collected between 2013 and 2018, Leprino discharges an average of 2.6 mgd of treated process water. This is combined with an average of 1.6 mgd of treated sanitary effluent from the City to create an average discharge of 4.2 mgd of combined effluent. This Order includes a monthly average flow limit of 5.0 mgd of combined effluent to Stone Ranch.

24. Solids/sludge from Leprino's wastewater treatment system are captured or discharged to one of the double lined facultative lagoons shown in **Attachment C**. The lagoons have a clay liner overlain by a synthetic liner. As necessary, solids are removed from the lagoon using a dredge, then dewatered and stored temporarily on a concrete slab before being hauled off-site for further processing, disposal, or land application at the Stone Ranch property.

25. The City's aerated treatment ponds are periodically dredged, as needed, to remove solids and sludge collected in the ponds. In the past, the sludge removed from the ponds has been taken off site for disposal at a permitted facility.

Land Application Area Practices

26. Stone Ranch has approximately 1,900 acres of farmland managed as 11 fields, all with irrigation water supply and drainage systems to support crop growth. The crops proposed for the land application program include winter wheat grown for forage (winter forage), alfalfa, and other crops that are allowed by Title 22 for irrigation of disinfected secondary-23 recycled water.

27. The water supply system for Stone Ranch consists of an extensive irrigation canal system with pump stations and gypsum treatment equipment that serve the entire farmed acreage. The canal system will receive combined effluent via the pipeline from Lemoore as well as groundwater inputs from nine irrigation wells at Stone Ranch. The canal system will allow for blending of combined effluent and pumped groundwater prior to irrigation. Application will be by flood irrigation of checks within the individual fields.

28. The irrigation wells for Stone Ranch are described in Table 5 below.

Table 5 – Irrigation Well Completion Depths and Water Quality[1]

Irrigation Well ID	Total Depth (Feet bsg[3])	Screened Interval (Feet bsg[3])	Estimated Pumping Rate (gpm)	Electrical Conductivity (µmho/cm)	TDS (mg/L)	Boron (mg/L)	Selenium (µg/L)
Well 2	220	180-220	500	1,440	970	2.3	<1
Well 6	584	116-584[4]	500	1,840	1,230	1.9	1
Well 13[2]	540	290-390 400-540	-	-	-	-	-
Well 14	520	280-410 420-520	700	913	560	1.8	<1
Well 15	530	280-380 390-530	500	711	430	1.3	<1
Well 16	540	320-430 440-540	1,000	4,070	3,110	3.2	3
Well 17	540	300-540	1,500	3,140	2,450	3.1	1
Well 18	540	300-540	1,500	1,920	1,250	2.6	<1
Well 19	1,290	1080-1150 1170-1270	2,500	1,030	620	1.6	2

1. Samples collected on 14 November 2017.
2. No sample collected from Well 13 in November 2017.
3. Below site grade (bsg).
4. Screened interval and depth assumed, actual details not available.

29. The drainage system for the LAA fields consists of drain lines installed at approximately eight feet below site grade (bsg). The drain line spacing and depth are shown in Table 6 below. Flows captured by the drainage system are collected in sumps and pumped to the existing evaporation basin at Stone Ranch. There are also interceptor drains around the evaporation basin to capture any lateral seepage, which are shown in **Attachment D** (incorporated herein). According to the RWD, the East Tailwater Ditch, between the evaporation basin and the Crescent Bypass, will be surveyed and possibly deepened so that it is below the bottom of the Crescent Bypass to ensure that no seepage from the evaporation basin into this surface water drainage channel occurs.

Table 6 – LAA Field Drain Line Spacing

LAA Field ID	Tile Drain Spacing (Feet)
Field 35	Perimeter Drains around field (~1,200 feet field width)
Field 34W	790
Field 27E, Field 27W	850
Field 11	500 – 600
Field 3NW, Field 3NE	420 – 680
Field 3SW, Field 10NW	470
Field 3SE, Field 10NE	660

30. The field drain lines collect water from both percolation below the crop root zone and shallow groundwater present throughout Stone Ranch. These flows discharge into six sumps distributed throughout the Stone Ranch property. Flows collected in the sumps are

pumped to the evaporation basin, controlled by high and low water level sensors. Flow measurements are recorded at the sumps. The interceptor drains and tailwater ditches are also connected to the drainage sumps. Total sump flow and flow weighted average EC levels for four years are presented in Table 7 below. The relatively high EC levels are indicative of the shallow groundwater collected in the drain lines.

Table 7 – Sump Flow and EC Readings for Four Years

Year	Total Sump Flow (acre-ft/day)	Flow-Weighted Average Sump Electrical Conductivity (µmhos/cm)
2000	1,308	20,177
2006	882	24,487
2013	832	15,639
2016	412	15,104

31. Since the combined effluent from the City and Leprino has been treated, the concentrations of biochemical oxygen demand (BOD) (12.7 mg/L) and total nitrogen (16.8 mg/L) shown in Table 3 are low compared to other food processing wastewater. As a result, average loading rates at about 9 pounds per acre per day (lbs/acre/day) and 160 pounds per acre per year (lbs/acre/year), respectively for these constituents are well below the loading rate guidelines provided by the California League of Food Processors (Manual of Good Practice for Land Application of Food Processing/Rinse Water, 2007).

32. The 2018 RWD evaluated several cropping and combined effluent storage scenarios to develop a plan that would meet the needs of the project. The scenarios included (1) farming the LAA acreage with 50% alfalfa and 50% winter forage with and without storage and (2) farming the LAA with 75% alfalfa and 25% winter forage with and without storage. Based on the analysis of the cropping strategies, the Dischargers selected 50% alfalfa and 50% winter forage without additional storage as the proposed project.

33. The evaporation basin water balance included in the 2018 RWD uses the proposed discharge to the Stone Ranch property and demonstrates that there is sufficient storage in the existing evaporation basin for percolation and groundwater inflow from the subsurface drainage system to handle wastewater flows at the proposed flow rate of 5.0 mgd during 100-year return period annual precipitation conditions. Table 8 shows the results of the water balance analysis for an average climate year and a 100-year wet year. With the proposed crop plan of 50% alfalfa and 50% winter forage, the evaporation basin would need a maximum of 678 acre-ft of storage during a 100-year wet year to accommodate evaporation basin storage during March (the month requiring the most storage). With a storage capacity of about 710 acre-ft in the evaporation basin with two feet of freeboard, this would leave almost 32 acre-ft of excess capacity. Additional treated effluent storage is available within the effluent storage ponds and facultative lagoons in Lemoore and within the irrigation system to provide about 10 days of storage, at the proposed flow rate, during periods when the combined effluent cannot be applied to the LAA (e.g., during a storm event, power outage, etc.).

Table 8 – Evaporation Basin Water and Salt Balance Results

Water Balance Parameter	Average Climate	100-year Wet Year
Effective Rainfall (Acre-ft)	105	338
Adjusted Evaporation (Acre-ft)	733	879
Inflow from Collection Sumps (Acre-ft)	771	1,075
Basin Seepage (Acre-ft)	152	182
Basin Maximum Storage Requirement (Acre-ft)	404	678
Flow-Weighted Annual Average Collection Sump TDS (mg/L)	18,582	13,440
Flow-Weighted Annual Average Evaporation Basin TDS (mg/L)	33,613	21,434

34. Table 9 shows the results of the LAA soil water and salt balance analysis with the proposed cropping plan of 50% alfalfa and 50% winter forage under average and 100-year wet year climate conditions.

Table 9 – LAA Soil Water and Salt Balance Results

Water Balance Parameter	Average Climate	100-Year Wet Year
General Parameters		
Effective Rainfall (Inches)	8.4	20.6
Reference Evapotranspiration (Inches)	61.6	60.6
Combined Effluent Flow (mgd)	5.0	5.0
Blended Combined Effluent and Groundwater TDS (mg/L)[1]	1,269	1,262
Alfalfa LAA Fields		
Net Combined Effluent Irrigation (Inches)	35.9	35.9
Net Supplemental Irrigation (Inches)	35.6	32.7
Percolation (Inches)	19.4	31.6
Percolation (Acre-ft)	1,536	2,503
Percolate Collected by Drain Lines (Acre-ft)	308	501
Percolate TDS (mg/L)	2,147	1,556
Winter Forage LAA Fields[2]		
Net Combined Effluent Irrigation (Inches)	13.6	13.6
Net Supplemental Irrigation (Inches)	14.3	5.2
Percolation (Inches)	11.1	18.1
Percolation (Acre-ft)	878	1,431
Percolate Collected by Drain Lines (Acre-ft)	176	286
Percolate TDS (mg/L)	1,597	953

1. Flow weighted average. Based on the blend of combined effluent and supplemental irrigation water from groundwater wells.
2. Winter forage crops are not irrigated during the period between spring harvest and fall planting.

Water Recycling Regulatory Considerations

35. Undisinfected domestic wastewater contains human pathogens that are typically measured using total or fecal coliform organism as indicator organisms. The State Water Board's Division of Drinking Water (DDW), which has primary statewide responsibility for protecting water quality and public health, has established statewide criteria for the use of recycled water (Title 22, section 60301 et seq.). This Order implements the applicable portions of the Title 22 water recycling regulations.

36. Effluent from the WWTF will be treated to meet at least the requirements for disinfected secondary-23 recycled water, under Title 22, section 60301. This Order requires that the combined effluent be used for irrigation on crops at Stone Ranch in accordance with Title 22, section 60304.

37. On 3 February 2009, the State Water Board adopted Resolution 2009-0011, *Adoption of a Policy for Water Quality Control for Recycled Water* (Recycled Water Policy). The Recycled Water Policy promotes the use of recycled water to achieve sustainable local water supplies and reduce greenhouse gas emissions.

38. On 23 April 2009, the Central Valley Water Board adopted Resolution R5-2009-0028, *In Support of Regionalization, Reclamation, Recycling and Conservation for Wastewater Treatment Plants*, which encourages water recycling, water conservation, and the regionalization of wastewater treatment facilities. Specifically, Resolution R5-2009-0028 requires dischargers to document:

    a. Efforts to promote new or expanded wastewater recycling opportunities and programs;

    b. Water conservation measures; and

    c. Regional wastewater management opportunities and solutions (e.g. regionalization).

39. Recycling of the Discharger's combined effluent is consistent with the intent of the State Water Board's Recycled Water Policy and Resolution R5-2009-0028.

40. Title 22, section 60323 requires recyclers of treated municipal wastewater to submit an engineering report detailing the use of recycled water, contingency plans, and safeguards to DDW for approval. Quad Knopf prepared a Title 22 Engineering Report on behalf of the City to demonstrate that the proposed discharge to Stone Ranch is consistent with Title 22 requirements for disinfected secondary-23 recycled water. This report was approved by DDW on 27 September 2018.

Site-Specific Conditions

41. Land uses in the vicinity of Stone Ranch are the Lemoore Naval Air Station and agricultural production. Crops grown in the area include cotton, alfalfa, wheat, tomatoes, and garlic.

42. Stone Ranch is in an arid climate characterized by dry summers and mild winters. Average annual reference evapotranspiration is 61.5 inches per year (in/yr) at the California Irrigation Management Information System (CIMIS) Stratford Station. The average annual precipitation is about 7.6 inches at the Stratford Station. The 100-year annual return precipitation of 24.6 in/yr

was based on the probability distribution of the annual precipitation dataset distributed per month in the same proportion as average precipitation.

43. The predominant soil types at Stone Ranch are Gepford Clay and Lethent Clay Loam. The Gepford Clay on the east side of Stone Ranch, is a very deep, poorly drained clay formed in lacustrine sediments. The Lethent Clay Loam soil type predominantly on the west side of Stone Ranch, generally consists of very deep, moderately well drained soils overlain on alluvial fans.

44. According to Federal Emergency Management Agency (FEMA) Map Number 06031C0135D (Sept. 2015), the majority of Stone Ranch is in Zone X, which has a minimal flood hazard. Some areas on the east side of Stone Ranch are in Zone AE with a base flood elevation of 206 feet.

45. The “Navy Ditch” runs through Stone Ranch north of the evaporation basin (**Attachment B**). This ditch historically discharged to the Crescent Bypass, but the connection was blocked with an earthen dam in the late 1980’s.

Groundwater Considerations

46. Regional groundwater flow in the area is in the southwesterly direction, towards the Tulare Lakebed. This is based on deeper groundwater zones and does not necessarily reflect groundwater flow in the shallow groundwater zones beneath Stone Ranch.

47. There are three primary clay layers beneath Stone Ranch that restrict downward migration of groundwater. These layers are lacustrine deposits consisting of very fine, clay-rich textures with very low permeability. The first layer, the “A Clay”, is approximately 60 to 100 feet bsg. The C Clay is approximately 250 to 300 feet bsg beneath Stone Ranch. The E Clay (or Corcoran Clay) is located between 610 and 700 feet bsg.

48. Monitoring well MW-1 was installed in 1992 at Stone Ranch between the west and north evaporation basin cells. This well was installed above the A Clay to a total depth of 69 feet bsg with a screened interval from 46 to 56 feet bsg. According to the RWD, a flexible wall permeability test was performed on a soil sample obtained from this depth. The result of this test indicated a vertical permeability of 5.2×10^{-8} cm/s in the A Clay. The static water level above the A Clay at Stone Ranch ranges from 4 to 14 feet bsg.

49. There are nine onsite irrigation wells at Stone Ranch; all are completed in groundwater beneath the A Clay. One irrigation well is installed to 220 feet bsg, between the A and C Clays. Seven wells range in depth from 510 to 584 bsg (between the C and E Clays). One irrigation well is installed to 1,290 feet bsg (below the E Clay). Groundwater pumped from these wells will be blended with the combined effluent and used for irrigation at Stone Ranch.

50. In 1983, 25 shallow groundwater observation wells were installed to approximately 12 feet bsg at Stone Ranch. At that time, the drainage collection system had not yet been installed and flood irrigation was being used at Stone Ranch. Water level elevation data from these wells indicate that shallow groundwater was moving toward the northeast in April 1983 with depth to shallow groundwater ranging from 1 to 3 feet bsg. These wells no longer exist at the site.

51. Around the Stone Ranch evaporation basin, there are four arrays of piezometers that were installed to a depth of 14 feet in 1992. There are five piezometers in each array (20 piezometers total).

52. Depth to groundwater at Stone Ranch is measured quarterly at the 20 piezometer locations and at monitoring well MW-1. Based on water level elevation data collected in late 2017, shallow groundwater was moving toward the south-southeast.

53. In November 2017, 10 auger holes were advanced at Stone Ranch to depths ranging from 4 to 13 feet bsg. Water level elevation information collected from these borings indicate that shallow groundwater was moving toward the southeast.

54. Quality of groundwater above the A Clay is summarized in Table 10. Annual samples are collected from monitoring well MW-1. Groundwater grab samples were collected from the auger holes in November 2017, and from the piezometers in March 2018. The 1983 groundwater quality dataset collected from shallow monitoring wells in the area that have since been destroyed is also included in the table.

    The shallow groundwater has been well characterized by long term monitoring at MW-1 and at the piezometer arrays (for EC and water level), with additional shallow groundwater datasets collected in 1983 and 2017.

Table 10 – Shallow Groundwater Quality Above the A Clay

Constituent	Monitoring Well (MW-1)[1]	November 2017 Range for Auger Hole Samples[2]	March 2018 Range for Piezometer Samples[3]	1983 Dataset[4]
pH	7.8	7.3 - 7.7	7.3 - 8	-
Electrical Conductivity (µmho/cm)	42,500	4,090 - 47,800	932 - 82,500	> 15,000
Total Dissolved Solids (mg/L)	50,200	3,810 - 58,600	570 - 111,000	-
Calcium (mg/L)	411	229 - 761	28 - 500	1,215
Magnesium (mg/L)	1,300	119 - 1,910	34 - 3,390	-
Sodium (mg/L)	13,600	292 - 18,300	184 - 43,000	4,430
Potassium (mg/L)	27	5.0 - 32.0	7 - 71	-
Chloride (mg/L)	3,400	150 - 2,800	37 - 3,500	927
Sulfate (mg/L)	31,600	2,040 - 27,600	164 - 38,800	-
Iron (mg/L)	7.8	7.5 - 67.3	0.25 - 425	-
Manganese (mg/L)	1.3	0.14 - 4.2	0.164 - 328	-
Boron (mg/L)	46	3.2 - 67.4	1.2 - 126	11.4
Selenium (µg/L)	16[(5)]	<2.0 - 43.0	2 - 100	-
Arsenic (µg/L)	17	10 - 46	9 - 340	-
Nitrate-N + Nitrite-N (mg/L)	-	1.7 - 23	0.1 - 44	15
Screened Interval or Depth (ft bsg)	46 - 56	4.2 - 13.4	14	12

1 Average of annual data collected between 1993 and 2017.
2 Range for all samples except GP-1, located adjacent to the river where the concentrations for seven salinity constituents are an order or magnitude lower than those of other samples.
3 Samples collected from piezometers on March 2018.
4 Samples collected by J.M. Lord in 1983.
5 The median value for Selenium at MW-1 is 0.4 µg/L, due to the number of non-detect values in the dataset

55. Groundwater samples were collected from eight of the onsite irrigation wells in November 2017. The results from seven of the eight wells that are installed between the A Clay and E Clay are presented in Table 11 below.

Table 11 – Stone Ranch Irrigation Well Water Quality[1, 2] (Between the A and E Clay)

Constituent	Irrigation Wells Between the A Clay and E Clay
pH	8.2
Electrical Conductivity (µmho/cm)	2,306
Total Dissolved Solids (mg/L)	1,672
Calcium (mg/L)	112
Magnesium (mg/L)	23
Sodium (mg/L)	389
Chloride (mg/L)	120
Sulfate (mg/L)	796
Iron (µg/L)	135
Manganese (µg/L)	214
Boron (mg/L)	2.5
Selenium (µg/L)	1.3
Arsenic (µg/L)	1.5

1 Samples collected on 14 November 2017 from wells 2, 6, 14, 15, 16, 17, 18.
2 Results are flow weighted based on estimated pumping rate of each well.

Basin Plan, Beneficial Uses, and Water Quality Objectives

56. The operative *Water Quality Control Plan for the Tulare Lake Basin* (Basin Plan) designates beneficial uses, establishes narrative and numerical water quality objectives, contains implementation plans and policies for protecting all waters of the Basin, and incorporates, by reference plans and policies of the State Water Board. In accordance with Water Code section 13263 (a), these waste discharge requirements implement the Basin Plan.

57. Stone Ranch is in the southwestern corner of the Kings Groundwater Basin 5-237 within the Tulare Lake Hydrologic Region. The Basin Plan identifies the following beneficial uses of groundwater in the basin: municipal; agricultural; and industrial service supply.

58. The 1998 WDRs (Order No. 98-229) for Stone Ranch state the following:

    The groundwater in the upper portion of the aquifer within one mile of the Stone Ranch does not have the beneficial use of municipal. The TDS typically exceeds 3,000 mg/L and the water contains excessive amounts of boron, chloride, sulfate, and sodium. This water cannot be used for municipal or domestic supply without extensive treatment, which is uneconomical given that excellent quality surface water (from the California Aqueduct or Kings River) and good quality groundwater (from below the "E" clay) are available. It is therefore not expected to ever supply a public water system.

    The deeper confined groundwater (about 700 feet deep and beneath the "E" clay) is of good quality and can be beneficially used for municipal, agricultural, and industrial supply.

59. Stone Ranch lies within the Lower Kings River Hydrologic Area (No. 551.80). The Basin Plan specifies beneficial uses of the Kings River from Peoples Weir to Empire Weir No. 2 on the South Fork as agricultural supply, water contact recreation; non-contact water recreation; warm freshwater habitat; wildlife habitat; and groundwater recharge.

60. The Basin Plan includes narrative water quality objectives for chemical constituents that, at a minimum, require water designated as domestic or municipal supply to meet the Maximum Contaminant Levels (MCLs) specified in Title 22 of the California Code of Regulations (hereafter Title 22). It also sets forth a numeric objective for total coliform organisms.

61. The Basin Plan's numeric water quality objective for bacteria requires that the most probable number (MPN) of coliform organisms over any seven-day period shall be less than 2.2 per 100mL in MUN groundwater.

62. The Basin Plan water quality objectives do not require improvement over naturally occurring background groundwater quality. However, if background groundwater quality exceeds the numeric objectives, background water quality becomes the objective.

63. The Basin Plan establishes narrative water quality objectives for chemical constituents, taste and odors, and toxicity in groundwater. The narrative toxicity objective, in summary, requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life associated with designated beneficial uses.

64. Quantifying a narrative water quality objective requires a site-specific evaluation of those constituents that have the potential to impact water quality and beneficial uses. The Basin Plan states that when compliance with a narrative objective is required to protect specific beneficial uses, the Central Valley Water Board will, on a case-by-case basis, adopt a numerical limitation in order to implement the narrative objective.

65. The Basin Plan identifies the greatest long-term problem facing the entire Tulare Lake Basin as the increase in salinity in groundwater, which has accelerated due to the intensive use of soil and water resources by irrigated agriculture. The Basin Plan recognizes that degradation is unavoidable until there is a long-term solution to the salt imbalance. Until then, the Basin Plan establishes several salt management requirements, including:

    a. The maximum electrical conductivity (EC) in the effluent discharged to land shall not exceed the EC of the source water supply plus 500 µmhos/cm. When the supply water is from more than one source, the EC shall be calculated as the weighted average of all sources.

    b. Discharges to areas that may recharge to good quality groundwater shall not exceed an EC of 1,000 µmhos/cm, a chloride concentration of 175 mg/L, or a boron concentration of 1.0 mg/L. The Basin Plan generally applies these limits to industrial discharges to land.

66. The Basin Plan authorizes an exemption to the incremental EC increase limit of 500 µmhos/cm for food processing industries that discharge to land and exhibit a disproportionate increase in EC of the discharge over the EC of the source water due to unavoidable concentrations of

organic dissolved solids from the raw food product, provided that beneficial uses are protected (the "food-processing exemption"). Exemptions must be based on demonstration of best available technology and best management practices that control inorganic dissolved solids to the maximum extent feasible.

67. The average fixed dissolved solids (FDS) to total dissolved solids (TDS) ratios of the combined effluent and the Leprino effluent are shown in Table 12. The FDS:TDS ratio for Leprino's effluent is 0.77 which indicates that 23 percent of the TDS is organic dissolved solids and will degrade during land application. Based on this information, the combined effluent discharge qualifies for the food-processing exemption for EC.

Table 12 – FDS:TDS Ratios

Wastewater Source	EC (µmho/cm)	TDS (mg/L)	FDS (mg/L)	FDS:TDS Ratio
Combined Effluent	2,063	1,405	1,093	0.77
Leprino Effluent	2,670	1,736	1,331	0.77

68. The Basin Plan also authorizes an exemption (the "water conservation exemption") to the incremental EC increase limit for industrial dischargers that meet the following condition:

> *An exception to this EC limit may be permitted for industrial sources when the discharger technically demonstrates that allowing a greater net incremental increase in EC will result in lower mass emissions of salt an in conservation of water, provided that beneficial uses are protected.*

69. Leprino's discharge qualifies for the water conservation exemption based on Leprino's implementation of short and long term measures to reduce use of the City's supply of potable water. The RWD indicates that Leprino employs best practicable treatment or control (BPTC) to conserve water and minimize salinity in its discharge including:

- Streamlining the clean-in-place (CIP) wash system and use of cleaning chemicals at recommended rates;
- Replaces higher salinity well water with lower salinity "COW Water" (treated water separated from milk) for certain processes within the Plant replacing almost 1.2 mgd of the City's potable water; and
- Use of reverse osmosis treatment units to concentrate lactose solids in the raw product. The clean water from the treatment process is also reused.

70. This Order establishes a performance-based limit for FDS on the combined effluent of 1,400 mg/L. This is consistent with the salinity of current irrigation supplies at Stone Ranch (including all irrigation wells above and below the E Clay at 1,370 mg/L TDS), is slightly better than groundwater quality between the A and E Clays (1,672 mg/L TDS), and is an order of magnitude better than first encountered groundwater above the A Clay (50,200 mg/L TDS).

Antidegradation Analysis

71. The State Water Board's, *Policy with Respect to Maintaining High Quality Waters of the State*, Resolution 68-16 (Antidegradation Policy) prohibits degradation of groundwater unless it is demonstrated that:

    a. The degradation will not unreasonably affect present and anticipated beneficial uses;

    b. The degradation does not result in water quality less than that prescribed in state and regional policies, including violation of one or more water quality objectives;

    c. The discharger employs best practicable treatment or control (BPTC) to minimize degradation; and

    d. The degradation is consistent with the maximum benefit to the people of the state.

72. The Antidegradation Policy applies when an activity discharges to high quality waters and will result in some degradation of such high-quality waters. "High quality waters" are defined as those waters where water quality is more than sufficient to support beneficial uses designated in the Basin Plan. Whether a water is a high quality water is established on a constituent-by-constituent basis, which means that an aquifer can be considered a high-quality water with respect to one constituent, but not for others (SWRCB Order No. WQ 91-10.). If the activity will not result in the degradation of high quality waters, the Antidegradation Policy does not apply, and the discharger need only demonstrate that it will use "best efforts" to control the discharge of waste.

73. Constituents of concern that were evaluated in the Antidegradation Analysis include organics, nutrients, and salts. These constituents are evaluated in the following findings.

    a. **For organics**, with an average BOD of approximately 13 mg/L in the combined effluent, the expected organic load to the LAA will be about 9 pounds per acre per day (lbs/acre/day) (assuming an irrigation rate of about 3 inches per day). With proper management of the LAA, this extremely low loading rate from the proposed discharge does not have the potential to cause nuisance conditions.

    b. **For nitrogen**, there is limited data available for nitrogen concentrations in the combined effluent. Leprino's effluent has an average total nitrogen concentration of <10 mg/L so the total nitrogen concentration for the combined effluent is expected to be approximately 16 to 20 mg/L (based on three samples collected in March 2018). With a combined effluent total nitrogen concentration of 20 mg/L, the expected nitrogen loading to the 1,900-acre LAA at 5.0 mgd would be approximately 160 pounds per acre per year (lbs/acre/year). This loading rate is well below the nitrogen crop requirements for alfalfa and winter forage (approximately 500 lb/ac/yr) and, with proper management of the LAA, is not expected to degrade groundwater quality for nitrogen.

    c. **For salinity**, while shallow groundwater beneath Stone Ranch is not considered a high-quality water with respect to salinity, the 2018 RWD provides a detailed analysis of the discharge and its potential impact on shallow groundwater. Water and salt balance analyses of the irrigation program were completed to address percolation beneath the root zone, drain line collection of water and salts, and seepage from the evaporation basin. Potential impacts to groundwater with respect to first encountered groundwater above the

A Clay as well as underlying groundwater below the A Clay are further discussed below in Finding 74, Finding 75, and Finding 76.

74. Table 13 provides a comparison of the average concentrations for constituents in the combined effluent with a) current irrigation water at Stone Ranch, b) first encountered groundwater above the A Clay, and c) deeper groundwater between the A and E Clays (between about 60 and 600 feet bsg). The constituent levels in the combined effluent and groundwater irrigation supply are lower than those of the groundwater above the A Clay. Groundwater irrigation supply has better water quality than the groundwater between the A and E Clay layers because it includes one well completed below the E Clay. The combined effluent has lower constituent levels than those in groundwater between the A and E Clay, except for arsenic and chloride.

Table 13. Average Concentrations for Combined Effluent and Groundwater

Constituent	Combined Effluent	Irrigation Wells[1]	Groundwater Above the A Clay[2]	Groundwater Between A and E Clays[5]
EC, µmho/cm	2,141	1,939	42,528[3] / 13,369[4]	2,306
TDS [FDS], mg/L	1,405 [1,093]	1,370	50,228[3] / 14,078[4]	1,672
Arsenic, µg/L	3.6	1.3	19[3] / 24[4]	1.5
Boron, mg/L	0.56	2.3	46[3] / 23[4]	2.5
Chloride, mg/L	353	107	3,440[3] / 674[4]	120
Sodium, mg/L	318	352	13,584[3] / 3,957[4]	389
Sulfate, mg/L	14.5	568	31,588[3] / 7,142[4]	796

1. Flow-weighted average of results from 8 of the 9 irrigation wells at Stone Ranch. This includes one well installed below the E Clay.
2. First encountered groundwater above the A clay, approximately 60 feet bsg.
3. Average of annual samples from MW-1, within the footprint of the evaporation basin, collected from 1993 – 2017.
4. Average of samples from 10 auger holes collected across the site in November 2017.
5. Average of seven irrigation wells between the A and E clays

75. Potential impacts of the discharge on groundwater above the A Clay are addressed by comparing percolation beneath the cropped fields and seepage from the evaporation basin to the quality of groundwater above the A Clay. Table 14 summarizes the results of this analysis. The percolate beneath the cropped fields has constituent levels that are significantly below those for groundwater above the A Clay. The evaporation basin seepage has higher constituent levels as a result of evaporative concentration that occurs in the basins. However, because the seepage rate is much lower than the percolation rate beneath the fields, the combined percolate and seepage has significantly better water quality than underlying groundwater quality above the A Clay. The proposed discharge is likely to improve underlying groundwater quality above the A Clay.

This Order sets a performance-based FDS limit of 1,400 mg/L on the combined discharge, consistent with the salinity of existing groundwater supplies, to ensure the discharge does not contribute to further degradation of groundwater for salinity.

Table 14. Comparison of Percolate and Seepage with Groundwater Quality above the A Clay

Constituent	Percolate from Cropped Fields	Evaporation Basin Seepage	Combined[1] Percolation and Seepage	Groundwater Above the A Clay[2]
Arsenic, µg/L	3.6	39	6	19
Boron, mg/L	2.0	77	8	46
Chloride, mg/L	361	6,288	827	3,440
Sodium, mg/L	525	22,643	2,263	13,584
Sulfate, mg/L	457	50,797	4,412	31,588
TDS, mg/L	1,932	83,700	8,357	50,228
EC, µmho/cm	3,202	74,671	8,817	42,528

1 Flow weighted average of seepage flow (152 Ac-ft) and field percolate (1,779 Ac-ft).
2. 1993 – 2017 Average for MW-1.

76. Potential impacts of the discharge on deeper groundwater below the A Clay were addressed by comparing the water quality of the combined effluent with the flow weighted average water quality for seven Stone Ranch irrigation wells completed between the A Clay and E Clay. The combined effluent discharge is expected to improve groundwater quality above the A Clay, partly because irrigation with the combined effluent replaces use of some of the poorer quality irrigation wells. The proposed discharge is not expected to cause degradation to groundwater between the A Clay and E Clay because shallow groundwater quality above the A Clay is likely to improve and the A Clay is known to have very low permeability. For similar reasons, the discharge is not likely to cause degradation to groundwater beneath the E Clay. If and when groundwater above the A Clay reaches the deepest groundwater, approximately 500 feet below the A Clay, the anticipated impact will be a slight improvement in water quality. This is because the discharge will improve groundwater quality above the A Clay and lessen any potential impacts from groundwater movement below the A Clay and into deeper layers.

77. The City of Lemoore provides BPTC at their WWTF. At the WWTF, the City provides wastewater treatment and discharges effluent that meets treatment and disinfection standards for secondary 23 recycled water. This allows reuse of the effluent for a variety of purposes including replacement of groundwater or surface water that would otherwise be used for irrigation.

78. Leprino provides BPTC including advanced treatment of its process wastewater from the two Leprino facilities to reduce organics and nitrogen, making it suitable for reuse as an irrigation water supply that can replace groundwater and surface water supplies. Leprino has also implemented process water pretreatment and reuse programs in their facilities to decrease potable water use and lower effluent salinity. These efforts result in water conservation by replacing use of the City's source supply with Leprino's treated effluent. Leprino's treatment and reuse of COW water replaces an average of 1.2 mgd of City's potable water. In addition to lowering source water TDS loading by using low TDS COW water, Leprino continues to lower salt loading by improving facility CIP systems and use of reverse osmosis to concentrate lactose solids and reusing the byproduct clean water stream within the facilities.

79. Economic prosperity of valley communities and associated industry is of maximum benefit to the people of the State. The discharge of Leprino's treated effluent at Stone Ranch will provide a secure, long term method of wastewater management that will enable the company to continue to operate two facilities in Lemoore. The presence of Leprino's processing facilities creates a demand for milk that will continue to provide local area dairies with a stable customer for their milk supply. The two facilities currently support over 100 individual dairies in the local area and the associated jobs at each of those dairies. In turn, the dairies maintain agricultural jobs and a strong market for goods and services. Leprino will continue to be an important employer in the area.

80. Leprino's two Lemoore facilities employ approximately 1,400 full time employees. Available information suggests that these two facilities have an annual economic impact of approximately $4.2 billion, including approximately $85 million in direct payroll and about $10 million in local and state taxes. In addition, the citizens of the City of Lemoore will benefit from improved management of their wastewater.

81. Therefore, sufficient reason exists to accommodate the combined effluent discharge of the City and Leprino to Stone Ranch. The Stone Ranch will remain an agricultural operation while using far less groundwater and surface water for irrigation supply, conserving valuable water resources.

82. This Order establishes terms and conditions to ensure that the discharge does not unreasonably affect present and anticipated future beneficial uses of groundwater or result in groundwater quality greater than background or the water quality objectives set forth in the Basin Plan.

83. This Order is consistent with Antidegradation Policy because: (a) the Dischargers implement BPTC to minimize degradation, (b) the Order does not allow further degradation of groundwater at Stone Ranch, c) the discharge allowed by this Order will not unreasonably affect present and anticipated future beneficial uses of groundwater, and (d) the continued operation of the Leprino facilities and a stable discharge method for the City are of maximum benefit to the people of the State.

Other Regulatory Considerations

84. Pursuant to Water Code section 106.3, subdivision (a), it is "the established policy of the state that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes." Although this Order is not necessarily subject to Water Code section 106.3 because it does not revise, adopt or establish a policy, regulation or grant criterion (see § 106.3, subd. (b)), it nevertheless promotes that policy by requiring discharges to meet MCLs designed to protect human health and ensure water is safe for domestic use where applicable.

85. Based on the threat and complexity of the discharge, the Facility is determined to be classified as a "2B" as defined below:

   a. Category 2 threat to water quality: "Those discharges of waste that could impair the designated beneficial uses of the receiving water, cause short-term violations of water quality objectives, cause secondary drinking water standards to be violated, or cause a nuisance."

b. Category B complexity: “Any discharger not included in Category A that has physical, chemical, or biological treatment systems (except for septic systems with subsurface disposal), or any Class 2 or Class 3 waste management units.”

86. California Code of Regulations, Title 27 (Title 27) contains regulatory requirements for the treatment, storage, processing, and disposal of solid waste, which includes designated waste, as defined by Water Code section 13173. However, Title 27 exempts certain activities from its provisions. Discharges regulated by this Order are exempt from Title 27 pursuant to provisions that exempt domestic sewage, wastewater, and reuse. Title 27, section 20090, states in part:

The following activities shall be exempt from the SWRCB-promulgated provisions of this subdivision, so long as the activity meets, and continues to meet, all preconditions listed:

(a) Sewage – Discharges of domestic sewage or treated effluent which are regulated by WDRs issued pursuant to Chapter 9, Division 3, Title 23 of this code, or for which WDRs have been waived, and which are consistent with applicable water quality objectives, and treatment or storage facilities associated with municipal wastewater treatment plants, provided that residual sludges or solid waste from wastewater treatment facilities shall be discharged only in accordance with the applicable SWRCB-promulgated provisions of this division.

(b) Wastewater – Discharges of wastewater to land, including but not limited to evaporation ponds, percolation ponds, or subsurface leachfields, are acceptable if the following conditions are met:

(1) The applicable regional water quality control board has issued WDRs, reclamation requirements, or waived such issuance;

(2) The discharge is in compliance with applicable water quality control plan; and

(3) The wastewater does not need to be managed according to Chapter 11, Division 4.5, Title 22 of this code as a hazardous waste.

87. The discharge authorized herein (except for the discharge of residual sludge and solid waste), and the treatment and storage facilities associated with the discharge, are exempt from the requirements of Title 27 as follows:

a. The discharge of combined effluent to Stone Ranch and discharge of tile drainage water to the evaporation basin are exempt pursuant to Title 27, section 20090(b) because they are discharges of wastewater to land and:

i. The Central Valley Water Board is issuing WDRs;

ii. The discharge is in compliance with the Basin Plan; and

iii. The treated effluent discharged to the LAA and tile drainage water collected in the evaporation basin do not need to be managed as hazardous waste.

TENTATIVE ORDER

88. The City is currently enrolled under the State Water Board's Waste Discharge Requirements for Sanitary Sewer Systems, Order 2006-0003-DWQ, which applies to publicly-owned or operated sanitary sewer systems with collection systems in excess of one mile in length.

89. Because all stormwater at the Leprino facilities and at the City's WWTF is collected and disposed of onsite, the Dischargers are not required to obtain coverage under the Statewide General Permit for Storm Water Discharges Associated with Industrial Activities, State Water Board Order 2014-0057-DWQ, NPDES Permit No. CAS000001 (Industrial General Permit) at this time.

90. Water Code section 13267, subdivision (b)(1) provides as follows:

> *In conducting an investigation … the regional board may require that any person who has discharged, discharges, or … proposes to discharge … shall furnish, under penalty of perjury, technical or monitoring program reports which the board requires. The burden, including costs of these reports, shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.*

91. The technical reports required under this Order and attached Monitoring and Reporting Program Order R5-2019-xxxx are necessary to ensure compliance with the WDRs prescribed herein. Additionally, the burden of producing such reports, as estimated by Central Valley Water Board staff, is also reasonably related to the need for such reports.

92. Absent promulgation of stricter standards pursuant to Water Code section 13801, Department of Water Resources' standards for the construction and destruction of groundwater wells per Bulletins 74-90 (June 1991) and 94-81 (December 1981), shall apply to all wells installed or monitored in connection with this Order.

93. Statistical data analysis methods outlined in the U.S. Environmental Protection Agency's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (Unified Guidance) are appropriate for determining compliance with Groundwater Limitations of this Order. Depending on circumstances, other methods may also be appropriate.

94. The United States Environmental Protection Agency (EPA) has promulgated biosolids reuse regulations in 40 Code of Federal Regulations (CFR) part 503, *Standards for the Use or Disposal of Sewage Sludge*, which establish management criteria for protection of ground and surface waters, sets limits and application rates for heavy metals, and establishes stabilization and disinfection criteria.

95. The Central Valley Water Board is using the standards in 40 CFR as guidelines in establishing this Order, but the Central Valley Water Board is not the implementing authority for the 40 CFR 503 regulations. The Discharger may have separate and/or additional compliance, reporting, and permitting responsibilities to EPA.

96. Pursuant to Water Code section 13263, subdivision (g), discharge is a privilege, not a right, and adoption of this Order does not create a vested right to continue the discharge.

CEQA

97. On 3 January 1989 the City of Lemoore certified a Final EIR in accordance with the California Environmental Quality Act (CEQA), Public Resource Code section 21000 et seq. for operation of the City's WWTF. As a responsible agency under CEQA, the Central Valley Water Board determined that the project as approved would not have a significant effect on water quality.

98. As the lead agency for the purposes of CEQA (Public Resource Code section 21000 et seq.), on 18 September 2018, the City adopted a Mitigated Negative Declaration for construction and operation of the new pipeline to carry effluent to the Stone Ranch property and reuse of the combined effluent from the City and Leprino for irrigation on the existing farmland. The Mitigated Negative Declaration determined compliance with waste discharge requirements would ensure that the proposed project would not have a significant impact on water quality.

    As discussed earlier (Finding 16), an EIR was prepared in 1993 for the operation and use of the tile drainage system and the evaporation basin at the site. Analysis of the combined discharge shows that it is of similar quality to existing irrigation sources and the reuse of the combined effluent in place of groundwater for irrigation of crops will not significantly change the existing use of the site. This Order implements measures necessary to mitigate any adverse impacts to the environment as a result of the discharge to less than significant levels.

CV-SALTS Reopener

99. The Central Valley Water Board adopted Basin Plan amendments incorporating new programs for addressing ongoing salt and nitrate accumulation in the Central Valley at its 31 May 2018 Board Meeting. These programs, once effective, could change how the Central Valley Water Board permits discharges of salt and nitrate. For nitrate, dischargers that are unable to comply with stringent nitrate requirements will be required to take on alternate compliance approaches that involve providing replacement drinking water to persons whose drinking water is affected by nitrate. Dischargers could comply with the new nitrate program either individually or collectively with other dischargers. For salinity, dischargers that are unable to comply with stringent salinity requirements would instead need to meet performance-based requirements and participate in a basin-wide effort to develop a long-term salinity strategy for the Central Valley. This Order may be amended or modified to incorporate any newly-applicable requirements.

100. The stakeholder-led Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) initiative has been coordinating efforts to implement new salt and nitrate management strategies. The Board expects dischargers that may be affected by new salt and nitrate management policies to coordinate with the CV-SALTS initiative.

Public Notice

101. All the above and the supplemental information and details in the attached Information Sheet, which is incorporated by reference herein, were considered in establishing the conditions of discharge of this Order.

102. The Dischargers and interested agencies and persons have been notified of the Central Valley Water Board's intent to prescribe waste discharge requirements for this discharge and have been provided an opportunity to submit written comments and an opportunity for a public hearing.

103. All comments pertaining to the discharge were heard and considered in a public meeting.

IT IS HEREBY ORDERED that Order 98-229 is rescinded, and, pursuant to sections 13263 and 13267 of the Water Code, the City of Lemoore and Leprino Foods Company, their agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall comply with the following:

A. Discharge Prohibitions

1. Discharge of waste to surface waters or surface water drainage courses is prohibited.

2. Discharge of waste classified as 'hazardous', as defined in California Code of Regulations, title 22, section 66261.1 et seq., is prohibited.

3. Treatment system bypass or overflow of untreated wastes is prohibited, except as allowed by Standard Provisions E.2 in *Standard Provisions and Reporting Requirements for Waste Discharge Requirements*, dated 1 March 1991 (SPRRs), incorporated herein.

4. Discharge of wastewater in a manner or location other than that described herein or in the RWD is prohibited.

5. Discharge of toxic substances into the wastewater treatment systems for the City and Leprino such that biological treatment mechanisms are disrupted is prohibited.

6. Discharge of toxic substances into the evaporation basin at Stone Ranch is prohibited.

7. The discharge of agricultural drainage water to surface water or to surface water drainage courses is prohibited. Drainage water reuse for irrigation purposes through ancillary structures (ditches, sumps, and ponds contained within the LAA and associated with its agricultural operations) is not prohibited.

8. Tires, other materials, and artificial structures that could entrap young birds along any evaporation basin cell bank are prohibited.

B. Effluent Limitations

1. The discharge of combined effluent to Stone Ranch shall not exceed a monthly average flow of 5.0 million gallons per day (mgd). [**Monitored at EFF-003**]

2. The discharge of combined effluent to Stone Ranch shall not exceed the following limitations. [**Monitored at EFF-003**]

Constituent	Units	Annual Average	Monthly Average	Daily Maximum
BOD_5[1]	mg/L	---	40	80
TSS[2]	mg/L	---	40	80
FDS[3]	mg/L	1,400	---	---

[1] Five-day biochemical oxygen demand at 20ºC.
[2] Total suspended solids
[3] Fixed Dissolved Solids

3. Total coliform bacteria in the combined discharge shall not exceed:
   i. 23 most probable number (MPN) per 100 mL, as a 7-day median; and
   ii. 240 MPN/100 mL more than once in any 30-day period.

C. Discharge Specifications

1. No waste constituent shall be released, discharged, or placed where it will cause a violation of Groundwater Limitations set forth in Section D of this Order.

2. Wastewater treatment, storage, and disposal shall not cause pollution or a nuisance as defined by Water Code section 13050.

3. The Dischargers shall operate all treatment systems and equipment to optimize the quality of the discharge.

4. All conveyance, treatment, storage, and disposal units shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.

5. Public contact with combined effluent shall be precluded through such means as fences, signs, or acceptable alternatives.

6. Objectionable odors shall not be perceivable beyond the limits of the property where the waste is generated, treated, and/or discharged at an intensity that creates or threatens to create nuisance conditions.

7. As a means of discerning compliance with Discharge Specification C.6, the dissolved oxygen (DO) content in the upper one foot of any wastewater storage and/or disposal pond shall not be less than 1.0 mg/L for three consecutive sampling events. If the DO in any single pond is below 1.0 mg/L for three consecutive sampling events, the Dischargers shall report the findings to the Central Valley Water Board in

writing within 10 days and shall include a specific plan to resolve the low DO results within 30 days.

8. The Dischargers shall operate and maintain all wastewater treatment, storage, and disposal ponds including the Stone Ranch evaporation basin to protect the integrity of containment dams and berms and prevent overtopping and/or structural failure. Unless a California-registered civil engineer certifies (based on design, construction, and conditions of operation and maintenance) that less freeboard is adequate, the operating freeboard in any pond shall never be less than two feet (measured vertically from the lowest possible point of overflow). As a means of management and to discern compliance with this requirement, the Dischargers shall install and maintain in each pond a permanent staff gauge with calibration marks that clearly show the water level at design capacity and enable determination of available operational freeboard.

9. Wastewater treatment, storage, and disposal ponds or structures shall have sufficient capacity to accommodate allowable wastewater flow, design seasonal precipitation, and ancillary inflow and infiltration during the winter while ensuring continuous compliance with all requirements of this Order. Design seasonal precipitation shall be based on total annual precipitation using a return period of 100 years, distributed monthly in accordance with historical rainfall patterns.

10. On or about **1 August** of each year, available capacity shall at least equal the volume necessary to comply with Effluent Limitation B.1 and Discharge Specifications C.8 and C.9.

11. All ponds and open containment structures shall be managed to prevent breeding of mosquitoes. Specifically:

    a. An erosion control program shall be implemented to ensure that small coves and irregularities are not created around the perimeter of the water surface.

    b. Weeds shall be minimized through control of water depth, harvesting, or herbicides.

    c. Dead algae, vegetation, and debris shall not accumulate on the water surface.

    d. The Dischargers shall consult and coordinate with the local Mosquito Abatement District to minimize the potential for mosquito breeding as needed to supplement the above measures.

12. Newly constructed or rehabilitated berms or levees (excluding internal berms that separate ponds or control the flow of water within the pond) shall be designed and constructed under the supervision of a California Registered Civil Engineer.

13. Weeds and aquatic plants shall be minimized through the control of water depth, harvesting, and/or herbicides used in an approved manner. Dead algae, vegetation, and debris shall not accumulate on the water surface. Prior to discharging to any basin, the Dischargers shall remove vegetation from the cell.

14. When filling a cell within the evaporation basin, the Dischargers shall employ all feasible measures to attain the required 2-foot minimum depth as quickly as feasible. If the drainage flows diminish and the cell cannot be maintained at a depth of two feet, then the cell will be pumped dry with portable pumps until increased drainage flows occur and additional storage is needed.

15. The Dischargers shall maintain an effective interceptor system to minimize lateral seepage from the evaporation basin.

16. Construction, modification, and maintenance of levees, and removal of vegetation from the evaporation basin, shall not take place during the nesting season without a survey of bird nests by a qualified wildlife biologist and implementation of mitigation measures as necessary. In event of emergency, the Dischargers shall complete levee maintenance immediately and notify the Central Valley Water Board and California Department of Fish and Wildlife (DFW) within 24 hours thereafter of the circumstances and action taken.

17. Should nests be identified below the high water level of an evaporation basin cell, water levels in that basin shall be managed to the extent practicable to minimize flooding of eggs.

18. If the geometric mean concentration of selenium in invertebrates in any evaporation basin cell exceeds 4 mg/kg in any one composite sampling event, the Dischargers shall conduct a hazing program that effectively keeps birds moving until the geometric mean concentration is less than 4 mg/kg. Hazing, if necessary, shall be conducted on a daily basis during the months of February through July for all cells where birds are present. Hazing shall consist of whatever is determined to be effective. If a nest is established to the point where it contains one egg or more, hazing shall be terminated in the proximity of the nest for the remainder of the nesting season.

19. Bird carcasses shall be burned or buried unless an unusual number (more than 15) is found. Upon finding an unusual number, the DFW shall be notified within 24 hours and a bird carcass shall, at the DFW's discretion, be held for diagnosis. A record of the number, date, and species of carcasses found and burned or buried shall be kept.

20. If a significant fish population develops within a basin cell, the Dischargers shall implement a fish control and removal program.

D. Groundwater Limitations

Release of waste constituents from any component of any treatment, storage, delivery system, or land application area associated with the discharge shall not cause groundwater concentrations to exceed the concentrations specified below or background groundwater quality, whichever is greater:

1. Nitrate as Nitrogen of 10 mg/L.

2. For constituents identified in Title 22, the MCLs quantified therein.

E. Land Application Area Specifications

For the purposes of this Order "land application areas" (LAA) refers to the discharge area on the Stone Ranch Property described in Finding 14.

1. The BOD loading to the LAAs calculated as a cycle average as determined by the method described in the attached Monitoring and Reporting Program, shall not exceed 100 lbs/ac/day. The cycle average BOD loading rate shall be calculated as determined by the method described in the attached MRP.

2. Land application of wastewater shall be managed to minimize erosion.

3. The LAA shall be inspected periodically to determine compliance with the requirements of this Order. If an inspection reveals noncompliance or threat of noncompliance with this Order, the Dischargers shall temporarily stop irrigation with combined effluent and implement corrective actions to ensure compliance with this Order.

4. Any runoff of tailwater shall be confined to the LAAs or evaporation basin and shall not enter any surface water drainage course or storm water drainage system that leaves the Stone Ranch property.

5. The Dischargers may not discharge combined effluent to the LAA during rainfall or when soils are saturated.

6. Crops shall be grown on the LAAs. Crops shall be selected based on nutrient uptake, consumptive use of water, irrigation requirements to maximize crop uptake of water and nutrients, and acceptable crops to receive disinfected secondary 23 recycled water.

7. Application of waste constituents to the LAAs shall be at reasonable agronomic rates to preclude creation of a nuisance or degradation of groundwater, considering the crop, soil, climate, and irrigation management system. The annual nutrient loading of the LAAs, including the contributions of organic and chemical fertilizers, solids removed from process water, and the combined effluent, shall not exceed the annual crop demand.

8. Hydraulic loading of combined effluent and supplemental irrigation water shall be managed to:
   - i. Provide water only when water is needed and in amounts consistent with crop needs;
   - ii. Maximize crop nutrient uptake;
   - iii. Maximize breakdown of organic waste constituents in the root zone; and
   - iv. Minimize the percolation of waste constituents below the root zone.

   The Central Valley Water Board recognizes that some leaching of salts is necessary to manage salt in the root zone of the crops. Leaching shall be managed to minimize degradation of groundwater and maintain compliance with the Groundwater Limitations in this Order and prevent pollution.

9. The Dischargers shall ensure that water, BOD, and nitrogen are applied and distributed uniformly across each LAA field. The Dischargers shall implement changes to the irrigation system and/or operations practices as needed to ensure compliance with this specification.

10. The LAA shall be managed to prevent breeding of mosquitos. In particular:
    a. All applied irrigation water must infiltrate within 48 hours;
    b. Tailwater ditches shall be maintained essentially free of emergent, marginal, and floating vegetation; and
    c. Low-pressure and unpressurized pipelines and ditches accessible to mosquitoes shall not be used to store wastewater.

F. Recycling Specifications

The following recycled water specifications apply to the reclamation of combined effluent (recycled water) to the LAA at Stone Ranch.

1. No physical connection shall exist between recycled water piping and any domestic or irrigation water supply well that does not have an air gap or reduced pressure principle device.

2. Not withstanding the following requirements, the production, distribution, and use of recycled water shall conform to an Engineering Report prepared pursuant to Title 22 section 60323 and approved by DDW.

3. Recycled water shall be at least disinfected secondary-23 recycled water as defined in Title 22, section 60301.225.

4. Recycled water shall be used in compliance with Title 22, section 60304.

5. The Dischargers shall maintain a 100-foot setback distance from all domestic supply wells.

6. The perimeter of the LAA shall be graded to prevent runoff onto adjacent properties not owned or controlled by the Dischargers and to prevent ponding along public roads or other public areas.

7. Public contact with recycled water shall be controlled using signs and/or other appropriate means. Signs of a size no less than four inches high by eight inches wide with proper wording (shown below) shall be placed at all areas of public access and around the perimeter of the LAA and conveyance structures to alert the public of the use of recycled water. All signs shall display an international recycled water symbol similar to that shown in **Attachment E** (incorporated herein), and present the following wording:

"RECYCLED WATER – DO NOT DRINK"
"AGUA DE DESPERDICIO RECLAMADA – POR FAVOR NO TOME"

G. Solids Specifications

Sludge, as used in this document, means the solid, semisolid, and liquid residues removed during primary, secondary, or advanced wastewater treatment processes from the City's domestic WWTF. Solid waste refers to screenings, solids, and semi-solids, generated during preliminary and advanced treatment from Leprino's WWTF. Biosolids refers to sludge that has been treated, tested, and shown to be capable of being beneficially used as a soil amendment pursuant to federal and state regulations.

1. Sludge and solid waste shall be removed from screens, sumps, and ponds as needed to ensure optimal plant operations.

2. Any drying, handling and storage of solids and/or sludge at the facilities shall be temporary and controlled and contained in a manner that minimizes leachate formation and precludes the development of odor nuisance conditions and infiltration of waste constituent into soils in a mass or concentration that will violate groundwater limitations of this Order.

3. Sludge, biosolids and solid waste shall be disposed of in a manner approved by the Executive Officer and consistent with Title 27, division 2. Removal for further treatment, disposal, or reuse at sites (i.e., landfill, composting sites, soil amendment sites) operated in accordance with valid waste discharge requirements issued by a regional water quality control board will satisfy this specification.

4. Use and disposal of biosolids from the City's WWTF shall comply with self-implementing federal regulations of 40 Code of Federal Regulations part 503, which are subject to enforcement by the U.S. EPA.

5. Any proposed change in solids use or disposal shall be reported to the Executive Officer at least **90 days** in advance of the change.

H. Provisions

1. Except as otherwise provided herein, the Dischargers shall comply with all provisions in the SPRRS (incorporated herein).

2. The Dischargers shall comply with MRP R5-2019-xxxx, which is part of this Order, and any revisions thereto as adopted by the Central Valley Water Board or approved by the Executive Officer.

3. A copy of this Order, including its MRP, Information Sheet, Attachments, and Standard Provisions, shall be kept at the facilities for reference by operating personnel. Key operating personnel shall be familiar with its contents.

4. The City shall maintain an approved Title 22 Engineering Report with DDW consistent with approved recycled water uses.

5. The City shall provide certified WWTF operators in accordance with Title 23, division 3, chapter 26.

6. Operation of the evaporation basin shall not cause violation of the Migratory Bird Treaty Act.

7. Subject to prior notice, and contingent upon a written report of findings being submitted to the Central Valley Water Board, Standard Provision A.8 shall include employees of DFW, USFWS, and U.S. Geological Survey – Biological Resources Division to the extent necessary to monitor conditions at the evaporation basin.

8. The Dischargers shall comply with all conditions of this Order, including timely submittal of technical and monitoring reports. On or before each report due date, the Dischargers shall submit the specified documents to the Central Valley Water Board or, if appropriate, a written report detailing compliance or noncompliance with the specific schedule date and task. If noncompliance is being reported, then the Discharger shall state the reasons for such noncompliance and provide an estimate of the date when the Dischargers will be in compliance. The Dischargers shall notify the Central Valley Water Board in writing when it returns to compliance with the time schedule. Violations may result in enforcement action, including Central Valley Water Board or court orders requiring corrective action or imposing civil monetary liability, or in revision or rescission of this Order.

9. The Dischargers shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Dischargers to achieve compliance with the conditions of this Order. Proper operation and maintenance also include adequate laboratory controls and appropriate quality assurance procedures. This Provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by the Dischargers only when the operation is necessary to achieve compliance with the conditions of this Order.

10. Per the SPRRs, the Dischargers shall report promptly to the Central Valley Water Board any material change or proposed change in the character, location, or volume of the discharge.

11. A discharger whose waste flows have been increasing, or is projected to increase, shall estimate when flows will reach the hydraulic and treatment capacity of its treatment, collection, and disposal facilities. The projections shall be made, based on the last three year's average dry weather flows, peak flows, and total annual flows as appropriate and be included as part of the annual report. When a projection shows that the capacity of any part of the system may be exceeded within four years, the Dischargers shall notify the Central Valley Water Board.

12. At least **90 days** prior to termination or expiration of any lease, contract, or agreement involving disposal or recycling areas or off-site reuse of effluent, used to justify the capacity authorized herein and assure compliance with this Order, the Dischargers shall notify the Central Valley Water Board in writing of the situation and of what measures have been taken or are being taken to assure full compliance with this Order.

13. In the event of any change in control or ownership of the City's WWTF, Leprino's processing facilities or wastewater treatment system, or Stone Ranch, the Dischargers shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to the Central Valley Water Board.

14. To assume operation as a Discharger under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the state of incorporation if a corporation, the address and telephone number of the persons responsible for contact with the Central Valley Water Board, and a statement. The statement shall comply with the signatory paragraph of Standard Provision B.3 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the Water Code. If approved by the Executive Officer, the transfer request will be submitted to the Central Valley Water Board for its consideration of transferring the ownership of this Order at one of its regularly scheduled meetings.

15. **By <6 months following adoption of this Order>**, Leprino shall submit a Solids Management Plan. The Solids Management Plan shall provide procedures for testing, handling, storage, and disposal of accumulated solids within the Leprino Facilities and its solids lagoon. If intended for land disposal on the Stone Ranch property, the Solids Management Plan shall provide a list of testing requirements and calculations for estimating organic and nutrient loading for solids and wastewater to ensure application at agronomic rates.

16. **By <6 months following adoption of this Order>**, Leprino shall develop and submit a Financial Assurance and Closure Plan (Closure Plan) with a schedule for decommissioning the drainage system and closing the evaporation basin. The Closure Plan shall assure fiscal capability to properly close the basin and relocate any wastes disposed in violation to these requirements. The Closure Plan shall include proposed plans for disposal of sediments containing elevated levels of minerals and trace elements per the requirements of Title 27. An update of the Closure Plan shall be submitted annually as part of the Annual Monitoring Report due February 1st of each year.

17. **By <1 year following adoption of this Order>**, the Dischargers shall submit a Wastewater and Nutrient Management Plan. The Plan shall specify management practices that will be implemented to ensure wastewater and the nutrients contained therein are applied evenly at agronomic rates and will not cause nuisance conditions or unreasonable degradation of underlying groundwater. The objective of the Wastewater and Nutrient Management Plan is to identify and utilize site specific data to demonstrate wastewater loading will occur at reasonable agronomic rates that will preclude degradation of groundwater or adversely affect beneficial uses.

18. **By <1 year following adoption of this Order>**, the Dischargers shall submit a Salinity Reduction Study Workplan. The Dischargers shall prepare and implement a Salinity Reduction Study Workplan (Workplan) to identify and address sources of salinity to and from the facilities. The Workplan shall at a minimum include the following:

i. Data on current influent and effluent salinity concentrations;
ii. Identification of known salinity sources;
iii. Description of current plans to reduce/eliminate known salinity sources;
iv. Preliminary identification of other potential sources;
v. A proposed schedule for evaluating sources; and
vi. A proposed schedule for identifying and evaluating potential reduction, elimination, and prevention methods.

Implementation progress of the Workplan shall be reported each year in the Annual Monitoring Report required pursuant to MRP R5-2019-xxxx.

19. **By <1 year following adoption of this Order>,** the Dischargers shall prepare and submit a Wildlife Protocol Monitoring Plan (Wildlife Protocol) with procedures and standards to be used when conducting wildlife monitoring of the evaporation basin as specified in MRP R5-2019-xxxx. The Wildlife Protocol must be consistent with the protocols established by DFW for wildlife monitoring and shall be submitted to both the Central Valley Water Board and DFW for approval.

20. **By <4 years following adoption of this Order>**, the Dischargers shall submit a technical report to the Central Valley Water Board and DFW summarizing the results of the evaporation basin and wildlife monitoring and assess whether existing operations are sufficient to compensate for potential impacts on target species, or if additional mitigation measures are necessary. The report shall be prepared by a qualified wildlife biologist and be sufficiently comprehensive and statistically sound to determine whether complete mitigation has been and can continue to be achieved.

21. The Dischargers shall submit the technical reports and work plans required by this Order for consideration by the Executive Officer and incorporate comments the Executive Officer may have in a timely manner, as appropriate. Unless expressly stated otherwise in this Order, the Dischargers shall proceed with all work required by the foregoing provisions by the due dates specified.

22. In accordance with Business and Professions Code sections 6735, 7835, and 7835.1, engineering and geologic evaluations and judgments shall be performed by or under the direction of registered professionals competent and proficient in the fields pertinent to the required activities. All technical reports specified herein that contain work plans for investigations and studies, that describe the conduct of investigations and studies or that contain technical conclusions and recommendations concerning engineering and geology shall be prepared by or under the direction of appropriately qualified professional(s), even if not explicitly stated. Each technical report submitted by the Dischargers shall bear the professional’s signature and stamp.

23. If the Central Valley Water Board determines that there is an increasing trend of selenium in the combined discharge or the evaporation basin that could pose a threat to wildlife, this Order may be reopened for consideration of additional mitigation measures for use of the evaporation basin.

24. The Central Valley Water Board will review this Order periodically and will revise requirements when necessary.

If, in the opinion of the Executive Officer, the Dischargers fail to comply with the provisions of this Order, the Executive Officer may refer this matter to the Attorney General for judicial enforcement, may issue a complaint for administrative civil liability, or may take other enforcement actions. Failure to comply with this Order may result in the assessment of Administrative Civil Liability of up to $10,000 per violation, per day, depending on the violation, pursuant to the Water Code, including sections 13268, 13350 and 13385. The Central Valley Water Board reserves its right to take any enforcement actions authorized by law.

Any person aggrieved by this action of the Central Valley Water Board may petition the State Water Board to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, section 2050 et seq. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filling petitions may be found on the Internet (at the address provided below) or will be provided upon request.

http://www.waterboards.ca.gov/public_notices/petitions/water_quality

I, PATRICK PULUPA, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on XX February 2019.

PATRICK PULUPA, Executive Officer

Order Attachments:
Attachment A—Project Area Map
Attachment B—Facility Map
Attachment C—Process Flow Diagram
Attachment D—Drainage Collection System
Attachment E—Recycled Water Symbol
Monitoring and Reporting Program R5-2019-xxxx
Information Sheet
Standard Provisions and Reporting Requirements dated 1 March 1991

Appendix F

2018 STONE RANCH TENTATIVE MONITORING AND REPORTING PROGRAM

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM R5-2019-XXXX
FOR
CITY OF LEMOORE AND LEPRINO FOODS COMPANY
STONE RANCH PROPERTY
KINGS COUNTY

This Monitoring and Reporting Program (MRP) is issued pursuant to California Water Code section 13267. The City of Lemoore (City) and Leprino Foods Company (Leprino) collectively referred to as Dischargers shall not implement any changes to this MRP unless and until the Central Valley Regional Water Quality Control Board (Central Valley Water Board) adopts, or the Executive Officer issues, a revised MRP.

Section 13267, subsection (b)(1) of the California Water Code states:

> *"In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge, waste outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports."*

Section 13268 of the California Water Code states, in part:

> *"(a)(1) Any person failing or refusing to furnish technical or monitoring program reports as required by subdivision (b) of Section 13267, failing or refusing to furnish a statement of compliance as required by subdivision (b) of Section 13399.2, or falsifying and information provided therein, is guilty of a misdemeanor and may be liable civilly in accordance with subdivision (b).*
> *. . .*
> *(b)(1) Civil liability may be administratively imposed by a regional board in accordance with Article 2.5 (commencing with section 13323) of Chapter 5 for a violation of subdivision (a) in an amount which shall not exceed one thousand dollars ($1,000) for each day in which the violation occurs."*

The City and Leprino own and operate their respective facilities that are subject to the Waste Discharge Requirements (WDRs) cited herein, and the monitoring reports are necessary to determine compliance with the WDRs.

Pursuant to Section 13267 of the California Water Code, the Dischargers shall implement this MRP and shall submit the monitoring reports described herein.

A glossary of terms used in this MRP is included on the last page.

I. GENERAL MONITORING REQUIREMENTS

A. FLOW MONITORING

Hydraulic flow rates shall be measured at the monitoring points specified in this MRP. Central Valley Water Board staff shall approve any proposed changes to flow monitoring locations prior to implementation of the change. All flow monitoring systems shall be appropriate for the conveyance system (i.e., open channel flow or pressure pipeline) and liquid type. Unless otherwise specified, each flow meter shall be equipped with a flow totalizer to allow reporting of cumulative volume as well as instantaneous flow rate. Flow meters shall be calibrated at the frequency recommended by the manufacturer; typically, at least once per year and records of calibration shall be maintained for review upon request.

B. MONITORING AND SAMPLING LOCATIONS

Samples shall be obtained at the monitoring points specified in this MRP. The Central Valley Water Board Executive Officer shall approve any proposed changes to sampling locations prior to implementation of the change.

The Dischargers shall monitor the following locations at their respective wastewater treatment facilities and at Stone Ranch to demonstrate compliance with the requirements of this Order:

B.1 CITY OF LEMOORE WASTEWATER TREATMENT FACILITY

Monitoring Location Name	Monitoring Location Description
INF-001	Location where a representative sample of the influent to the City's Wastewater Treatment Facility can be obtained prior to treatment.
EFF-001	Location where a representative sample of the effluent from the City's WWTF can be obtained after treatment (excluding disinfection) but prior to comingling with Leprino's effluent.
SPL-001	Source Water Supply for the City and Leprino.
PND-002 and PND-003	The City's effluent storage ponds.
BIO-001	Sludge/biosolids from the City's WWTF.

B.2 LEPRINO WASTEWATER TREATMENT FACILITY

Monitoring Location Name	Monitoring Location Description
EFF-002	Location where a representative sample of the effluent from Leprino can be obtained after treatment (excluding disinfection) but prior to comingling with the City's effluent.
LG-01 and LG-02	Leprino's facultative lagoons.
BIO-002	Sludge/residual solids from Leprino's wastewater treatment system.

B.3 STONE RANCH

Monitoring Location Name	Monitoring Location Description
EFF-003	Location where a representative sample of the combined effluent from the City and Leprino can be obtained after disinfection but prior to discharge to the land application area (LAA or Stone Ranch).
IRRIGATION SUPPLY WELLS	Irrigation supply wells (includes Well 2, Well 6, Well 13, Well 14, Well 15, Well 16, Well 17, Well 18, Well 19, and any future supply wells added to the network).
LAA-001	Land application area at Stone Ranch where the combined effluent is applied.
GROUNDWATER	Groundwater monitoring (includes MW-1, the piezometer sets around the evaporation basin [P1, P2, P3, P4], and any additional monitoring wells or piezometers installed at the site).

B.4 EVAPORATION BASIN

Monitoring Location Name	Monitoring Location Description
DRAINAGE SUMPS	Drainage collection sump monitoring (includes Sumps #3N, #3-10, #11, #27, #34, and #35).
EVB-North, EVB-East, and EVB-West	Evaporation basin monitoring (North cell, East cell, and West cell).
SEDIMENT	Evaporation basin sediment monitoring.
INV-North, INV East, and INV-West	Invertebrate monitoring (North cell, East cell, and West cell).
Wild	Wildlife monitoring.

C. SAMPLING AND SAMPLE ANALYSIS

All samples shall be representative of the volume and nature of the discharge or matrix of material sampled. Except as specified otherwise in this MRP, grab samples will be considered representative of water, wastewater, soil, solids/sludges and groundwater.

The time, date, and location of each sample shall be recorded on the sample chain of custody form. All analyses shall be performed in accordance with the *Standard Provisions and Reporting Requirements for Waste Discharge Requirements*, dated 1 March 1991 (Standard Provisions).

Field test instruments (such as those used to measure pH, temperature, electrical conductivity, dissolved oxygen, wind speed, and precipitation) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are field calibrated at the frequency recommended by the manufacturer;

TENTATIVE ORDER

3. The instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in the "Reporting" section of this MRP.

Laboratory analytical procedures shall comply with the methods and holding times specified in the following (as applicable to the medium to be analyzed):

- *Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater* (EPA);
- *Test Methods for Evaluating Solid Waste* (EPA);
- *Methods for Chemical Analysis of Water and Wastes* (EPA);
- *Methods for Determination of Inorganic Substances in Environmental Samples* (EPA);
- *Standard Methods for the Examination of Water and Wastewater* (APHA/AWWA/WEF); and
- *Soil, Plant and Water Reference Methods for the Western Region* (WREP 125).

Approved editions shall be those that are approved for use by the United States Environmental Protection Agency (EPA) or the State Water Resources Control Board (State Water Board), Division of Drinking Water's Laboratory Accreditation Program (ELAP). The Discharger may propose alternative methods for approval by the Executive Officer. Where technically feasible, laboratory reporting limits shall be lower than the applicable water quality objectives for the constituents to be analyzed.

If monitoring consistently shows no significant variation in a constituent concentration or parameter after at least 12 months of monitoring, the Discharger may request this MRP be revised to reduce monitoring frequency. The proposal must include adequate technical justification for reduction in monitoring frequency. This monitoring program shall remain in effect unless and until a revised MRP is issued.

II. SPECIFIC MONITORING REQUIREMENTS

B.1 CITY OF LEMOORE WASTEWATER TREATMENT FACILITY

a. City Influent Monitoring (INF-001)

Samples shall be representative of the volume and nature of the discharge. Time of collection of samples shall be recorded. At a minimum, the influent shall be monitored as specified below:

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Flow	mgd	Meter[1]	Continuous
Electrical Conductivity	µmhos/cm	Grab	Monthly
BOD_5	mg/L	24-Hour Composite	Monthly
Total Suspended Solids	mg/L	24-Hour Composite	Monthly
Total Kjeldahl Nitrogen	mg/L	24-Hour Composite	Quarterly
Nitrate as Nitrogen (NO_3-N)	mg/L	24-Hour Composite	Quarterly
Nitrite as Nitrogen (NO_2-N)	mg/L	24-Hour Composite	Quarterly
Ammonia as Nitrogen	mg/L	24-Hour Composite	Quarterly
Total Nitrogen	mg/L	24-Hour Composite	Quarterly

1. For continuous analyzers, the Discharger shall report documented routine meter maintenance activities including date, time of day, and duration, in which the analyzer(s) is not in operation.

b. City Effluent Monitoring (EFF-001)

Samples shall be representative of the volume and nature of the discharge. Time of collection of samples shall be recorded. At a minimum, effluent shall be monitored as specified below:

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Flow	mgd	Meter[1]	Continuous
pH	pH Units	Grab	Weekly
Electrical Conductivity	µmhos/cm	Grab	Weekly
Biochemical Oxygen Demand	mg/L	Grab	Weekly
Total Suspended Solids	mg/L	Grab	Weekly
Total Kjeldahl Nitrogen	mg/L	Grab	Quarterly
Nitrate as Nitrogen (NO_3-N)	mg/L	Grab	Quarterly
Nitrite as Nitrogen (NO_2-N)	mg/L	Grab	Quarterly
Ammonia as Nitrogen	mg/L	Grab	Quarterly
Total Nitrogen	mg/L	Grab	Quarterly
Arsenic and Selenium	µg/L	Grab	Annually
Total Dissolved Solids	mg/L	Grab	Annually
General Minerals[2]	mg/L	Grab	Annually

1. For continuous analyzers, the Discharger shall report documented routine meter maintenance activities including date, time of day, and duration, in which the analyzer(s) is not in operation.
2. General minerals shall include, at a minimum, the following: boron, calcium, chloride, iron, magnesium, manganese, potassium, sodium, sulfate, total alkalinity (including alkalinity series), and hardness.

c. Source Water Monitoring (SPL-001)

Shall be representative of the source water supplied to the City and the Leprino Facilities. If the source water is from more than one source, the results shall be presented as a flow-weighted average of all sources. In addition, the City shall submit a copy of the most current Division of Drinking Water Consumer Confidence Report as part of the Annual Monitoring Report. At a minimum, source water shall be monitored as specified below:

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Electrical Conductivity	µmhos/cm	Grab	Annually
Total Dissolved Solids	mg/L	Grab	Annually
Nitrate as Nitrogen (NO_3-N)	mg/L	Grab	1/Three Years[2]
General Minerals[1]	mg/L	Grab	1/Three Years[2]

1. General minerals shall include, at a minimum, the following: boron, calcium, chloride, iron, magnesium, manganese, potassium, sodium, sulfate, total alkalinity (including alkalinity series), hardness, and verification that the analysis is complete (i.e., cation/anion balance).
2. Samples shall be collected once every three years starting in 2019.

d. City Pond Monitoring (PND-002 and PND-003)

The City's effluent storage ponds shall be monitored as specified below:

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Dissolved Oxygen (DO)	mg/L	Grab[1]	Daily[2]
Freeboard	Feet[3]	Measurement	Weekly

1. Samples shall be collected between 8:00 a.m. and 10:00 a.m. opposite the pond inlet at a depth of approximately one foot below the surface of the pond.
2. If the DO is below 1.0 mg/L in any effluent pond for more than three consecutive sampling events, the Discharger shall report the findings to the Central Valley Water Board in writing within 10 days with a specific plan to resolve the issue.
3. Freeboard shall be monitored to the nearest tenth of a foot.

The Discharger shall inspect the condition of the effluent storage ponds weekly and record visual observations in a bound logbook. Notations shall include observations of whether weeds are developing in the water or along the bank, and their location; whether grease, dead algae, vegetation, scum, or debris are accumulating on the storage pond surface and their location; whether burrowing animals or insects are present; and the color of the reservoirs (e.g., dark green, dull green, yellow, gray, tan, brown, etc.). A summary of the entries made in the log shall be submitted along with the quarterly monitoring reports.

e. City Sludge/Biosolids Monitoring (BIO-001)

When sludge is removed from the treatment ponds, but prior to disposal, a composite sample of the sludge/biosolids shall be collected and analyzed for the following:

Arsenic	Cadmium	Copper
Lead	Mercury	Molybdenum
Nickel	Selenium	Zinc

Monitoring shall be conducted using the methods in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846) and updates thereto, as required in Title 40 of the Code of Federal Regulations (40 CFR), Part 503.8(b)(4). The Discharger also needs to demonstrate that the facility where sludge is hauled to complies with 40 CFR, Part 503.

If intended for land application, the Discharger shall demonstrate that treated sludge (i.e., biosolids) meets Class A or Class B pathogens reduction levels by one of the methods listed in 40 CFR, Part 503.32. The Discharger shall track and keep records of the operational parameters used to achieve Vector Attraction Reduction requirements in 40 CFR, Part 503.33(b).

B.2 LEPRINO WASTEWATER TREATMENT FACILITY

a. Leprino Effluent Monitoring (EFF-002)

Samples shall be representative of the volume and nature of the discharge. Time of collection of samples shall be recorded. At a minimum, effluent shall be monitored as specified below:

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Flow	mgd	Meter[1]	Continuous
pH	pH Units	Grab	Weekly
Electrical Conductivity	µmhos/cm	Grab	Weekly
BOD_5	mg/L	24-Hour Composite	Monthly
Total Suspended Solids	mg/L	24-Hour Composite	Monthly
Total Kjeldahl Nitrogen	mg/L	24-Hour Composite	Quarterly
Nitrate as Nitrogen (NO_3-N)	mg/L	24-Hour Composite	Quarterly
Nitrite as Nitrogen (NO_2-N)	mg/L	24-Hour Composite	Quarterly
Ammonia as Nitrogen	mg/L	24-Hour Composite	Quarterly
Total Nitrogen	mg/L	24-Hour Composite	Quarterly
Total Dissolved Solids	mg/L	24-Hour Composite	Quarterly
Fixed Dissolved Solids	mg/L	24-Hour Composite	Quarterly
Arsenic and Selenium	µg/L	24-Hour Composite	Annually
General Minerals[2]	mg/L	24-Hour Composite	Annually

1. For continuous analyzers, the Discharger shall report documented routine meter maintenance activities including date, time of day, and duration, in which the analyzer(s) is not in operation.
2. General minerals shall include, at a minimum, the following: boron, calcium, chloride, iron, magnesium, manganese, nitrate as nitrogen, potassium, sodium, sulfate, total alkalinity (including alkalinity series), and hardness.

b. Leprino Lagoon Monitoring (LG-01 and LG-02)

Leprino's facultative lagoons, when in use, shall be monitored as specified below:

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Dissolved Oxygen (DO)	mg/L	Grab[1]	Weekly
Freeboard	Feet[3]	Measurement	Weekly

1. Samples shall be collected between 8:00 a.m. and 10:00 a.m. opposite the pond inlet at a depth of approximately one foot below the surface of the pond.
2. Freeboard shall be monitored to the nearest tenth of a foot.

TENTATIVE ORDER

The Discharger shall inspect the condition of the facultative lagoons weekly when in use and record visual observations in a bound logbook. Notations shall include observations of whether weeds are developing in the water or along the bank, and their location; whether grease, dead algae, vegetation, scum, or debris are accumulating on the storage pond surface and their location; whether burrowing animals or insects are present; and the color of the reservoirs (e.g., dark green, dull green, yellow, gray, tan, brown, etc.). A summary of the entries made in the log shall be submitted along with the quarterly monitoring reports.

c. **Leprino Solids Monitoring (BIO-002)**
Leprino shall monitor the sludge depth in its facultative lagoons on an annual basis and include the results in the Annual Monitoring Report. If used for land application, the Discharger shall collect composite samples of the solids removed from the wastewater treatment system and the facultative lagoons for analysis prior to disposal. At a minimum, composite samples shall be analyzed for the following:

Constituent/Parameter	Units	Monitoring Frequency
Total Solids	%	Prior to disposal
Total Nitrogen	mg/kg	Prior to disposal
Total Phosphorus	mg/kg	Prior to disposal
Total Potassium	mg/kg	Prior to disposal
Metals[1]	mg/kg	Prior to disposal

1. Metals analysis shall include the following: arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc.

The sampling results shall be submitted to the Central Valley Water Board along with proposed method of disposal for Executive Officer approval. Additional analysis may be required depending on the final disposal site. Sampling records should be retained for a minimum of five years. A log shall be kept of the quantities generated, and handling and disposal activities. A summary of the log notations shall be included as part of the annual monitoring report.

B.3 STONE RANCH DISCHARGE

a. **Combined Effluent Monitoring (EFF-003)**
Monitoring of the combined effluent from the City and Leprino shall be collected at EFF-003, on days when the combined effluent is discharged to the land application area (or LAA). Samples shall be representative of the volume and nature of the discharge. Time of collection of samples shall be recorded. At a minimum, the combined effluent shall be monitored as specified below:

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Flow	mgd	Meter[1]	Continuous
pH	pH Units	Meter[1]	Continuous
Electrical Conductivity	μmhos/cm	Meter[1]	Continuous
Total Coliform Organisms	MPN/100 ml	Grab	Daily
BOD_5	mg/L	24-Hour Composite	Monthly
Total Suspended Solids	mg/L	24-Hour Composite	Monthly

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Total Kjeldahl Nitrogen	mg/L	24-Hour Composite	Monthly
Nitrate as Nitrogen (NO_3-N)	mg/L	24-Hour Composite	Monthly
Nitrite as Nitrogen	mg/L	24-Hour Composite	Monthly
Ammonia as Nitrogen	mg/L	24-Hour Composite	Monthly
Total Nitrogen	mg/L	24-Hour Composite	Monthly
Total Dissolved Solids	mg/L	24-Hour Composite	Monthly
Fixed Dissolved Solids	mg/L	24-Hour Composite	Monthly
Arsenic and Selenium	µg/L	24-Hour Composite	Quarterly
General Minerals[2]	mg/L	24-Hour Composite	Quarterly
SAR[3]	mg/L	Calculated	Quarterly

1. For continuous analyzers, the Discharger shall report documented routine meter maintenance activities including date, time of day, and duration, in which the analyzer(s) is not in operation.
2. General minerals shall include, at a minimum, the following: boron, calcium, chloride, iron, magnesium, manganese, nitrate as nitrogen, potassium, sodium, sulfate, total alkalinity (including alkalinity series), and hardness.
3. Sodium adsorption ratio $(SAR) = \frac{Na}{\sqrt{\frac{Ca+Mg}{2}}}$, where NA, Ca, and Mg are in meq/L.

b. Irrigation Supply Well Monitoring

The Stone Ranch property has nine irrigation supply wells (Well 2, Well 6, Well 13, Well 14, Well 15, Well 16, Well 17, Well 18, Well 19), which provide supplemental irrigation water for the property. If supplemental water is provided from more than one well during any month, the results for EC and TDS shall be presented as a flow-weighted average of all sources for that month. At a minimum, supplemental irrigation water shall be monitored as specified below:

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Flow	gallons	Meter	Daily
Electrical Conductivity	µmhos/cm	Grab	Annually
Total Dissolved Solids	mg/L	Grab	Annually
Arsenic and Selenium[1]	µg/L	Grab	Annually
General Minerals[1,2]	mg/L	Grab	Annually

1. Samples for metals shall be filtered prior to preservation, digestion, and analysis using a 0.45-micron filter.
2. General minerals shall include, at a minimum, the following: boron, calcium, chloride, iron, magnesium, manganese, nitrate as nitrogen, potassium, sodium, sulfate, total alkalinity (including alkalinity series), hardness, and verification that the analysis is complete (i.e., cation/anion balance).

c. Land Application Area Monitoring (LAA-001)
The Dischargers shall perform the following routine monitoring and loading calculations for each discrete irrigation area within the LAA each day when water is applied. The data shall be presented in both graphical (map) and tabular format and shall include at least the following:

Constituent/Parameter	Units	Sample Type	Frequency
Application Area/Field	Acres	Calculated	Daily[1]
Wastewater Flow	Gallons	Metered	Daily[1]
Wastewater Loading	Inches/day	Calculated	Daily[1]
Supplemental Irrigation Flow	Gallons	Metered	Daily[1]
Supplemental Irrigation Loading	Inches/day	Calculated	Daily[1]
Precipitation	Inches	Rain gage[2]	Daily[1]
Total Hydraulic Loading[3]	Inches/(acre-month)	Calculated	Monthly
<u>BOD_5 Loading</u>[4]			
Day of Application	lbs/acre/day	Calculated	Daily[1]
Cycle Average[5]	lbs/acre/day	Calculated	Cycle
<u>Nitrogen Loading</u>[4]			
From Wastewater	lbs/acre/yr	Calculated	Annually
From Fertilizers and Sludge/Solids	lbs/acre/yr	Calculated	Annually
From Supplemental Irrigation	lbs/acre/yr	Calculated	Annually
<u>Salt Loading</u>[4]			
From Wastewater	lbs/acre/yr	Calculated	Annually
From Supplemental Irrigation	lbs/acre/yr	Calculated	Annually

1 When wastewater is applied to the LAA.
2 National Weather Service or CIMIS data from the nearest weather station is acceptable.
3 Combined loading from wastewater, irrigation water, and precipitation.
4 The BOD_5, salt, and nitrogen loading rates shall be calculated as specified in Section III of this MRP.
5 A cycle average is calculated by taking the pounds of BOD_5 applied to the LAA in a given period, divided by the sum of the total days wastewater was applied plus the number of days of rest (no application of wastewater). See Section III of this MRP for the formula to calculate the cycle average loading rate.

In addition, the Dischargers shall inspect the LAA at least once a week. Evidence of erosion, field saturation, runoff, or the presence of nuisance conditions (i.e., flies, ponding, etc.) shall be noted in the log book and included as part of the quarterly monitoring report.

d. Groundwater/Piezometer Monitoring
Groundwater monitoring will consist of periodic sampling of the existing monitoring well MW-1, the piezometer sets installed around the evaporation basin (P1, P2, P3, and P4) and any additional monitoring wells or piezometers installed at the site. Prior to purging or sampling, depth to groundwater shall be measured in each well to the nearest 0.01 feet. At a minimum, groundwater shall be monitored as specified below:

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Depth to Groundwater[1]	0.01 feet	Measurement	Monthly
Groundwater Elevation[1]	0.01 feet	Calculation	Monthly
pH	pH Units	Grab	Quarterly
Electrical Conductivity	µmhos/cm	Grab	Quarterly
Total Kjeldahl Nitrogen	mg/L	Grab	Quarterly
Nitrate as Nitrogen (NO_3-N)	mg/L	Grab	Quarterly
Nitrite as Nitrogen (NO_2-N)	mg/L	Grab	Quarterly
Ammonia as Nitrogen	mg/L	Grab	Quarterly
Total Nitrogen	mg/L	Grab	Quarterly
Total Dissolved Solids	mg/L	Grab	Quarterly
Arsenic and Selenium[2]	µg/L	Grab	Quarterly
General Minerals[2,3]	mg/L	Grab	Quarterly

1 Groundwater elevations shall be determined based on depth-to-water measurements using a surveyed elevation reference point on the well casing.

2 Samples for metals shall be filtered prior to preservation, digestion, and analysis using a 0.45-micron filter.

3 General Minerals shall include, at a minimum, the following: boron, calcium, chloride, iron, manganese, magnesium, potassium, sodium, sulfate, total alkalinity (including alkalinity series), hardness, and verification that all analysis are complete (i.e., cation/anion balance).

B.4 EVAPORATION BASIN DISCHARGE

The Dischargers shall monitor the Evaporation Basin for the parameters specified below. The results of the Evaporation Basin monitoring shall be tabulated and submitted as an Annual Monitoring Report to both the Central Valley Water Board and California Department of Fish and Wildlife (DFW).

a. Drainage Collection Sump Monitoring

There are six drainage collection sumps (#3N, #3-10, #11, #27, #34, and #35) at Stone Ranch, which discharge collected groundwater and percolate from the tile drains and tail water and interceptor ditches to the Evaporation Basin. At a minimum, water collected in the drainage collection sumps shall be monitored as specified below:

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Flow	gpd	Meter[1]	Daily
Electrical Conductivity	µmhos/cm	Grab	Quarterly
Total Dissolved Solids	mg/L	Grab	Quarterly
Selenium	µg/L	Grab	Quarterly
Arsenic, Boron, and Molybdenum	µg/L	Grab	Quarterly
General Minerals[2]	mg/L	Grab	Annually

1. For continuous analyzers, the Discharger shall report documented routine meter maintenance activities including date, time of day, and duration, in which the analyzer(s) is not in operation.

2. General Minerals shall include, at a minimum, the following: calcium, chloride, iron, manganese, magnesium, potassium, sodium, sulfate, total alkalinity (including alkalinity series), and hardness,

b. Evaporation Basin Monitoring (EVB-North, EVB-East, and EVB-West)
There are three cells within the Evaporation Basin at Stone Ranch (North cell, East cell, and West cell). If drainage water is discharged to a cell during the specified monitoring period (e.g., month, quarter, year, etc.), that cell shall be monitored as specified below:

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Mean Water Depth	Feet[1]	Measurement	Monthly
Electrical Conductivity	µmhos/cm	Grab	Monthly
Selenium	µg/L	Grab	Quarterly
Arsenic, Boron, and Molybdenum	µg/L	Grab	Quarterly
General Minerals[2]	mg/L	Grab	Annually

1. Measured to the nearest tenth of a foot.
2. General Minerals shall include, at a minimum, the following: calcium, chloride, iron, manganese, magnesium, potassium, sodium, sulfate, total alkalinity (including alkalinity series), and hardness.

c. Evaporation Basin Sediment Monitoring
Composite samples consisting of at least three discrete samples shall be collected from the upper two to three inches of sediment from the bottom of each cell within the Evaporation Basin to monitor any change in the character of the bottom sediments. Sediments from the Evaporation Basin shall be monitored as specified below:

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Selenium	mg/kg	Composite	Annually[1]
Arsenic	mg/kg	Composite	Annually[1]
Boron	mg/kg	Composite	Annually[1]
Molybdenum	mg/kg	Composite	Annually[1]

1. Samples shall be collected near the end of the third quarter.

d. Invertebrate Monitoring (INV-North, INV-East, INV-West)
The Dischargers shall analyze aquatic invertebrates for selenium levels within each of the Evaporation Basin cells. Invertebrate sampling shall be conducted for each cell on a monthly basis and a 4-month composite sent to the lab for analysis. Each composite, consisting of at least five grams (approximately six discrete samples), shall be representative of the aquatic invertebrates present in each cell, and monitored for the constituents below:

Constituent/Parameter	Units	Sample Type	Monitoring Frequency
Selenium[1]	mg/kg	4-month Composite[2]	Monthly

1. Results shall be presented as the mean concentration of all invertebrates in the sample for the quarter.
2. Composites shall represent; (a) the Breeding Period (April, May, June, and July), (b) the Migration Period (August, September, October, and November), and (c) the Wintering Period (December, January, February, and March).

e. Wildlife Monitoring

Wildlife monitoring shall be conducted in accordance with the protocols established between the Dischargers and DFW as required by Provision H.19 of WDRs R5-2019-XXXX and shall be submitted as part of the annual monitoring report to both the Central Valley Water Board and DFW. Wildlife monitoring of the evaporation basin will be conducted by or under the direct supervision of a qualified wildlife biologist, and shall include the parameters listed below:

- Monthly bird counts from December through July;
- Semi-monthly breeding bird nest surveys from April through July; and
- Counts of nests and nest fates by species.

In addition, the Dischargers shall inspect the evaporation basin weekly for dead birds. Inspections shall be increased to daily at any cell where the water depth is less than two feet or when a botulism or fowl cholera outbreak is occurring in the area, as confirmed by DFW. The Discharges shall consult with DFW on the best management approach for disposal.

III. REPORTING REQUIREMENTS

All monitoring reports should be converted to a searchable Portable Document Format (PDF) and submitted electronically. Documents that are less than 50MB should be emailed to*:* *centralvalleyfresno@waterboards.ca.gov*. Documents that are 50 MB or larger should be transferred to a CD, DVD, or flash drive and mailed to the following address:

Central Valley Regional Water Quality Control Board
Region 5 – Fresno Office
1685 “E” St.
Fresno, California 93706

To ensure that your submittal is routed to the appropriate staff person, the following information should be included in the body of the email or transmittal sheet:

Program: Non-15,
WDID:5D160104001,
Facility: Stone Ranch Property
Order: R5-2019-XXXX
County: Kings
Place ID: 223055

A transmittal letter shall accompany each monitoring report. The letter shall include a discussion of all violations of the WDRs and this MRP during the reporting period and actions taken or planned for correcting each violation. If the Dischargers have previously submitted a report describing corrective actions taken and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. Pursuant to Section B.3 of the Standard Provisions and General Reporting Requirements, the transmittal letter shall contain a statement by the Discharger or the Discharger’s authorized agent certifying under penalty of perjury that the report is true, accurate and complete to the best of the signer’s knowledge.

In reporting monitoring data, the Dischargers shall arrange the data in tabular form so that the date, sample type (e.g., effluent, groundwater, etc.), and reported analytical result for each sample are readily discernible. The data shall be summarized in such a manner to clearly illustrate compliance with waste discharge requirements and spatial or temporal trends, as applicable.

The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall be reported in the next scheduled monitoring report.

Laboratory analysis reports do not need to be included in the monitoring reports; however, all laboratory reports must be retained for a minimum of three years in accordance with Standard Provision C.3. For a Discharger conducting any of its own analyses, reports must also be signed and certified by the chief of the laboratory.

In addition to the requirements of Standard Provision C.3, monitoring information shall include the method detection limit (MDL) and the Reporting limit (RL) or practical quantitation limit (PQL). If the regulatory limit for a given constituent is less than the RL (or PQL), then any analytical results for that constituent that are below the RL (or PQL) but above the MDL shall be reported and flagged as estimated.

All monitoring reports that involve planning, investigation, evaluation or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared by or under the direction of persons registered to practice in California pursuant to California Business and Professions Code sections 6735, 7835, and 7835.1.

A. Quarterly Monitoring Reports

Quarterly monitoring reports shall be submitted to the Central Valley Water Board by the **1st day of the second month after the quarter** (i.e., the January-March quarterly report is due by **May 1st**). Each Quarterly Monitoring Report shall include the following:

1. Results of **Influent, Effluent, Source Water, Pond, and Sludge/Biosolids Monitoring** for the City of Lemoore Wastewater Treatment Facility specified in Section II. B.1a through B.1e.
2. Results of the **Effluent, Lagoon, and Solids Monitoring** for Leprino's Wastewater Treatment Facility specified in Section II. B.2a through B.2c.
3. Results of the **Combined Effluent Monitoring and Irrigation Supply Well Monitoring** for the Stone Ranch Discharge (or LAA) specified in Section II.B.3a through B.3b, including;
   a. Calculation of the maximum daily flow, monthly average flow, and cumulative annual flow for each month of the quarter;
   b. Calculation of the monthly average concentration of biochemical oxygen demand (BOD), fixed dissolved solids (FDS), and total nitrogen of the combined effluent for each month of the quarter;
   c. Calculation of the flow-weighted average EC and total dissolved solids (TDS) of supplemental irrigation water for the quarter. Results must include supporting calculations;
   d. A comparison of the combined effluent monitoring data with flow and effluent limitations and an explanation for any violations of those limitations.

4. Results of **Land Application Area Monitoring** specified in Section II. B.3c., including:
   a. A summary of the inspection activities conducted for the LAA;
   b. Calculated daily BOD_5 Loading rate for the LAA;
      i. The mass of BOD_5 applied to each discrete field in the LAA on a daily basis shall be calculated using the following formula:

$$M = \frac{8.345(CV)}{A}$$

Where:	*M*	=	Mass of BOD_5 applied to a LAA in lbs/ac/day
	C	=	Concentration of BOD_5 in mg/L based on the most recent monitoring result collected
	V	=	Volume of wastewater applied to discrete LAA fields in millions of gallons per day
	A	=	Area of the LAA irrigated in acres
	8.345	=	Unit conversion factor.

   c. Calculated cycle average BOD_5 loading rate for the LAA.
      i. The mass of BOD_5 applied to discrete fields in the LAA on a cycle average basis shall be calculated using the following formula:

$$M = \frac{8.345(CV)}{AT}$$

Where:	*M*	=	Mass of BOD_5 applied to an LAA in lbs/ac/day
	C	=	Concentration of BOD_5 in mg/L based on the three most recent monitoring results
	V	=	Total volume of wastewater applied to discrete LAA fields during the irrigation cycle, in millions of gallons
	A	=	Area of the LAA irrigated in acres
	T	=	Irrigation cycle length in days (from the first day water was applied to the last day of the drying time)
	8.345	=	Unit conversion factor.

5. Results of **Groundwater/Piezometer Monitoring**, as specified in Section II. B.3d., including:
   a. A table presenting the results of depth-to-water and groundwater elevation measurements, and sampling for the quarter.
   b. A field log for each well documenting depth to groundwater; method of purging; parameters measured before, during, and after purging; sample preparation (e.g., filtering); and sample preservation.
   c. A scaled map showing relevant structures fields, and features, the locations of monitoring wells, surface waters.

B. Annual Monitoring Reports

An Annual Report shall be submitted by **1 February of each year,** and shall include the following:

1. Names, title, and certificate grade (if required) and general responsibilities of persons operating and maintaining the wastewater treatment facilities and LAA.

2. Names and telephone numbers of persons to contact regarding the facilities for emergency and routine situations.

3. Monitoring equipment and calibration records, as described in Standard Provision C.4.

4. A discussion and summary of the compliance record for the reporting period. If violations have occurred, the report shall also discuss corrective actions taken and planned to bring the discharge into compliance.

5. A summary of any changes in processing that might affect waste characterization and/or discharge flow rates.

6. A statement of when the wastewater treatment system Operation and Maintenance Manual was last reviewed for adequacy and a description of any changes made during the calendar year.

7. Total annual effluent flow and average monthly flows for the City of Lemoore, Leprino, and the combined discharge for each month of the year.

8. A table summarizing the results of all influent and effluent monitoring for the City of Lemoore, Leprino, and the combined discharge for year.

9. Results of sludge depth monitoring of the aerated ponds and facultative lagoons.

10. A summary of information on the disposal of sludge and/or solid waste during the calendar year.

11. For the LAA, a chronological log of dates for fertilizer, sludge and/or solids applications. Nitrogen and salt loading calculations shall be included.

12. Calculated flow-weighted annual average FDS/TDS concentration for the LAA.

    a. The flow-weighted annual average FDS/TDS concentrations shall be calculated using the following formula:

$$C_a = \frac{\sum_{1}^{12}[(C_{Pi} \times V_{Pi}) + (C_{Si} \times V_{Si})]}{\sum_{1}^{12}(V_{Pi} + V_{Si})}$$

Where:	C_a	=	Flow-weighted average annual FDS concentration in mg/L
	i	=	The number of the month (e.g., January = 1, February = 2, etc.)
	C_{Pi}	=	Monthly average combined discharge FDS concentration for calendar month *i* in mg/L)
	C_{Si}	=	Monthly average supplemental irrigation water TDS concentration for calendar month *i* in mg/L (considering each supplemental source separately)
	V_{Pi}	=	Volume of combined effluent applied to discrete LAA fields during calendar month *i* in million gallons
	V_{Si}	=	Volume of supplemental irrigation water applied to discrete LAA fields during calendar month *i* in million gallons (considering each supplemental source separately)

12. Calculated total nitrogen loading rate for each field in the LAA for each month and the total annual load.

    a. The mass of total nitrogen applied to each discrete field in the LAA on a monthly and annual basis shall be calculated using the following formula and compared to published crop demand for the crops actually grown:

$$M = \sum_{i=1}^{12} \frac{(8.345(C_i V_i) + M_x)}{A}$$

Where:	M	=	Mass of nitrogen applied to LAA in lbs/ac/yr
	C_i	=	Monthly average concentration of total nitrogen for month i in mg/L
	V_i	=	Volume of combined effluent applied to discrete LAA fields during calendar month i in million gallons
	A	=	Area of the field irrigated in acres
	i	=	The number of the month (e.g., January = 1, February = 2, etc.)
	M_x	=	Nitrogen mass from other sources (e.g., fertilizer, sludge/solids, and compost) in pounds
	8.345	=	Unit conversion factor

13. The results of the Evaporation Basin monitoring including **Drainage Sumps, Basin Cells, Basin Sediment, Invertebrate, and Wildlife Monitoring** as specified in Section II. B.4a through B.4e. The results of the monitoring data shall be tabulated and submitted to both the Central Valley Water Board and DFW. Reports submitted to DFW shall be mailed to the California Department of Fish and Wildlife at 1234 E. Shaw Avenue, Fresno, CA 93710.

14. Update of the Financial Assurance and Closure Plan required by Provision H.16 of WDRs R5-2019-XXXX.

15. Update on implementation of the Salinity Reduction Study Workplan.

16. A discussion of any data gaps and potential deficiencies or redundancies in the monitoring system or reporting program.

The Dischargers shall implement the above monitoring program upon initiating discharge of the combined effluent to the Stone Ranch Property.

I, PATRICK PULUPA, Executive Officer, do hereby certify the forgoing is a full, true and correct copy of the Monitoring and Reporting Program issued by the California Regional Water Quality Control Board, Central Valley Region, on XX February 2019.

PATRICK PULUPA, Executive Officer

GLOSSARY

BOD_5	Five-day biochemical oxygen demand
CaCO3	Calcium carbonate
DO	Dissolved oxygen
EC	Electrical conductivity at 25° C
FDS	Fixed dissolved solids
TDS	Total dissolved solids
TKN	Total Kjeldahl nitrogen
TSS	Total suspended solids
Continuous	The specified parameter shall be measured by a meter continuously.
24-hr Composite	Samples shall be a flow-proportioned composite consisting of at least eight aliquots over a 24-hour period.
Daily	Every day except weekends or holidays.
Twice Weekly	Twice per week on non-consecutive days.
Weekly	Once per week.
Twice Monthly	Twice per month during non-consecutive weeks.
Monthly	Once per calendar month.
Quarterly	Once per calendar quarter.
Semiannually	Once every six calendar months (i.e., two times per year) during non-consecutive quarters.
Annually	Once per year.
mg/L	Milligrams per liter
mg/kg	Milligrams per kilogram
mL/L	Milliliters [of solids] per liter
µg/L	Micrograms per liter
µmhos/cm	Micromhos per centimeter
gpd	Gallons per day
mgd	Million gallons per day
MPN/100 mL	Most probable number [of organisms] per 100 milliliters

Appendix G

DRY WEATHER FLOW CALIBRATION

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Meter Number	Pipe Diameter (in)	Weekday: Measured Data[1] Avg. Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Weekday: Modeled Data[2] Avg. Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Weekday: Percent Error[3] Avg. Flow (%)	Avg. Velocity (%)	Avg. Level (%)	Weekend: Measured Data[1] Avg. Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Weekend: Modeled Data[2] Avg. Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Weekend: Percent Error[3] Avg. Flow (%)	Avg. Velocity (%)	Avg. Level (%)	Overall ADWF: Measured (mgd)	Modeled (mgd)	Percent Error (%)
L-01	10	0.18	1.61	3.4	0.178	1.54	3.5	1.0%	-3.9%	3.9%	0.18	1.61	3.4	0.18	1.55	3.6	0.0%	-3.9%	3.1%	0.18	0.18	0.7%
L-02	14.5	0.32	1.74	4.2	0.340	1.60	4.6	4.6%	-8.2%	9.1%	0.35	1.76	4.4	0.36	1.61	4.8	3.9%	-8.2%	8.2%	0.33	0.35	4.4%
L-03	17.25	0.46	1.57	5.6	0.460	1.66	5.5	-0.3%	5.7%	-1.2%	0.49	1.60	5.7	0.49	1.68	5.6	-0.6%	5.1%	-0.9%	0.47	0.47	-0.4%
L-04	9.75	0.16	1.10	4.3	0.166	1.12	4.3	0.7%	1.9%	-1.9%	0.18	1.13	4.5	0.18	1.15	4.4	-0.1%	1.6%	-2.3%	0.17	0.17	0.4%
L-05	18	0.71	1.03	11.7	0.722	1.25	10.1	1.2%	21.5%	-14.1%	0.77	1.00	15.4	0.76	1.07	15.0	-0.4%	6.6%	-2.5%	0.73	0.73	0.7%
L-06	11.5	0.21	1.17	5.7	0.216	1.39	4.6	2.9%	18.6%	-18.0%	0.21	1.16	5.5	0.21	1.40	4.5	-1.0%	20.6%	-19.1%	0.21	0.21	1.8%
L-07	PS	0.13	0.00	0.0	0.127	3.74	1.3	-1.7%	--	--	0.12	0.00	0.0	0.12	3.66	1.3	-1.3%	--	--	0.13	0.12	-1.6%
L-08	10	0.22	2.04	3.4	0.221	1.90	3.5	-0.4%	-6.8%	5.3%	0.25	2.10	3.5	0.24	1.95	3.7	-1.1%	-7.5%	5.5%	0.23	0.23	-0.6%
L-09	10	0.09	0.87	3.3	0.093	0.85	3.4	-1.6%	-2.6%	2.0%	0.10	0.89	3.3	0.10	0.85	3.4	0.1%	-3.7%	3.0%	0.09	0.09	-1.1%
L-10	12	0.21	1.34	4.0	0.222	1.32	4.2	7.7%	-1.7%	3.9%	0.24	1.26	4.7	0.26	1.36	4.4	8.0%	7.7%	-4.4%	0.22	0.23	7.8%
L-11	15	0.68	1.42	8.6	0.662	1.48	8.3	-2.9%	4.1%	-4.2%	0.72	1.47	8.7	0.69	1.49	8.5	-3.3%	1.1%	-2.2%	0.69	0.67	-3.0%
L-12	15	0.42	0.63	12.6	0.438	0.79	9.1	3.4%	23.8%	-28.2%	0.43	0.63	13.3	0.44	0.77	9.1	2.3%	23.4%	-31.4%	0.42	0.44	3.1%
L-13	12	0.03	0.58	1.8	0.033	0.54	1.9	-1.0%	-7.4%	6.4%	0.01	0.35	1.4	0.01	0.42	1.3	-1.6%	20.7%	-9.1%	0.03	0.03	-1.1%
L-14	9.75	0.04	0.83	1.8	0.067	0.89	2.4	69.0%	7.3%	35.5%	0.05	0.93	1.9	0.11	1.22	2.7	125.9%	31.2%	40.2%	0.04	0.08	87.8%
L-15	12	0.68	2.24	6.9	0.682	2.29	6.7	-0.4%	2.1%	-2.0%	0.67	2.23	6.8	0.67	2.27	6.7	0.4%	1.8%	-1.4%	0.68	0.68	-0.2%

Notes:
1. Source: City of Banning 2017 Temporary Flow Monitoring Program Draft, V&A Consulting Engineers
2. Average flows are calculated from flow monitoring data.
3. Percent Difference = (Modeled - Measured)/Measured*100.

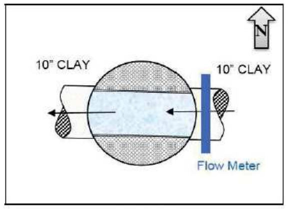
FLOW MONITORING L-01 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

Location: 185 W Spring Ln
Pipeline diameter: 10"

Site Photo


Street View

Sewer Map



Flow Sketch

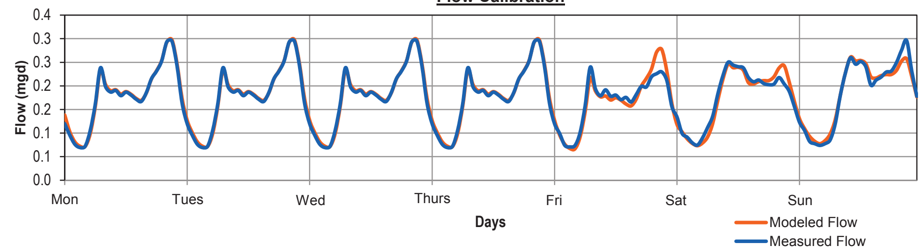

Plan View

Model Calibration Summary

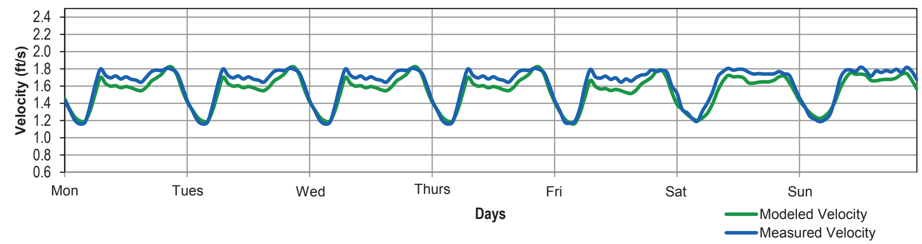
Day	Measured Data[1] Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Peak Flow (%)	Avg. Level (%)	Avg. Vel. (%)
Mon.	0.18	0.30	3.4	1.61	0.18	0.30	3.55	1.55	1.0%	1.0%	3.8%	-3.6%
Tues.	0.18	0.30	3.4	1.61	0.18	0.30	3.55	1.55	1.0%	1.0%	3.8%	-3.6%
Wed.	0.18	0.30	3.4	1.61	0.18	0.30	3.55	1.55	1.0%	1.0%	3.8%	-3.6%
Thur.	0.18	0.30	3.4	1.61	0.18	0.30	3.55	1.55	1.0%	1.0%	3.8%	-3.6%
Fri.	0.17	0.24	3.3	1.60	0.17	0.28	3.43	1.52	1.0%	15.6%	4.4%	-5.1%
Sat.	0.18	0.25	3.4	1.62	0.18	0.25	3.50	1.54	0.0%	-1.6%	3.4%	-4.9%
Sun.	0.19	0.30	3.5	1.61	0.19	0.26	3.61	1.56	-0.1%	-11.8%	2.8%	-3.0%
Summary												
Weekday	0.18	--	3.4	1.61	0.18	--	3.5	1.54	1.0%	--	3.9%	-3.9%
Weekend	0.18	--	3.4	1.61	0.18	--	3.6	1.55	0.0%	--	3.1%	-3.9%
ADWF[4]	0.18	--	3.4	1.61	0.18	--	3.5	1.55	0.7%	--	3.7%	-3.9%

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

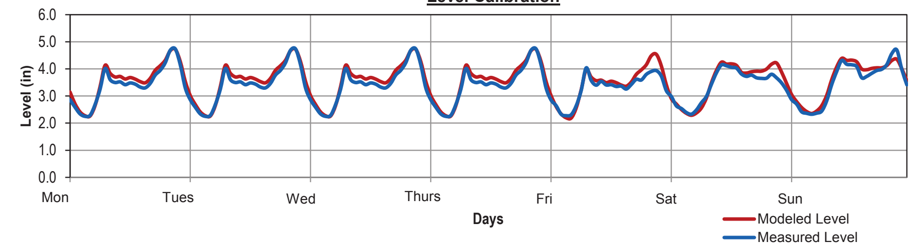
Flow Calibration



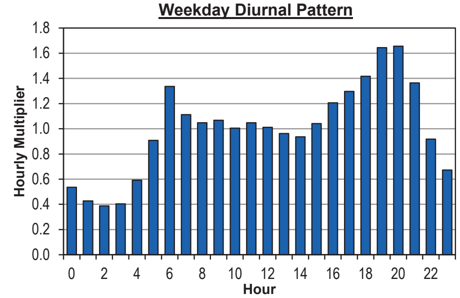
Velocity Calibration



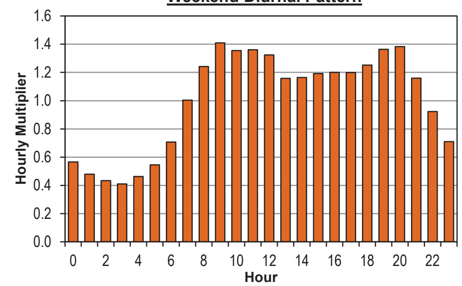
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern



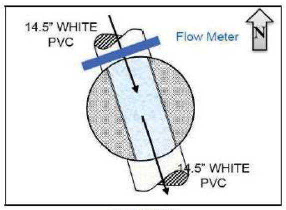
FLOW MONITORING L-02 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

Location: Fox St north of Cinnamon Dr.
Pipeline diameter: 14.5"

Site Photo


Street View

Sewer Map



Flow Sketch

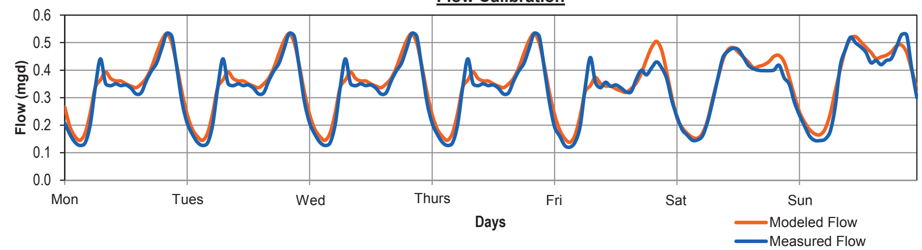

Plan View

Model Calibration Summary

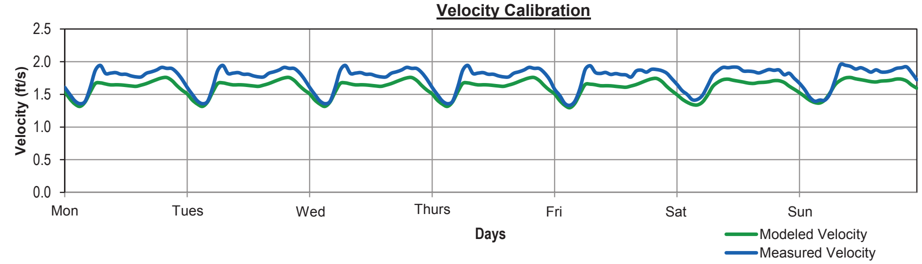
Day	Measured Data[1] Avg. Flow (mgd)	Measured Data[1] Peak Flow[2] (mgd)	Measured Data[1] Avg. Level (in)	Measured Data[1] Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Modeled Data Peak Flow[2] (mgd)	Modeled Data Avg. Level (in)	Modeled Data Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Percent Error[3] Peak Flow (%)	Percent Error[3] Avg. Level (%)	Percent Error[3] Avg. Vel. (%)
Mon.	0.33	0.53	4.3	1.75	0.34	0.53	4.64	1.60	4.7%	-0.2%	9.1%	-8.1%
Tues.	0.33	0.53	4.3	1.75	0.34	0.53	4.64	1.60	4.7%	-0.2%	9.1%	-8.1%
Wed.	0.33	0.53	4.3	1.75	0.34	0.53	4.64	1.60	4.7%	-0.2%	9.1%	-8.1%
Thur.	0.33	0.53	4.3	1.75	0.34	0.53	4.64	1.60	4.7%	-0.2%	9.1%	-8.1%
Fri.	0.31	0.45	4.1	1.74	0.33	0.50	4.50	1.59	4.5%	13.1%	9.3%	-8.8%
Sat.	0.34	0.48	4.3	1.76	0.35	0.48	4.68	1.60	3.9%	0.5%	8.5%	-8.9%
Sun.	0.36	0.53	4.5	1.76	0.38	0.52	4.91	1.63	3.9%	-1.3%	7.9%	-7.5%
Summary												
Weekday	0.32	--	4.2	1.74	0.34	--	4.6	1.60	4.6%	--	9.1%	-8.2%
Weekend	0.35	--	4.4	1.76	0.36	--	4.8	1.61	3.9%	--	8.2%	-8.2%
ADWF[4]	0.33	--	4.3	1.75	0.35	--	4.7	1.60	4.4%	--	8.8%	-8.2%

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

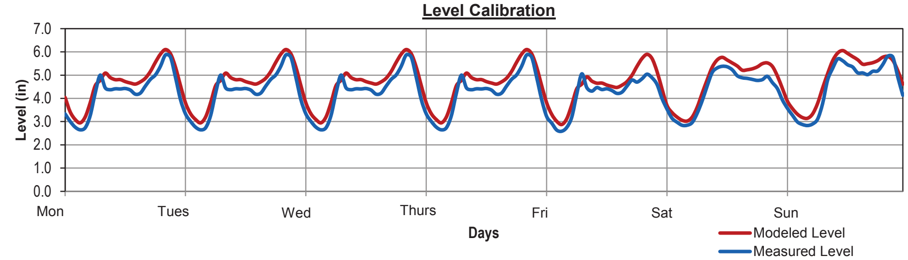
Flow Calibration



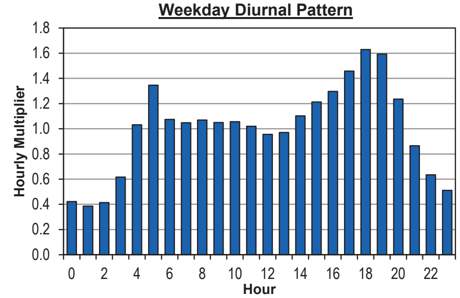
Velocity Calibration



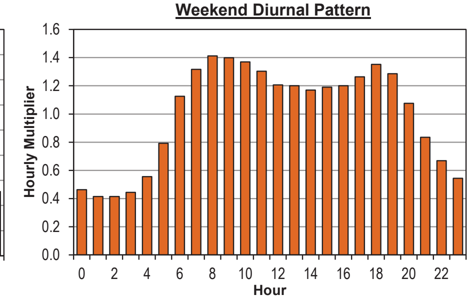
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern



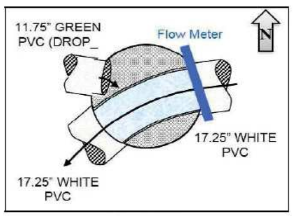
FLOW MONITORING L-03 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

Location: Cinnamon Dr at N 19th Avenue
Pipeline diameter: 17.25"

Site Photo

Street View

Sewer Map



Flow Sketch

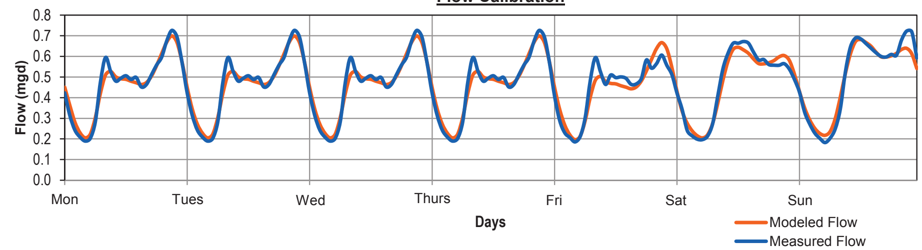
Plan View

Model Calibration Summary

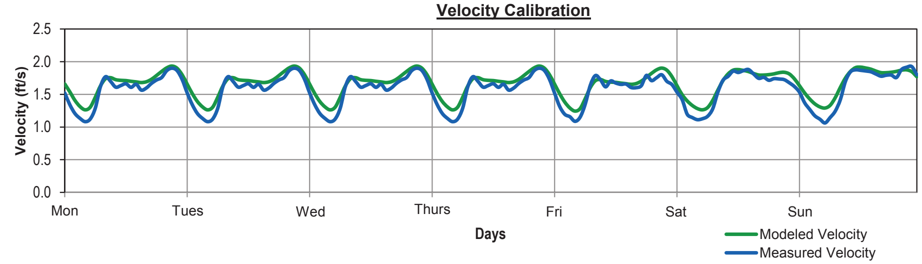
Day	Measured Data[1] Avg. Flow (mgd)	Measured Peak Flow[2] (mgd)	Measured Avg. Level (in)	Measured Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Modeled Peak Flow[2] (mgd)	Modeled Avg. Level (in)	Modeled Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Percent Error Peak Flow (%)	Percent Error Avg. Level (%)	Percent Error Avg. Vel. (%)
Mon.	0.47	0.73	5.6	1.57	0.46	0.70	5.53	1.66	-0.3%	-3.7%	-1.3%	5.9%
Tues.	0.47	0.73	5.6	1.57	0.46	0.70	5.53	1.66	-0.3%	-3.7%	-1.3%	5.9%
Wed.	0.47	0.73	5.6	1.57	0.46	0.70	5.53	1.66	-0.3%	-3.7%	-1.3%	5.9%
Thur.	0.47	0.73	5.6	1.57	0.46	0.70	5.53	1.66	-0.3%	-3.7%	-1.3%	5.9%
Fri.	0.45	0.61	5.5	1.56	0.44	0.67	5.43	1.64	-0.2%	10.0%	-0.7%	4.8%
Sat.	0.47	0.67	5.6	1.58	0.47	0.64	5.56	1.66	-0.6%	-4.2%	-1.2%	5.1%
Sun.	0.50	0.72	5.7	1.62	0.50	0.68	5.69	1.70	-0.5%	-5.7%	-0.7%	5.0%
Summary												
Weekday	0.46	--	5.6	1.57	0.46	--	5.5	1.66	-0.3%	--	-1.2%	5.7%
Weekend	0.49	--	5.7	1.60	0.49	--	5.6	1.68	-0.6%	--	-0.9%	5.1%
ADWF[4]	0.47	--	5.6	1.58	0.47	--	5.5	1.66	-0.4%	--	-1.1%	5.5%

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

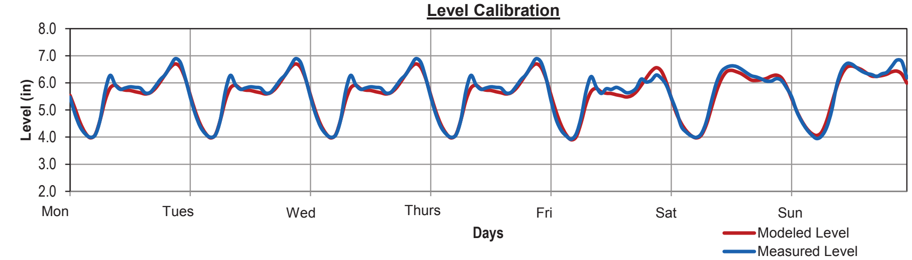
Flow Calibration



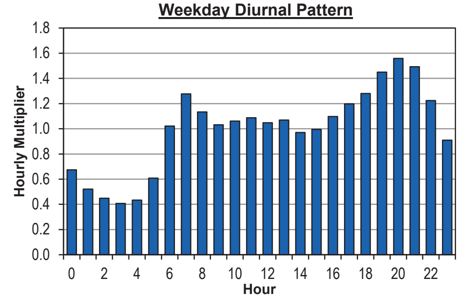
Velocity Calibration



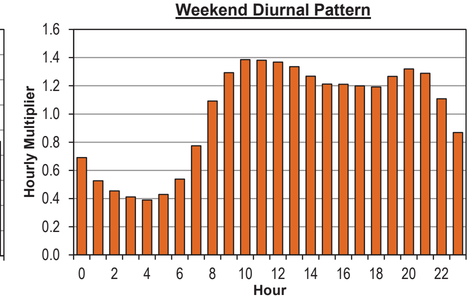
Level Calibration



Weekday Diurnal Pattern



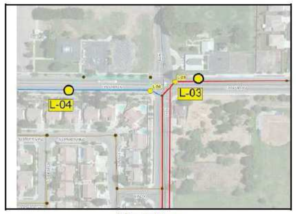
Weekend Diurnal Pattern



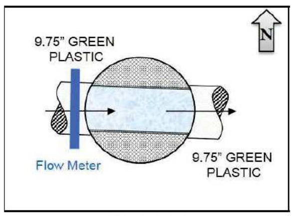
Location: Cinnamon Dr west of N 19th Avenue
Pipeline diameter: 9.75"

Site Photo

Street View



Sewer Map



Flow Sketch

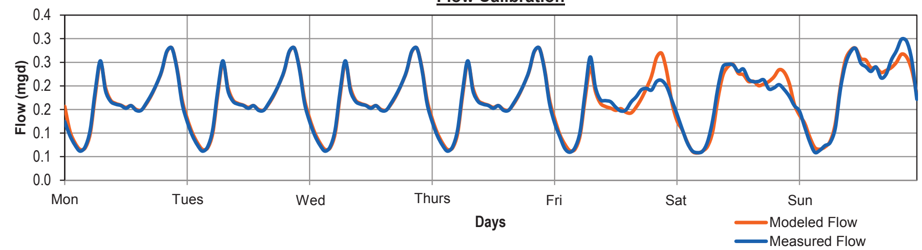
Plan View

Model Calibration Summary

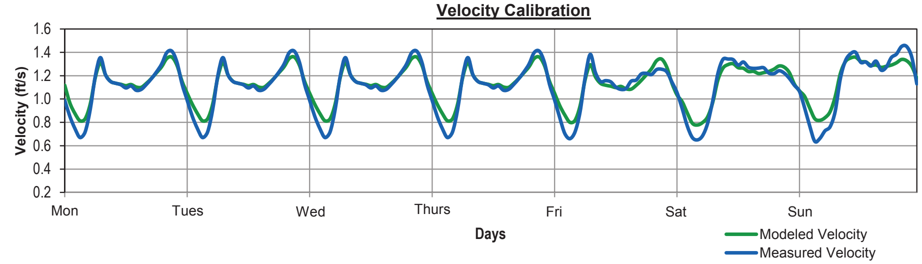
Day	Measured Data[1] Avg. Flow (mgd)	Measured Data[1] Peak Flow[2] (mgd)	Measured Data[1] Avg. Level (in)	Measured Data[1] Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Modeled Data Peak Flow[2] (mgd)	Modeled Data Avg. Level (in)	Modeled Data Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Percent Error[3] Peak Flow (%)	Percent Error[3] Avg. Level (%)	Percent Error[3] Avg. Vel. (%)
Mon.	0.17	0.28	4.4	1.10	0.17	0.28	4.28	1.13	0.6%	0.1%	-1.9%	1.9%
Tues.	0.17	0.28	4.4	1.10	0.17	0.28	4.28	1.13	0.6%	0.1%	-1.9%	1.9%
Wed.	0.17	0.28	4.4	1.10	0.17	0.28	4.28	1.13	0.6%	0.1%	-1.9%	1.9%
Thur.	0.17	0.28	4.4	1.10	0.17	0.28	4.28	1.13	0.6%	0.1%	-1.9%	1.9%
Fri.	0.16	0.26	4.3	1.09	0.16	0.27	4.19	1.11	0.8%	2.9%	-2.0%	1.7%
Sat.	0.17	0.25	4.4	1.11	0.17	0.25	4.29	1.12	0.1%	-0.2%	-2.2%	1.2%
Sun.	0.19	0.30	4.7	1.15	0.19	0.28	4.58	1.17	-0.4%	-6.5%	-2.5%	2.0%
Summary												
Weekday	0.16	--	4.3	1.10	0.17	--	4.3	1.12	0.7%	--	-1.9%	1.9%
Weekend	0.18	--	4.5	1.13	0.18	--	4.4	1.15	-0.1%	--	-2.3%	1.6%
ADWF[4]	0.17	--	4.4	1.11	0.17	--	4.3	1.13	0.4%	--	-2.0%	1.8%

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

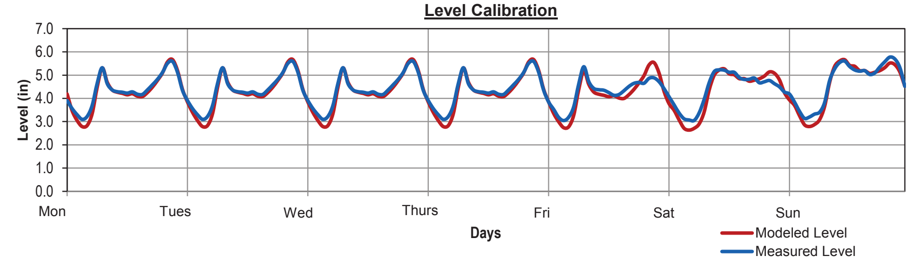
Flow Calibration



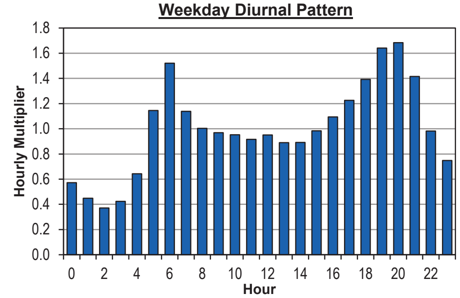
Velocity Calibration



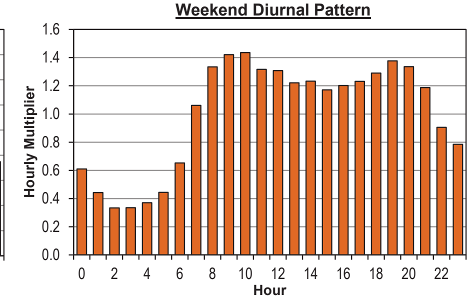
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern



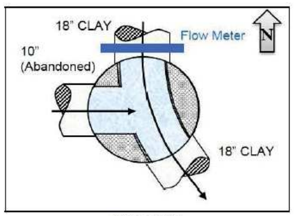
FLOW MONITORING L-05 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

Location: S 19th Avenue south of Siverado Dr
Pipeline diameter: 18"

Site Photo


Street View

Sewer Map



Flow Sketch

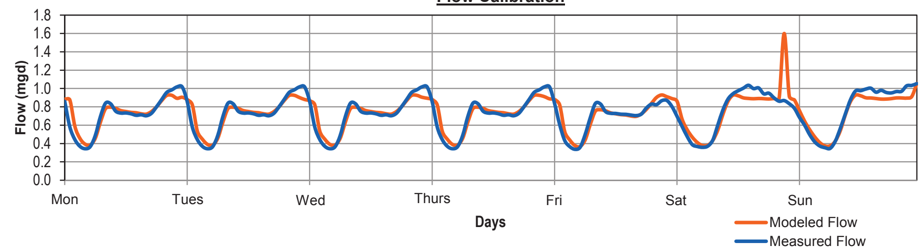

Plan View

Model Calibration Summary

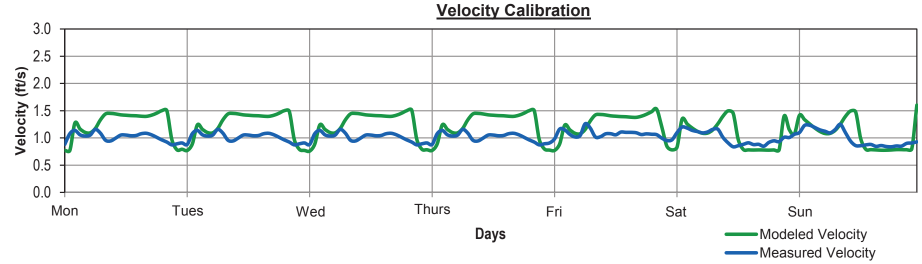
Day	Measured Data[1] Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Peak Flow (%)	Avg. Level (%)	Avg. Vel. (%)
Mon.	0.72	1.02	12.1	1.02	0.73	0.93	10.19	1.25	0.9%	-9.1%	-15.7%	22.8%
Tues.	0.72	1.02	12.1	1.02	0.73	0.93	10.19	1.25	0.9%	-9.1%	-15.7%	22.8%
Wed.	0.72	1.02	12.1	1.02	0.73	0.93	10.19	1.25	0.9%	-9.1%	-15.7%	22.8%
Thur.	0.72	1.02	12.1	1.02	0.73	0.93	10.19	1.25	0.9%	-9.1%	-15.7%	22.8%
Fri.	0.69	0.87	10.2	1.07	0.71	0.93	9.53	1.25	2.7%	6.9%	-6.3%	16.6%
Sat.	0.75	1.04	14.1	1.01	0.78	1.60	14.86	1.06	3.3%	54.5%	5.8%	5.6%
Sun.	0.78	1.05	16.7	0.99	0.75	1.06	15.14	1.07	-4.0%	0.2%	-9.4%	7.6%
Summary												
Weekday	0.71	--	11.7	1.03	0.72	--	10.1	1.25	1.2%	--	*-14.1%*	*21.5%*
Weekend	0.77	--	15.4	1.00	0.76	--	15.0	1.07	-0.4%	--	*-2.5%*	*6.6%*
ADWF[4]	0.73	--	12.8	1.02	0.73	--	11.5	1.20	0.7%	--	*-10.1%*	*17.3%*

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

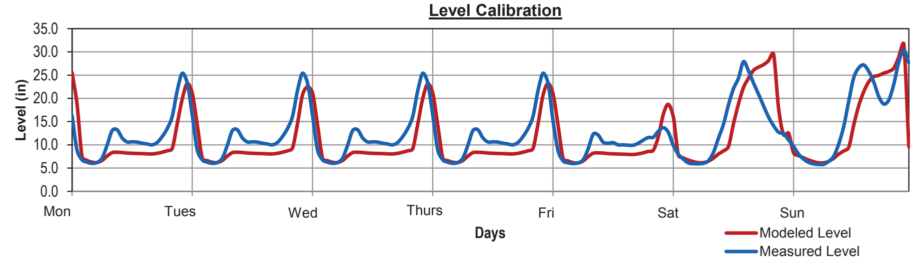
Flow Calibration



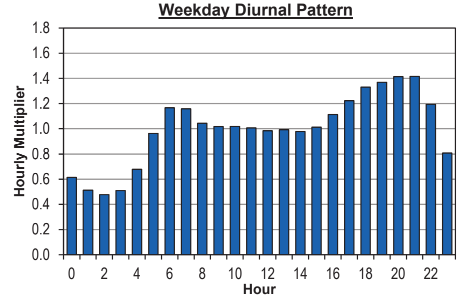
Velocity Calibration



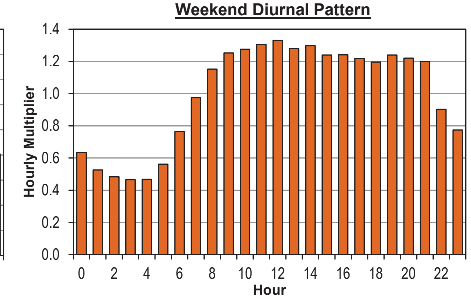
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern



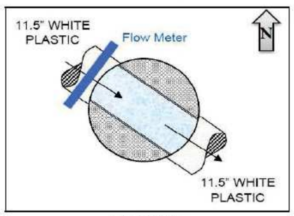
FLOW MONITORING L-06 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

Location: Grass area at Carmel Dr & San Simeon Dr
Pipeline diameter: 11.5"

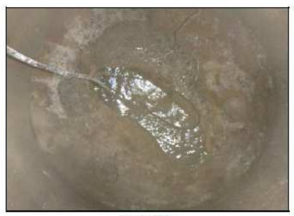
Site Photo

Satellite Map


Street View



Flow Sketch

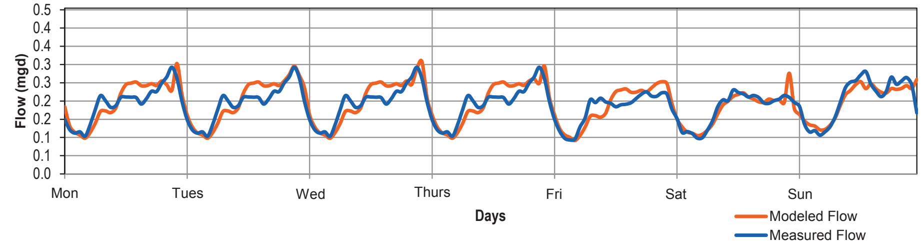

Plan View

Model Calibration Summary

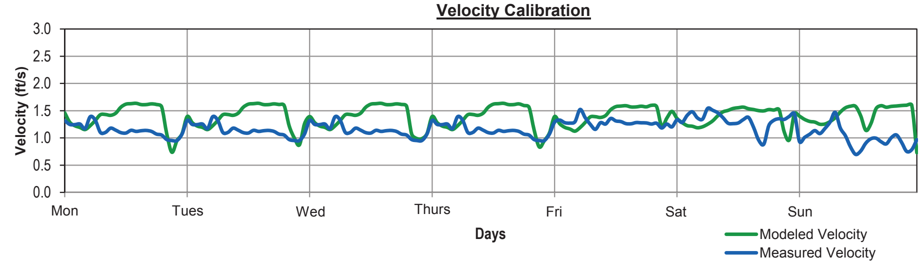
Day	Measured Data[1] Avg. Flow (mgd)	Measured Data[1] Peak Flow[2] (mgd)	Measured Data[1] Avg. Level (in)	Measured Data[1] Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Modeled Data Peak Flow[2] (mgd)	Modeled Data Avg. Level (in)	Modeled Data Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Percent Error[3] Peak Flow (%)	Percent Error[3] Avg. Level (%)	Percent Error[3] Avg. Vel. (%)
Mon.	0.21	0.32	5.7	1.14	0.22	0.34	4.75	1.38	2.8%	5.3%	-17.0%	20.9%
Tues.	0.21	0.32	5.7	1.14	0.22	0.34	4.75	1.38	2.8%	5.3%	-17.0%	20.9%
Wed.	0.21	0.32	5.7	1.14	0.22	0.34	4.75	1.38	2.8%	5.3%	-17.0%	20.9%
Thur.	0.21	0.32	5.7	1.14	0.22	0.34	4.75	1.38	2.8%	5.3%	-17.0%	20.9%
Fri.	0.20	0.25	5.5	1.28	0.20	0.28	4.22	1.42	3.3%	12.2%	-22.6%	10.3%
Sat.	0.20	0.25	5.1	1.32	0.20	0.30	4.24	1.38	-0.4%	20.0%	-16.3%	4.6%
Sun.	0.22	0.31	6.0	0.99	0.22	0.29	4.69	1.41	-1.6%	-7.7%	-21.6%	42.0%
Summary												
Weekday	0.21	--	5.7	1.17	0.22	--	4.6	1.39	2.9%	--	*-18.0%*	*18.6%*
Weekend	0.21	--	5.5	1.16	0.21	--	4.5	1.40	-1.0%	--	*-19.1%*	*20.6%*
ADWF[4]	0.21	--	5.6	1.17	0.21	--	4.6	1.39	1.8%	--	*-18.3%*	*19.1%*

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

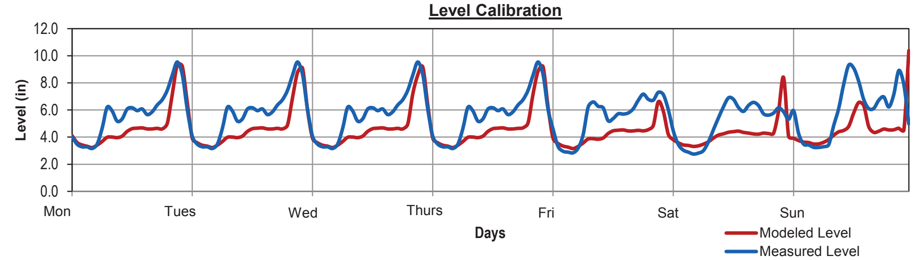
Flow Calibration



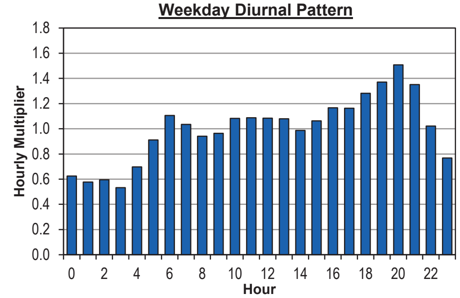
Velocity Calibration



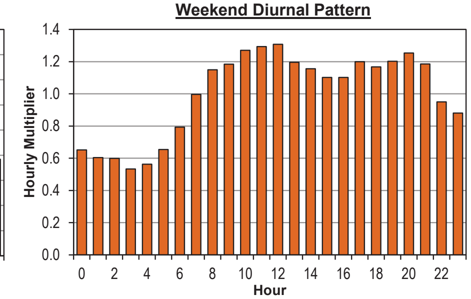
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern



FLOW MONITORING L-07 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

Location: Inside wet well at S 19th Avenue & Enterprise Dr
Pipeline diameter: PS"

Site Photo

Satellite Map


Street View

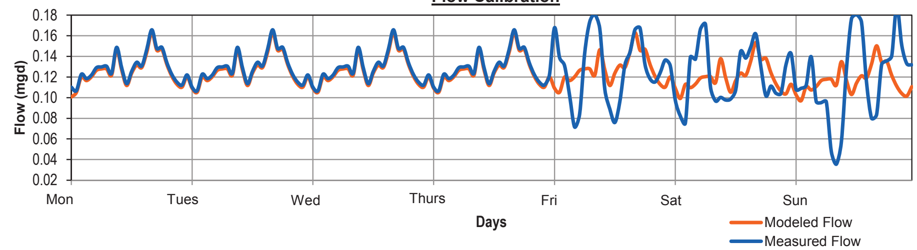

Plan View

Model Calibration Summary

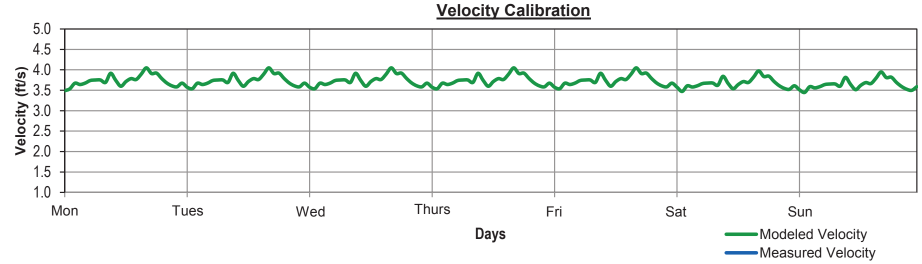
Day	Measured Data[1] Avg. Flow (mgd)	Measured Data[1] Peak Flow[2] (mgd)	Measured Data[1] Avg. Level (in)	Measured Data[1] Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Modeled Data Peak Flow[2] (mgd)	Modeled Data Avg. Level (in)	Modeled Data Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Percent Error[3] Peak Flow (%)	Percent Error[3] Avg. Level (%)	Percent Error[3] Avg. Vel. (%)
Mon.	0.13	0.17	0.0	0.00	0.13	0.16	1.31	3.74	-1.6%	-1.6%	#DIV/0!	#DIV/0!
Tues.	0.13	0.17	0.0	0.00	0.13	0.16	1.31	3.74	-1.6%	-1.6%	#DIV/0!	#DIV/0!
Wed.	0.13	0.17	0.0	0.00	0.13	0.16	1.31	3.74	-1.6%	-1.6%	#DIV/0!	#DIV/0!
Thur.	0.13	0.17	0.0	0.00	0.13	0.16	1.31	3.74	-1.6%	-1.6%	#DIV/0!	#DIV/0!
Fri.	0.13	0.18	0.0	0.00	0.13	0.16	1.31	3.74	-1.8%	-9.7%	#DIV/0!	#DIV/0!
Sat.	0.12	0.17	0.0	0.00	0.12	0.15	1.27	3.67	-1.1%	-10.3%	#DIV/0!	#DIV/0!
Sun.	0.12	0.19	0.0	0.00	0.12	0.15	1.26	3.64	-1.4%	-20.3%	#DIV/0!	#DIV/0!
Summary												
Weekday	0.13	--	0.0	0.00	0.13	--	1.3	3.74	-1.7%	--	#DIV/0!	#DIV/0!
Weekend	0.12	--	0.0	0.00	0.12	--	1.3	3.66	-1.3%	--	#DIV/0!	#DIV/0!
ADWF[4]	0.13	--	0.0	0.00	0.12	--	1.3	3.71	-1.6%	--	#DIV/0!	#DIV/0!

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

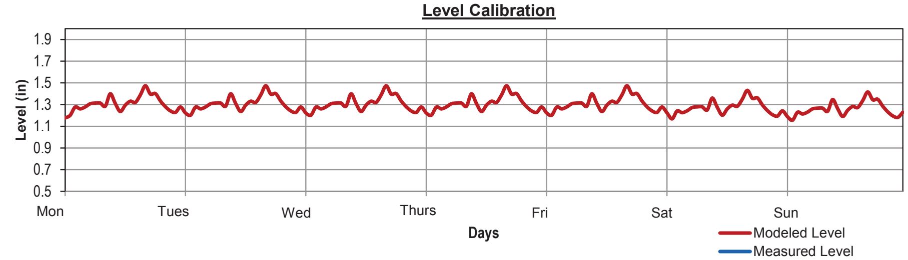
Flow Calibration



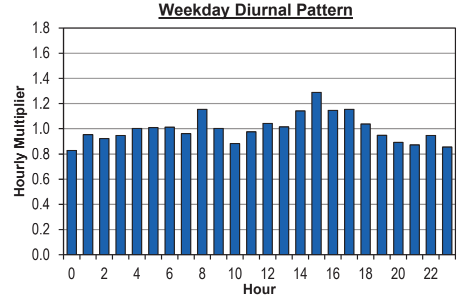
Velocity Calibration



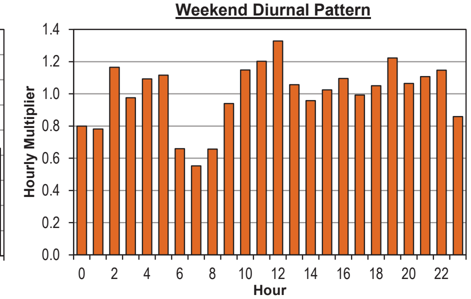
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern

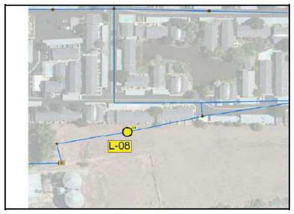


FLOW MONITORING L-08 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

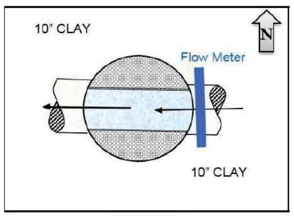
Location: Infield behind 700 N Lemoore Avenue
Pipeline diameter: 10"

Site Photo

Street View



Sewer Map



Flow Sketch

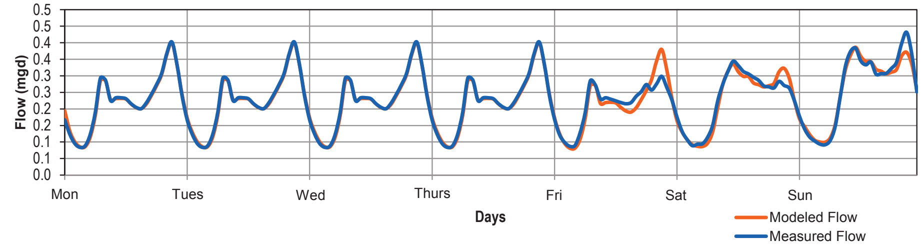
Plan View

Model Calibration Summary

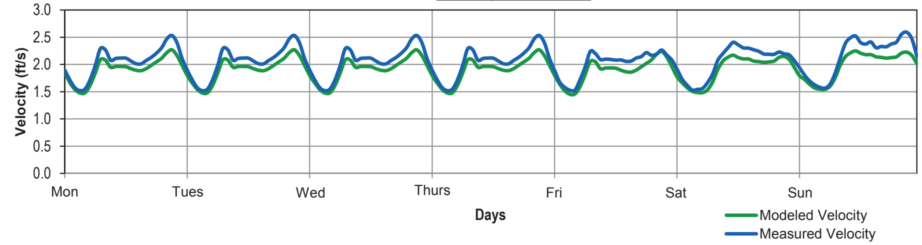
Day	Measured Data[1] Avg. Flow (mgd)	Measured Data[1] Peak Flow[2] (mgd)	Measured Data[1] Avg. Level (in)	Measured Data[1] Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Modeled Data Peak Flow[2] (mgd)	Modeled Data Avg. Level (in)	Modeled Data Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Percent Error[3] Peak Flow (%)	Percent Error[3] Avg. Level (%)	Percent Error[3] Avg. Vel. (%)
Mon.	0.22	0.40	3.4	2.05	0.22	0.40	3.56	1.91	-0.4%	-0.6%	5.5%	-7.0%
Tues.	0.22	0.40	3.4	2.05	0.22	0.40	3.56	1.91	-0.4%	-0.6%	5.5%	-7.0%
Wed.	0.22	0.40	3.4	2.05	0.22	0.40	3.56	1.91	-0.4%	-0.6%	5.5%	-7.0%
Thur.	0.22	0.40	3.4	2.05	0.22	0.40	3.56	1.91	-0.4%	-0.6%	5.5%	-7.0%
Fri.	0.21	0.30	3.3	2.01	0.21	0.38	3.47	1.88	-0.1%	27.2%	4.3%	-6.3%
Sat.	0.23	0.34	3.4	2.05	0.23	0.34	3.58	1.91	-0.6%	-2.4%	4.5%	-6.5%
Sun.	0.26	0.43	3.6	2.16	0.26	0.39	3.86	1.98	-1.4%	-10.5%	6.5%	-8.3%
Summary												
Weekday	0.22	--	3.4	2.04	0.22	--	3.5	1.90	-0.4%	--	5.3%	-6.8%
Weekend	0.25	--	3.5	2.10	0.24	--	3.7	1.95	-1.1%	--	5.5%	-7.5%
ADWF[4]	0.23	--	3.4	2.06	0.23	--	3.6	1.92	-0.6%	--	5.4%	-7.0%

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

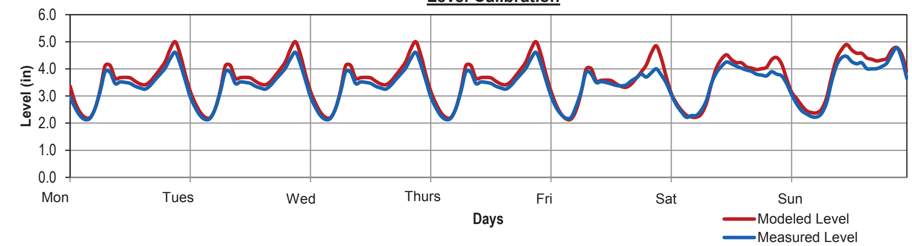
Flow Calibration



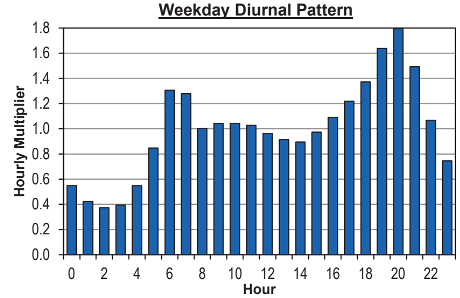
Velocity Calibration



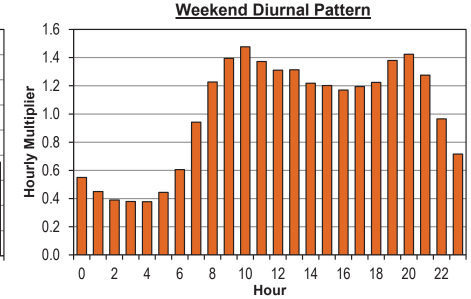
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern

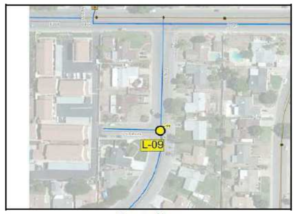


FLOW MONITORING L-09 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

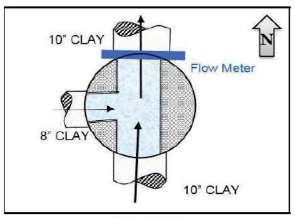
Location: Linda Ln and Sycamore Ln
Pipeline diameter: 10"

Site Photo


Street View



Sewer Map



Flow Sketch

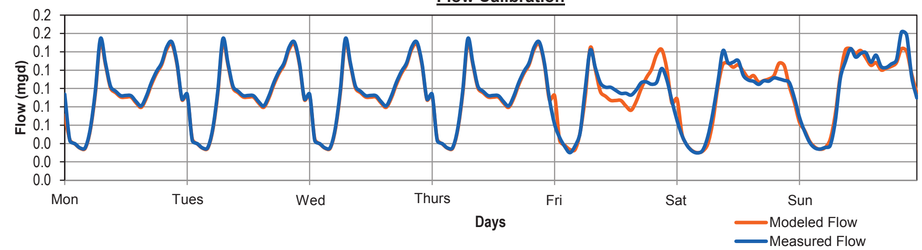

Plan View

Model Calibration Summary

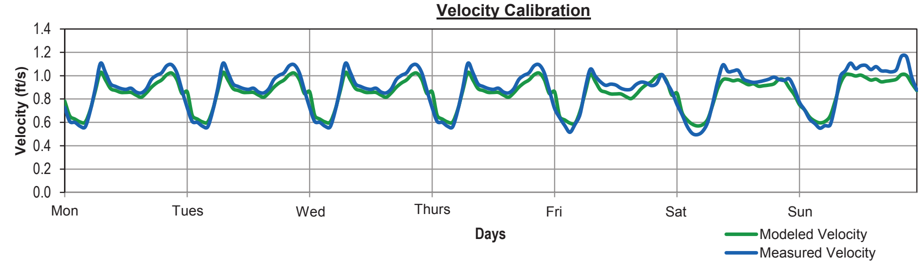
Day	Measured Data[1] Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Peak Flow (%)	Avg. Level (%)	Avg. Vel. (%)
Mon.	0.10	0.15	3.3	0.87	0.09	0.15	3.39	0.85	-2.0%	-2.4%	2.2%	-2.7%
Tues.	0.10	0.15	3.3	0.87	0.09	0.15	3.39	0.85	-2.0%	-2.4%	2.2%	-2.7%
Wed.	0.10	0.15	3.3	0.87	0.09	0.15	3.39	0.85	-2.0%	-2.4%	2.2%	-2.7%
Thur.	0.10	0.15	3.3	0.87	0.09	0.15	3.39	0.85	-2.0%	-2.4%	2.2%	-2.7%
Fri.	0.09	0.14	3.3	0.85	0.09	0.14	3.34	0.84	0.1%	1.9%	1.3%	-1.8%
Sat.	0.09	0.14	3.3	0.86	0.09	0.13	3.35	0.84	1.0%	-9.5%	2.1%	-2.0%
Sun.	0.10	0.16	3.4	0.92	0.10	0.14	3.51	0.87	-0.8%	-11.2%	3.9%	-5.2%
Summary												
Weekday	0.09	--	3.3	0.87	0.09	--	3.4	0.85	-1.6%	--	2.0%	-2.6%
Weekend	0.10	--	3.3	0.89	0.10	--	3.4	0.85	0.1%	--	3.0%	-3.7%
ADWF[4]	0.09	--	3.3	0.87	0.09	--	3.4	0.85	-1.1%	--	2.3%	-2.9%

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

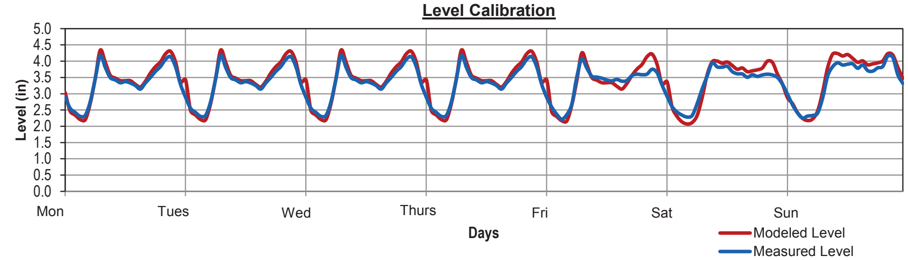
Flow Calibration



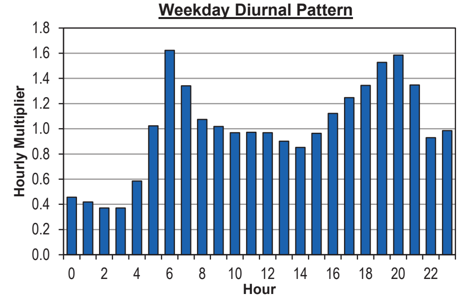
Velocity Calibration



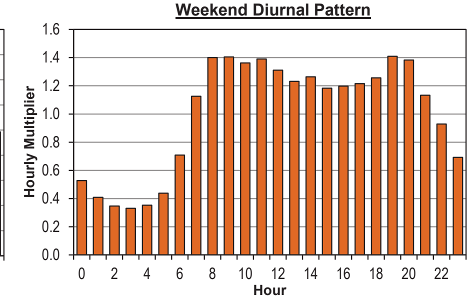
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern

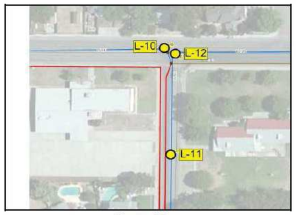


FLOW MONITORING L-10 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

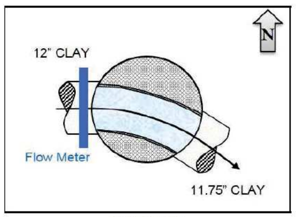
Location: W Bush St and Vine St
Pipeline diameter: 12"

Site Photo


Street View



Sewer Map



Flow Sketch

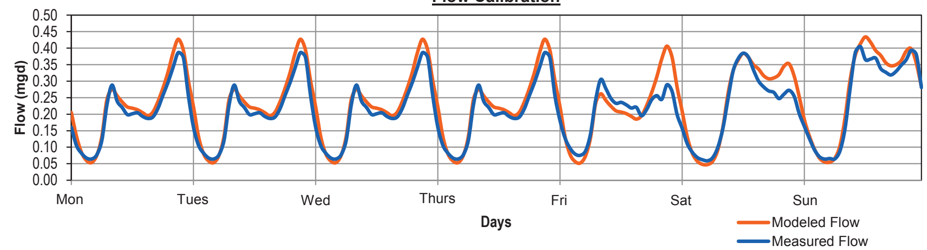

Plan View

Model Calibration Summary

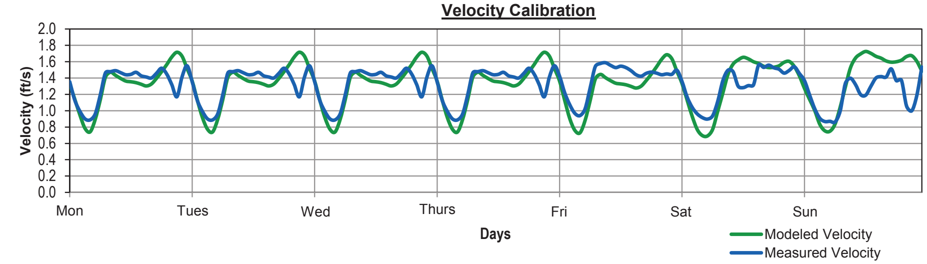
Day	Measured Data[1] Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Peak Flow (%)	Avg. Level (%)	Avg. Vel. (%)
Mon.	0.21	0.39	4.1	1.32	0.22	0.43	4.21	1.32	8.5%	10.5%	3.4%	-0.4%
Tues.	0.21	0.39	4.1	1.32	0.22	0.43	4.21	1.32	8.5%	10.5%	3.4%	-0.4%
Wed.	0.21	0.39	4.1	1.32	0.22	0.43	4.21	1.32	8.5%	10.5%	3.4%	-0.4%
Thur.	0.21	0.39	4.1	1.32	0.22	0.43	4.21	1.32	8.5%	10.5%	3.4%	-0.4%
Fri.	0.20	0.30	3.9	1.39	0.21	0.41	4.12	1.30	4.4%	33.1%	6.2%	-6.7%
Sat.	0.22	0.38	4.2	1.31	0.24	0.38	4.33	1.33	10.4%	0.0%	3.2%	1.2%
Sun.	0.26	0.40	5.1	1.21	0.27	0.43	4.57	1.39	5.9%	7.2%	-10.6%	14.7%
Summary												
Weekday	0.21	--	4.0	1.34	0.22	--	4.2	1.32	7.7%	--	3.9%	-1.7%
Weekend	0.24	--	4.7	1.26	0.26	--	4.4	1.36	8.0%	--	-4.4%	7.7%
ADWF[4]	0.22	--	4.2	1.32	0.23	--	4.3	1.33	7.8%	--	1.3%	0.9%

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

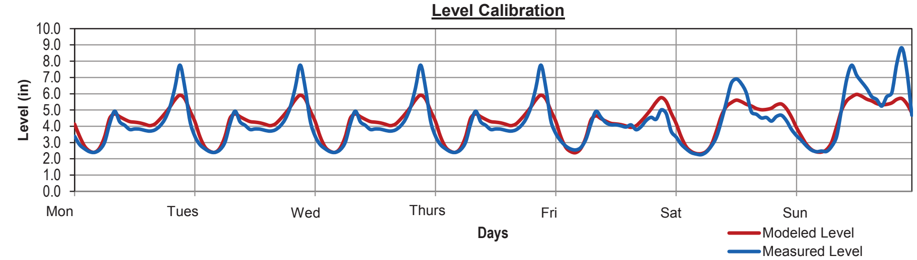
Flow Calibration



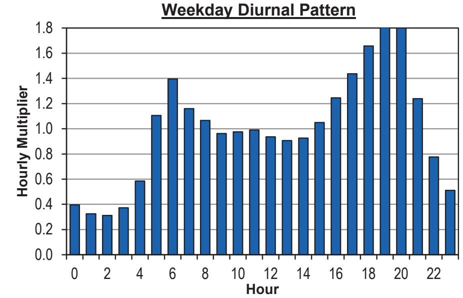
Velocity Calibration



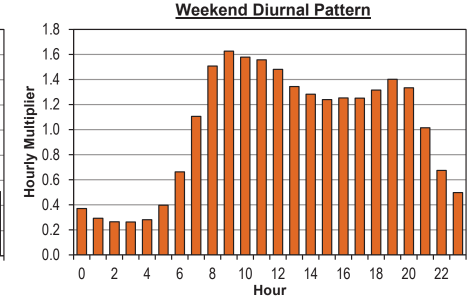
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern

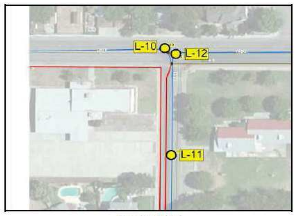


FLOW MONITORING L-11 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

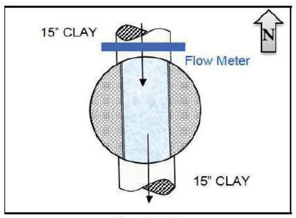
Location: Vine St south of Bush St
Pipeline diameter: 15"

Site Photo


Street View



Sewer Map



Flow Sketch

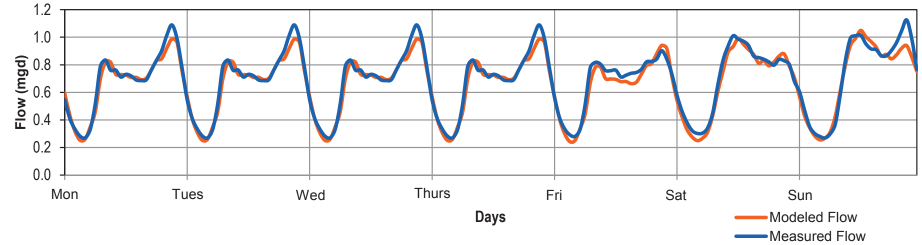

Plan View

Model Calibration Summary

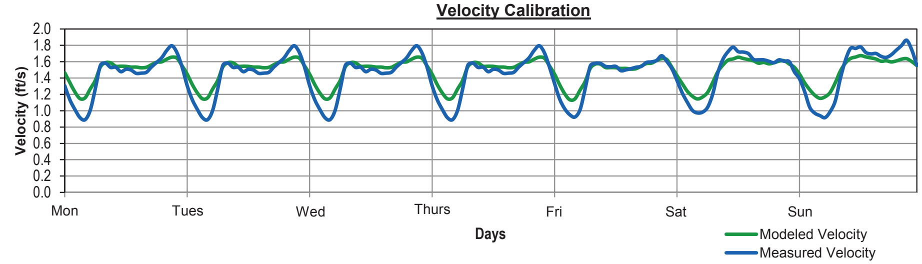
Day	Measured Data[1] Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Peak Flow (%)	Avg. Level (%)	Avg. Vel. (%)
Mon.	0.68	1.09	8.7	1.42	0.67	0.99	8.32	1.48	-2.6%	-9.3%	-4.0%	4.3%
Tues.	0.68	1.09	8.7	1.42	0.67	0.99	8.32	1.48	-2.6%	-9.3%	-4.0%	4.3%
Wed.	0.68	1.09	8.7	1.42	0.67	0.99	8.32	1.48	-2.6%	-9.3%	-4.0%	4.3%
Thur.	0.68	1.09	8.7	1.42	0.67	0.99	8.32	1.48	-2.6%	-9.3%	-4.0%	4.3%
Fri.	0.67	0.90	8.5	1.42	0.64	0.94	8.11	1.47	-4.4%	4.2%	-5.0%	3.3%
Sat.	0.70	1.01	8.6	1.46	0.68	0.99	8.38	1.48	-3.4%	-1.9%	-3.0%	1.5%
Sun.	0.74	1.13	8.8	1.49	0.71	1.05	8.66	1.50	-3.3%	-6.8%	-1.3%	0.6%
Summary												
Weekday	0.68	--	8.6	1.42	0.66	--	8.3	1.48	-2.9%	--	-4.2%	4.1%
Weekend	0.72	--	8.7	1.47	0.69	--	8.5	1.49	-3.3%	--	-2.2%	1.1%
ADWF[4]	0.69	--	8.7	1.44	0.67	--	8.3	1.48	-3.0%	--	-3.6%	3.2%

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

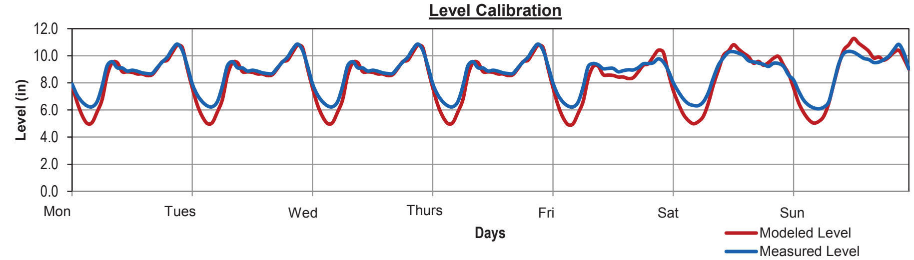
Flow Calibration



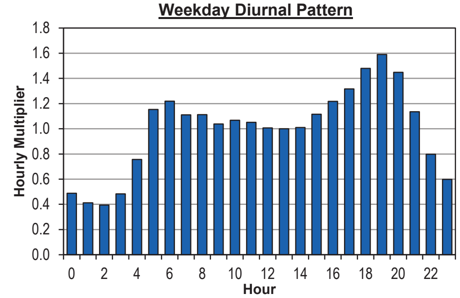
Velocity Calibration



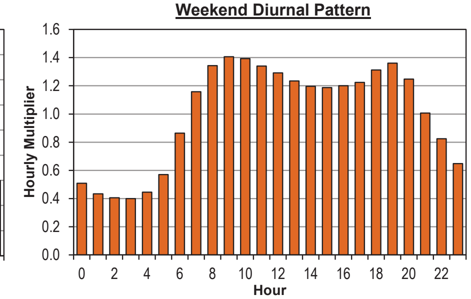
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern



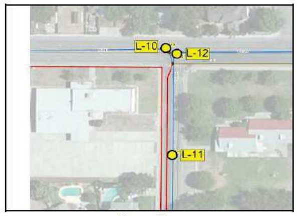
FLOW MONITORING L-12 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

carollo

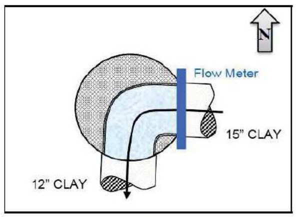
Location: W Bush St and Vine St
Pipeline diameter: 15"

Site Photo

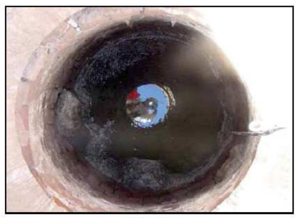

Street View



Sewer Map



Flow Sketch

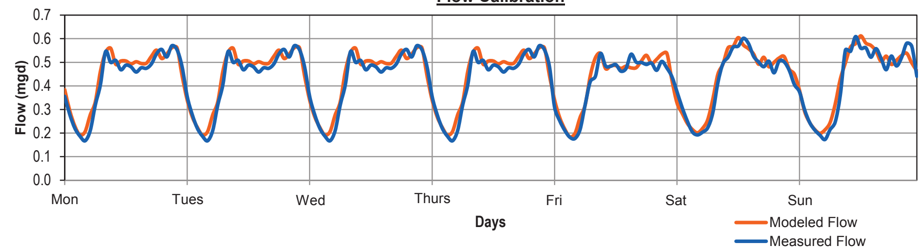

Plan View

Model Calibration Summary

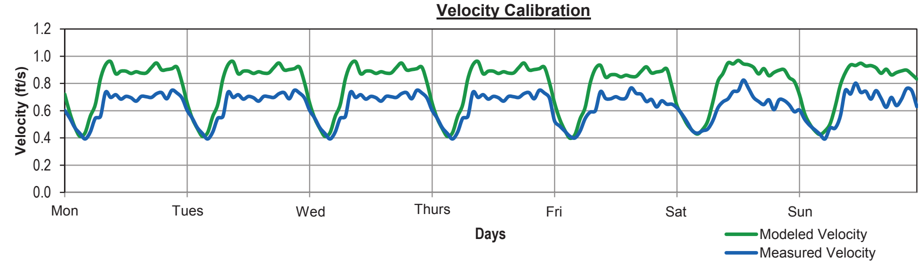
Day	Measured Data[1] Avg. Flow (mgd)	Measured Data[1] Peak Flow[2] (mgd)	Measured Data[1] Avg. Level (in)	Measured Data[1] Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Modeled Data Peak Flow[2] (mgd)	Modeled Data Avg. Level (in)	Modeled Data Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Percent Error[3] Peak Flow (%)	Percent Error[3] Avg. Level (%)	Percent Error[3] Avg. Vel. (%)
Mon.	0.43	0.57	12.7	0.64	0.44	0.56	9.09	0.79	3.5%	-1.4%	-28.6%	23.7%
Tues.	0.43	0.57	12.7	0.64	0.44	0.56	9.09	0.79	3.5%	-1.4%	-28.6%	23.7%
Wed.	0.43	0.57	12.7	0.64	0.44	0.56	9.09	0.79	3.5%	-1.4%	-28.6%	23.7%
Thur.	0.43	0.57	12.7	0.64	0.44	0.56	9.09	0.79	3.5%	-1.4%	-28.6%	23.7%
Fri.	0.41	0.54	12.3	0.62	0.42	0.54	8.99	0.77	3.3%	0.2%	-26.8%	24.3%
Sat.	0.42	0.60	12.9	0.62	0.43	0.60	9.07	0.77	2.5%	0.5%	-29.8%	23.9%
Sun.	0.43	0.61	13.7	0.63	0.44	0.61	9.21	0.77	2.2%	0.5%	-32.8%	22.9%
Summary												
Weekday	0.42	--	12.6	0.63	0.44	--	9.1	0.79	3.4%	--	*-28.2%*	*23.8%*
Weekend	0.43	--	13.3	0.63	0.44	--	9.1	0.77	2.3%	--	*-31.4%*	*23.4%*
ADWF[4]	0.42	--	12.8	0.63	0.44	--	9.1	0.78	3.1%	--	*-29.2%*	*23.7%*

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

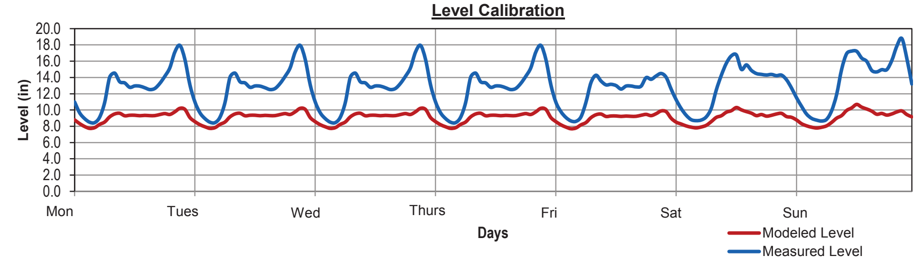
Flow Calibration



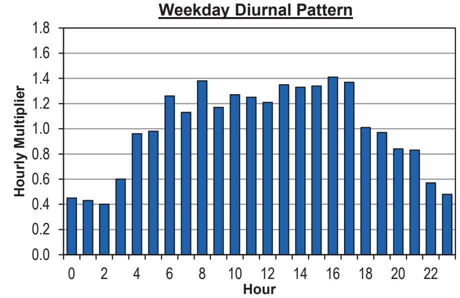
Velocity Calibration



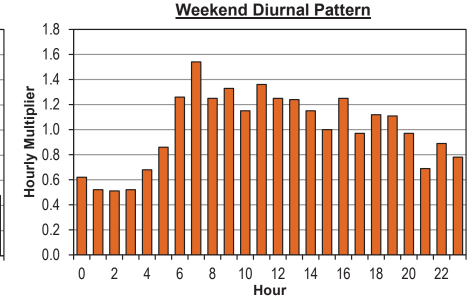
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern



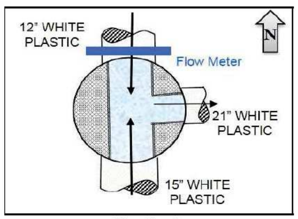
FLOW MONITORING L-13 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

Location: In front of pump station on College Avenue
Pipeline diameter: 12"

Site Photo

Satellite Map


Street View



Flow Sketch

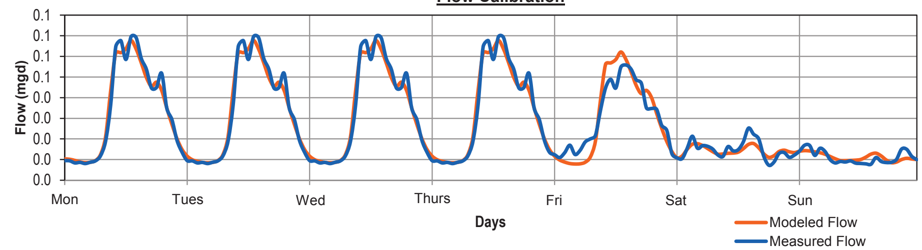

Plan View

Model Calibration Summary

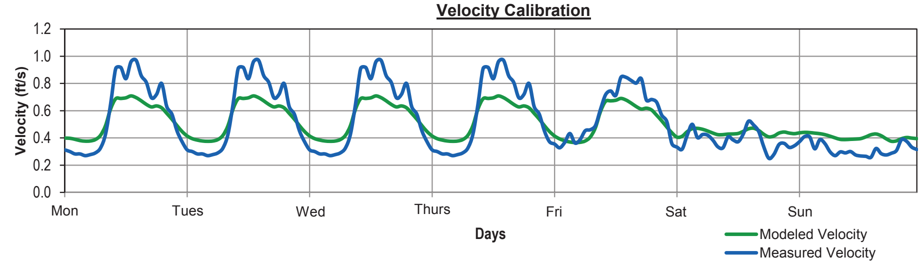
Day	Measured Data[1] Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Peak Flow (%)	Avg. Level (%)	Avg. Vel. (%)
Mon.	0.03	0.07	1.8	0.58	0.03	0.07	1.95	0.54	-1.1%	-2.6%	6.8%	-6.8%
Tues.	0.03	0.07	1.8	0.58	0.03	0.07	1.95	0.54	-1.1%	-2.6%	6.8%	-6.8%
Wed.	0.03	0.07	1.8	0.58	0.03	0.07	1.95	0.54	-1.1%	-2.6%	6.8%	-6.8%
Thur.	0.03	0.07	1.8	0.58	0.03	0.07	1.95	0.54	-1.1%	-2.6%	6.8%	-6.8%
Fri.	0.03	0.06	1.8	0.58	0.03	0.06	1.88	0.53	-0.4%	11.3%	4.9%	-9.8%
Sat.	0.01	0.03	1.5	0.38	0.01	0.02	1.37	0.44	-3.7%	-29.5%	-6.0%	14.8%
Sun.	0.01	0.02	1.4	0.32	0.01	0.01	1.23	0.41	1.2%	-15.4%	-12.3%	27.8%
Summary												
Weekday	0.03	--	1.8	0.58	0.03	--	1.9	0.54	-1.0%	--	6.4%	-7.4%
Weekend	0.01	--	1.4	0.35	0.01	--	1.3	0.42	-1.6%	--	-9.1%	*20.7%*
ADWF[4]	0.03	--	1.7	0.52	0.03	--	1.8	0.51	-1.1%	--	2.7%	-2.0%

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

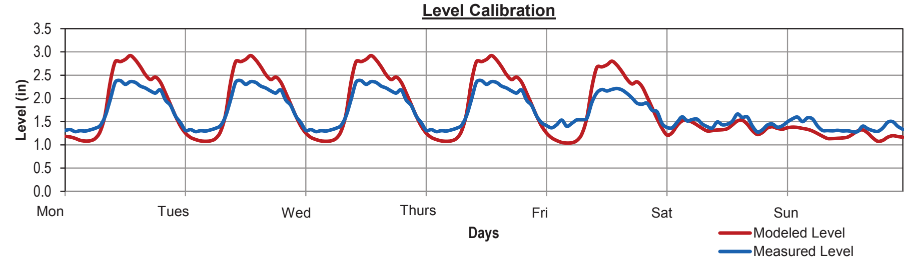
Flow Calibration



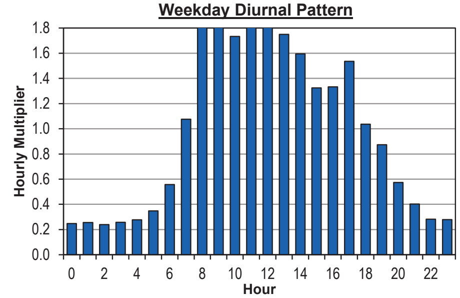
Velocity Calibration



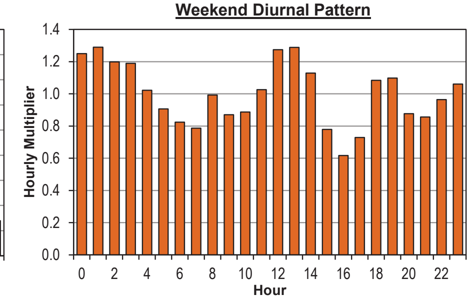
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern



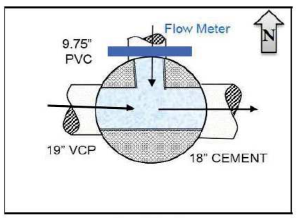
FLOW MONITORING L-14 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

Location: Inside pump station south of meter L-15
Pipeline diameter: 9.75"

Site Photo


Street View


Sewer Map



Flow Sketch

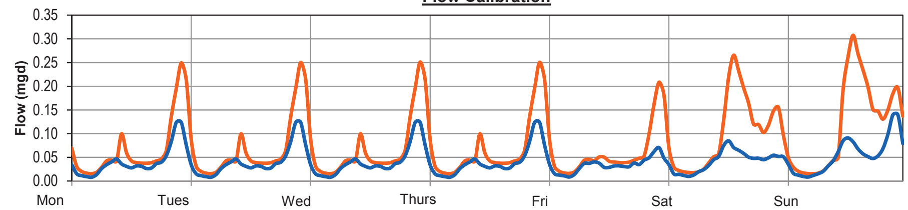

Plan View

Model Calibration Summary

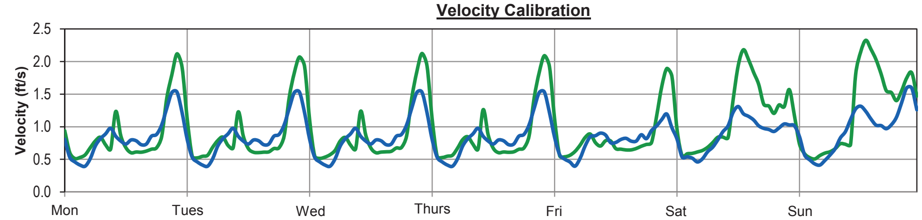
Day	Measured Data[1]				Modeled Data				Percent Error[3]			
	Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Avg. Flow (mgd)	Peak Flow[2] (mgd)	Avg. Level (in)	Avg. Vel. (ft/s)	Avg. Flow (%)	Peak Flow (%)	Avg. Level (%)	Avg. Vel. (%)
Mon.	0.04	0.12	1.8	0.84	0.07	0.25	2.41	0.90	66.8%	102.8%	35.2%	7.0%
Tues.	0.04	0.12	1.8	0.84	0.07	0.25	2.41	0.90	66.8%	102.8%	35.2%	7.0%
Wed.	0.04	0.12	1.8	0.84	0.07	0.25	2.41	0.90	66.8%	102.8%	35.2%	7.0%
Thur.	0.04	0.12	1.8	0.84	0.07	0.25	2.41	0.90	66.8%	102.8%	35.2%	7.0%
Fri.	0.03	0.07	1.7	0.80	0.06	0.21	2.32	0.87	80.2%	195.5%	36.9%	8.7%
Sat.	0.04	0.08	1.8	0.89	0.10	0.27	2.63	1.18	138.2%	213.2%	43.6%	32.1%
Sun.	0.06	0.14	2.0	0.97	0.12	0.31	2.71	1.26	116.4%	119.9%	37.2%	30.4%
Summary												
Weekday	0.04	--	1.8	0.83	0.07	--	2.4	0.89	*69.0%*	--	*35.5%*	*7.3%*
Weekend	0.05	--	1.9	0.93	0.11	--	2.7	1.22	*125.9%*	--	*40.2%*	*31.2%*
ADWF[4]	0.04	--	1.8	0.86	0.08	--	2.5	0.99	*87.8%*	--	*37.0%*	*14.7%*

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

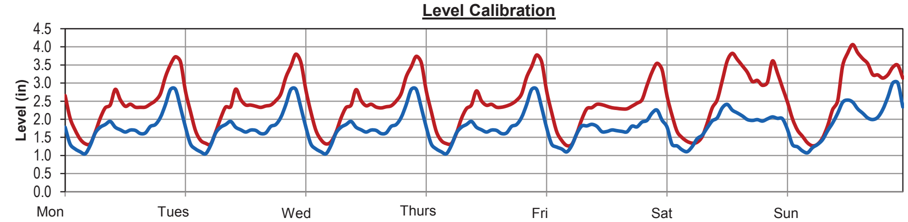
Flow Calibration



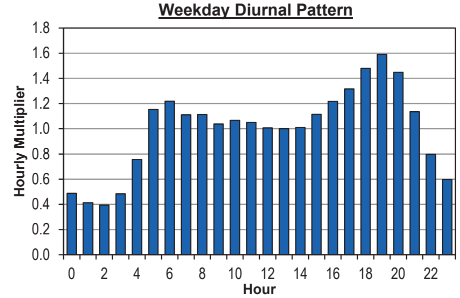
Velocity Calibration



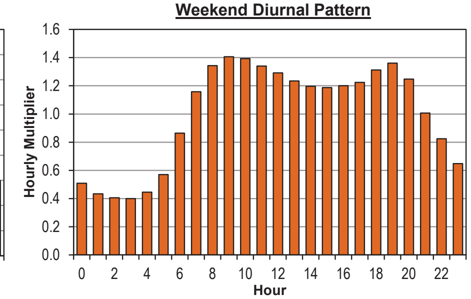
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern

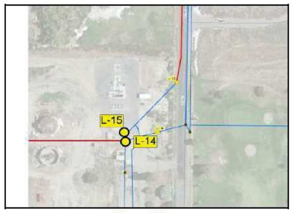


FLOW MONITORING L-15 DRY WEATHER FLOW CALIBRATION
City of Lemoore
Lemoore, CA

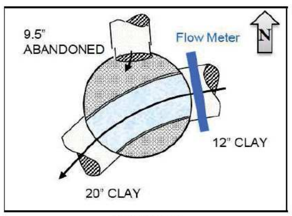
Location: Inside pump station off of 18 1/2 Avenue
Pipeline diameter: 12"

Site Photo

Street View



Sewer Map



Flow Sketch

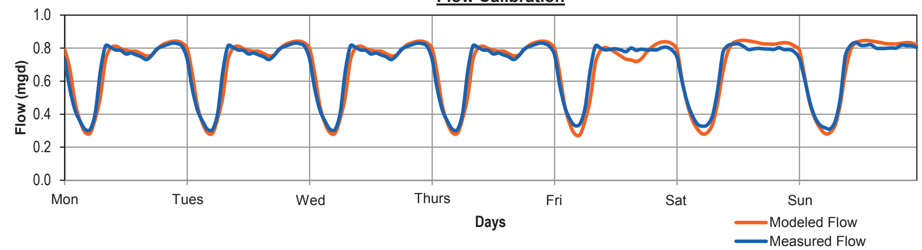
Plan View

Model Calibration Summary

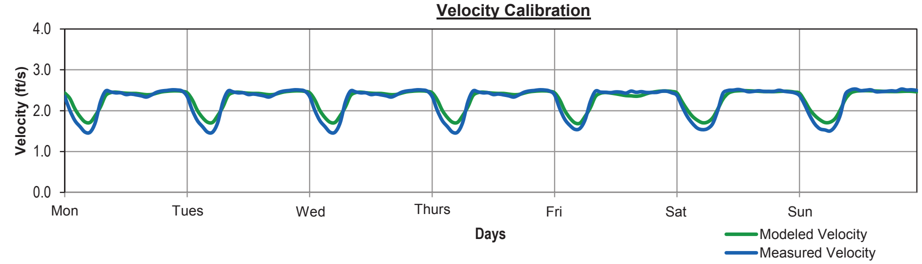
Day	Measured Data[1] Avg. Flow (mgd)	Measured Data[1] Peak Flow[2] (mgd)	Measured Data[1] Avg. Level (in)	Measured Data[1] Avg. Vel. (ft/s)	Modeled Data Avg. Flow (mgd)	Modeled Data Peak Flow[2] (mgd)	Modeled Data Avg. Level (in)	Modeled Data Avg. Vel. (ft/s)	Percent Error[3] Avg. Flow (%)	Percent Error[3] Peak Flow (%)	Percent Error[3] Avg. Level (%)	Percent Error[3] Avg. Vel. (%)
Mon.	0.68	0.83	6.8	2.23	0.68	0.84	6.73	2.29	0.4%	1.4%	-1.7%	2.5%
Tues.	0.68	0.83	6.8	2.23	0.68	0.84	6.73	2.29	0.4%	1.4%	-1.7%	2.5%
Wed.	0.68	0.83	6.8	2.23	0.68	0.84	6.73	2.29	0.4%	1.4%	-1.7%	2.5%
Thur.	0.68	0.83	6.8	2.23	0.68	0.84	6.73	2.29	0.4%	1.4%	-1.7%	2.5%
Fri.	0.69	0.81	6.9	2.26	0.67	0.84	6.65	2.27	-3.3%	3.1%	-3.4%	0.5%
Sat.	0.67	0.83	6.8	2.23	0.67	0.85	6.66	2.27	0.3%	2.6%	-1.6%	1.8%
Sun.	0.67	0.83	6.7	2.23	0.68	0.85	6.67	2.27	0.5%	1.4%	-1.2%	1.8%
Summary												
Weekday	0.68	--	6.9	2.24	0.68	--	6.7	2.29	-0.4%	--	-2.0%	2.1%
Weekend	0.67	--	6.8	2.23	0.67	--	6.7	2.27	0.4%	--	-1.4%	1.8%
ADWF[4]	0.68	--	6.8	2.24	0.68	--	6.7	2.28	-0.2%	--	-1.8%	2.0%

Notes:
1. Source: V&A Temporary Flow Monitoring Program
2. Peak flow is the hourly average hourly peak flow, which was derived based on the 15-minute flow data from V&A.
3. Percent Error = (Modeled - Measured) /Measured x 100
4. ADWF = (5xWeekday Average + 2xWeekend Average)/7

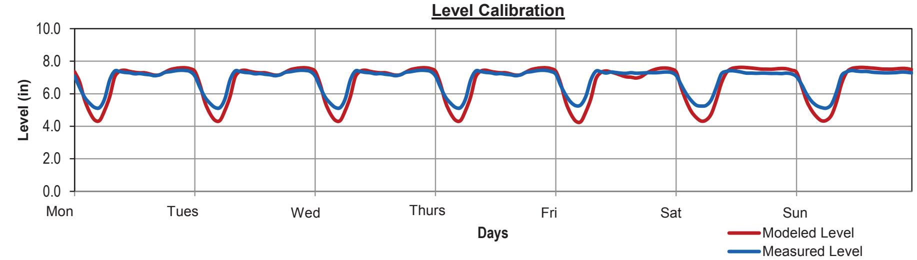
Flow Calibration



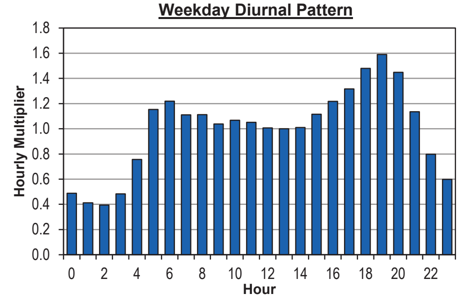
Velocity Calibration



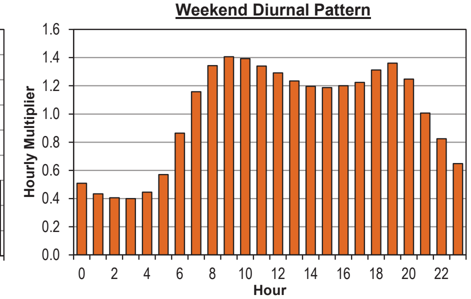
Level Calibration



Weekday Diurnal Pattern



Weekend Diurnal Pattern



WASTEWATER COLLECTION SYSTEM CAPITAL IMPROVEMENT PLAN SUMMARY

Project		Existing Size/Type	Proposed Size/Type	Proposed Amount	CIP Cost Estimate[1][2][3][4] ($)	Existing User Cost ($)	Future User Cost ($)	CIP Phasing ($)							
								Near-Term						Long-Term	Build-Out
								2019	2020	2021	2022	2023	2024-2028	2029-2040	2041 & beyond
Capacity Related Improvements					$ 48,299,000	$ 11,223,000	$ 37,076,000	$ 1,361,000	$ 356,000	$ 1,489,000	$ 4,134,000	$ 4,848,000	$ 2,504,000	$ 12,554,000	$ 21,053,000
Gravity Mains		Diameter (in)	Diameter (in)	Length (ft)	$ 12,921,000	$ 3,122,000	$ 9,799,000	$ 46,000	$ 356,000	$ 1,459,000	$ 487,000	$ 1,367,000	$ 133,000	$ 3,521,000	$ 5,552,000
WWGM-1A	19th Avenue Trunk	-	21	100	$ 46,000	$ 36,000	$ 10,000	$ 46,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
WWGM-1B	19th Avenue Trunk	-	18	1,000	$ 356,000	$ 317,000	$ 39,000	$ -	$ 356,000	$ -	$ -	$ -	$ -	$ -	$ -
WWGM-2A	Vine Street Trunk	12	21	3,200	$ 1,459,000	$ 1,167,000	$ 292,000	$ -	$ -	$ 1,459,000	$ -	$ -	$ -	$ -	$ -
WWGM-2B	Vine Street Trunk Pipe Casing	12	21/42	400	$ 487,000	$ 390,000	$ 97,000	$ -	$ -	$ -	$ 487,000	$ -	$ -	$ -	$ -
WWGM-2C	Vine Street Trunk	12/15	21	3,000	$ 1,367,000	$ 1,094,000	$ 273,000	$ -	$ -	$ -	$ -	$ 1,367,000	$ -	$ -	$ -
WWGM-3	Central Bush Street Sewer	12	15	400	$ 133,000	$ 118,000	$ 15,000	$ -	$ -	$ -	$ -	$ -	$ 133,000	$ -	$ -
WWGM-4A	East Bush Street Sewer	15	18	300	$ 108,000	$ -	$ 108,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 108,000	$ -
WWGM-4B	East Bush Street Sewer	8	15	2,500	$ 829,000	$ -	$ 829,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 829,000	$ -
WWGM-4C	East Bush Street Sewer	8	12	2,100	$ 645,000	$ -	$ 645,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 645,000	$ -
WWGM-5	19th Street Main	18	24	1,300	$ 646,000	$ -	$ 646,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 646,000	$ -
WWGM-6	Lemoore Avenue Main	10	12	3,000	$ 973,000	$ -	$ 973,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 973,000	$ -
WWGM-7	Millan Drive Sewer	10	12	500	$ 154,000	$ -	$ 154,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 154,000	$ -
WWGM-8	Bell Haven Drive Sewer	8	15	500	$ 166,000	$ -	$ 166,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 166,000	$ -
WWGM-9	19th Street Main	18	24	2,000	$ 995,000	$ -	$ 995,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 995,000
WWGM-10	San Simeon Main	12	18	2,300	$ 820,000	$ -	$ 820,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 820,000
WWGM-11	Park Street Main	12	18	200	$ 71,000	$ -	$ 71,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 71,000
WWGM-12	South 19th Street Sewer	10	21	1,200	$ 547,000	$ -	$ 547,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 547,000
WWGM-13	Cinnamon Drive Main	18	24	1,300	$ 646,000	$ -	$ 646,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 646,000
WWGM-14	Liberty Drive Main	12	18	3,400	$ 1,212,000	$ -	$ 1,212,000		$ -	$ -	$ -	$ -	$ -	$ -	$ 1,212,000
WWGM-15	Milan Drive Sewer	10	12	1,300	$ 399,000	$ -	$ 399,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 399,000
WWGM-16	College Avenue Sewer	12	15	1,000	$ 332,000	$ -	$ 332,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 332,000
WWGM-17	Spring Lane Sewer	10	15	1,600	$ 530,000	$ -	$ 530,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 530,000
Lift Stations		Capacity (mgd)	Capacity (mgd)		$ 34,749,000	$ 8,056,000	$ 26,693,000	$ 1,300,000	$ -	$ -	$ 3,647,000	$ 3,481,000	$ 2,371,000	$ 9,033,000	$ 14,917,000
WWLS-1A	Carmel Lift Station	-	1.9	N/A	$ 1,300,000	$ 1,014,000	$ 286,000	$ 1,300,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
WWLS-1B	Carmel Lift Station	-	10.9	N/A	$ 9,033,000	$ -	$ 9,033,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,232,000	$ 5,801,000
WWLS-2A	Thomas Lift Station	1.44	4.4	N/A	$ 3,647,000	$ 1,905,000	$ 1,742,000	$ -	$ -	$ -	$ 3,647,000	$ -	$ -	$ -	$ -
WWLS-2B	Thomas Lift Station	-	4	N/A	$ 3,315,000	$ -	$ 3,315,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,315,000
WWLS-3	Bush Willow Lift Station	1.22	4.2	N/A	$ 3,481,000	$ 3,063,000	$ 418,000	$ -	$ -	$ -	$ -	$ 3,481,000	$ -	$ -	$ -
WWLS-4	Avalon Lift Station	0.66	1.1	N/A	$ 912,000	$ 848,000	$ 64,000	$ -	$ -	$ -	$ -	$ -	$ 912,000	$ -	$ -
WWLS-5	Grainery Lift Station	1.2	1.76	N/A	$ 1,459,000	$ 1,226,000	$ 233,000	$ -	$ -	$ -	$ -	$ -	$ 1,459,000	$ -	$ -
WWLS-6	Cimarron Lift Station	0.72	4.6	N/A	$ 3,812,000	$ -	$ 3,812,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,812,000	$ -
WWLS-7	Elk Meadows Lift Station	0.72	2.4	N/A	$ 1,989,000	$ -	$ 1,989,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,989,000	$ -
WWLS-9	Olam (SK) Lift Station	1	7	N/A	$ 5,801,000	$ -	$ 5,801,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,801,000
Force Main		Diameter (in)	Diameter (in)	Length (ft)	$ 629,000	$ 45,000	$ 584,000	$ 15,000	$ -	$ 30,000	$ -	$ -	$ -	$ -	$ 584,000
WWFM-1	Carmel Lift Station Force Main	-	10/12	50	$ 32,000	$ 15,000	$ 17,000	$ 15,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 17,000
WWFM-2	Thomas Lift Station Force Main	8	10/10	100	$ 60,000	$ 30,000	$ 30,000	$ -	$ -	$ 30,000	$ -	$ -	$ -	$ -	$ 30,000
WWFM-4	Cimarron Lift Station Force Main	8	12/24	500	$ 411,000	$ -	$ 411,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 411,000
WWFM-5	Olam (SK) Lift Station Force Main	8	12	400	$ 126,000	$ -	$ 126,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 126,000

City of Lemoore
Integrated Master Plans

WASTEWATER COLLECTION SYSTEM CAPITAL IMPROVEMENT PLAN SUMMARY

Project	Existing Size/Type	Proposed Size/Type	Proposed Amount	CIP Cost Estimate(1)(2)(3)(4) ($)	Existing User Cost ($)	Future User Cost ($)	CIP Phasing ($)							
							Near-Term						Long-Term	Build-Out
							2019	2020	2021	2022	2023	2024-2028	2029-2040	2041 & beyond
New Service Related Improvements				$ 26,245,000	$ -	$ 26,245,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 804,000	$ 25,441,000
Gravity Mains	Diameter (in)	Diameter (in)	Length (ft)	$ 14,164,000	$ -	$ 14,164,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 14,164,000
WWGM-18 17th Avenue Main	-	8	5,600	$ 1,578,000	$ -	$ 1,578,000	$ -	$ -		$ -	$ -	$ -	$ -	$ 1,578,000
WWGM-19 Houston Avenue Sewer	-	8	5,100	$ 1,437,000	$ -	$ 1,437,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,437,000
WWGM-20A 18th Avenue Sewer	-	10	3,400	$ 986,000	$ -	$ 986,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 986,000
WWGM-20B 18th Avenue Sewer	-	8	1,700	$ 479,000	$ -	$ 479,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 479,000
WWGM-20C 18th Avenue Sewer	-	8	1,000	$ 282,000	$ -	$ 282,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 282,000
WWGM-21 Vine Street Sewer Sewer	-	15	3,500	$ 1,160,000	$ -	$ 1,160,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,160,000
WWGM-22 South 19th Avenue Main	-	21	2,700	$ 1,232,000	$ -	$ 1,232,000	$ -	$ -		$ -	$ -	$ -	$ -	$ 1,232,000
WWGM-23A Idaho Avenue Main	-	15	2,600	$ 862,000	$ -	$ 862,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 862,000
WWGM-23B Idaho Avenue Main	-	12	4,100	$ 1,258,000	$ -	$ 1,258,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,258,000
WWGM-24 Iona Avenue Main	-	12	7,100	$ 2,178,000	$ -	$ 2,178,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,178,000
WWGM-25 Idaho Jackson Annexation East	-	10	3,700	$ 1,074,000	$ -	$ 1,074,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,074,000
WWGM-26 Idaho Jackson Annexation West	-	12	3,500	$ 1,074,000	$ -	$ 1,074,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,074,000
WWGM-27 North Liberty Drive Main	-	15	1,700	$ 564,000	$ -	$ 564,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 564,000
Lift Stations	Capacity (mgd)	Capacity (mgd)		$ 8,288,000	$ -	$ 8,288,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 663,000	$ 7,625,000
WWLS-8 Glendale Lift Station	-	0.8	N/A	$ 663,000	$ -	$ 663,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 663,000	$ -
WWLS-10 Hanford Armona Lift Station	-	0.2	N/A	$ 166,000	$ -	$ 166,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 166,000
WWLS-11 D Street Lift Station	-	0.6	N/A	$ 497,000	$ -	$ 497,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 497,000
WWLS-12 18th Avenue Lift Station	-	1	N/A	$ 829,000	$ -	$ 829,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 829,000
WWLS-13 South 18th Avenue Lift Station	-	0.5	N/A	$ 414,000	$ -	$ 414,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 414,000
WWLS-14 Idaho Avenue Lift Station	-	2	N/A	$ 1,658,000	$ -	$ 1,658,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,658,000
WWLS-15 South Vine Street Lift Station	-	1.7	N/A	$ 1,409,000	$ -	$ 1,409,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,409,000
WWLS-16 South 19th Avenue Lift Station	-	1.5	N/A	$ 1,243,000	$ -	$ 1,243,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,243,000
WWLS-17 Liberty Drive Lift Station	-	1.7	N/A	$ 1,409,000	$ -	$ 1,409,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,409,000
Force Main	Diameter (in)	Diameter (in)	Length (ft)	$ 3,793,000	$ -	$ 3,793,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 141,000	$ 3,652,000
WWFM-3 Glendale Avenue Lift Station Force Main		6	500	$ 141,000	$ -	$ 141,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 141,000	$ -
WWFM-6 Hanford Armona Lift Station Force Main		6	1,300	$ 366,000	$ -	$ 366,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 366,000
WWFM-7 D Street Lift Station Force Main		6	1,000	$ 282,000	$ -	$ 282,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 282,000
WWFM-8 18th Avenue Lift Station Force Main		6	900	$ 254,000	$ -	$ 254,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 254,000
WWFM-9 South 18th Avenue Lift Station Force Main		6	300	$ 85,000	$ -	$ 85,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 85,000
WWFM-10 Idaho Avenue Lift Station Force Main		8/24	2,700	$ 1,031,000	$ -	$ 1,031,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,031,000
WWFM-11 South Vine Street Lift Station Force Main		6	2,700	$ 761,000	$ -	$ 761,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 761,000
WWFM-12 South 19th Avenue Lift Station Force Main		6	1,700	$ 479,000	$ -	$ 479,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 479,000
WWFM-13 Liberty Drive Lift Station Force Main		6	1,400	$ 394,000	$ -	$ 394,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 394,000
Rehabilitation and Replacement Projects				$ 2,200,000	$ 1,000,000	$ 1,200,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 500,000	$ 1,200,000	$ -
Gravity Mains	Diameter (in)	Diameter (in)	Length (ft)	$ 2,200,000	$ 1,000,000	$ 1,200,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 500,000	$ 1,200,000	$ -
WWRR-1 Annual Sewer Line Replacement Program	--	--	--	$ 2,200,000	$ 1,000,000	$ 1,200,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 500,000	$ 1,200,000	$ -
Other Projects				$ 52,437,000	$ 42,984,000	$ 9,453,000	$ -	$ -	$ -	$ -	$ 150,000	$ 5,207,000	$ 46,093,000	$ 987,000
WWO-1 Sewer Master Plan Update	--	--	--	$ 600,000	$ 300,000	$ 300,000	$ -	$ -	$ -	$ -	$ 150,000	$ 150,000	$ 300,000	$ -
WWO-2 Septic Removal	-	8	4,500	$ 1,269,000	$ 1,269,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 282,000	$ 987,000
WWO-3 WWTF	0	0	0	$ 50,568,000	$ 41,415,000	$ 9,153,000	$ -	$ -	$ -	$ -	$ -	$ 5,057,000	$ 45,511,000	$ -
CIP Total				**$ 129,181,000**	**$ 55,207,000**	**$ 73,974,000**	**$ 1,461,000**	**$ 456,000**	**$ 1,589,000**	**$ 4,234,000**	**$ 5,098,000**	**$ 8,211,000**	**$ 60,651,000**	**$ 47,481,000**
Annual Cost				**N/A**	**N/A**	**N/A**	**$ 1,461,000**	**$ 456,000**	**$ 1,589,000**	**$ 4,234,000**	**$ 5,098,000**	**$ 1,642,000**	**$ 5,054,000**	**N/A**

Notes:

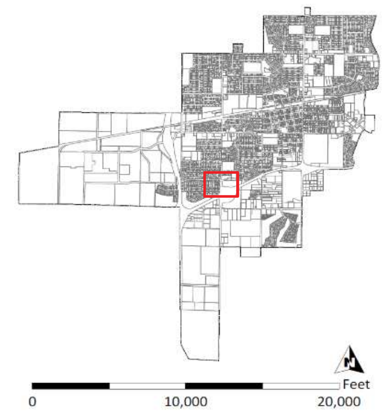
(1) ENR 20 City Average Construction Cost Index for February 2018 is 10,889.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

(4) Total Mark-Up is 65.8% of the baseline construction costs.

Project Number:	WWGM-1A
Project Name:	19th Avenue Trunk
System Type:	Wastewater Collection System



Project Description:

The Viera and Carmel lift stations will be abandoned along with associated force mains. This project will convey flows from the intersection of 19th Avenue and Silverado Drive to a proposed lift station located at Milan Drive and San Simeon. A segment of pipeline will require 100 feet of 21-inch gravity main to convey flows from the north (Viera Basin) and the West Hills College area (Carmel Basin).

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	21	New	100	$ 275	$ 28,000	$ 36,000	$ 46,000	2019

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

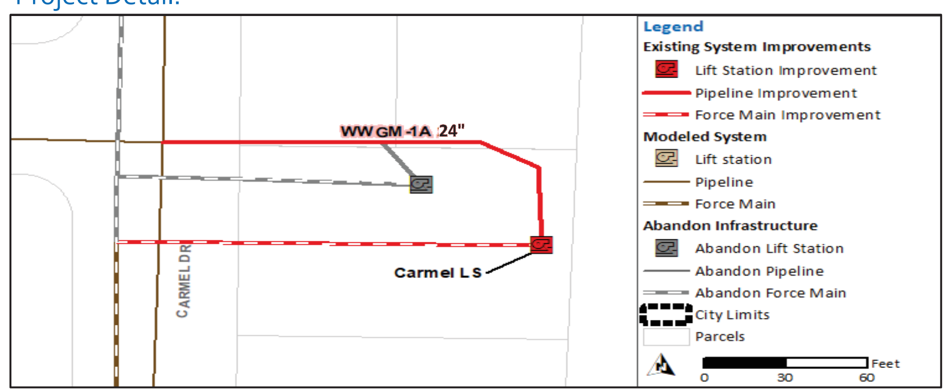
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	78%	$ 36,000
Future Users	22%	$ 10,000
Total	100%	$ 46,000

Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

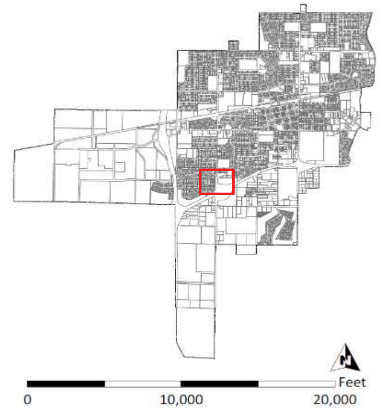
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-1B
Project Name:	19th Avenue Trunk
System Type:	Wastewater Collection System



Project Description:

The Viera and Carmel lift stations will be abandoned along with associated force mains. This project will convey flows from the intersection of 19th Avenue and Silverado Drive to a proposed lift station located at Milan Drive to San Simeon. The 18-inch sewer will extend 1,000 feet from the existing system at the intersection of 19th Avenue and Silverado Drive and continue south on Milan Drive to San Simeon. This segment will convey flows from the Viera sub basin.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost[1] ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Gravity Main	-	18	New	1,000	$ 215	$ 215,000	$ 280,000	$ 356,000	2020

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

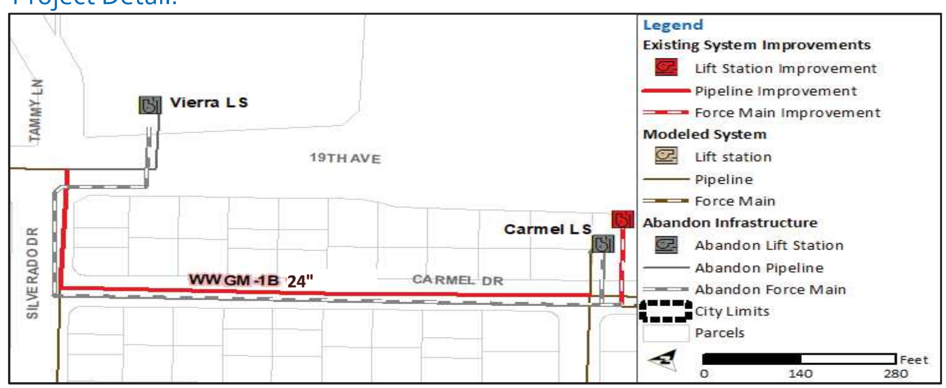
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	89%	$ 317,000
Future Users	11%	$ 39,000
Total	100%	$ 356,000

Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

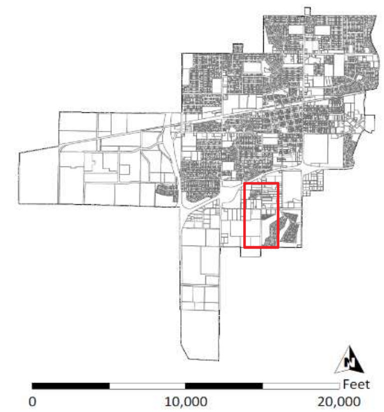
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-2A
Project Name:	Vine Street Trunk
System Type:	Wastewater Collection System



Project Description:

This segment is located south of Highway 198 and extends to the WWTP. Under existing PWWF, the 12-inch diameter pipeline surcharges. To mitigate the capacity deficiency, this project replaces 3,200 feet of the existing main with a 21-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	12	21	Replace	3,200	$ 275	$ 880,000	$ 1,144,000	$ 1,459,000	2021

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

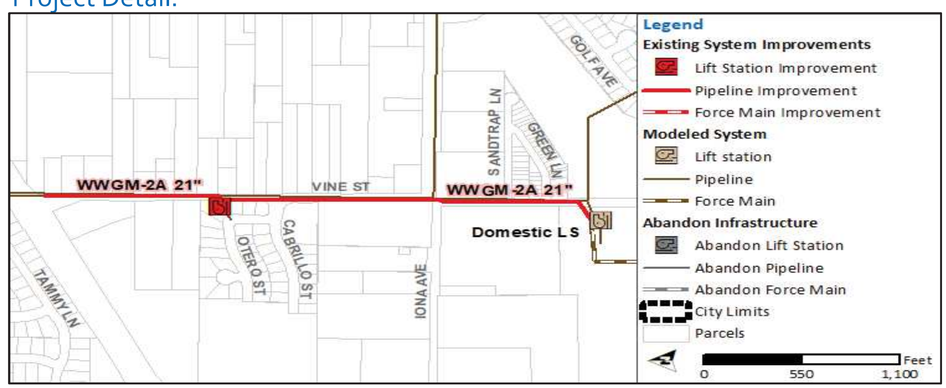
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	80%	$ 1,167,000
Future Users	20%	$ 292,000
Total	100%	$ 1,459,000

Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

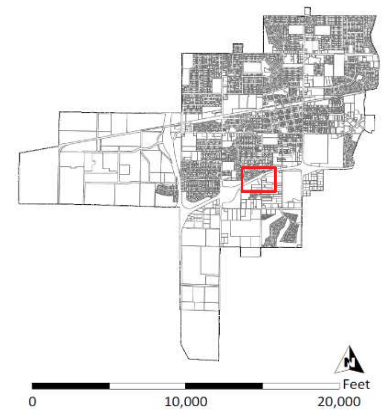
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-2B
Project Name:	Vine Street Trunk Pipe Casing
System Type:	Wastewater Collection System



Project Description:

A segment of the project extends under Highway 198 and requires a steel encasement. This project replaces 400 feet of the existing main with a 21/42inch diameter gravity pipeline and encasement.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main and Interstate Crossing	12	21/42	New	400	$ 735	$ 294,000	$ 382,000	$ 487,000	2022

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

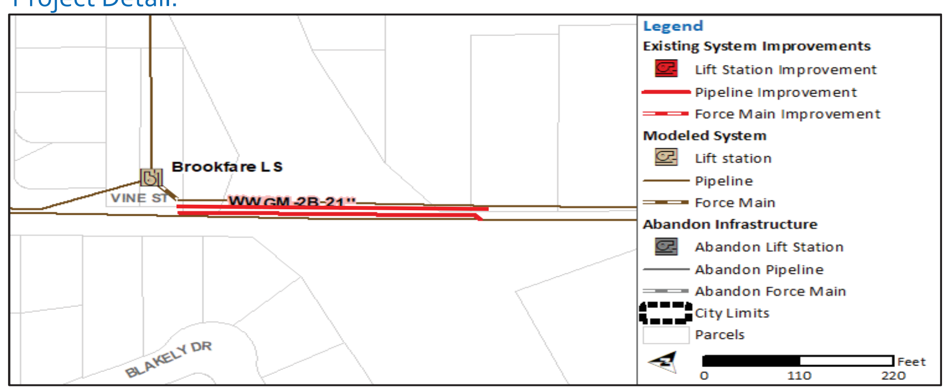
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	80%	$ 390,000
Future Users	20%	$ 97,000
Total	100%	$ 487,000

Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

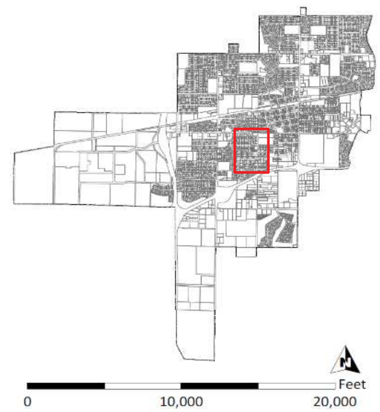
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-2C
Project Name:	Vine Street Trunk
System Type:	Wastewater Collection System



Project Description:

This project extends from Bush Street to the north of Highway 198. Under existing PWWF, the 15-inch and 12-inch diameter pipelines surcharge. To mitigate the capacity deficiency, this project replaces 3,000 feet of the existing main with a 21-inch diameter pipeline. In addition, the project abandons the parallel overflow pipeline and connects the Brookfare Lift Station to the proposed 21-inch pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost[1] ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Gravity Main	12/15	21	Replace	3,000	$ 275	$ 825,000	$ 1,073,000	$ 1,367,000	2023

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

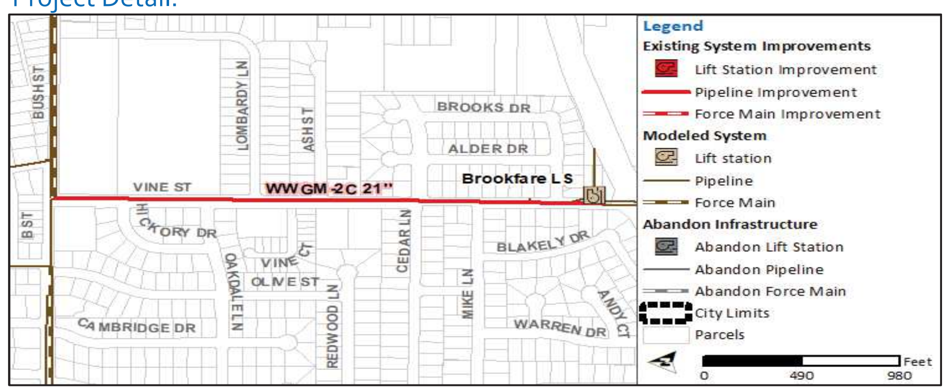
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	80%	$ 1,094,000
Future Users	20%	$ 273,000
Total	100%	$ 1,367,000

Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

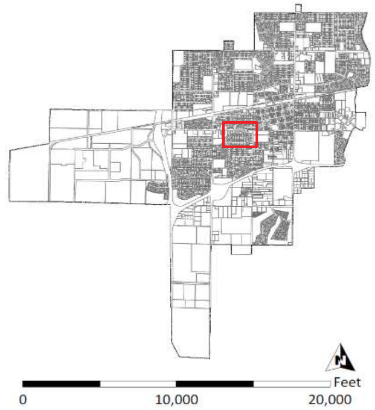
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-3
Project Name:	Central Bush Street Sewer
System Type:	Wastewater Collection System



Project Description:

This project consists of replacing the existing 12-inch diameter sewer in Bush Street from Olive Street to Vine Street with a 15-inch pipeline. Approximately 400 feet of replacement pipeline is recommended.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	12	15	Replace	400	$ 200	$ 80,000	$ 104,000	$ 133,000	2024

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

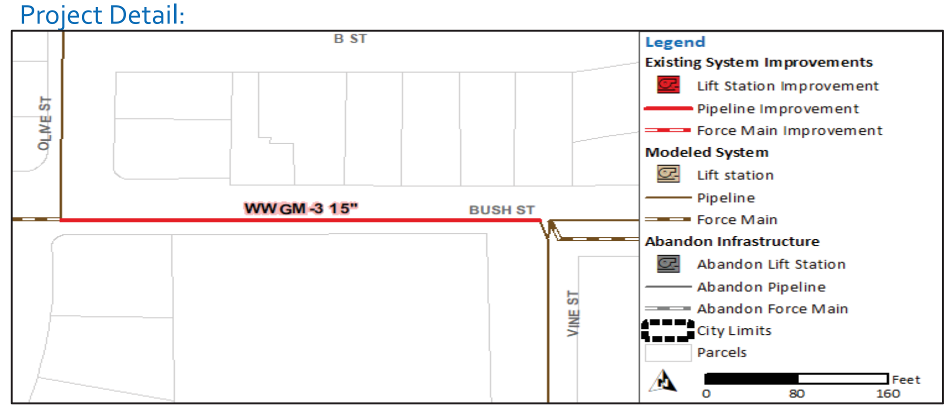
(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	89%	$ 118,000
Future Users	11%	$ 15,000
Total	100%	$ 133,000

Project Detail:



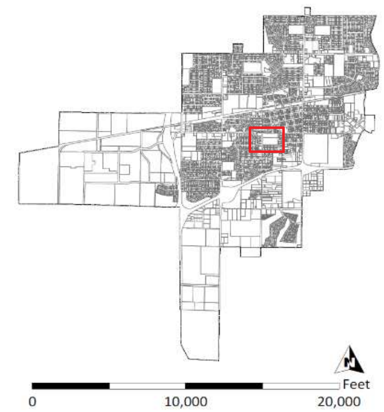
Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

City of LEMOORE CALIFORNIA

carollo

Project Number: WWGM-4A
Project Name: East Bush Street Sewer
System Type: Wastewater Collection System



Project Description:

The project will replace approximately 300 feet of 15-inch diameter pipeline in Vine Street and Bush Street. Improvement Plans show this segment of pipeline has an inverse slope. To mitigate capacity deficiencies under 2040 PWWF, it is recommended that the existing 15-inch pipeline be replaced with an 18-inch diameter and the slope of the pipeline adjusted.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	15	18	Replace	300	$ 215	$ 65,000	$ 85,000	$ 108,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

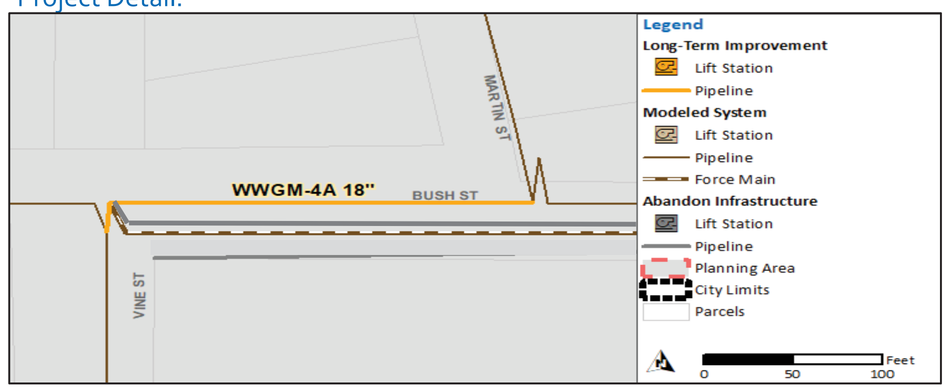
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 108,000
Total	100%	$ 108,000

Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

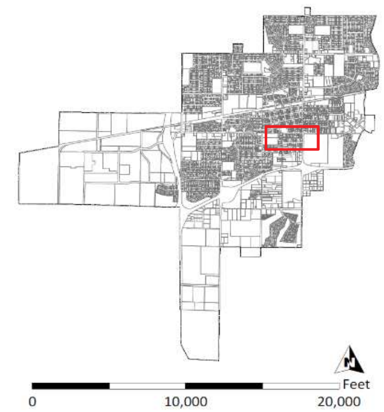
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-4B
Project Name:	East Bush Street Sewer
System Type:	Wastewater Collection System



Project Description:

This project will replace approximately 2,500 feet of 8-inch diameter pipeline in Bush Street and extends From Lemoore Street to Martin Street. In addition, the project recommends abandoning the 8-inch diameter force main running parallel in Bush Street. The High School Lift Station would convey flows into the upsized gravity main. To mitigate deficiencies identified under the 2040 PWWF scenario, it is recommended that the existing pipeline be replaced with a 15-inch diameter pipeline, which is sized to convey flows from the original tributary and flows from the High School Lift Station.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost[1] ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Gravity Main	8	15	Replace	2,500	$ 200	$ 500,000	$ 650,000	$ 829,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

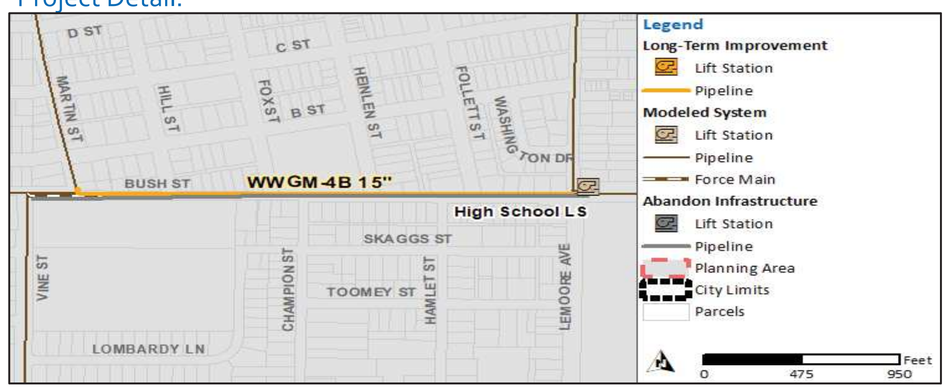
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 829,000
Total	100%	$ 829,000

Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

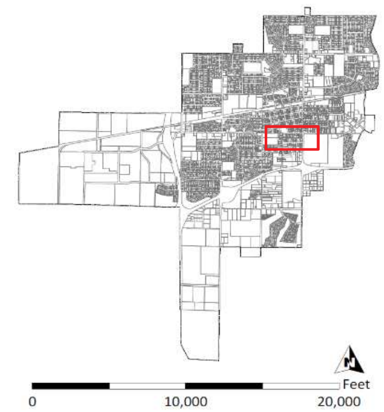
Project Detail:



LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-4C
Project Name:	East Bush Street Sewer
System Type:	Wastewater Collection System



Project Description:

This project will replace approximately 2,100 feet of 8-inch diameter pipeline in Bush Street and extends From West of Barcelona Street to Lemoore Street. To mitigate deficiencies identified under 2040 PWWF, it is recommended to replace the existing pipelines with a 12-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	8	12	Replace	2,100	$ 185	$ 389,000	$ 506,000	$ 645,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

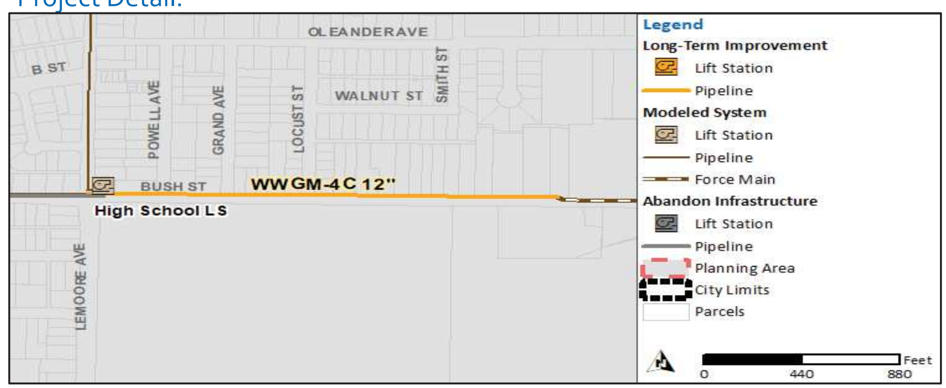
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 645,000
Total	100%	$ 645,000

Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

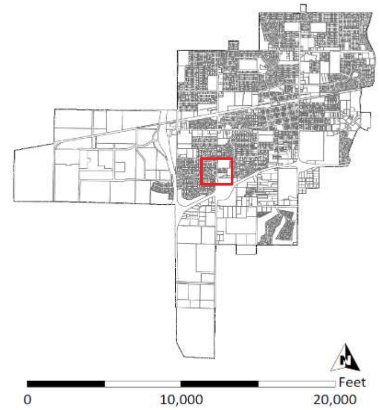
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-5
Project Name:	19th Street Main
System Type:	Wastewater Collection System



Project Description:

The project will replace 1,300 feet of 18-inch diameter pipeline in 19th Avenue, from Cedar Lane to Silverado Drive. To mitigate deficiencies identified under 2040 PWWF, it is recommended that the existing pipeline be replaced with a 24-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	18	24	Replace	1,300	$ 300	$ 390,000	$ 507,000	$ 646,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 646,000
Total	100%	$ 646,000

Notes on Cost Estimation:

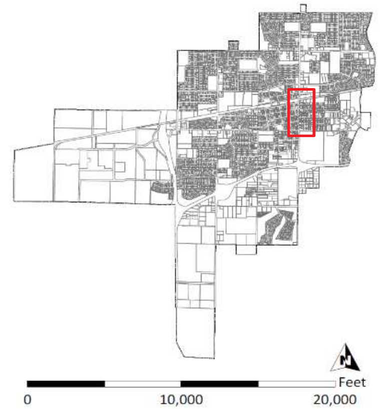
This project is a future improvement and the cost has been assigned to future users.

Project Detail:

City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-6
Project Name:	Lemoore Avenue Main
System Type:	Wastewater Collection System



Project Description:

This project will replace 3,000 feet of 10-inch diameter pipeline in Lemoore Avenue and extends from The Grainery Lift Station to the High School Lift Station. To mitigate deficiencies under 2040 PWWF, it is recommend that the existing pipeline be replaced with a 12-inch diameter pipeline. This project will require 100 feet of steal casing under railroad crossing

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	10	12	Replace	2,900	$ 185	$ 537,000	$ 698,000	$ 890,000	2029-2040
Gravity Main and Interstate Crossing	10	12/24	Replace	100	$ 495	$ 50,000	$ 65,000	$ 83,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

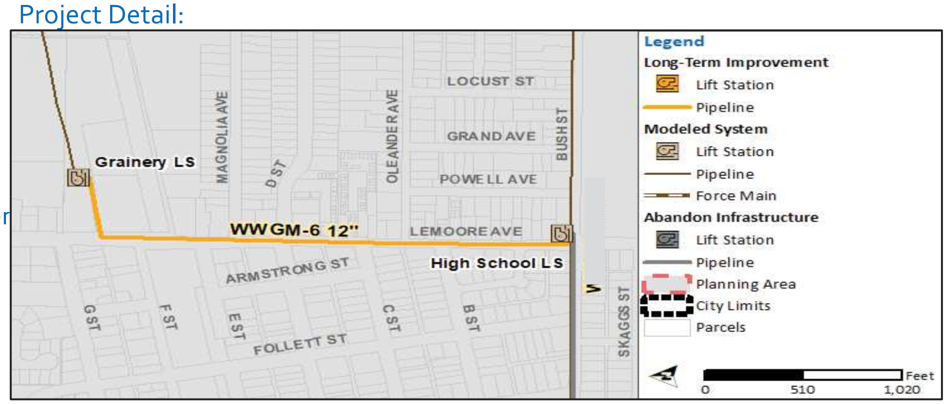
(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 973,000
Total	100%	$ 973,000

This project is a future improvement and the cost has been assigned to future user

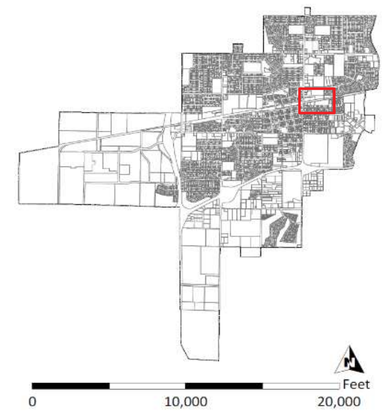
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number: WWGM-7
Project Name: Millan Drive Sewer
System Type: Wastewater Collection System



Project Description:

This project will replace 500 feet of 10-inch diameter pipeline directly upstream of the Grainery Lift Station. The flow levels in the identified pipelines create a bottle neck effect and cause the upstream pipelines to surcharge. To mitigate deficiencies under 2040 PWWF, it is recommended that the existing pipeline be replace with a 12-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	10	12	Replace	500	$ 185	$ 93,000	$ 121,000	$ 154,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

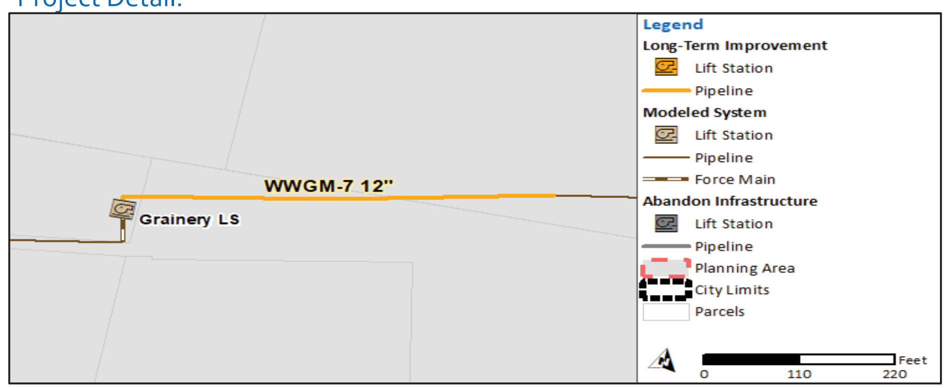
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 154,000
Total	100%	$ 154,000

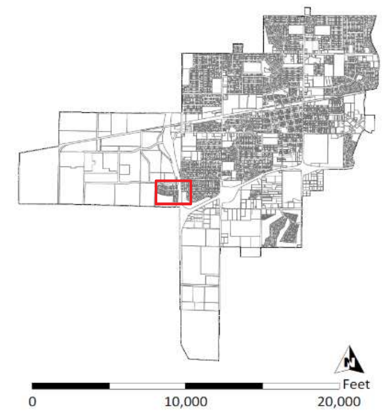
Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

Project Detail:



Project Number: WWGM-8
Project Name: Bell Haven Drive Sewer
System Type: Wastewater Collection System



Project Description:

This project will replace 500 feet of 8-inch sewer in Belle Haven Drive and extends from Pedersen Avenue to Park Lane. To mitigate deficiencies under 2040 PWWF, it is recommended to replace the existing pipeline with a 15-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	8	15	Replace	500	$ 200	$ 100,000	$ 130,000	$ 166,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 166,000
Total	100%	$ 166,000

Notes on Cost Estimation:

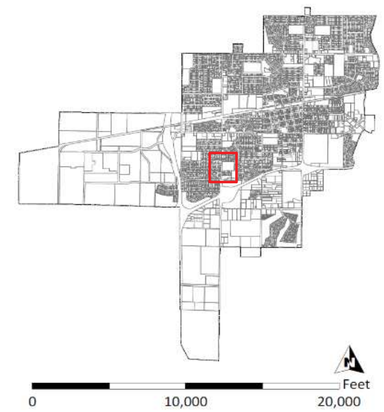
This project is a future improvement and the cost has been assigned to future users.

Project Detail:

City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-9
Project Name:	19th Street Main
System Type:	Wastewater Collection System



Project Description:

This project will replace approximately 2,000 feet of 18-inch diameter pipeline and extends from Bush Street to Cedar Lane. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with a 24-inch diameter sewer.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	18	24	Replace	2,000	$ 300	$ 600,000	$ 780,000	$ 995,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 995,000
Total	100%	$ 995,000

Notes on Cost Estimation:

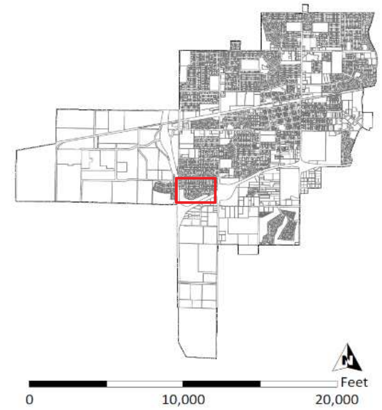
This project is a future improvement and the cost has been assigned to future users.

Project Detail:

City of LEMOORE CALIFORNIA

carollo

Project Number: WWGM-10
Project Name: San Simeon Main
System Type: Wastewater Collection System



Project Description:

This project will replace approximately 2,300 feet of 12-inch diameter pipeline in San Simeon and extends from Sonoma Avenue to Carmel Drive. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with an 18-inch diameter sewer.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	12	18	Replace	2,300	$ 215	$ 495,000	$ 644,000	$ 820,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

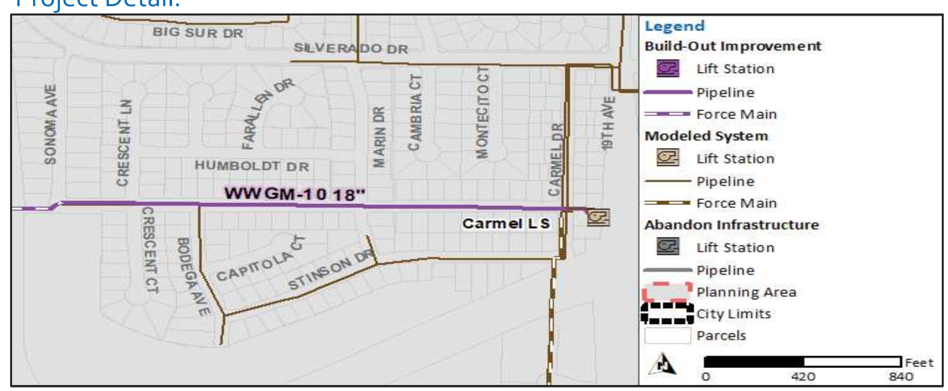
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 820,000
Total	100%	$ 820,000

Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

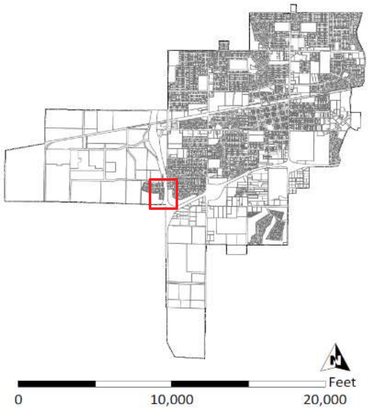
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number: WWGM-11
Project Name: Park Street Main
System Type: Wastewater Collection System



Project Description:
This project will replace approximately 200 feet of 12-inch diameter pipeline in Park Street, west of Highway 41. The project extends from Belle Haven Drive to the Cimarron Lift Station. This project is recommended to mitigate buildout deficiencies and will require an 18-inch diameter pipeline. This is under the assumption that all new development west of Highway 41 and north of Highway 198 will be conveyed to the Cimarron Lift Station.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost[(1)] ($)	Estimated Construction Cost[(2)] ($)	Capital Improvement Cost[(3)] ($)	Project Schedule
Gravity Main	12	18	Replace	200	$ 215	$ 43,000	$ 56,000	$ 71,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

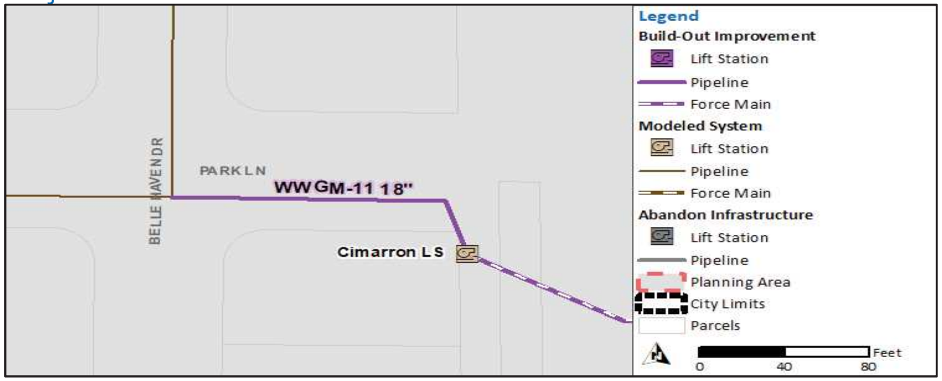
(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

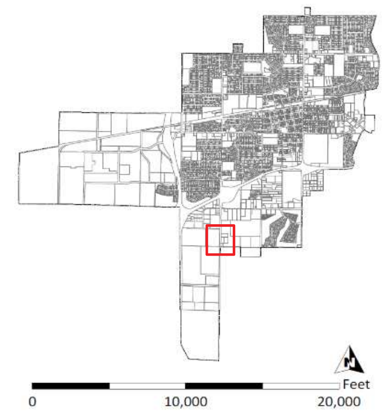
Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 71,000
Total	100%	$ 71,000

Notes on Cost Estimation:
This project is a future improvement and the cost has been assigned to future users.

Project Detail:



Project Number: WWGM-12
Project Name: South 19th Street Sewer
System Type: Wastewater Collection System



Project Description:

This project will replace approximately 1,200 feet of 10-inch diameter pipeline in South 19th Avenue. The project targets the pipeline near Olam and extends to the Olam Lift Station. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with an 18-inch diameter sewer. This is under the assumption that all sewer flows from future development along South 19th Avenue and land designated as Employee Reserve, west of Highway 41, will be conveyed to the Olam Lift Station via the south 19th Avenue sewer.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	10	21	Replace	1,200	$ 275	$ 330,000	$ 429,000	$ 547,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

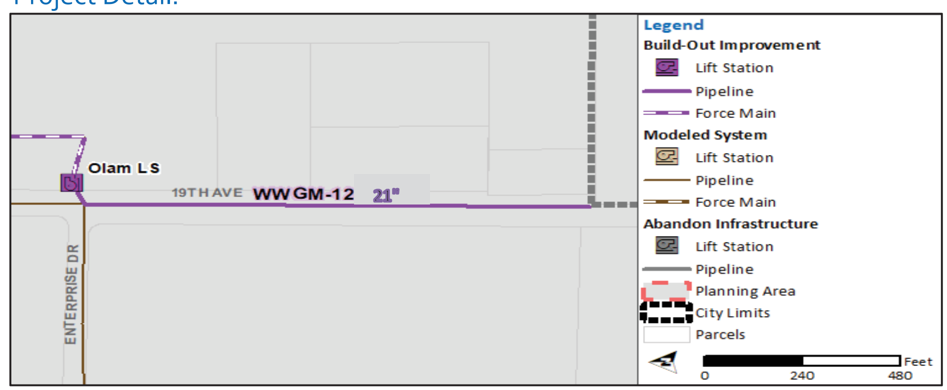
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 547,000
Total	100%	$ 547,000

Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

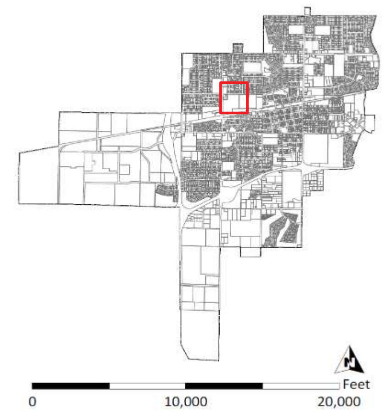
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-13
Project Name:	Cinnamon Drive Main
System Type:	Wastewater Collection System



Project Description:

This project will replace approximately 1,300 feet of 18-inch diameter pipeline in Cinnamon Avenue and extends from Liberty Drive to 19th Avenue. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with an 18-inch diameter sewer. This project assumes that all future flows north of Glendale Avenue will be convey to Liberty Avenue.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost[1] ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Gravity Main	18	24	Replace	1,300	$ 300	$ 390,000	$ 507,000	$ 646,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

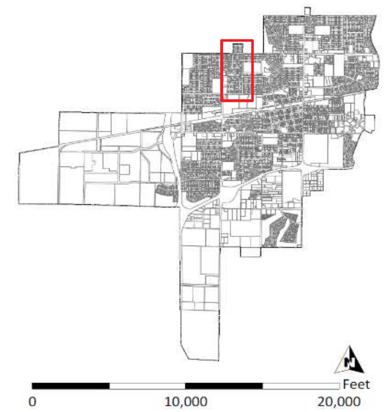
Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 646,000
Total	100%	$ 646,000

Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

Project Detail:

Project Number: WWGM-14
Project Name: Liberty Drive Main
System Type: Wastewater Collection System



Project Description:

This project will replace approximately 3,400 feet of 12-inch diameter pipeline in Liberty Drive and extends from Makenna Street to Cinnamon Avenue. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with a 21-inch diameter sewer. This is under the assumption that all flow from future development north of the City's current limits (north of Glendale) will be conveyed to the Liberty Drive sewer.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	12	18	Replace	3,400	$ 215	$ 731,000	$ 950,000	$ 1,212,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

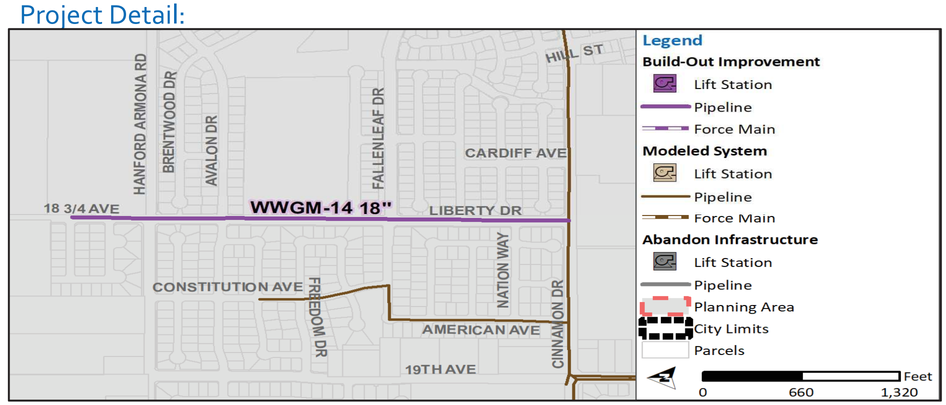
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,212,000
Total	100%	$ 1,212,000

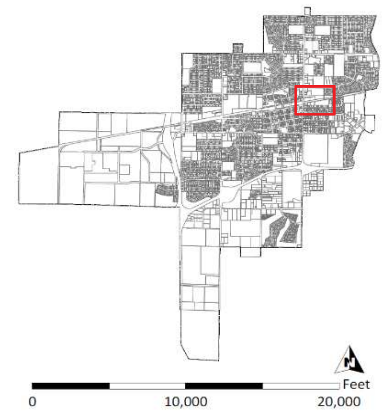
Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

Project Detail:



Project Number:	WWGM-15
Project Name:	Milan Drive Sewer
System Type:	Wastewater Collection System



Project Description:

This project will replace approximately 1,300 feet of 10-inch diameter pipeline in Milan Drive and extends from Balboa Avenue to north east of Grainery Lift Station. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with a 12-inch diameter sewer. This is under the assumption that all Sewer flows generated northeast of Lemoore Canal are conveyed through the Milan Sewer.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	10	12	Replace	1,300	$ 185	$ 241,000	$ 313,000	$ 399,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

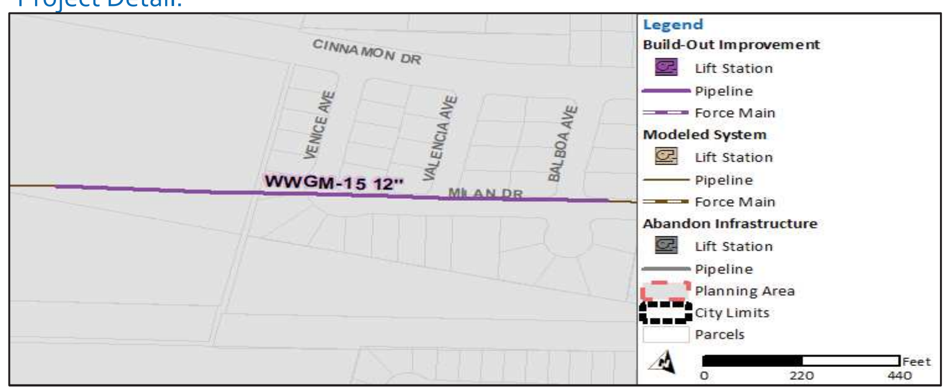
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 399,000
Total	100%	$ 399,000

Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

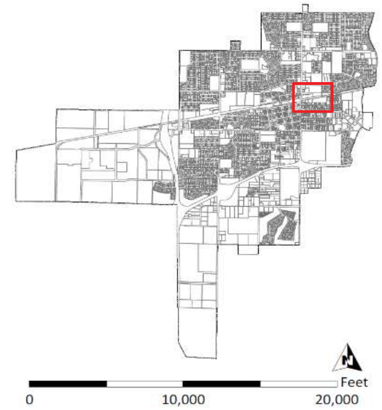
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-16
Project Name:	College Avenue Sewer
System Type:	Wastewater Collection System



Project Description:

This project will replace approximately 1,000 feet of 12-inch diameter pipeline in College Avenue and extends to the West Hills Lift Station. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with a 15-inch diameter sewer. This project assumes all future flows west of Semas Avenue are conveyed through the College Avenue sewer.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	12	15	Replace	1,000	$ 200	$ 200,000	$ 260,000	$ 332,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

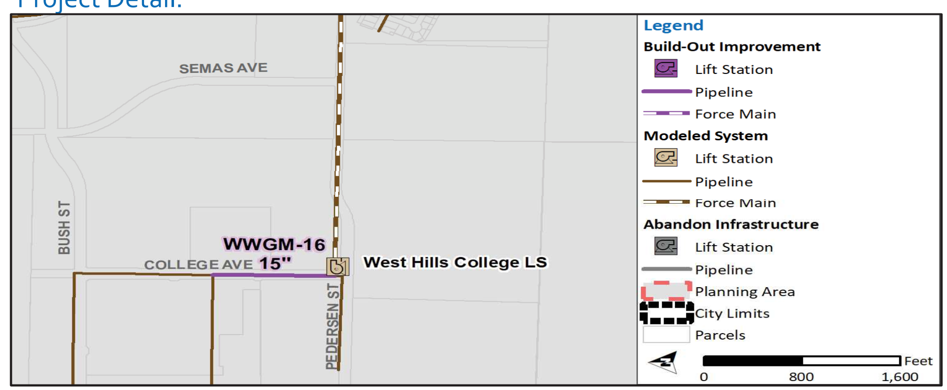
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 332,000
Total	100%	$ 332,000

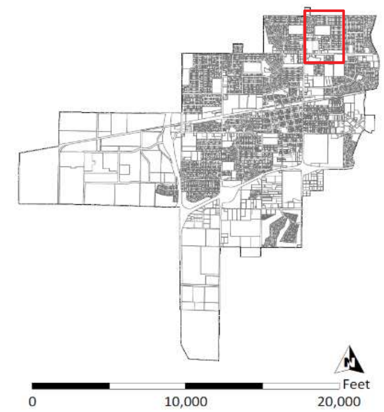
Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

Project Detail:



Project Number: WWGM-17
Project Name: Spring Lane Sewer
System Type: Wastewater Collection System



Project Description:

This project will replace approximately 1,600 feet of 10-inch diameter pipeline in Spring Lane and extends from Lemoore Avenue to the Elk Meadows Lift Station. To mitigate deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with a 15-inch diameter sewer. This project is triggered by projected growth.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost[1] ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Gravity Main	10	15	New	1,600	$ 200	$ 320,000	$ 416,000	$ 530,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

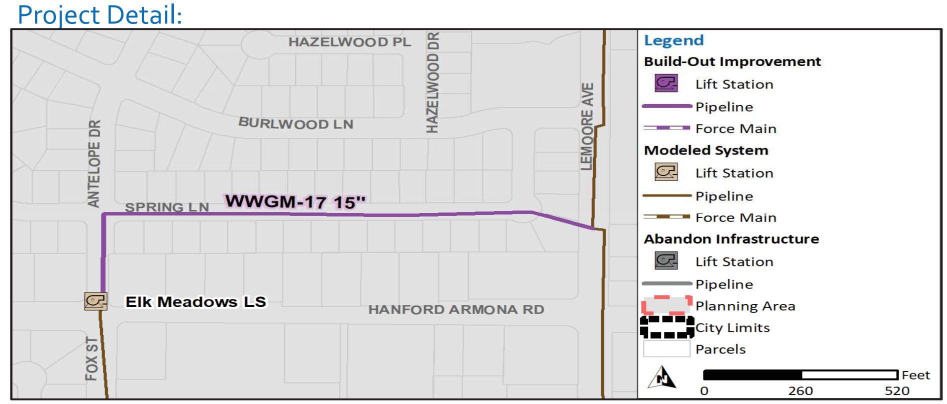
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 530,000
Total	100%	$ 530,000

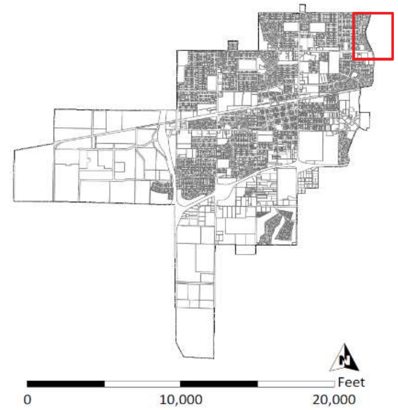
Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

Project Detail:



Project Number: WWGM-18
Project Name: 17th Avenue Main
System Type: Wastewater Collection System



Project Description:

This projects will serve future growth and potentially existing users northeast of the City's current city limits. This project consists of 5,600 feet of 8-inch diameter pipeline in 17th Avenue and will convey flow from growth and existing users north and south of Hanford Armona Road.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	8	New	5,600	$ 170	$ 952,000	$ 1,238,000	$ 1,578,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

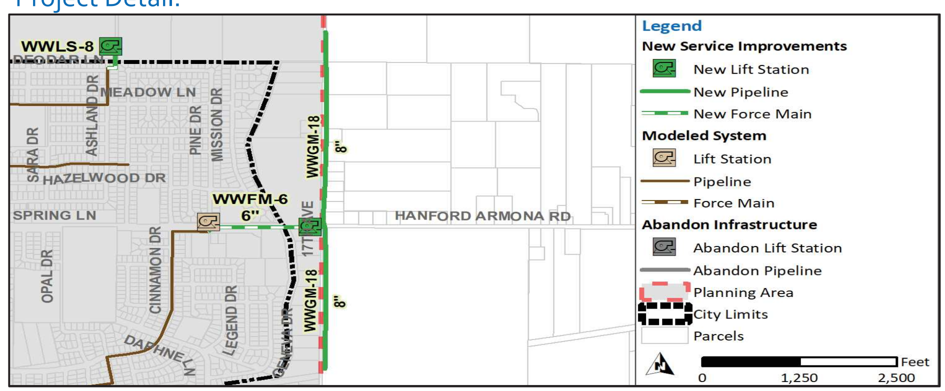
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,578,000
Total	100%	$ 1,578,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



Project Number:	WWGM-19
Project Name:	Houston Avenue Sewer
System Type:	Wastewater Collection System

Project Description:

This projects will serve future growth and potentially existing users east of the City's current city limits. The project consists of 5,100 feet of 8-inch diameter pipeline in D Street, Houston Avenue, and 17th Avenue.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	8	New	5,100	$ 170	$ 867,000	$ 1,127,000	$ 1,437,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

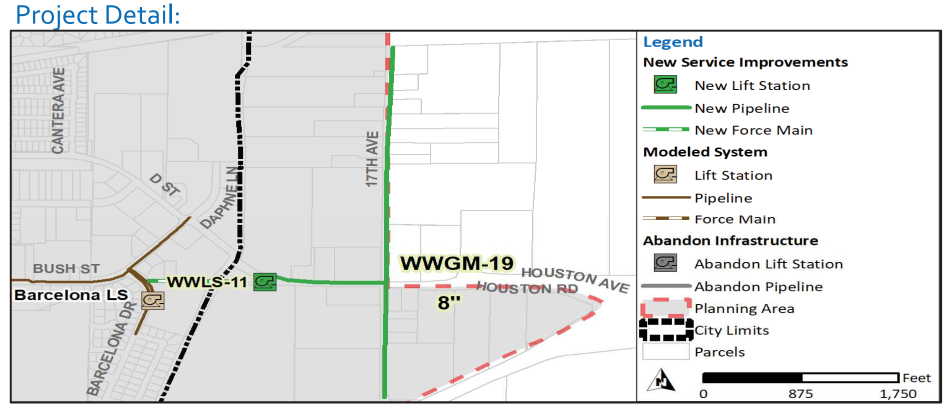
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,437,000
Total	100%	$ 1,437,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

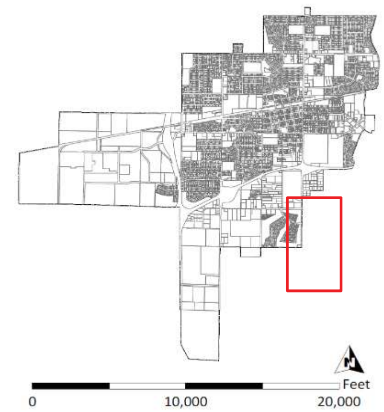
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-20A
Project Name:	18th Avenue Sewer
System Type:	Wastewater Collection System



Project Description:

This projects will serve future growth within the south east quadrant of the City. The project consists of 3,400 feet of 10-inch diameter pipeline in 18th Avenue and extends south of Indiana Road to Iona Avenue.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost[1] ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Gravity Main	-	10	New	3,400	$ 175	$ 595,000	$ 774,000	$ 986,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

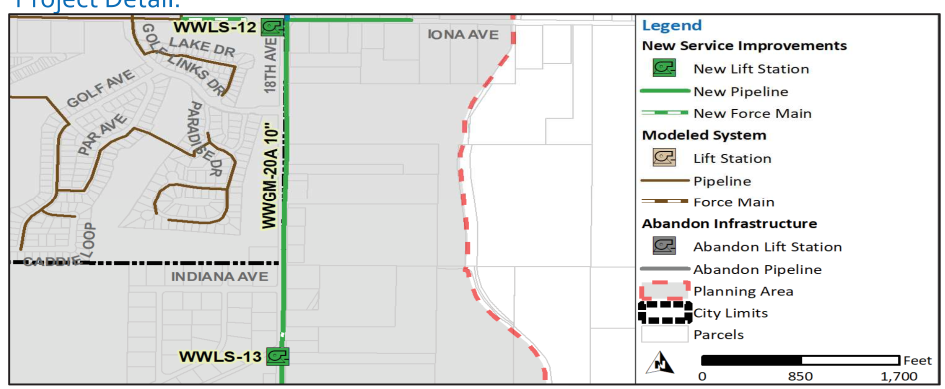
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 986,000
Total	100%	$ 986,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

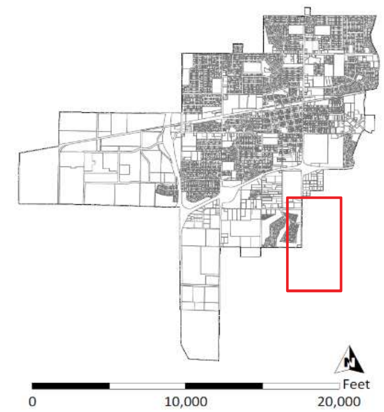
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-20B
Project Name:	18th Avenue Sewer
System Type:	Wastewater Collection System



Project Description:

This projects will serve future growth within the south east quadrant of the City. The project consists of 1,700 feet of 8-inch diameter pipeline in 18th Avenue and extends from Idaho Avenue to a canal south of Indiana Avenue.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	8	New	1,700	$ 170	$ 289,000	$ 376,000	$ 479,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

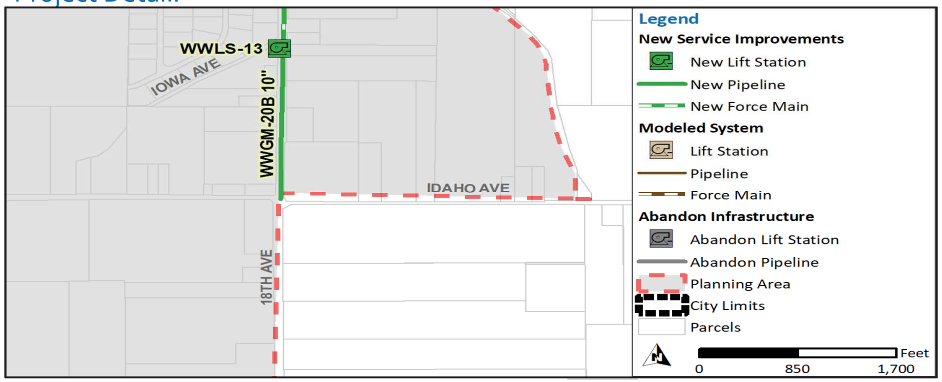
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 479,000
Total	100%	$ 479,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

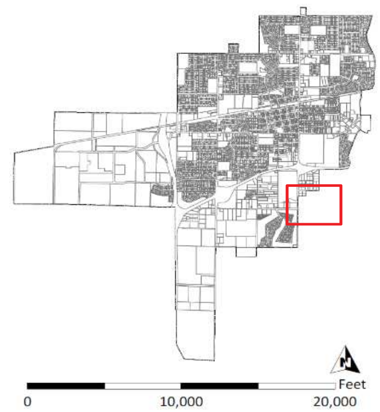
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-20C
Project Name:	18th Avenue Sewer
System Type:	Wastewater Collection System



Project Description:

This projects will serve future growth within the south east quadrant of the City. The project consists of 1,000 feet of 8-inch diameter pipeline in Iona Avenue. The project extends from Fairway Drive to 18th Avenue in Iona Avenue.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	8	New	1,000	$ 170	$ 170,000	$ 221,000	$ 282,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

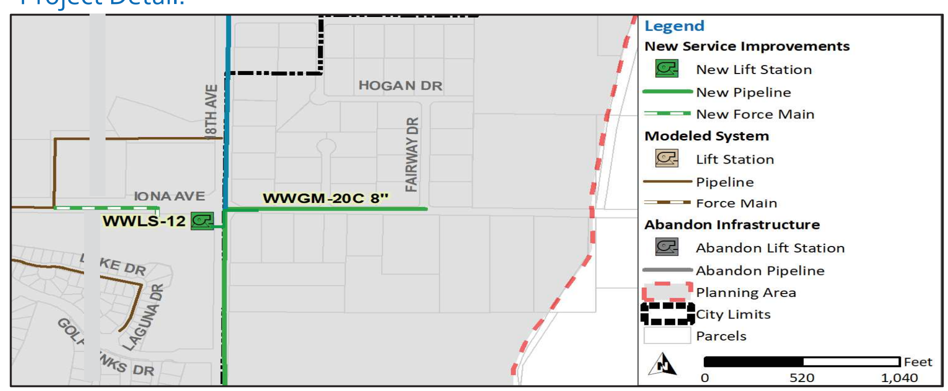
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 282,000
Total	100%	$ 282,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

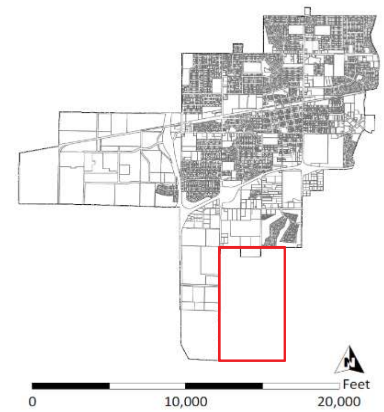
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-21
Project Name:	Vine Street Sewer Sewer
System Type:	Wastewater Collection System



Project Description:

This projects will serve future growth within the south quadrant of the City.The project will construct 3,500 feet of 15-inch diameter pipeline in South Vine Street. This project will extend the service area south of the WWTP and provide service to residential and industrial users along South Vine Street.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	15	New	3,500	$ 200	$ 700,000	$ 910,000	$ 1,160,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

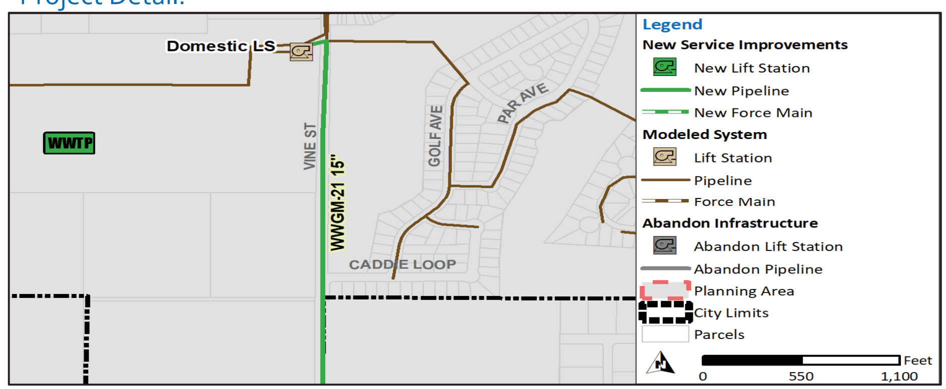
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,160,000
Total	100%	$ 1,160,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

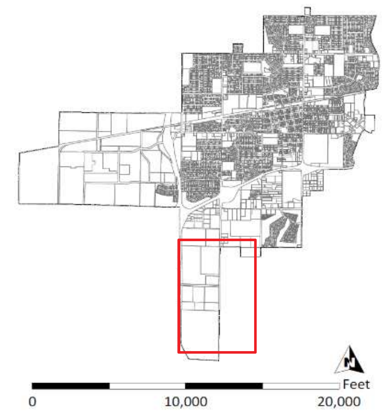
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-22
Project Name:	South 19th Avenue Main
System Type:	Wastewater Collection System



Project Description:

This projects will serve future growth within the southwest quadrant of the City. The project extends from Idaho Avenue, continues north along 19th Avenue and connects to the existing system. This segments consists of 2,700 feet of 21-inch diameter pipeline and will convey flows form the Employment Reserve area, industrial users along south 19th Avenue, and Annexation.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	21	New	2,700	$ 275	$ 743,000	$ 966,000	$ 1,232,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

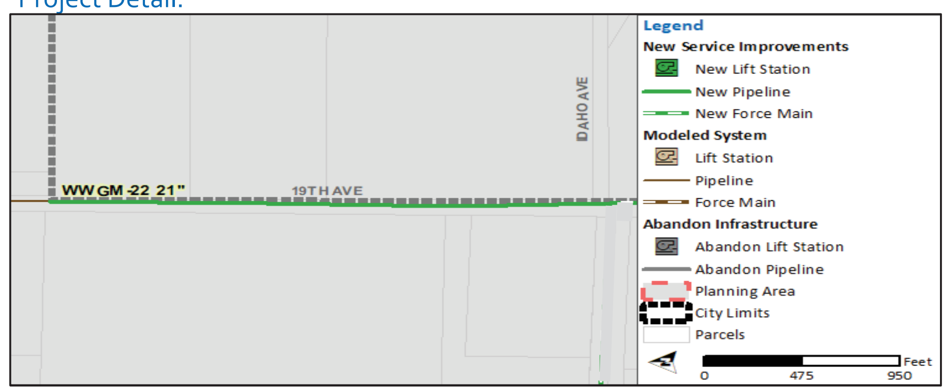
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,232,000
Total	100%	$ 1,232,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

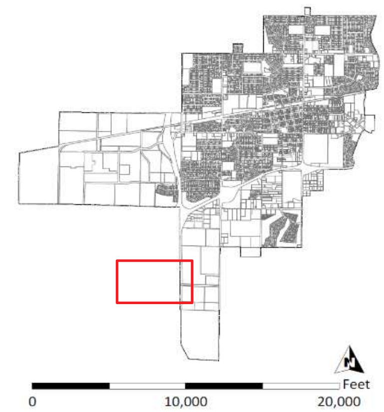
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number: WWGM-23A
Project Name: Idaho Avenue Main
System Type: Wastewater Collection System



Project Description:
This project will service future growth within the Employment Reserve area in the southwest. This project consists of 2,600 feet of 15-inch diameter in Idaho Avenue, west of Highway 41.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	15	New	2,600	$ 200	$ 520,000	$ 676,000	$ 862,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

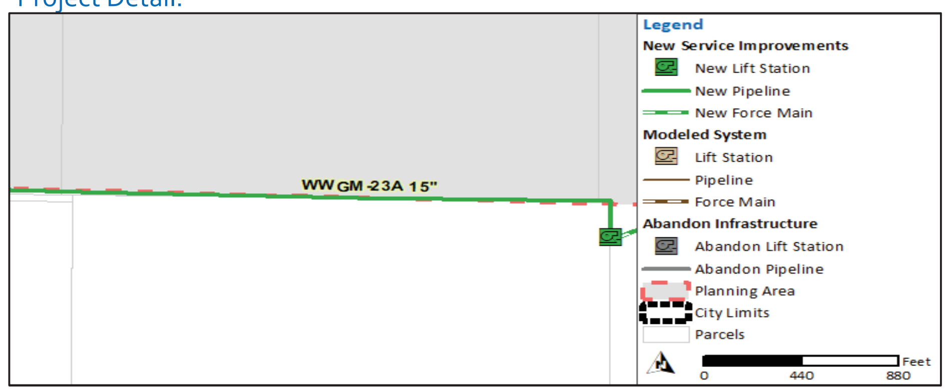
(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 862,000
Total	100%	$ 862,000

Notes on Cost Estimation:
This Project will service new development, therefore, future users are assigned 100-percent of the cost.

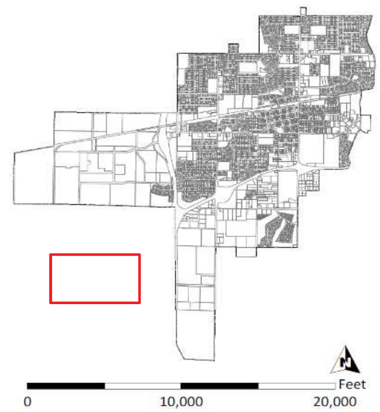
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-23B
Project Name:	Idaho Avenue Main
System Type:	Wastewater Collection System



Project Description:

This project will service future growth within the Employment Reserve area in the southwest. This project consists 4,100 feet of 12-inch diameter pipeline and is located in Idaho Road, west of Highway 41.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	12	New	4,100	$ 185	$ 759,000	$ 987,000	$ 1,258,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

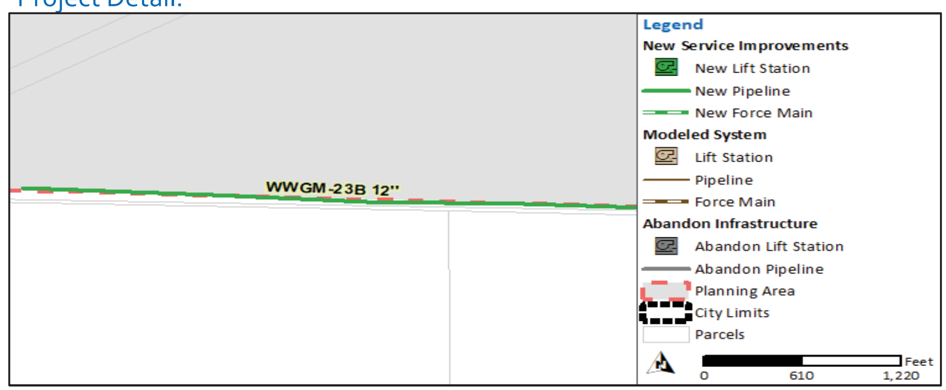
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,258,000
Total	100%	$ 1,258,000

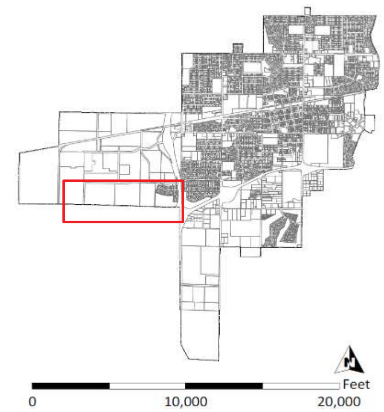
Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



Project Number: WWGM-24
Project Name: Iona Avenue Main
System Type: Wastewater Collection System



Project Description:
This project will service future growth southwest of the city limits. The preliminary alignment extends along an unimproved area of agricultural land. This segment of pipeline consists of 7,100 feet of 12-inch diameter pipeline and will connect to the existing system in Park Lane.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	12	New	7,100	$ 185	$ 1,314,000	$ 1,708,000	$ 2,178,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

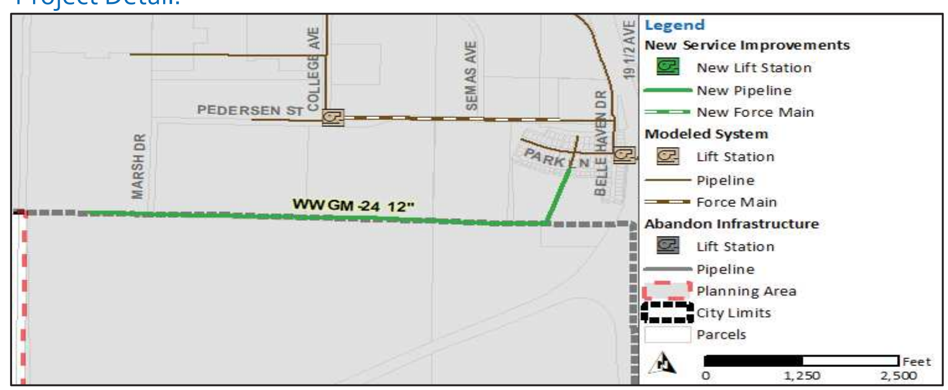
(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

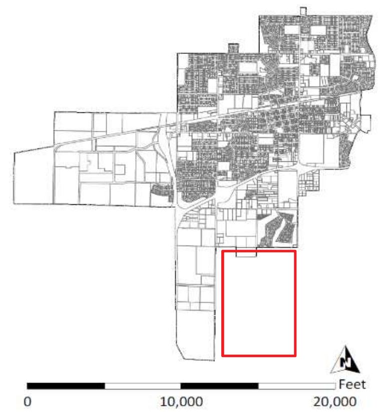
Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 2,178,000
Total	100%	$ 2,178,000

Notes on Cost Estimation:
This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



Project Number:	WWGM-25
Project Name:	Idaho Jackson Annexation East
System Type:	Wastewater Collection System



Project Description:

This project will service future growth within the eastern Idaho-Jackson Annexation. This area is defined as light industrial and is considered east of the irrigation canal, extending from Idaho Avenue to Jackson Avenue. The project consists of 3,700 feet of 10-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	10	New	3,700	$ 175	$ 648,000	$ 842,000	$ 1,074,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

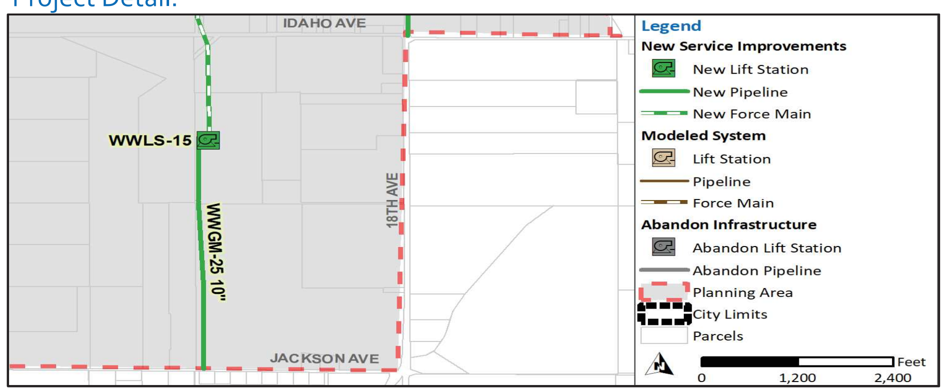
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,074,000
Total	100%	$ 1,074,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

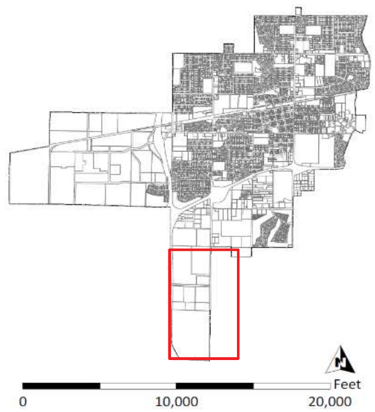
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWGM-26
Project Name:	Idaho Jackson Annexation West
System Type:	Wastewater Collection System



Project Description:

This project will service future growth within the western Idaho-Jackson Annexation and light industrial west of 19th Avenue. The project consists of 3,500 feet of 12-inch diameter pipeline.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	12	New	3,500	$ 185	$ 648,000	$ 842,000	$ 1,074,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

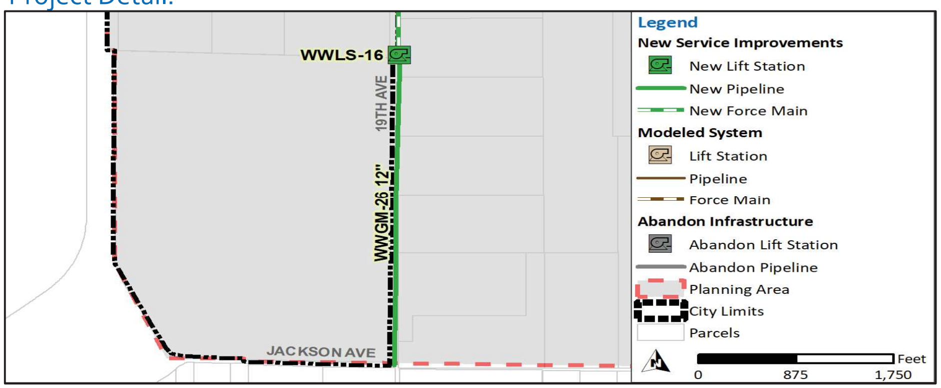
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,074,000
Total	100%	$ 1,074,000

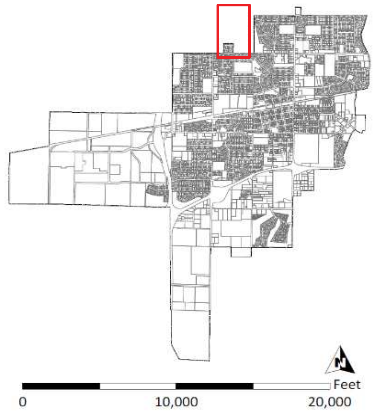
Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



Project Number:	WWGM-27
Project Name:	North Liberty Drive Main
System Type:	Wastewater Collection System



Project Description:

This project will service future growth northwest of the city limits. This segment of pipeline consists of 1,700 feet of 15-inch diameter pipeline and will connect to the existing system in Liberty Drive.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	15	New	1,700	$ 200	$ 340,000	$ 442,000	$ 564,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

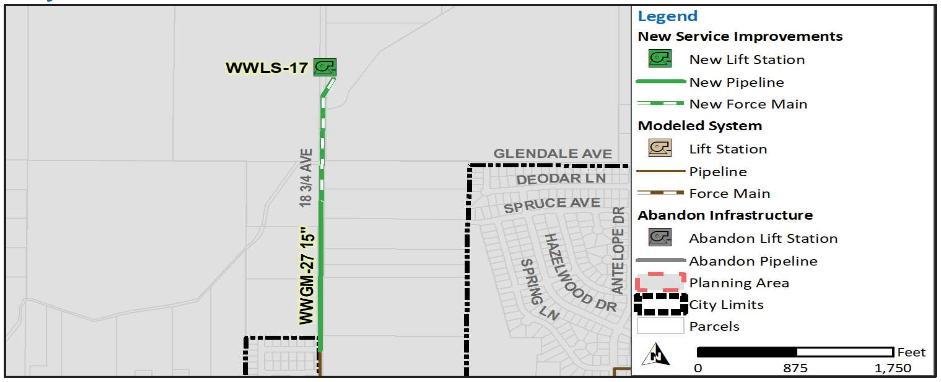
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 564,000
Total	100%	$ 564,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

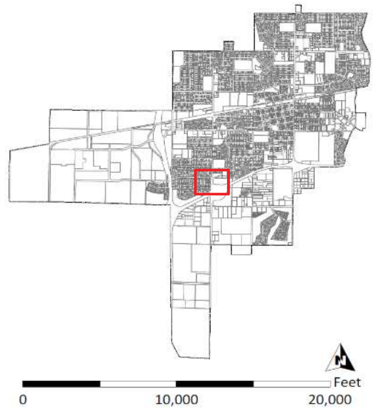
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number: WWLS-1A
Project Name: Carmel Lift Station
System Type: Wastewater Collection System



Project Description:
The City has identified the construction of a single lift station to mitigate both deficiencies. The new lift station is currently being designed by QK Engineering and is at 30-percent design (December 2018). The lift station will be designed with an initial capcity of 1.9 mgd to convey existing flows from the Viera and Carmel sewer basins. As flows increase pumps will need to be replaced to increase capacity. The proposed lift station is located at the intersection of San Simeon Drive and Carmel Drive. This project will abandon the Viera and Carmel lift station along with the associated force mains.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(1) ($)	Project Schedule
Lift Station	-	1.9	New	2	--	-	-	$ 1,300,000	2019

Notes:

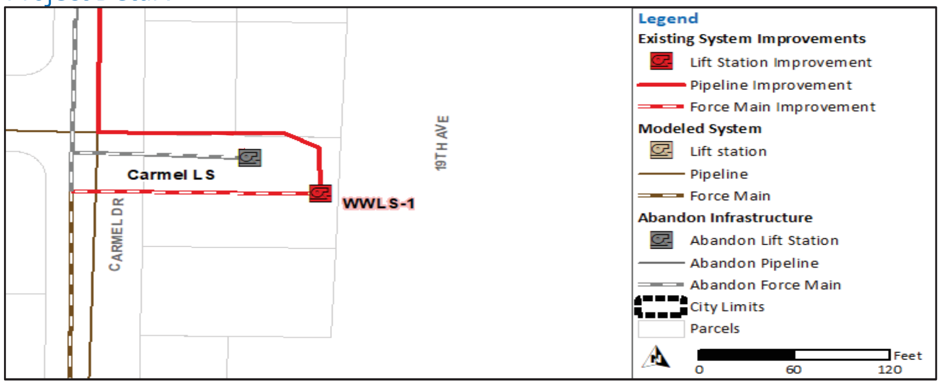
(1) Cost is based on QK Engineering estimates.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	78%	$ 1,014,000
Future Users	22%	$ 286,000
Total	100%	$ 1,300,000

Notes on Cost Estimation:
A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

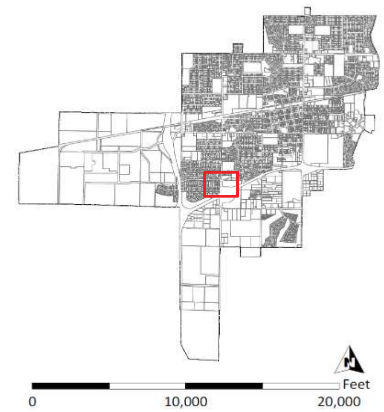
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number: WWLS-1**B**
Project Name: Carmel Lift Station
System Type: Wastewater Collection System



Project Description:

The lift station will be designed with an initial capcity of 1.9 mgd to convey existing flows from the Viera and Carmel sewer basins. As flows increase, pumps will need to be replaced to increase the firm capacity. Peak flows are estimated to increase to 2.9 mgd by 2040 and 6.4 by buildout.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(1) ($)	Project Schedule
Lift Station	-	3.9	Replace	2	--	$ 1,950,000	$ 2,535,000	$ 3,232,000	2029-2040
Lift Station	-	7	Replace	2	--	$ 3,500,000	$ 4,550,000	$ 5,801,000	2041 & beyond

Notes:

(1) Cost is based on QK Engineering estimates.

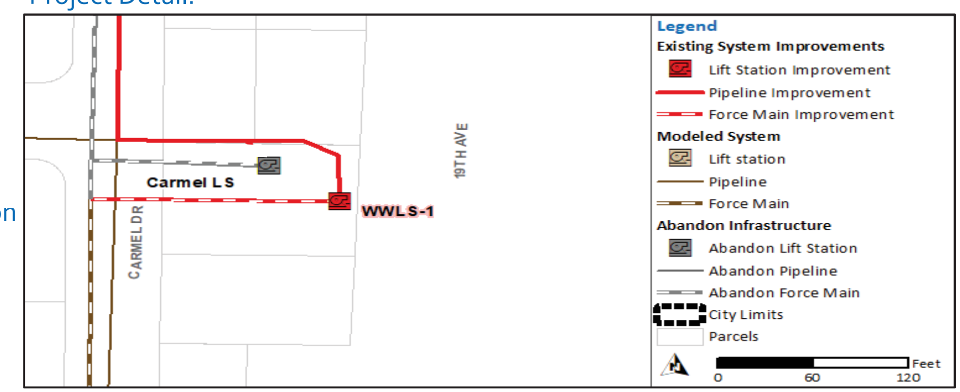
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 9,033,000
Total	100%	$ 9,033,000

A cost percentage has been assigned to existing and future users as a combination

Projected costs are based on capacity requirements.

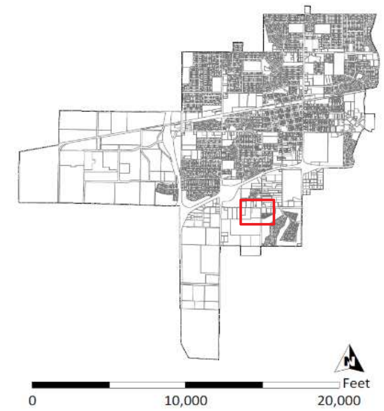
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number: WWLS-2A
Project Name: Thomas Lift Station
System Type: Wastewater Collection System



Project Description:

The Thomas lift station is located south of Highway 198 on Vine Street and conveys flow from an adjacent residential development and one of two parallel pipelines in Vine Street. Under current conditions this lift station has been identified as lacking the firm capacity to convey PWWF. In addition, pipeline improvements recommend abandoning one of the parallel pipelines in Vine Street and combining flows into a large diameter sewer. The lift station would provide service to the proposed pipeline and convey an increased amount of flow. To provide reliable capacity for current and future peak flow, this project will increase the firm capacity from 0.72 mgd to 4.2 mgd.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	1.44	4.4	Replace	2	--	$ 2,200,000	$ 2,860,000	$ 3,647,000	2022

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

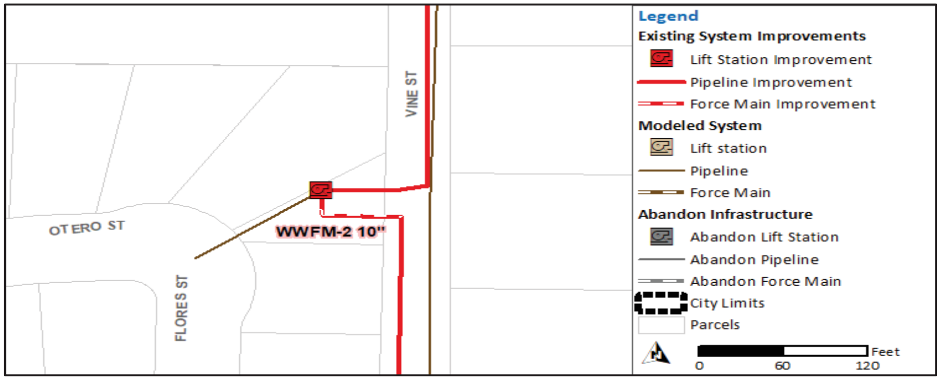
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	52%	$ 1,905,000
Future Users	48%	$ 1,742,000
Total	100%	$ 3,647,000

Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

Project Detail:



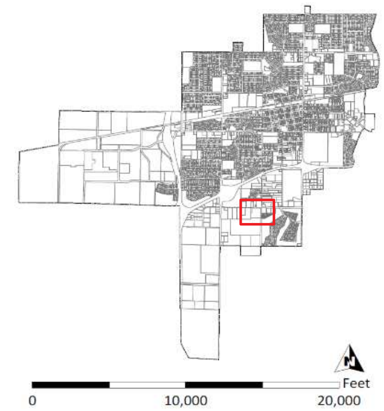
City of LEMOORE CALIFORNIA

carollo

Project Number: WWLS-2B

Project Name: Thomas Lift Station

System Type: Wastewater Collection System



Project Description:

an Initial total capcity of 4.4 mgd (firm 2.2 mgd) is recommended to convey flows to 2040. As flows increase, pumps will need to be replaced to increase capacity. Peak flows are estimated to increase to 4.2 mgd at buildout (Total Capacity 8.4 mgd).

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	-	4	Replace	2	--	$ 2,000,000	$ 2,600,000	$ 3,315,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

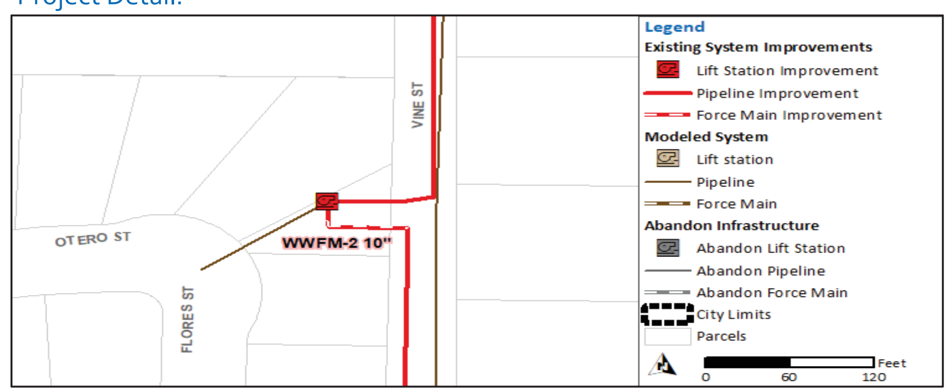
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 3,315,000
Total	100%	$ 3,315,000

Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

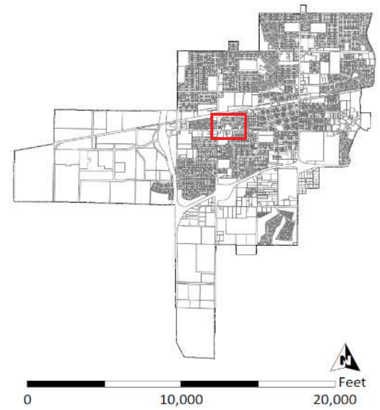
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWLS-3
Project Name:	Bush Willow Lift Station
System Type:	Wastewater Collection System



Project Description:

The firm capacity of this lift station is not adequate to convey the existing PWWF. It is recommended that the lift stations firm capacity be upgraded from 0.61 mgd to 2.1 mgd to accommodate existing and future flows.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	1.22	4.2	Replace	2	--	$ 2,100,000	$ 2,730,000	$ 3,481,000	2023

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

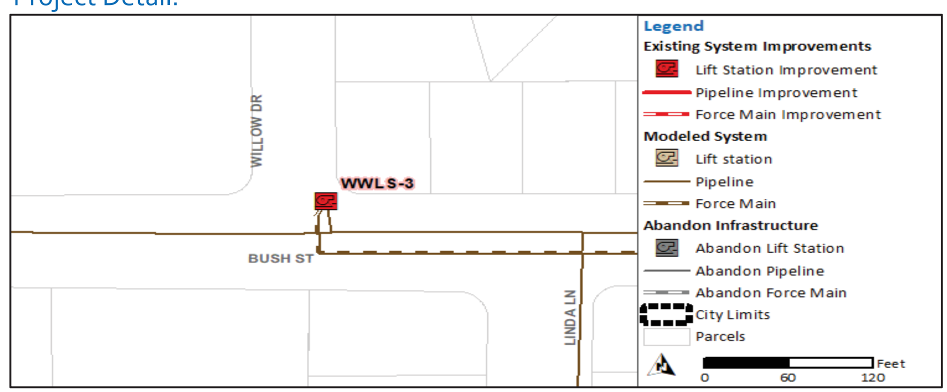
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	88%	$ 3,063,000
Future Users	12%	$ 418,000
Total	100%	$ 3,481,000

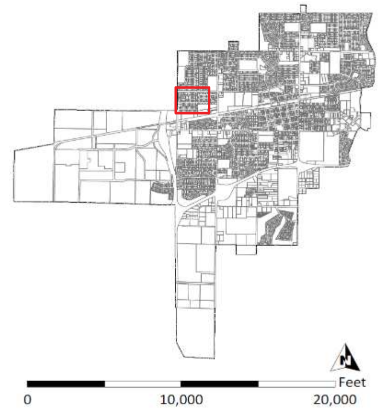
Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

Project Detail:



Project Number: WWLS-4
Project Name: Avalon Lift Station
System Type: Wastewater Collection System



Project Description:

The firm capacity of this lift station is not adequate to convey the existing PWWF. It is recommended that the lift stations firm capacity be upgraded from 0.33 mgd to 0.55 mgd to accommodate existing and future flows.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	0.66	1.1	Replace	2	--	$ 550,000	$ 715,000	$ 912,000	2027

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

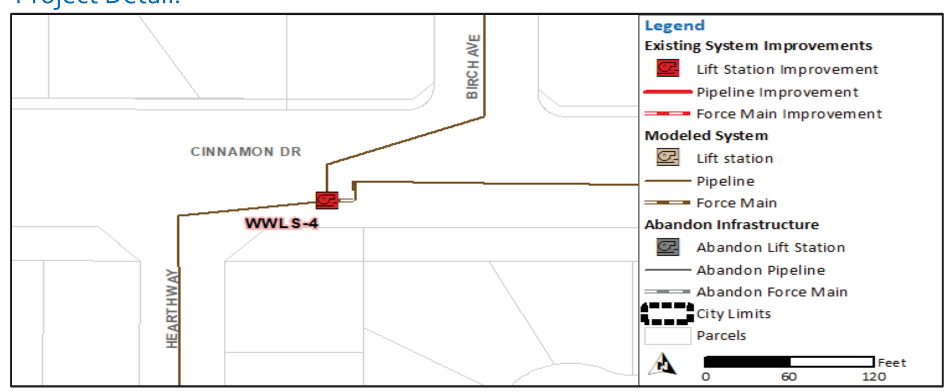
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	93%	$ 848,000
Future Users	7%	$ 64,000
Total	100%	$ 912,000

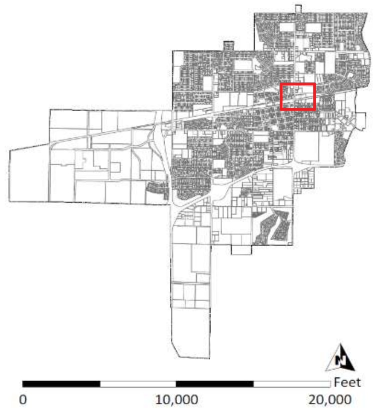
Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

Project Detail:



Project Number: WWLS-5
Project Name: Grainery Lift Station
System Type: Wastewater Collection System



Project Description:

The firm capacity of this lift station is not adequate to convey the existing PWWF. It is recommended that the lift stations firm capacity be upgraded from 0.58 mgd to 0.88 mgd to accommodate existing and future flows.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	1.20	1.76	Replace	2	--	$ 880,000	$ 1,144,000	$ 1,459,000	2028

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

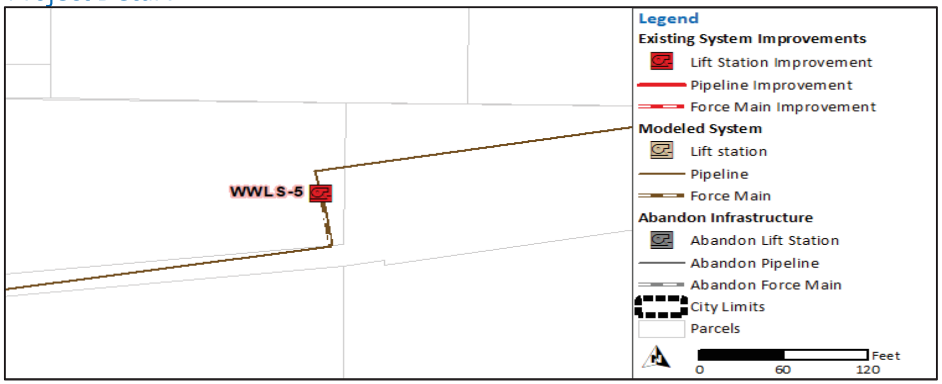
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	84%	$ 1,226,000
Future Users	16%	$ 233,000
Total	100%	$ 1,459,000

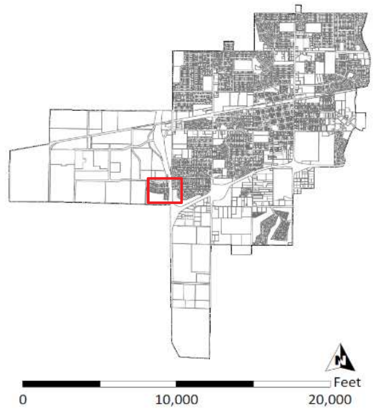
Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

Project Detail:



Project Number: WWLS-6
Project Name: Cimarron Lift Station
System Type: Wastewater Collection System



Project Description:

The firm capacity of this lift station is not adequate to convey 2040 PWWF. It is recommended that the lift stations firm capacity be upgraded from 0.36 mgd to 2.3 mgd to accommodate future flows. This lift station provides service to the Wet Hills Area, which has potential for significant growth.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	0.72	4.6	Replace	2	--	$ 2,300,000	$ 2,990,000	$ 3,812,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

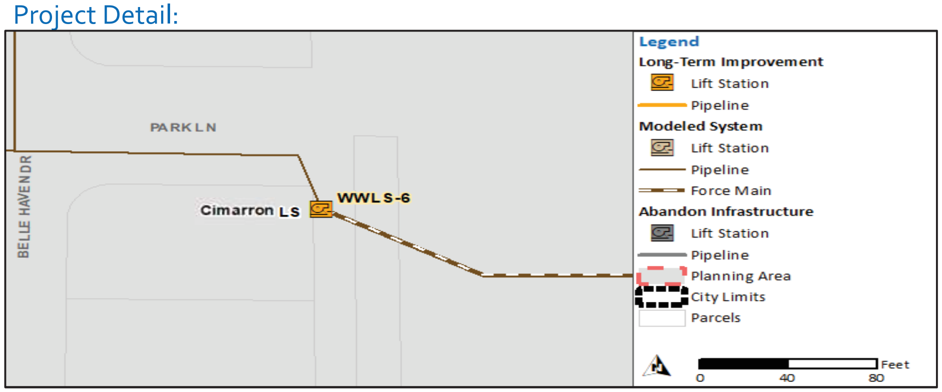
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 3,812,000
Total	100%	$ 3,812,000

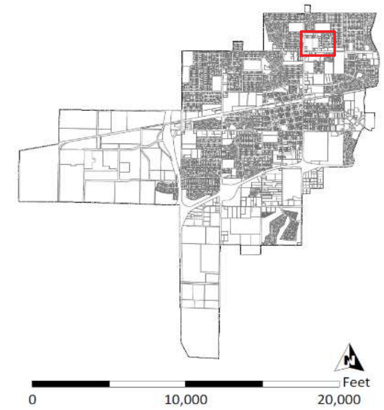
Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

Project Detail:



Project Number: WWLS-7
Project Name: Elk Meadows Lift Station
System Type: Wastewater Collection System



Project Description:

The firm capacity of this lift station is not adequate to convey 2040 PWWF. It is recommended that the lift stations firm capacity be upgraded from 0.72 mgd to 1.2 mgd to accommodate future flows. This lift station provides service to the north east and will convey flows from future development.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	0.72	2.4	Replace	2	--	$ 1,200,000	$ 1,560,000	$ 1,989,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

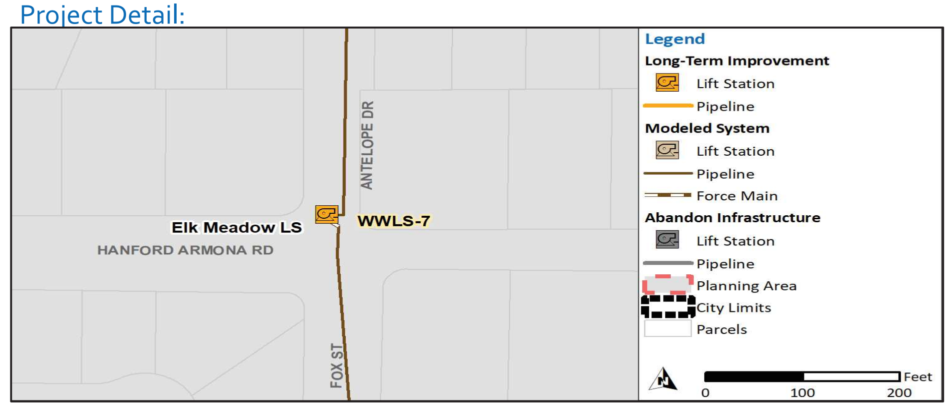
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,989,000
Total	100%	$ 1,989,000

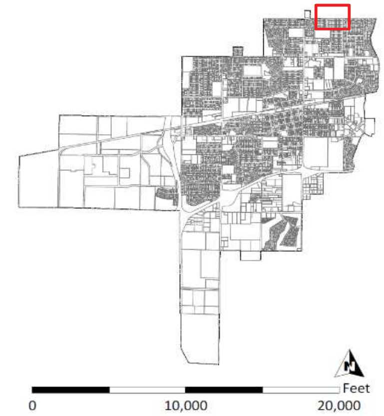
Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

Project Detail:



Project Number: WWLS-8
Project Name: Glendale Lift Station
System Type: Wastewater Collection System



Project Description:

This projects will serve future growth within the north east quadrant of the City and will have a initial firm capacity of 0.15 mgd (Total capacity 0.3 mgd). A preliminary analysis indicated a lift station is required due to the topography and minimum slope of proposed 8-inch gravity mains. The project is located near the intersection of Glendale Avenue and Ashland Drive. Capacity is available in both the Ashland sewer trunk and the Quandt sewer trunk. As development to the east occurs, pumps will need to be replaced or added to increase capacity. Peak flows are estimated to increase 0.24 mgd at buildout (Total Firm Capacity 0.39 mgd).

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	-	0.8	New	2	--	$ 400,000	$ 520,000	$ 663,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

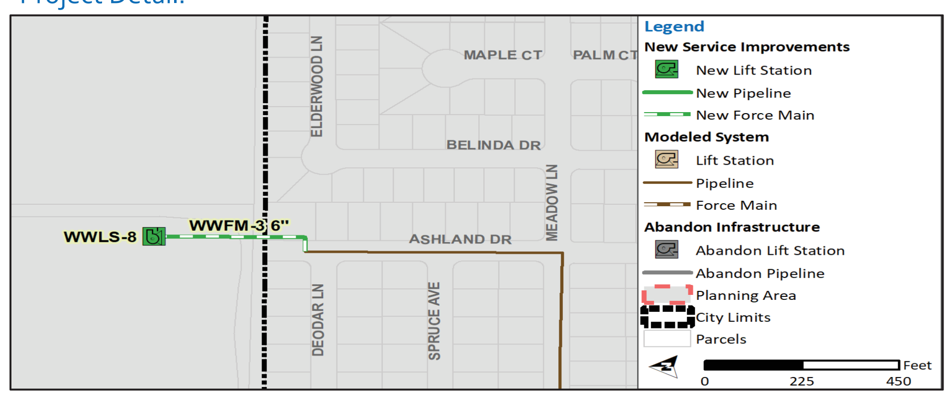
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 663,000
Total	100%	$ 663,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

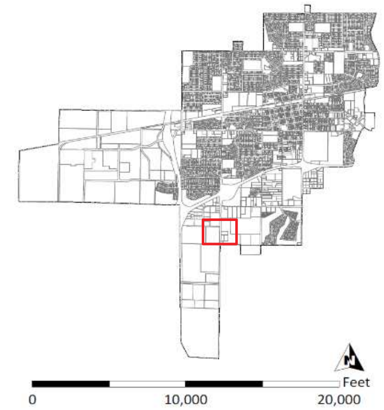
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWLS-9
Project Name:	Olam (SK) Lift Station
System Type:	Wastewater Collection System



Project Description:

The firm capacity of this lift station is not adequate to convey buildout PWWF. It is recommended that the lift stations firm capacity be upgraded from 0.5 mgd to 3.5 mgd to accommodate buildout PWWF. Under buildout it was assumed that that all sewer flows from future development along South 19th Avenue and land designated as Employee Reserve, west of Highway 41, will be conveyed to the Olam Lift Station.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost[(1)] ($)	Estimated Construction Cost[(2)] ($)	Capital Improvement Cost[(3)] ($)	Project Schedule
Lift Station	1.00	7	Replace	2	--	$ 3,500,000	$ 4,550,000	$ 5,801,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

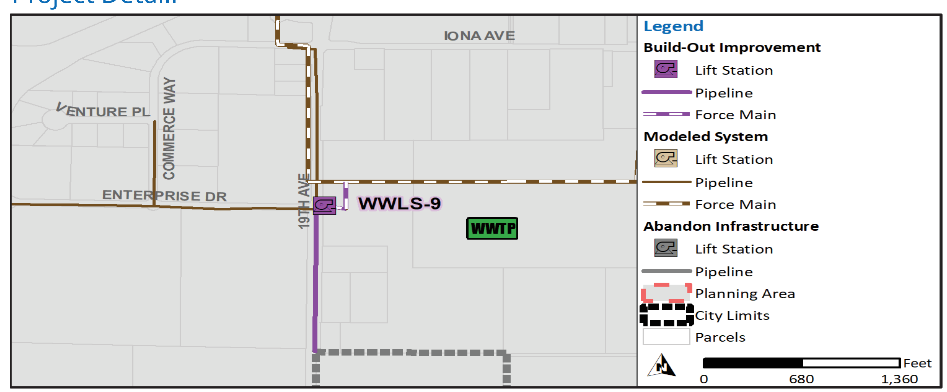
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 5,801,000
Total	100%	$ 5,801,000

Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

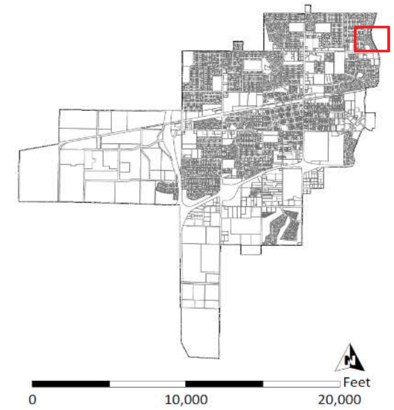
Project Detail:



LEMOORE CALIFORNIA

carollo

Project Number:	WWLS-10
Project Name:	Hanford Armona Lift Station
System Type:	Wastewater Collection System



Project Description:

This projects will serve future growth and potentially existing users northeast of the City's current city limits. This project is recommended to convey flows under the Lemoore Canal. The lift station is estimated to have a firm capacity of 0.10 mgd. A preliminary analysis proposed the lift station near the intersection of Hanford Armona Road and 17th Avenue.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	-	0.2	New	2	--	$ 100,000	$ 130,000	$ 166,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

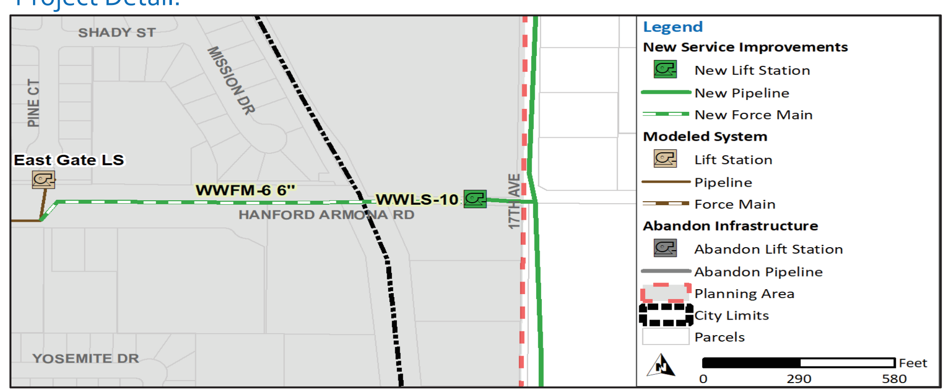
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 166,000
Total	100%	$ 166,000

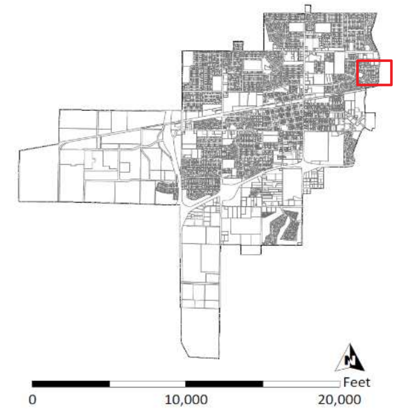
Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



Project Number:	WWLS-11
Project Name:	D Street Lift Station
System Type:	Wastewater Collection System



Project Description:

This projects will serve future growth and potentially existing users east of the City's current limits. The project will have a firm capacity of 0.30 mgd to convey future PWWF. A lift station and force main were recommended to convey flows under the Lemoore canal.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	-	0.6	New	2	--	$ 300,000	$ 390,000	$ 497,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

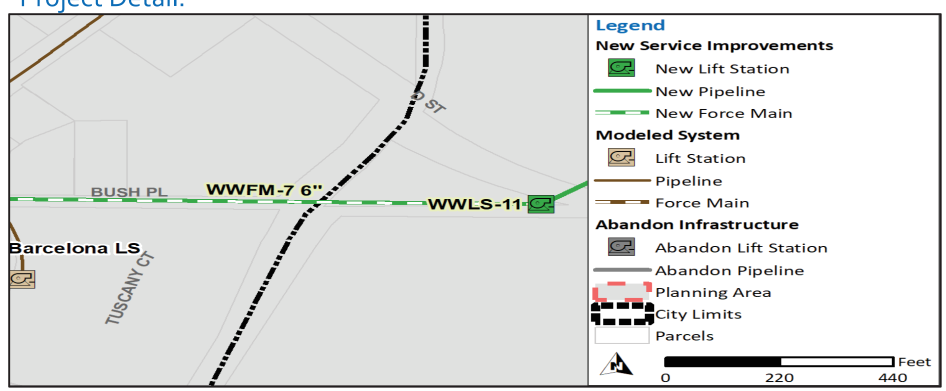
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 497,000
Total	100%	$ 497,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

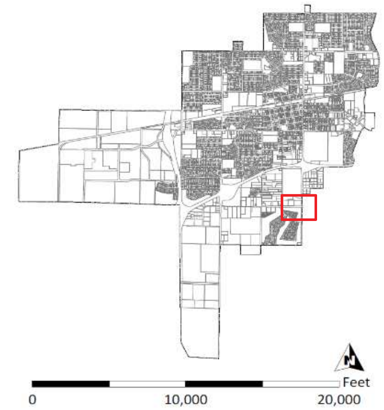
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number: WWLS-12
Project Name: 18th Avenue Lift Station
System Type: Wastewater Collection System



Project Description:

This projects will serve future growth within the south east quadrant of the Cityand will have a firm capacity of 0.50 mgd. A preliminary analysis indicated a lift station is required due to the topography, extensive length and minimum slope of proposed gravity mains. The project is located near the intersection of Iona Avenue and 18th Avenue.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	-	1	New	2	--	$ 500,000	$ 650,000	$ 829,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

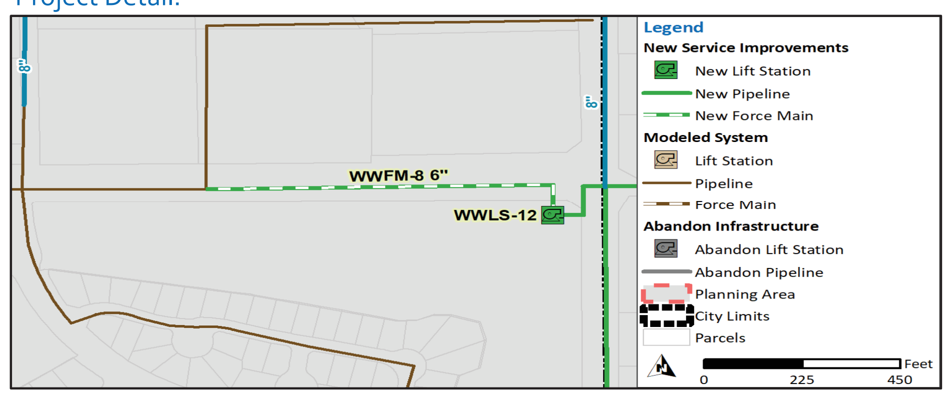
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 829,000
Total	100%	$ 829,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

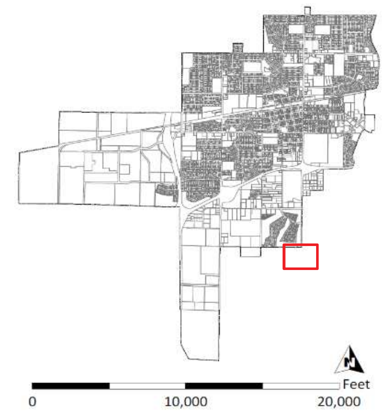
Project Detail:



Project Number: WWLS-13

Project Name: South 18th Avenue Lift Station

System Type: Wastewater Collection System



Project Description:

This projects will serve future growth within the south east quadrant of the Cityand will have a firm capacity of 0.25 mgd. A preliminary analysis indicated a lift station is required due to the topography, extensive length, minimum slope of proposed gravity mains and canal crossing required. The project is located near the intersection of Indiana Avenue and 18th Avenue.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	-	0.5	New	2	--	$ 250,000	$ 325,000	$ 414,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

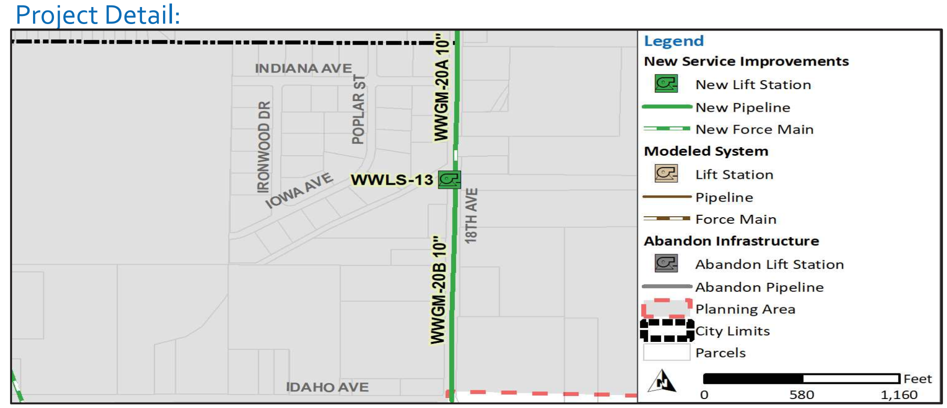
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 414,000
Total	100%	$ 414,000

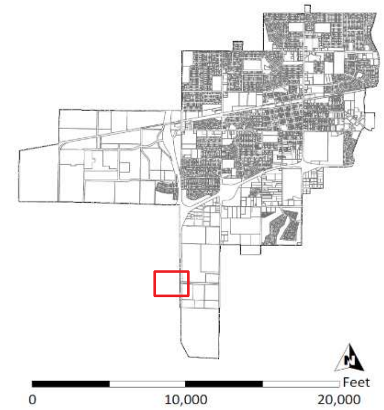
Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



Project Number:	WWLS-14
Project Name:	Idaho Avenue Lift Station
System Type:	Wastewater Collection System



Project Description:

This project will service future growth within the Employment area in the southwest and is estimated to require a firm capacity of 1.0 mgd to convey PWWFs. The project is located near the intersection of Highway 41 and Idaho Avenue.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	-	2	New	2	--	$ 1,000,000	$ 1,300,000	$ 1,658,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

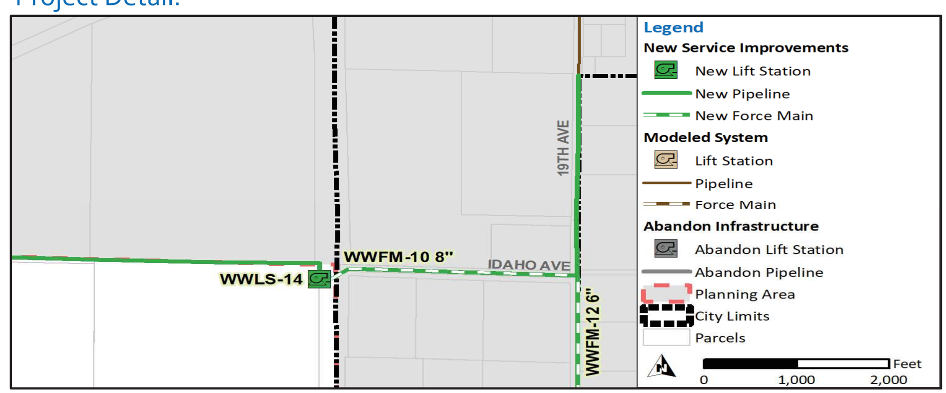
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,658,000
Total	100%	$ 1,658,000

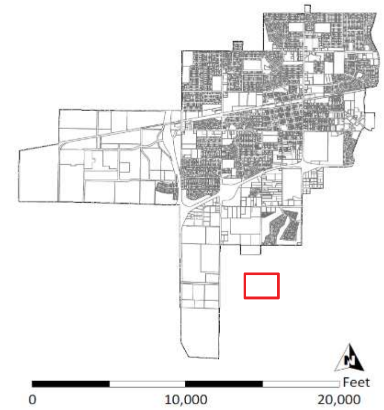
Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



Project Number: WWLS-15
Project Name: South Vine Street Lift Station
System Type: Wastewater Collection System



Project Description:

This project will service future growth within the eastern Idaho-Jackson Annexation. This area is defined as light industrial and is considered east of the irrigation canal, extending from Idaho Avenue to Jackson Avenue. The project is estimated to require a firm capacity of 0.85 mgd.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	-	1.7	New	2	--	$ 850,000	$ 1,105,000	$ 1,409,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

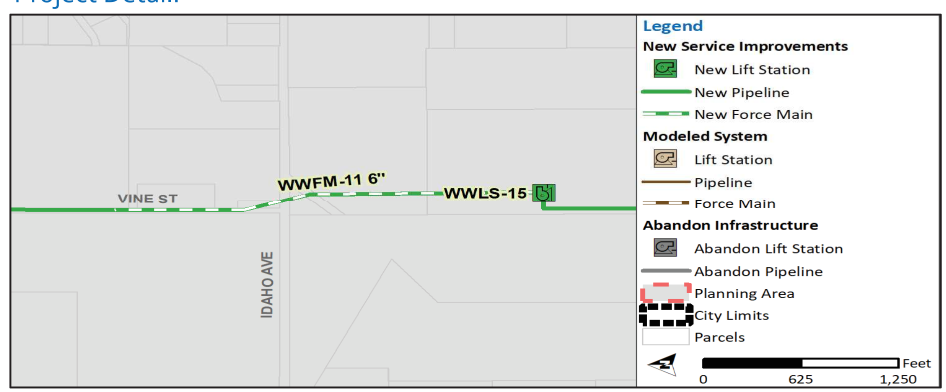
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,409,000
Total	100%	$ 1,409,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



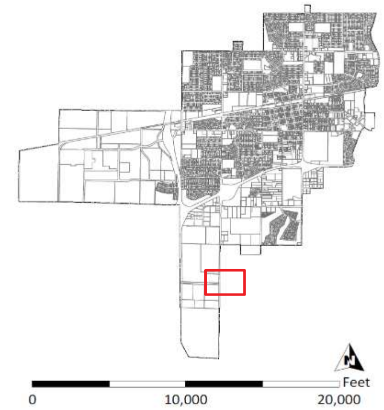
City of LEMOORE CALIFORNIA

carollo

Project Number:	WWLS-16
Project Name:	South 19th Avenue Lift Station
System Type:	Wastewater Collection System

Project Description:

This project will service future growth within the western Idaho-Jackson Annexation and light industrial west of 19th Avenue. The project is estimated to require a firm capacity of 0.75 mgd.



Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost[1] ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Lift Station	-	1.5	New	2	--	$ 750,000	$ 975,000	$ 1,243,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

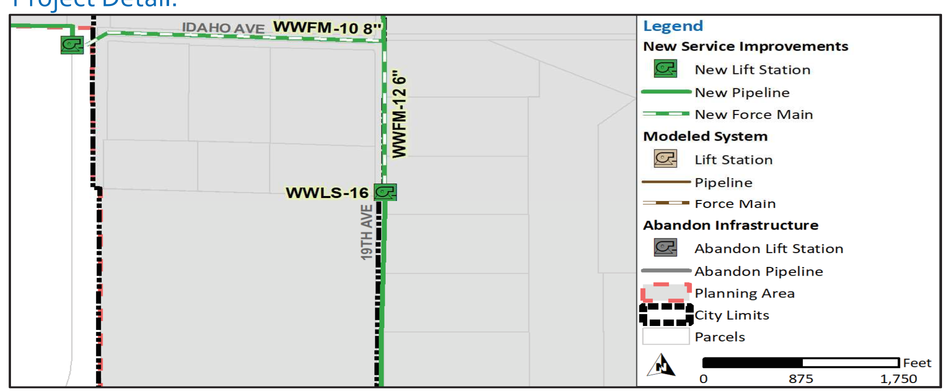
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,243,000
Total	100%	$ 1,243,000

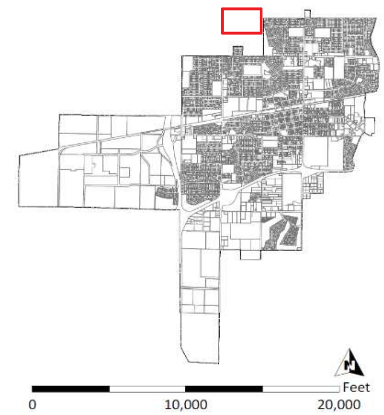
Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



Project Number: WWLS-17
Project Name: Liberty Drive Lift Station
System Type: Wastewater Collection System



Project Description:

This project will service future growth north of the City's limits. The project is estimated to require a firm capacity of 0.87 mgd (Total Capacity 1.74 mgd). A preliminary analysis indicated a lift station is required due to the topography and minimum slope of proposed gravity mains.

Project Details:

Project Element	Existing Total Capacity (mgd)	Proposed Total Capacity (mgd)	Replace/ New	No. of Pumps (Units)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Lift Station	-	1.7	New	2	--	$ 850,000	$ 1,105,000	$ 1,409,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

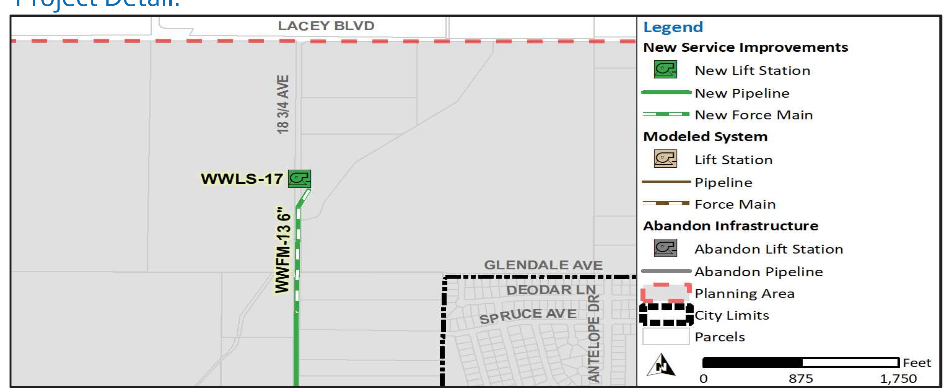
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,409,000
Total	100%	$ 1,409,000

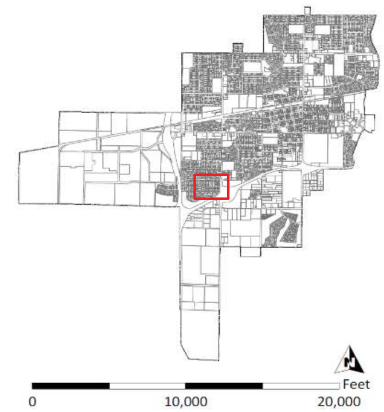
Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



Project Number:	WWFM-1
Project Name:	Carmel Lift Station Force Main
System Type:	Wastewater Collection System



Project Description:

Dual force mains are recommended to convey flows into the existing 16-inch force main. A 10-inch and 12-inch diameter force mains are recommended to convey existing and future flows. Under existing and 2040 flow conditions the 10-inch will convey dry weather and wet weather flows. To convey flows beyond 2040, a second force main (12-inch diameter) is recommended.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Force Main	-	10	New	50	$ 180	$ 9,000	$ 12,000	$ 15,000	2019
Force Main	-	12	New	50	$ 190	$ 10,000	$ 13,000	$ 17,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

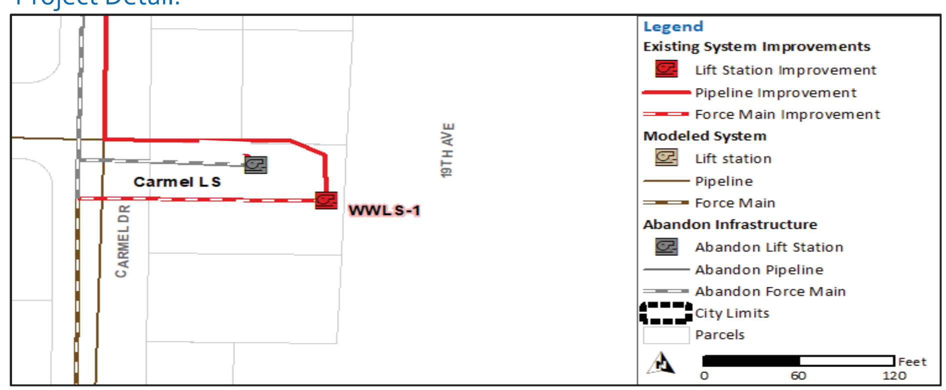
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	47%	$ 15,000
Future Users	53%	$ 17,000
Total	100%	$ 32,000

Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

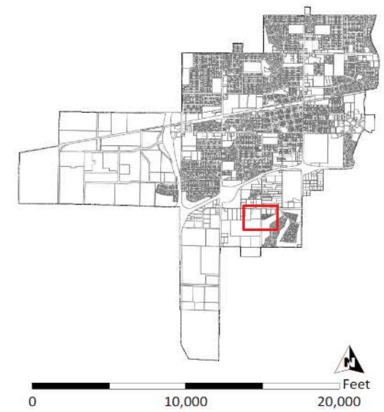
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number: WWFM-2
Project Name: Thomas Lift Station Force Main
System Type: Wastewater Collection System



Project Description:

This project will replace approximately 100 feet of 8-inch diameter force main. To mitigate capacity deficiencies under existing conditions, it is recommended the pipeline be replaced with a 10-inch diameter force main to accommodate existing and 2040 flows. To convey flows beyond 2040, a second force main (10-inch diameter) is recommended under future conditions.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Force Main	8	10	Replace	100	$ 180	$ 18,000	$ 23,000	$ 30,000	2021
Force Main	-	10	Replace	100	$ 180	$ 18,000	$ 23,000	$ 30,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

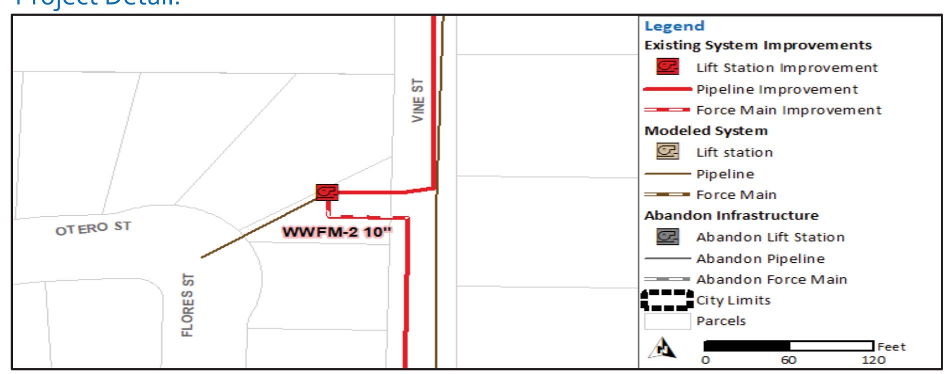
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	50%	$ 30,000
Future Users	50%	$ 30,000
Total	100%	$ 60,000

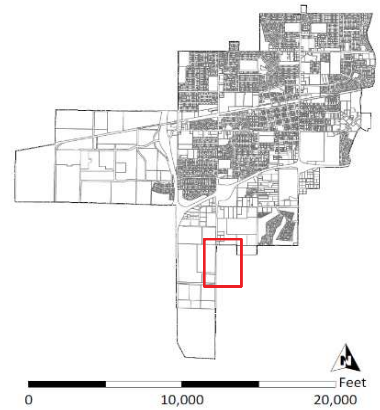
Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

Project Detail:



Project Number: WWFM-3
Project Name: Glendale Avenue Lift Station Force Main
System Type: Wastewater Collection System



Project Description:

This project is a force main for the Glendale Avenue (WWLS-6) Lift Station. The pipeline consists of a 6-inch diameter pipeline and extends 500 feet. The force main crosses a canal and connects to the existing system in Ashland Drive. Alternatively, the Quandt trunk sewer has capacity.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Force Main	-	6	New	500	$ 170	$ 85,000	$ 111,000	$ 141,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

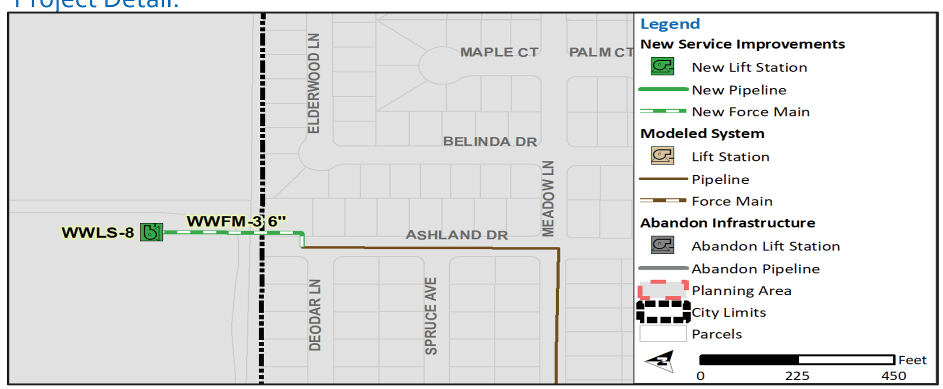
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 141,000
Total	100%	$ 141,000

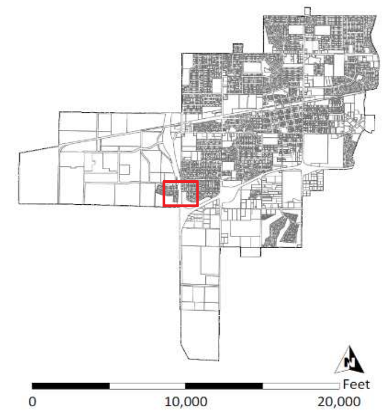
Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



Project Number:	WWFM-4
Project Name:	Cimarron Lift Station Force Main
System Type:	Wastewater Collection System



Project Description:

This project will replace approximately 450 feet of 8-inch diameter force main under Highway 41. To mitigate capacity deficiencies under buildout conditions, it is recommended that the existing pipeline be replaced with a 12-inch diameter force main. Because the pipeline crosses a highway, the force main will require a 24-inch steel casing.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Force Main and Interstate Crossing	8	12/24	Repalce	500	$ 495	$ 248,000	$ 322,000	$ 411,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

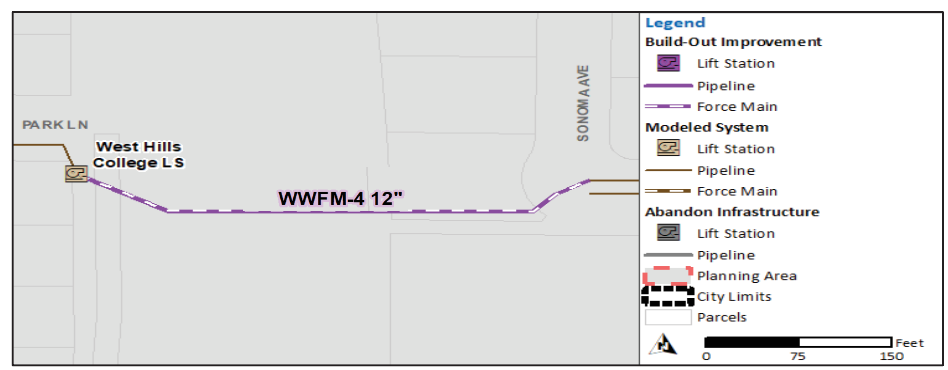
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 411,000
Total	100%	$ 411,000

Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

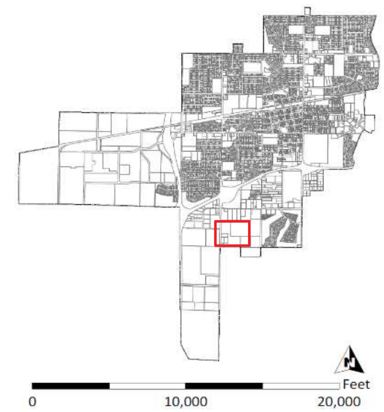
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWFM-5
Project Name:	Olam (SK) Lift Station Force Main
System Type:	Wastewater Collection System



Project Description:

This project will replace approximately 400 feet of 8-inch diameter force main. To mitigate capacity deficiencies under buildout conditions, it is recommended the existing pipeline be replaced with a 12-inch diameter force main. Under buildout it's assumed that all sewer flows from future development along South 19th Avenue and land designated as Employee Reserve, west of Highway 41, will be conveyed to the Olam Lift.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Force Main	8	12	Replace	400	$ 190	$ 76,000	$ 99,000	$ 126,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

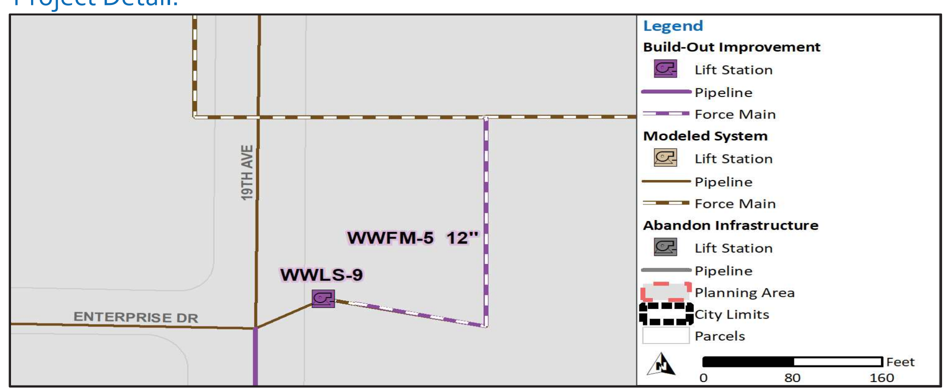
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 126,000
Total	100%	$ 126,000

Notes on Cost Estimation:

This project is a future improvement and the cost has been assigned to future users.

Project Detail:



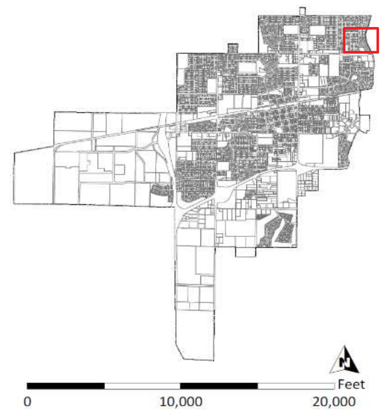
City of LEMOORE CALIFORNIA

carollo

Project Number:	WWFM-6
Project Name:	Hanford Armona Lift Station Force Main
System Type:	Wastewater Collection System

Project Description:

This project will service future growth and potentially existing users northeast of the City's current city limits. A 6-inch diameter force main is recommeded to convey flows under the Lemoore Canal and will extend approximatley 1,300 feet.



Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Force Main	-	6	New	1,300	$ 170	$ 221,000	$ 287,000	$ 366,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

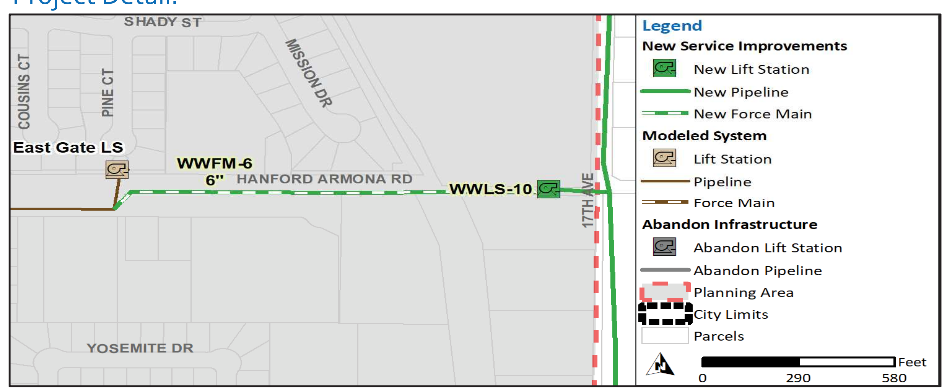
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 366,000
Total	100%	$ 366,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

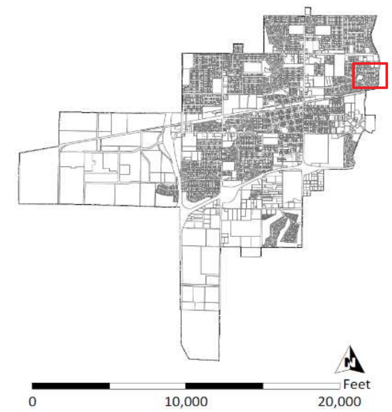
Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWFM-7
Project Name:	D Street Lift Station Force Main
System Type:	Wastewater Collection System



Project Description:

This project projects will serve future growth and potentially existing users east of the City's current limits. A 6-inch diameter force main is recommeded to convey flows under the Lemoore Canal and will extend approximatley 1,000 feet to the existing force main in Barcelona Drive.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Force Main	-	6	New	1,000	$ 170	$ 170,000	$ 221,000	$ 282,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

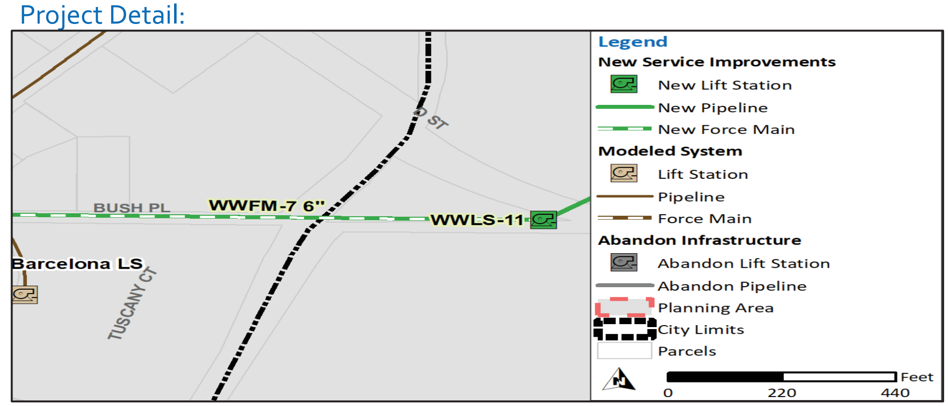
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 282,000
Total	100%	$ 282,000

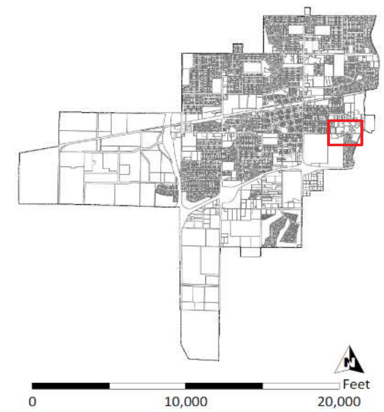
Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



Project Number:	WWFM-8
Project Name:	18th Avenue Lift Station Force Main
System Type:	Wastewater Collection System



Project Description:

This projects will serve future growth within the south east quadrant of the City. A 6-inch diameter force main will extend 900 feet from 18th Avenue to the existing system in Iona Avenue.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Force Main	-	6	New	900	$ 170	$ 153,000	$ 199,000	$ 254,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

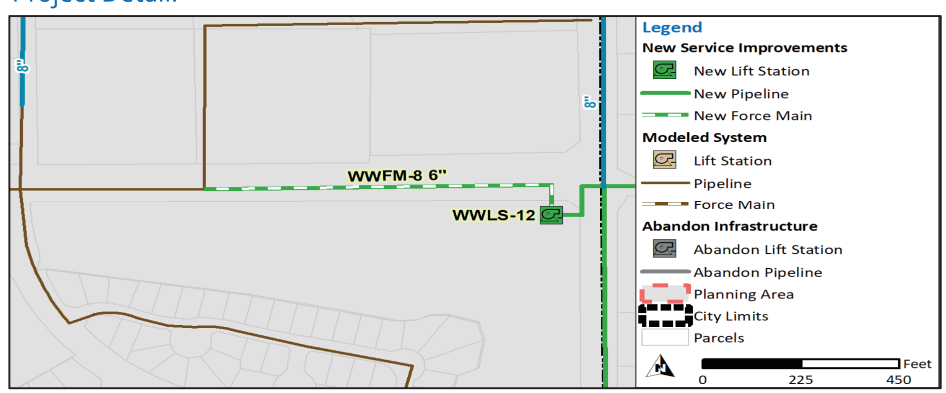
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 254,000
Total	100%	$ 254,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



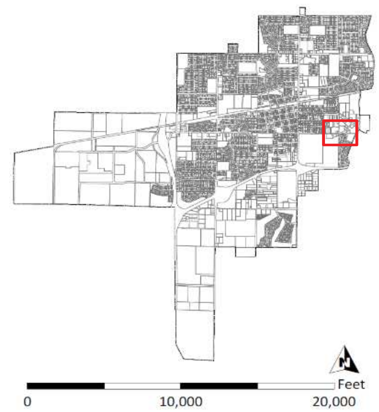
City of LEMOORE CALIFORNIA

carollo

Project Number: WWFM-9

Project Name: South 18th Avenue Lift Station Force Main

System Type: Wastewater Collection System



Project Description:

This projects will serve future growth within the south east quadrant of the City. A 6-inch diameter force main will extend 300 feetin 18th Avenue and cross a canal.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Force Main	-	6	New	300	$ 170	$ 51,000	$ 66,000	$ 85,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

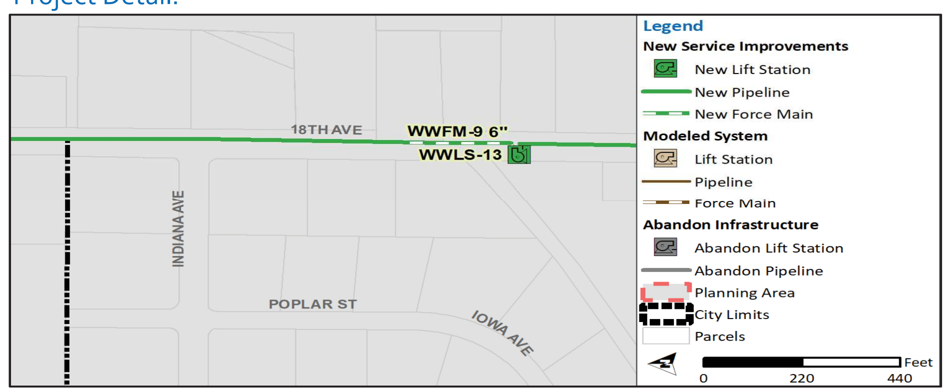
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 85,000
Total	100%	$ 85,000

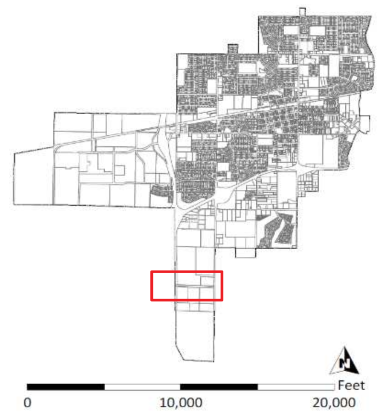
Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



Project Number:	WWFM-10
Project Name:	Idaho Avenue Lift Station Force Main
System Type:	Wastewater Collection System



Project Description:

This project will service future growth within the Employment area in the southwest. The project will cross Highway 41 and connect to a proposed pipeline (WWGM-24) in 19th Avenue. This reach of pipeline consists of an 8-inch diameter force main and extends 2,700 feet. The segment that crosses Highway 41 will require a steel casing.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Force Main and Interstate Crossing	-	8/24	New	500	$ 495	$ 248,000	$ 322,000	$ 411,000	2041 & beyond
Force Main	-	8	New	2,200	$ 170	$ 374,000	$ 486,000	$ 620,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

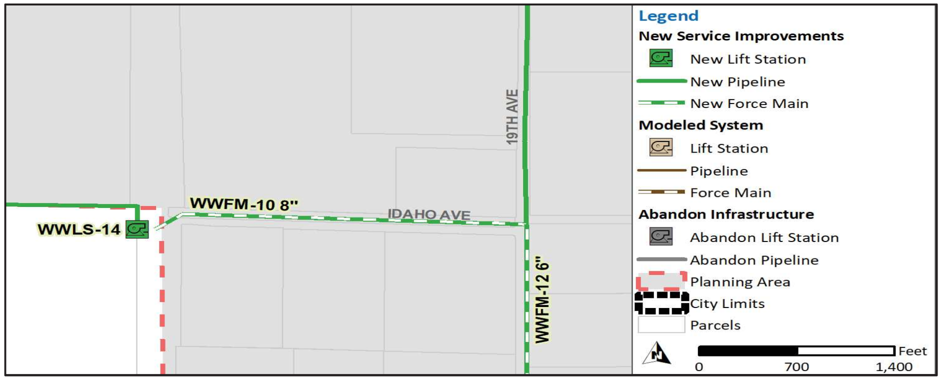
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,031,000
Total	100%	$ 1,031,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



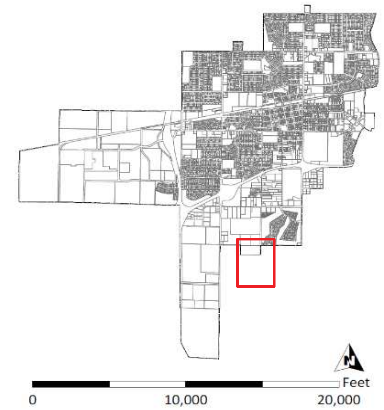
City of LEMOORE CALIFORNIA

carollo

Project Number: WWFM-11
Project Name: South Vine Street Lift Station Force Main
System Type: Wastewater Collection System

Project Description:

This project is a force main for the South Vine Street (WWLS-13) Lift Station. The pipeline consisits of a 6-inch diameter pipeline and extends 1,900 feet.



Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Force Main	-	6	New	2,700	$ 170	$ 459,000	$ 597,000	$ 761,000	2041 & beyonc

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

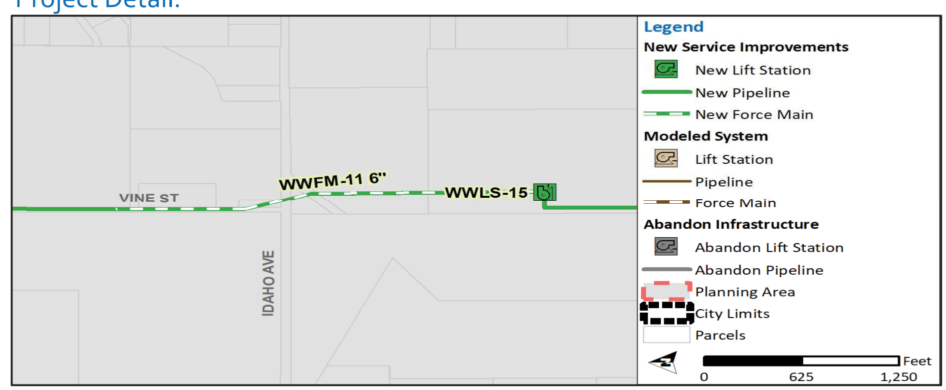
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 761,000
Total	100%	$ 761,000

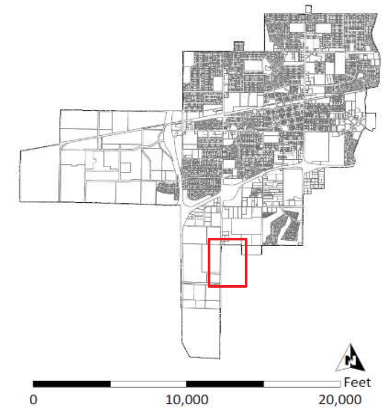
Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



Project Number:	WWFM-12
Project Name:	South 19th Avenue Lift Station Force Main
System Type:	Wastewater Collection System



Project Description:

This project is a force main for the South 19th Avenue (WWLS-14) Lift Station. The pipeline consisits of a 6-inch diameter pipeline and extends 1,700 feet.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Force Main	-	6	New	1,700	$ 170	$ 289,000	$ 376,000	$ 479,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

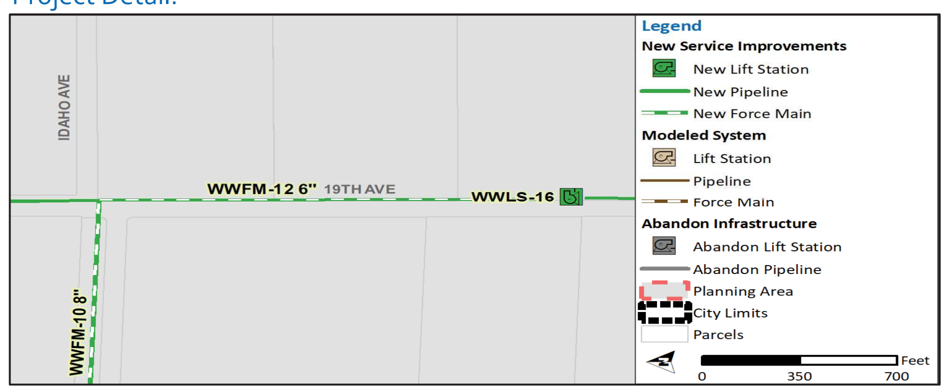
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 479,000
Total	100%	$ 479,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



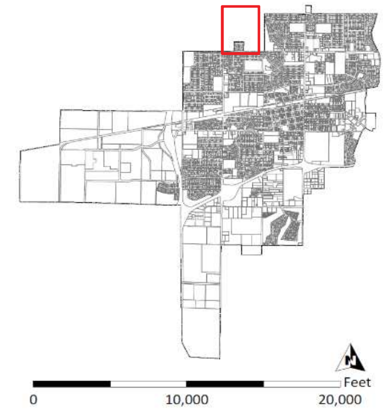
City of LEMOORE CALIFORNIA

carollo

Project Number: WWFM-13

Project Name: Liberty Drive Lift Station Force Main

System Type: Wastewater Collection System



Project Description:

This project is a force main for the Liberty Drive Lift Station (WWLS-16) Lift Station. The pipeline consisits of a 6-inch diameter pipeline and extends 1,400 feet.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Force Main	-	6	New	1,400	$ 170	$ 238,000	$ 309,000	$ 394,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

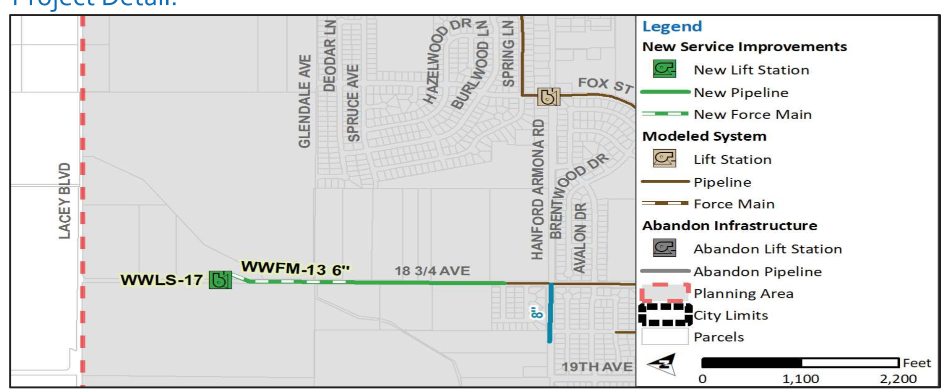
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 394,000
Total	100%	$ 394,000

Notes on Cost Estimation:

This Project will service new development, therefore, future users are assigned 100-percent of the cost.

Project Detail:



City of LEMOORE CALIFORNIA

carollo

Project Number:	WWRR-1
Project Name:	Annual Sewer Line Replacement Program
System Type:	Wastewater Collection System

Project Description:

Annual Sewer Line Replacement Program. The purpose of the program is to identify and replace sewer infrastructure susceptible to failure or shows corrosion and deterioration. This program will maintain operation of the collection system by replacing infrastructure prior to failure.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Annual Sewer Line Replacement	--	--	--	--	--	--	--	$ 100,000	2019
Annual Sewer Line Replacement	--	--	--	--	--	--	--	$ 100,000	2020
Annual Sewer Line Replacement	--	--	--	--	--	--	--	$ 100,000	2021
Annual Sewer Line Replacement	--	--	--	--	--	--	--	$ 100,000	2022
Annual Sewer Line Replacement	--	--	--	--	--	--	--	$ 100,000	2023
Annual Sewer Line Replacement	--	--	--	--	--	--	--	$ 500,000	2024-2028
Annual Sewer Line Replacement	--	--	--	--	--	--	--	$ 1,200,000	2029-2040

Notes:
(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	45%	$ 1,000,000
Future Users	55%	$ 1,200,000
Total	100%	$ 2,200,000

Notes on Cost Estimation:

Cost estimates beyond 2028 are assigned to future users.

City of LEMOORE CALIFORNIA

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Project Number: WWO-1
Project Name: Sewer Master Plan Update
System Type: Wastewater Collection System

Project Description:
It is recommended that the City undergoes a Sewer Master Plan Update every 5-years to evaluate wastewater collection system.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Sewer Master Plan Update	--	--	--	--	--	--	--	$ 150,000	2023
Sewer Master Plan Update	--	--	--	--	--	--	--	$ 150,000	2028
Sewer Master Plan Update	--	--	--	--	--	--	--	$ 150,000	2029-2040
Sewer Master Plan Update	--	--	--	--	--	--	--	$ 150,000	2029-2040

Notes:
(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.
(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.
(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

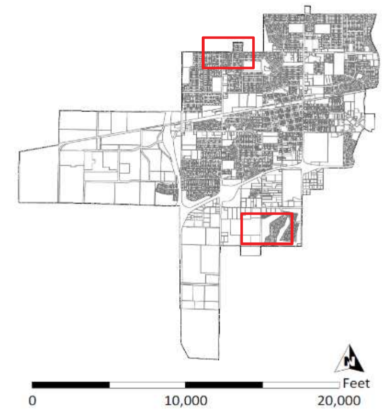
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	50%	$ 300,000
Future Users	50%	$ 300,000
Total	100%	$ 600,000

Notes on Cost Estimation:
Cost estimates beyond 2028 are assigned to future users.

City of LEMOORE

Project Number:	WWO-2
Project Name:	Septic Removal
System Type:	Wastewater Collection System



Project Description:

These projects are recommended to connect septic users to the City's collection system:

- 1,000 feet of 8-inch diameter pipeline is recommended to connect the Lemoore Mobile Home Park on Hanford Armona Road to the existing system.
- 2,000 feet of 8-inch sewer is recommended to connect the community parallel to the Lemoore Golf Course on 18th Avenue.
- 1,500 feet of 8-inch sewer is recommend to connect users along Champion Street.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	8	New	1,000	$ 170	$ 170,000	$ 221,000	$ 282,000	2029-2040
Gravity Main	-	8	New	2,000	$ 170	$ 340,000	$ 442,000	$ 564,000	2041 & beyond
Gravity Main	-	8	New	1,500	$ 170	$ 255,000	$ 332,000	$ 423,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

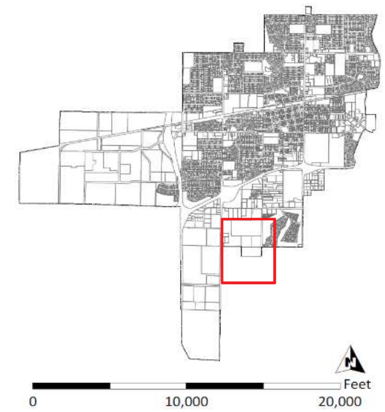
(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,269,000
Total	100%	$ 1,269,000

Notes on Cost Estimation:

Project Number: WWO-3
Project Name: WWTF
System Type: Wastewater Collection System



Project Description:

Costs are for recommended treatment alternative. Details are available in Chapter 9 and Appendix S of the Master Plan.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost[1] ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost[2] ($)	Capital Improvement Cost[3] ($)	Project Schedule
Design								$ 5,057,000	2028
Construction								$ 45,511,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

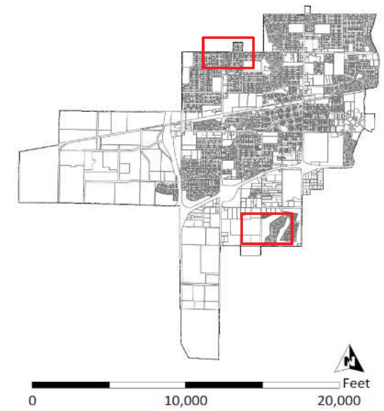
Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	82%	$ 41,415,000
Future Users	18%	$ 9,153,000
Total	100%	$ 50,568,000

Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

Project Number: WWO-2
Project Name: Septic Removal
System Type: Wastewater Collection System



Project Description:

These projects are recommended to connect septic users to the City's collection system:
- 1,000 feet of 8-inch diameter pipeline is recommended to connect the Lemoore Mobile Home Park on Hanford Armona Road to the existing system.
- 2,000 feet of 8-inch sewer is recommended to connect the community parallel to the Lemoore Golf Course on 18th Avenue.
- 1,500 feet of 8-inch sewer is recommend to connect users along Champion Street.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost ($)	Baseline Construction Cost(1) ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Gravity Main	-	8	New	1,000	$ 170	$ 170,000	$ 221,000	$ 282,000	2029-2040
Gravity Main	-	8	New	2,000	$ 170	$ 340,000	$ 442,000	$ 564,000	2041 & beyond
Gravity Main	-	8	New	1,500	$ 170	$ 255,000	$ 332,000	$ 423,000	2041 & beyond

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	0%	$ -
Future Users	100%	$ 1,269,000
Total	100%	$ 1,269,000

Notes on Cost Estimation:

City of LEMOORE CALIFORNIA

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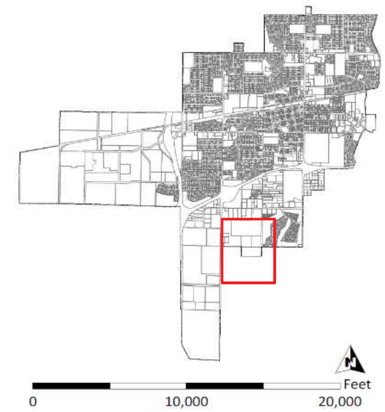
Project Number: WWO-3
Project Name: WWTF
System Type: Wastewater Collection System



Project Description:

Costs are for recommended treatment alternative. Details are available in Chapter 9 and Appendix S of the Master Plan.

Project Details:

Project Element	Existing Diameter (in)	Proposed Diameter (in)	Replace/ New	Length (ft)	Unit Cost(1) ($/ft)	Baseline Construction Cost ($)	Estimated Construction Cost(2) ($)	Capital Improvement Cost(3) ($)	Project Schedule
Design								$ 5,057,000	2028
Construction								$ 45,511,000	2029-2040

Notes:

(1) ENR 20 City Average Construction Cost Index for October 2018 is 11,183.

(2) Estimated Construction Cost includes a 30% contingency of the baseline construction cost.

(3) Total project costs includes a 10% markup for engineering, a 10% markup for construction management and a 7.5% markup for project administration of the estimated construction cost.

Project Cost Allocation:

Reimbursement Category	Percent	Cost ($)
Existing Users	82%	$ 41,415,000
Future Users	18%	$ 9,153,000
Total	100%	$ 50,568,000

Notes on Cost Estimation:

A cost percentage has been assigned to existing and future users as a combination of users will benefit from the improvement.

City of LEMOORE CALIFORNIA

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Appendix I

WATER BALANCE

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
	2040 Projections		Hydrologic				Title 22 Reuse			Percolation Ponds					
	Flow[1]		ETo[2]	Precip[2]	Net irrigation requirement[3]	Pan Evap[4]	Urban[5]	RW demand[6]	Excess Effluent[7]	Area[8]	Percolation Rate		Evap/Precip		Monthly Storage Needs[13]
Month	mgd	AF/mo	in/mo	in/mo	in/mo	in/mo	Acres	AF/mo	AF/mo	Acres	in/day[9]	AF/mo[10]	in/mo[11]	AF/mo[12]	AF/mo
January	2.438	232.0	1.19	1.54	0	1.3	194	0	232.0	20	4.8	-248	0.24	0.4	-15.6
February	2.453	210.8	2.14	1.42	0.98	2.3	194	16	195.0	20	4.8	-224	-0.88	-1.5	-30.5
March	2.443	232.4	4.11	1.21	3.92	4.2	194	63	169.0	20	4.8	-248	-2.99	-5.0	-83.9
April	2.430	223.7	6.06	0.50	7.52	5.9	194	122	102.1	20	4.8	-240	-5.40	-9.0	-146.9
May	2.406	228.9	8.16	0.30	10.63	8.3	194	172	57.0	20	4.8	-248	-8.00	-13.3	-204.4
June	2.322	213.8	8.97	0.05	12.07	9.6	194	195	18.7	20	4.8	-240	-9.55	-15.9	-237.2
July	2.247	213.8	9.04	0.05	12.17	10.0	194	197	17.0	20	4.8	-248	-9.95	-16.6	-247.6
August	2.291	218.0	8.12	0.06	10.90	8.5	194	176	41.7	20	4.8	-248	-8.44	-14.1	-220.3
September	2.345	215.9	6.18	0.12	8.20	6.3	194	133	83.4	20	4.8	-240	-6.18	-10.3	-166.9
October	2.385	226.9	4.09	0.67	4.62	4.4	194	75	152.3	20	4.8	-248	-3.73	-6.2	-101.9
November	2.450	225.6	2.12	0.49	2.20	2.1	194	36	190.1	20	4.8	-240	-1.61	-2.7	-52.6
December	2.457	233.8	1.16	1.27	0	1.0	194	0	233.8	20	4.8	-248	0.27	0.4	-13.8
Total		**2676**	**61.3**	**7.7**	**73.2**	**63.9**		**1184**	**1492**			**-2920**	**-56.2**	**-93.7**	**-1522**

Notes:
1) 2040 flow values based on projected average annual flow of 2.38 mgd and historical monthly variations.
2) Data from California Irrigation Management Information System.
3) ([C]-[D])*1.15/0.85. Where 0.85 = 85% irrigation factor (Average value from Carlos and Guitijens, University of Nevada) and 1.15 = 15% leaching fraction (Average value from Ayers and Westcot, "Water Quality for Agriculture", Food and Agriculture Organization of the United Nations).
4) Values from Tulare, CA
5) Recycled water use area for Lemoore Golf Course and Lemoore High School.
6) [E]*[G]/12
7) [B]-[H]
8) Area of percolation ponds required to dispose of excess effluent year round.
9) Percolation rate of 0.2 in/hr determined based on 2003 soils report at Lemoore Headworks Structure (Carollo, 2003)
10) -[J]*[K}*(days/mo)/12
11) [D]-[F]
12) [J]*[M]/12

Appendix J
RECYCLED WATER INFRASTRUCTURE CONSTRUCTION COST ESTIMATE

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Engineers...Working Wonders With Water®

PROJECT SUMMARY

Project:	**Wastewater Treatement Facility Master Plan**	**Estimate Class:**	**Class 5**
Client:	**City of Lemoore**	**PIC:**	
Location:	**City of Lemoore**	**PM:**	**Eric Casares**
Zip Code:	**93245**	**Date:**	**Fall 2018**
		By:	**John Witter**
Carollo Job #	**10651A00**	**Reviewed:**	

NO.	DESCRIPTION			TOTAL
01	Distribution			$1,837,940
02	Storage			$146,760
		TOTAL DIRECT COST		**$1,984,700**
	Contingency		30.0%	$595,410
		Subtotal		**$2,580,110**
	General Contractor Overhead, Profit & Risk		10.0%	$258,011
		Subtotal		**$2,838,121**
	Escalation to Mid-Point		3.0%	$267,635
		Subtotal		**$3,105,756**
	Sales Tax (Based on 50% of Direct Cost)		7.25%	$71,945
		Subtotal		**$3,177,702**
	Bid Market Allowance		0.0%	$0
	TOTAL ESTIMATED CONSTRUCTION COST			**$3,177,702**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

Engineers...Working Wonders With Water®

DETAILED COST ESTIMATE

Project:	**Wastewater Treatement Facility Master**	**Format:**	**MASTER FORMAT 17**
Client:	**City of Lemoore**	**Date :**	**Fall 2018**
Location:	**City of Lemoore**	**By :**	**John Witter**
Element:	**01 Distribution**	**Reviewed:**	

SPEC. NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL
	Division 15 - Mechanical					
15_00_00	8" PVC Jack and Bore	250	LF	$960	$240,000	
15249	16" Sdr-26 Pvc Sewer Pipe, In Trench	5280	LF	$218	$1,151,040	
15249	8" Sdr-26 Pvc Sewer Pipe, In Trench	4100	LF	$109	$446,900	
	Total					**$1,837,940**
	Grand Total					**$1,837,940**

Engineers...Working Wonders With Water®

DETAILED COST ESTIMATE

Project: Wastewater Treatement Facility Master
Client: City of Lemoore
Location: City of Lemoore
Element: 02 Storage

Format: MASTER FORMAT 17
Date : Fall 2018
By : John Witter
Reviewed:

SPEC. NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL
	Division 02 - Site Construction					
02_00_00	Pond Liner	174240	SF	$.84	$146,362	
02_00_00	Pond Berm	133	CY	$2.99	$399	
	Total					**$146,760**
	Grand Total					**$146,760**

Appendix K

2018 CONSUMERCONFIDENCE REPORT

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2018
City of Lemoore Consumer Confidence Report

CONSTITUENTS	YEAR TESTED	UNIT	MCL	PHG	MCLG	COL LEVEL DETECTED	RANGE	SOURCE OF LIKELY CONTAMINANT
PRIMARY STANDARDS								
Aluminum	2017	ppb	1000	NA	NA	430	170-640	Erosion of natural deposits.
Arsenic	2017	ppb	10	NA	NA	6.2	ND-25	Erosion of nature & industries.
Fluoride	2017	ppm	2	1	NA	0.7	.62 - 1.1	Erosion of nature & industries.
1,2-Dichlorobenze	2015	ppb	600	600	NA	4.7		Industrial discharge
Lead	2017	ppb	15	2	NA	2.0	2	Erosion of nature & plumbing system.
SECONDARY STANDARDS								
Color	2017	Units	15	NA	NA	25		Naturally occurring organic materials
Iron	2017	ppb	300	NA	NA	17		Erosion of nature & industries.
Turbidity	2017	NTU	5	NA	NA	3.7		Erosion of natural deposits.
GENERAL MINERALS								
Bicarbonate	2017	mg/l	NA	no goal		200		Erosion of natural deposits.
Carbonate	2017	mg/l	NA	no goal		0.67		Erosion of natural deposits.
Calcium	2017	mg/l	NA	no goal		1.2		Erosion of natural deposits.
Magnesium	2017	mg/l	NA	no goal		0.16		Erosion of natural deposits.
Sodium	2017	mg/l	NA	no goal		160		Erosion of natural deposits.
Hardness	2017	mg/l	NA	no goal		3.8		Erosion of natural deposits.
PH	2017	Std Units	NA	no goal		9		
SECONDARY STANDARDS								
TDS	2017	ppm	1000	NA	NA	400		Erosion of natural deposits.
Specific Conductance	2015	umho/cm	1600	NA	NA	584	240-740	Substances that form ions in water
Chloride	2017	ppm	500	NA	NA	88		Erosion of natural deposits
Sulfate	2017	ppm	500	NA	NA	1.18	ND - 7	Erosion of natural deposits.
Manganese	2017	ppb				4	ND - 16	Erosion of natural deposits.
Copper	2015	ppb	1000			0.06	.05-.06	Erosion of natural deposits; pipe corrosion
RADIOACTIVITY								
Gross Alpha	2010-2014	pCi/L	15	no goal		7.4	3.44-16.65	Erosion of natural deposits.
Radium 226+228	2010-2013	pCi/L	5	no goal		1.16	.18-2.43	Erosion of natural deposits.
Uranium	2010-2013	pCi/L	20	no goal		3.76	1.24-5.61	Erosion of natural deposits.
UNREGULATED CONTAMINANTS								
Strontium	2015	pCi/L	NA	no goal		19		Erosion of natural deposits.
Vanadium	2015	ppb	NA	no goal		2.00		Naturally occurring elemental metal
DISTRIBUTION SYSTEM MONITORING								
DISINFECTION BYPRODUCTS								
Total Haloacetic acids	2017	ppb	60	NA	NA	37	30-46	Disinfection byproduct.
TTHMs [Total trihalomethanes]	2017	ppb	80	NA	NA	128	98-130	Disinfection byproduct.
*** A Compliance Order has been issued, and the City is looking into a project to treat for disinfection byproducts.**								
Chlorine Residual Average	2017	mg/L	4	NA	NA	1.66	.1-4.0	Disinfection byproduct.
***Non-corrosive (NC)**								

Microbiological Contaminants	Highest No. of Detections	No. of months in Violation	MCL	MCLG	Typical Source of Bacteria
Total Coliform Bacteria*	2 (in a month)	0	More than 1 sample positive	0	Naturally present in the environment
Fecal Coliform or *E. coli*	0 (in a year)	0		0	Human and animal fecal waste

*Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, bacteria may be present. When coliform bacteria are found, special follow-up tests are done to determine if harmful bacteria are present in the water supply. If the standard is exceeded, the water supplier must notify the public.

Lead and Copper	Year Tested	No. of Samples Collected	90th Percentile Level Detected	No. Sites Exceeding AL	AL	MCLG	Typical Source of Contaminant
Lead (ppb)	2017	30	ND	0	15	2	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits.
Copper (ppb)	2017	30	0.63	0	1300	170	Internal corrosion of household water plumbing systems; erosion of natural deposits; leaching from wood preservatives.

Appendix L

2001 WWTF CAPACITY ANALYSIS

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carollo engineers

Dedicated to creative,
responsive, quality solutions
for those we serve.

Ind Dom

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March 30, 2001
6214A.00

Leprino Foods Company
1830 East 38th Avenue
Denver, CO 80211-2200

Attention: Mr. Robert Garcia
Director of Technical Services, Environmental Operations

Subject: Lemoore Wastewater Treatment Plant (WWTP) Capacity Evaluation

Dear Mr. Garcia:

We have completed our preliminary evaluation of the capacity of the Lemoore WWTP, in accordance with our agreement dated January 10, 2001. Our preliminary findings indicate that the WWTP is currently operating near capacity. This is based on achieving an effluent BOD_5 less than 40 mg/L, which is their current permit limit.

Table 1 lists the historical flows and BOD loadings for the WWTP for the year 2000. For our analysis, we used the annual average data for the Leprino influent and the domestic influent. We did not include the flows and loadings from the Candlewick and SK dischargers, as they are negligible. We used the industrial pond (Pond 1A) the domestic pond (Pond 1B) running in parallel and discharging to Pond 2. Pond 3 is a polishing pond and, unless provided with sufficient aeration, does not provide any appreciable treatment. Therefore, we did not include it in our model for the year 2000. Pond 3 will help protect the plant against peak conditions and, more importantly, to provide settling of solids which do contribute some amount of BOD_5 in the effluent.

We input the 2000 flow and BOD_5 data into our computer model to compare against actual discharge data (Spreadsheet No. 1). The industrial flow was 0.62 million gallons per day (mgd), and the domestic flow was 2 mgd. The industrial BOD5 loading was 8,723 pounds per day (lbs/day) and the domestic BOD_5 loading was 2,346 lbs/day, for a total loading of 11,069 lbs/day. The model assumes a reaction rate constant (K20) of 0.25 for the partial mix ponds; two K20 values for the complete mix ponds (0.55 and 1.0), a temperature coefficient (theta) of 1.075 for all ponds.

The model shows a predicted effluent BOD_5 would be 16 mg/L in the summer and 36 mg/L in the winter. In reality, the effluent BOD_5 would be slightly lower than the ranges predicted, since we have not accounted for the minor treatment provided by the polishing pond (Pond 3). We believe the model is reasonable, when compared to the last year's data. In 2000, the lowest effluent BOD5 values were 10 mg/L (October) and 13 mg/L (June and July), and the highest BOD5 value was 29 mg/L in January.

7580 NORTH INGRAM AVENUE, SUITE 112 • FRESNO, CALIFORNIA 93711 • (559) 436-6616 • FAX (559) 436-1191

Table 2 lists our estimated horsepower requirements for mixing and aeration, and compares our estimates to the horsepower currently provided. Overall, mixing requirements govern over aeration. The WWTP has adequate horsepower to treat current BOD_5 and satisfy mixing requirements. There does not appear to be a gross excess of installed horsepower beyond what is needed. One exception is in Pond 2, where 120 hp is installed. According to the 1990 design report, aerators were not planned for this pond unless needed to handle peak industrial loadings. We assume this is why they were added; however, the 120 hp is more than what is needed in this pond to handle average 2000 conditions.

According to the 1990 design report, the design criteria for Pond 1A is 0.8 mgd, at a BOD_5 loading of 12,000 lbs/day. The design criteria for Pond 1B is 1.0 mgd, at a BOD_5 loading of 2,000 lbs/day. This gives a total plant capacity of 2.0 mgd at 14,000 lbs/day incoming BOD_5.

We ran our model at the 1990 design flows and loads and came up with a projected effluent of 37 mg/L for winter conditions (Spreadsheet No. 2). The value is the same as the projected effluent concentration reported in the 1990 design criteria. This indicates the overall capacity of the plant (14,000 lbs/day, as established in 1990 and based on detention time) has not changed, even though additional aerators have been added.

As shown in Table 1, the industrial loading varied from 5,160 to 15,140 lbs/day last year, and there are several months when the loading remains near the 1990 design criteria of 12,000 lbs/day. Note that the effluent quality varies with the temperature more than with the loading. Winter conditions clearly dictate the treatment capacity of the system.

The plant is currently operating well to meet the BOD_5 limit, even though there is significantly more flow going through compared to 1990 flow criteria (30 percent increase), which reduces detention time, and slightly less BOD_5 (92 percent of the 1990 loading). You will find the flow and loading are inversely related, and must balance each other to remain within the treatment capability of the pond system.

Our conclusion is that the existing pond system is near capacity now. The industrial pond can handle a BOD_5 loading of 8,700 lbs/day to 15,000 lbs/day. The lower range is based on our model, which used average annual conditions, and provides reliability for the overall system. The higher range is based on monthly data from 2000. We would not consider this reliable capacity. The excess horsepower in Pond 2 may be assisting in handling peak loadings. The industrial capacity is limited by the domestic flow and loading conditions remaining at current levels. The 2000 effluent data support our calculations. With winter BOD_5 concentrations in the mid to high 20s, the WWTP simply does not have any reliable excess capacity. The limiting factor in the system is the detention time through the winter.

Additional ponds and aerators would need to be added to increase BOD_5 treatment capacity. One option to provide additional capacity would be to reconfigure the piping and aerators to convert Pond 3 into a fully aerated treatment pond. However, we would not expect this to add a significant increase in capacity. Another option would be to increase the volume of the complete mix cell, or add another complete mix cell. These options would also require installing more aerators.

The system is not equipped with enough aeration for nitrification. We assume all nitrogen is currently passing through the plant as ammonia. It will take a dramatic increase in horsepower to convert the ammonia to nitrate. We will provide an estimate of the additional power needed to treat current ammonia loadings next week, after we receive the laboratory results of the wastewater samples.

Carollo Engineers appreciates the opportunity to be of service to Leprino Foods Company. We are available to develop various design options to increase the capacity of the pond system; however, this work is not in our current scope. Please let us know if you are interested and we can prepare an amendment to our current agreement for your review.

Sincerely,

CAROLLO ENGINEERS, P.C.

David Stringfield

David L. Stringfield, P.E.

Penny Carlo

Penny Carlo, P.E.

DLS/PLC:cjp

Enclosures: Spreadsheet No. 1
Spreadsheet No. 2
Table 1
Table 2

Table 1 **Historical Flows and BOD Loadings**
City of Lemoore Wastewater Treatment Plant
Leprino Foods

2000	Domestic Influent			CW Influent			Leprino Influent			Final Combined Effluent			SK Effluent		
Month	Flow	BOD_5	BOD_5	Flow	BOD_5	BOD_5	Flow	BOD_5	BOD_5	Flow	BOD_5	BOD_5	Flow(1)	BOD_5	BOD_5
	(mgd)	(mg/L)	(ppd)	(mgd)	(mg/L)	(ppd)	(mgd)	(mg/L)	(ppd)	(mgd)	(mg/L)	(ppd)	(mgd)	(mg/L)	(ppd)
January	1.93	283	4566	0.04	23	7	0.66	1788	9881	2.08	29	504	0.11	0	0
February	1.98	173	2856	0.04	95	28	0.68	1235	7042	2.32	25	483	0.15	0	0
March	1.97	135	2220	0.04	25	7	0.67	1283	7153	2.49	21	436	0.18	0	0
April	1.96	140	2284	0.04	15	4	0.68	2665	15140	2.32	23	445	0.05	0	0
May	1.98	173	2859	0.04	48	14	0.55	1130	5160	2.16	24	433	0.07	0	0
June	2.05	98	1676	0.04	28	8	0.64	1965	10447	2.25	13	244	0.07	0	0
July	2.02	65	1093	0.04	105	31	0.69	1773	10201	2.32	13	251	0.46	0	0
August	2.14	113	2013	0.04	5	1	0.56	1293	6032	2.31	15	289	0.56	0	0
September	2.05	143	2445	0.04	3	1	0.59	1323	6490	2.53	18	380	0.52	0	0
October	2.06	105	1800	0.04	0	0	0.52	1840	7944	2.43	10	202	0.22	0	0
November	1.94	123	1993	0.04	5	1	0.56	2225	10464	2.42	16	323	0.20	0	0
December	-	-	-	-	-	-	-	-	-	2.48	20	414	-	-	-
Average	2.01	141	2346	0.04	32	9	0.62	1684	8723	2.34	19	367	0.23	0	0

Notes:
1. SK flow is discharged to canal with treated plant effluent.

Table 2	Estimated Aeration Horsepower Requirements at Current Conditions Lemoore Wastewater Treatment Plant Leprino Foods Company				
	Horsepower		Estimated Horsepower Requirements Based On Year 2000 Conditions		
Pond	Installed	Mixing Intensity Hp/mgal	Aeration	Mixing	Mixing Intensity Hp/mgal
1A1	390	53	344	365	50
1A2	75	9	58	85	10
1A3	75	13	19	56	10
1B1	70	5	23	94	6
1B2	0	0	4	17	3
2	120	6	11	64	3
3	25	1	--	--	--
Total HP	**755**		**459**	**681**	

SPREADSHEET NO. 1

	A	D	E	F	G	H	I	J	K	L	M
1	LEPRINO FOODS COMPANY										
2	CAPACITY ANALYSIS OF LEMOORE WWTF - YEAR 2000 CONDITIONS										
3											
4	HP SIZING FOR COMPLETE MIX CELL1A1										
5											
6											
7											
8											
9	Volume (mgal)			7.3							
10	Flow (mgd)			**0.62**							
11	Detention Time (d)			11.8							
12	Incoming BOD (mg/L)			1684							
13	Winter WW temp (C)			8							
14	Summer WW Temp (C)			26							
15	k20 (1/d)	0.45	0.25	0.55	1						
16	Theta	1.075	1.075	1.075	1.075						
17	kwinter	0.189	0.105	0.231	0.420						
18	ksummer	0.694	0.386	0.849	1.543						
19											
20	Size HP for both K values for summer and winter										
21	Formula = BOD out = (BODin/(1+kt)										
22			Winter	Summer	Winter	Summer					
23	k20		0.55	0.55	1	1					
24	kadjusted		0.231	0.849	0.420	1.543					
25	BODout (mg/L))		**453**	**153**	283	**88**					
26	BOD removed (mg/L)		1231	1531	1401	1596					
27	BOD removed (ppd)		6366	7916	7243	8253					
28	Oxygen Rqd (lbs O2/BOD removed)		1.5	1.5	1.5	1.5					
29	Oxygen Rqd (lbs)		9549	11873	10864	12380					
30	Aerater Efficiency (lbs O2/hp-hr)		1.5	1.5	1.5	1.5					
31	Aerator Efficiency per day (lbs O2/hp)		36	36	36	36					
32	**HP rqd for daily aeration rqmt**		**265**	**330**	**302**	**344**					
33	HP per mgal for aeration		36	45	41	47					
34	HP rqd for mixing per mgal		50	50	50	50					
35	**Total HP rqd for mixing (HP)**		**365**	**365**	**365**	**365**					
36											
37	HP SIZING FOR PARTIAL MIX CELL 1A2						HP SIZING FOR DOMESTIC POND 1B1				
38											
39											
40											
41											
42			Worst Case Influent			Best Case Influent	Worst Case Influent			Best Case Influent	
43			Winter	Summer		Summer	Winter	Summer		Summer	
44	k20		0.25	0.25		0.25	0.25	0.25		0.25	
45	kadjusted		0.105	0.386		0.386	0.105	0.386		0.386	
46	Flow per train (mgd)		**0.6**	**0.6**		**0.6**	**2.0**	**2.0**		**2.0**	
47	Detention Time (d)		13.7	13.7		13.7	7.9	7.9		7.9	
48	Volume (mgal)		8.5	8.5		8.5	15.7	15.7		15.7	
49	**BOD In (mg/L)**		**453**	**153**		**88**	**141**	**141**		**141**	
50	**BODout (mg/L))**		**186**	**24**		**14**	**77**	**35**		**35**	
51	BOD removed (mg/L)		267	129		74	64	106		106	
52	BOD removed (ppd)		1382	666		382	329	548		548	
53	Percent Removal		59%	84%		84%	45%	75%		75%	
54	Oxygen Rqd (lbs O2/BOD removed)		1.5	1.5		1.5	1.5	1.5		1.5	
55	Oxygen Rqd (lbs)		2072	999		573	494	822		822	
56	Aerater Efficiency (lbs O2/hp-hr)		1.5	1.5		1.5	1.5	1.5		1.5	
57	Aerator Efficiency per day (lbs O2/hp)		36	36		36	36	36		36	
58	**HP rqd for daily aeration rqmt**		**58**	**28**		**16**	**14**	**23**		**23**	
59	HP per mgal for aeration		7	3		2	1	1		1	
60	HP rqd for mixing per mgal		10	10		10	6	6		6	
61	**Total HP rqd for mixing**		**85**	**85**		**85**	**94.2**	**94.2**		**1**	
62											

	A	B	C	D	E	F	G	H	I	J	K	L	M
63	HP SIZING FOR PARTIAL MIX CELLS 1A3								HP SIZING FOR DOMESTIC POND 1B2				
64					Worst Case Influent			Best Case Influent	Worst Case Influent			Best Case Influent	
65					Winter	Summer		Summer	Winter	Summer		Summer	
66	k20				0.25	0.25		0.25	0.25	0.25		0.25	
67	kadjusted				0.105	0.386		0.386	0.105	0.386		0.386	
68	Flow per train				0.6	0.6		0.6	2.0	2.0		2.0	
69	Detention Time (d)				9.0	9.0		9.0	2.8	2.8		2.8	
70	Volume (mgal)				5.6	5.6		5.6	5.6	5.6		5.6	
71	**BOD In (mg/L)**				**186**	**24**		**14**	**77**	**35**		**35**	
72	**BODout (mg/L))**				**95**	**5**		**3**	**60**	**17**		**17**	
73	BOD removed (mg/L)				90	19		11	18	18		18	
74	BOD removed (ppd)				467	98		56	91	94		94	
75	Percent Removal				49%	78%		78%	23%	52%		52%	
76	Oxygen Rqd (lbs O2/BOD removed)				1.5	1.5		1.5	1.5	1.5		1.5	
77	Oxygen Rqd (lbs)				701	147		84	136	141		141	
78	Aerater Efficiency (lbs O2/hp-hr)				1.5	1.5		1.5	1.5	1.5		1.5	
79	Aerator Efficiency per day (lbs O2/hp)				36	36		36	36	36		36	
80	**HP rqd for daily aeration rqmt**				**19**	**4**		**2**	**4**	**4**		**4**	
81	HP per mgal for aeration				3	1		0	1	1		1	
82	HP rqd for mixing per mgal				10	10		10	3	3		3	
83	**Total HP rqd for mixing**				**56**	**56**		**56**	**16.8**	**16.8**		**16.8**	
84													
85	**HP SIZING FOR PARTIAL MIX POND 2**												
86					Worst Case Influent			Best Case Influent					
87					Winter	Summer		Summer					
88	k20				0.25	0.25		0.25					
89	kadjusted				0.105	0.386		0.386					
90	Total flow (1A1 + 1B1)				2.620	2.620		2.620					
91	Detention Time (d)				8.1	8.1		8.1					
92	Volume (mgal)				21.3	21.3		21.3					
93	**BOD In (mg/L) Blend from 1a3 and 1b2**				**68**	**68**	**68**	**68**					
94	**BODout (mg/L))**				**37**	**16**		**16**					
95	BOD removed (mg/L)				31	52		52					
96	BOD removed (ppd)				162	267		267					
97	Percent Removal				46%	76%		76%					
98	Oxygen Rqd (lbs O2/BOD removed)				1.5	1.5		1.5					
99	Oxygen Rqd (lbs)				243	401		401					
100	Aerater Efficiency (lbs O2/hp-hr)				1.5	1.5		1.5					
101	Aerator Efficiency per day (lbs O2/hp)				36	36		36					
102	**HP rqd for daily aeration rqmt**				**7**	**11**		**11**					
103	HP per mgal for aeration				0	1		1					
104	HP rqd for mixing per mgal				3	3		3					
105	**Total HP rqd for mixing**				**63.9**	**63.9**		**63.9**					
106													
107													
108													
109													
110													
111													
112													
113													
114													
115													

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	LEPRINO FOODS COMPANY												
2	CAPACITY ANALYSIS OF LEMOORE WWTF - 1990 FLOW CONDITIONS												
3													
4	HP SIZING FOR COMPLETE MIX CELL1A1												
5													
6													
7													
8													
9	Volume (mgal)					7.3							
10	Flow (mgd)					0.8							
11	Detention Time (d)					9.1							
12	Incoming BOD (mg/L)					1800							
13	Winter WW temp (C)					8							
14	Summer WW Temp (C)					26							
15	k20 (1/d)			0.45	0.25	0.55	1						
16	Theta			1.075	1.075	1.075	1.075						
17	kwinter			0.189	0.105	0.231	0.420						
18	ksummer			0.694	0.386	0.849	1.543						
19													
20	Size HP for both K values for summer and winter												
21	Formula = BOD out = (BODin/(1+kt)												
22					Winter	Summer	Winter	Summer					
23	k20				0.55	0.55	1	1					
24	kadjusted				0.231	0.849	0.420	1.543					
25	BODout (mg/L))				579	206	373	119					
26	BOD removed (mg/L)				1221	1594	1427	1681					
27	BOD removed (ppd)				8144	10636	9524	11213					
28	Oxygen Rqd (lbs O2/BOD removed)				1.5	1.5	1.5	1.5					
29	Oxygen Rqd (lbs)				12217	15955	14286	16820					
30	Aerater Efficiency (lbs O2/hp-hr)				1.5	1.5	1.5	1.5					
31	Aerator Efficiency per day (lbs O2/hp)				36	36	36	36					
32	**HP rqd for daily aeration rqmt**				**339**	**443**	**397**	**467**					
33	HP per mgal for aeration				46	61	54	64					
34	HP rqd for mixing per mgal				50	50	50	50					
35	**Total HP rqd for mixing (HP)**				**365**	**365**	**365**	**365**					
36													
37	HP SIZING FOR PARTIAL MIX CELL 1A2								HP SIZING FOR DOMESTIC POND 1B1				
38													
39													
40													
41													
42					Worst Case Influent			Best Case Influent	Worst Case Influent			Best Case Influent	
43					Winter	Summer		Summer	Winter	Summer		Summer	
44	k20				0.25	0.25		0.25	0.25	0.25		0.25	
45	kadjusted				0.105	0.386		0.386	0.105	0.386		0.386	
46	Flow per train (mgd)				0.8	0.8		0.8	1.0	1.0		1.0	
47	Detention Time (d)				10.6	10.6		10.6	15.7	15.7		15.7	
48	Volume (mgal)				8.5	8.5		8.5	15.7	15.7		15.7	
49	**BOD in (mg/L)**				**579**	**206**		**119**	**200**	**200**		**200**	
50	**BODout (mg/L))**				**274**	**40**		**23**	**76**	**28**		**28**	
51	BOD removed (mg/L)				305	165		96	124	172		172	
52	BOD removed (ppd)				2038	1104		640	831	1145		1145	
53	Percent Removal				53%	80%		80%	62%	86%		86%	
54	Oxygen Rqd (lbs O2/BOD removed)				1.5	1.5		1.5	1.5	1.5		1.5	
55	Oxygen Rqd (lbs)				3057	1656		960	1246	1718		1718	
56	Aerater Efficiency (lbs O2/hp-hr)				1.5	1.5		1.5	1.5	1.5		1.5	
57	Aerator Efficiency per day (lbs O2/hp)				36	36		36	36	36		36	
58	**HP rqd for daily aeration rqmt**				**85**	**46**		**27**	**35**	**48**		**48**	
59	HP per mgal for aeration				10	5		3	2	3		3	
60	HP rqd for mixing per mgal				10	10		10	6	6		6	
61	**Total HP rqd for mixing**				**85**	**85**		**85**	**94.2**	**94.2**		**1**	
62													

	A	B	C	D	E	F	G	H	I	J	K	L	M
63	**HP SIZING FOR PARTIAL MIX CELLS 1A3**								HP SIZING FOR DOMESTIC POND 1B2				
64					Worst Case Influent			Best Case Influent	Worst Case Influent			Best Case Influent	
65					Winter	Summer		Summer	Winter	Summer		Summer	
66	k20				0.25	0.25		0.25	0.25	0.25		0.25	
67	kadjusted				0.105	0.386		0.386	0.105	0.386		0.386	
68	Flow per train				**0.8**	**0.8**		**0.8**	**2.0**	**2.0**		**2.0**	
69	Detention Time (d)				7.0	7.0		7.0	2.8	2.8		2.8	
70	Volume (mgal)				5.6	5.6		5.6	5.6	5.6		5.6	
71	**BOD In (mg/L)**				**274**	**40**		**23**	**76**	**28**		**28**	
72	**BODout (mg/L))**				**158**	**11**		**6**	**58**	**14**		**14**	
73	BOD removed (mg/L)				116	29		17	17	15		15	
74	BOD removed (ppd)				774	196		114	114	98		98	
75	Percent Removal				42%	73%		73%	23%	52%		52%	
76	Oxygen Rqd (lbs O2/BOD removed)				1.5	1.5		1.5	1.5	1.5		1.5	
77	Oxygen Rqd (lbs)				1161	295		171	172	147		147	
78	Aerater Efficiency (lbs O2/hp-hr)				1.5	1.5		1.5	1.5	1.5		1.5	
79	Aerator Efficiency per day (lbs O2/hp)				36	36		36	36	36		36	
80	**HP rqd for daily aeration rqmt**				**32**	**8**		**5**	**5**	**4**		**4**	
81	HP per mgal for aeration				6	1		1	1	1		1	
82	HP rqd for mixing per mgal				10	10		10	3	3		3	
83	**Total HP rqd for mixing**				**56**	**56**		**56**	**16.8**	**16.8**		**16.8**	
84													
85	**HP SIZING FOR PARTIAL MIX POND 2**												
86					Worst Case Influent			Best Case Influent					
87					Winter	Summer		Summer					
88	k20				0.25	0.25		0.25					
89	kadjusted				0.105	0.386		0.386					
90	Total flow (1A1 + 1B1)				1.800	1.800		1.800					
91	Detention Time (d)				11.8	11.8		11.8					
92	Volume (mgal)				21.3	21.3		21.3					
93	**BOD In (mg/L) Blend from 1a3 and 1b2**				**103**	**103**		**103**					
94	**BODout (mg/L))**				**46**	**18**		**18**					
95	BOD removed (mg/L)				57	84		84					
96	BOD removed (ppd)				379	561		561					
97	Percent Removal				55%	82%		82%					
98	Oxygen Rqd (lbs O2/BOD removed)				1.5	1.5		1.5					
99	Oxygen Rqd (lbs)				569	842		842					
100	Aerater Efficiency (lbs O2/hp-hr)				1.5	1.5		1.5					
101	Aerator Efficiency per day (lbs O2/hp)				36	36		36					
102	**HP rqd for daily aeration rqmt**				**16**	**23**		**23**					
103	HP per mgal for aeration				1	1		1					
104	HP rqd for mixing per mgal				3	3		3					
105	**Total HP rqd for mixing**				**63.9**	**63.9**		**63.9**					
106													
107	ESTIMATED EFFLUENT FROM POND 3 - PLUG FLOW												
108	Formula = Ce = Coe $^{-kt}$												
109	Volume (mgal)				21.3	21.3		21.3					
110	Detention Time (d)				11.8	11.8		11.8					
111	k20				0.11	0.11		0.11					
112	theta				1.075	1.075		1.075					
113	k adjusted				0.046	0.170		0.170					
114	BOD in (mg/L)				**46**	**18**		**18**					
115	BOD out (mg/L)				**27**	**2**		**2**					
116													
117													
118													

Appendix M

COMMON WWTF IMPROVEMENTS CONSTRUCTION COST ESTIMATE

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Engineers...Working Wonders With Water®

PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Headworks	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	HEADWORKS - 5.95 (peak) MGD including Influent Pumping, Mechanical Bar Screens, Grit Removal, Parshall Flume Metering, Screenings Washer/Dewatering Press Dry Pit	1	LS	$ 2,938,492	1.00	$ 2,940,000	
2	SITEWORK - Included in item 1	10	%			$ -	
3	YARD PIPING	10	%			$ 290,000	
4	ELECTRICAL AND INSTRUMENTATION	30	%			$ 880,000	
	TOTAL DIRECT COST						**$ 4,110,000**
	Estimating Contingency	30	%	$ 1,233,000			
	SUBTOTAL					**$ 5,340,000**	
	Contractor General Conditions - Included in item 1	15	%				
	SUBTOTAL					**$ 5,340,000**	
	Contractor Overhead and Profit - Included in item 1	12	%				
	SUBTOTAL					**$ 5,340,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 148,988			
	SUBTOTAL					**$ 5,490,000**	
	Escalation to Midpoint of Construction	3	%	$517,822.42			
	SUBTOTAL					**$ 6,010,000**	
	TOTAL CONSTRUCTION COST						**$ 6,010,000**

Engineers...Working Wonders With Water®

PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Pond Demolition	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	Pond Demolition - dredging solids and removing clay layer from 38 acres of existing ponds	1	LS	$1,447,822	1.00	$ 1,450,000	
	TOTAL DIRECT COST						**$1,450,000**
	Estimating Contingency	30	%	$ 435,000			
	SUBTOTAL					**$ 1,890,000**	
	Contractor General Conditions	15	%	$ 283,500			
	SUBTOTAL					**$ 2,170,000**	
	Contractor Overhead and Profit	12	%	$ 260,400			
	SUBTOTAL					**$ 2,430,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 52,563			
	SUBTOTAL					**$ 2,480,000**	
	Escalation to Midpoint of Construction	3	%	$ 233,916			
	SUBTOTAL					**$ 2,710,000**	
	TOTAL CONSTRUCTION COST						**$2,710,000**

Engineers...Working Wonders With Water®

PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Effluent Pump Station	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	EFFLUENT PUMP STATION - 5.95 (peak) MGD design flow	1	LS	$ 257,662	1.00	$ 260,000	
2	SITEWORK	10	%			$ 30,000	
3	YARD PIPING	10	%			$ 30,000	
4	ELECTRICAL AND INSTRUMENTATION	30	%			$ 80,000	
	TOTAL DIRECT COST						**$ 400,000**
	Estimating Contingency	30	%	$ 120,000			
	SUBTOTAL					**$ 520,000**	
	Contractor General Conditions	15	%	$ 78,000			
	SUBTOTAL					**$ 600,000**	
	Contractor Overhead and Profit	12	%	$ 72,000			
	SUBTOTAL					**$ 670,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 14,500			
	SUBTOTAL					**$ 680,000**	
	Escalation to Midpoint of Construction	3	%	$64,138.30			
	SUBTOTAL					**$ 740,000**	
	TOTAL CONSTRUCTION COST						**$ 740,000**

Appendix N

SECONDARY TREATMENT ALTERNATIVES CONSTRUCTION COST ESTIMATE

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Engineers...Working Wonders With Water®

PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Secondary Treatment - CAS w/ MLE	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	AERATION BASINS (3+1, 0.67 MG EA at 2.6 MGD design flow) - DIRECT COSTS	1	LS	$5,007,234	1.00	$ 5,010,000	
2	CIRCULAR SECONDARY CLARIFIERS (3+1, 60 ft diameter ea, 15 ft depth) - CONSTRUCTION COSTS	1	LS	$2,624,466	1.00	$ 2,620,000	
3	SPLITTER BOX / RAS/WAS PS	1	LS	$ 647,027	1.00	$ 650,000	
4	BLOWER BUILDING	1	LS	$1,595,381	1.00	$ 1,600,000	
5	SITEWORK	10	%			$ 570,000	
6	YARD PIPING	10	%			$ 830,000	
7	ELECTRICAL AND INSTRUMENTATION	30	%			$ 2,480,000	
	TOTAL DIRECT COST						**$13,760,000**
	Estimating Contingency	30	%	$4,128,000			
	SUBTOTAL					**$ 17,890,000**	
	Contractor General Conditions - On oxidation ditch and splitter box/RAS PS/WAS PS subtotal only	15	%	$2,123,550			
	SUBTOTAL					**$ 20,010,000**	
	Contractor Overhead and Profit - On aeration basin, splitter box/RAS PS/WAS PS, and blower building subtotal only	12	%	$1,953,666			
	SUBTOTAL					**$ 21,960,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 498,800			
	SUBTOTAL					**$ 22,460,000**	
	Escalation to Midpoint of Construction	3	%	$2,118,450			
	SUBTOTAL					**$ 24,580,000**	
	TOTAL CONSTRUCTION COST						**$24,580,000**

Engineers...Working Wonders With Water®

PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Secondary Treatment - Oxidation Ditch	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	OXIDATION DITCHES (3, 1.2 MG EA at 2.6 MGD design flow) - DIRECT COSTS	1	LS	$5,502,971	1.00	$ 5,500,000	
2	CIRCULAR SECONDARY CLARIFIERS (3+1, 60 ft diameter ea, 15 ft depth) - CONSTRUCTION COSTS	1	LS	$2,624,466	1.00	$ 2,620,000	
3	SPLITTER BOX/RAS PS/WAS PS	1	LS	$ 647,027	1.00	$ 650,000	
4	SITEWORK	10	%			$ 620,000	
5	YARD PIPING	10	%			$ 880,000	
6	ELECTRICAL AND INSTRUMENTATION	30	%			$ 2,630,000	
	TOTAL DIRECT COST						**$12,900,000**
	Estimating Contingency	30	%	$3,870,000			
	SUBTOTAL					**$ 16,770,000**	
	Contractor General Conditions - On oxidation ditch and splitter box/RAS PS/WAS PS subtotal only	15	%	$1,799,850			
	SUBTOTAL					**$ 18,570,000**	
	Contractor Overhead and Profit - On oxidation ditch and splitter box/RAS PS/WAS PS subtotal only	12	%	$1,655,862			
	SUBTOTAL					**$ 20,230,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 467,625			
	SUBTOTAL					**$ 20,700,000**	
	Escalation to Midpoint of Construction	3	%	$1,952,445			
	SUBTOTAL					**$ 22,650,000**	
	TOTAL CONSTRUCTION COST						**$22,650,000**

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PROJECT :	CITY OF LEMOORE	LOCATION FACTOR:	107.5
	WWTP MASTER PLAN	20 CITIES ENR CCI NOVEMBER 2018:	11183
JOB # :	10651A00	ESTIMATED MIDPOINT OF CONSTRUCTION :	12/1/2021
LOCATION :	LEMOORE	COST ESTIMATE PREPARATION DATE :	11/14/2018
ELEMENT # :	Secondary Treatment - MBR	BY :	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	MBR (3+1, Aeration Basins at 0.25 MG EA and 3+1 MBR at 0.0125 MG EA at 2.6 MGD design flow) - DIRECT COST	1	LS	$9,572,863	1.00	$ 9,570,000	
2	SPLITTER BOX/RAS PS/WAS PS - Included in item 1	0	LS			$ -	
3	BLOWER BUILDING - Included in item 1	0	LS			$ -	
4	SITEWORK	10	%			$ 1,060,000	
5	YARD PIPING	10	%			$ 1,060,000	
6	ELECTRICAL AND INSTRUMENTATION	30	%			$ 4,100,000	
	TOTAL DIRECT COST						**$15,790,000**
	Estimating Contingency	30	%	$4,737,000			
	SUBTOTAL					**$ 20,530,000**	
	Contractor General Conditions	15	%	$3,079,500			
	SUBTOTAL					**$ 23,610,000**	
	Contractor Overhead and Profit	12	%	$2,833,200			
	SUBTOTAL					**$ 26,440,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.25	%	$ 572,388			
	SUBTOTAL					**$ 27,010,000**	
	Escalation to Midpoint of Construction	3	%	$2,547,611			
	SUBTOTAL					**$ 29,560,000**	
	TOTAL CONSTRUCTION COST						**$29,560,000**

Appendix O

TERTIARY TREATMENT ALTERNATIVES CONSTRUCTION COST ESTIMATE

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Engineers...Working Wonders With Water®

LOCATION FACTOR:	107.5
20 CITIES ENR CCI NOVEMBER 2018:	11183

PROJECT : CITY OF LEMOORE
WWTP MASTER PLAN
JOB # : 10651A00
LOCATION : LEMOORE
ELEMENT # : Tertiary Treatment - Filters (Cloth Disk)

ESTIMATED MIDPOINT OF CONSTRUCTION :	12/1/2021
COST ESTIMATE PREPARATION DATE :	11/14/2018
BY :	JRW
REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	FILTERS - 6+2 Cloth Media Disk, 2.6 MGD design flow	1	LS	$ 701,285	1.00	$ 700,000	
2	SITEWORK	10	%			$ 70,000	
3	YARD PIPING	10	%			$ 70,000	
4	ELECTRICAL AND INSTRUMENTATION	30	%			$ 210,000	
	TOTAL DIRECT COST						**$ 1,050,000**
	Estimating Contingency	30	%	$ 315,000			
	SUBTOTAL					**$ 1,370,000**	
	Contractor General Conditions	15	%	$ 205,500			
	SUBTOTAL					**$ 1,580,000**	
	Contractor Overhead and Profit	12	%	$ 189,600			
	SUBTOTAL					**$ 1,770,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 38,063			
	SUBTOTAL					**$ 1,810,000**	
	Escalation to Midpoint of Construction	3	%	$ 170,721			
	SUBTOTAL					**$ 1,980,000**	
	TOTAL CONSTRUCTION COST						**$ 1,980,000**

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PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Tertiary Treatment - Filters (Continuous Backwash)	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	FILTERS - 8+2, Continuous Backwash, 2.6 MGD design flow	1	LS	$1,977,863	1.00	$ 1,980,000	
2	SITEWORK	10	%			$ 200,000	
3	YARD PIPING	10	%			$ 200,000	
4	ELECTRICAL AND INSTRUMENTATION	30	%			$ 590,000	
	TOTAL DIRECT COST						**$2,970,000**
	Estimating Contingency	30	%	$ 891,000			
	SUBTOTAL					**$ 3,860,000**	
	Contractor General Conditions	15	%	$ 579,000			
	SUBTOTAL					**$ 4,440,000**	
	Contractor Overhead and Profit	12	%	$ 532,800			
	SUBTOTAL					**$ 4,970,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 107,663			
	SUBTOTAL					**$ 5,080,000**	
	Escalation to Midpoint of Construction	3	%	$ 479,151			
	SUBTOTAL					**$ 5,560,000**	
	TOTAL CONSTRUCTION COST						**$5,560,000**

	Units	Unit Costs	Quantity	Cost
MF/UF System	EA	$0.50	2444000	$1,222,000
Backwash/RO Feed Tank	GAL	$3.00	150000	$450,000
RO Feed Pumps	EA	$275,000	2	$550,000
RO Cartridge Filters	EA	$40,000	2	$80,000
RO Systems	GPD	$0.60	1450000	$870,000
RO CIP System	EA	$200,000	1	$200,000
RO Flush/Plant Water Pumps	EA	$35,000	2	$70,000
RO Flush Tank	EA	$3.00	25000	$75,000
Brine Concentrator System	EA	$14,875,000	1	$14,875,000
Lime Feed System	EA	$650,000	1	$650,000
Sulfuric Acid System	EA	$350,000	1	$350,000
Antiscalant System	EA	$150,000	1	$150,000
Building, Non-Process Area [1]	FT^2	$250	5000	$1,250,000
Building, Process Area [1]	FT^2	$200	3500	$700,000
Covered Chemical Storage	FT^2	$75	2000	$150,000
Sitework[2]	%	5%		$1,082,100
Electrical & I/C [3]	%	30%		$6,492,600
Mechanical[4]	%	25%		$4,885,500
Direct Cost Subtotal				$34,102,200
Contingency	%	25%		$8,525,550
Subtotal				$42,627,750
Sales Tax[5]	%	7.25%		$1,545,255.94
Subtotal				$44,173,006
Contractor General Conditions	%	6%		$2,650,380
Subtotal				$46,823,386
Contractor Overhead and Profit	%	15%		$7,023,508
Subtotal				$53,846,894
Evaporation Ponds	$/acre	$1,500,000	4.848020168	$7,272,030
TOTAL CONSTRUCTION COSTS				**$61,118,924**

1. Includes general building HVAC and plumbing.
2. Includes demolition, excavation, paving, sidewalks, landscaping and general site improvements. Excludes pipelines and wells.
3. Electrical for desalter site facilities only and does not include backup power. Well electrical costs included in well equipment unit cost.
4. Estimate for onsite piping, valves, supports, etc. HVAC and plumbing included in building per square foot cost.
5. Estimated as sales tax*(0.5*direct cost+contingency)

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PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Tertiary Treatment - Disinfection (Chlorine Contact Basin)	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	CHLORINE CONTACT BASINS - 2.61 MGD, 90 min contact time, 75% efficiency assumed, CT required for Title 22 = 450 mg-min/L	1	LS	$ 850,829	1.00	$ 850,000	
2	CHEMICAL METERING AND STORAGE	1	LS	$ 700,000	1.00	$ 700,000	
3	SITEWORK - Included in item 1	10	%			$ -	
4	YARD PIPING	10	%			$ 90,000	
5	ELECTRICAL AND INSTRUMENTATION	30	%			$ 260,000	
	TOTAL DIRECT COST						**$1,900,000**
	Estimating Contingency	30	%	$ 570,000			
	SUBTOTAL					**$ 2,470,000**	
	Contractor General Conditions - Included in item 1	15	%				
	SUBTOTAL					**$ 2,470,000**	
	Contractor Overhead and Profit - Included in item 1	12	%				
	SUBTOTAL					**$ 2,470,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 68,875			
	SUBTOTAL					**$ 2,540,000**	
	Escalation to Midpoint of Construction	3	%	$ 239,575			
	SUBTOTAL					**$ 2,780,000**	
	TOTAL CONSTRUCTION COST						**$2,780,000**

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PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Tertiary Treatment - Disinfection (UV)	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	UV - Backup equipment costs provided by Bill Sotirakis. Construction cost assume to be 4x equipment cost. The 4x multiplier includes sitework, yard piping, EI&C, estimating contigency, contractor general condidtions, contractor overhead and profit, and sales tax	1	LS	$3,492,000	1.00	$ 3,490,000	
2	SITEWORK - Included in item 1	10	%			$ -	
3	YARD PIPING - Included in item 1	10	%			$ -	
4	ELECTRICAL AND INSTRUMENTATION - Included in item 1	30	%			$ -	
	TOTAL DIRECT COST						**$3,490,000**
	Estimating Contingency - Included in item 1	30	%				
	SUBTOTAL					**$ 3,490,000**	
	Contractor General Conditions - Included in item 1	15	%				
	SUBTOTAL					**$ 3,490,000**	
	Contractor Overhead and Profit - Included in item 1	12	%				
	SUBTOTAL					**$ 3,490,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal - Included in ite	7.250	%				
	SUBTOTAL					**$ 3,490,000**	
	Escalation to Midpoint of Construction	3	%	$ 329,180			
	SUBTOTAL					**$ 3,820,000**	
	TOTAL CONSTRUCTION COST						**$3,820,000**

Appendix P

UV SYSTEMS COMPARISON

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Lemoore WWTF, CA

Table 1 Estimated UV Equipment Costs

Description	Trojan UVFit	WEDECO LBX	ETS UVLW	Aquionics AmaLine	Aquionics InLine
Estimated Equipment Cost	$873,000	$505,000	$836,800	$639,956	$591,300
Total Equipment Costs:	**$873,000**	**$505,000**	**$836,800**	**$639,956**	**$591,300**

Table 2 Operation and Maintenance Costs and Basis

Description	Trojan UVFit	WEDECO LBX	ETS UVLW	Aquionics AmaLine	Aquionics InLine
Lamp Replacement	$280	$150	$375	$200	$400
Ballast Replacement	$650	$588	$400	$500	$4,500
Wiper Replacement	$14	$18	$20	$18	$18
Sleeve Replacement	$90	$165	$280	$100	$100
Chemical Usage	$500	$500	$500	$500	$500
UV Sensor Replacement	$2,000	$750	$950	$1,850	$1,850
Sensor Calibration	$0	$412	$600	$0	$0
Discount Rate	6.00%				
Inflation Rate	3.00%				
Project Life, years	20				
Electricity Rate (kWh)	$0.12				
Labor Rate (per hour)	$50.00				
Parts and Replacement Cost	$66,584	$37,326	$47,961	$34,320	$59,676
Labor Cost	$7,417	$13,846	$8,331	$20,631	$9,177
Energy Cost	$24,412	$24,913	$46,079	$45,412	$113,530
Total:	**$98,414**	**$76,085**	**$102,372**	**$100,363**	**$182,383**

Energy Cost, % of Total O&M	24.8%	32.7%	45.0%	45.2%	62.2%

Table 3 Equipment Cost - Net Present Value Evaluation Summary

Equipment	Equipment Cost	Parts and Replacement Cost	Labor Cost	Energy	O&M Cost	Life Cycle Cost	Ranking (Low to High)
Trojan UVFIT	873,000	66,584	7,417	24,412	98,414	**$2,349,000**	**3**
WEDECO LBX	505,000	37,326	13,846	24,913	76,085	**$1,646,000**	**1**
ETS UVLW	836,800	47,961	8,331	46,079	102,372	**$2,372,000**	**4**
Aquionics AmaLine	639,956	34,320	20,631	45,412	100,363	**$2,145,000**	**2**
Aquionics InLine	591,300	59,676	9,177	113,530	182,383	**$3,327,000**	**5**

Appendix Q

SOLIDS HANDLING TREATMENT ALTERNATIVES CONSTRUCTION COST ESTIMATE

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Engineers...Working Wonders With Water®

PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Solids Processing - Thickening (GBT)	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	THICKENING EQUIPMENT - 100 gpm WAS flow (from model) DIRECT COST	1	LS	$ 559,759	1.00	$ 560,000	
2	THICKENING/DEWATERING BUILDING - DIRECT COST	1	LS	$ 242,027	1.00	$ 240,000	
3	SITEWORK	10	%			$ 80,000	
4	YARD PIPING	10	%			$ 80,000	
5	ELECTRICAL AND INSTRUMENTATION	30	%			$ 240,000	
	TOTAL DIRECT COST						**$1,200,000**
	Estimating Contingency	30	%	$ 360,000			
	SUBTOTAL					**$ 1,560,000**	
	Contractor General Conditions	15	%	$ 234,000			
	SUBTOTAL					**$ 1,790,000**	
	Contractor Overhead and Profit	12	%	$ 214,800			
	SUBTOTAL					**$ 2,000,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 43,500			
	SUBTOTAL					**$ 2,040,000**	
	Escalation to Midpoint of Construction	3	%	$ 192,415			
	SUBTOTAL					**$ 2,230,000**	
	TOTAL CONSTRUCTION COST						**$2,230,000**

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PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Solids Processing - Thickening (RDT)	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	THICKENING EQUIPMENT - 100 gpm WAS flow (from model) DIRECT COST	1	LS	$ 685,392	1.00	$ 690,000	
2	THICKENING/DEWATERING BUILDING - DIRECT COST	1	LS	$ 242,027	1.00	$ 240,000	
3	SITEWORK	10	%			$ 90,000	
4	YARD PIPING	10	%			$ 90,000	
5	ELECTRICAL AND INSTRUMENTATION	30	%			$ 280,000	
	TOTAL DIRECT COST						**$1,390,000**
	Estimating Contingency	30	%	$ 417,000			
	SUBTOTAL					**$ 1,810,000**	
	Contractor General Conditions	15	%	$ 271,500			
	SUBTOTAL					**$ 2,080,000**	
	Contractor Overhead and Profit	12	%	$ 249,600			
	SUBTOTAL					**$ 2,330,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 50,388			
	SUBTOTAL					**$ 2,380,000**	
	Escalation to Midpoint of Construction	3	%	$ 224,484			
	SUBTOTAL					**$ 2,600,000**	
	TOTAL CONSTRUCTION COST						**$2,600,000**

Engineers...Working Wonders With Water®

PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Solids Processing - Stabilization (Aerobic Digester)	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	AEROBIC DIGESTERS (four 38'x38' tanks at 0.215 MG EA at 2.6 MGD design flow) - DIRECT COST	1	LS	$2,051,505	1.00	$ 2,050,000	
2	SITEWORK	10	%			$ 210,000	
3	YARD PIPING	10	%			$ 210,000	
4	ELECTRICAL AND INSTRUMENTATION	30	%			$ 620,000	
	TOTAL DIRECT COST						**$3,090,000**
	Estimating Contingency	30	%	$ 927,000			
	SUBTOTAL					**$ 4,020,000**	
	Contractor General Conditions	15	%	$ 603,000			
	SUBTOTAL					**$ 4,620,000**	
	Contractor Overhead and Profit	12	%	$ 554,400			
	SUBTOTAL					**$ 5,170,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 112,013			
	SUBTOTAL					**$ 5,280,000**	
	Escalation to Midpoint of Construction	3	%	$ 498,015			
	SUBTOTAL					**$ 5,780,000**	
	TOTAL CONSTRUCTION COST						**$5,780,000**

Engineers...Working Wonders With Water®

PROJECT :	CITY OF LEMOORE
	WWTP MASTER PLAN
JOB # :	10651A00
LOCATION :	LEMOORE
ELEMENT # :	Solids Processing - Stabilization (Solids Lagoon)

LOCATION FACTOR:	107.5
20 CITIES ENR CCI NOVEMBER 2018:	11183
ESTIMATED MIDPOINT OF CONSTRUCTION :	12/1/2021
COST ESTIMATE PREPARATION DATE :	11/14/2018
BY :	JRW
REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	SOLIDS LAGOON - Allowance, assuming can keep current clay liner	1	LS	$ 500,000	1.00	$ 500,000	
2	SITEWORK	10	%			$ 50,000	
3	YARD PIPING	10	%			$ 50,000	
4	ELECTRICAL AND INSTRUMENTATION	30	%			$ 150,000	
	TOTAL DIRECT COST						**$ 750,000**
	Estimating Contingency	30	%	$ 225,000			
	SUBTOTAL					**$ 975,000**	
	Contractor General Conditions	15	%	$ 146,250			
	SUBTOTAL					**$ 1,121,000**	
	Contractor Overhead and Profit	12	%	$ 134,520			
	SUBTOTAL					**$ 1,256,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 27,188			
	SUBTOTAL					**$ 1,283,000**	
	Escalation to Midpoint of Construction	3	%	$ 121,014			
	SUBTOTAL					**$ 1,400,000**	
	TOTAL CONSTRUCTION COST						**$1,400,000**

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PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Solids Processing - Dewatering (Drying Bed)	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	DRYING BED - 30,000 lb/week solids (from model) - DIRECT COST	1	LS	$ 581,817	1.00	$ 580,000	
2	SITEWORK	10	%			$ 60,000	
3	YARD PIPING	10	%			$ 60,000	
4	ELECTRICAL AND INSTRUMENTATION	30	%			$ 170,000	
	TOTAL DIRECT COST						**$ 870,000**
	Estimating Contingency	30	%	$ 261,000			
	SUBTOTAL					**$ 1,130,000**	
	Contractor General Conditions	15	%	$ 169,500			
	SUBTOTAL					**$ 1,300,000**	
	Contractor Overhead and Profit	12	%	$ 156,000			
	SUBTOTAL					**$ 1,460,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 31,538			
	SUBTOTAL					**$ 1,490,000**	
	Escalation to Midpoint of Construction	3	%	$ 140,538			
	SUBTOTAL					**$ 1,630,000**	
	TOTAL CONSTRUCTION COST						**$1,630,000**

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PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Solids Processing - Dewatering (Screw Press)	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	THICKENING/DEWATERING BUILDING - DIRECT COST	1	LS	$ 242,027	1.00	$ 240,000	
2	DEWATERING EQUIPMENT - 30,000 lb/week solids (from model) DIRECT COST	1	LS	$1,316,684	1.00	$ 1,320,000	
3	SITEWORK	10	%			$ 160,000	
4	YARD PIPING	10	%			$ 160,000	
5	ELECTRICAL AND INSTRUMENTATION	30	%			$ 470,000	
	TOTAL DIRECT COST						**$2,350,000**
	Estimating Contingency	30	%	$ 705,000			
	SUBTOTAL					**$ 3,060,000**	
	Contractor General Conditions	15	%	$ 459,000			
	SUBTOTAL					**$ 3,520,000**	
	Contractor Overhead and Profit	12	%	$ 422,400			
	SUBTOTAL					**$ 3,940,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 85,188			
	SUBTOTAL					**$ 4,030,000**	
	Escalation to Midpoint of Construction	3	%	$ 380,114			
	SUBTOTAL					**$ 4,410,000**	
	TOTAL CONSTRUCTION COST						**$4,410,000**

Appendix R

O&M COST ESTIMATE

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ANNUAL O&M COST SUMMARY(1)

PROJECT :	City of Lemoore		
	WWTF Master Plan	**COST ESTIMATE PREPARATION DATE :**	Fall 2018
JOB # :	10651A00	**BY :**	JRW
LOCATION :	Lemoore WWTF	**REVIEWED BY:**	-

	Power(1)	Chemical(2)	Maintenance(4)	Total
Headworks	$ 58,600	$ -	$ -	$ 58,600
Oxidation Ditch	$ 206,000	$ -	$ -	$ 206,000
CAS w/ MLE	$ 225,600	$ -	$ 9,800	$ 235,400
MBR	$ 346,600	$ 3,900	$ 117,600	$ 468,100
Continuous Backwash Filter	$ 20,500	$ 32,200	$ 1,500	$ 54,200
Cloth Disk Media Filter	$ 5,900	$ 32,200	$ 26,000	$ 64,100
Reverse Osmosis	$ 900,000	$ 409,000	$ 571,000	$ 1,880,000
Chlorine Contact Basin	$ 16,500	$ 92,100	$ -	$ 108,600
UV	$ 24,400	$ -	$ 66,600	$ 91,000
RDT	$ 1,600	$ 6,600	$ -	$ 8,200
GBT	$ 12,200	$ 6,600	$ -	$ 18,800
Aerobic Digester	$ 188,400	$ -	$ -	$ 188,400
Solids Lagoon	$ -	$ -	$ 95,300	$ 95,300
Screw Press	$ 2,900	$ 39,500	$ 196,800	$ 239,200
Sludge Drying Bed	$ -	$ -	$ 196,800	$ 196,800
Effluent Pump Station	$ 47,100	$ -	$ -	$ 47,100

Notes:

(1) O&M summary does not include labor cost.

(2) Average power cost assumed to be $0.12/kWh.

(3) Chemical costs were assumed to be $2.00/lb for polymer; $0.96/gal for 12.5% sodium hypochlorite solution; $0.96/gal for 50% sodium bisulfite solution; $0.20/lb for 42% alum solution; $1.00/gal for citric acid; $5.00/gal for sulfuric acid.

(4) Maintenance includes replacement parts and hauling/dredging

Appendix S

RECOMMENDED ALTERNATIVE CONSTRUCTION AND O&M COST ESTIMATE

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PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Headworks	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	HEADWORKS - 5.95 (peak) MGD including Influent Pumping, Mechanical Bar Screens, Grit Removal, Parshall Flume Metering, Screenings Washer/Dewatering Press Dry Pit	1	LS	$ 2,938,492	1.00	$ 2,940,000	
2	SITEWORK - Included in item 1	10	%			$ -	
3	YARD PIPING	10	%			$ 290,000	
4	ELECTRICAL AND INSTRUMENTATION	30	%			$ 880,000	
	TOTAL DIRECT COST						**$ 4,110,000**
	Estimating Contingency	30	%	$ 1,233,000			
	SUBTOTAL					**$ 5,340,000**	
	Contractor General Conditions - Included in item 1	15	%				
	SUBTOTAL					**$ 5,340,000**	
	Contractor Overhead and Profit - Included in item 1	12	%				
	SUBTOTAL					**$ 5,340,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 148,988			
	SUBTOTAL					**$ 5,490,000**	
	Escalation to Midpoint of Construction	3	%	$517,822.42			
	SUBTOTAL					**$ 6,010,000**	
	TOTAL CONSTRUCTION COST						**$ 6,010,000**

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PROJECT :	CITY OF LEMOORE WWTP MASTER PLAN	LOCATION FACTOR:	107.5
		20 CITIES ENR CCI NOVEMBER 2018:	11183
JOB # :	10651A00	ESTIMATED MIDPOINT OF CONSTRUCTION :	12/1/2021
LOCATION :	LEMOORE	COST ESTIMATE PREPARATION DATE :	11/14/2018
ELEMENT # :	Secondary Treatment - Oxidation Ditch	BY :	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	OXIDATION DITCHES (3, 1.2 MG EA at 2.6 MGD design flow) - DIRECT COSTS	1	LS	$5,502,971	1.00	$ 5,500,000	
2	CIRCULAR SECONDARY CLARIFIERS (3+1, 60 ft diameter ea, 15 ft depth) - CONSTRUCTION COSTS	1	LS	$2,624,466	1.00	$ 2,620,000	
3	SPLITTER BOX/RAS PS/WAS PS	1	LS	$ 647,027	1.00	$ 650,000	
4	SITEWORK	10	%			$ 620,000	
5	YARD PIPING	10	%			$ 880,000	
6	ELECTRICAL AND INSTRUMENTATION	30	%			$ 2,630,000	
	TOTAL DIRECT COST						**$12,900,000**
	Estimating Contingency	30	%	$3,870,000			
	SUBTOTAL					**$ 16,770,000**	
	Contractor General Conditions - On oxidation ditch and splitter box/RAS PS/WAS PS subtotal only	15	%	$1,799,850			
	SUBTOTAL					**$ 18,570,000**	
	Contractor Overhead and Profit - On oxidation ditch and splitter box/RAS PS/WAS PS subtotal only	12	%	$1,655,862			
	SUBTOTAL					**$ 20,230,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 467,625			
	SUBTOTAL					**$ 20,700,000**	
	Escalation to Midpoint of Construction	3	%	$1,952,445			
	SUBTOTAL					**$ 22,650,000**	
	TOTAL CONSTRUCTION COST						**$22,650,000**

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PROJECT : CITY OF LEMOORE
WWTP MASTER PLAN
JOB # : 10651A00
LOCATION : LEMOORE
ELEMENT # : Tertiary Treatment - Disinfection (Chlorine Contact Basin)

LOCATION FACTOR: 107.5
20 CITIES ENR CCI NOVEMBER 2018: 11183

ESTIMATED MIDPOINT OF CONSTRUCTION : 12/1/2021
COST ESTIMATE PREPARATION DATE : 11/14/2018
BY : JRW
REVIEWED BY: 0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	CHLORINE CONTACT BASINS - 5.95 MGD, 90 min contact time, 75% efficiency assumed, CT required for Title 22 = 450 mg-min/L	1	LS	$1,934,191	1.00	$ 1,930,000	
2	CHEMICAL METERING AND STORAGE	1	LS	$ 700,000	1.00	$ 700,000	
3	SITEWORK - Included in item 1	10	%			$ -	
4	YARD PIPING	10	%			$ 190,000	
5	ELECTRICAL AND INSTRUMENTATION	30	%			$ 580,000	
	TOTAL DIRECT COST						**$3,400,000**
	Estimating Contingency	30	%	$1,020,000			
	SUBTOTAL					**$ 4,420,000**	
	Contractor General Conditions - Included in item 1	15	%				
	SUBTOTAL					**$ 4,420,000**	
	Contractor Overhead and Profit - Included in item 1	12	%				
	SUBTOTAL					**$ 4,420,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 123,250			
	SUBTOTAL					**$ 4,540,000**	
	Escalation to Midpoint of Construction	3	%	$ 428,217			
	SUBTOTAL					**$ 4,970,000**	
	TOTAL CONSTRUCTION COST						**$4,970,000**

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PROJECT :	CITY OF LEMOORE	**LOCATION FACTOR:**	107.5
	WWTP MASTER PLAN	**20 CITIES ENR CCI NOVEMBER 2018:**	11183
JOB # :	10651A00	**ESTIMATED MIDPOINT OF CONSTRUCTION :**	12/1/2021
LOCATION :	LEMOORE	**COST ESTIMATE PREPARATION DATE :**	11/14/2018
ELEMENT # :	Solids Processing - Dewatering (Screw Press)	**BY :**	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	THICKENING/DEWATERING BUILDING - DIRECT COST	1	LS	$ 242,027	1.00	$ 240,000	
2	DEWATERING EQUIPMENT - 30,000 lb/week solids (from model) DIRECT COST	1	LS	$1,316,684	1.00	$ 1,320,000	
3	SITEWORK	10	%			$ 160,000	
4	YARD PIPING	10	%			$ 160,000	
5	ELECTRICAL AND INSTRUMENTATION	30	%			$ 470,000	
	TOTAL DIRECT COST						**$2,350,000**
	Estimating Contingency	30	%	$ 705,000			
	SUBTOTAL					**$ 3,060,000**	
	Contractor General Conditions	15	%	$ 459,000			
	SUBTOTAL					**$ 3,520,000**	
	Contractor Overhead and Profit	12	%	$ 422,400			
	SUBTOTAL					**$ 3,940,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 85,188			
	SUBTOTAL					**$ 4,030,000**	
	Escalation to Midpoint of Construction	3	%	$ 380,114			
	SUBTOTAL					**$ 4,410,000**	
	TOTAL CONSTRUCTION COST						**$4,410,000**

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PROJECT : CITY OF LEMOORE
WWTP MASTER PLAN
JOB # : 10651A00
LOCATION : LEMOORE
ELEMENT # : Pond Demolition

LOCATION FACTOR: 107.5
20 CITIES ENR CCI NOVEMBER 2018: 11183

ESTIMATED MIDPOINT OF CONSTRUCTION : 12/1/2021
COST ESTIMATE PREPARATION DATE : 11/14/2018
BY : JRW
REVIEWED BY: 0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	Pond Demolition - dredging solids and removing clay layer from 38 acres of existing ponds	1	LS	$1,447,822	1.00	$ 1,450,000	
	TOTAL DIRECT COST						**$1,450,000**
	Estimating Contingency	30	%	$ 435,000			
	SUBTOTAL					**$ 1,890,000**	
	Contractor General Conditions	15	%	$ 283,500			
	SUBTOTAL					**$ 2,170,000**	
	Contractor Overhead and Profit	12	%	$ 260,400			
	SUBTOTAL					**$ 2,430,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 52,563			
	SUBTOTAL					**$ 2,480,000**	
	Escalation to Midpoint of Construction	3	%	$ 233,916			
	SUBTOTAL					**$ 2,710,000**	
	TOTAL CONSTRUCTION COST						**$2,710,000**

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PROJECT :	CITY OF LEMOORE	LOCATION FACTOR:	107.5
	WWTP MASTER PLAN	20 CITIES ENR CCI NOVEMBER 2018:	11183
JOB # :	10651A00	ESTIMATED MIDPOINT OF CONSTRUCTION :	12/1/2021
LOCATION :	LEMOORE	COST ESTIMATE PREPARATION DATE :	11/14/2018
ELEMENT # :	Effluent Pump Station	BY :	JRW
		REVIEWED BY:	0

ITEM	DESCRIPTION	QUAN	UNIT	UNIT COST	ENR, LOCATION ADJUSTMENT FACTOR	SUBTOTAL	TOTAL
1	EFFLUENT PUMP STATION - 5.95 (peak) MGD design flow	1	LS	$ 257,662	1.00	$ 260,000	
2	SITEWORK	10	%			$ 30,000	
3	YARD PIPING	10	%			$ 30,000	
4	ELECTRICAL AND INSTRUMENTATION	30	%			$ 80,000	
	TOTAL DIRECT COST						**$ 400,000**
	Estimating Contingency	30	%	$ 120,000			
	SUBTOTAL					**$ 520,000**	
	Contractor General Conditions	15	%	$ 78,000			
	SUBTOTAL					**$ 600,000**	
	Contractor Overhead and Profit	12	%	$ 72,000			
	SUBTOTAL					**$ 670,000**	
	Sales Tax on 50% of Total Direct Cost Subtotal	7.250	%	$ 14,500			
	SUBTOTAL					**$ 680,000**	
	Escalation to Midpoint of Construction	3	%	$64,138.30			
	SUBTOTAL					**$ 740,000**	
	TOTAL CONSTRUCTION COST						**$ 740,000**

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ANNUAL O&M COST SUMMARY(1)

PROJECT :	City of Lemoore		
	WWTF Master Plan	**COST ESTIMATE PREPARATION DATE :**	Fall 2018
JOB # :	10651A00	**BY :**	JRW
LOCATION :	Lemoore WWTF	**REVIEWED BY:**	-

	Power(1)	Chemical(2)	Maintenance(4)	Total
Headworks	$ 58,600	$ -	$ -	$ 58,600
Oxidation Ditch	$ 206,000	$ -	$ -	$ 206,000
Chlorine Contact Basin	$ 16,500	$ 92,100	$ -	$ 108,600
Screw Press	$ 2,900	$ 39,500	$ 196,800	$ 239,200
Effluent Pump Station	$ 47,100	$ -	$ -	$ 47,100

Notes:

(1) O&M summary does not include labor cost.

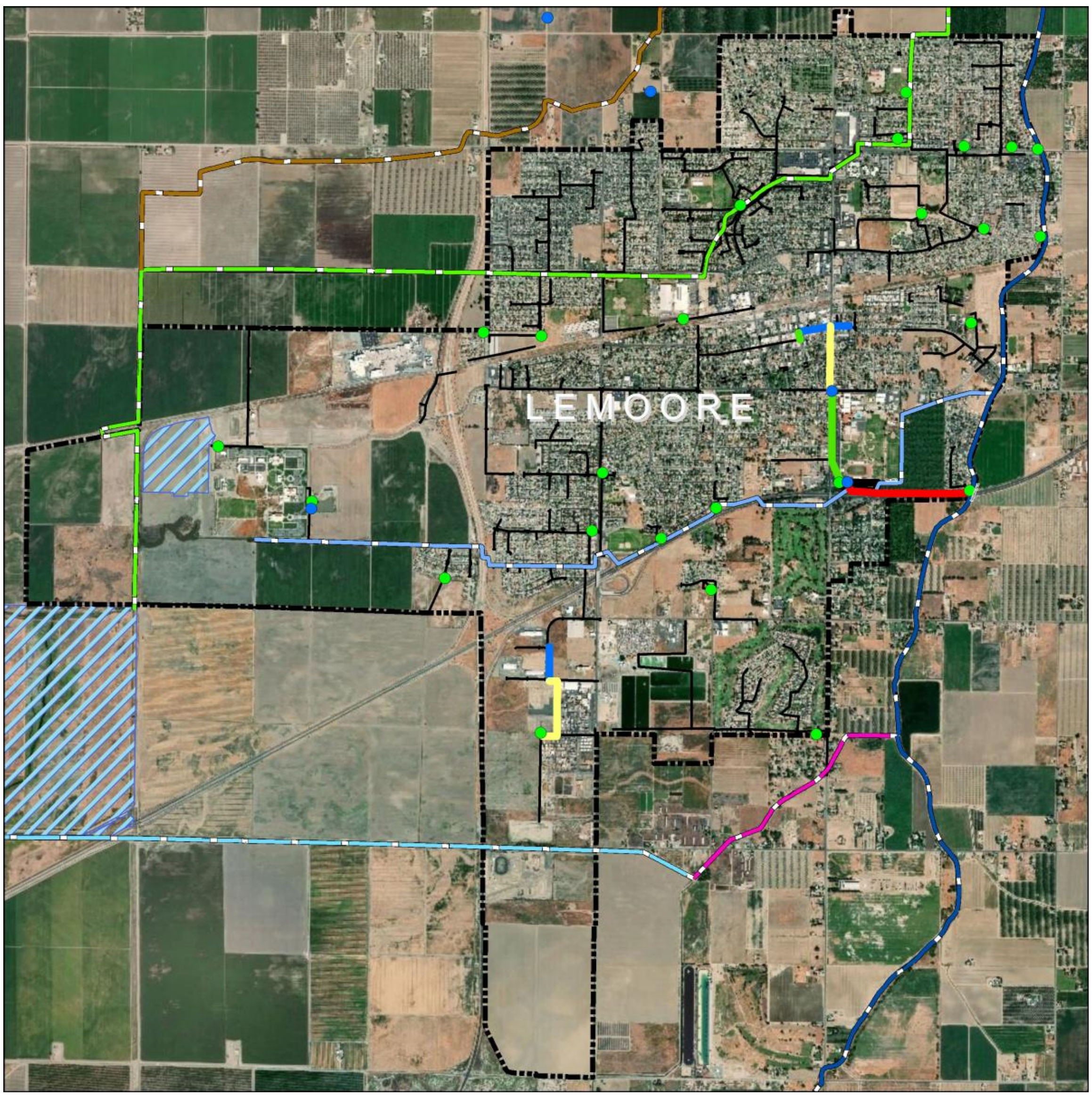
(2) Average power cost assumed to be $0.12/kWh.

(3) Chemical costs were assumed to be $2.00/lb for polymer; $0.96/gal for 12.5% sodium hypochlorite solution; $0.96/gal for 50% sodium bisulfite solution; $0.20/lb for 42% alum solution; $1.00/gal for citric acid; $5.00/gal for sulfuric acid.

(4) Maintenance includes replacement parts and hauling/dredging

CITY OF LEMOORE

STORM DRAINAGE MASTER PLAN



SEPTEMBER 2018

STORM DRAINAGE MASTER PLAN

Prepared for:

City of Lemoore
711 West Cinnamon Drive
Lemoore, CA 93245
Contact Person: Nathan Olson, City Manager
Phone: (559) 924-6700

Consultant:

901 East Main Street
Visalia, CA 93292
Contact: Joel Joyner, P.E., City Engineer
Phone: (559) 733-0440
Fax: (559) 733-7821

September 2018

Project #170160

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INTRODUCTION

This Storm Drainage Master Plan (Plan) has two components – analysis of the existing City storm drainage system and its needed improvements and analysis of the essential expansion of that system to accommodate and serve community growth.

To guide the analyses, and to implement its conclusions and recommendations, both data and counsel were obtained from key existing and past City staff members, City records were accessed, field surveys undertaken, calculations and critical-area modelling/engineering analysis completed, and the Lemoore Canal and Irrigation Company (LCIC) and disposal area landowners were contacted.

The City has, in the past, undertaken significant studies and has adopted essential documents concerning community storm drainage. The City and LCIC's (Appendix A) agreement provided guidance, as did a 1998 Westside Drainage Study and the City's 2008 Storm Water Management Plan.

This document includes summaries of existing system supplementation and proposed system-expansion needs (Section 1), recommended hydrologic criteria and facilities design regulations (Section 2), descriptions of planned growth area facilities and existing facilities modifications (Sections 3 and 4), suggested capital improvement priorities and programs (Section 5), summarized funding needs (Section 6), and suggested Master Plan adoption and implementation measures (Section 7).

City Council understanding and emphasis in reviewing and authorizing Plan implementation should include:

- A conceptual knowledge of the City's existing storm drainage system, its capabilities and its shortcomings;
- Concurrence in the Plan for an expanded storm drainage system to serve community growth and development;
- Support of the need for concurrent improvements in the existing storm drainage system serving the developed community;
- Concurrence with the essential separate revenue sources for expanding-community and existing community drainage programs and projects; and
- Implementation of the steps necessary to initiate and maintain such revenue sources.

SECTION 1 - THE CITY'S EXISTING STORM DRAINAGE SYSTEM

1.1 - The Existing Community Storm Drainage System

The City's existing storm drainage system has, within funding and technology limits, been well designed, maintained and operated. Despite topography (0.1% average ground slope), historically high groundwater levels (5 feet), and poorly drained soils, the system performs well, with limited areas of street ponding during storm runoff. Residential, commercial, and most industrially developed areas are curb-and-guttered, drop inlets convey runoff through gravity pipeline systems and pump stations, principally to storm drainage retention and limited-detention basins, and from such detention basins to a Lemoore Canal and Irrigation Company (LCIC) irrigation canal bordering, and irrigation ditches traversing and bordering, the City. The canal and ditch system convey storm drainage to irrigated farmland west and southwest of the City and to an un-farmed wetlands Disposal Area east of the Kings River.

The incorporated City includes approximately 8 ½ square miles, 5,440 acres. An estimated 60% of that area is developed and contributes storm runoff to the City's storm drainage system. The balance of the City area is undeveloped or marginally developed industrial facilities with onsite storm runoff detention, low-density/large lot development, a community college campus, golf course, or wastewater facilities, with limited runoff. Total runoff through the storm drainage system probably does not exceed 685-acre feet from a design storm (ten-year/two-day); runoff flows to the Canal and ditch system are reduced by detention basins, and total runoff to the disposal system is reduced by retention basins.

The City and its principal drainage disposal areas are depicted on Figure 1-1 as are the City limits, the Study Area for this Plan, and the Lemoore Canal and the various irrigation ditches and pipelines replacing those ditches, which border and traverse the City. Figure 1-2 depicts, on a larger scale, the City's existing development and proposed growth areas east of State Route 41. Development west of State Route 41, and agricultural areas west and southwest of the City, are pictured on Figure 1-3.

Existing and proposed land uses within the Plan's Study Area have been used as a basis for calculation of storm drainage flows and volumes. These land uses are depicted on Figure 1- 4. (The Study Area boundaries have been confirmed by the City planning staff and are derived from the existing General Plan, along with assumptions for growth in the Plan Area that will occur beyond the date-range of the General Plan.)

Figure 1-5 shows approximate, existing, in-City drainage areas. Figure 1-6 illustrates the location of residential developments currently in progress. Table 1-1 describes such developments and their storm drainage demands and facilities.

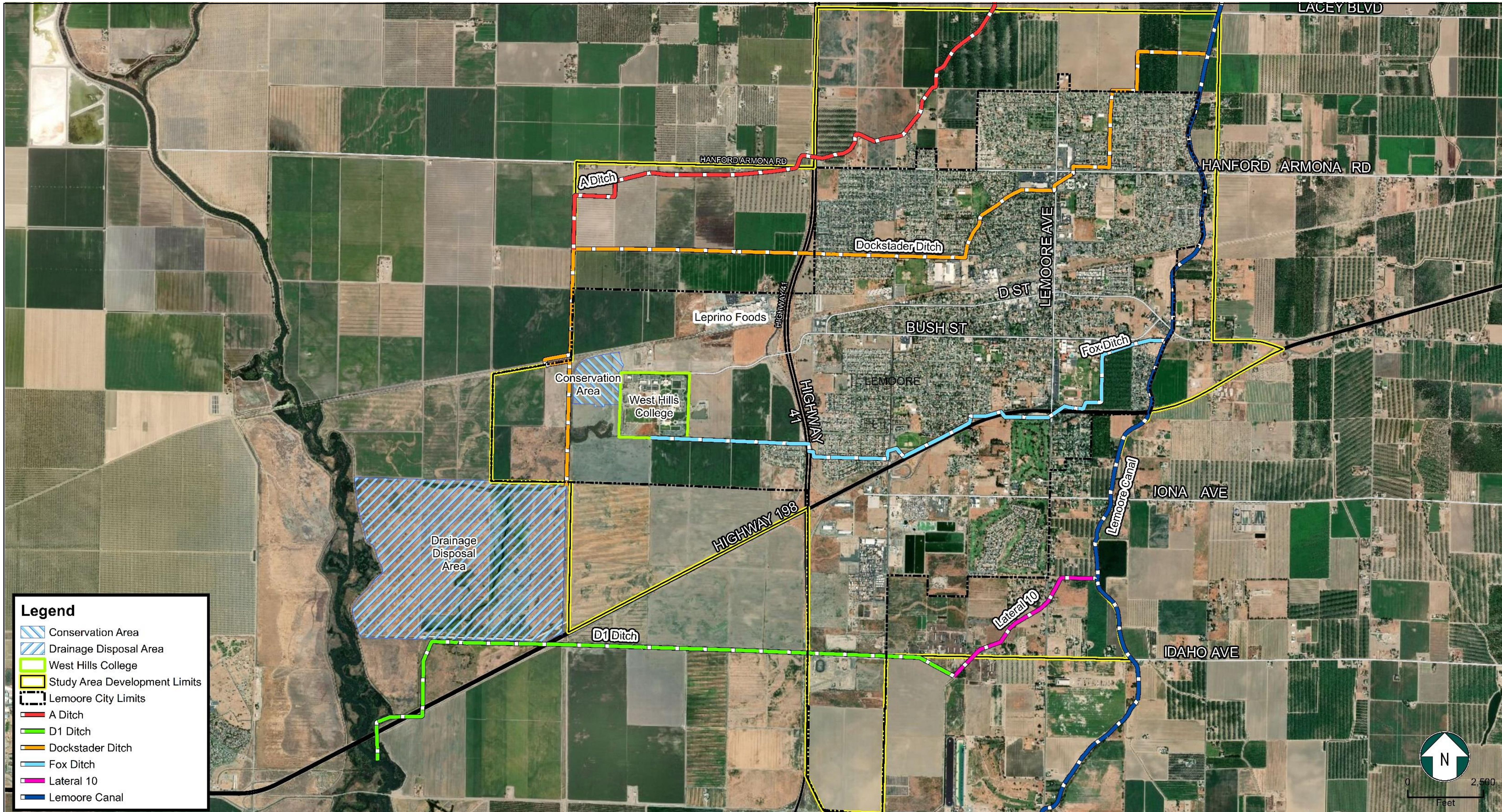

Figure 1-1

City of Lemoore and Drainage Disposal Areas

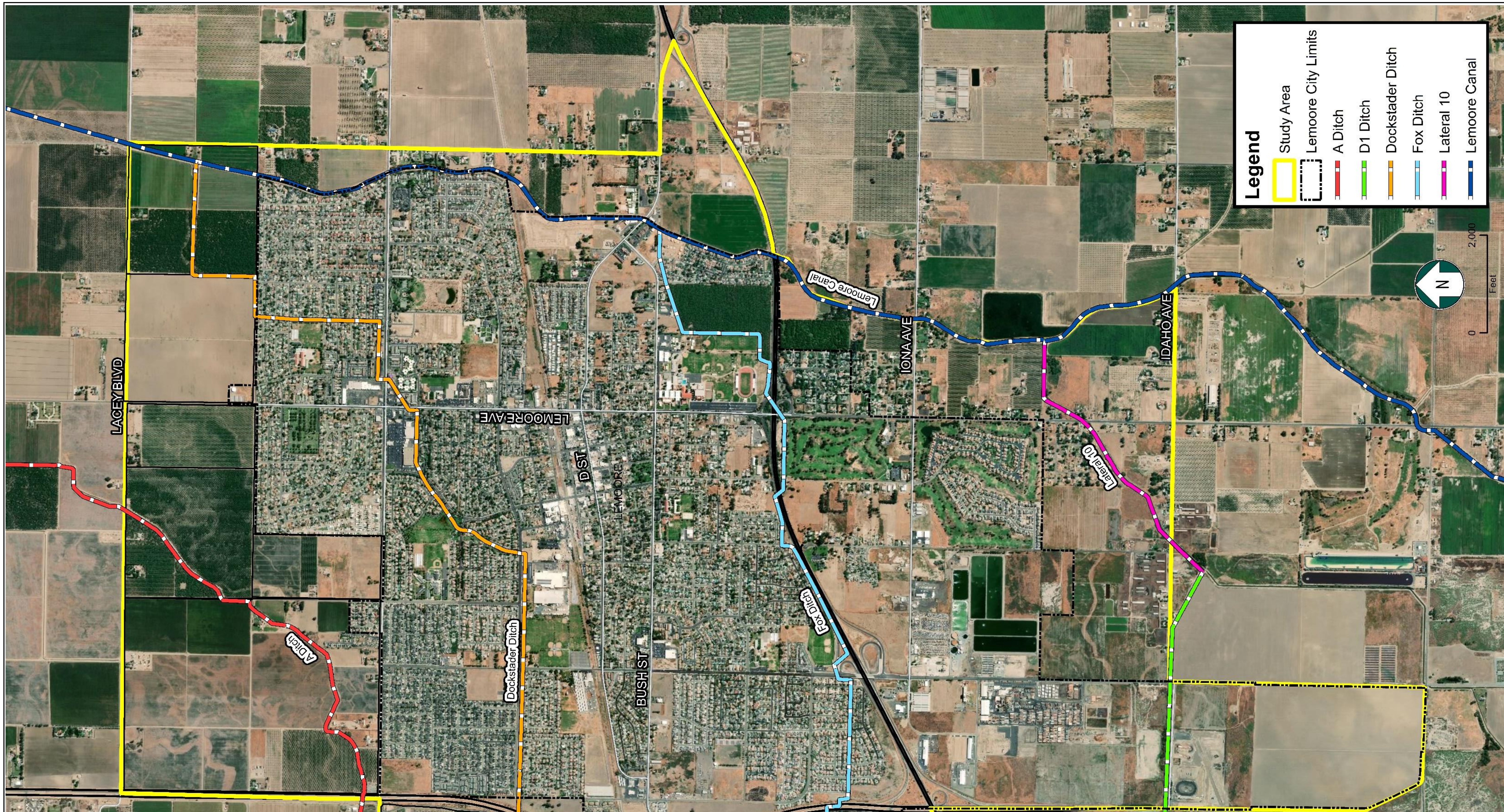

Figure 1-2

Existing City Development and Proposed Growth Areas East of SR 41

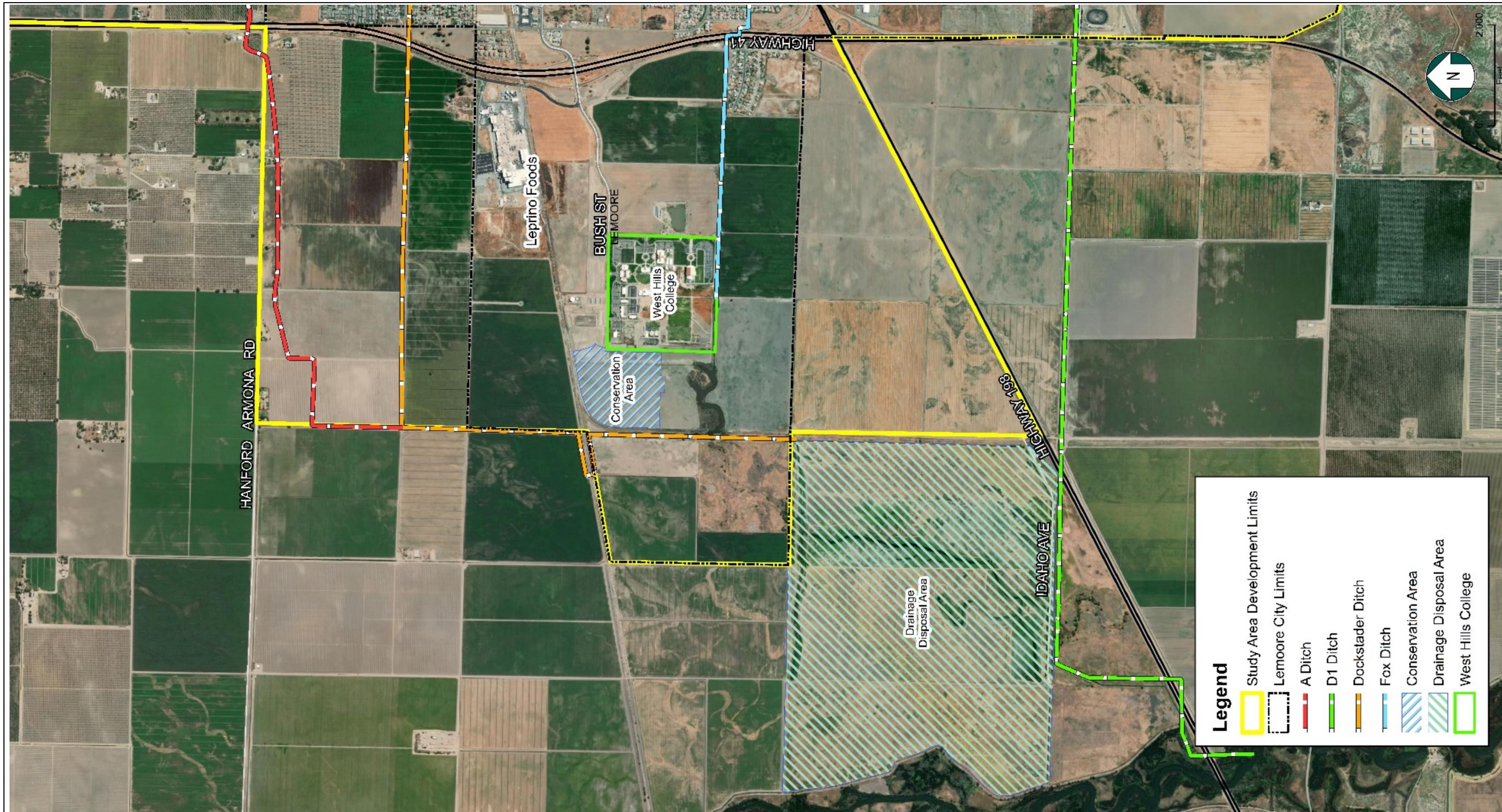

Figure 1-3

Existing City Development and Agricultural Areas West of SR 41

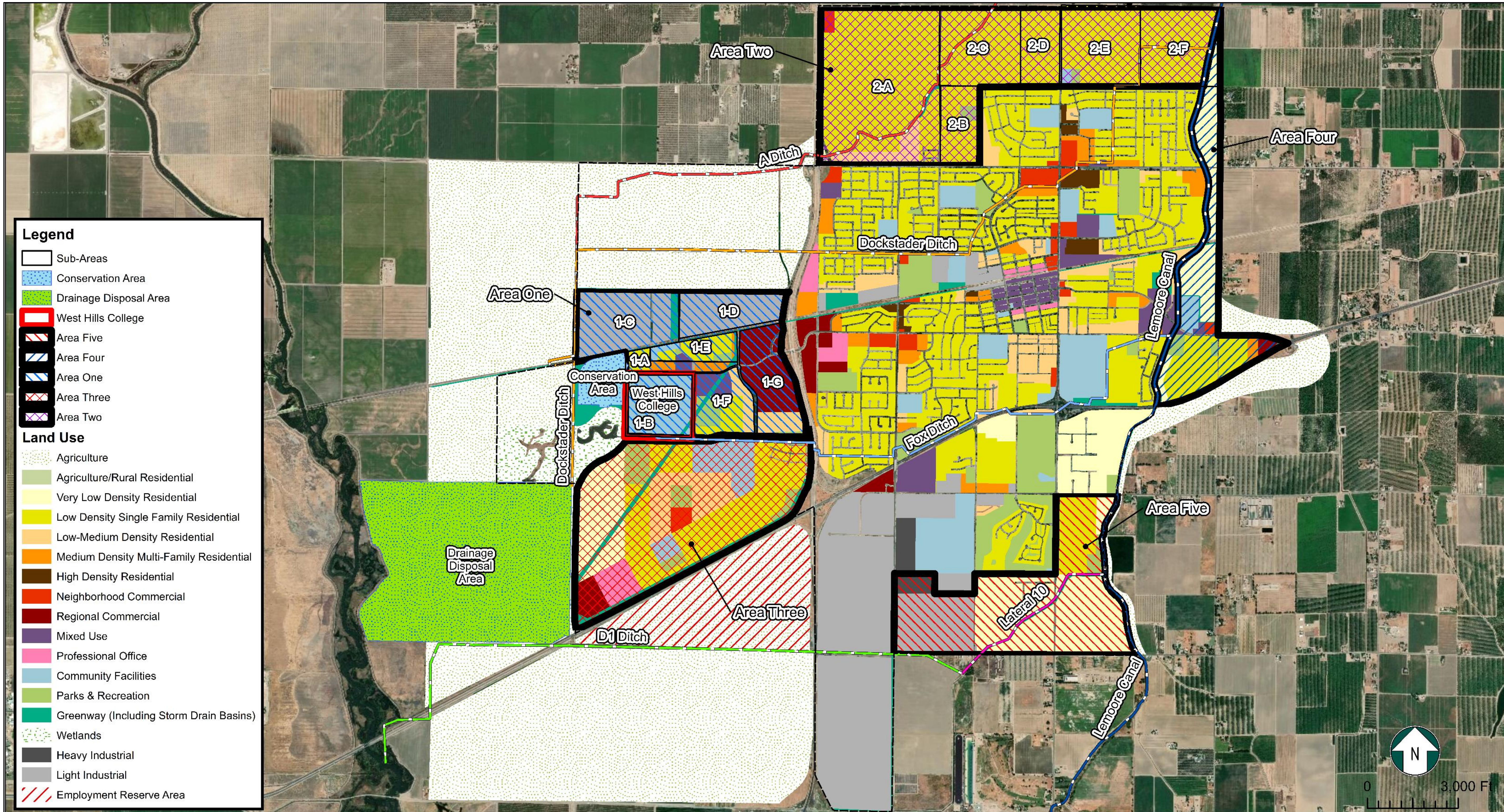

Figure 1-4

Existing and Proposed Land Uses in Plan Study Area

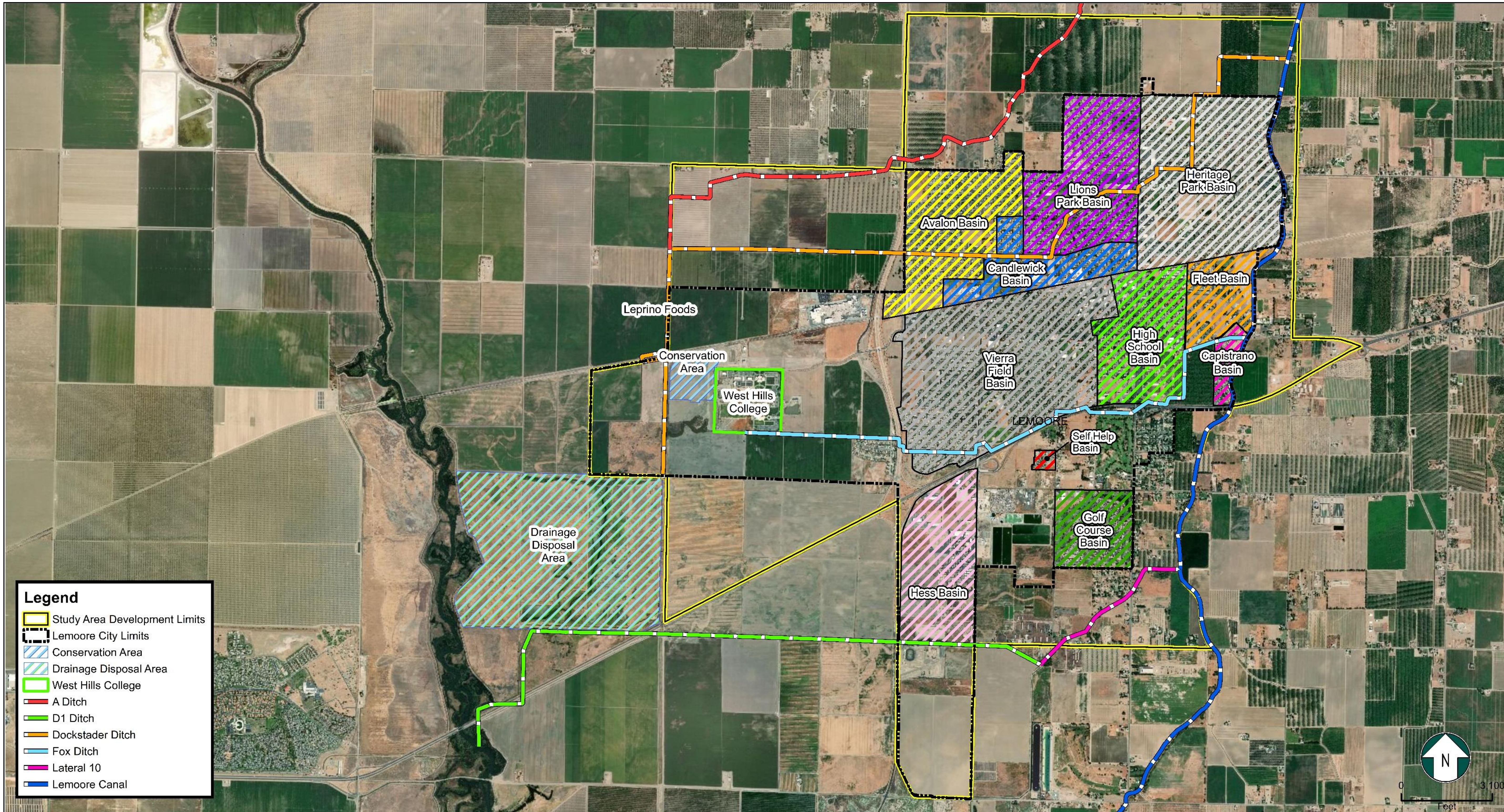

Figure 1-5

In-City Drainage Areas

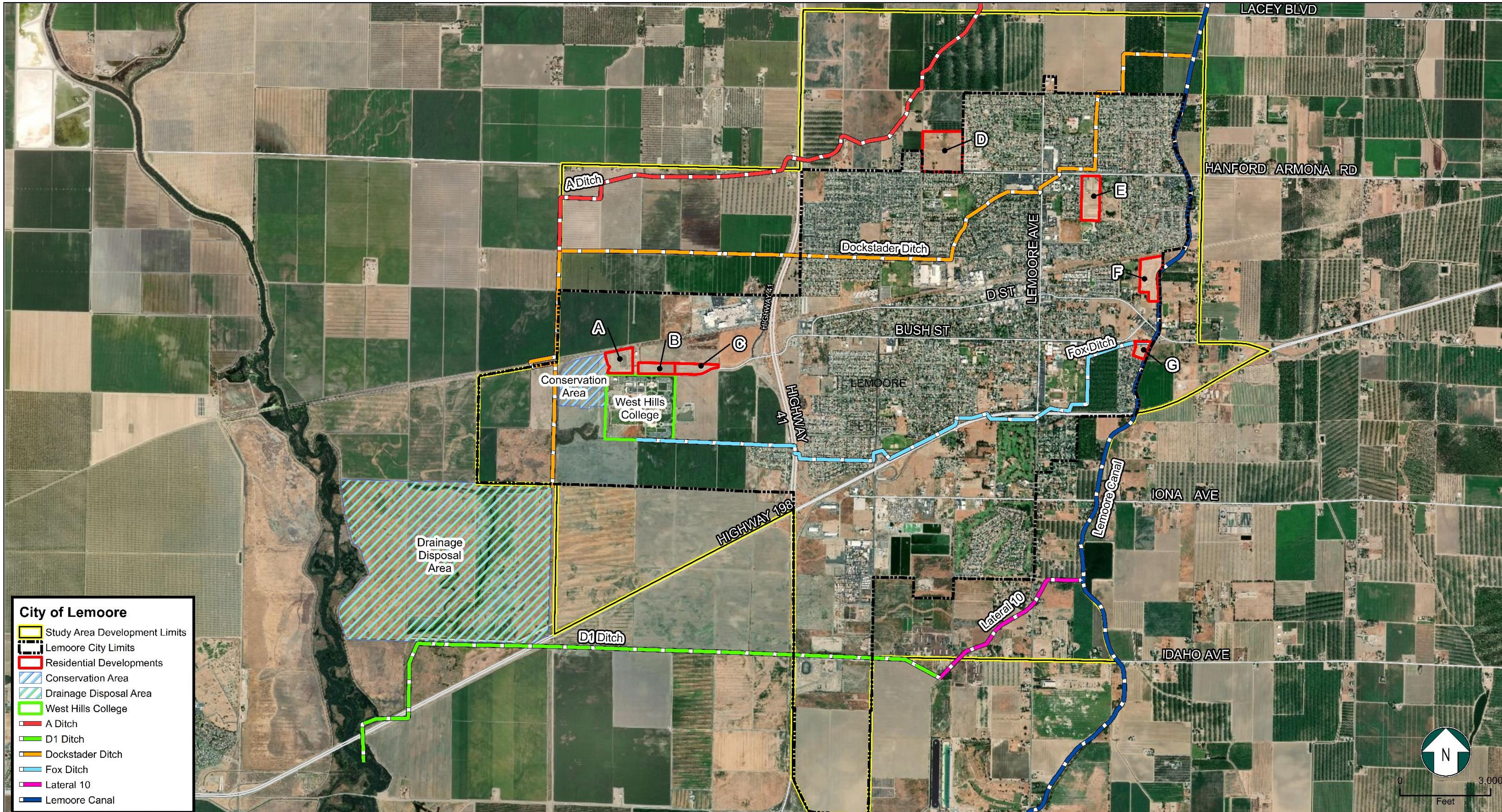

Figure 1-6

Current Residential Developments

Table 1-1
Current Residential Developments and Their Storm Drainage

Figure 1-6 Designations	Development	Number of Units	Acreage	Drainage (Acre Feet)	Drainage Facility
A	Single-Family Residential	68	15	1.44	Conservation Area*
B	Multi-family Residential	145	10	2.33	Conservation Area*
C	Multi-family Residential	145	10	1.71	Conservation Area*
D	Single-Family Residential	180	40	4.28	On-Site Retention
E	Single-Family Residential	90	20	1.93	Heritage Basin**
F	Single-Family Residential	90	20	1.93	Daphne/Fleet Basins**
G	Single-Family Residential	27	6	0.58	Capistrano Basin**

* See Figures 1-1 and 1-3
** See Figure 1-5

1.2 - The Existing Collection System

Lemoore is served by a basically adequate and well-maintained storm drainage collection system. Almost all streets in the City have curb and gutter and drop inlets; piping (concrete or PVC) is in good condition. The piping collection system, depicted on Figure 1-7, has some pipe-size deficiencies. These deficiencies are addressed in later sections of this Plan.

The City's topography and historic high groundwater levels constraining storm drainage basin depths have necessitated pump stations at or approaching the terminus of some collection system piping networks (see Figure 1-8 and Table 1-2). (It should be noted that three pump stations (Numbers 1, 9 and 21) pump Lemoore Canal seepage back into the Canal to avoid high-groundwater damage to Canal-abutting residential developments.)

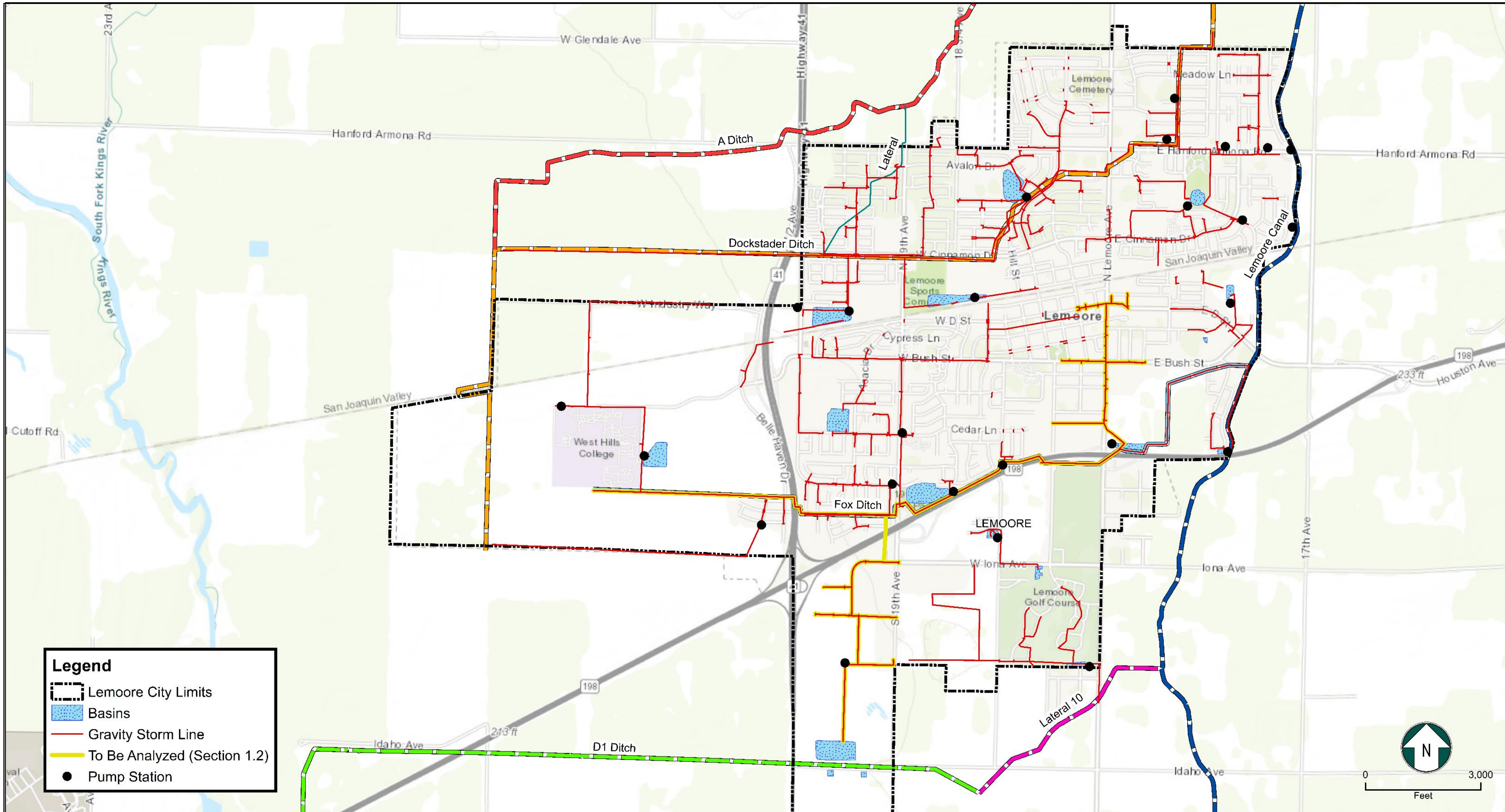

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Figure 1-7

Existing Storm Drainage Piping

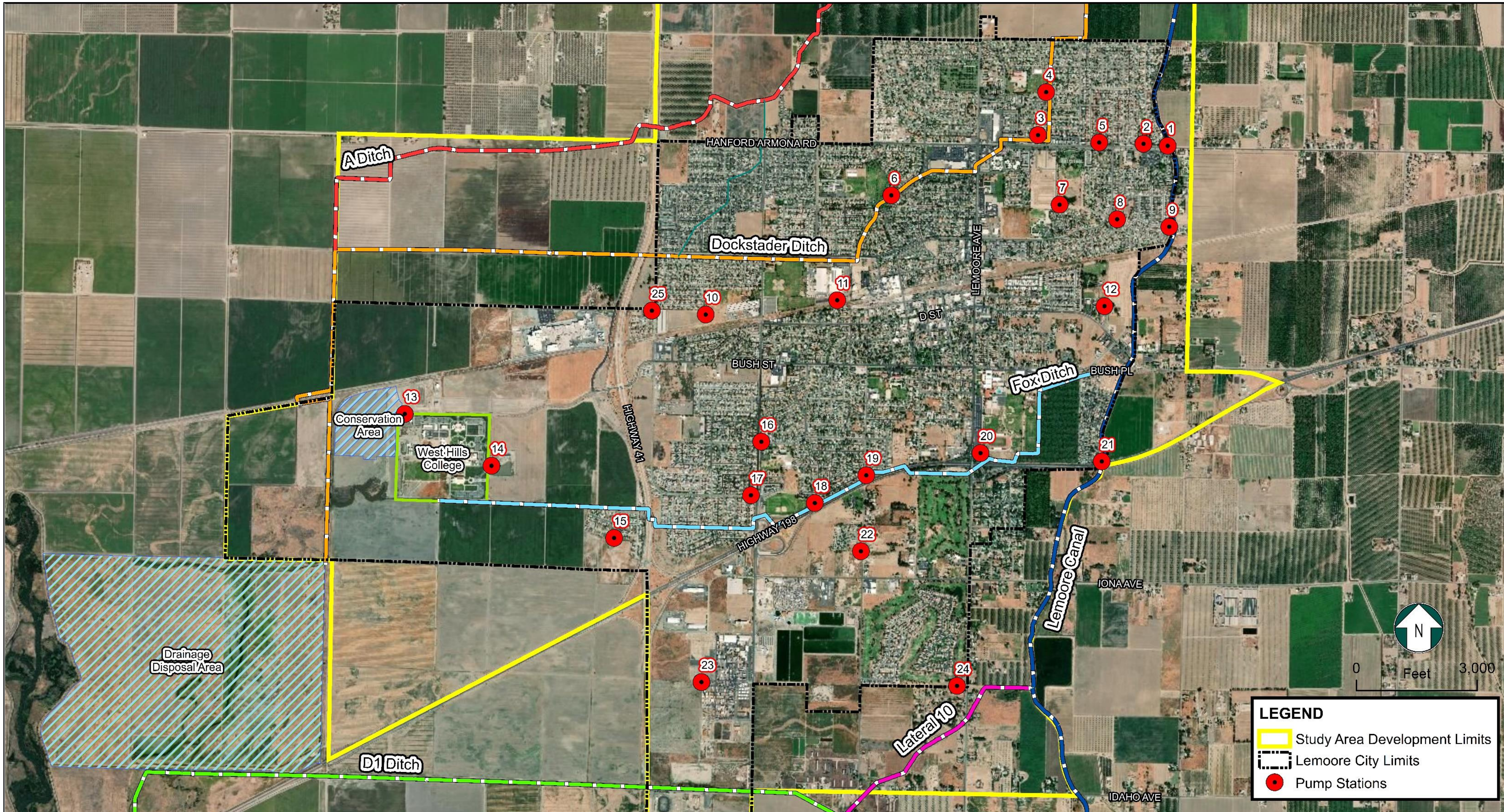

Figure 1-8

Existing Storm Drainage Pump Stations

Table 1-2
Pump Stations

Figure 1-8 Designations	Name	Function and Comments	Equipment
1	Hanford-Armona	Dewatering only, to Lemoore Canal	-
2	Eastgate	Pumps to Heritage Basin (line size to pump station too small; flooding of Cinnamon Avenue & Pine Court)	2 14 HP pumps (290 gpm each)
3	Spring Lane	Pumps to Heritage Basin (Pumps clog with trash, overloads trip out, causing flooding at apartments west of pump station	2 25 HP pumps
4	Sara	Direct discharge to Dockstader Ditch pipeline	2 20 HP pumps (3,375 gpm each)
5	Belinda	Pumps across Hanford/Armona Road to Heritage drainage area	1 3 HP pump
6	Lions Park	Pumping in and out of Basin, drains Basin to piped Dockstader Ditch	2 75 HP pumps into Basin, 1 25 HP pump out
7	Husted	Discharges to Heritage Basin (no problem)	2 14 HP pumps into Basin
8	Daphne	Combination pedestal and submersible pumps, discharging into and out of Heritage Basin, and to Lemoore Canal (manual control of operations)	1 15 HP pump into Basin, 1 25 HP pump to Canal
9	Geneva	Dewatering into Lemoore Canal	-
10	Avalon	Pumps to Dockstader Ditch to drain the Basin (only one pump; backup needed)	1 10 HP pump
11	Candlewick	Pumps to Olive Ave onto Cedar pump station, lifted then to Vierra Basin* (has pipe not hooked up to Dockstader Ditch)	1 5 HP pump to Olive Avenue storm drain
12	Fleet Reserve	Pumps to retention basin (basin being connected to new-development basin on	To be re-determined; construction in progress

Figure 1-8 Designations	Name	Function and Comments	Equipment
		the site, and pumped to Lemoore Canal)	
13	West Hills-West	Accepts City well maintenance and City street flows)	-
14	West Hills	Pumps into retention basin	2 35 HP pumps
15	Cimmaron Park	Pumps directly to Fox Ditch	1 1 HP, 1 2 HP pumps
16	Cedar	Pumps to Vierra Basin receiving "manhole"	2 125 HP pumps
17	Silverado	Pumps to Vierra Basin receiving "manhole"	2 40 HP pumps
18	Vierra Basin	Pumps out of Basin to either Fox Ditch pipeline or Hess Basin ("split" control, manual, at riser northwest of 19th/198 interchange)	2 25 HP pumps
19	Brookfair	Pumps to Fox Ditch	2 3 HP pumps
20	High School	Pumps to Fox Ditch	1 1.5 HP pump, 1 20 HP pump
21	Capistrano	Pumps directly to Lemoore Canal, dewatering and area drainage (pump too small; drained area floods)	1 5 HP pump (450 gpm)
22	Self Help	Pumps out of Basin to a golf course retention basin	1 3 HP pump
23	Hess	Pumps, through a ditch, into Basin, as needed	1 3 HP pump
24	Golf Course (Fire Station)	Pumps out of Basin to Lateral 10 (D-1 Ditch)	2 5 HP pumps
25	Country Club (Catholic School and Country Club Apartments)	Pumps to Avalon Basin	-

NOTES:
*19th Avenue Park Basin

1.3 - The Existing Storm Drainage Basins

Approximately 62% (about 425-acre feet[1]) of the City's existing storm drainage goes through limited-detention basins before disposal to the Lemoore Canal and irrigation ditches; 2% (12-acre feet[1]) drains to a retention basin east of the College campus; 36% (247-acre feet[1]) discharges directly to the Canal or irrigation ditches. The detention basin

[1] From a ten-year, 2-day, storm

capacities range from 18% (Heritage Basin) to 76.2% (Vierra Field Basin) of ten-year/two-day storm demand. Figure 1-9 depicts Basin locations; Table 1-3 lists Basin capacities.

Basin discharges require pumping. Discharge rates are currently solely dependent upon the size of discharge pumps (see Table 1-2), the ability of downstream piping and ditches to convey pumped flows, and non-flooding constraints on agricultural-usage properties. Basins are initially pumped at or approaching inflow rates and emptied as soon as possible. Percolation from Basins to groundwater is minimal because of short detention and low percolation-rate soils.

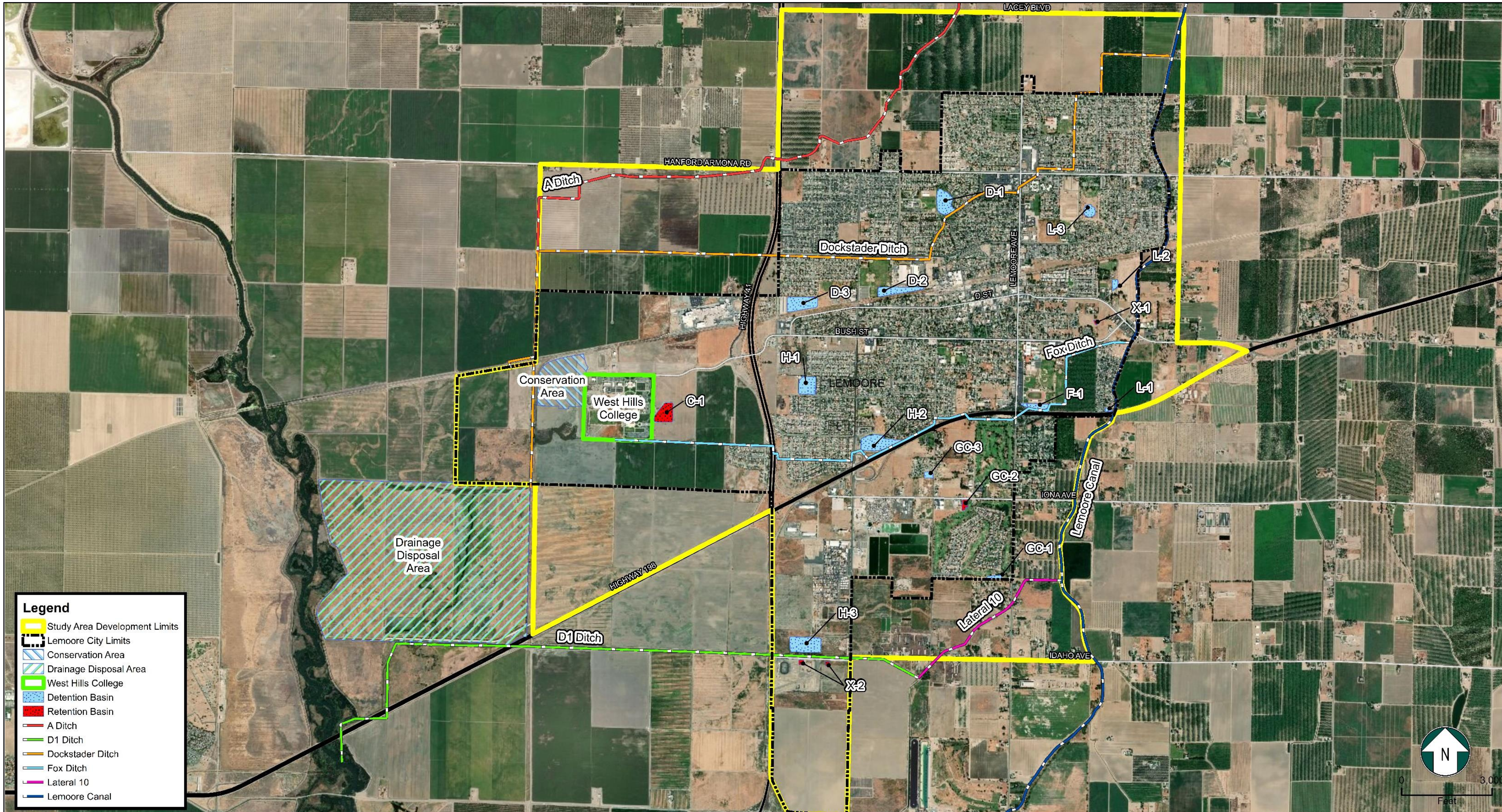

Figure 1-9

Existing Storm Drainage Basins

Table 1-3
Lemoore Storm Drainage Basins, Existing System

Location	Identifier	Name	Area (acres)	Depth (ft)	Volume (acre*ft)	Demand Volume	Percent Capacity	Notes:
Basins Discharging into Lemoore Canal	L-1	Capistrano	0.516	1.61	0.83	4.67	17.73	Drainage from adjacent subdivisions.
	L-2	Fleet	1.32	3	3.96	10.27	39	As of June 2017, a retention basin, not fully developed and maintained. Being supplemented in conjunction with adjacent subdivision development. To be converted to detention basin discharging to canal.
	L-3	Heritage	2.83	4	12	68.57	18	Major subdivision drainage facility. 'permanent' pond, 2-4 feet in depth, in developed area. Additional storm drainage flow pending from vested subdivision west of basin. Space available for further development.
Basins Discharging into Dockstader (pipeline and open ditch)	D-1	Lions Park	8.34	2.04	16.98	39.74	42.72	Fully developed basin draining major subdivision areas.
	D-2	Candlewick	6.81	1.54	10.51	21.6	48.68	Fully developed small basin.
	D-3	Avalon	9.44	3	28.32	32.44	87	Fully developed basin serving single-family subdivisions, a multiple-family development and a service/highway commercial area.
Basins discharging into Lateral 10/D-1 Ditch	H-1	Cedar	7.22	2.32	16.72	74.87	76.21	A partially developed (shallow) detention basin for drainage en route to Basin H-2; ultimately to be additionally used for areas east and west of basin when developed.
	H-2	Vierra Field	10.98	3.67	40.34			Fully developed; alternate discharges to Fox Ditch or Hess Basin; manually controlled by City dependent upon Fox Ditch capacity. Unresolved difficulties with pumped input facilities (capacity).
	H-3	Hess	11.64	3	34.92	117.94	30	Currently discharged into D-1 Ditch with portable pumps.
Basins discharging to Fox Ditch	F-1	High School	3	4	12	43.82	27	Fully developed.
Golf Course Area Basins	GC-1	Fire Station	1.12	4	4.49	10.54	42.6	Fully developed. To be modified for well and tank site; existing capacity to be maintained. Discharges to D-1 Ditch.
	GC-2	Golf Course	1.07	4	4.27	0.81	1175.31	Fully developed. Retention.
	GC-3	Self Help	1.31	4	5.25			Fully developed. Discharges to GC-2.
College Area	C-1	West Hills Basin	7.11	1.71	12.14			Retention basin; fully developed
Miscellaneous small basins (unnamed)	X-1	Oleander	0.26	4	1.04			Residential area basin, partially excavated and maintained, west of Bush, south of D Street
	X-2	Idaho	0.96	4.03	3.87			Idaho Avenue drainage; 2 small retention basins on south side between 19th and SR-41; gravity flow from catch basins.

NOTES:
* 1' freeboard.
Percent Capacity = Capacity/Demand

1.4 - The Stormwater Disposal System

Except for the limited storm drainage retained on-site by major industries (Leprino Foods and Olam Industries), and the small amounts of drainage retained in basins east and west of the College campus, Lemoore's storm drainage is disposed of:

- By 1995 agreement with LCIC/John Heinlen Mutual Water Company, discharge to Lemoore Canal;
- By 1995 agreement with LCIC/John Heinlen Mutual Water Company, discharge to the Dockstader and "D-1" irrigation ditches, with agricultural land usage west of State Route 41 and north (Dockstader) and south (D-1) of State Route 198; and
- To the Fox Ditch for agricultural land usage west of State Route 41 and north of State Route 198, and for pipeline and ditch transport to an 800-acre City-entitled drainage-easement wetlands Disposal Area southwest of the College campus (Appendix B).

Figure 1-10 shows the Canal and irrigation ditch alignments, agricultural land usage areas, and the Disposal Areas (Appendix B). Irrigation ditch alignments in the developed portion of the City are principally converted from open ditches to pipeline. The Figure also depicts the location of a 55-acre Conservation Area newly constructed for, and to be operated by, the College (Appendix C). It will accept storm drainage from three near-College residential developments (see Figure 1-6 and Table 1-1).

Operation of the City's storm water disposal transport system is a challenge for City staff. It has been largely successful, coordinating City storm water disposal with agricultural cropping and irrigation requirements and Canal company transport and irrigation ditch maintenance needs.

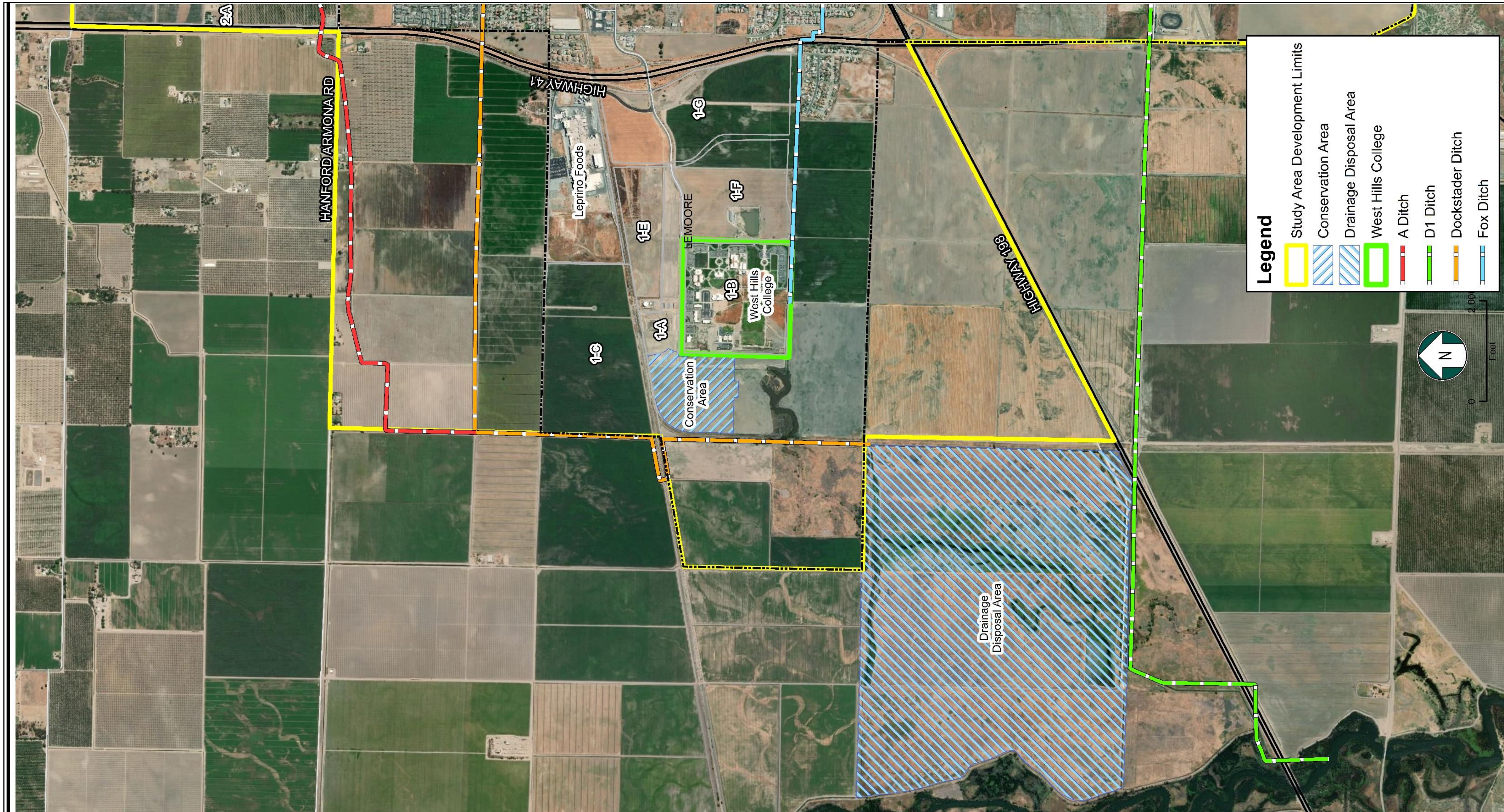

Figure 1-10

Disposal Systems and Areas

1.5 - Existing System Needs and Solutions

The system's needs are evident when storm runoff from "ten-year" or greater storms exceeds the capacity of existing facilities:

- In a few locations, runoff ponding exceeds curb heights and nearly reaches residential floor elevations;
- System capacity serving 'downtown' routinely necessitates sandbagging;
- Curb-height street flooding is repetitious with less-than-design storms;
- Excessive operational attention is required to operate or maintain system facilities; and
- Basin discharges to transport and disposal facilities are exceeded.

Figure 1-11, Table 1-4, and representative, typical, street-ponding photos (Appendix D) identify and illustrate system deficiencies and problems, although they are, in comparison to those of most Valley communities, relatively minor. Section 4 of this Plan addresses:

- Obvious solutions to minor problems such as drop inlet placement or replacement, and pump capacity increases, pump station and basin equipment changes or additions to minimize operational requirements;
- The results of modelled/engineered analyses of significant problems, with resulting recommended solutions;
- Basin size increases, where possible, to assure downstream transport and disposal capacity for infill development;
- Redirection of discharges to transport and disposal facilities; and
- Basin pump-out rate modifications.

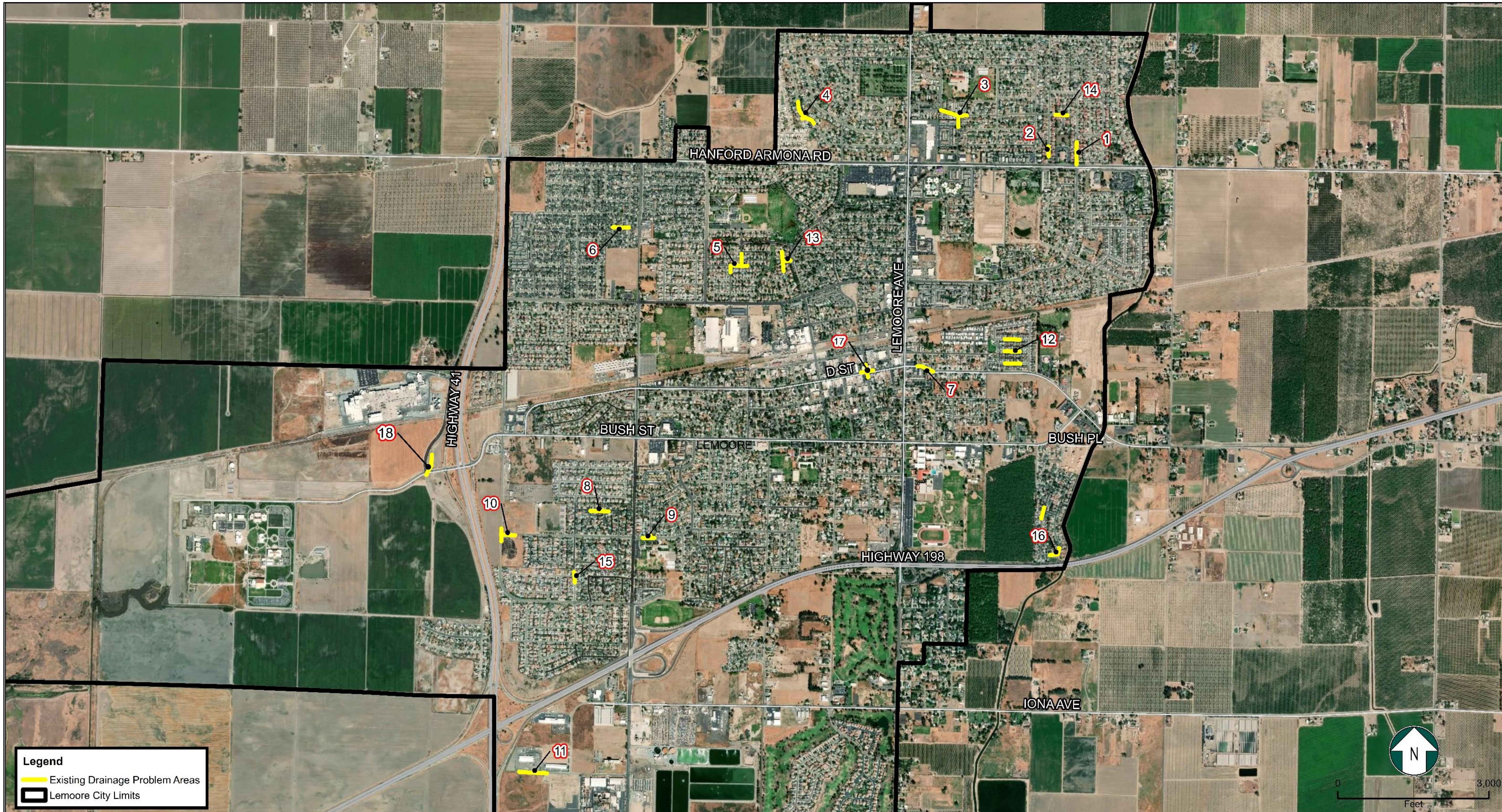

Figure 1-11

Locations of Illustrative System Deficiencies and Problem Areas

Table 1-4
Existing Problem Areas

Area (From Figure 1-11	Location and Description	Recommended Solution
1	East Cinnamon Drive, north of Hanford Armona Rd. Over curb. Pipe under-sized	Increase size of, or parallel, approximately 700 feet of pipe.
2	Belinda Dr, north of Hanford Armona Rd. Floods when pumps get plugged, or turn off. Over curb.	Replace pumps with non-clog pumps of larger size
3	E. Hazelwood and Beverly. Too much water to one location. Street ponding if pumps plug up or kick out, almost into apartments. Have to keep a man at Spring Lift Station during heavy rains to reset pumps immediately when tripped.	Replace pumps with non-clog pumps of larger size
4	West Spring Lane just east of Juniper Lane. All surface water from north of Juniper to this location. At Hanford-Armona Road, a manhole that has to fill up in order to drain the area. Ponding over curb and into yards.	Solution will require surveying and design; not evident at this juncture.
5	Wexford and Cardiff. Floods into yards; drains to Lions Park.	Increase Lions Park Basin inlet pump size.
6	Noble, west of 19th Ave. Drains to Avalon Basin. Floods into yards.	Increase the size of the pump.
7	East D Street. Floods, with heavy rains, into yards. (Lemoore Avenue pipe size too small)	Part of modelling/engineered analyses, 'downtown' to High School Basin; see Plan recommendation.
8	Lincoln Lane. Floods, with heavy rains, into yards.	New pump station at Cedar Basin may correct. (Pump station to both fill and empty Cedar Basin.)
9	Cedar and Kenwood. All surface water to two drop inlets. Floods into yards.	Install pipeline from Cedar and Kenwood to new pump station at Cedar Basin. (Pump station to both fill and empty Cedar Basin.)
10	19 ½ and Cedar. Line terminates. Pipe is capped at manhole. Water comes out of manhole in	Connect dead-end pipe to new pump station, about 1000 feet; deepen basin.

Area (From Figure 1-11	Location and Description	Recommended Solution
	intersection. Low manhole, no curbs.	
11	Cul-de-sac on Enterprise at service station. Floods over curb if valve on ditch at San Simeon is open too much. Takes a day to drain.	Part of the Hess Basin modelling/engineering analysis.
12	New subdivision on East D St. Drainage floods over curbs; takes excessive time to drain to Fleet Basin.	Pump station out of Fleet Basin should be increased in size.
13	Stratford Court floods over curb. Too much water for two drop inlets. Drains to Lions Park.	Drop inlet supplementation; increase Lions Park Basin inlet pump size.
14	Hazelwood between Belinda and Cinnamon floods over curb. Two drop inlets get all the water once Heritage Basin fills. Takes excessive time to drain.	Increase pump size.
15	Acacia and Morrow floods over curb, due to low spot in the road, until pumps catch up.	No easy solution; analysis required.
16	Capistrano subdivision pump too small. Floods over curb.	Add a pump out of the subdivision with a low-flow pump into the Lemoore Canal.
17	D St. and Follett. Flooding of downtown businesses. Requires sand bagging during high intensity storms.	See Downtown/High School Basin modelling/engineering analysis.
18	Bush St. and Bell Haven Dr. Storm drain pipe terminates and floods the intersection.	Complete the conveyance system to the Disposal Area.

SECTION 2 - STORM DRAINAGE HYDROLOGIC CRITERIA AND DEVELOPMENT DESIGN REGULATIONS[1]

This Plan section will describe the hydrologic criteria serving as the basis for Plan development, and their origins and application, list the design criteria to be utilized by development engineers, describe and depict required standards for storm drainage facilities and define storm drainage-related development project approval requirements.

The design criteria in this section are the minimum acceptable for use by engineers for project drainage facilities to be developed within the City. Engineers are cautioned to apply their own expertise and judgment in development of final designs. Specific projects may require more stringent criteria. The City will not reimburse for costs associated with systems designed to criteria higher than listed herein, unless those higher criteria have been mandated by City staff or governing bodies.

2.1 - Project Design Approval Procedures

Storm drain design shall conform to the Master Plan and the City's Standard Plans and Specifications. Any deviation requires the approval of the City Engineer.

The City has, through the adoption of the Storm Drainage Master Plan, addressed storm drainage for City development with a program of development impact fee-financed detention basins discharging to Lemoore Canal and to irrigation ditches traversing and bordering the City, with ultimate disposal of detention-basin discharge to agricultural usage and City-entitled wetland disposal areas. With the exception of mixed use/commercial/industrial developments one acre or more in size, or when area-service detention basins are not yet available for development, onsite retention basin disposal is, because of increased maintenance and operational costs, discouraged.

Within this conceptual framework the following procedures shall be observed:

When a project site plan or tentative map is first submitted, a schematic-level storm drainage plan shall be concurrently submitted for approval by the City Engineer. At a minimum, this schematic-level drainage plan shall include: drainage tributary area, storm basin volume demand, and piping to the storm drainage basin.

When the first set of improvement plans is submitted for a project, or if a vesting tentative map is submitted for a project in lieu of a tentative map, a more detailed drainage master plan shall be concurrently submitted for review and approval by the City Engineer. The drainage plan submittal shall include the following:

[1] See Appendix E, for corresponding required changes to City Standard Specifications for Public Works Improvements

Topographic map of the drainage-shed and adjacent area showing existing and proposed ground elevations and the drainage area encompassing the project;
Preliminary pipe sizes and drainage piping/pumpage design geometry with hydraulic grade lines, inverts, proposed ground elevations, and supporting calculations;
Map showing analysis points, proposed street grades, and proposed storm drain facilities;
Configuration and elevations of any proposed retention basins, including a preliminary grading plan;
Information on proposed pumps; pump design shall be undertaken and completed in close coordination with the City Engineer; and
Agreement shall be reached regarding the design of connecting facilities to detention basins, any need for developer-financed oversizing of such facilities and amounts of impact fees which must be paid prior to entitlement approval.

2.2 - Criteria

All elements of the storm drainage collection system (inlets, pipes and pump stations) shall be designed in accordance with the Modified Rational Method presented below (or with a City-approved modelling system). This method does not provide for the most intensive, short-duration, storms. The peak flows from such storms are handled through short-term ponding within street areas. Once the brief peak has passed, the inlets, pipes and pump stations designed according to the City's criteria will clear the streets.

Calculated flow (Q) shall be derived from the standard formula.

$Q = CiA$

Where:

Q	=	Runoff Flow (cubic feet per second)
C	=	Runoff Coefficient
I	=	Rainfall Intensity (inches/hour)
A	=	Tributary Area (acres)

2.2.1 - Rainfall Intensity and Accumulation

10-yr., 2-day event	3.32 inches (.276 feet)
100-yr., 10-day event	5.68 inches (.473 feet)

2.2.2 - Runoff Coefficients[2]

Commercial, Warehousing, Mixed Use and Industrial (less than 1 acre)	0.80
Low Density Residential	0.40
Multiple Residential	0.70

[2] General Plan land use designations are discussed and drainage-defined in Appendix F of this Plan.

All other land uses shall be individually evaluated, and coefficients approved by the City Engineer.

2.3 - Pipelines and Drop Inlets

Pipelines and drop inlets shall be designed in accord with the City of Lemoore's most current, adopted, Standard Plans and:

- Drop inlet sizing and spacing shall be calculated by the development engineer to permit disposal of criteria-required rainfall runoff, and calculations thereof will be approved by the City Engineer at the time of submittal of development improvement drawings. Inlets shall be sized and located so that runoff "spread" not exceed, at any location, over 4 feet from the face of curb at gutter line during design storms.
- Pipelines shall be designed so that runoff high-gradient elevations are 6" or more below drop inlet entryways, utilizing n = .013 plus minor losses as design criteria, 2.5 to 10.0 feet per second as flow parameters, and a minimum 30" cover, with all calculations therefor submitted for City Engineer approval at the time of submittal of development improvement drawings.

Drop inlets and pipelines shall be designed as follows:

a. A 2-year, 6-hour storm shall be assumed for residential area drainage. The rainfall for this storm is .11 inches per hour; and
b. A 5-year, 6-hour storm shall be assumed for any area having commercial and/or industrial land uses or zoning covering more than 50% of the area. The rainfall for this storm is .15 inches per hour.

c. If site plan review indicates higher runoff can be anticipated, the City may direct use of higher runoff coefficients. For example, an industrial development covering its entire site with building and impervious surface would require a runoff coefficient of 0.95 rather than the standard 0.80 given in the Table. Please see Subsection 2.5 for related design approvals required prior to approval of a tentative subdivision map or other land entitlement.

2.4 - Pump Stations

Storm drain pump stations to storm drainage basins shall be designed in accordance with the requirements of the City's Standard Drawings, the City's Standard Specifications for Public Works Improvements and the Storm Drain Master Plan. It shall be the responsibility of the project engineer to determine how a project is affected by the Storm Drain Master Plan, and to coordinate his design with the existence, or City-projected time of construction, of Master Plan facilities.

Pump stations shall contain duplex non-clog centrifugal pumps and shall be provided with trash racks in accord with the Standard Drawings. Should site-specific conditions so dictate, alternative designs will be considered if it can be demonstrated that such alternatives are in the interest of the City. Such alternatives could include propeller or other-type pumps, or alternative wet well designs. All pump stations and pumps shall be designed in accord with Sections 32 or 33 of the Standard Specifications.

Pumps shall be selected and designed to provide the required flow when running in tandem, and at least 60 percent of the maximum design flow when running singly. The design engineer shall submit pump design calculations for review. Calculations shall include pump curves (single and duplex operation) and system head curves overlaid on the same scale. The operating range shall give consideration to all variable conditions including discharge head and depth of water in the wet well or basin. Typically, pumps shall be selected to run to the right of the point of peak efficiency on the pump curve. Variance from that policy requires approval of the City Engineer.

Pump submittals shall indicate type, make, model, horsepower, selected impeller type and model number, overall efficiency, motor voltage, and any other pertinent information. Typically, impellers shall be single-vane non-clog; however, in larger diameters dual vane impellers may be considered if in the interest of the City.

Wet wells shall be designed to provide not more than ten pump starts per hour for the selected pump and the system conditions. They shall be of sufficient depth to allow complete drainage of tributary pipelines. Pump shut-off elevation shall be at or below the inlet flowline elevation. The design engineer shall submit calculations demonstrating the range of required pump starts.

Pump stations shall be located within public rights-of-way, or in landscape easements, so that there is ready vehicular access for pump maintenance.

Pump control panels and electric service shall be located near a right-of-way boundary, against a wall. A masonry enclosure thereof with chain link or wrought iron gates (as directed by the City) shall be constructed in accordance with the Standard Drawings. Control panels shall be located so as to give a direct line of sight to the pump(s) by a person standing at the control panel.

2.5 - Drainage Basins

The design engineer shall submit appropriate calculations supporting the selected size and design criteria for any retention basin included in a development, and for offsite, developer-funded, piping to a City detention basin.

2.5.1 - Retention Basins

A basin shall be designed as “retention” if it meets the following criteria:

- Provides protection only for a single development or portion thereof; and
- Has no pumped or gravity outlet for storm drainage disposal.

2.5.2 - DETENTION BASINS

Basins which meet the following criteria are designated as "detention basins":

- Designed to receive storm water and discharge to an irrigation ditch or other facility at a flow rate which is a fraction of the peak inflow rate, within 96 hours, with that discharge rate approved by the City Engineer to comply with or exceed NPDES Phase II standards and the requirements of this Master Plan.

2.5.3 - BASIN DESIGN

All retention basins shall be designed to handle a total of 5.68 inches of rain, with no allowance for percolation or evaporation. The developer's engineer shall prepare a hydrograph for any retention basin to be utilized and submit a design to the City Engineer for approval.

All detention basins will be designed to handle a total of 3.32 inches of rain, with no allowance for percolation or evaporation.

The City of Lemoore, as a small Municipal Separate Storm Sewer System, is governed by the National Pollution Elimination System's (NPDES') Phase II Rule. That Rule requires compliance with 'Attachment 4' Design Standards. The City, as required, adopted in August 2008 a Storm Water Management Plan (SWMP) incorporating such standards including Structural or Treatment Control Best Management Practice capacity requirement:

The 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Water Quality Management, WET Manual of Practice No. 23/ASCE Manual of Practice No. 97, (1998)…[3]

The City's new detention basin requirements meets this standard.

It should be noted that the Attachment 4 Design Standards are promulgated to mitigate (infiltrate, filter or treat) storm water runoff (Attachment 4, p. 5). Attachment 4, p. 10, provides, "through adoption of an ordinance, code or other regulatory mechanism", by the City of a waiver "if" impracticability can be established. Page 10 also notes a water table distance separation of ten feet depth in California which presumptively poses negligible risk for storm water not associated with industrial activity or high vehicular traffic.

Since groundwater levels in and surrounding the City of Lemoore have historically been five feet or slightly more and must be assumed to potentially again reach these levels, the City's volume requirements for storm drainage detention basins have been selected to exceed minimum Attachment 4 requirements. The Council authorization for the Storm Drainage Master Plan will include reference to and adoption of the appropriate waiver (Appendix H) in recognition of the infeasibility of maintaining the ten-foot separation.

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[3] Attachment 4, B. Design Standards, I, (1), p.5

2.5.4 - General

The requirements of this section apply to all basins whether detention or retention.

- Maximum water surface level shall be 0.50 feet below the lowest hydraulic grade line of the incoming pipes.
- Hydraulic grade lines of storm water collection pipes shall not exceed the flow line elevation of any inlets along such pipe.
- Minimum basin freeboard shall be 1.00 feet.
- Minimum basin bottom elevation of retention basins shall be determined by the City Engineer upon review of current groundwater data submitted by the Developer's engineer. In no case, for either detention basins or retention basins, shall they be lower than five feet below initial ground levels unless so approved by the City Engineer.
- Basin bottoms shall be sloped at 0.25% minimum toward any single point in detention or retention basins.
- Basins may be bermed to a maximum of 2 feet above surrounding grade.
- A minimum 15' 0" width all-weather surfaced access roadway shall be provided around the perimeter of all basins.
- Maximum basin side slopes shall be 3:1.
- A six-foot chain link fence in accordance with City Standards (Section 2a. Chain Link Fence) shall be built around the outer perimeter of the basin except when detention basins are of sufficient size to be designed as park or 'water feature' areas by the City. A minimum of one (1) 12-foot swinging gate with access to a public street shall be provided for maintenance purposes. Such access may be either direct or through an approved access easement.

Calculations of any required retention pond volume, maximum permissible water surface elevation, and system hydraulic grade line shall be submitted by the design engineer. Runoff coefficients shall be prorated if necessary to account for composite land uses.

- All industrial and warehousing developments over one acre in area shall retain all drainage onsite in retention basins.
- Commercial and mixed-use properties over one acre will be required by the City to utilize such onsite storm drainage disposal basins, at the City's sole option (any City Engineer decision otherwise will be based on availability and adequacy of offsite City drainage disposal).
- Lack of economically feasible availability of offsite storm Drainage Master-Planned detention facilities, e.g., excessive pipeline costs or lack of City funding to timely construct planned detention basins or basin discharge transport or disposal facilities, may be the basis for City Engineer approval of onsite retention basins.

Figure 2-1, on the following page, depicts a typical onsite retention basin, Figure 2-2 a typical City detention basin.

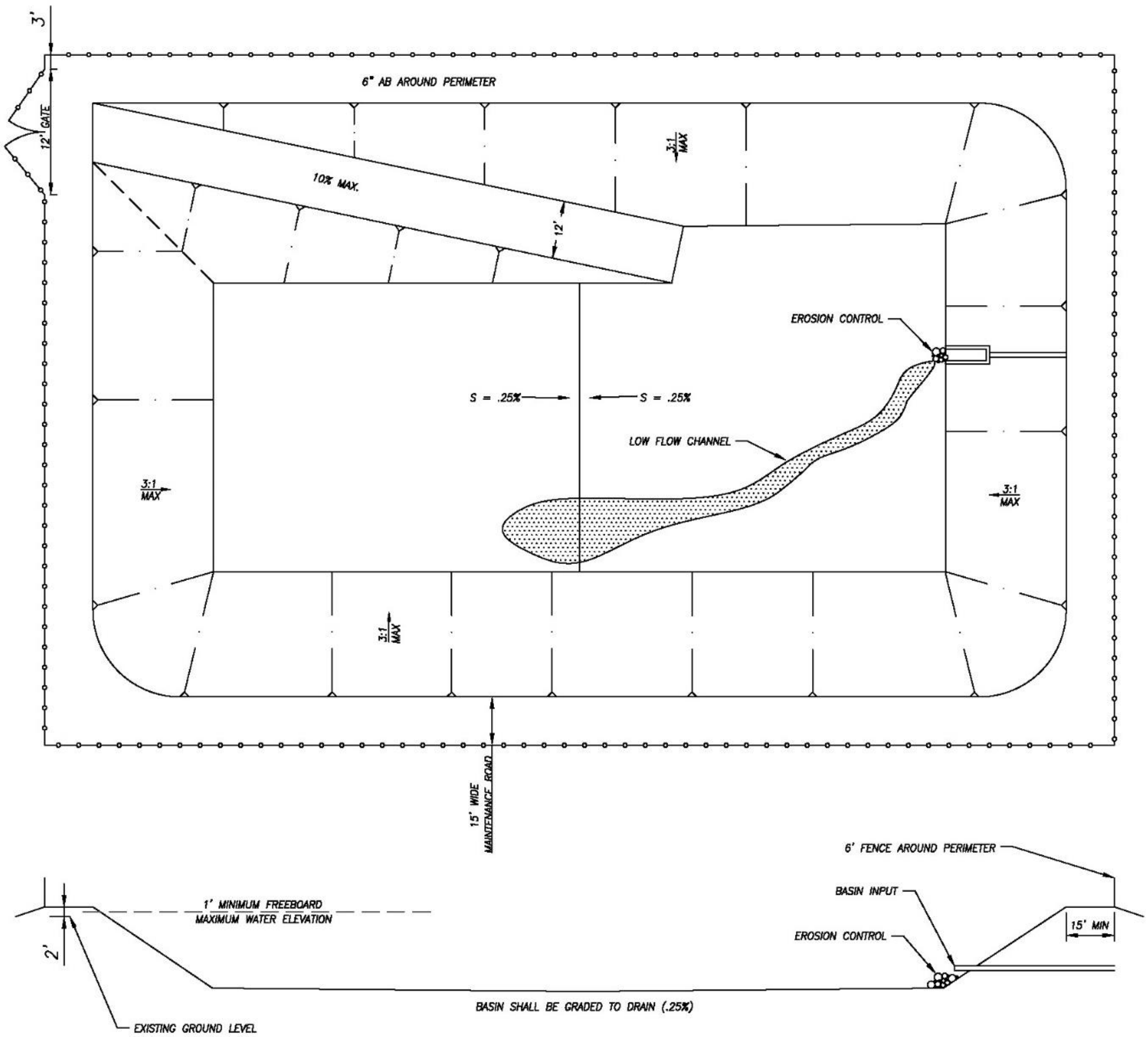

Figure 2-1
Typical Onsite Retention Basin

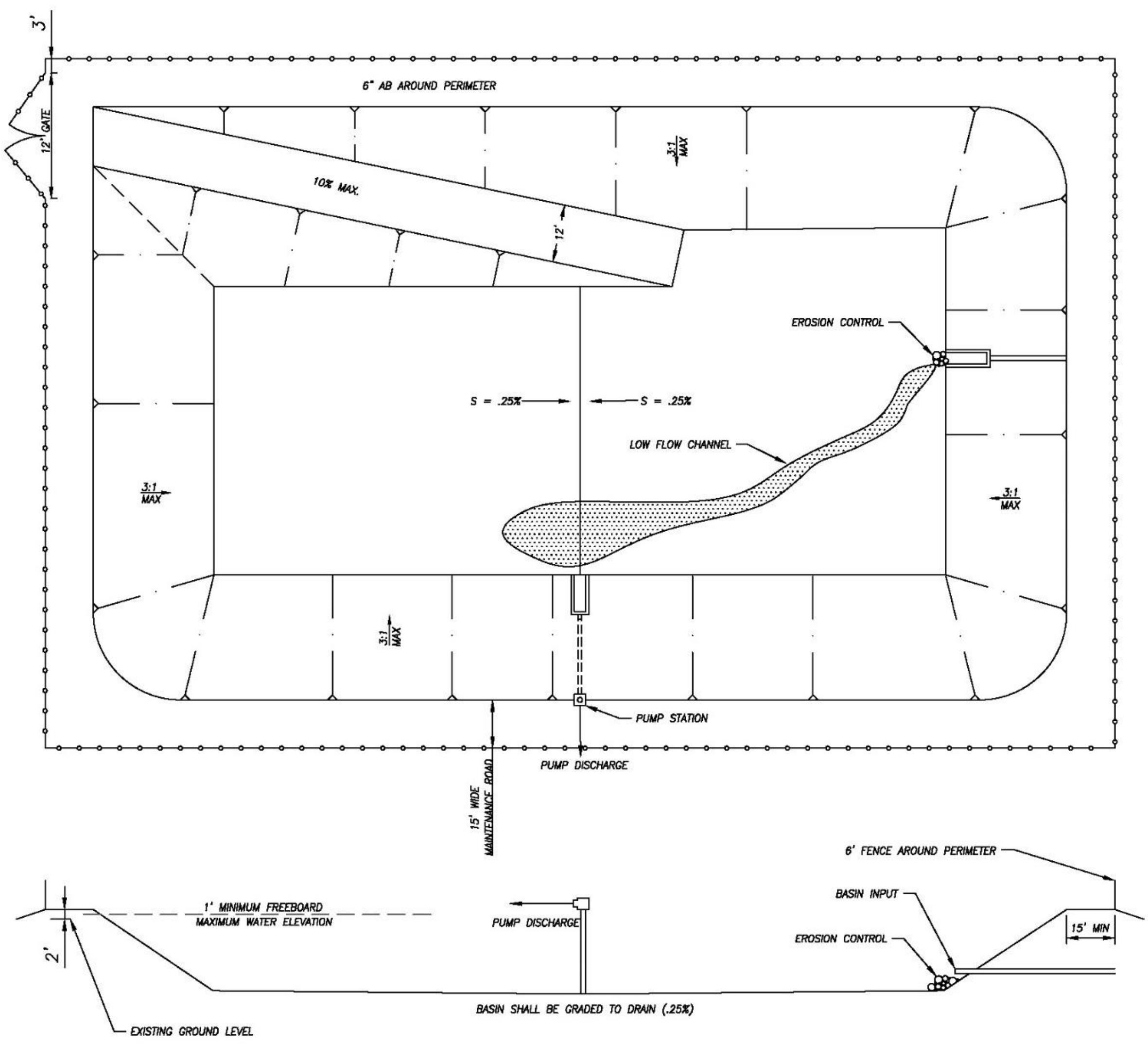

Figure 2-2
Typical Detention Basin

2.6 - Further Development Project Approval Requirements

Prior to approval of a subdivision tentative map, or any other first-step land use entitlement approval, the following storm drainage data, and design documents based on that data, shall be provided to the City together with agreements prepared by a registered civil engineer for approval by the City Engineer.

1. The storm runoff flows and quantities from the proposed development.
2. Calculations and data supporting proposed storm drainage disposal facilities including but not limited to:
   a. Proposed pipelines, and pumpage as required, to convey development drainage to a City Master Planned or existing detention basin, and calculated impacts on and required modifications to, such basin;
   b. Alternative proposed onsite detention basin calculations and data for location onsite, including easements, onsite pipelines, and all onsite facilities such as pumps required for ultimate conversion of onsite retention disposal to offsite connection to a City detention basin and to be designed prior to any such approval;
   c. Any detailed calculations essential to the City Engineer's preliminary analysis of the detailed drop inlet, and pipeline design, to be submitted and approved at the time of proposed improvement drawings submittal; and
   d. An agreement prepared by the developer's engineer, and signed by the developer, as to the amount of storm drainage impact fee to be paid for the development.

In this regard the construction of onsite storm drainage retention facilities, except when required by the City to serve one acre or more of industrial, warehousing, mixed use or commercial development, does not excuse any portion of the storm drainage impact fee because of the ultimate cost to the City of eliminating such onsite retention facility, constructing offsite storm drainage piping to a detention basin, constructing such basin, and providing interim maintenance and operation costs for the onsite retention basin.

SECTION 3 - SYSTEM EXPANSION

The types and locations of drainage facilities in Lemoore have been dictated by rainfall characteristics, topography, shallow groundwater, soils with low percolation rates and drainage disposal limitations. System design thus far has been relatively effective and met, to the extent feasible, regulatory requirements, and disposal constraints.

Projected City growth must be served with storm drainage facilities that meet current regulatory constraints. Such constraints now include State MS4 Best Management Practices (see Appendix G). Groundwater levels may be assumed to again reach five-foot depths, although currently slightly greater due to the recent five-year drought and intensified agricultural and urban development water demands. Community growth places additional demand on existing canal/irrigation ditch transport facilities and disposal areas.

The facilities planned to serve projected growth areas reflect these constraints. They are premised upon shallow, limited freeboard, limited-depth detention basins, typically “fed” with dual-pump facilities and discharged to transport facilities with 96-hour basin clearance flow rates.

3.1 - Community Growth

Projected community growth is depicted on Figure 1-4. The boundaries and locations of projected growth were selected using the existing (2008) General Plan and assumptions for growth in the Plan Area that will occur beyond the date range of the General Plan.

Although projected growth includes land use designations for both residential and commercial/industrial development, the residential land use projections are most critical in analysis of storm drainage needs and solutions. Larger acreages of residential development have been projected; the policies proposed in this Master Plan presume onsite drainage facilities for commercial, mixed use, and industrial developments one acre in size or larger.

This Plan does not assume time horizons for either projected community buildout or its geographic components. It does, however, assume to the extent feasible, timing-priority likelihood for Plan-designated residential development areas.

3.2 - Growth Areas

Lemoore residential growth (the ‘driver’ for analysis of the location, scope and design of essential storm drainage facility needs) has been projected by the City to occur in five areas.

- Area One: The geographic area west of State Route 41, south of Industry Road, north of the southerly boundary of the West Hills College. Partially developed, it proposes 557 acres of as-yet non-developed residential, commercial and industrial land uses including 181 acres of residential and mixed-use development.
- Area Two: 1,107 acres of agricultural land north of the City limits, south of Lacey Boulevard, east of State Route 41 and west of the Lemoore Canal has been assumed

as principally for single-family residential development. (It has, for analysis in this Plan, been divided into six subareas.)

- Area Three: 730 acres of undeveloped agricultural land west of State Route 41, north of State Route 198, south of the southerly boundary of West Hills College.
- Area Four: Residentially designated (rural residential) land east of the Lemoore Canal.
- Area Five: The "country residential" area east and southeast of the City golf course, south of State Route 198.

For purposes of storm drainage analysis, Areas Four and Five have been eliminated from Plan consideration. Area Four, as currently zoned and developed, is unlikely to develop at densities requiring offsite drainage; infrastructure costs preclude the likelihood of significant growth in the foreseeable future. Area Five, in view of existing rural residential development, also seems unlikely to develop at such a density. Area One, Two and Three boundaries and projected development land uses are depicted on Figure 1-4.

It is not possible to predict with certainty which Areas will first develop, although it appears based upon current development activity and access/City utility availability, that Areas One and Two will do so. It is with only slightly more certainty that Lemoore's residential growth rate can be projected. It was only 1.1% per year during the recent five-year economic downturn. Current regional trends and Naval Air Station utilization suggest a 2 ½% per year growth rate for the next decade. The only impact of a differing growth rate, since storm drainage system expansion must be impact fee-financed, is the need to adjust such fees in consonance with changing system construction costs.

Utilizing the hydrologic criteria and facilities design regulations in Section 2 of the Plan, recommended system expansion(s) to serve Areas One, Two and Three are briefly considered here and Areas One and Two are further described in Section 5 of the Plan. Figure 3-1 depicts the locations of existing and proposed growth-related facilities.

3.2.1 - AREA ONE (THE "COLLEGE" AREA; FIGURE 1-4)

This growth area will drain to two basins:

a. An existing retention basin east of the College campus enlarged to a detention basin; and
b. A "Conservation Area" west and northwest of the College campus.

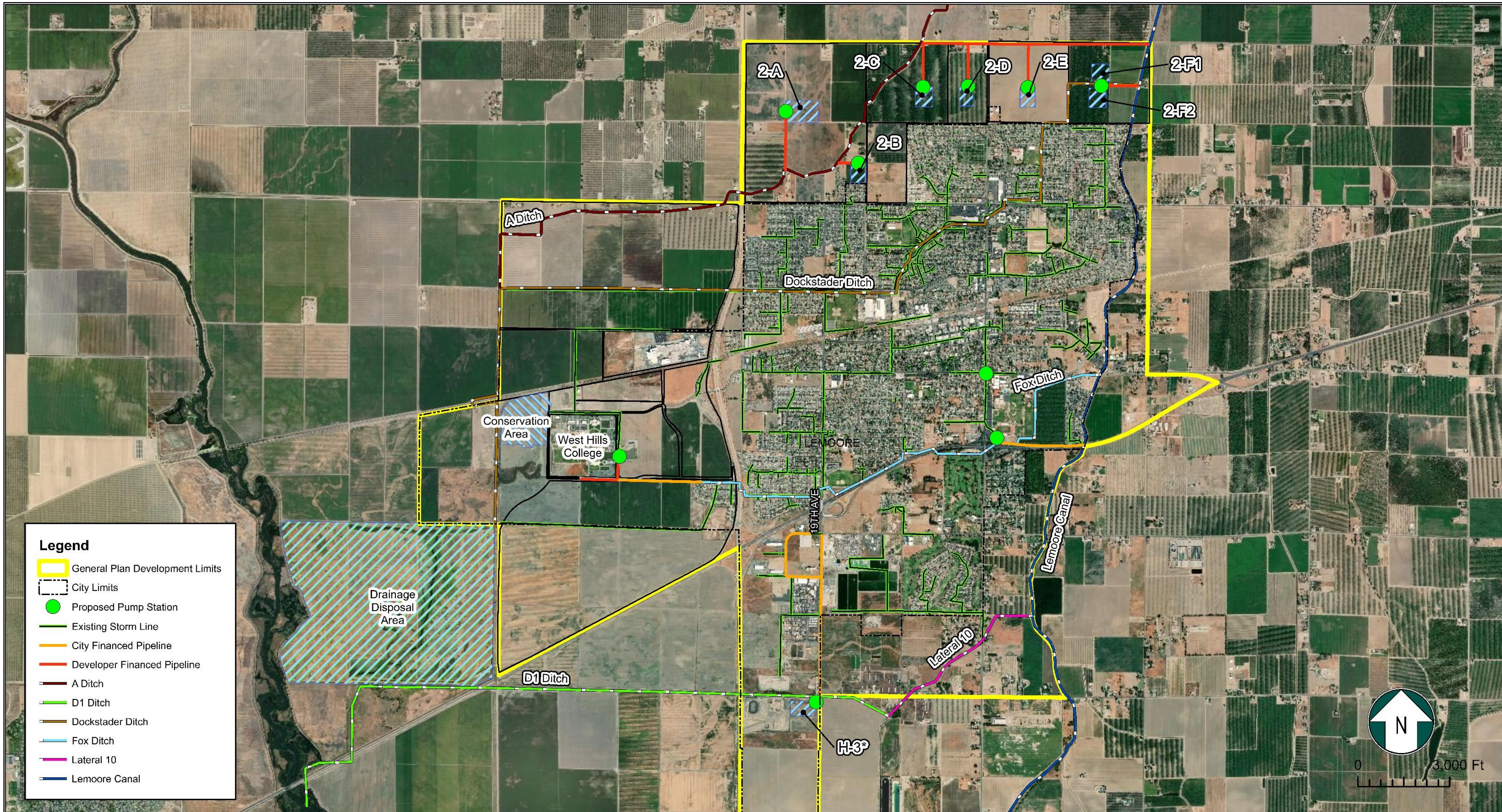

Figure 3-1

Locations of Community Growth Facilities and Existing Facilities Modifications

3.2.1(a) Current Retention Basin, Disposal Area

The current retention basin partially serves portions of Bush Street and College Avenue.

Storm drainage is pumped into the 9-acre foot retention basin; there is no outflow. It has been calculated (Appendix I) that total storm drainage inflow to the basin after full development of service area in accord with the General Plan will require 32-acre feet of basin capacity. An alternative calculation assumes that existing office and General Plan commercially-designated acreage south of Bush Street in Area One will be developed as single-family residential. (The alternative calculation is utilized for basin size and impact fee estimation.) The basin must have pumped and pipeline outflow to a supplemental 24-inch City pipeline, on the Fox Ditch alignment(see 3.2.1(b)), to the City Disposal Area southwest of the College campus. The disposal area-approach canal system and wetlands should, in cooperation with Fox Ditch/irrigated lands representatives, be reviewed in the near future and detailed facilities designs agreed upon and implemented – ditch enlargement and a possible lift station to the disposal area, for example. The probable costs of such required facilities are not significant, but the opportunity to constructively and amicably confirm by agreement and facilities capacity improvement the City's adverse possession rights for storm water drainage transport should be pursued.

The total storm water flows in Area One, with the General Plan land uses, are significantly lessened because of the Plan's 'one acre/plus' onsite drainage requirements for 'commercial and industrial' development. An example of this reduction is the onsite drainage facilities already utilized by Leprino Foods in the Area.

The current basin must be modified to accommodate at least 30-acre feet of storage. This can be accomplished through deepening the basin to 6 feet of water depth and basin expansion to 5 acres within the city-owned property. It then becomes a detention basin requiring a discharge pipeline and pump station.

3.2.1(b) Supplemental Facilities

Construction of the needed storm drainage facilities to serve this Area must include a discharge pump station and discharge pipeline from the expanded basin (see Appendix I).

3.2.1(c) Costs

The total cost of expanded and supplemental facilities in Area One to be impact-fee funded is estimated (see Appendix I) to be approximately $1,129,800, $1,386 per residential unit.

3.2.1(d) Conservation Area Drainage

The multiple residential and single-family subdivisions currently proposed just north of the College bordering Bush Street, and the commercial area north of Bush Street, would discharge 18.1-acre feet of storm drainage to the 55-acre, 150-acre feet volume, "Conservation Area" currently under construction for College stewardship.

As this Plan is being prepared the College has furnished to the City documentation which provides plans and cross sections for the Conservation Area including provisions for the pre-disposal 'detention basin' (Appendix J).

An alternative which should be considered for a part of the storm drainage of his Area is the diversion of drainage from other portions of the Area than the residential areas immediately north of the College currently licensed to do so to the west-of-College Conservation Area (CA). Since the currently-licensed developments would generate only about 5.5-acre feet of storm drainage runoff in a ten-year/two-day storm, current drainage is insufficient to sustain a water environment. (It had apparently been assumed that high water table would so sustain.) Assuming onsite drainage facilities for one acre plus commercial and industrial properties, a remaining area between Bush and Industry could productively be drained to the Conservation Area. Pumped interchange between the CA and the Dockstader Ditch could assist in successful implementation of this alternative.

This alternative would require College (and perhaps Navy) approval but should be aggressively pursued to reduce storm drainage costs for this area.

3.2.2 - AREA TWO (NORTH EXPANSION, FIGURE 1-4)

3.2.2(a) Facilities Required

This Area, because of planned and existing infrastructure availability (wastewater, water), and road access to the existing developed urban community, has also been projected for early development. It has, for storm drainage analysis purposes, been subdivided into 6 subareas (Figure 1-4):

Subareas 2A and 2B are proposed to be served by detention basins which would discharge on a low-flow basis to the irrigation ditch ('A Ditch') traversing the subareas. The detention basin(s) would be designed and operated to assure not "overloading" either the ditch or any agricultural areas served by the ditch. All other subareas (Two C through Two F) in this Area will be served by detention basins discharging to the Lemoore Canal.

The City will be responsible for land acquisition for basins, basins construction and pipeline connections to A Ditch and the Lemoore Canal. Costs for these facilities, as for all detention facilities serving Areas One and Two, must be derived from drainage impact fees. Costs for development-to-basin pumps or pipelines will be, developer-shared if necessary, totally developer responsibilities.

Precise locations of basins in these subareas are not selected. Such locations must be determined in accord with the pace and location of planned development, and with concern for then-current property availability and cost.

It should be noted that a 40-acre development is currently in progress in Subarea Two B and is to be served by an onsite retention basin. That basin should be abandoned after a subarea detention basin is constructed, and the drainage from the development routed to the detention basin.

The timing of development of each of these subareas cannot be accurately predicted; it may be principally affected (with respect to each subarea and to other projected development in the City) by land values and controlled to some degree by City utility extension availability.

Detention basins for each subarea should, nevertheless, be planned to be constructed by the City concurrent with or precedent to subarea development. Pumped basin discharges to a pipeline in Lacey Boulevard and to the Lemoore Canal should be planned. It will be assumed, only for preliminary cost estimation purposes, that basins will be located approximately mid-point north-and-south in each subarea; that developers will be responsible, on a shared basis if necessary, to provide pump and/or piping connections from their developments to the basins. The City, utilizing impact fee funds, will be responsible for land acquisition and construction costs for the basins, for basin connection to A Ditch or the Lacey Boulevard pipeline, for Lacey Boulevard pipeline construction, and for Lemoore Canal connection.

The calculated subareas required detention volumes and land areas for each of these sub basins are:

Subarea 2A: 50.9-acre feet, 10 acres
Subarea 2B: 21-acre feet, 4.5 acres
Subarea 2C: 17.3-acre feet, 3.5 acres
Subarea 2D: 10-acre feet, 2 acres
Subarea 2E: 18-acre feet, 3.5 acres
Subarea 2F1: 13-acre feet, 2.6 acres
Subarea 2F2: 13-acre feet, 2.6 acres

3.2.2(b) Costs

Appendix K details the costs of these facilities; they are approximately $6,993,600, $1,397 per residential unit.

3.2.3 - Area Three (Southwest, Figure 1-4)

This Area, 730 acres in size, occupying the currently undeveloped land south of Area One and north of State Route 198, has as yet unresolved access restraints (Bush Street across State Route 41 is the only access). It's early, and likely, development is questionable although it is General Plan designated for urban growth. The development of the westerly third thereof may be of concern to Lemoore Naval Air Station. Storm drainage for the Area should be independently assessed and designed when and if development appears imminent.

SECTION 4 - RECOMMENDED EXISTING FACILITIES MODIFICATIONS

4.1 - Introduction

The existing facilities modifications discussed in this Plan section are:

- Major projects which will reduce flows or total storm drainage discharges to pipelines or irrigation ditches which have existing or potential capacity problems, or which must accommodate projected City growth not impact fee fundable; and
- Lesser-magnitude improvements of, and physical changes to, existing drainage facilities to similarly reduce or eliminate current ponding problems.

As previously noted, Lemoore's existing storm drainage system is well designed, maintained and operated. Nevertheless, the community's essentially-flat topography and high groundwater table make it difficult to avoid intensive rainfall-related street ponding without over-designing runoff transport and disposal facilities.

Although perhaps less critical than planning, funding and constructing storm drainage facilities which accommodate future growth, the above-described changes and modifications are important to Lemoore's residents, businesses and agricultural neighbors and should be financed and implemented.

4.2 - Major Projects

Major projects addressing existing, related, drainage issues have been modelled/engineered and/or analyzed. The issues are:

- Downtown street flooding requiring sandbagging by affected businesses; and
- Agricultural-area flooding west of State Route 41, south of Bush Street, and related commercial area ponding southeast of the State Route 41/State Route 198 intersection.

4.2.1 - DOWNTOWN STREET FLOODING

This issue results from inadequate pipe capacity in the drainage system 'upstream' of and located in Lemoore Avenue from downtown to the 'High School' Basin and needed changes in the Basin.

Figure 3-1, in the preceding Section depicts the location of the recommended corrective project; Figure L-1 in Appendix L provides details.

It includes:

- Deepening of the High School Basin;
- Supplemental storm drainage piping;
- A pump station from such piping to the Basin; and

- An increase in Basin discharge pump capacity to meet increased Basin "input" flow levels.

(The discharge pump will convey Basin storm drainage to the Lemoore Canal instead of, at present, to the Fox Ditch; see Section 4.2.2.)

Appendix L details the estimated cost, $1,770,636, of this Project.

4.2.2 - Agricultural-Area/Commercial Area Flooding

Operational minimization of these problems is attempted during and after high-intensity rainfall events, by manual flow-direction valve control of Vierra Basin (19th Avenue Park Basin) discharge at a "riser" at the intersection of San Simeon and Carmel Streets. Simultaneous mitigation of both problems is currently difficult because of "downstream" pipe capacities on the Fox Ditch alignment traversing the agricultural area, and "downstream" pipe capacities on the alternate-route drainage system from the control point to the Hess drainage basin.

The recommended solutions to these interrelated problems include:

- Redirection of the pumped discharge from the High School Basin to Fox Ditch to east to the Lemoore Canal. This redirection will require, from increased-flow discharge pumps from the High School Basin, installation of approximately 2,800 feet of 14" pipe north of State Route 198 to the Canal.
- Supplementation of the existing 24" pipe from approximately 2,000 feet west of State Route 41, along the Fox Ditch alignment, with a 24" pipe. This increased pipe capacity, together with the reduction in Fox Ditch flows resulting from High School Basin discharge re-routing, will enable total remaining Fox Ditch-alignment piping to reach the Disposal Area without flooding in either the abutting agricultural area or the Hess Basin-served industrial/commercial area southeast of the State Route 41/State Route 198 interchange (see Appendix L for costs).
- Reduction or elimination, "shut-off", of existing flows from the San Simeon/Carmel riser to the Hess Basin service area through an under-198 pipe from the Carmel/San Simeon riser to the Hess Basin service area. The pipe sizes serving the area are too small and supplementation/modification of this existing piping, and related pump station are essential.
- Existing commercial area piping is undersized and must be supplemented. Additionally, recommendations for flooding area-downstream connections to Hess Basin were considered. The recommendations used in developing total system costs, assume relocation of the Hess Basin to City property at the southwest corner of Idaho and 19th Avenues, thus permitting development of the 85-acre property in which the Basin is now located.

Appendix L graphically depicts and details the estimated cost, $1,700,000, of implementation of these facilities (see Figure L-2).

4.3 - Modifications to Existing Storm Drainage Basins and Connections to Such Basins

These modifications are critical to existing drainage system utilization. They include:

4.3.1 - Hess Basin

This retention basin currently acts as a pro-forma limited-detention facility following periods of high rainfall intensity; City staff uses a portable pump to discharge basin contents to the basin-adjacent 'D-1' irrigation ditch.

The Fox/Hess modelling engineering analysis included evaluation of the current essential basin size (11.6 acres, 36 acre-feet) to serve the existing, partly developed, industrial/commercial service area. Development proposals for the development of the 85-acre area of City-owned land which includes the Basin will require Basin relocation. It cannot be abandoned but may be relocated to land currently owned by the City immediately southeast of the existing Basin location, south of Idaho Avenue.

The size of a relocated Basin, and the piping and pumpage facilities necessary, will be dependent upon whether or not the 85-acre area to be served will be principally one acre or more in configuration and thus subject to onsite drainage retention requirements. Costs of relocated facilities, cannot, therefore, be accurately estimated at this time. Although relocated Basin costs will be limited by sale of dirt, surfaced perimeter access roads and fencing will be needed, with under-Idaho Avenue piping to and from the basin and discharge pumps.

If the City does not elect to use City funds for these costs, they could be assessed against developers of the 85 acres prior to development.

The cost of essential Hess Basin upstream improvements is estimated to be $436,800 (See attached Appendix Figure L-2). The cost of 19th Avenue pipeline improvements are also outlined in Appendix L and are estimated to be $1,328,700. Again, the total costs of Basin relocation cannot be accurately calculated pending 85-acre development design and development drainage decisions.

4.3.2 - Heritage Basin

The developed area of the Heritage Basin is approximately 2.8 acres; its estimated capacity; with 1 foot of freeboard, is approximately 12-acre feet. Estimated existing Basin demand is, for a ten-year/two-day storm, 68.6-acre feet. An estimated 70% of the Basin 'footprint', an additional 2 acres, has not been fully excavated but is used, in part, as a "frisbee golf" area. Full excavation would increase Basin capacity to 30-acre feet, 44% of existing demand.

The cost of the Basin enlargement will be minimal if excavation is undertaken at a time when dirt can be sold to a new development. Basin expansion would enable an approach to the desired ten-year storm detention period to achieve contaminants removal.

4.4 - Existing Drainage Facilities "Ponding" Corrections

Figure 1-11 depicts the location of the majority (not all) of street drainage ponding in the developed area of the City. (Appendix D shows illustrative photos of the ponding problems.) Table 1-4, in Section 1.5 of the Plan lists, to the extent they are known and economically feasible, solutions for problem areas. The Table is repeated here for emphasis and clarification.

Table 4-1
Existing Problem Areas

Area from Figure 1-11	Location and Description	Recommended Solution
1	East Cinnamon Drive, north of Hanford Armona Rd. Over curb. Pipe under-sized	Increase size of, or parallel, approximately 700 feet of pipe.
2	Belinda Dr, north of Hanford Armona Rd. Floods when pumps get plugged, or turn off. Over curb.	Replace pumps with non-clog pumps of larger size
3	E. Hazelwood and Beverly. Too much water to one location. Street ponding if pumps plug up or kick out, almost into apartments. Have to keep a man at Spring Lift Station during heavy rains to reset pumps immediately when tripped.	Replace pumps with non-clog pumps of larger size
4	West Spring Lane just east of Juniper Lane. All surface water from north of Juniper to this location. At Hanford-Armona Road, a manhole that has to fill up in order to drain the area. Ponding over curb and into yards.	Solution will require surveying and design; not evident at this juncture.
5	Wexford and Cardiff. Floods into yards; drains to Lions Park.	Increase Lions Park Basin inlet pump size.
6	Noble, west of 19th Ave. Drains to Avalon Basin. Floods into yards.	Increase the size of the pump.
7	East D Street. Floods, with heavy rains, into yards. (Lemoore Avenue pipe size too small)	Part of modelling/engineered analyses, 'downtown' to High School Basin; see Plan recommendation.
8	Lincoln Lane. Floods, with heavy rains, into yards.	New pump station at Cedar Basin may correct. (Pump station to both fill and empty Cedar Basin.)

Area from Figure 1-11	Location and Description	Recommended Solution
9	Cedar and Kenwood. All surface water to two drop inlets. Floods into yards.	Install pipeline from Cedar and Kenwood to new pump station at Cedar Basin. (Pump station to both fill and empty Cedar Basin.)
10	19 ½ and Cedar. Line terminates. Pipe is capped at manhole. Water comes out of manhole in intersection. Low manhole, no curbs.	Connect dead-end pipe to new pump station, about 1000 feet; deepen basin.
11	Cul-de-sac on Enterprise at service station. Floods over curb if valve on ditch at San Simeon is open too much. Takes a day to drain.	Part of the Hess Basin modelling/engineering analysis.
12	New subdivision on East D St. Drainage floods over curbs; takes excessive time to drain to Fleet Basin.	Pump station out of Fleet Basin should be increased in size.
13	Stratford Court floods over curb. Too much water for two drop inlets. Drains to Lions Park.	Drop inlet supplementation; increase Lions Park Basin inlet pump size.
14	Hazelwood between Belinda and Cinnamon floods over curb. Two drop inlets get all the water once Heritage Basin fills. Takes excessive time to drain.	Increase pump size.
15	Acacia and Morrow floods over curb, due to low spot in the road, until pumps catch up.	No easy solution; analysis required.
16	Capistrano subdivision pump too small. Floods over curb.	Add a pump out of the subdivision with a low-flow pump into the Lemoore Canal.
17	D St. and Follett. Flooding of downtown businesses. Requires sand bagging during high intensity storms.	See Downtown/High School Basin modelling/engineering analysis.
18	Bush St. and Bell Haven Dr. Storm drain pipe terminates and floods the intersection.	Complete the conveyance system to the Disposal Area.

This Plan has not attempted to detail-design, or construction cost-estimate all these solutions. Such an exercise is financially beyond possible Plan scope. It is certain, however, that the total cost of such solutions is a seven-figure amount. Sections 5 and 6 include discussion of funding for their implementation.

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SECTION 5 - RECOMMENDED CAPITAL IMPROVEMENT PRIORITIES AND CAPITAL IMPROVEMENT PROGRAMS

5.1 - Introduction

Priorities for General Plan-recommended capital improvements will be discussed in three categories:

1. Facilities essential to adequate storm drainage in developing areas of the City;
2. Facilities needed to assure continuing adequate storm drainage in the existing developed areas of the community; and
3. Existing facilities upgrading, replacement, or supplementation required for improvement of lesser existing-development storm drainage deficiencies. (Detailed, construction-level, surveying and engineering for such lesser deficiencies must be completed on a case by case basis as funding is available.)

Within each category, priorities and programs will be outlined in detail appropriate to fiscal planning and the funding available for and appropriate to the Master Plan.

5.2 - Developing Area Facilities

As described in Section 3 of the Plan and depicted on Figure 1-4 these include:

5.2.1 - AREA ONE ("COLLEGE")

- Subareas One A and One B

  These subareas are pipeline-served and graded to drain to the Conservation Area west of the West Hills Community College campus. They include (Subarea One A) three subdivisions currently being entitled and (Subarea One B) the College campus).

- Subareas One C, One D, One E, One F, One G

  Early development of adequate detention basin capacity and a pipeline from such basin to the Disposal Area will be required. It should, however, be noted that development of the portion of Subarea One C west of the northerly extension of Marsh Drive may be inhibited by Lemoore Naval Air Station concerns. It should be further noted that a significant portion of the Area (Subarea One G) is designated as Regional Commercial or Mixed Use with a potential for onsite drainage.

  This assumes basin enlargement and installation of a discharge pump station at the existing retention basin east of the College, pipelines to and at the south side of the College campus, and ditch transport to the Disposal Area. The estimated cost of these facilities is $1,129,800 (see Appendix I).

The Drainage Disposal Area is approximately 800 acres; its conservatively estimated volume capacity is 800-acre feet. At full development of Area One, its ten-year/two-day event disposal area volume demand would be approximately 70-acre feet. The calculated volume demand of flow in the Fox Ditch/Fox Ditch alignment pipeline serving the developing community is 40-acre feet assuming onsite drainage for 90% of the Mixed Use, Commercial and Industrial land uses, 32-acre feet assuming single-family development of all but the Industrial land use areas. The larger figure is recommended to be utilized for basin sizing purposes (Appendix I).

A recommendation for reduction of Area One detention basin/pipeline costs is additional disposal in the College's Conservation Area (CCA) (see Section 3.2.1I). The available disposal volume in the CCA is about 150-acre feet; existing permitted private property two-year/ten-day drainage (36 acres) to the CCA is approximately 5.5-acre feet. Negotiations with the College should be undertaken to secure permission to drain additional Area One development to the CCA. Such diverted drainage would not only reduce required detention basin volumes and costs but increase the viability of the CCA as a wildlife preserve by increasing water levels and ponding duration.

5.2.2 - AREA TWO (NORTH EXPANSION)

- Subareas Two A and Two B

These subareas, likely to be early-development targets, will involve the acquisition of land for, and the development of, detention basins with short lengths of discharge pipeline to 'A Ditch'. The detention basin serving the portion of Subarea A south of A Ditch and Subarea B should provide for eventual replacement of the retention basin in the currently-proposed 40-acre subdivision at its southerly boundary.

'Design' requirements for storm drainage of the subareas are thus non-complex; timing of completion is, however, critical.

The costs of the facilities, including land acquisition and short basin-discharge transport to pipelines to A Ditch, are approximately $2,600,000 (see Appendix K).

- Subareas Two C, Two D, Two E, and Two F

Utilizing as detention basin volume criteria a ten-year/two-day event, the conceptual design of facilities for each of these subareas is again not complex but must be timely implemented.

A detention basin should be located approximately midway north-to-south in each subbasin (to equalize developer and City piping and pumping costs) and discharge-pipelines connected to a major connecting pipeline in Lacey Boulevard to the Lemoore Canal or directly to the Lemoore Canal (see Figure 3-1).

It is assumed that Subareas Two D and Two E, because of land uses, road access, and relative City utilities availability may be the first of these northern-tier subareas to develop, thus dictating early, total, Lacey Boulevard discharge pipeline length.

The costs of these facilities, including land acquisition, are approximately $3,800,000 (see Appendix K).

5.2.3 - Area Three (Southwest)

As noted in Section 3, precise storm drainage facilities design for this Area has not been attempted. Adequate disposal area is available; basin locations and basin discharge pipeline sizing will be dependent upon then-proposed actual development patterns.

5.3 - Major Existing-Community Facilities

The major projects which constitute this priority capital improvements category are described in Section 4 of this Plan. They are the pipe-capacity/pump facilities project which has been designed to correct downtown street flooding, the agricultural area/commercial area flooding correction project involving Fox Ditch piping supplementation and the redirection of High School Basin discharge from Fox Ditch to the Lemoore Canal, and the improvement of Hess Basin drainage.

The first, downtown flooding correction, is, again, estimated to cost $1,770,000; the second, Fox Ditch/Hess Basin related flooding, $1,706,000; thirdly, supplementation of the 24" pipeline of the Fox Ditch west of SR41, $192,000.

5.4 - Existing Drainage Facilities Upgrading, Replacement or Supplementation

The cost of corrections to the existing street drainage ponding located on Figure 1-11 and photographically illustrated in Appendix D, with potential corrections listed in Table 1-4, has not been estimated in detail. Such detailed design and cost estimation are outside the scope of this Plan. Such costs are, however, in the seven-figure range dependent upon timing and on whether City personnel are available to undertake much of the labor. It is recommended that a budget of $1,500,000 to be expended over a period of ten years be funded.

SECTION 6 - FUNDING NEEDS AND RECOMMENDATIONS

6.1 - Introduction

Funding of community growth-related new facility construction, maintenance and operations is feasible without excessive cost to such new development. Funding of the replacement, upgrading, modifications, supplementations to, and operation and maintenance of existing City drainage facilities, catch basins, pipelines, pump stations, basins and disposal area is an ongoing challenge. This Master Plan proposes no magic bullet for the response to such challenge.

Storm drainage funding needs fall in three broad categories:

1. The costs of facilities to serve community growth;
2. The costs of major and minor replacement, upgrading, modifications and supplementation of facilities serving the existing community; and
3. The costs of ongoing operation and maintenance of existing facilities.

With respect to the first of these three categories, it is incumbent upon the City to adopt and implement these Master Plan development regulations and adopt development impact fees which assure existing City taxpayers that they are not cost-responsible and assure future residents and property owners that their storm drainage facilities are adequate. The second and third categories must be the equitable ongoing responsibilities of current and future storm drainage-served property owners and residents.

Within these three categories, this Section will summarize approximate needs and recommended funding.

6.2 - Funding of Storm Drainage Facilities to Serve New Development

It is essential that the cost of constructing storm drainage facilities for new development be developer-funded, not a taxpayer liability. To assure the achievement of this objective.

6.2.1 - DETENTION BASIN CONNECTIONS

- If a City detention basin is available for development within the basin service area, the developer shall either construct the necessary pipeline, and pump station if required, to convey development drainage to the detention basin or shall, if rights-of-way for such construction are not available, pay to the City prior to development entitlement the City Engineer-estimated costs of such connection facilities.
- If it is determined by the City Engineer that development-shared connection facilities would be preferable and equitable, the developer shall construct or fund the shared facilities and shall be equitably reimbursed when the facilities are made available to a subsequent development.

6.2.2 - One acre Drainage

Industrial, warehousing, commercial and mixed-use developments one acre or more in size shall be required to construct, operate and maintain onsite storm drainage retention basin disposal facilities which will prevent offsite storm drainage runoff, with the design of such facilities to be approved by the City Engineer and to be in accord with the retention basin criteria incorporated in this Master Plan.

6.2.3 - Fee Payment

Storm drainage impact fees shall be paid as a component of the project (development or construction) entitlement process and the amount of required fee payment and timely entitlement-concurrence therein shall be reflected in entitlement documents.

This payment schedule is essential to protect public health, safety and welfare by assuring funding availability and timely construction of storm drainage facilities.

6.2.4 - Fee Conditions

If development precedes the availability, and City Engineer-determined adequacy, of a City detention basin serving the area in which a development is proposed:

- An onsite or site-adjacent retention basin shall be constructed by the developer;
- Development and retention basin design shall accommodate (easements, elevations, etc.) eventual diversion of the development's storm drainage to a City detention basin, permitting abandonment of the interim retention basin;
- Full impact fees shall be paid prior regardless of any need for interim retention basin construction and usage. Such full fee payment provides for development-related cost of a detention basin;
- The developer shall, additionally, pay to the City the City Engineer-estimated cost of a pipeline, and pump station if required, for discharge of development drainage to a proposed detention basin location and facility; and
- The City Engineer-estimated cost of operation and maintenance of any development-related storm drainage retention facilities shall be included in the PSMD zone for the development, or absent such PSMD zone, shall be developer-funded and guaranteed by other documentation and agreement satisfactory to the City.

6.2.5 - Quantifying Needs and Fee-based Costs

In quantifying community-growth related needs and costs two geographic areas will be considered – Area One west of State Route 41 and Area Two north of Hanford-Armona Road. Two growth areas, in determining impact fee funding recommendations, will be ignored – Area Three west of State Route 41 and infill growth in the existing community east of State Route 41. See Appendix M for impact fee calculations. The early development of Area Three, as previously discussed, is questionable.

Community infill is, in general, to be served by existing storm drainage facilities, modified as required to serve such development, with impact fees equal to those of development in City expansion areas. To assure nexus and equity for such community infill development, and because none of the existing community's storm drainage basins and much of the existing storm drainage piping system, do not meet current proposed, and legally required, standards, exceptions to the imposition of uniformly-applied fees may be requested. Such exceptions shall be based upon demonstration by the developer's or construction applicant's engineer that all existing impact fee-related facilities which must serve the development or construction do meet such standards. Such engineering analysis must be approved by the City Engineer as a basis for impact fee exemption or reduction.

Because of their importance in calculating storm drainage impact fees, criteria and assumptions long inherent in the development entitlement process or previously articulated in this Section or Plan are repeated here:

Costs of all storm drainage facilities "upstream" from drainage basins will, as at present, be assumed by developers – curb and gutters, cross-gutters, drop inlets, and piping. Developers must bear the costs of necessarily-shared pipelines to detention basins, recovering shared costs from subsequent developers. Onsite retention basins utilized by developers ahead of detention basins yet to be constructed will be at developer cost and deeded to the City for eventual abandonment. A City-approved cost deposit shall be made for ultimate piping connection to an area-serving detention basin if such connection is not feasible at the time of development. Full impact fees will be required of "early-development" utilizing onsite retention basins (to enable the City to recover additional maintenance and/or abandonment costs). The only developments exempt from storm drainage impact fees shall be commercial/industrial/mixed use areas one acre or more in size which are required to provide private onsite drainage at ten-day/100-year storm capacity levels.

6.2.6 - Storm Drainage Impact Fees

Although precise impact fees must be the subject of a "218" fee study, approximate cost estimates are provided here:

- The 'basic' storm drainage impact fee, now $730 per single-family residential unit should be revised to reflect typical local residential unit densities and to reflect currently-estimated detention basin costs. Residential fees shall be adopted based upon acreage, not on residential units. Acreage fees for single family ("low density") development are calculated on the development of 4 ½ units per acre. Multiple residential fees are based upon the ratio of the development area runoff coefficient, 70 to 40, to the single-family runoff coefficient. Fees for other than residential development must be individually evaluated to match relative storm intensities and storm drainage runoff.
- A citywide impact fee, rather than differing fees for different areas, is desirable. The calculated costs per residential unit in Area One are $1,386 per unit; for Area Two, $1,397 per unit. There are an estimated 815 units in Area One and 4,806 units in Area

Two. To establish equity and nexus for an overall fee: (\$1,386 x 815) + (\$1,397 x 4,806)/(815 + 4,806) = \$1,395

- An impact fee of \$1,400 per residential unit, expressed as \$1,400 x 4.5 units per acre, \$6,300 per acre is recommended. Fees for other land uses must, again, be adopted based on a storm intensity-runoff coefficient basis for each such use.

6.2.7 - Fee Increases

All storm drainage fees should be increased 2% annually to reflect probable increases in land and construction costs, and that scheduled increase should be reflected in all entitlement agreements including those for vesting tentative maps.

6.2.8 - Usage of Funds Only for New Facilities

Impact fee fund usage should be restricted as follows:

- The City shall utilize storm drainage impact fees leveled on new development in the City for the sole purpose of acquisition of sites for and construction of storm drainage detention basins;
- Any revenues received by the City for the sale of dirt from detention basin construction shall also be solely used for such acquisition and construction; and
- The City may, at its sole option, elect to supplement these two funding sources with other municipal funds or private donations.

6.3 - Existing System Replacement, Upgrading, Modification and Upgrading

6.3.1 - Needs and Costs

Sections 3 and 4 of this Plan describe three required major changes which have been modelled or engineered and cost estimated, and minor system modifications to correct localized street ponding. The capital improvement costs for these are:

• The Downtown/High School Basin piping system and pumps	\$1,770,636
• The agricultural/commercial flooding correction project, including High School Basin discharge re-routing and Fox Ditch pipeline supplementation	\$192,000
• The Hess Basin drainage area facilities	\$1,765,500
• The localized street ponding corrections	\$1,500,000
Totals	\$5,228,136

6.3.2 - Funding

It is, because of their relevance and importance to the total community, recommended that the City consider funding these costs with a revenue bond or similar debt instrument based upon monthly service rates (see Section 6.4).

6.4 - Funding of the Operation and Maintenance of Existing City Storm Drainage Facilities

Operation and maintenance are currently funded from utility service fees, with supplemental General Fund assistance if required. Operating/maintenance personnel share wastewater system and storm drainage system duties.

Non-inflationary increases in required storm drainage operation and maintenance expenditures may be anticipated to enable existing-City compliance with newly-enacted regulations directed toward minimizing contamination of "waters of the State". However, community growth-related increases in storm drainage operating and maintenance costs should be ameliorated by development-related costs-assumption of drainage facilities by any new Public Service Maintenance District (PSMD) zone in which retention facilities are located or which serve the zone.

The City may elect, with property owner concurrence, to separate its storm drainage fees from its sewer fees. With the exception of the existing-facilities improvements, and their financing discussed in Section 6.3, implementation of this Plan does not envision or require any significant increase in proportionate, per resident, system maintenance service fees.

Including pipe size increases to serve the southwest industrial area, the costs of storm drainage facilities to be funded by a debt instrument (revenue bond) would be approximately $4.59 per month for each residential connection, with commensurate increases in nonresidential fees (based on a 20-year bond issue at 6%; see Appendix M for fee calculation).

SECTION 7 - STORM DRAINAGE MASTER PLAN ADOPTION AND IMPLEMENTATION

The steps essential for implementation of the Storm Drain Master Plan include the following:

7.1 - Council Acceptance/Approval of the Plan

Since the implementation of the Plan involves long-term, future City Council, Planning Commission and key City staff guidance it should be adopted by Council resolution.

If such approval includes funding and implementation of the growth-related facilities supplementation described in Sections 3 and 6 of the Plan, it should be preceded by CEQA analysis and processing. Similar analysis and processing for the Plan-proposed drainage facilities described in Sections 4 and 6 would preclude the necessity for later facility-specific environmental clearance (other than “checklist compliance”).

Alternatively, environmental clearance for Plan adoption and this Plan’s facilities could be incorporated in the environmental analysis and processing which must precede Water Master Plan and Wastewater Master Plan adoption if recommended funding of facilities is incorporated in the Plans.

7.2 - Impact Fee Revisions

Immediately following Plan adoption, the City Engineer should be directed to prepare for Council consideration, and adoption by resolution, a revision of the storm drainage impact fees currently in effect. Full citizen and developer-community participation in the fee adoption process should be encouraged.

7.3 - Service Fee Modifications

Proposition 218-compliant studies by City staff and the City Engineer should, following Plan adoption, be timely undertaken and completed for revenue-based financing of the facilities serving the existing community which should be modified and improved. To do so it will be necessary to utilize and document quantitative “split” of routine storm drainage facilities maintenance and operations costs from wastewater-related costs, and then to provide joint-rate-based funding for needed facilities improvements or separate rates for such facilities and routine storm drainage system operation and maintenance. The Council must first determine whether or not they wish to continue the current joint rates (wastewater and storm drainage) or separate them. If it is decided to continue the joint-rate fee program it will be necessary to incorporate in the City staff/City Engineer’s rate study pertinent recommendations from an adopted Wastewater Master Plan.

It should be noted that the approximate fees suggested in this document must be further detailed and justified for public hearing and adoption consideration both for impact fees and service charges; impact fee and rate study regulations must be followed in that regard.

7.4 - Adoption of Revisions to the City's Standard Specifications for Public Works Improvements

Such revisions, incorporated in Appendix E, outline the changes essential as discussed in Section 2, to reflect the revised design criteria recommended in this Plan.

SECTION 8 - REFERENCES

City of Lemoore, Storm Water Management Plan, August 2008; City Staff

City of Lemoore, Standard Specifications for Public Works Improvements, Updated 2003; City staff and Quad Knopf, Inc.

Designation of City of Lemoore as a small Municipal Separate Storm Sewer System (MS4) under an Attachment 2 NPDES Phase II Rule General Permit, Federal Water Pollution Control Act, March 10, 2003

City of Hanford Storm Drainage Master Plan, August 1995; Montgomery Watson

City of Manteca Storm Drainage Master Plan, March 2013; City staff

City of Elk Grove Storm Drainage Master Plan, December 2013; West Yost Associates

David Wlaschin, Public Works Director (retired), City of Lemoore; verbal communications, May 2017 – May 2018

Stormwater Best Management Practice Handbook, January 2003; California's Stormwater Quality Association

Rick Yanes, Collections Systems Coordinator (retired), City of Lemoore; verbal communications, photography, May 2017 – April 2018

Frank Rivera, Public Works Director, City of Lemoore; verbal communications, May 2017 – April 2018

Steve Brandt, Planning Director, City of Lemoore; verbal communications, 2017

City of Lemoore 2030 General Plan, May 2008; Lemoore Community Development Department

APPENDICES

APPENDIX A

AGREEMENT, LEMOORE CANAL AND IRRIGATION COMPANY AND CITY OF LEMOORE, 1995

9500710

RECORDING REQUESTED BY:

City of Lemoore

WHEN RECORDED MAIL TO:

City Clerk
City of Lemoore
119 Fox Street
Lemoore, CA 93245

RECORDED IN OFFICIAL RECORDS OF
KINGS COUNTY, CALIFORNIA
AT 10 MIN PAST 2 P M

JAN 17 1995

JOAN L. BULLOCK
COUNTY CLERK AND
RECORDER

FEE

LICENSE AGREEMENT RELATING TO THE USE,
OWNERSHIP AND MAINTENANCE OF IRRIGATION DITCHES

TITLE OF DOCUMENT

9500710

THIS PAGE ADDED TO PROVIDE ADEQUATE SPACE FOR RECORDING INFORMATION
GOVT. CODE 27361.6 ADDITIONAL RECORDING FEE APPLIES

LICENSE AGREEMENT RELATING TO THE USE, OWNERSHIP AND MAINTENANCE OF IRRIGATION DITCHES

THIS AGREEMENT, made and entered into this 2nd day of September, 1993 by and between the JOHN HEINLEN MUTUAL WATER COMPANY, but only to the extent of its interests, and LEMOORE CANAL AND IRRIGATION Company (hereinafter collectively "Company,") and the CITY OF LEMOORE, a municipal corporation (hereinafter the "City").

RECITALS

WHEREAS Company is the owner of various irrigation ditches and/or is the owner of granted or prescriptive rights to exclusively use various irrigation ditches illustrated and shown on Exhibit "A" which it uses to transport and distribute irrigation water to its stockholders, and

WHEREAS City, from time to time, has and will in the future annex parcels of property contiguous to City for subdivision development and also will approve the subdivision and/or development of other parcels; and

WHEREAS the said irrigation ditches of Company can in certain conditions herein provided be used advantageously by City for the discharge of storm waters (as herein defined) collected on various portions of property within the City's limits, both as to the existing city limits and the area which may possibly be annexed to City in the future, and

WHEREAS both the areas within the existing City limits as well as those newly developed areas which may be annexed to the City in the future from time to time generate storm drainage water that must be transported out of the areas of origin for disposal, and

WHEREAS development of lands within the City may result in the pipelining of irrigation ditches, increases in the assessed value of said ditches for property tax purposes and the increased use of said ditches for discharge and disposal of storm water by the City, and;

WHEREAS the parties desire to provide for the conditions under which the City may continue to discharge storm water into Company's ditches, the orderly transfer of ownership and title to of the ditches to the City and, in so doing, further desire to supersede the prior agreement of the parties dated November 1961.

NOW, THEREFORE, IT IS AGREED by Company and City as follows:

1. Company does hereby grant to City an irrevocable license and right to discharge storm waters as herein defined into certain of Company's irrigation ditches at such points as presently exist

and as may in the future be requested by City and agreed to by Company. In this connection it is understood and agreed that the points of discharge, the rate of discharge, the type of installation, and the proposed method of discharge of said storm waters shall and must be first approved by the Company prior to the installation of any such facilities and that all such installation shall be constructed at City's sole cost and expense.

Company hereby acknowledges its prior approval of and consent to those City facilities and points of discharge which presently exist as shown on Exhibit "B" attached hereto, so long as the City continues to use the said facilities in a manner consistent with the terms of this agreement.

2. (a) Subject to the provisions of paragraph (b), it is expressly understood and agreed that in the event the rate of storm drainage proposed to be discharged by City into the proposed discharge ditch or any of them is in an amount estimated by the Company to be greater than the then available capability of the said ditch, that Company will be under no responsibility whatsoever to accept the same, or if, at any time or times in the future, in the opinion of the Company the discharge of such storm waters into any of said ditches might, when added to Company's irrigation water flowing therein, exceed the capability of said ditch and cause an overflow or damage the banks of said ditch, the discharge of said storm waters shall, immediately upon notice from the Company, either be reduced or completely stopped for a period determined to be necessary in the opinion of the Company, it being expressly understood and agreed that City shall defend, indemnify, and hold Company harmless for any and all liability for any injury to person and/or property by reason (i) of the Company's refusal to accept discharge of all of the storm waters into Company ditches, or (ii) of such overflow caused by city storm water discharges. Provided, however, the City shall have no duty to defend, indemnify, and hold Company harmless for such overflows if (i) the Company is not running irrigation water to which the storm water discharge will be added, or (ii) the City prior to each discharge has requested from the Company a determination of the rate of flow of storm water which can be safely discharged into a ditch and the City has not allowed the discharge to exceed said determined rate.

(b) It is the intent of the parties hereto that the rate of storm water discharge into any Company ditch shall at no time cause the amount of water then flowing in said ditch to exceed the capability of the downstream ditch and irrigation system as configured at the time of discharge. The Company hereby agrees that in times of heavy water flow in the Company's ditches or in the downstream ditch and irrigation system, whether caused by the Company or by City discharge, the Company shall assist and cooperate with the City to make such changes in the flow of water in the Company's ditches and ditch system as may be necessary to maximize the capability of said ditches (located both within the

City and, to the extent of the Company's ability, downstream from the City) to receive storm water discharge from the City.

3. It is understood and agreed that while Company agrees to accept such storm water drainage into its ditches under the conditions herein set forth, that some land areas including but not limited to the lower reaches of the area west and south of the City in which the water will run are not owned or controlled by Company and Company makes no warranty whatsoever to City that it has the right or power to grant the right to City to discharge waters beyond the areas actually owned by Company, provided, however, to the extent Company owns or has acquired the right or privilege to transport and convey water, including storm water, to some land areas including but not limited to areas west and south of the City, Company hereby agrees to the City's joint access, use and benefit of said rights for the purposes set forth herein. Company further agrees to immediately notify the City of any occurrence, threat, or notice which in any way relates to or may affect the rights granted the City hereunder or Company's rights to transport irrigation and/or storm water to some land areas including but not limited to areas west or south of the City.

4. (a) The parties hereto agree that the development (as that term is hereinafter defined in paragraph 17) of property within the City has and may continue to cause one or more of the following to occur: (i) the installation of permanent pipelines and related facilities to replace Company's open, earthen ditches, (ii) the acknowledgment, creation and/or recordation of formal easements of record in favor of Company pertaining to the said ditches, pipelines and facilities, (iii) the levy and assessment of ad valorem property taxes on the said ditches, easements, pipelines and facilities to the extent they are owned by Company, and (iv) the desire or decision by Company to abandon, in place, some or all of the said ditches, easements, pipelines and facilities.

(b) The City agrees to take the following actions, on request of Company, if the events described in subparagraph (a) occur: (i) if the occurrences described in (a)(i) occur, then the City agrees to cause said facilities and pipelines to be constructed and installed in accordance with standards and specifications approved by Company and thereafter to take and assume ownership of said pipelines and facilities upon their completion and acceptance by the City, and thereupon to be responsible for the maintenance of pipelines (but not of any uncovered or above-ground facilities such as gates, flumes, trashracks, previously existing fences and interceptor lines, pumps and systems and open ditches for which maintenance responsibility shall remain with the Company); (ii) if the occurrences described in sub-paragraph (a)(ii) occur as a result of the development of lands approved by the City, the City agrees to accept the conveyance, dedication, or transfer of title to the said easements; (iii) if the events described in subparagraph (a)(iii) occur as a result of the installation of pipelines or the acknowledgement, recording, or creation of easements (in favor of Company) as a result of the development of lands approved by the City, the City shall reimburse Company for any such taxes so levied (but not for any late penalties or assessment) but only to the extent that such taxes constitute new or additional taxes; and (iv) if the events described in subparagraph (a) (iv) shall occur, the City shall have and possess the first priority right (but not the obligation) to obtain and acquire at no cost or charge to the City, some or all of the right, title, and ownership of said ditches, easements, pipelines, and facilities.

For all pipelines which prior to this agreement already have replaced the Company's open ditches as a result of a development now or hereafter within the City boundaries, the City agrees to: take and assume ownership of said pipelines; be responsible for the maintenance of said pipeline; accept the conveyance, dedication, or transfer of title to easements pertaining to said pipelines; and reimburse the Company for any additional taxes attributable to said pipelines. Promptly upon execution of this agreement, the Company shall convey and transfer to the City all such pipelines and easements, with the Company reserving the right to use as described herein, and the preparation of such documents shall be the City's responsibility.

(c) In the event that a development is proposed to be located adjacent to or abutting either bank or both banks of a Company open ditch, the City shall require as a part of development improvements that the adjacent and abutting sections of the open ditch be replaced with underground pipe when the capacity of the ditch can be transported in a pipe with a diameter of 54 inches or less. In the event that the capacity of the open ditch is in excess of the amount that can be carried in a pipe with diameter of 54 inches, the City shall require as part of the development improvements the installation of an interceptor line to control seepage into the adjacent groundwater table and the installation of protective fencing. The fencing and interceptor line shall be maintained by the City. The installation of all such improvements shall be in accordance with plans and specifications approved by the Company. If a section of the ditch remains open after development abutting the ditch, and the presence of the development is related in any manner to any injuries to persons or property, the City shall defend, indemnify, and hold the Company harmless from all such injuries to persons or property.

(d) The Company shall control the operation of all interceptor lines and the discharge of water therefrom into a Company ditch regardless of where the interceptor line is located, when it was installed, who paid for the installation, who is the owner of it, and who is responsible to maintain it.

5. It is expressly understood and agreed that this agreement

shall relate to the responsibilities of City and Company, and Company shall be under no obligation whatsoever at any time now or hereafter to enter into any private arrangements with any subdividers or developers of property adjacent to or annexed to the City or Company, its only agreement and liability being as set forth in this agreement.

6. "Storm water" as herein used is hereby defined to be that water originating from precipitation within the limits of City and which is in excess of the amount absorbed by the land upon which it falls and also minimum amounts of nuisance water from sources other than precipitation collected by the City from time to time.

7. It is understood and agreed that all of said ditches are now and shall always be used primarily for irrigation purposes as long as Company so desires to so use the same and the use of said ditches by City shall not at any time materially interfere with Company's use thereof.

8. It is understood and agreed that Company shall forever after retain and have the right and privilege at its sole cost and expense to change the type of conveyance, to wit: from open earthen ditch (as the same now are) to pipeline, concrete lined ditch or any other type of conveyance, whatsoever; and in the event such change is made, City will, upon notice at its own cost and expense do whatever is necessary to connect or reconnect its then existing installation for the said drainage of storm waters into the particular ditch in a manner satisfactory to Company.

9. It is understood and agreed that City will operate, maintain, and keep in good order and repair each of its installations presently owned or hereafter installed by the City, including but not limited to any and all pumps installed and used by City in connection therewith, all at its own sole cost and expense. City will pay all power charges incurred in the use and operation of said pumps.

10. It is understood and agreed that the storm water discharged into the said ditches pursuant to this agreement shall be of such quality as in the opinion of Company that it will not adversely and materially affect the quality of the irrigation water being transported by Company in said ditch or ditches when commingled therein; and in the event contaminated storm water is discharged by the City, immediately upon notice by Company, such discharge of said storm waters shall be stopped until, in the opinion of Company, the quality of said storm waters no longer adversely and materially affects the quality of the irrigation water then or in the future being transported in said ditch or ditches. The Company shall inform the City of the reasons for the Company's opinion regarding water quality.

11. It is further understood and agreed that no such storm

waters shall be discharged into any of said ditches when the discharge of the same therein would interfere with the maintenance and/or repair of the said ditch or ditches by Company and Company may close said ditch and bar the discharge of said storm waters therein at any time and from time to time, after written notice to the City, for the purpose of maintaining and/or repairing said ditch or ditches.

12. It is understood and agreed that City shall hold Company free from any and all liability to the extent of any damage that is caused to any property or to any third person, firm, and/or corporation by reason of the City's discharge of storm waters into the said ditches pursuant to the terms of this agreement which damage shall include but not be limited to damage caused by seepage, overflow, or poor quality of water. Subject to the foregoing sentence, if Company, its Engineer, any or all of the members of Company's Board of Directors and/or any employee or representative of Company is or are made a defendant or defendants in any legal action, by reason thereof, City will defend such defendants at its own sole cost and expense and in the event a final monetary judgment is obtained in such action or actions City will pay such judgment or judgments immediately upon the same becoming final.

13. Neither this agreement nor any of its terms, provisions, conditions and/or covenants including the use of said ditches granted herein by Company may be assigned in whole or in part to any third person, firm, corporation, district of any kind, the State of California, County of Kings, the United States Government and/or any Federal, State, or County Agencies without first obtaining the written consent of Company and the City to do so; provided, however, that Company can assign to a public district without City's consent if Company's assignee in writing accepts such assignment and agrees to be fully bound by this agreement.

14. Time is of the essence of this agreement and of each of the terms, conditions, provisions, and covenants contained herein and this agreement and each of the terms, provisions, contains, and conditions contained herein shall bind and benefit the successors in interest and assigns of Company and the City.

15. The City agrees to promptly reimburse the Company for all future reasonable legal, engineering, and other professional fees and costs which the Company incurs after the City expressly requests the Company's involvement and resulting from development of property within the City which affects the Company's ditch and pipeline system.

In the event suit is brought to enforce or interpret any part of this agreement, the prevailing party shall be entitled to recover as an element of his costs of suit, and not as damages, a reasonable attorneys' fee to be fixed by the court. The "prevailing party" shall be the party who is entitled to recover his costs of suit, whether or not the suit proceeds to final judgment. A party not entitled to recover his costs shall not recover attorneys' fees. No sum for attorneys' fees shall be counted in calculating the amount of a judgment for purposes of determining whether a party is entitled to recover his costs or attorneys' fees.

16. This agreement supersedes and replaces the prior agreement between the City and Company dated November, 1961. However, this agreement is not intended to supersede or replace the agreement (entitled "Agreement Permitting Water discharge into the Fox Ditch") between the parties hereto, dated April 25, 1990, including any amendments thereto.

17. The term "development" as used herein with reference to real property shall mean obtaining one or more of the following approvals from the City of Lemoore by an owner of property: site plan approval, conditional use permit approval, parcel or subdivision map approval or planned unit development (PUD) approval.

18. If the City annexes land which has been developed prior to annexation, such as the area commonly known as Cimarron Park subdivision, all of the terms and conditions herein shall apply in the same manner and to the same extent as if land already in the City was being developed for the first time.

Dated this 9th day of September, 1993

JOHN HEINLEN MUTUAL WATER COMPANY

By Danny Denton
President

By Robert K Bekkem
Secretary

9500710 9

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

No. 5907

State of California

County of Kings

On January 12, 1995 before me, Mary Ann Sarratt - Notary Public
DATE — NAME, TITLE OF OFFICER - E.G., "JANE DOE, NOTARY PUBLIC"

personally appeared DANNY NEWTON
NAME(S) OF SIGNER(S)

☐ personally known to me - OR - ☒ proved to me on the basis of satisfactory evidence to be the person(~~s~~) whose name(~~s~~) is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity(~~ies~~), and that by his/~~her/their~~ signature(~~s~~) on the instrument the person(~~s~~), or the entity upon behalf of which the person(~~s~~) acted, executed the instrument.

MARY ANN SARRATT
Notary Public
Kings County, California
My Comm. Exp. March 20, 1995

WITNESS my hand and official seal.

Mary Ann Sarratt
SIGNATURE OF NOTARY

STATE OF CALIFORNIA)
) ss
COUNTY OF KINGS)

On this 12th day of January 1995, before me, LINDA J. DOMINICO, Notary Public, personally appeared ROBERT K. BEHRENS, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

(Seal)

Linda J. Dominico
Comm. #[illegible]1247
NOTARY PUBLIC CALIFORNIA
KINGS COUNTY
Comm. Expires April 14, 1997

LINDA J. DOMINICO, Notary Public

LEMOORE CANAL & IRRIGATION COMPANY

By _______________
President

By _______________
Secretary

CITY OF LEMOORE

By _______________
City Manager

Attest _______________
City Clerk

STATE OF CALIFORNIA)
) ss
COUNTY OF KINGS)

On this 16th day of January 1995, before me, LINDA J. DOMINICO, Notary Public, personally appeared LOUIE RODRIGUES, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

(Seal)

Linda J. Dominico

LINDA J. DOMINICO, Notary Public

MGC1 Linda J. Dominico
Comm. #991247
NOTARY PUBLIC CALIFORNIA
KINGS COUNTY
Comm. Expires April 14, 1997

STATE OF CALIFORNIA)
) ss
COUNTY OF KINGS)

On this 12th day of January 1995, before me, LINDA J. DOMINICO, Notary Public, personally appeared CONSTANTINE D. COSTA, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

(Seal)

Linda J. Dominico

LINDA J. DOMINICO, Notary Public

MGC1 Linda J. Dominico
Comm. #991247
NOTARY PUBLIC CALIFORNIA
KINGS COUNTY
Comm. Expires April 14, 1997

9500710

PUBLIC AGENCY ACKNOWLEDGEMENT

STATE OF CALIFORNIA)
COUNTY OF KINGS) ss.
CITY OF LEMOORE)

On January 10, 1995 before me, Helen M. Murray, City Clerk, personally appeared Allen L. Goodman, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/ her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument, the person(s) or the entity upon behalf of which the person(s) acted, executed the instrument.

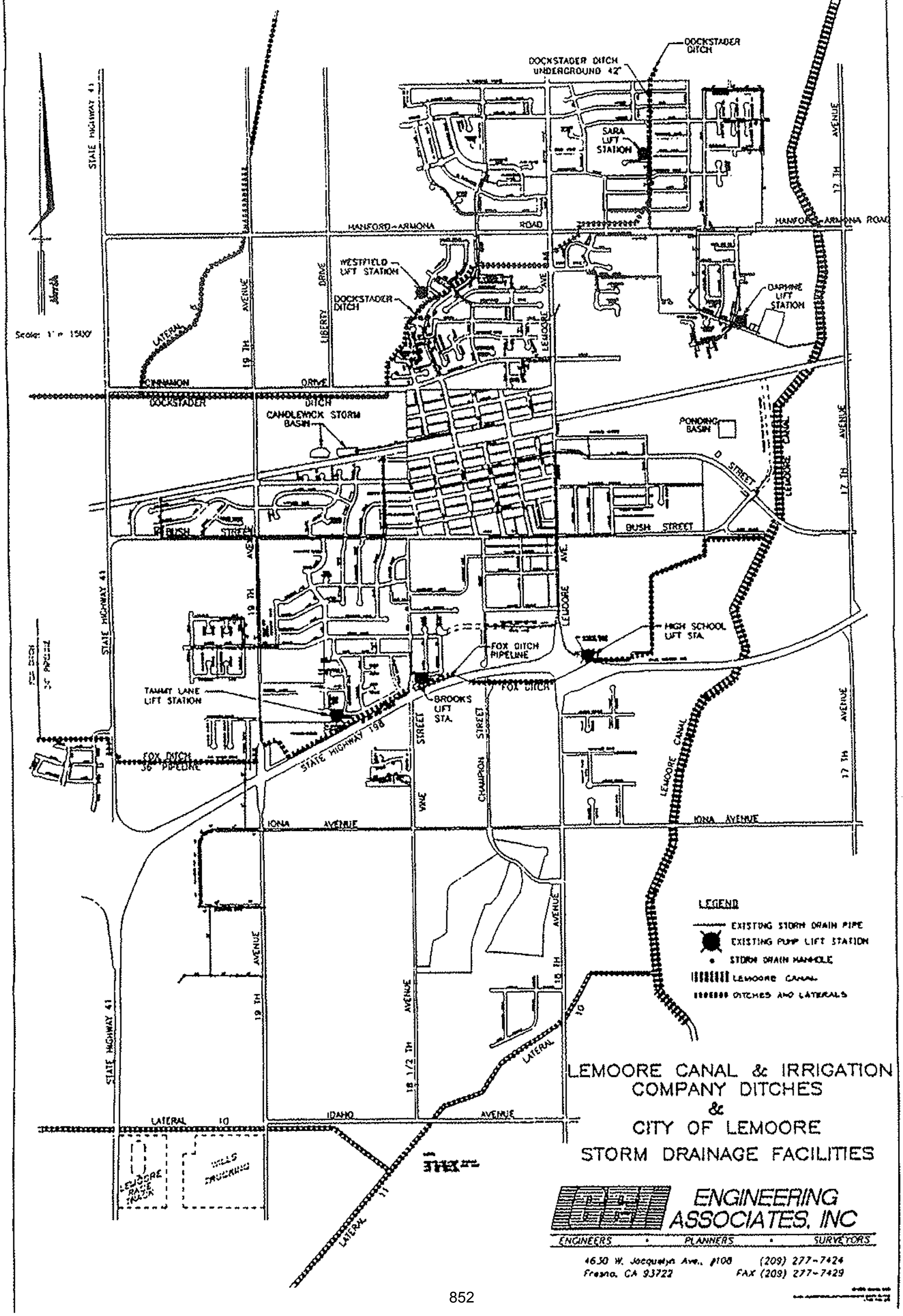
Helen M. Murray

Helen M. Murray, City Clerk

CITY OF LEMOORE KINGS COUNTY
SEAL
CALIFORNIA

9500710

EXHIBIT 'A' & 'B'



APPENDIX B

DRAINAGE DISPOSAL AREA AGREEMENT, CITY OF LEMOORE AND LANDOWNERS, 2001

Note:

A title report review in 2017 confirms that 800 acres of the properties described herein (not including the 189-acre State Route Scenic Easement abutting State Route 198) were in 2001 encumbered with the drainage easement described in the attached documents.

070002/10

RECORDING REQUESTED BY
AND WHEN RECORDED RETURN TO:

CITY OF LEMOORE
119 Fox Street
Lemoore, CA 93245

(Space Above for Recorder's Use)

DEED OF EASEMENT

For valuable consideration, (i) STEVEN W. BROWN, a married man, as his sole and separate property, as to an undivided 20 percent interest, (ii) NEIL THOMAS BROWN, an unmarried man, as to an undivided 20 percent interest, (iii) CHRISTOPHER J. BROWN, a married man, as his sole and separate property, as to an undivided 20 percent interest, (iv) DIANE B. LOUSTALE, a married woman, as her sole and separate property, as to an undivided 20 percent interest, and (v) STEVE GRANT and SUSAN B. GRANT, husband and wife, as community property, as to an undivided 20 percent interest, all as to Parcels 1 through 5 of the Property described below, and NEIL T. BROWN and GRISELDA BROWN, husband and wife, as joint tenants, as to Parcel 6 of the Property described below (all of the above, collectively, the "Grantors"), hereby grant to the CITY OF LEMOORE, a California municipal corporation and charter city (the "Grantee"), easements in all that real property located in the County of Kings, California, and described on Exhibit A, which is attached to and incorporated in this Deed of Easement (the "Property"), as follows:

1. **Description of Easements.** The easements include the following:

a. The continuing right to discharge, release and permit flowage at any time, on or over all or any part of the Property, any and all storm water and flood water generated from or flowing across any or all real property within the official city boundaries of the City of Lemoore as of the date this Deed of Easement is recorded (as shown on the map in Exhibit B, which is attached to and incorporated in this Deed of Easement), including but not limited to water from the Lemoore Canal and from detention basins, reservoirs and ditches located within such city limits at any time, and to flood, inundate and submerge any part or parts of the Property with such storm water or flood water in connection with such discharge, release or flowage; and

b. A right-of-way to install, construct and maintain, on that portion of the Property described on Exhibit C, pumping equipment, inlet and outlet structures, turnouts, pipes and other improvements and structures necessary or convenient in connection with such storm or flood water discharge, release or flowage on or over the Property. Exhibit C is attached to and incorporated in this Deed of Easement.

2. Location and Scope of Easements.

a. Except as expressly provided in subparagraph 2.b., the easement described in subparagraph 1.a. shall be located on all parts of the Property at all times, and shall not be otherwise limited, defined or altered by implication of law, use, non-use or designation of any particular part of the Property at any time. The easement described in subparagraph 1.b. shall be located on and limited to the portion of the Property described on Exhibit C.

b. The Grantors shall be entitled to use the storm water and flood water discharged, released or flowing onto the Property pursuant to the easement in subparagraph 1.a. for purposes of irrigation, agriculture or wildlife habitat on the Property, and to designate locations and confinements and employ management practices with respect to such storm water or flood water as may be reasonably necessary or appropriate for such purposes. The Grantors' activities under this subparagraph 2.b. may include, but will not be limited to, restriction of such storm water and flood water from certain portions of the Property or direction of flow and retention of such storm water and flood water to specific locations on the Property. However, (i) the Grantors' activities under this subparagraph 2.b. shall be without cost or expense to the Grantee, and (ii) no activities of the Grantors under this subparagraph 2.b. or otherwise shall unreasonably interfere with the Grantee's right to discharge on the Property the total volume of storm water and flood water described in subparagraph 1.a. or otherwise unreasonably impair, destroy or interfere with use and enjoyment of any easements granted herein.

3. Exclusiveness of Easements. The easements granted in subparagraphs 1.a. and 1.b. are not exclusive. However, no structures, vegetation or use on the Property shall be allowed to unreasonably impair, destroy or interfere with use and enjoyment of the easements.

4. Secondary Easements. The easements granted in subparagraphs 1.a. and 1.b. include incidental rights to enter onto all or any part of the Property to maintain, repair, replace, reconstruct and protect the easements described in paragraph 1 and to remove any obstructions to use and enjoyment of the easements.

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[Remainder of this page intentionally left blank]

5. **Binding Effect.** This instrument shall be binding on and apply to each of the Grantors named herein, all future owners of any part of the Property, and their respective heirs, personal representatives, executors, administrators, successors, transferees and assigns.

* * * * *

Executed on ___________________, 2001, at ____________________, California.

Parcels 1 through 5, Inclusive:

Steven W. Brown	Neil Thomas Brown
Christopher J. Brown	Diane B. Loustale
Steve Grant	Susan B. Grant

Parcel 6:

Neil T. Brown	Griselda Brown

Certificate of Acceptance

This is to certify that the interest in real property conveyed by the deed or grant dated ________________________ from Steven W. Brown, Neil Thomas Brown, Christopher J. Brown, Diane B. Loustale, Steve Grant, Susan B. Grant, Neil T. Brown and Griselda Brown to the City of Lemoore, a political corporation and/or governmental agency, is hereby accepted by order of the City Council of the City of Lemoore on ______________, 2001, and the Grantee consents to recordation thereof by its duly authorized officer.

Dated: ___________________, 2001 By: ______________________________

Mayor, City of Lemoore

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EXHIBIT A

DESCRIPTION OF PROPERTY

PARCEL 1: APN: 024-030-03 AND 024-040-03; 024-040-004; 024-040-005

THE EAST HALF OF SECTION 13, TOWNSHIP 19 SOUTH, RANGE 19 EAST, MOUNT DIABLO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT AND ALL OF SECTION 18, TOWNSHIP 19 SOUTH, RANGE 20 EAST, MOUNT DIABLO BASE AND MERIDIAN, IN THE COUNTY OF KINGS, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF.

EXCEPTING THEREFROM:

A. ANY PART OF SAID LANDS INCLUDED IN DITCHES, CANALS, RIGHT OF WAY FOR RAILROAD AND EXTRA YARDAGE OR PUBLIC ROADS.

B. AN UNDIVIDED 2/100THS (2%) OF ALL OF THE OIL, GAS AND OTHER KINDRED HYDROCARBON SUBSTANCES IN, UPON AND UNDER SAID LAND AS CONVEYED BY DEED DATED MARCH 6, 1941 FROM KINGS COUNTY LAND AND CATTLE COMPANY , INCORPORATED, A CALIFORNIA CORPORATION, TO PHILLIP A. KLIPSTEIN, INDIVIDUALLY AND PHILLIP A. KLIPSTEIN, AS TRUSTEE, FOR O. G. DAVIES, OSCAR RUDNICK AND FRANK JEPPI, RECORDED MARCH 8, 1941 IN BOOK 247 AT PAGE 2 OF OFFICIAL RECORDS, AS DOCUMENT NO.1791.

C. ALSO EXCEPTING THEREFROM AN UNDIVIDED 1% OF ALL OIL, GAS AND OTHER KINDRED HYDROCARBON SUBSTANCES IN, UPON AND UNDER SECTION 18 HEREINABOVE DESCRIBED AS CONVEYED TO ROBERT A. ROWAN, AN UNDIVIDED 1/3 INTEREST, GEORGE D. ROWAN, AN UNDIVIDED 1/3 INTEREST AND R. A. ROWAN AND CO., A CALIFORNIA CORPORATION, AN UNDIVIDED 1/3 INTEREST BY DEEDS RECORDED DECEMBER 31, 1941 AND RECORDED IN BOOK 262 AT PAGE 259 OF OFFICIAL RECORDS AND IN BOOK 262 AT PAGE 260 OF OFFICIAL RECORDS AND IN BOOK 262 AT PAGE 261 OF OFFICIAL RECORDS

D. AN UNDIVIDED 49% OF ALL OIL, GAS AND OTHER KINDRED HYDROCARBON SUBSTANCES IN, UPON AND UNDER THE EAST HALF OF SAID SECTION 13 AND AN UNDIVIDED 48 1/2% OF ALL OIL, GAS AND OTHER KINDRED HYDROCARBON SUBSTANCES IN, UPON AND UNDER SAID SECTION 18, AS RESERVED IN CORRECTION GRANT DEED DATED DECEMBER 4, 1974 EXECUTED BY GRAZILLA DE BEAUMONT , A MARRIED WOMAN , ET AL TO JACK GOING, A MARRIED MAN , ET AL, AND RECORDED APRIL 17, 1975 IN BOOK 1048 PAGE 1 OF OFFICIAL RECORDS AS DOCUMENT NO. 3897.

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E. THAT PORTION CONVEYED TO THE STATE OF CALIFORNIA BY DEED DATED MARCH 31, 1961 AND RECORDED AUGUST 3, 1961 IN BOOK 787 AT PAGE 197, OFFICIAL RECORDS, AS DOCUMENT NO. 10782.

AND ALSO EXCEPTING THEREFROM THE INTEREST RESERVED IN DEED DATED FEBRUARY 9, 1976, EXECUTED BY INCO FARMS CO., A CALIFORNIA CORPORATION, JACK GOING, A MARRIED MAN, AS HIS SEPARATE PROPERTY AND WYNNE GOING, A MARRIED MAN AS HIS SEPARATE PROPERTY, TO LESLIE K. BROWN AND M. DOLORES BROWN, AS TRUSTEES FOR RIO DE LOS REYES TRUST AND UNDER TRUST AGREEMENT DATED FEBRUARY 6, 1976 AND RECORDED FEBRUARY 18, 1976 IN BOOK 1064 AT PAGE 987, OFFICIAL RECORDS, AS DOCUMENT NO. 1981, WHICH DEED RECITES AS FOLLOWS: "EXCEPTING AND RESERVING UNTO THE HEREIN GRANTORS, AS THEIR INTEREST APPEAR OF RECORD, ALL OF THEIR PRESENT INTEREST IN AND TO ALL OIL, GAS, ORE, MINERALS AND OTHER HYDROCARBON SUBSTANCES IN AND UNDER SAID LAND."

PARCEL 2: APN 024-090-23

THAT PORTION OF LOTS 1, 2 AND 3 OF THE SUBDIVISION OF EMPIRE RANCH IN SECTION 19, TOWNSHIP 19 SOUTH, RANGE 20 EAST, MOUNT DIABLO BASE AND MERIDIAN, IN THE COUNTY OF KINGS, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 1 OF PLATS AT PAGE 91, KINGS COUNTY RECORDS, DESCRIBED AS FOLLOWS :

BEGINNING AT A POINT IN THE NORTH LINE OF SAID SECTION, SAID POINT BEARS NORTH 88°44'29" WEST, 706.28 FEET FROM THE NORTHEAST CORNER OF SAID SECTION; THENCE (1) SOUTH 58°23'32" WEST, 614.92 FEET TO A POINT 83 FEET LEFT OF ENGINEERS STATION 376 + 50 IN THE CENTERLINE OF THE DEPARTMENT OF PUBLIC WORKS SURVEY FROM THE LEMOORE NAVAL AIR STATION TO ROUTE 135 (NOW ROUTE 43), ROAD VI-KIN-10-B (NOW 06-KIN-198); THENCE (2) ALONG A LINE PARALLEL WITH AND 83 FEET NORTHWESTERLY, MEASURED AT RIGHT ANGLES FROM SAID CENTERLINE, SOUTH 62°03'15" WEST, 1996.03 FEET TO THE WESTERLY BOUNDARY OF THE LAND DESCRIBED IN THE DEED TO THE STATE OF CALIFORNIA, RECORDED OCTOBER 5, 1961 IN BOOK 791 AT PAGE 644, KINGS COUNTY OFFICIAL RECORDS; THENCE, ALONG THE WESTERLY BOUNDARY OF THE LAND DESCRIBED IN SAID DEED, THE FOLLOWING COURSES: (3) NORTH 0°23'40" WEST, 320.07 FEET; (4) NORTH 12°37'10" WEST, 68.66 FEET; (5) NORTH 5°06'08" EAST, 112.45 FEET; (6) NORTH 4°17'59" WEST, 266.77 FEET; (7) NORTH 30°04'07" WEST, 109.78 FEET; (8) NORTH 41°54'21" WEST, 262.03 FEET; (9) NORTH 26°33'54" WEST, 245.98 FEET; AND (10) NORTH 2°51'45" WEST, 40.98 FEET TO SAID NORTH LINE; THENCE (11) ALONG SAID NORTH LINE, SOUTH 88°44'29" EAST, 2656.89 FEET TO THE POINT OF BEGINNING.

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EXCEPTING THEREFROM ALL OIL, OIL RIGHTS, MINERALS, MINERAL RIGHTS, NATURAL GAS, NATURAL GAS RIGHTS AND OTHER HYDROCARBONS BY WHATSOEVER NAME KNOWN THAT MAY BE WITHIN OR UNDER SAID LAND AS EXCEPTED IN DEED EXECUTED BY ANN MCCARTNEY, A WIDOW, TO THE STATE OF CALIFORNIA, RECORDED ON OCTOBER 5, 1961 IN BOOK 791 AT PAGE 644 OF OFFICIAL RECORDS, AS DOCUMENT NO.13983 .

AND ALSO EXCEPTING THEREFROM THE INTEREST RESERVED IN DEED DATED FEBRUARY 9, 1976, EXECUTED BY INCO FARMS CO., A CALIFORNIA CORPORATION, JACK GOING, A MARRIED MAN, AS HIS SEPARATE PROPERTY AND WYNNE GOING, A MARRIED MAN AS HIS SEPARATE PROPERTY, TO LESLIE K. BROWN AND M. DOLORES BROWN, AS TRUSTEES FOR RIO DE LOS REYES TRUST AND UNDER TRUST AGREEMENT DATED FEBRUARY 6, 1976 AND RECORDED FEBRUARY 18, 1976 IN BOOK 1064 AT PAGE 987, OFFICIAL RECORDS, AS DOCUMENT NO. 1981, WHICH DEED RECITES AS FOLLOWS: "EXCEPTING AND RESERVING UNTO THE HEREIN GRANTORS, AS THEIR INTEREST APPEAR OF RECORD, ALL OF THEIR PRESENT INTEREST IN AND TO ALL OIL, GAS, ORE, MINERALS AND OTHER HYDROCARBON SUBSTANCES IN AND UNDER SAID LAND."

PARCEL 3: APN 024-030-011

THE NORTH HALF OF THE NORTHEAST QUARTER OF SECTION 24, TOWNSHIP 19 SOUTH, RANGE 19 EAST, MOUNT DIABLO BASE AND MERIDIAN, IN THE COUNTY OF KINGS, STATE OF CALIFORNIA, ACCORDING TO GOVERNMENT TOWNSHIP PLAT.

~~EXCEPTING THEREFROM THE WEST 330 FEET THEREOF.~~

ALSO EXCEPTING THEREFROM ANY RIGHT, TITLE OR INTEREST OR CLAIMS THEREOF, OF THE STATE OF CALIFORNIA, IN AND TO THAT PORTION THEREOF, IF ANY, WHICH LIES WITHIN THE BED AND BANK OF THE KINGS RIVER.

AND ALSO EXCEPTING THEREFROM ANY PORTION OF SAID LANDS INCLUDED IN DITCHES, CANALS AND PUBLIC ROADS.

EXCEPTING THEREFROM AN UNDIVIDED 2/100THS (2%) OF ALL OF THE OIL, GAS AND OTHER KINDRED HYDROCARBON SUBSTANCES IN, UPON AND UNDER SAID LAND AS CONVEYED BY DEED DATED MARCH 6, 1941 FROM KINGS COUNTY LAND AND CATTLE COMPANY INCORPORATED, A CALIFORNIA CORPORATION TO PHILIP A. KLIPSTEIN, INDIVIDUALLY AND PHILIP A. KLIPSTEIN, AS TRUSTEE, FOR O. G. DAVIES, OSCAR RUDNICK AND FRANK JEPPI; RECORDED MARCH 8, 1941 IN BOOK 247 AT PAGE 2 OF OFFICIAL RECORDS, AS DOCUMENT NO.1791.

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AND ALSO EXCEPTING THEREFROM AN UNDIVIDED 98% OF ALL OF THE OIL, GAS AND OTHER HYDROCARBON SUBSTANCES IN AND UNDER SAID LAND AS CONVEYED BY KINGS COUNTY LAND AND CATTLE COMPANY, INCORPORATED, A CORPORATION, BY DEED DATED MARCH 18, 1947 TO WESTERN CATTLE COMPANY RECORDED MARCH 20, 1947 IN BOOK 369 AT PAGE 367, OFFICIAL RECORDS AS DOCUMENT NO. 2878. (SAID DEED RECITES: "ALL OF OIL, GAS AND OTHER HYDROCARBON SUBSTANCES IN AND UNDER THE FOLLOWING DESCRIBED PROPERTY.")

PARCEL 4: PORTION OF APN 024-030-014

THE SOUTH HALF OF THE NORTHEAST QUARTER AND THE NORTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 24, TOWNSHIP 19 SOUTH, RANGE 19 EAST, MOUNT DIABLO BASE AND MERIDIAN, IN THE COUNTY OF KINGS, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF.

EXCEPTING THEREFROM THE WEST 330 FEET THEREOF.

ALSO EXCEPTING THEREFROM ANY CLAIM OF THE STATE OF CALIFORNIA IN AND TO THAT PORTION THEREOF IN THE BED AND BANK OF KINGS RIVER.

ALSO EXCEPTING THEREFROM AN UNDIVIDED 2/100THS (2%) OF ALL OIL, GAS AND OTHER HYDROCARBON SUBSTANCES AS SET OUT IN THE DEED RECORDED IN BOOK 247 AT PAGE 2 OF OFFICIAL RECORDS.

ALSO EXCEPTING THEREFROM AN UNDIVIDED 98/100THS (98%) INTEREST OF ALL OIL, GAS AND OTHER HYDROCARBON SUBSTANCES AS SET OUT IN THE DEED RECORDED IN BOOK 369 AT PAGE 367 OF OFFICIAL RECORDS ON MARCH 20, 1947 AS CONVEYED BY KINGS COUNTY LAND AND CATTLE CO., INC., A CORPORATION, BY DEED DATED MARCH 18, 1947 TO WESTERN CATTLE CO.

ALSO EXCEPTING THEREFROM THAT PORTION THEREOF LYING SOUTHEASTERLY OF THE NORTH BOUNDARY LINE OF THE STATE FREEWAY 198, AS SAID FREEWAY WAS CONVEYED TO THE STATE OF CALIFORNIA BY DEED RECORDED AUGUST 4, 1961 IN BOOK 787 AT PAGE 277 AS DOCUMENT NO.10865 OF OFFICIAL RECORDS.

PARCEL 5: PORTION APN 024-030-014

THAT PORTION OF LOT 1 IN SECTION 24, TOWNSHIP 19 SOUTH, RANGE 19 EAST, MOUNT DIABLO BASE AND MERIDIAN, IN THE COUNTY OF KINGS, STATE OF CALIFORNIA, ACCORDING TO THE MAP OF EMPIRE RANCH RECORDED IN BOOK 1 AT PAGES 91 AND 92 OF LICENSED SURVEYOR PLATS, LYING NORTHERLY OF THE

NORTHERLY BOUNDARY OF STATE FREEWAY 198, AS SAID FREEWAY WAS CONVEYED TO THE STATE OF CALIFORNIA, BY DEED RECORDED AUGUST 4, 1961 IN BOOK 787 AT PAGE 277 OF OFFICIAL RECORDS, AS DOCUMENT NO. NO.10865.

EXCEPTING FROM THAT PORTION OF LOT 1 LYING NORTH OF THE NORTH LINE OF THE STATE FREEWAY 198 AND SOUTH OF THE LEVEE, AN UNDIVIDED ONE-HALF INTEREST IN ALL OIL, GAS AND OTHER HYDROCARBON SUBSTANCES AS SET OUT IN DEED RECORDED IN BOOK 168 AT PAGE 243 OF OFFICIAL RECORDS, AND AN UNDIVIDED ONE-HALF INTEREST IN ALL NATURAL GAS, OIL AND HYDROCARBON SUBSTANCES, AS SET OUT IN DEED RECORDED IN BOOK 174 AT PAGE 100 OF OFFICIAL RECORDS.

PARCEL 6: APN 024-090-020

ALL OF LOT 3, LYING WEST OF THE CANAL; ALL OF LOT 4, LYING EAST OF THE LEVEE; AND THE NORTH 22.47 ACRES OF THAT PORTION OF LOTS 5 AND 6, LYING WEST OF THE DITCH RUNNING THERETHROUGH, ALL BEING IN SECTION 19, TOWNSHIP 19 SOUTH, RANGE 20 EAST, MOUNT DIABLO BASE AND MERIDIAN, ACCORDING TO THE MAP OF EMPIRE RANCH, IN THE COUNTY OF KINGS, STATE OF CALIFORNIA, RECORDED IN BOOK 1 AT PAGES 91 AND 92 OF LICENSED SURVEYOR PLATS;

EXCEPTING FROM SAID LOTS 5 AND 6 ANY PART THEREOF WHICH MAY LIE SOUTH OF A LINE DESCRIBED AS:

BEGINNING AT A POINT 12.17 CHAINS NORTH OF THE WEST QUARTER CORNER OF SAID SECTION 19, AND RUNNING EAST 29.83 CHAINS, MORE OR LESS, TO A POINT;

ALSO EXCEPTING FROM LOTS 3, 5 AND 6 HEREIN DESCRIBED, THE FOLLOWING DESCRIBED PORTIONS THEREOF;

COMMENCING FOR REFERENCE AT THE SOUTHWEST CORNER OF THE NORTHWEST QUARTER OF SECTION 19, TOWNSHIP 19 SOUTH, RANGE 20 EAST, MOUNT DIABLO BASE AND MERIDIAN; THENCE, ALONG THE WEST LINE OF THE NORTHWEST QUARTER OF SAID SECTION, NORTH 00°23'28" EAST, 91.43 FEET; THENCE ALONG A LINE PARALLEL WITH AND 83.00 FEET SOUTHEASTERLY MEASURED AT RIGHT ANGLES FROM THE CENTERLINE OF THE DEPARTMENT OF PUBLIC WORKS SURVEY FROM LEMOORE TO ROUTE 135, ROAD VI-KIN-10-B, NORTH 62°03'15" EAST, 1452.08 FEET TO A POINT IN THE SOUTH LINE OF THE NORTH 22. 47 ACRES OF THAT PORTION OF SAID LOTS 5 AND 6 LYING WEST OF THE DITCH, RUNNING THERETHROUGH SAID POINT BEING THE TRUE POINT OF BEGINNING; THENCE, ALONG SAID SOUTH LINE NORTH 88°35'53" WEST, 338.70 FEET; THENCE, ALONG A LINE PARALLEL WITH AND 83.00 FEET

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EXHIBIT B

MAP OF CITY LIMITS

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EXHIBIT C

DESCRIPTION OF EASEMENT FOR INSTALLATION, CONSTRUCTION AND MAINTENANCE (SUBPARAGRAPH 1.b.)

The North 50.00 feet and the East 50.00 feet of the following described property:

Those portions of Section 13, Township 19 South, Range 19 East and Section 18, Township 19 South, Range 20 East, Mount Diablo Base and Meridian, in the County of Kings, State of California, described as follows:

Beginning at the Southeast corner of said Section 13, thence North 89°55'33" West, 1960.90 feet to the Southeast corner of the property described in the Easement Deed to the Kings River Conservation District recorded May 24, 1963 in Book 832, Page 650 of Official Records of Kings County; thence along the easterly line of said property the following:

> North 12°55'33" West, 265.00 feet; thence North 18°22'33" West, 585.00 feet; thence North 3°52'27" East, 225.00 feet; thence North 28°58'27" East, 165.00 feet; thence North 43°13'27" East, 665.00 feet; thence North 34°01'27" East, 315.00 feet; thence North 46°13'27" East, 345.00 feet; thence North 21°43'33" West, 970.00 feet; thence North 66°07'33" West, 185.00 feet; thence North 15°19'33" West, 1355.00 feet; thence North 4°10'33" West, 807.26 feet to the agreed line between said Section 13 and Section 12, Township 19 South, Range 19 East, as shown on the Record of Survey recorded in Book 7 of Maps, at Page 21 of Kings County Records;

thence leaving the easterly line of said property, South 89°18'43" East along said agreed line ~~2212.46 feet to the agreed corner common to Section 12 and 13 of Township 19 South, Range 19~~ East and Sections 7 and 18 of Township 19 South, Range 20 East; thence South 89°11'35" East along a line from said agreed corner to the Northeast corner of said Section 18, a distance of 4824.18 feet to the intersection with the West right of way line of the Southern Pacific Railroad as described in the Deed to the Southern Pacific Company recorded October 21,1909 in Book 36, Page 218 of Deeds of Kings County Records; thence South 0°58'16" West along said West right of way line, 4628.08 feet to the northerly right of way line of Idaho Avenue as described in Parcel 3 of the Relinquishment of Highway Right of Way to the County of Kings recorded July 30,1963 in Book 836, Page 266 of Official Records of Kings County; thence along said right of way line the following:

> South 62°03'15" West, 1040.40 feet; thence southwesterly, 290.54 feet along a curve concave northerly with a radius of 570.00 feet and a central angle of 29°12'16"; thence North 88°44'29" West, 3585.43 feet to the West end of said right of way line and the East line of said Section 13; thence South 0°25'17" West along the West end of said right of way and said East line, 60.01 feet to the point of beginning.

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Excepting therefrom that portion of said Section 18 described as follows:

Commencing at the Northeast corner of said Section 18, thence North 89°11'35" West along the line to the above described agreed corner, 175.02 feet; thence South 0°48'25" West, 55.00 feet to the True Point of Beginning; thence South 0°48'58" West, 417.44 feet; thence North 89°11'35" West, 417.44 feet; thence North 0°48'58" East 417.44 feet; thence South 89°11'35" East, 417.44 feet to the True Point of Beginning.

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USDA United States Department of Agriculture | Natural Resources Conservation Service | 430 G Street, # 4164
Davis, CA 95616-4164
(530) 792-5684
(530) 792-5795 fax

August 28, 2001

Ms Kristi Adan
Fidelity National Title Company
285 West Court Street, Suite 100
Woodland, CA 95695

RE: Neil T Brown, et. al.
Escrow #114243 KA
Order # 1012879 GMC
NRCS Contract number 66-9104-0-139

Dear Ms Adan,

This letter will constitute the closing instructions of the United States of America ("USA") for a transaction whereby the USA will receive a **perpetual easement** by Warranty Easement Deed ("the Deed") from **Steven W. Brown, a married man, as his sole and separate property, as to an undivided 20 % interest, Neil Thomas Brown, an unmarried man, , as to an undivided 20 % interest, Christopher J. Brown, , a married man, as his sole and separate property, as to an undivided 20 % interest, Diane B. Loustale, , a married woman, as her sole and separate property, as to an undivided 20 % interest, Steve Grant and Susan Grant, husband and wife, as community property, as to an undivided 20% interest as to parcels 1 through 5 inclusive; and Neil T. Brown and Griselda Brown, husband and wife as joint tenants, as to parcel 6** (the Landowners). This easement is over certain real property (787.1 acres) located in Kings County ("the subject property") described in a title commitment/binder from Chicago Title Co (for Fidelity National Title) dated April 11, 2000 ("the Title Report") for a total purchase price of **$1,259,360.00 (One million, two hundred fifty-nine thousand, three hundred sixty dollars).** The anticipated closing date is on or about September 18, 2001.

The parties to this transaction are as follows:

USA:
Attention Raymond C. Miller (530) 792-5684
Contract Specialist fax (530) 792-5795
USDA, NRCS
430 G Street, #4164
Davis, CA 95616-4164

Landowner:
Mr. Neil Brown (559) 924-5245
Rio Vista Farms
10122 21 ½ Avenue
Lemoore, CA 93245

Enclosed are the following:

1. An un-executed Warranty Easement Deed.
2. A document marked "**exhibit A**" which is a legal description of the survey of the easement area.
3. There is **NO** "**exhibit B**" (the access easement) .
4. A document marked **Exhibit "C"**, which is an "Indemification and Hold Harmless Agreement" regarding outstanding oil, gas and mineral rights
5. First Amended Preliminary Title Opinion (dated August 15, 2001) from the USDA Office of General Counsel.

The purchase price for the acquisition will be sent to you electronically from the U.S. Treasury prior to closing payable to Fidelity National Title Company, order No. 205606 in the amount of **$1,259,360.00** for the purchase of the easement.. **If funds are NOT disbursed within seventy two hours of receipt,** they will be placed into an interest bearing account in the name of USDA/NRCS using the tax ID number 72-0564830. The closing costs and Title Policy costs will be billed to NRCS **after closing and delivery** of the **ALTA 9/28/91 Title Policy.** Any interest earned during escrow will be returned in a separate check payable to USDA/NRCS.

You are authorized and instructed to close and record when you can insure that the following have occurred: (1) no new encumbrances have been recorded against the Subject Property since the date of the above referenced title report; (2) you have received the properly executed Warranty Easement Deed; (3) you are prepared to secure the policy of title insurance referred to below; (4) all items required to be removed, released, subordinated or otherwise handled as set forth in the enclosed Preliminary Title Opinion from the Office of General Counsel have been completed including the PS (**but excluding** the last three paragraphs which are the responsibility of the USA) and the applicable clearance documents recorded; (5) all taxes, assessments, etc. are paid to the date the Warranty Easement Deed is recorded; and (6) comply with any listed title commitment/binder requirements. All cost to clear title are the responsibility of the USA. However, if any new encumbrances have been recorded against the subject property since the date of the above referenced title commitment/binder, notify the USA immediately and do not proceed until further instructions are provided.

Immediately following closing, please issue a policy of Title Insurance on **ALTA U.S.Policy September 28, 1991 form** in the amount of the purchase price as of the time and date of the recording of the Warranty Easement Deed to the USA. If the exact form can not be provided, a certification that the substitute form exactly complies with the specified policy will be required. Said policy of Title Insurance will be free and clear of any and all encumbrances (exceptions) to the title except those shown as acceptable in the Office of General Counsel's Preliminary Title Opinion.

Please deliver the following to the USA immediately following closing:
1. Policy of Title Insurance (original and two copies) insuring the **easement and any access easements.**

2. Recorder's certified copy of Warranty Easement Deed.
3. Original and one copy of executed settlement statements.
4. Recorder's certified copies of any clearance documents, including subordination and/or Indemnification and Hold Harmless Agreement.

Please deliver the following to the Landowner immediately following closing:

1. Proceeds of the sale, less any expenses to place title in the condition specified above such as expenses to remove liens, deeds of trust, etc., as set forth in the Office of General Counsel's Preliminary Title Opinion.
2. Sellers closing statement.
3. Original instruments relating to re-conveyance, release of other money liens and other title documents.

Please acknowledge receipt of these instructions and indicate your agreement to act in accordance therewith by signing and returning a copy to the undersigned.

If additional information is needed, please call us. We appreciate your prompt attention to expedite this transaction.

Sincerely,

RAYMOND C. MILLER
Contract Specialist

Enclosures

__________________________________ ____________
Closing Agents Name or Representative date

cc: (w/o enclosures)
Ms Helen R. Flach, Assistant State Conservationist, NRCS, Davis, CA
Mr. Alan Forkey, State Wetlands Biologist, NRCS, Davis, CA
Mr. Curtis Tarver, Asst. State Conservationist, Field Operations, Red Bluff, CA
Mr. Vince Moreno, District Conservationist, Hanford, CA
Mr. Neil Brown, Lemoore, CA
Mr. Dave Patterson , CWA, Sacramento, CA (fax)

U.S. DEPARTMENT OF AGRICULTURE
COMMODITY CREDIT CORPORATION

CCC-1255
10-96
{PRIVATE }OMB No. 0578-0013

WARRANTY EASEMENT DEED

WETLANDS RESERVE PROGRAM
AGREEMENT NO. 66-9104-0-139

THIS WARRANTY EASEMENT DEED is made by and between, **Steven W. Brown, a married man, as his sole and separate property, as to an undivided 20 % interest, Neil Thomas Brown, an unmarried man, , as to an undivided 20 % interest, Christopher J. Brown, , a married man, as his sole and separate property, as to an undivided 20 % interest, Diane B. Loustale, , a married woman, as her sole and separate property, as to an undivided 20 % interest, Steve Grant and Susan Grant, husband and wife, as community property, as to an undivided 20% interest as to parcels 1 through 5 inclusive; and Neil T. Brown and Griselda Brown, husband and wife as joint tenants, as to parcel 6** (hereafter referred to as the "Landowners"), Grantor(s), and the UNITED STATES OF AMERICA, by and through the Commodity Credit Corporation (hereafter referred to as the "United States"), Grantee. The Landowner and the United States are jointly referred to as the "Parties

Witnesseth

Purposes and Intent. The purpose of this easement is to restore, protect, manage, maintain, and enhance the functional values of wetlands and other lands, and for the conservation of natural values including fish and wildlife habitat, water quality improvement, flood water retention, groundwater recharge, open space, aesthetic values, and environmental education. It is the intent of CCC to give the Landowner the opportunity to participate in the restoration and management activities on the easement area.

Authority. This easement deed acquisition is authorized by Title XII of the Food Security Act of 1985, as amended (16 U.S.C. § 3837), for the Wetlands Reserve Program.

NOW THEREFORE, for and in consideration of the sum of One million, two hundred fifty-nine thousand, three hundred sixty Dollars ($1,259,360.00), the Grantor(s), hereby grants and conveys with general warranty of title to the UNITED STATES OF AMERICA and its assigns, the Grantee, forever, all rights, title and interest in the lands comprising the easement area described in Part I and appurtenant rights of access to the easement area, but reserving to the Landowner only those rights, title and interest expressly enumerated in Part II. It is the intention of the Landowner to convey and relinquish any and all other property rights not so reserved. This easement shall constitute a servitude upon the land so encumbered, shall run with the land **in perpetuity** and shall bind the Landowner, (the Grantor(s)), their heirs, successors, assigns, lessees, and any other person claiming under them.

SUBJECT, however, to all valid rights of record, if any.

PART I. Description of the Easement Area. The lands encumbered by this easement deed, referred to hereafter as the easement area, are described on EXHIBIT A which is appended to and made a part of this easement deed.

TOGETHER with a right of access for ingress and egress to the easement area across adjacent or other properties of the Landowner. Such a right-of-way for access purposes is described in EXHIBIT B which is appended to and made a part of this easement deed. ~~There is no Exhibit B.~~

PART II. Reservations in the Landowner on the Easement Area. Subject to the rights, title, and interest conveyed by this easement deed to the United States, the Landowner reserves:

A. Title. Record title, along with the Landowner's right to convey, transfer, and otherwise alienate title to these reserved rights.

B. Quiet Enjoyment. The right of quiet enjoyment of the rights reserved on the easement area.

C. Control of Access. The right to prevent trespass and control access by the general public.

D. Recreational Uses. The right to undeveloped recreational uses, including hunting and fishing, and including leasing of such rights for economic gain, pursuant to applicable State and Federal regulations that may be in effect at the time.

E. Subsurface Resources. The right to oil, gas, minerals, and geothermal resources underlying the easement area, provided that any drilling or mining activities are to be located outside the boundaries of the easement area unless activities within the boundaries are specified in accordance with the terms and conditions of EXHIBIT C.

PART III. Obligations of the Landowner. The Landowner shall comply with all terms and conditions of this easement, including the following:

A. Prohibitions. Unless authorized as a compatible use under Part IV, it is expressly understood that the rights to the following activities and uses have been acquired by the United States and are prohibited of the Landowner on the easement area:

1. haying, mowing or seed harvesting for any reason;
2. altering of grassland, woodland, wildlife habitat or other natural features by burning, digging, plowing, disking, cutting or otherwise destroying the vegetative cover;
3. dumping refuse, wastes, sewage or other debris;
4. harvesting wood products;
5. draining, dredging, channeling, filling, leveling, pumping, diking, impounding or related activities, as well as altering or tampering with water control structures or devices;
6. diverting or causing or permitting the diversion of surface or underground water into, within or out of the easement area by any means;
7. building or placing buildings or structures on the easement area;
8. planting or harvesting any crop; and
9. grazing or allowing livestock on the easement area.

B. Noxious plants and pests. The Landowner is responsible for noxious weed control and emergency control of pests as required by all Federal, State and local laws. A plan to control noxious weeds and pests must be approved in writing by CCC prior to implementation by the Landowner.

C. Fences. Except for establishment cost incurred by the United States and replacement cost not due to the Landowner's negligence or malfeasance, all other costs involved in maintenance of fences and similar facilities to exclude livestock shall be the responsibility of the Landowner.

D. Taxes. The Landowner shall pay any and all real property and other taxes and assessments, if any, which may be levied against the land.

E. Reporting. The Landowner shall report to CCC any conditions or events which may adversely affect the wetland, wildlife, and other natural values of the easement area.

PART IV. Allowance of Compatible Uses by the Landowner.

A. General. The United States may authorize, in writing and subject to such terms and conditions CCC may prescribe at its discretion, the use of the easement area for compatible economic uses, including, but not limited to, managed timber harvest, periodic haying, or grazing.

B. Limitations. Compatible use authorizations will only be made if such use is consistent with the long-term protection and enhancement of the wetland and other natural values of the easement area. CCC shall prescribe the amount, method, timing, intensity, and duration of the compatible use.

PART V. Rights of the United States. The rights of the United States include:

A. Management activities. The United States shall have the right to enter unto the easement area to undertake, at its own expense or on a cost share basis with the Landowner or other entity, any activities to restore, protect, manage, maintain, enhance, and monitor the wetland and other natural values of the easement area. The United States, at its own cost, may apply to or impound additional waters on the easement area in order to maintain or improve wetland and other natural values.

B. Access. The United States has a right of reasonable ingress and egress to the easement area over the Landowner's property, whether or not the property is adjacent or appurtenant to the easement area, for the exercise of any of the rights of the United States under this easement deed. The authorized representatives of the United States may utilize vehicles and other reasonable modes of transportation for access purposes.

C. Easement Management. The Secretary of Agriculture, by and through CCC may delegate all or part of the management, monitoring or enforcement responsibilities under this easement to any entity authorized by law that CCC determines to have the appropriate authority, expertise and resources necessary to carry out such delegated responsibilities. State or federal agencies may utilize their general statutory authorities in the administration of any delegated management, monitoring or enforcement responsibilities for this easement. The authority to modify or terminate this easement (16 U.S.C. § 3837e(b)) is reserved to CCC in accordance with applicable law.

D. Violations and Remedies – Enforcement. The Parties agree that this easement deed may be introduced in any enforcement proceeding as the stipulation of the Parties hereto. If there is any failure of the Landowner to comply with any of the provisions of this easement deed, the United States or other delegated authority shall have any legal or equitable remedy provided by law and the right:

1. To enter upon the easement area to perform necessary work for prevention of or remediation of damage to wetland or other natural values; and,

2. To assess all expenses incurred by the United States (including any legal fees or attorney fees) against the Landowner, to be owed immediately to the United States.

PART VI. General Provisions.

A. Successors in Interest. The rights granted to the United States shall accrue to any of its agents, successors, or assigns. All obligations of the Landowner under this easement deed shall also bind the Landowner's heirs, successors, agents, assigns, lessees, and any other person claiming under them. All the Landowners who are parties to this easement deed shall be jointly and severally liable for compliance with its terms.

B. Rules of Construction and Special Provisions. All rights in the easement area not reserved by the Landowner shall be deemed acquired by the United States. Any ambiguities in this easement deed shall be construed in favor of the United States to effect the wetland and conservation purposes for which this easement deed is being acquired. The property rights of the United States acquired under this easement shall be unaffected by any subsequent amendments or repeal of the Wetlands Reserve Program. If the Landowner receives the consideration for this easement in installments, the Parties agree that the conveyance of this easement shall be totally effective upon the payment of the first installment.

PART VII. Special Provisions (if any).

NONE

TO HAVE AND TO HOLD, this Warranty Easement Deed is granted to the United States of America and its successors and assigns forever. The Landowner covenants that he, she or they are vested with good title to the easement area and will warrant and defend the same on behalf of the United States against all claims and demands. The Landowner covenants to comply with the terms and conditions enumerated in this document for the use of the easement area and adjacent lands for access, and to refrain from any activity not specifically allowed or that is inconsistent with the purposes of this easement deed.

Dated this ___________day of _________________________________, 2001.

Landowner(s): ____(Seal)

____(Seal)

Acknowledgment

In the State or Commonwealth of ______________________, County, Borough or Parish of ________________________, on this _______ day of ____________________, 2001, before me, the undersigned, a Notary Public in and for said jurisdiction, personally appeared

____

to me known to be the person(s) described in and who executed the foregoing instrument, and acknowledged that ______ executed the same as ______ free act and deed,

IN TESTIMONY WHEREOF, I have hereunto my hand and Notarial Seal subscribed and affixed in said jurisdiction, the day and year above written.

(NOTARIAL SEAL)

____
Notary Public

My Commission Expires:

This instrument was drafted by the Office of the General Counsel, U.S. Department of Agriculture, Washington, D.C. 20250-1400.

OMB DISCLOSURE STATEMENT

Public reporting burden for this collection of information is approximately (60) minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Agriculture Clearance Office OIRM, Room 404-W, Washington, D.C. 20250; and to the Office of Management and Budget, Paperwork Reduction Project (OMB No. 0578-0013), Washington, D.C. 20503.

Exhibit A

Those portions of Section 13, Township 19 South, Range 19 East and Section 18, Township 19 South, Range 20 East, Mount Diablo Base and Meridian, in the County of Kings, State of California, described as follow:

Beginning at the Southeast corner of said Section 13, thence North 89° 55' 33" West, 1960.90 feet to the Southeast corner of the property described in the Easement Deed to the Kings River Conservation District recorded May 24, 1963 in Book 832, Page 650 of Official Records of Kings County; thence along the easterly line of said property the following:

> North 12° 55' 33" West, 265.00 feet; thence North 18° 22' 33" West, 585.00 feet; thence North 3° 52' 27" East, 225.00 feet; thence North 28° 58' 27" East, 165.00 feet; thence North 43° 13' 27" East, 665.00 feet; thence North 34° 01' 27" East, 315.00 feet; thence North 46° 13' 27" East, 345.00 feet; thence North 21° 43' 33" West, 970.00 feet; thence North 66° 07' 33" West, 185.00 feet; thence North 15° 19' 33" West, 1355.00 feet; thence North 4° 10' 33" West, 807.26 feet to the agreed line between said Section 13 and Section 12, Township 19 South, Range 19 East, as shown on the Record of Survey recorded in Book 7 of Maps, at Page 21 of Kings County Records;

thence leaving the easterly line of said property, South 89° 18' 43" East along said agreed line 2212.46 feet to the agreed corner common to Section 12 and 13 of Township 19 South, Range 19 East and Sections 7 and 18 of Township 19 South, Range 20 East; thence South 89° 11' 35" East along a line from said agreed corner to the Northeast corner of said Section 18, a distance of 4824.18 feet to the intersection with the West right of way line of the Southern Pacific Railroad as described in the Deed to the Southern Pacific Company recorded October 21, 1909 in Book 36, Page 218 of Deeds of Kings County Records; thence South 0° 58' 16" West along said West right of way line, 4628.08 feet to the northerly right of way line of Idaho Avenue as described in Parcel 3 of the Relinquishment of Highway Right of Way to the County of Kings recorded July 30, 1963 in Book 836, Page 266 of Official Records of Kings County; thence along said right of way line the following:

South 62° 03' 15" West, 1040.40 feet; thence southwesterly, 290.54 feet along a curve concave northerly with a radius of 570.00 feet and a central angle of 29° 12' 16"; thence North 88° 44' 29" West, 3585.43 feet to the West end of said right of way line and the East line of said Section 13; thence South 0° 25' 17" West along the West end of said right of way and said East line, 60.01 feet to the point of beginning.

Excepting therefrom that portion of said Section 18 described as follows:

Commencing at the Northeast corner of said Section 18, thence North 89° 11' 35" West along the line to the above described agreed corner, 175.02 feet; thence South 0° 48' 25" West, 55.00 feet to the True Point of Beginning; thence South 0° 48' 58" West, 417.44 feet; thence North 89° 11' 35" West, 417.44 feet: thence North 0° 48' 58" East 417.44 feet; thence South 89° 11' 35" East, 417.44 feet to the True Point of Beginning.

Containing 787.11 acres.

PROFESSIONAL LAND SURVEYOR
MICHAEL R. MARTIN
Exp. 9-30-03
11/30/00
P.L.S. 4714
STATE OF CALIFORNIA

Quad Knopf, Inc. 11/17/00
\\server_two\Projects\Projects\2000\00389\Docs\00389 Exhibit A.doc

Exhibit C to Warranty Easement Deed
Revised July 7, 1998

INDEMNIFICATION AND HOLD HARMLESS AGREEMENT

This Indemnification and Hold Harmless Agreement ("Agreement") is made this ______ day of ________________ 2001, by and between NATURAL RESOURCES CONSERVATION SERVICE, United States Department of Agriculture ("NRCS"), and **Steven W. Brown, a married man, as his sole and separate property, as to an undivided 20 % interest, Neil Thomas Brown, an unmarried man, , as to an undivided 20 % interest, Christopher J. Brown, , a married man, as his sole and separate property, as to an undivided 20 % interest, Diane B. Loustale, , a married woman, as her sole and separate property, as to an undivided 20 % interest, Steve Grant and Susan Grant, husband and wife, as community property, as to an undivided 20% interest as to parcels 1 through 5 inclusive; and Neil T. Brown and Griselda Brown, husband and wife as joint tenants, as to parcel 6** (the"Landowners").

1. NRCS has entered into an agreement with Landowners whereby certain real property owned by Landowners and more particularly described in Exhibit A, which is attached hereto and made a part hereof ("Property") will become subject to a Wetlands Reserve Program Easement and associated documents, all of which are herein called WRP documents.

2. Based upon a Preliminary Report from Chicago Title Company, dated April 11,2000, Order Number 1012879 ("Preliminary Report") the title held by Landowners to the Property appears to be subject to an exception of certain outstanding interests in waters, minerals, oil, gas and other hydrocarbon substances, and other gaseous materials located on, in or under the Property, (collectively "Outstanding Mineral Interests"), which are shown in either the Preliminary Report exceptions and/or the legal description of the property.

3. Because of the objectives of the Wetlands Reserve Program as set forth in the WRP documents, it is necessary to limit the seasons during which drilling is conducted on the Property subject to the WRP documents and to provide for the selection of sites for drilling and related activities that will not unreasonably interfere with the WRP documents.

NOW THEREFORE, NRCS and Landowners mutually covenant and agree as follows:

4. A. **No** drilling or other related operations, including but not limited to exploration, will be conducted by Landowner on the Property during the month of **February, March, April , May and June**. If parties other than Landowner conduct such activities, Landowners are subject to the indemnification and hold harmless provisions of this document.

   B. At present, there are no drilling or other related operations, including but not limited to exploration, on the subject easement area.

C. NRCS **will agree** to the selection of drilling sites which may be used during the months of **October, November, December and January.** **No NRCS approval** will be required in the months of **July, August, and September**. NRCS will also agree to the location of access routes for exploration, drilling and related activities on the Property. NRCS will be reasonable in the selection of these sites and routes taking into account the standard that such agreement will not unreasonably interfere with the purposes of the WRP program. Any work-sites will be **restored prior to January 31** of each year.

D. Landowners, and each of them, hereby agree that they will not exercise any of their respective mineral interest in the Property, or cooperate with the owner or any Outstanding Mineral Interests, in any manner which would unreasonably interfere with the purpose of the WRP documents.

E. If the exercise of any Outstanding Mineral Interests noted in the Preliminary Report unreasonably interferes with the purposes of the WRP documents, Landowners agree to indemnify and hold harmless NRCS for any damage to the Wetland Program Easement which are proximately caused by the exercise of any Outstanding Mineral Interests. Landowners also agree to take any action which has a reasonable chance of success, that might stop the exercise of any above mentioned Outstanding Mineral Interests.

5. If any party hereto fails to perform its obligations because of strikes, fires or other casualties, acts of God, legal acts of public authorities, or other causes not within the control of the party to perform, and which cannot be reasonably forecast or provided against, than that party's failure to perform shall be excused for a period equal to such cause.

6. This Agreement may be executed in any number of counterparts, each of which shall be an original, but all of which together shall constitute one instrument.

7. This Agreement supersedes any and all other agreements, either oral or in writing, between the parties hereto with respect to the matters set forth herein and contains all of the covenants and agreements between the parties regarding said matters. Each party to this Agreement acknowledges that no representations, inducements, promises or agreements, orally or in writing, have been made by any party or anyone acting on behalf of any party which are not embodied in this Agreement and no other alleged agreement, statement, or promise shall be valid or binding.

8. If an action at law or in equity is necessary to enforce or interpret the terms of this Agreement, if the United States is the prevailing party it shall be entitled to recover reasonable attorneys' fees and costs. If the Landowners are the prevailing party, they are entitled to recover reasonable attorney's fees and costs only pursuant to the Equal Access to Justice Act (28 U.S.C. 2412 and 5 U.S.C. 504.

9. If any provision of this Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions shall nevertheless continue in full force and effect without being impaired or invalidated in any way.

10. The covenants and agreements contained in this Agreement shall be binding upon and shall inure to the benefit of the heirs, successors and assigns of the parties hereto.

11. No change, amendment or modification of this Agreement shall be valid unless the same be in writing and signed by the parties hereto.

12. This Agreement shall be construed and governed pursuant to the applicable laws of the State of California and the laws of the United States.

NATURAL RESOURCES CONSERVATION SERVICE
United States Department of Agriculture

LANDOWNERS:

____

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____

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By ______________________________

NOTARIZATIONS

USDA

United States Department of Agriculture

Office of the General Counsel

Pacific Region
San Francisco Office
33 New Montgomery, 17th Floor
San Francisco, CA 94105-4511
415-744-3172;Fax 415-744-3170
richard.flynn@usda.gov

August 15, 2001

Reply To: WRP Easement Acquisition

Subject : Wetlands Reserve Program - BROWN, NEIL T., et al.
Kings County, CA
Contract #66-9104-0-139
Purchase
First Amended Preliminary Title Opinion

To : Helen R. Flach, Acting State Conservationist
Natural Resource Conservation Service, USDA
Attn: Dave Rexroat/Hy Young

An examination has been made of the title papers relating to an easement on 787.1 acres of land, more or less, together with an easement for the continuing right to discharge, release and permit flowage of storm water runoff, designated as the Neil T. Brown Tract, Contract #66-9104-139, in Kings County, California. Access is via adjoining dirt and graveled county roads named Houston Avenue and 21st Avenue. These easements are to be acquired by the United States of America under the provisions of the Food Security Act of 1985, as amended, (16 U.S.C. 3801 et. seq.) by Wetlands Reserve Program Warranty Easement Deed by and between STEVEN W. BROWN, a married man, as his sole and separate property, as to an undivided 20% interest, NEIL THOMAS BROWN, an unmarried man, as to an undivided 20% interest, CHRISTOPHER J. BROWN, a married man, as his sole and separate property, as to an undivided 20% interest, DIANE B. LOUSTALE, a married woman, as her sole and separate property, as to an undivided 20% interest, STEVE GRANT and SUSAN B. GRANT, husband and wife, as community property, as to an undivided 20% interest, as to Parcels 1 through 5 inclusive; and NEIL T. BROWN and GRISELDA BROWN, husband and wife, as joint tenants, as to Parcel 6 and the United States of America, by and through the Natural Resources Conservation Service (NRCS), an agency of the United States Department of Agriculture.

These easements are more particularly described in the Wetlands Reserve Program Warranty Easement Deed to the United States of America, the consideration being $1,259,360.00.

Preliminary Title Report No. 1012879-GMC, dated April 11, 2000, herein called preliminary report, was issued by Chicago Title Company and is in satisfactory form.

From the information contained in the Wetlands Reserve Program Easement Deed, and related papers, it appears that the title to the land in question is now vested in,

STEVEN W. BROWN, a married man, as his sole and separate property, as to an undivided 20% interest, NEIL THOMAS BROWN, an unmarried man, as to an undivided 20% interest, CHRISTOPHER J. BROWN, a married man, as his sole and separate property, as to an undivided 20% interest, DIANE B. LOUSTALE, a married woman, as her sole and separate property, as to an undivided 20% interest, STEVE GRANT and SUSAN GRANT, husband and wife, as community property, as to an undivided 20% interest, as to Parcels 1 through 5 inclusive; and

NEIL T. BROWN and GRISELDA BROWN, husband and wife, as joint tenants, as to Parcel 6, subject to:

1. Payment of property taxes, including any assessments collected with taxes, as noted in items 1 and 46 of Schedule B of the Preliminary Title Report.

2. The lien of supplemental taxes, if any, as noted in items 2 and 47 of Schedule B of the Preliminary Title Report.

3. Taxes, assessments and obligations of Lemoore Irrigation District and Kings River Resource Conservation District within the boundaries of which said property is situated, as noted in items 3, 4, 48, 49 and of Schedule B of the Preliminary Title Report.

4. Taxes, assessments and obligations of John Heinlen Mutual Water Company within the boundaries of which said property is situated, as noted in item 5 of Schedule B of the Preliminary Title Report.

5. Taxes and assessments levied b6y the Stratford Irrigation District for the year 2000, as noted in items 6 and 50 of Schedule B of the Preliminary Title Report.

6. Any right, title or interest or claim of the State of California, in an to any portion of Sections 1 and 12, or any portion of the east half of Section 13, as noted in item 7 of Schedule B of the Preliminary Report.

7. Easements granted to Empire Water Company for canals, water ditches, and laterals, as noted in items 8 and 10 of Schedule B of the Preliminary Title Report.

8. Easements granted to Southern Pacific Company for railways, as noted in items 9 and 12 of Schedule B of the Preliminary Title Report.

9. Easements granted to Southern California Gas Company for public utilities and right of way for a pipeline, as noted in items 13, 14, 15, 17 and 56 of Schedule B of the Preliminary Title Report.

10. An easement granted to Lemoore Canal and Irrigation Company for canals, water ditches, and maintenance, as noted in items 11 and 24 of Schedule B of the Preliminary Title Report.

11. Covenants, conditions and restrictions, as noted in items 16, 18, 30 (Land Conservation Contract) and 32 of Schedule B of the Preliminary Title Report.

12. Whatever duties and obligations may have been imposed upon the owner of said land by virtue of the judgment made 2/26/48 in the Superior Court of the State of California, Case No. 66823, Chas. L. Kaupke as Treasurer of Kings River Water Association vs. Kings County Land and Cattle Company, et al., as noted in item 19 of Schedule B of the Preliminary Title Report.

13. The ownership of said land does not include rights of access to or from the street or highway abutting said land, such rights having been served from said land by document, as noted in items 20, 22, 29 and 57 of Schedule B of the Preliminary Title Report.

14. A waiver in favor of The State of California of any claims for damages to said land by reason of a highway contiguous thereto, as noted in items 21, 23 and 58 of Schedule B of the Preliminary Title Report.

15. Any boundary discrepancies or rights which may exist or arise as disclosed by a map of survey of said property, as noted in item 25 of Schedule B of the Preliminary Title Report.

16. Easements granted to Pacific Gas and Electric Company for public utilities and an electric line consisting of poles and necessary appurtenances, as noted in items 26, 27, 59 and 60 of Schedule B of the Preliminary Title Report.

17. Easements granted to Kings River Conservation District to clear, construct, reconstruct, enlarge, repair, operate and maintain the Kings River Channel Improvement Project, as noted in item 28 of Schedule B of the Preliminary Title Report.

18. Unrecorded oil and gas lease for the term therein provided, together with easements, if any, as noted in items 31, 33, 34, 35, 39, 40, 41, 62 and 63 of Schedule B of the Preliminary Title Report and in the legal description.

19. Financing Statements filed with the Office of the County Recorder, as noted in items 36 and 37 of Schedule B of the Preliminary Title Report.

20. Deed of Trust to secure an indebtedness in the amount of $1,530,000.00, as noted in item 38 of Schedule B of the Preliminary Title Report.

21. Matters which may be disclosed by an inspection or by survey of said land that is satisfactory to the title company, as noted in items 42 and 64 of Schedule B of the Preliminary Title Report.

22. Any easements not disclosed by those public records which impart constructive notice and which are not visible and apparent from an inspection of the surface of said land, as noted in items 43 and 65 of Schedule B of the Preliminary Report.

23. Water rights, claims or title to water, whether or not the matters are shown by the public records, as noted in items 44 and 66 of Schedule B of the Preliminary Report.

24. Any adverse claim based on the assertion that said land or any part thereof is now or at any time has been below the highest of the high water marks of Kings River, some portion of said land has been created by artificial means or has accreted to such portions so created, some portion of said land has been brought within the boundaries thereof by avulsive movement of said river or has been formed by accretion to any such portion, some portion of said land has been brought within the boundaries of said county, he water boundary on the West side of said Parcels, or has, as noted in item 45 of Schedule B of the Preliminary Title Report.

25. Right of way 50 feet in width, for canal purposes, as conveyed by Empire Water Company to Lemoore Canal and Irrigation Company, as noted in item 51 of Schedule B of the Preliminary Title Report.

26. Reservation of rights of ways for ditches and canals over and through said lands as contained in the deed from Empire Invest Company to A.S. Nunes, as noted in item 52 of Schedule B of the Preliminary Title Report.

27. Right of way to run water through said land, through a canal, for the purpose of irrigating land south of the subject property, as noted in item 53 of Schedule B of the Preliminary Title Report.

28. The insufficiency of a deed, apparently conveying the subject property herein, named by vestee by describing that portion of lots 5 and 6, as noted in item 54 of Schedule B of the Preliminary Title Report. (Lots 5 and 6 are not on the subject wetlands easement area described as parcels 1, 2, 3, 4, 5 and 6.)

29. Pipeline easement, as noted in item 55 of Schedule B of the Preliminary Title Report.

30. The interest of Kings County in that portion of the herein described land lying in Idaho Avenue, including the interest therein as obtained by relinquishment by the State of California, as noted in item 61 of Schedule B of the Preliminary Title Report.

31. Exceptions of ditches, canals, rights of way for railroad and extra yardage on public roads, as noted in the legal description attached to the Preliminary Report for Parcels 1 and 3.

32. Exception of any interest of the State of California to the bed and bank of the Kings River, as noted in the legal description attached to the preliminary report for Parcels 3 and 4.

33. Existing well and associated pump and utility lines, as noted on the survey plat of the subject wetlands easement done by Michael R. Martin.

34. Oil, gas and mineral exceptions for Parcels 1, 2, 3, 4 and 5, as noted in the legal description attached to the Preliminary Report.

35. General exceptions, conditions and stipulations of the Preliminary Report.

The acquisition of this land subject to conditions herein numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33 and 34 has been approved and condition(s) numbered 35 is unobjectionable, provided:

( ) title is vest in ______________________________;

(X) condition(s) herein numbered 1, 2, 3, 4, and 5 are paid in full to the date of recordation;

(X) condition(s) herein numbered 19, 20, 21 and 22 are removed or subordinated;

(X) condition(s) numbered 18 and 34 are included in an Indemnification and Hold Harmless Agreement which is to be executed and recorded with the subject Warranty Easement Deed; and

(X) the subject Wetlands Reserve Program Warranty Easement Deed and easement for storm water runoff to the United States of America is executed in recordable form.

When you have the above-mentioned properly executed Wetlands Reserve Program Warranty Easement Deed, easement for storm water runoff by and between Steven W. Brown, et al and the City of Lemoore, to be recorded prior to the subject wetlands easement, and Indemnification and Hold Harmless Agreement, and provided that no new encumbrances have been recorded against the subject property, except as shown above, and Chicago Title Company is prepared to issue the policy of title insurance referred to herein, you are authorized to record, or have recorded, the properly executed Wetlands Reserve Program Easement Deed and pay the consideration of $1,259,360.00.

Immediately following recordation, please have a policy of title insurance, ALTA, US Policy, 9/28/91, form issued insuring the subject Wetlands Reserve Program Easement Deed in the amount of $1,259,360.00, as of the time and date of the recordation of said easement to the United States of America, subject only to the above-referenced acceptable exceptions.

You should obtain an updated Certificate of Possession as of the date of recording the subject easement deed, or thereafter.

When you have completed the above, you should submit the recorded easement deed and related documents, the original final policy of title insurance, and a updated Certificate of Possession to this office for a Final After Preliminary Title Opinion.

Upon issuance of the Final After Preliminary Title Opinion, all documents will be returned to the State Office, where they should be retained.

Richard T. Flynn

RICHARD T. FLYNN
Attorney

RTF/rlm

USDA United States Department of Agriculture

Office of the General Counsel

Pacific Region
San Francisco Office
33 New Montgomery, 17th Floor
San Francisco, CA 94105-4511
415-744-3172;Fax 415-744-3170
richard.flynn@usda.gov

August 15, 2001

Reply To: WRP Easement Acquisition

Subject : Wetlands Reserve Program - BROWN, NEIL T., et al.
Kings County, CA
Contract #66-9104-0-139
Purchase
First Amended Preliminary
Title Opinion

To : Helen R. Flach, Acting State Conservationist
Natural Resource Conservation Service, USDA
Attn: Dave Rexroat/Hy Young

An examination has been made of the title papers relating to an easement on 787.1 acres of land, more or less, together with an easement for the continuing right to discharge, release and permit flowage of storm water runoff, designated as the Neil T. Brown Tract, Contract #66-9104-139, in Kings County, California. Access is via adjoining dirt and graveled county roads named Houston Avenue and 21st Avenue. These easements are to be acquired by the United States of America under the provisions of the Food Security Act of 1985, as amended, (16 U.S.C. 3801 et. seq.) by Wetlands Reserve Program Warranty Easement Deed by and between STEVEN W. BROWN, a married man, as his sole and separate property, as to an undivided 20% interest, NEIL THOMAS BROWN, an unmarried man, as to an undivided 20% interest, CHRISTOPHER J. BROWN, a married man, as his sole and separate property, as to an undivided 20% interest, DIANE B. LOUSTALE, a married woman, as her sole and separate property, as to an undivided 20% interest, STEVE GRANT and SUSAN B. GRANT, husband and wife, as community property, as to an undivided 20% interest, as to Parcels 1 through 5 inclusive; and NEIL T. BROWN and GRISELDA BROWN, husband and wife, as joint tenants, as to Parcel 6 and the United States of America, by and through the Natural Resources Conservation Service (NRCS), an agency of the United States Department of Agriculture.

These easements are more particularly described in the Wetlands Reserve Program Warranty Easement Deed to the United States of America, the consideration being $1,259,360.00.

Preliminary Title Report No. 1012879-GMC, dated April 11, 2000, herein called preliminary report, was issued by Chicago Title Company and is in satisfactory form.

From the information contained in the Wetlands Reserve Program Easement Deed, and related papers, it appears that the title to the land in question is now vested in,

STEVEN W. BROWN, a married man, as his sole and separate property, as to an undivided 20% interest, NEIL THOMAS BROWN, an unmarried man, as to an undivided 20% interest, CHRISTOPHER J. BROWN, a married man, as his sole and separate property, as to an undivided 20% interest, DIANE B. LOUSTALE, a married woman, as her sole and separate property, as to an undivided 20% interest, STEVE GRANT and SUSAN GRANT, husband and wife, as community property, as to an undivided 20% interest, as to Parcels 1 through 5 inclusive; and

NEIL T. BROWN and GRISELDA BROWN, husband and wife, as joint tenants, as to Parcel 6, subject to:

1. Payment of property taxes, including any assessments collected with taxes, as noted in items 1 and 46 of Schedule B of the Preliminary Title Report.

2. The lien of supplemental taxes, if any, as noted in items 2 and 47 of Schedule B of the Preliminary Title Report.

3. Taxes, assessments and obligations of Lemoore Irrigation District and Kings River Resource Conservation District within the boundaries of which said property is situated, as noted in items 3, 4, 48, 49 and of Schedule B of the Preliminary Title Report.

4. Taxes, assessments and obligations of John Heinlen Mutual Water Company within the boundaries of which said property is situated, as noted in item 5 of Schedule B of the Preliminary Title Report.

5. Taxes and assessments levied b6y the Stratford Irrigation District for the year 2000, as noted in items 6 and 50 of Schedule B of the Preliminary Title Report.

6. Any right, title or interest or claim of the State of California, in an to any portion of Sections 1 and 12, or any portion of the east half of Section 13, as noted in item 7 of Schedule B of the Preliminary Report.

7. Easements granted to Empire Water Company for canals, water ditches, and laterals, as noted in items 8 and 10 of Schedule B of the Preliminary Title Report.

8. Easements granted to Southern Pacific Company for railways, as noted in items 9 and 12 of Schedule B of the Preliminary Title Report.

9. Easements granted to Southern California Gas Company for public utilities and right of way for a pipeline, as noted in items 13, 14, 15, 17 and 56 of Schedule B of the Preliminary Title Report.

10. An easement granted to Lemoore Canal and Irrigation Company for canals, water ditches, and maintenance, as noted in items 11 and 24 of Schedule B of the Preliminary Title Report.

11. Covenants, conditions and restrictions, as noted in items 16, 18, 30 (Land Conservation Contract) and 32 of Schedule B of the Preliminary Title Report.

12. Whatever duties and obligations may have been imposed upon the owner of said land by virtue of the judgment made 2/26/48 in the Superior Court of the State of California, Case No. 66823, Chas. L. Kaupke as Treasurer of Kings River Water Association vs. Kings County Land and Cattle Company, et al., as noted in item 19 of Schedule B of the Preliminary Title Report.

13. The ownership of said land does not include rights of access to or from the street or highway abutting said land, such rights having been served from said land by document, as noted in items 20, 22, 29 and 57 of Schedule B of the Preliminary Title Report.

14. A waiver in favor of The State of California of any claims for damages to said land by reason of a highway contiguous thereto, as noted in items 21, 23 and 58 of Schedule B of the Preliminary Title Report.

15. Any boundary discrepancies or rights which may exist or arise as disclosed by a map of survey of said property, as noted in item 25 of Schedule B of the Preliminary Title Report.

16. Easements granted to Pacific Gas and Electric Company for public utilities and an electric line consisting of poles and necessary appurtenances, as noted in items 26, 27, 59 and 60 of Schedule B of the Preliminary Title Report.

17. Easements granted to Kings River Conservation District to clear, construct, reconstruct, enlarge, repair, operate and maintain the Kings River Channel Improvement Project, as noted in item 28 of Schedule B of the Preliminary Title Report.

18. Unrecorded oil and gas lease for the term therein provided, together with easements, if any, as noted in items 31, 33, 34, 35, 39, 40, 41, 62 and 63 of Schedule B of the Preliminary Title Report and in the legal description.

19. Financing Statements filed with the Office of the County Recorder, as noted in items 36 and 37 of Schedule B of the Preliminary Title Report.

20. Deed of Trust to secure an indebtedness in the amount of $1,530,000.00, as noted in item 38 of Schedule B of the Preliminary Title Report.

21. Matters which may be disclosed by an inspection or by survey of said land that is satisfactory to the title company, as noted in items 42 and 64 of Schedule B of the Preliminary Title Report.

22. Any easements not disclosed by those public records which impart constructive notice and which are not visible and apparent from an inspection of the surface of said land, as noted in items 43 and 65 of Schedule B of the Preliminary Report.

23. Water rights, claims or title to water, whether or not the matters are shown by the public records, as noted in items 44 and 66 of Schedule B of the Preliminary Report.

24. Any adverse claim based on the assertion that said land or any part thereof is now or at any time has been below the highest of the high water marks of Kings River, some portion of said land has been created by artificial means or has accreted to such portions so created, some portion of said land has been brought within the boundaries thereof by avulsive movement of said river or has been formed by accretion to any such portion, some portion of said land has been brought within the boundaries of said county, he water boundary on the West side of said Parcels, or has, as noted in item 45 of Schedule B of the Preliminary Title Report.

25. Right of way 50 feet in width, for canal purposes, as conveyed by Empire Water Company to Lemoore Canal and Irrigation Company, as noted in item 51 of Schedule B of the Preliminary Title Report.

26. Reservation of rights of ways for ditches and canals over and through said lands as contained in the deed from Empire Invest Company to A.S. Nunes, as noted in item 52 of Schedule B of the Preliminary Title Report.

27. Right of way to run water through said land, through a canal, for the purpose of irrigating land south of the subject property, as noted in item 53 of Schedule B of the Preliminary Title Report.

28. The insufficiency of a deed, apparently conveying the subject property herein, named by vestee by describing that portion of lots 5 and 6, as noted in item 54 of Schedule B of the Preliminary Title Report. (Lots 5 and 6 are not on the subject wetlands easement area described as parcels 1, 2, 3, 4, 5 and 6.)

29. Pipeline easement, as noted in item 55 of Schedule B of the Preliminary Title Report.

30. The interest of Kings County in that portion of the herein described land lying in Idaho Avenue, including the interest therein as obtained by relinquishment by the State of California, as noted in item 61 of Schedule B of the Preliminary Title Report.

31. Exceptions of ditches, canals, rights of way for railroad and extra yardage on public roads, as noted in the legal description attached to the Preliminary Report for Parcels 1 and 3.

32. Exception of any interest of the State of California to the bed and bank of the Kings River, as noted in the legal description attached to the preliminary report for Parcels 3 and 4.

33. Existing well and associated pump and utility lines, as noted on the survey plat of the subject wetlands easement done by Michael R. Martin.

34. Oil, gas and mineral exceptions for Parcels 1, 2, 3, 4 and 5, as noted in the legal description attached to the Preliminary Report.

35. General exceptions, conditions and stipulations of the Preliminary Report.

The acquisition of this land subject to conditions herein numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33 and 34 has been approved and condition(s) numbered 35 is unobjectionable, provided:

( ) title is vest in ______________________________;

(X) condition(s) herein numbered 1, 2, 3, 4, and 5 are paid in full to the date of recordation;

(X) condition(s) herein numbered 19, 20, 21 and 22 are removed or subordinated;

(X) condition(s) numbered 18 and 34 are included in an Indemnification and Hold Harmless Agreement which is to be executed and recorded with the subject Warranty Easement Deed; and

(X) the subject Wetlands Reserve Program Warranty Easement Deed and easement for storm water runoff to the United States of America is executed in recordable form.

When you have the above-mentioned properly executed Wetlands Reserve Program Warranty Easement Deed, easement for storm water runoff by and between Steven W. Brown, et al and the City of Lemoore, to be recorded prior to the subject wetlands easement, and Indemnification and Hold Harmless Agreement, and provided that no new encumbrances have been recorded against the subject property, except as shown above, and Chicago Title Company is prepared to issue the policy of title insurance referred to herein, you are authorized to record, or have recorded, the properly executed Wetlands Reserve Program Easement Deed and pay the consideration of $1,259,360.00.

Immediately following recordation, please have a policy of title insurance, ALTA, US Policy, 9/28/91, form issued insuring the subject Wetlands Reserve Program Easement Deed in the amount of $1,259,360.00, as of the time and date of the recordation of said easement to the United States of America, subject only to the above-referenced acceptable exceptions.

You should obtain an updated Certificate of Possession as of the date of recording the subject easement deed, or thereafter.

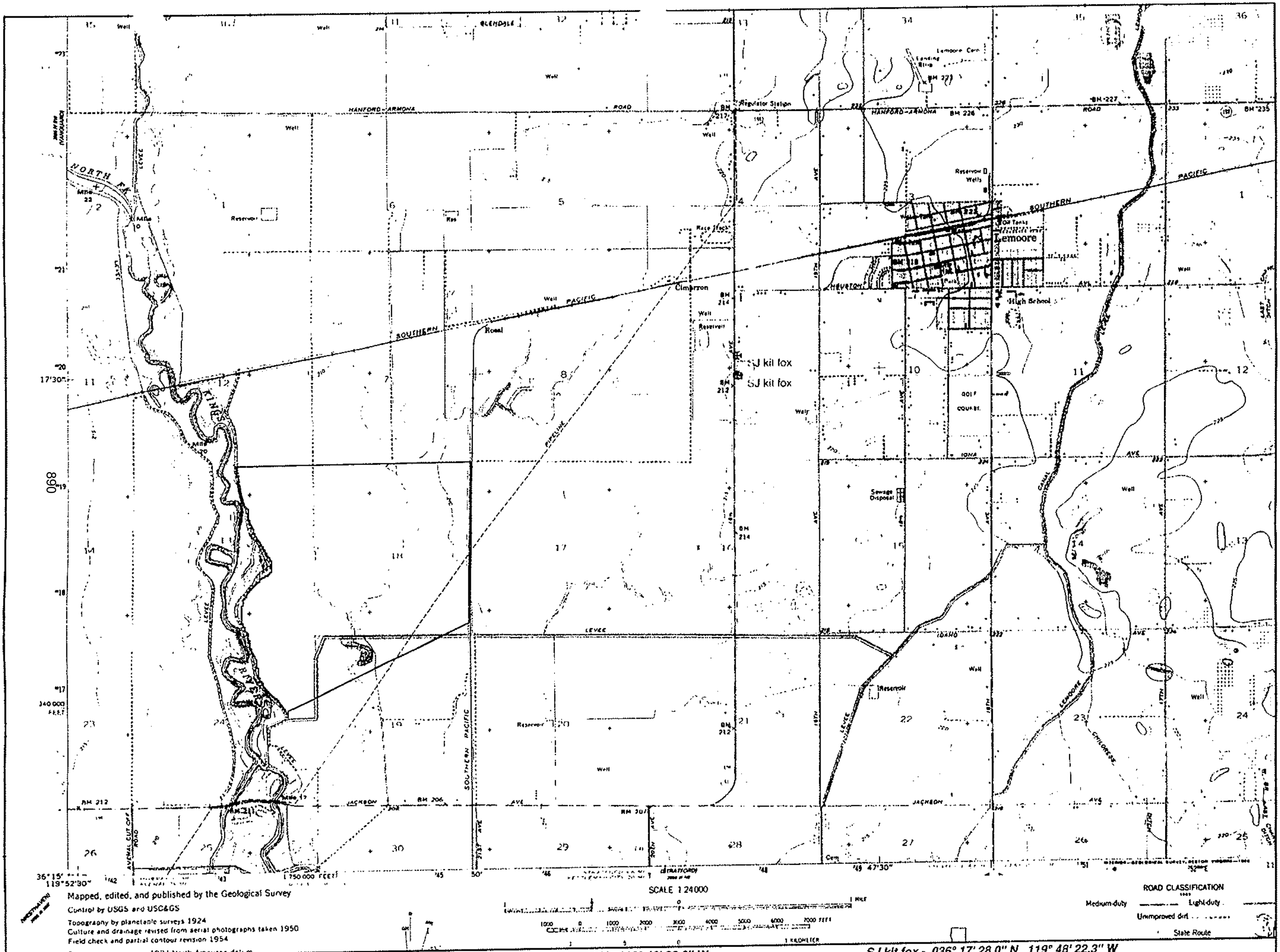
When you have completed the above, you should submit the recorded easement deed and related documents, the original final policy of title insurance, and a updated Certificate of Possession to this office for a Final After Preliminary Title Opinion.

Upon issuance of the Final After Preliminary Title Opinion, all documents will be returned to the State Office, where they should be retained.

Richard T Flynn

RICHARD T. FLYNN
Attorney

RTF/rlm



VUMA - 2 Markers, Length = 604 fee

SJ kit fox - 036° 17' 33.9" N, 119° 48' 22.3" W

SJ kit fox - 036° 17' 28.0" N, 119° 48' 22.3" W

APPENDIX C

CONSERVATION AREA AGREEMENT, WEST HILLS COLLEGE/LEMOORE NAVAL AIR STATION

DOC NBR: 1321601 11/21/2013 02:22:04 PM
OFFICIAL RECORDS OF Kings County
KEN BAIRD Clerk-Recorder
RECORDING FEE: $214.00
COUNTY TAX: $0.00
CITY TAX: $0.00

DOC TYPE: 07
69 PGS
R031

DPS INC.

RECORDING REQUESTED BY AND WHEN RECORDED MAIL TO:

West Hills Community College District
Office of the Chancellor
9900 Cody Street
Coalinga, CA 93210

With a copy to:
Joseph Zampi Counsel
Zampi, Determan & Erickson LLC
225 Broadway, Suite 1450
San Diego, CA 92101 NCS 496028

Space above for Recorder's use only

GRANT DEED OF CONSERVATION EASEMENT

THIS GRANT DEED OF CONSERVATION EASEMENT is made this 21 day of November 2013, by and between Pharris Lemoore LLC, a Delaware limited liability company ("Pharris") located at 2050 Main Street, Suite 250, Irvine, CA 92660, hereinafter called ("Grantor"); and West Hills Community College District, a political subdivision of the State of California, located at 9900 Cody Street, Coalinga, CA 93210, herein after called ("Grantee")

WITNESSETH:

WHEREAS, Grantor is the sole owner ("Owner") in fee of two parcels of land, Parcel 5 of Parcel Map 2005-03 Book 18 page 6 (APN 023-510-034) consisting of approximately 29.7 acres, and Parcel 6 of Parcel Map 2005-03 Book 18 page 6 (APN 023-510-036) consisting of 37.17 acres, together totaling approximately 66.87 acres of unimproved land (the "Property") located adjacent to West Hills Community College in the City of Lemoore, California (the "City"), as more particularly described on Exhibit "A" attached hereto and incorporated herein by this reference.

WHEREAS, Grantor has previously prepared and processed Vesting Tentative Tract Map 845 ("TTM 845"), which has been approved by the City of Lemoore and secured entitlements for 279 single family dwellings ("SFD") on the Property.

WHEREAS, it is in the public interest to protect and retain open space in the vicinity of Naval Air Station Lemoore ("NAS Lemoore") and to prohibit or restrict certain land uses and activities that would be incompatible with the current or future mission of NAS Lemoore.

WHEREAS, the NAS Lemoore mission is to support more than 20 fleet carrier squadrons and serve as a master training center for carrier-based squadrons of the United States Pacific Fleet by providing air warfare training support to carrier air wings, tenant commands, and individual units participating in training events, including joint and multinational exercises, while remaining committed to its assigned personnel. In support of critical military flight and training operations, NAS Lemoore upgrades and

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maintains the airfield, aviation support facilities and base living/recreation accommodations, ensuring deployed unit training and a local quality of life.

WHEREAS, a portion of the Property possesses certain open space, environmental, biological and habitat values (hereinafter referred to as "Conservation Values") of importance to Grantor, Grantee and the people of Kings County, California and maintaining and preserving these Conservation Values is in the public interest.

WHEREAS, Grantor and Grantee have identified a property of interest, whose protection is mutually beneficial. These mutually beneficial uses include the retention of open space in an undeveloped condition in perpetuity on a portion of the Property intended to be protected ("Open Space Area") and for the allowance of limited development of an area for roadway and parking purposes ("Roadway/Parking Area"), respectively, as described and depicted on Exhibit B and together consisting of approximately 56.7 acres.

WHEREAS, such protection may be facilitated through certain real property acquisitions pursuant to Section 2684a of Title 10 U.S. Code. Grantor intends to grant and Grantee intends to acquire an interest in the Property to restrict uses of land in said vicinity that otherwise might be incompatible with the mission of NAS Lemoore, or might interfere, whether directly or indirectly, with current or future military training, testing or operations on or adjacent to NAS Lemoore.

WHEREAS, Grantor desires to convey to Grantee a conservation easement ("Conservation Easement") to preserve and protect the Conservation Values over an Open Space Area and a Roadway/Parking Area (collectively the "Conservation Easement Area") in perpetuity, and to prohibit certain development and restrict uses and activities over the Conservation Easement Area that will be incompatible with the current and future mission of NAS Lemoore.

WHEREAS, Grantee is qualified to hold conservation easements under California Civil Code Section 815.3 by virtue of its status as a political subdivision of the State of California (Skelly v. Westminster School Dist. (1894) 103 Cal.652.659).

WHEREAS, conditions relating to the specific Conservation Values on a portion of the Property are documented and described in the "Baseline Report for Pharris Lemoore LLC" dated October 2012 and is included as Exhibit C to this Conservation Easement. The Baseline Report is to identify the current condition and use of the Property, and consists of a report, maps, photographs and other documentation. It provides an accurate, though non-exclusive representation of the Property affected by the Conservation Easement as of the date of this Conservation Easement. One of the purposes of the Baseline Report is to serve as a baseline for monitoring compliance with the terms of this Conservation Easement. Grantor and Grantee acknowledge that it is accurate as of the date of this Conservation Easement.

WHEREAS, to effectuate the intentions of the parties, Grantor is granting to Grantee a perpetual and irrevocable Conservation Easement over the Conservation Easement Area, which, in addition to the other rights conveyed, will extinguish irrevocably and perpetually the right of Owner and/or Grantor and Owner's and/or Grantor's successors to develop the Conservation Easement Area except as expressly permitted in this Conservation Easement.

WHEREAS, the parties acknowledge that the portion of the Property outside the Conservation Easement Area (the "Development Parcel") is not encumbered or restricted by this Conservation Easement. Concurrently herewith, Grantor, as Declarant, is recording a separate Declaration of Restrictive

Covenants in favor of Grantee and the Navy that imposes certain development restrictions upon the Development Parcel.

NOW THEREFORE, in consideration of the payment of Eight Hundred Thirty Five Thousand Dollars ($835,000) (which includes the $825,000 paid by the U.S. Navy to Grantee pursuant to the certain Grant of Restrictive Use Easement being recorded against the Conservation Easement Area concurrently herewith), and the mutual covenants, terms, conditions and restrictions contained herein, Grantor hereby grants and conveys to Grantee a Conservation Easement in perpetuity over the Conservation Easement Area of the nature and character and to the extent set forth herein.

1. Purpose and Applicability.

a. The purpose of this Conservation Easement is to identify and preserve open space by specifically prohibiting any and all residential, commercial and industrial uses and activities and/or use of the Conservation Easement Area that would otherwise be incompatible with the mission of NAS Lemoore, or might interfere, whether directly or indirectly, with current or future military training, testing or operations on or adjacent to the property of NAS Lemoore.

b. The Conservation Easement applies specifically and only to the property described and depicted on Exhibit "B" attached hereto and incorporated herein by this reference. The Conservation Easement contains an area that will remain in an undeveloped condition (the "Open Space Area"), constituting approximately 52.88 acres more or less, and an adjacent area that will be developed with roadway, parking and associated infrastructure (the "Roadway/Parking Area") constituting approximately 3.82 acres, more or less. It is acknowledged that the Open Space Area and Roadway/Parking Area (together constituting the "Easement Area") include the Bush Street vacation of approximately 3.15 acres. These limitations will reduce the proposed development on the Easement Area by 228 housing units.

2. Organization of this Document. For the purposes of specifying prohibited and allowable uses, the Conservation Easement is divided into two separate areas, the Open Space Area and the Roadway/Parking Area, in which specific restrictions and allowed uses are delineated.

3. Rights of Grantee. To accomplish the purpose of this Conservation Easement, following rights are conveyed to Grantee by this Conservation Easement:

a. Enforcement of Prohibitions. To enforce specified prohibitions on residential and/or industrial and/or commercial development or use of the Easement Area that would otherwise be incompatible with the current or future mission of NAS Lemoore;

b. Right of Entry. To enter upon the Easement Area at reasonable times and with reasonable notice in order to monitor compliance with and enforce the terms of this Conservation Easement; provided that such entry shall be upon reasonable notice to the Owner (reasonable notice shall consist of written notice ten (10) calendar days prior to the desired inspection date), except when a threat of imminent harm of personal injury or property damage exists, and the Grantee shall not unreasonably interfere with Owner use and quiet enjoyment of the Property; and

c. Prevention of Uses or Activities and Restoration of Property. To prevent any activity on or use of the Easement Area that is not permitted by the Conservation Easement and to require the restoration of such areas or features of the Easement Area that may be damaged by any inconsistent condition, activity or use that is not permitted.

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4. Prohibited Uses and Activities. Any activity or use of the Easement Area inconsistent with the purpose of this Conservation Easement is prohibited. Without limiting the generality of the foregoing, the following uses and activities are expressly prohibited:

a. Subdivision. The division, subdivision, *de facto* subdivision or partition of the Conservation Easement Area, is prohibited. Development Rights surrendered under this Conservation Easement whether currently existing or arising out of future zoning changes, are removed and may not be used except as provided in this Conservation Easement. Grantor will not apply for, or otherwise seek recognition of additional legal parcels or lots within the Conservation Easement Area except as defined in this Conservation Easement.

b. Height Limits. No structure, building, antenna tower or other obstruction may exceed sixty (60) feet above ground level.

c. Human Habitation. Overnight human occupancy of any type, at any time, and for any purpose is prohibited.

d. Construction of Improvements.

i. Structures, towers, or improvements of any kind or for any purpose are prohibited;

ii. Surface improvements, including parking and/or roads, curb, gutter, sidewalk and street lights are prohibited except within the 3.82 acre Roadway/Parking area (as shown on Exhibit B) as defined in Section 5.j. of this Conservation Easement;

iii. Any and all power generation, storage or distribution, except that directly related to an agricultural use of the Open Space Area (only) and irrigation/water infrastructure related to inlet and outlet structures for drainage water on the property.

e. Uses. Any and all residential, commercial and industrial uses are prohibited. Agricultural uses are permitted in Section 5 of this Conservation Easement.

f. Lighting. No lighting shall be permitted that may be dangerous, distracting or misleading to aircraft operating at the NAS Lemoore property. This type of lighting includes, but is not limited to, strobe lights, non-emergency vehicle rotating beacons, or light sources above 16,000 lumens. Light sources above 16,000 lumens must be angled 15 degrees below the horizon.

g. Other Hazards. No operations of any type shall be permitted that produce glare or other visual hazards or encourage concentrations of birds that may be dangerous for aircraft operating from NAS Lemoore.

h. Dust. Dust must be mitigated.

i. Waste Removal. No trash, refuse, vehicle bodies, rubbish, debris, junk, waste, garbage, sewage, hazardous or toxic substances, household garbage, or other unsightly material shall be placed on the Property. This provision does not prohibit burning or composting of excess brush or other plant material resulting from activities permitted herein; nor does this prohibit storage of agricultural waste incidental to farm operations on the Conservation Easement Area. Disposal of any waste materials generated by activities permitted under this Conservation Easement shall be in accordance with any Federal, State, and local laws and regulations.

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5. <u>Permitted Uses and Activities</u> Notwithstanding any provision in this Conservation Easement to the contrary, allowed uses are limited to the following:

a. Grading and removal of dirt, not to exceed 250,000 cubic yards and to be completed within 48 months of the closing date in accordance with the Grading Plan attached hereto as Exhibit "D" and incorporated herein by this reference, as such Grading Plan may be modified with the approval of the City of Lemoore to reduce (but not increase) the amount of dirt removed from the Conservation Easement Area .

b. Drainage of water onto the Open Space Area and detention, retention, and storage of such water on the Open Space Area, in accordance with Section 6.b. below.

c. Use of the Conservation Easement Area for biological, environmental and wildlife conservation; wetland restoration; habitat restoration.

d. Educational and public activities associated with conservation and environmental restoration uses are permitted.

e. Agricultural uses and activities are permitted. Agriculture is the science, art, and business of cultivating soil, producing crops, and animal husbandry, which is defined as raising any type of livestock and includes, but is not limited to, the grazing of livestock, dairy, sheep, swine, goats, horses; as well as poultry keeping, bee keeping and/or honey production; and any other reasonably defined farming operation.

f. Passive recreational activities including, but not limited to, hiking, horseback riding, bicycle riding and bird watching that require no improvements.

g. Thinning flammable vegetation is authorized as necessary to maintain defensible space for fire protection and that facilitates a safe environment and operating conditions.

h. Construction of fencing is permitted where reasonably necessary for the permitted uses and activities hereunder.

i. Erection and maintenance of a sign or other appropriate marker at a location visible from the public road, and directional signage as may be necessary to identify streets, roads or other locations or landmarks.

j. With respect to the Roadway/Parking Area only, construction of surface improvements, including parking and/or roads, curb, gutter, sidewalk, street lights and associated landscape improvements, and construction of underground utilities, irrigation/water infrastructure related to inlet and outlet structures for drainage water is permitted.

k. With respect to the Open Space Area, the construction of underground utilities, irrigation/water infrastructure related to agricultural uses and/or inlet and outlet structures for drainage water is permitted.

6. Reserved Rights of Grantor.

a. Grantor reserves unto itself and to personal representatives, heirs, successors and assigns, all rights accruing from its ownership of the property that is not expressly prohibited herein and are not inconsistent with the purposes of this Conservation Easement. All rights reserved by Grantors shall be exercised so as to prevent or minimize damage to the Conservation Values and Conservation purpose within the Conservation Easement Area.

b. An easement appurtenant to and for the benefit of the property described on Exhibits "E" and "F" (the "Benefitted Drainage Parcels") to concentrate and direct the flow of storm and surface water from such Benefitted Drainage Parcels onto the Open Space Area and to detain, retain and store such water on the Open Space Area.

7. Notification Provisions.

a. Grantor shall notify Grantee in writing not less than ninety (90) calendar days prior to the date that Owner and/or Grantor intends to undertake any use, activity, construction or other action(s) that have not already been considered in this Conservation Easement and that may have an adverse impact on the purpose of or rights granted to Grantee under this Conservation Easement and applicable law. The notice shall describe the nature, scope, design, location, timetable, and any other material aspects of the proposed activity in sufficient detail to permit the Grantee to make an informed judgment as to its consistency with the purpose of the Conservation Easement.

b. Within thirty (30) calendar days of receipt of the request, Grantee will grant or withhold approval in writing. The Grantee's approval may be withheld only upon a reasonable determination by the Grantee that the action proposed would have an adverse impact on the purposes of or rights granted to Grantee under this Conservation Easement and applicable laws and regulations or would otherwise be inconsistent with this Conservation Easement.

8. Grantee's Discretion. Enforcement of the terms of this Conservation Easement shall be at the discretion of the Grantee. No failure on the part of the Grantee to enforce any term hereof shall discharge or invalidate such term or any other term hereof or affect the right of the Grantee to enforce the same in the event of a subsequent breach or default.

9. Enforcement and Remedies. Grantee is authorized to record or file any notices or instruments appropriate to assure the perpetual enforceability of this Conservation Easement. The current and subsequent owner(s) of the Property agree to provide and execute any instruments appropriate or necessary to enforcing this Conservation Easement. Grantee has the right to enforce the provisions of this Conservation Easement by proceedings at law or in equity and to prevent or remedy violations through appropriate judicial action brought against Grantor, Owner or other responsible parties in a court of competent jurisdiction.

a. Violations: Notice and Injunctive Relief.

(1) Except as permitted in subsection 9.a.(2) below, if Grantee determines that there is a violation of the terms, conditions, or obligations created by this Conservation Easement or that a violation is threatened, Grantee shall give written notice to Grantor/Owner. The notice shall identify the violation or threatened violation. Where known to Grantee, the notice shall identify corrective action necessary to cure the violation. Where the violation involves injury to the Easement Area resulting from any use or activity inconsistent with this Conservation Easement, the notice may demand restoration of the portion

of the Conservation Easement Area so injured. The Grantor/Owner shall be afforded ninety (90) days from the receipt of Grantee's notice of non-compliance to cure the subject breach, except where irreparable harm may result from any delay in curing a breach. If Grantor/Owner fails to cure the violation within the ninety (90) day period after Grantee gives notice, or under circumstances where the violation cannot reasonably be cured within the ninety (90) day period as determined by Grantee, if Grantor/Owner fails to begin curing the violation during that period, or if Grantor/Owner does not continue diligently to cure the violation until finally cured, or as otherwise provided in this Conservation Easement, Grantee may first attempt mediation or arbitration with Owner and Grantor and/or Grantee may bring an action at law or in equity to enforce the terms of this Conservation Easement.

(2) If Grantee, in its sole discretion, determines that an ongoing or imminent violation could irreversibly diminish or impair the agricultural productive capacity and/or open space character of the Conservation Easement Area, Grantee may pursue its remedies under this Section, including but not limited to ex parte judicial relief, without prior notice to Owner and Grantor or without waiting for the period provided for cure to expire. Grantee shall have the right to seek injunctive relief pursuant to this Section if, in Grantee's reasonable discretion, an injunction is required to prevent the irreversible and material impairment of the purposes of or rights granted to Grantee under this Conservation Easement and applicable law or otherwise to enforce this Conservation Easement.

b. Damages. Grantee is entitled to recover damages from Owner and/or Grantor for violation of the terms of this Conservation Easement.

c. Equitable Remedies. Grantee's rights under this Section apply equally in the event of either actual or threatened violations of the terms of this Conservation Easement. Grantor and Grantee expressly agree that the Conservation Easement Area is unique and that a violation of this Conservation Easement, and the ensuing harm or alteration of the Conservation Easement Area may result in damages that are irremediable and not subject to quantification. Grantor agrees that Grantee's remedies at law for a violation of the terms of this Conservation Easement may be inadequate and that Grantee is entitled to seek the injunctive relief described in this Section, both prohibitive and mandatory, in addition to such other relief to which Grantee may be entitled, including specific performance of the terms of this Conservation Easement. Grantee's remedies described in this Section shall be cumulative and shall be in addition to all remedies now or hereinafter existing at law or in equity. Equitable relief may include restoration of the Conservation Easement Area to the condition that existed prior to the injury.

d. Acts Beyond Grantor's/Owner's Control. Grantee may not bring any action against Owner or Grantor for any change to the Conservation Easement Area resulting from causes beyond Owner or Grantor's control, such as changes caused by fire, flood, storm, earth movement, or natural deterioration, or resulting from prudent action taken in good faith under emergency conditions to prevent or mitigate damage from such causes.

e. Right to Report. In addition to other remedies, Grantee has the right to report any environmental concerns or conditions or any actual or potential violations of any environmental laws to appropriate regulatory agencies.

f. Breach. Upon any breach of a term of this Conservation Easement, Grantee may exercise any or all of the following remedies, including:

(1) Requiring that the Conservation Easement Area be restored promptly to the condition required by this Conservation Easement.

(2) Take necessary actions to correct the non-compliance and upon request by Grantee, Owner/Grantor shall reimburse Grantee for its reasonable costs incurred to correct the non-compliance; and/or

(3) Instituting suits to enjoin any breach or enforce any term by injunction. The Grantee's remedies shall be cumulative and shall be in addition to any other rights and remedies available to the Grantee at law or equity. Enforcement of the terms of this Conservation Easement shall be at the discretion of the Grantee. No failure on the part of the Grantee to enforce any term hereof shall discharge or invalidate such term or any other term hereof or affect the right of the Grantee to enforce the same in the event of a subsequent breach or default.

(4) Enforcing abatement procedures to return the Easement Area into compliance.

If Owner and/or Grantor is found to have breached any of the obligations under this easement, Owner and/or Grantor shall reimburse the Grantee for any costs or expenses incurred by the Grantee to cure or abate such breach, including court costs and attorney fees.

10. <u>Costs and Liabilities</u>. Grantor retains all responsibilities and shall bear all costs and liabilities of any kind related to the ownership and maintenance of the Conservation Easement Area, except as such costs or liabilities shall have resulted from the acts of Grantee or Grantee's agents or contractors.

11. <u>Noise and Other Effects of Air Operations</u>. Except as provided below, Grantor and/or Owner do hereby waive, remise, and release any right or cause of action which Grantor and/or Owner or their successors and assigns may have due to such noise, noise vibrations, fumes, dust, fuel particles and all other effects that may be caused by military training exercises originated on the Installation, or lawful operation of aircraft from or to the Installation, operating within Department of the Navy, U.S. Federal Aviation Administration ("FAA") and NAS Lemoore regulations and/or Standard Operating Procedures. Furthermore, this waiver is with respect to operation of aircraft by or for purposes of the Installation. If the Installation is closed, and the base is converted to private, non-military use, this waiver shall terminate. As used herein, the term "aircraft" shall mean any and all types of aircraft, to include but not be limited to, jet aircraft, propeller driven aircraft, civil aircraft, military aircraft, commercial aircraft, helicopters and all types of aircraft or vehicles now in existence or hereafter developed, regardless of existing or future noise levels, for the purpose of military training, and/or transporting persons or through the air by whomsoever owned or operated.

12. <u>Subsequent Transfers</u>. Grantor agrees to recognize and incorporate the terms of this Conservation Easement in any deed or other legal instrument by which Grantor divests of any interest, including but not limited to, a transfer of the Conservation Easement, fee title or leasehold interest in the Conservation Easement Area to a third party other than Grantee. Grantor further agrees to give written notice to Grantee of the transfer of any interest to a third party, other than a transfer to Grantee, at least sixty (60) days prior to the date of such transfer.

13. <u>Notices</u>. Any notice, approval or communication that either party is required to give in writing may be served personally or mailed to:

To Grantor: Pharris Lemoore LLC
2050 Main Street, Suite 250
Irvine, CA 92660

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To Grantee: West Hills College District
Office of the Chancellor
9900 Cody Street
Coalinga, CA 93210

With a Copy to: Rex Randall Erickson, Counsel
Zampi, Determan & Erickson LLP
225 Broadway, Suite 1450
San Diego CA 92101

or to such other address as a party may designate by written notice to the others.

14. Transfer by Grantee. Grantee shall convey a negative easement ("Restrictive Use Easement") to the United States of America prohibiting any conduct that would be adverse to or inconsistent with the purposes of this Conservation Easement.

15. Recordation. Grantor shall record this Conservation Easement in a timely manner in the official records for the county in which the property is located. Grantee may re-record this Conservation Easement or any other documents necessary to protect its rights under this Conservation Easement or to assure the perpetual enforceability of this Conservation Easement.

16. Severability. If any provision of this Conservation Easement, or the application thereof to any person or circumstance, is found to be invalid, the remainder of the provisions of this Conservation Easement, or the application of such provision to persons or circumstances other than those as to which it is found to be invalid, as the case may be, shall not be affected thereby.

17. Conservation Easement Runs with the Land. The covenants, terms, conditions, and restrictions of this grant of Conservation Easement shall run with the land in perpetuity and shall be binding upon and inure to the benefit of the parties hereto and their respective personal representatives, heirs, successors and assigns and shall continue as a servitude running with the Property.

18. Entire Agreement. This instrument sets forth the entire agreement of the parties with respect to the conveyance of a Conservation Easement in, and supersedes all prior discussions, negotiations, understandings or agreements relating to this Conservation Easement, all of which are merged herein.

19. Controlling Law. The interpretation and performance of this Easement shall be governed by applicable laws of the United States of America.

20. Liberal Construction. Any general rule of construction to the contrary notwithstanding, this Easement shall be liberally construed in favor of the grant to effect the purpose of this Easement and the policy and purpose of 10 U.S.C. Section 2684a, as amended. If any provision in this instrument is found to be ambiguous, an interpretation consistent with the purpose of this Easement that would render the provision valid shall be favored over any interpretation that would render it invalid.

21. Exhibits.

Exhibit "A" Legal Description and Depiction of the Property

Exhibit "B" Legal Description and Depiction of the Easement Area

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Exhibit "C" Baseline Report

Exhibit "D" Grading Plan

Exhibit "E" Benefited Drainage Parcel 1

Exhibit "F" Benefited Drainage Parcel 2

IN WITNESS WHEREOF, Grantor has executed this Conservation Easement on the day and the year written above.

Dated: August 2, 2013

PHARRIS LEMOORE, LLC,
a Delaware limited liability company

By: Pharris Properties, LLC, a
Delaware limited liability company
Its: Manager

By: ______________________
Gerald N. Pharris
Its: Manager

STATE OF CALIFORNIA
COUNTY OF Orange

On August 2, 2013 before me, Kimberly Sue Tardiff, Notary Public, personally appeared Gerald N. Pharris who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature: ______________________ (seal)

KIMBERLY SUE TARDIFF
Commission # 1996543
Notary Public - California
Orange County
My Comm. Expires Oct 30, 2016

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IN WITNESS WHEREOF, Grantee hereby accepts this Conservation Easement.

Dated: November 1st, 2013 Accepted:

West Hills Community College
A Political Subdivision of the State of California

By: ______________________________
Frank Gornick, PhD
Chancellor

STATE OF CALIFORNIA
COUNTY OF Fresno

On November 1st, 2013 before me, Anne M. Jorgens, Notary Public, personally appeared Frank Gornick, who proved to me on the basis of satisfactory evidence to be the person(~~s~~) whose name(~~s~~) is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity(~~ies~~), and that by his/~~her/their~~ signature(~~s~~) on the instrument the person(~~s~~), or the entity upon behalf of which the person(~~s~~) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature: ______________________________ (seal)

ANNE M JORGENS
Commission # 1930445
Notary Public - California
Fresno County
My Comm. Expires Apr 23, 2015

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EXHIBIT "A"
LEGAL DESCRIPTION

THE LAND REFERRED TO IN THIS COMMITMENT IS SITUATED IN THE CITY OF LEMOORE, COUNTY OF KINGS, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCELS 5 AND 6 AS SHOWN ON THAT CERTAIN PARCEL MAP RECORDED IN BOOK 18, AT PAGE 6 OF PARCEL MAPS, KINGS COUNTY RECORDS.

TOGETHER WITH THAT PORTION OF BUSH STREET THAT WOULD PASS BY LAW, AS VACATED BY RESOLUTION NO. 2013-26, RECORDED OCTOBER 3, 2013, AS INSTRUMENT NO. 1318558 AND RE-RECORDED OCTOBER 16, 2013 AS INSTRUMENT NO. 1319575, KINGS COUNTY OFFICIAL RECORDS.

EXCEPTING THEREFROM AN UNDIVIDED 2/100THS OF ALL OIL, GAS AND OTHER KINDRED HYDROCARBON SUBSTANCES IN, UPON AND UNDER SAID LAND, AS GRANTED TO PHILLIP A. KLIPSTEIN, INDIVIDUALLY, AND PHILLIP A. KLIPSTEIN, AS TRUSTEE FOR O.G. DAVIES, OSCAR RUDNICH AND FRANK JEPPI, IN DEED RECORDED MARCH 08, 1941 IN BOOK 247, PAGE 2 OF OFFICIAL RECORDS, AND RE-RECORDED MAY 28, 1941 IN BOOK 249, PAGE 384 OF OFFICIAL RECORDS, AS DOCUMENT NO. 3615.

ALSO EXCEPTING THEREFROM AN UNDIVIDED 23% OF THE OIL, GAS MINERALS AND HYDROCARBON SUBSTANCES LYING IN, UPON AND UNDER THE ABOVE DESCRIBED PARCEL. THE GRANTEE SHALL HAVE THE SOLE RIGHT AND PRIVILEGE AT ANY AND ALL TIMES AND FROM TIME TO TIME HEREAFTER TO ENTER INTO AND EXECUTE ANY AND ALL LEASES, SALE AGREEMENTS, AND OTHER CONTRACTS PROVIDING FOR THE PROSPECTING FOR AND RECOVERING, SALE, TREATMENT OR OTHER DISPOSITION OF SAID OIL, GAS OR OTHER KINDRED HYDROCARBON SUBSTANCES WHICH GRANTEE, OR ITS SUCCESSORS OR ASSIGNS, MAY DESIRE TO ENTER INTO AND EXECUTE UPON SUCH TERMS AND CONDITIONS AND/OR SUCH CONSIDERATION AS THE GRANTEE, ITS SUCCESSORS AND ASSIGNS MAY, IN ITS SOLE

DISCRETION, AGREE UPON WITHOUT THE GRANTOR, OR ANY OTHER PARTY, OWNING ANY INTEREST IN SAID OIL, GAS, MINERALS AND HYDROCARBON SUBSTANCES JOINING THEREIN, BUT WITH THE SAME EFFECT AS THOUGH THE GRANTOR AND SAID OTHER PERSONS JOIN THEREIN, THE ONLY LIMITATIONS UPON THE RIGHT OF THE GRANTEE HEREUNDER BEING THAT GRANTOR SHALL BE ENTITLED TO AN UNDIVIDED 23% AND THE SAID OTHER PERSONS SHALL BE ENTITLED TO THEIR SHARE, OF THE NET CONSIDERATION WHICH MAY BE PAID FOR ANY SUCH OIL, GAS OR OTHER KINDRED HYDROCARBON SUBSTANCES AS EXCEPTED AND RESERVED IN THE DEED FROM KINGS COUNTY LAND AND CATTLE COMPANY, INCORPORATED, A CORPORATION, TO CIMARRON CATTLE COMPANY, A CORPORATION, DATED DECEMBER 16, 1955 AND RECORDED DECEMBER 21, 1955 IN BOOK 634 AT PAGE 171 OF OFFICIAL RECORDS, AS DOCUMENT NO. 11791.

ALSO EXCEPTING THEREFROM AN UNDIVIDED 12 INTEREST AND OWNERSHIP IN AND TO ALL MINERALS, OIL, GAS AND HYDROCARBONS IN AND UNDER SAID REAL PROPERTY, AS EXCEPTED AND RESERVED UNTO ROBERT N. MCKEE AND ELIZABETH L. MCKEE, HUSBAND AND WIFE AND LYMAN D. GRISWOLD AND OLGA T. GRISWOLD, HUSBAND AND WIFE IN DEED DATED DECEMBER 31, 1975 AND RECORDED JANUARY 02, 1976 IN BOOK 1062, PAGE 489, OFFICIAL RECORDS, AS DOCUMENT NO. 25, WHICH THE SAID ROBERT N. MCKEE, ELIZABETH L. MCKEE, LYMAN D. GRISWOLD AND OLGA T. GRISWOLD OWN, TOGETHER WITH AN UNDIVIDED 12 INTEREST IN AND TO ALL RENTAL PAYMENTS, BONUS PAYMENTS OR SIMILAR
PAYMENTS UPON THE LEASING OF SAID MINERALS, OIL, GAS AND HYDROCARBONS AND SAID
ROBERT N. MCKEE, ELIZABETH L. MCKEE, LYMAN D. GRISWOLD AND OLGA T. GRISWOLD SHALL HAVE THE RIGHT TO ENTER INTO LEASES, AGREEMENTS AND CONTRACTS FOR THE EXPLORATION AND PRODUCTION OF OIL, GAS MINERALS AND OTHER HYDROCARBON SUBSTANCES IN AND UNDER SAID LANDS. SAID DEED FURTHER RECITES: THERE IS EXCEPTED AND RESERVED TO THE GRANTORS HEREIN THE RIGHT IN COMMON WITH GRANTEES HEREIN, TO ENTER INTO AND EXECUTE ANY AND ALL LEASES, SALES AGREEMENTS AND OTHER CONTRACTS PROVIDING FOR THE PROSPECTING FOR AND RECOVERING, SALE, TREATMENT OR OTHER DISPOSITION OF SAID OIL, GAS OR OTHER HYDROCARBON SUBSTANCES, AND SUCH RIGHT SHALL NOT BE LIMITED TO THE OIL, MINERALS AND HYDROCARBONS VESTED IN SAID PARTIES, BUT SHALL EXTEND TO LEASING SAID OIL, GAS AND MINERAL INTEREST OF OTHERS, WHICH RIGHT HAS PREVIOUSLY BEEN RESERVED BY DEED.

AND ALSO EXCEPTING THEREFROM THE INTEREST EXCEPTED AND RESERVED IN DEED DATED DECEMBER 23, 1980, EXECUTED BY LIONEL SEMAS, ET AL TO DENNIS J. SANCHEZ, ET AL AND RECORDED DECEMBER 31, 1980 IN BOOK 1190, PAGE 432 OF OFFICIAL RECORDS, AS DOCUMENT NO. 15149, WHICH DEED RECITES AS FOLLOWS:

EXCEPTING AND RESERVING UNTO THE GRANTORS HEREIN 12 OF THEIR PRESENT RIGHT, TITLE AND INTEREST IN AND TO ALL OIL, GAS, MINERALS AND OTHER HYDROCARBON SUBSTANCES IN OR UNDER SAID LAND AS DESCRIBED IN ALL OF THE PARCELS HEREIN ABOVE SET FORTH.

APN: 023-510-034 and 023-510-036

REVIEWED AND ACCEPTED ROBERT SCHMIDT CADASTRAL 10/31/2013

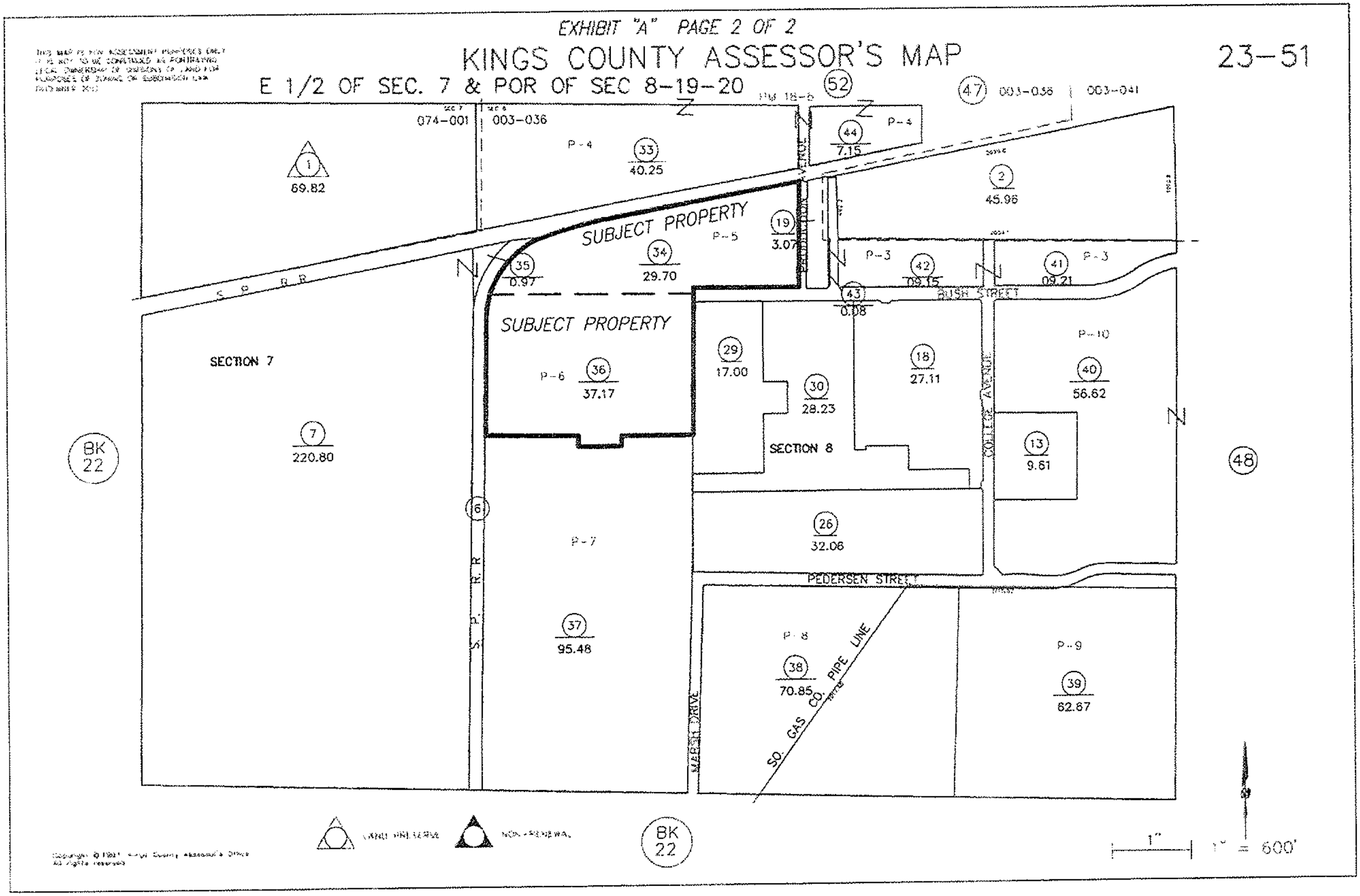
EXHIBIT "A" PAGE 2 OF 2
KINGS COUNTY ASSESSOR'S MAP
E 1/2 OF SEC. 7 & POR OF SEC 8-19-20
23-51
SUBJECT PROPERTY
SUBJECT PROPERTY
SECTION 7
SECTION 8
S. P. R. R.
BUSH STREET
COLLEGE AVENUE
PEDERSEN STREET
MARSH DRIVE
SO. GAS CO. PIPE LINE
074-001
003-036
003-041
BK 22
1" = 600'

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Exhibit "F"

Legal Description
Benefited Drainage Parcel 2

That certain real property located in City of Lemoore, County of Kings, State of California described as follows:

Parcel No. 3 of Parcel Map No. 2005-03 as recorded in Book 18 of Parcel Maps at Page 6, Kings County Records in the City of Lemoore, County of Kings, State of California lying in the east half of Section 8, Township 19 South, Range 20 East, Mount Diablo Base & Meridian.

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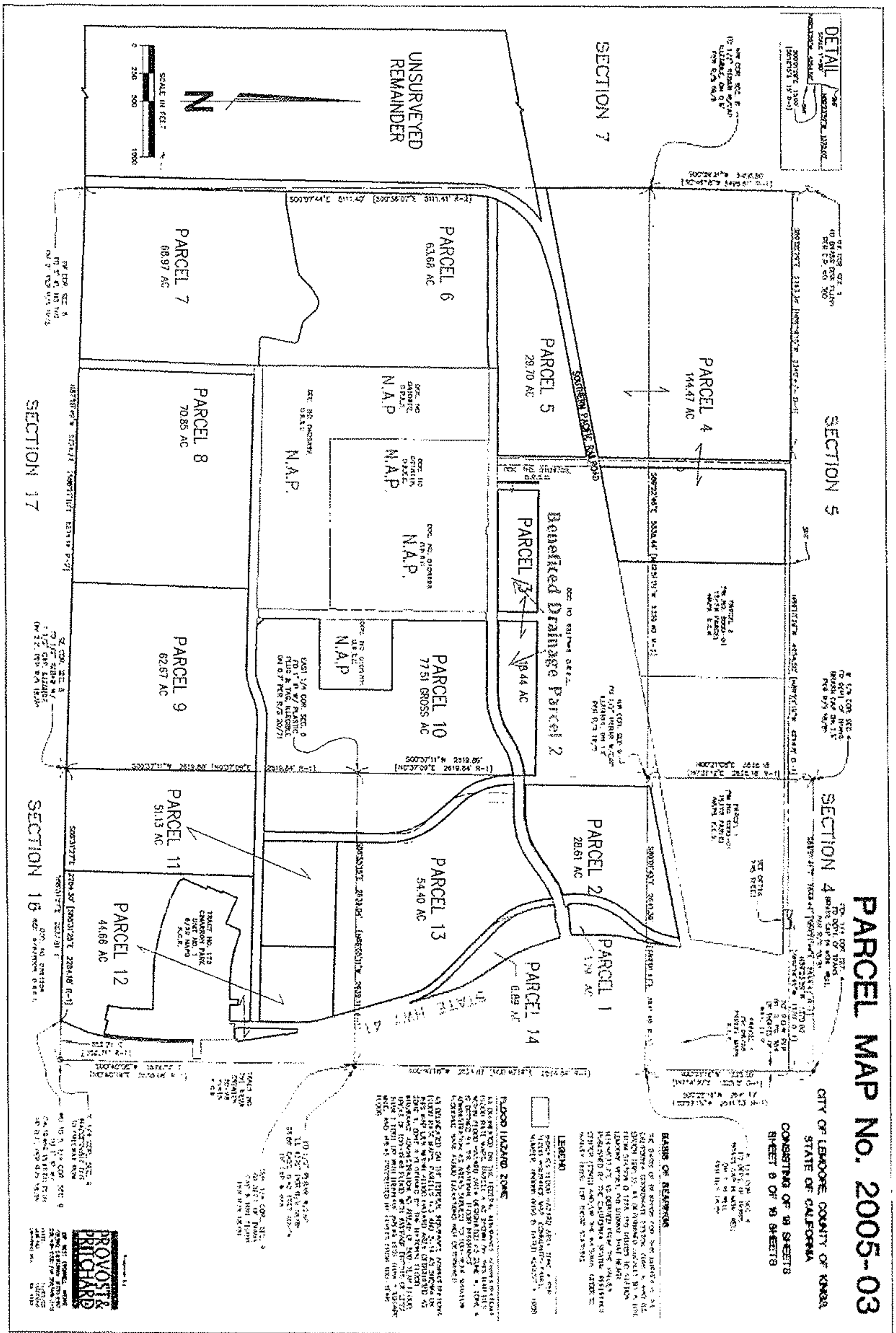
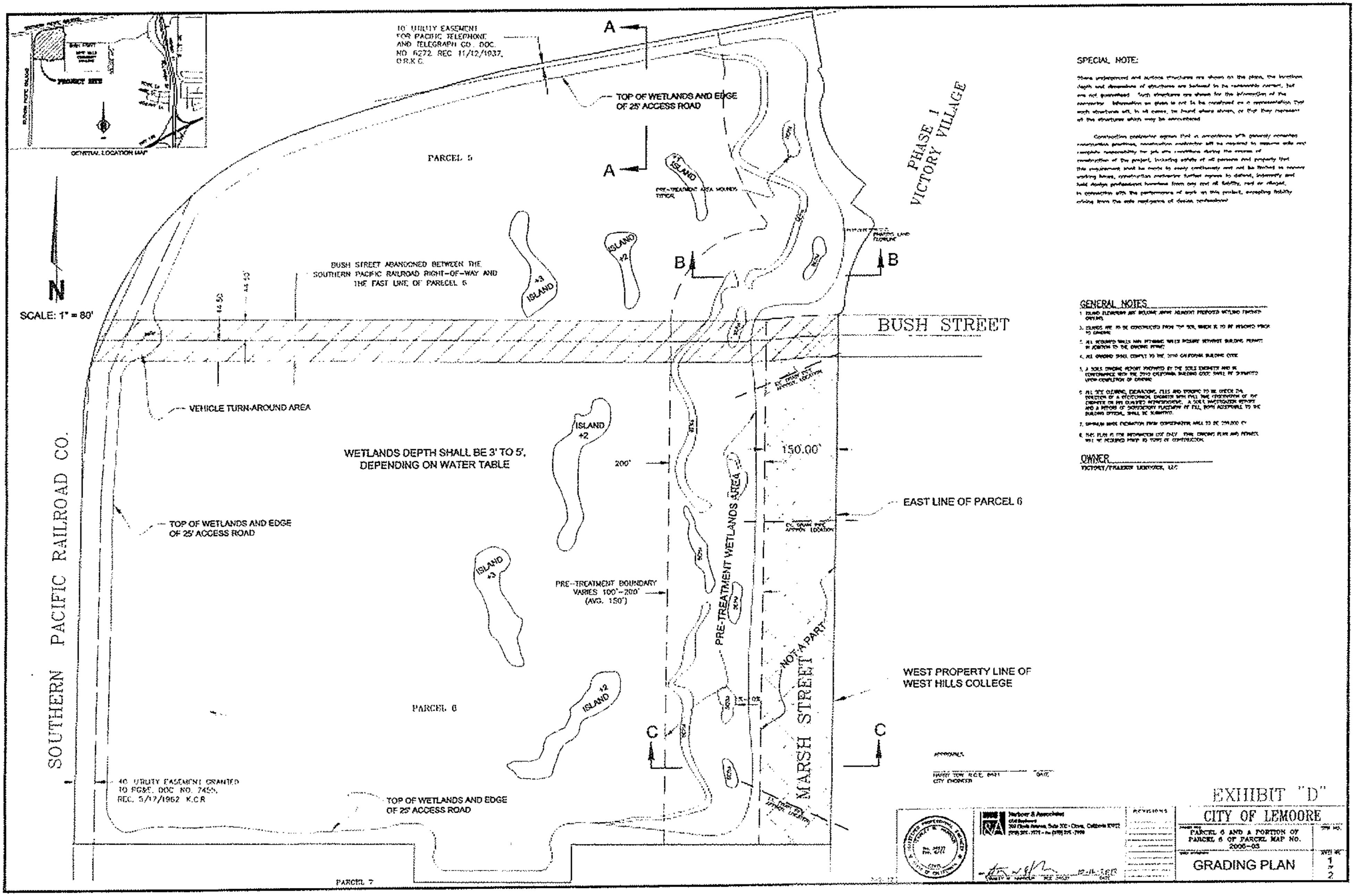


EXHIBIT "F"

END OF DOCUMENT



SOUTHERN PACIFIC RAILROAD CO.
10' UTILITY EASEMENT FOR PACIFIC TELEPHONE AND TELEGRAPH CO. DOC. NO 6272 REC 11/12/1937, O.R.K.C.
TOP OF WETLANDS AND EDGE OF 25' ACCESS ROAD
PARCEL 5
BUSH STREET ABANDONED BETWEEN THE SOUTHERN PACIFIC RAILROAD RIGHT-OF-WAY AND THE EAST LINE OF PARCEL 6
SCALE: 1" = 80'
N
BUSH STREET
VEHICLE TURN-AROUND AREA
WETLANDS DEPTH SHALL BE 3' TO 5', DEPENDING ON WATER TABLE
PRE-TREATMENT BOUNDARY VARIES 100'-200' (AVG. 150')
PRE-TREATMENT WETLANDS AREA
150.00'
200'
EAST LINE OF PARCEL 6
WEST PROPERTY LINE OF WEST HILLS COLLEGE
NOT A PART
MARSH STREET
PARCEL 6
PARCEL 7
ISLAND +2
ISLAND +3
40' UTILITY EASEMENT GRANTED TO PG&E, DOC. NO. 7455, REC. 5/17/1962 K.C.R.
PHASE 1 VICTORY VILLAGE
A
B
C
SPECIAL NOTE:
GENERAL NOTES
OWNER
EXHIBIT "D"
CITY OF LEMOORE
PARCEL 6 AND A PORTION OF PARCEL 6 OF PARCEL MAP NO. 2006-03
GRADING PLAN

APPENDIX D

PHOTOGRAPHS, TYPICAL EXISTING SYSTEM STREET-PONDING

#1 Cinnamon & Hanford Armona

#3 Hazelwood & Beverly

Photographs, Existing System Street Ponding

#4 West Spring Lane by Juniper Lane

#5 Wexford & Cardiff

Photographs, Existing System Street Ponding

#5 Bristol Circle

#6 Noble West of 19th Ave.

Photographs, Existing System Street Ponding

#8 Lincoln

#11 Enterprise

Photographs, Existing System Street Ponding

#12 Montego Way

#13 Stratford Court

Photographs, Existing System Street Ponding

#14 Hazelwood and Maple

#15 Acacia & Morro

Photographs, Existing System Street Ponding

APPENDIX E

REQUIRED CHANGES TO CITY STANDARD SPECIFICATIONS FOR PUBLIC WORKS IMPROVEMENTS

30. Hydrologic Design Criteria

30.1 General

The design criteria in this section are the minimum acceptable criteria for use by designers of drainage facilities to be developed within the City. Designers are cautioned to apply their own expertise and judgment in development of final designs. Certain projects or clients may appropriately require more stringent criteria. However, the City will not reimburse for costs associated with systems designed to criteria higher than listed herein, unless those higher criteria have been mandated by City staff or governing bodies.

30.2 Collection Systems

All elements of the storm drainage collection system (streets, gutters, inlets, pipes, and pump stations) shall be designed in accordance with the modified Rational method presented below. The peak flows from short-duration storms are handled through short-term ponding within street areas. Once the peak has passed, the inlets, pipes and pump stations designed according to the City's criteria clear the streets.

Calculated flow for a given system (Q) shall be derived from the standard formula:

$$Q = CiA$$

Where:

Q	=	Runoff Flow (cubic feet per second)
C	=	Runoff Coefficient (Per Table, Section 30.2.1 or as directed)
I	=	Rainfall Intensity (inches/hour, per Table, Section 30.2.2)
A	=	Tributary Area (acres)

Inlets, pipes and pump stations are designed to handle a time-averaged event with approximately a two-year return frequency. Runoff coefficients are given in Section 30.2.1. These shall be used for any future development under consideration. If a site plan is available, and higher runoff can be anticipated, the City may direct use of higher runoff coefficients. For example, an industrial development covering its entire site with building and impervious surface would require a runoff coefficient of 0.95 rather than the standard 0.80 given in the table.

30.2.1 Runoff Coefficients (Inlet, Pipeline and Pump Station Design)

Commercial and Industrial	0.80
Multi-Family Residential	0.70
Single Family Residential	0.40

30.2.2 Rainfall Intensity and Accumulation

10 yr., 2-day event	3.32 inches (.276 feet)
100 yr., 10-day event	5.68 inches (.473 feet)

30.3 Pump Stations

Storm drain pump stations shall be designed in accordance with the requirements of this section, the Standard Drawings, and the Storm Drain Master Plan.

Pump stations shall be duplex centrifugal pumps and shall be provided with trash racks and non-clog pumps in accordance with the Standard Drawings. Should site-specific conditions so dictate, alternative designs will be considered if it can be demonstrated that such alternatives are in the interest of the City. Such alternatives could include propeller or other-type pumps, or alternative wet well designs. In any case, the quality and durability of the supplied hardware and facilities shall be of the level shown on the Standard Drawings.

Pumps shall be selected and designed to provide the required flow when running in tandem, and at least 60 percent of the maximum design flow when running singly. The design engineer shall submit pump design calculations for review along with the Improvement Drawings. Calculations shall include pump curves (simplex and duplex operation) and system head curves on the same scale. The operating range shall give consideration to all variable conditions including discharge head and depth of water in the wet well. Typically, pumps shall be selected to run to the right of the point of peak efficiency on the pump curve. Variance from that policy requires approval of the City Engineer.

Pump submittals shall indicate type, make, model, horsepower, selected impeller type and model number, overall efficiency (wire to water), motor voltage, and any other pertinent information. Typically, impellers shall be single-vane non-clog or vortex; however, in larger diameters dual vane impellers may be considered if in the interest of the City.

Wet wells shall be designed to provide not more than ten pump starts per hour for the selected pump and the system conditions. The design engineer shall submit calculations demonstrating the range of required pump starts for approval along with the improvement drawings.

Wet wells shall be of sufficient depth to allow complete drainage of tributary pipelines and basins. That is, pump shut-off elevation shall be at or below the inlet flowline elevation.

Pump stations shall be located within public rights-of-way, or in drainage basins or landscape easements, so that there is ready vehicular access for pump maintenance.

Pump control panels and electric service shall be located near a right-of-way boundary, against a fence or masonry wall as may be the case. A masonry enclosure with chain link or wrought iron gates (as directed by the City) shall be constructed in accordance with the Standard Drawings. The control panel shall be located so as to give a direct line of sight to the pump station by a person standing at the control panel.

30.4 Storm Drainage Basin Classification

Storm drainage basins shall be classified as detention or retention, as defined herein. The design engineer shall submit appropriate calculations supporting the selected size and design criteria for any basin included in a development along with the Improvement Drawings.

30.4.1 Detention Basins
Basins which meet the following criteria shall be designated as “detention basins:”

- Designed to receive storm water and discharge to an irrigation ditch or other facility at a flow rate, which is a major fraction of the peak inflow rate and designed to permit emptying the basin in 96 hours.

- The downstream disposal area is not subject to restrictions on flow discharge or quantity.

30.4.2 Retention Basins
Any basin which has no relief outlet, or which has an outlet not meeting the conditions in 30.4.1, shall be designated a “retention basin.”

30.4.3 Basin Volumes
All detention basins shall be designed to handle a total of 3.32 inches of rain, with no allowance for percolation or evaporation. Retention basins shall be designed to handle a total of 5.68 inches of rain, with no allowance for percolation or evaporation. The developer’s engineer shall prepare a hydrograph for each detention or retention basin and shall submit the design to the City Engineer for approval.

30.5 Basin Design Criteria

The requirements of this section apply to all basins whether detention or retention.

- Maximum water surface level shall be 0.50 feet below the lowest hydraulic gradeline of the incoming pipes.

- Minimum basin freeboard shall be 1.00 feet.

- Minimum basin bottom elevation shall be determined by the City Engineer upon review of current groundwater data submitted by the Developer’s engineer, but in no case shall be lower than five feet below initial ground levels.

- Basin bottoms shall be sloped at 0.25% minimum toward the basin outlet or toward any single area in retention basins.

- Basins may, by approval of the City Engineer, be bermed to a maximum of 2 feet above surrounding grade.

- A minimum of a 15’-0” width access roadway shall be provided around the perimeter of all basins.

- Maximum basin side slopes shall be three to one.

- A six-foot chain link fence in accordance with Standards Section 2a., Chain Link Fence, shall be built around the outer perimeter of the basin. A minimum of one (1) 12-foot swinging gate with access to a public street shall be provided for maintenance purposes. Such access may be either direct, or through an approved access easement.

Calculations of required retention pond volume, maximum permissible water surface elevation, and system hydraulic grade line shall be submitted by the design engineer. Runoff coefficients shall be prorated to account for composite land uses.

APPENDIX F

GENERAL PLAN LAND USE DESIGNATIONS

Lemoore General Plan Land Use Designations

Land Use Classification	Unit Density (du/net) acre			Floor Area Ratio (FAR)		
	Min	Typical	Max	Min	Typical	Max
Agriculture/Rural Residential		0.05	0.2			
Very Low Density Residential	1	2.5	3			0.25
Low Density Residential	3	4.5	7			0.40
Low-Medium Density Residential	7	9	12			0.60
Medium Density Residential	12	14	17			0.80
High Density Residential	17	18	25			
Mixed Use	8	9	20	0.2	0.25	1
Neighborhood Commercial				0.1	0.2	0.6
Regional Commercial				0.1	0.3	0.6
Professional Office				0.1	0.25	0.6
Light/Heavy Industrial				0.1	0.2	0.5
Business, Tech, & Indust. Reserve				0.1	0.15	0.2

APPENDIX G

ATTACHMENT 4, STATE MS4 BEST MANAGEMENT PRACTICES

Areas subject to high growth or serving a population of at least 50,000 must comply with the following provisions (for counties this threshold population applies to the population within the permit area).

A. RECEIVING WATER LIMITATIONS

1. Discharges shall not cause or contribute to an exceedance of water quality standards contained in a Statewide Water Quality Control Plan, the California Toxics Rule (CTR), or in the applicable RWQCB Basin Plan.

2. The permittees shall comply with Receiving Water Limitations A.1 through timely implementation of control measures and other actions to reduce pollutants in the discharges in accordance with the SWMP and other requirements of this permit including any modifications. The SWMP shall be designed to achieve compliance with Receiving Water Limitations A.1. If exceedance(s) of water quality objectives or water quality standards (collectively, WQS) persist notwithstanding implementation of the SWMP and other requirements of this permit, the permittees shall assure compliance with Receiving Water Limitations A.1 by complying with the following procedure:

   a. Upon a determination by either the permittees or the RWQCB that discharges are causing or contributing to an exceedance of an applicable WQS, the permittees shall promptly notify and thereafter submit a report to the RWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of WQSs. The report may be incorporated in the annual update to the SWMP unless the RWQCB directs an earlier submittal. The report shall include an implementation schedule. The RWQCB may require modifications to the report.

   b. Submit any modifications to the report required by the RWQCB within 30 days of notification.

   c. Within 30 days following approval of the report described above by the RWQCB, the permittees shall revise the SWMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, implementation schedule, and any additional monitoring required.

   d. Implement the revised SWMP and monitoring program in accordance with the approved schedule.

   So long as the permittees have complied with the procedures set forth above and are implementing the revised SWMP, the permittees do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the RWQCB to develop additional BMPs.

B. DESIGN STANDARDS

Regulated Small MS4s subject to this requirement must adopt an ordinance or other document to ensure implementation of the Design Standards included herein or a functionally equivalent program that is acceptable to the appropriate RWQCB. The ordinance or other document must be adopted and effective prior to the expiration of this General Permit or, for Small MS4s designated subsequent to the Permit adoption, within five years of designation as a regulated Small MS4.

All discretionary development and redevelopment projects that fall into one of the following categories are subject to these Design Standards. These categories are:

- Single-Family Hillside Residences
- 100,000 Square Foot Commercial Developments
- Automotive Repair Shops
- Retail Gasoline Outlets
- Restaurants
- Home Subdivisions with 10 or more housing units
- Parking lots 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff

1. Conflicts With Local Practices
   Where provisions of the Design Standards conflict with established local codes or other regulatory mechanism, (e.g., specific language of signage used on storm drain stenciling), the Permittee may continue the local practice and modify the Design Standards to be consistent with the code or other regulatory mechanism, except that to the extent that the standards in the Design Standards are more stringent than those under local codes or other regulatory mechanism, such more stringent standards shall apply.

2. Design Standards Applicable to All Categories

   a. Peak Storm Water Runoff Discharge Rates
      Post-development peak storm water runoff discharge rates shall not exceed the estimated pre-development rate for developments where the increased peak storm water discharge rate will result in increased potential for downstream erosion.

   b. Conserve Natural Areas
      If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

      1) Concentrate or cluster Development on portions of a site while leaving the remaining land in a natural undisturbed condition.
      2) Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
      3) Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.

4) Promote natural vegetation by using parking lot islands and other landscaped areas.
5) Preserve riparian areas and wetlands.

c. Minimize Storm Water Pollutants of Concern

Storm water runoff from a site has the potential to contribute oil and grease, suspended solids, metals, gasoline, pesticides, and pathogens to the storm water conveyance system. The development must be designed so as to minimize, to the maximum extent practicable, the introduction of pollutants of concern that may result in significant impacts, generated from site runoff of directly connected impervious areas (DCIA), to the storm water conveyance system as approved by the building official. Pollutants of concern consist of any pollutants that exhibit one or more of the following characteristics: current loadings or historic deposits of the pollutant are impacting the beneficial uses of a receiving water, elevated levels of the pollutant are found in sediments of a receiving water and/or have the potential to bioaccumulate in organisms therein, or the detectable inputs of the pollutant are at concentrations or loads considered potentially toxic to humans and/or flora and fauna.

In meeting this specific requirement, "minimization of the pollutants of concern" will require the incorporation of a BMP or combination of BMPs best suited to maximize the reduction of pollutant loadings in that runoff to the Maximum Extent Practicable. Those BMPs best suited for that purpose are those listed in the *California Storm Water Best Management Practices Handbooks*; *Caltrans Storm Water Quality Handbook: Planning and Design Staff Guide*; *Manual for Storm Water Management in Washington State*; *The Maryland Stormwater Design Manual*; *Florida Development Manual: A Guide to Sound Land and Water Management*; Denver *Urban Storm Drainage Criteria Manual, Volume 3 – Best Management Practices* and *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* , USEPA Report No. EPA-840-B-92-002, as "likely to have significant impact" beneficial to water quality for targeted pollutants that are of concern at the site in question. However, it is possible that a combination of BMPs not so designated, may in a particular circumstance, be better suited to maximize the reduction of the pollutants.

d. Protect Slopes and Channels

Project plans must include BMPs consistent with local codes, ordinances, or other regulatory mechanism and the Design Standards to decrease the potential of slopes and/or channels from eroding and impacting storm water runoff:

1) Convey runoff safely from the tops of slopes and stabilize disturbed slopes.
2) Utilize natural drainage systems to the maximum extent practicable.
3) Stabilize permanent channel crossings.
4) Vegetate slopes with native or drought tolerant vegetation, as appropriate.
5) Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion, with the approval of all agencies

with jurisdiction, e.g., the U.S. Army Corps of Engineers and the California Department of Fish and Game.

e. Provide Storm Drain System Stenciling and Signage
Storm drain stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets. The stencil contains a brief statement that prohibits the dumping of improper materials into the storm water conveyance system. Graphical icons, either illustrating anti-dumping symbols or images of receiving water fauna, are effective supplements to the anti-dumping message. All storm drain inlets and catch basins within the project area must be stenciled with prohibitive language (such as: "NO DUMPING – DRAINS TO OCEAN") and/or graphical icons to discourage illegal dumping.· Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area.· Legibility of stencils and signs must be maintained.

f. Properly Design Outdoor Material Storage Areas
Outdoor material storage areas refer to storage areas or storage facilities solely for the storage of materials. Improper storage of materials outdoors may provide an opportunity for toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to enter the storm water conveyance system. Where proposed project plans include outdoor areas for storage of materials that may contribute pollutants to the storm water conveyance system, the following Structural or Treatment BMPs are required:

1) Materials with the potential to contaminate storm water must be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm water conveyance system; or (2) protected by secondary containment structures such as berms, dikes, or curbs.
2) The storage area must be paved and sufficiently impervious to contain leaks and spills.
3) The storage area must have a roof or awning to minimize collection of storm water within the secondary containment area.

g. Properly Design Trash Storage Areas
A trash storage area refers to an area where a trash receptacle or receptacles (dumpsters) are located for use as a repository for solid wastes. Loose trash and debris can be easily transported by the forces of water or wind into nearby storm drain inlets, channels, and/or creeks. All trash container areas must meet the following Structural or Treatment Control BMP requirements (individual single family residences are exempt from these requirements):

1) Trash container areas must have drainage from adjoining roofs and pavement diverted around the area(s).
2) Trash container areas must be screened or walled to prevent off-site transport of trash.

h. Provide Proof of Ongoing BMP Maintenance

Improper maintenance is one of the most common reasons why water quality controls will not function as designed or which may cause the system to fail entirely. It is important to consider who will be responsible for maintenance of a permanent BMP, and what equipment is required to perform the maintenance properly. As part of project review, if a project applicant has included or is required to include, Structural or Treatment Control BMPs in project plans, the Permittee shall require that the applicant provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

For all properties, the verification will include the developer's signed statement, as part of the project application, accepting responsibility for all structural and treatment control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private or public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owner's responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the project's conditions, covenants and restrictions (CC&Rs). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. The transfer of this information shall also be required with any subsequent sale of the property.

If Structural or Treatment Control BMPs are located within a public area proposed for transfer, they will be the responsibility of the developer until they are accepted for transfer by the County or other appropriate public agency. Structural or Treatment Control BMPs proposed for transfer must meet design standards adopted by the public entity for the BMP installed and should be approved by the County or other appropriate public agency prior to its installation.

i. Design Standards for Structural or Treatment Control BMPs
The Permittees shall require that post-construction treatment control BMPs incorporate, at a minimum, either a volumetric or flow based treatment control design standard, or both, as identified below to mitigate (infiltrate, filter or treat) storm water runoff:

1) Volumetric Treatment Control BMP

a) The 85^{th} percentile 24-hour runoff event determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87, (1998); or
b) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/ Commercial, (2003); or
c) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" that achieves approximately the same reduction in pollutant loads achieved by the 85^{th} percentile 24-hour runoff event.

2) Flow Based Treatment Control BMP
   a) The flow of runoff produced from a rain event equal to at least two times the 85^{th} percentile hourly rainfall intensity for the area; or
   b) The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

Limited Exclusion
Restaurants and Retail Gasoline Outlets, where the land area for development or redevelopment is less than 5,000 square feet, are excluded from the numerical Structural or Treatment Control BMP design standard requirement only.

3. Provisions Applicable to Individual Priority Project Categories

a. 100,000 Square Foot Commercial Developments

1) Properly Design Loading/Unloading Dock Areas
Loading/unloading dock areas have the potential for material spills to be quickly transported to the storm water conveyance system. To minimize this potential, the following design criteria are required:

   a) Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.
   b) Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

2) Properly Design Repair/Maintenance Bays
Oil and grease, solvents, car battery acid, coolant and gasoline from the repair/maintenance bays can negatively impact storm water if allowed to come into contact with storm water runoff. Therefore, design plans for repair bays must include the following:

a) Repair/maintenance bays must be indoors or designed in such a way that doesn't allow storm water runon or contact with storm water runoff.
b) Design a repair/maintenance bay drainage system to capture all washwater, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

3) Properly Design Vehicle/Equipment Wash Areas
The activity of vehicle/equipment washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. Include in the project plans an area for washing/steam cleaning of vehicles and equipment. The area in the site design must be:

a) Self-contained and/ or covered, equipped with a clarifier, or other pretreatment facility, and
b) Properly connected to a sanitary sewer or other appropriately permitted disposal facility.

b. Restaurants

1) Properly Design Equipment/Accessory Wash Areas
The activity of outdoor equipment/accessory washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. Include in the project plans an area for the washing/steam cleaning of equipment and accessories. This area must be:

a) Self-contained, equipped with a grease trap, and properly connected to a sanitary sewer.
b) If the wash area is to be located outdoors, it must be covered, paved, have secondary containment, and be connected to the sanitary sewer or other appropriately permitted disposal facility.

c. Retail Gasoline Outlets

1) Properly Design Fueling Area
Fueling areas have the potential to contribute oil and grease, solvents, car battery acid, coolant and gasoline to the storm water conveyance system. The project plans must include the following BMPs:

a) The fuel dispensing area must be covered with an overhanging roof structure or canopy. The canopy's minimum dimensions must be equal to or greater than the area within the grade break. The canopy must not drain onto the fuel dispensing area, and the canopy downspouts must be routed to prevent drainage across the fueling area.

b) The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface), and the use of asphalt concrete shall be prohibited.
c) The fuel dispensing area must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of storm water to the extent practicable.
d) At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

d. Automotive Repair Shops

1) Properly Design Fueling Area
Fueling areas have the potential to contribute oil and grease, solvents, car battery acid, coolant and gasoline to the storm water conveyance system. Therefore, design plans, which include fueling areas, must contain the following BMPs:

a. The fuel dispensing area must be covered with an overhanging roof structure or canopy. The canopy's minimum dimensions must be equal to or greater than the area within the grade break. The canopy must not drain onto the fuel dispensing area, and the canopy downspouts must be routed to prevent drainage across the fueling area.
b. The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface), and the use of asphalt concrete shall be prohibited.
c. The fuel dispensing area must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of storm water to the extent practicable.
d. At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

2) Properly Design Repair/Maintenance Bays
Oil and grease, solvents, car battery acid, coolant and gasoline from the repair/maintenance bays can negatively impact storm water if allowed to come into contact with storm water runoff. Therefore, design plans for repair bays must include the following:

a) Repair/maintenance bays must be indoors or designed in such a way that doesn't allow storm water run-on or contact with storm water runoff.
b) Design a repair/maintenance bay drainage system to capture all wash-water, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is

prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

3) Properly Design Vehicle/Equipment Wash Areas
The activity of vehicle/equipment washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. Include in the project plans an area for washing/steam cleaning of vehicles and equipment. This area must be:

    a) Self-contained and/or covered, equipped with a clarifier, or other pretreatment facility, and properly connected to a sanitary sewer or other appropriately permitted disposal facility.

4) Properly Design Loading/Unloading Dock Areas
Loading/unloading dock areas have the potential for material spills to be quickly transported to the storm water conveyance system. To minimize this potential, the following design criteria are required:

    a) Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.
    b) Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

e. Parking Lots

1) Properly Design Parking Area
Parking lots contain pollutants such as heavy metals, oil and grease, and polycyclic aromatic hydrocarbons that are deposited on parking lot surfaces by motor-vehicles. These pollutants are directly transported to surface waters. To minimize the offsite transport of pollutants, the following design criteria are required:

    a) Reduce impervious land coverage of parking areas.
    b) Infiltrate or treat runoff.

2) Properly Design To Limit Oil Contamination and Perform Maintenance
Parking lots may accumulate oil, grease, and water insoluble hydrocarbons from vehicle drippings and engine system leaks:

    a) Treat to remove oil and petroleum hydrocarbons at parking lots that are heavily used (e.g. fast food outlets, lots with 25 or more parking spaces , sports event parking lots, shopping malls, grocery stores, discount warehouse stores).
    b) Ensure adequate operation and maintenance of treatment systems particularly sludge and oil removal, and system fouling and plugging prevention control.

4. Waiver

   A Permittee may, through adoption of an ordinance, code, or other regulatory mechanism incorporating the treatment requirements of the Design Standards, provide for a waiver from the requirement if impracticability for a specific property can be established. A waiver of impracticability shall be granted only when all other Structural or Treatment Control BMPs have been considered and rejected as infeasible. Recognized situations of impracticability include, (i) extreme limitations of space for treatment on a redevelopment project, (ii) unfavorable or unstable soil conditions at a site to attempt infiltration, and (iii) risk of ground water contamination because a known unconfined aquifer lies beneath the land surface or an existing or potential underground source of drinking water is less than 10 feet from the soil surface. Any other justification for impracticability must be separately petitioned by the Permittee and submitted to the appropriate RWQCB for consideration. The RWQCB may consider approval of the waiver justification or may delegate the authority to approve a class of waiver justifications to the RWQCB EO. The supplementary waiver justification becomes recognized and effective only after approval by the RWQCB or the RWQCB EO. A waiver granted by a Permittee to any development or redevelopment project may be revoked by the RWQCB EO for cause and with proper notice upon petition.

5. Limitation on Use of Infiltration BMPs

   Three factors significantly influence the potential for storm water to contaminate ground water. They are (i) pollutant mobility, (ii) pollutant abundance in storm water, (iii) and soluble fraction of pollutant. The risk of contamination of groundwater may be reduced by pretreatment of storm water. A discussion of limitations and guidance for infiltration practices is contained in, *Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration, Report No. EPA/600/R-94/051, USEPA (1994).*

   In addition, the distance of the groundwater table from the infiltration BMP may also be a factor determining the risk of contamination. A water table distance separation of ten feet depth in California presumptively poses negligible risk for storm water not associated with industrial activity or high vehicular traffic.

   Site specific conditions must be evaluated when determining the most appropriate BMP. Additionally, monitoring and maintenance must be provided to ensure groundwater is protected and the infiltration BMP is not rendered ineffective by overload. This is especially important for infiltration BMPs for areas of industrial activity or areas subject to high vehicular traffic [25,000 or greater average daily traffic (ADT) on main roadway or 15,000 or more ADT on any intersecting roadway]. In some cases pretreatment may be necessary.

6. Alternative Certification for Storm Water Treatment Mitigation

   In lieu of conducting detailed BMP review to verify Structural or Treatment Control BMP adequacy, a Permittee may elect to accept a signed certification from a Civil Engineer or a Licensed Architect registered in the State of California, that the plan meets the criteria established herein. The Permittee is encouraged to verify that certifying person(s) have been trained on BMP design for water quality, not more than two years prior to the signature date. Training conducted by an organization with storm water BMP design expertise (e.g., a University, American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, or the California Water Environment Association) may be considered qualifying.

APPENDIX H

WAIVER, GROUNDWATER SEPARATION

Waiver of Ten-Foot Groundwater Separation, Storm Drainage Basins, City of Lemoore

Whereas it is not feasible, in view of historic and potential future groundwater levels in the City of Lemoore, to maintain regulatory agency-desired ten-feet separation between the bottom of storm drainage basins and the groundwater, and

Whereas Storm Drain Master Plan-adopted storm drain basin volume requirements exceed those outlined as Best Management Practice (BMP) by Attachment 4 of the City's MS4 permit, and

Whereas such Attachment provides for a waiver to conformance with such BMP implementation if said conformance is infeasible, now therefore

The City's basin design volumes and the elimination of requirements regarding separation of basins from groundwater are hereby approved for City basin design.

APPENDIX I

GROWTH FACILITIES COST CALCULATIONS (DEVELOPER FUNDED) AREA ONE

Appendix I

Growth Facilities Cost Calculations (Developer Funded) – Area One

A. College East Basin conversion to detention basin
Total Area One drainage* 32-acre feet

Basin capacity at 6' usable depth: 30-acre feet		
Estimated land cost @$100,000 per acre: $100,000 x 5** =		$500,000
Rough grading cost = $0 (soil sale to developers)		$0
Fine grading/compaction costs = $0 (soil sale to developers)		$0
Access roadway (AB) surfacing costs (1 sq. ft. x 24,000 sq. ft) =		$24,000
Discharge pump station (96 hour, 60% per pump, 2 pumps) =		$350,000
	Total	$874,000

B.

Discharge piping, 1,500 feet at $45/foot =		$67,500
∴ Total direct cost, Area One detention and transport =		$941,500
Estimated costs of appraisals, legal, engineering, surveying and inspection @ 25% =		$153,100
	Total	$1,129,800

C. Impact Fee Approximation
Total single-family residential area drainage, Area One, 32-acre feet

∴ % of total costs to be borne by single-family residential units***	100%
Estimated total number of single-family residential units (at 4.5 units per gross acre x 181 acres)	815
Estimated impact fee per single family unit: 1,129,800/815 =	$1,386
Estimated impact fee per single family acre: $1,386 x 4.5 =	$6,237

*Not including parcels draining to College Conservation Area

**New development pays for total land, 5 acres, for detention basin capacity

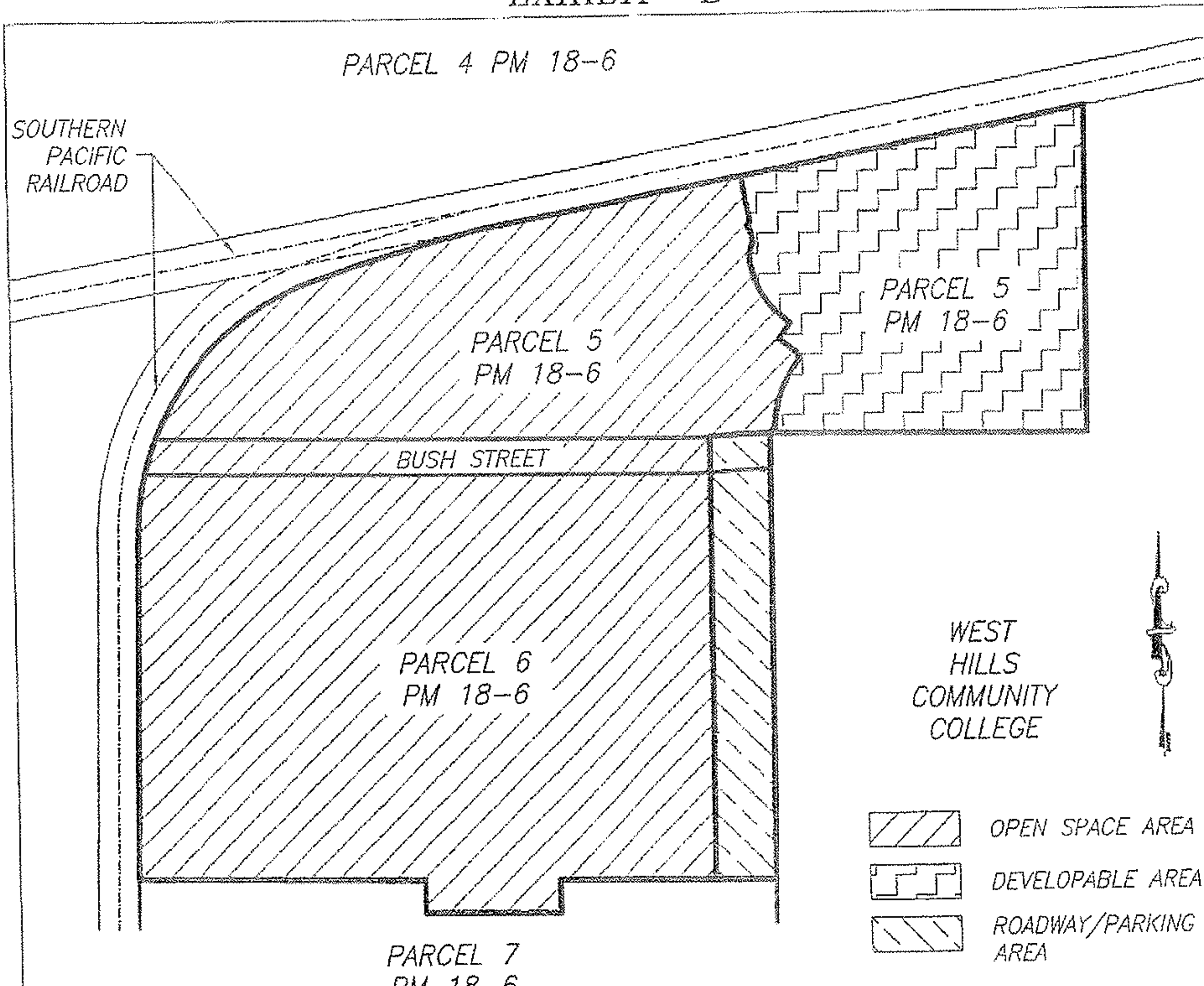
***for 'Areas' comparison purposes and pending '218'-level analysis

APPENDIX J

COLLEGE CONSERVATION AREA FACILITIES

59

EXHIBIT "B"

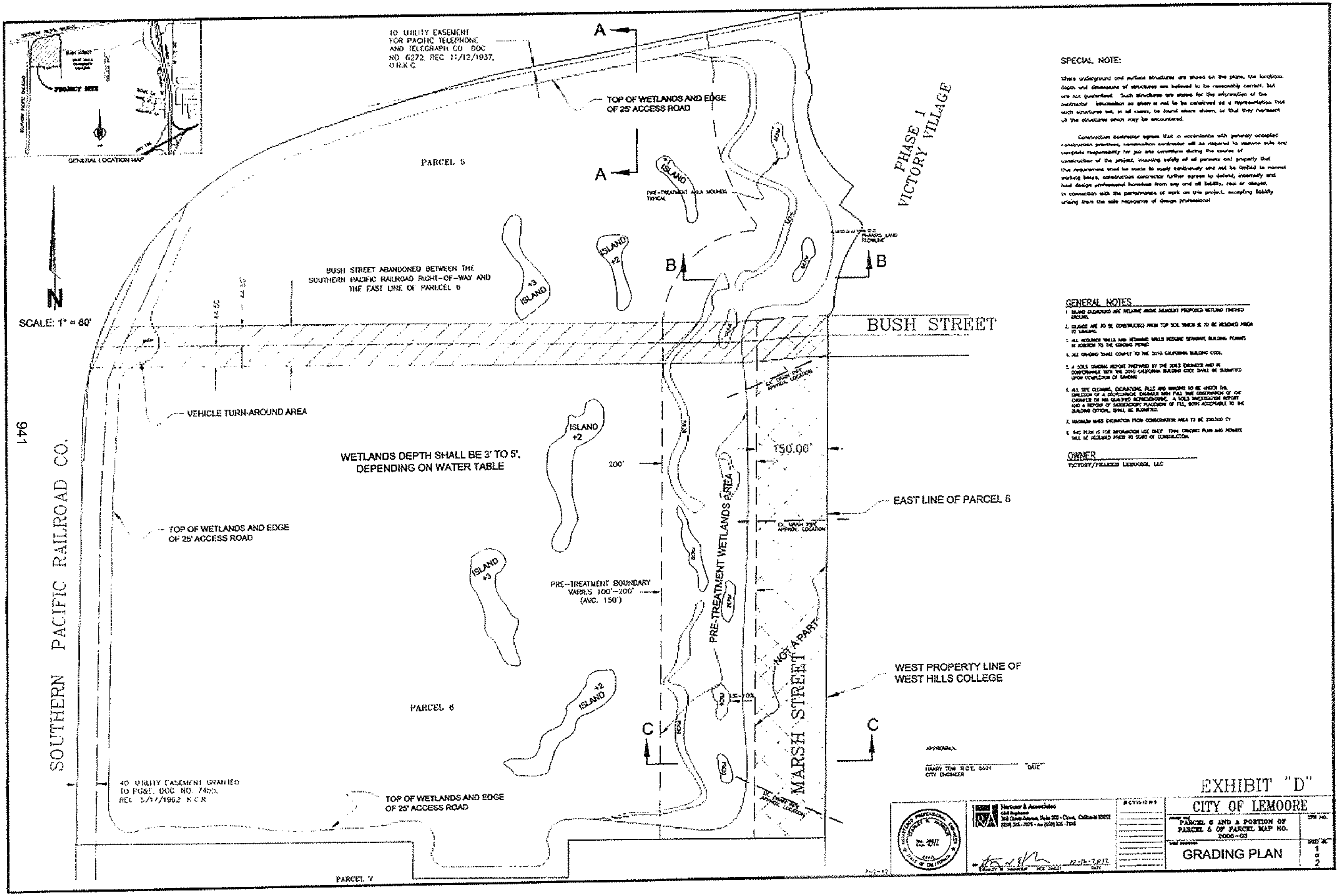


NOTES:

1. PARCELS SHOWN ARE WITHIN SECTION 8, T19S, R20E, M.D.B.M, KINGS CO., CALIFORNIA

2. REFERENCE PM 18-6, DOC. NO. 0618827, REC. 06/28/2006, K.C.R. FOR PARCEL DESCRIPTIONS.

NAVFAC	DEPT. OF THE NAVY	NAVFAC SOUTHWEST
	EASEMENT AREA PARCELS 5, 6, AND BUSH STREET (REFERENCE PARCEL MAP 18-6)	DRAWN BY: J. LUMSDEN
		PLS: R. SCHMIDT
		DATE: 12/05/2011
	LEMCORE CALIFORNIA	SCALE (8.5" X 11"): 1"= 400'
	SHEET 1 OF 11	FILE NAME: EXHIBIT "B"


SPECIAL NOTE:
GENERAL NOTES
OWNER
PHASE 1
VICTORY VILLAGE
10' UTILITY EASEMENT FOR PACIFIC TELEPHONE AND TELEGRAPH CO. DOC NO. 6272, REC. 11/12/1937, O.R.K.C.
TOP OF WETLANDS AND EDGE OF 25' ACCESS ROAD
PARCEL 5
ISLAND
PRE-TREATMENT AREA MOUNDS TYPICAL
GENERAL LOCATION MAP
PROJECT SITE
N
SCALE: 1" = 80'
BUSH STREET ABANDONED BETWEEN THE SOUTHERN PACIFIC RAILROAD RIGHT-OF-WAY AND THE EAST LINE OF PARCEL 6
+3 ISLAND
ISLAND +2
BUSH STREET
VEHICLE TURN-AROUND AREA
WETLANDS DEPTH SHALL BE 3' TO 5', DEPENDING ON WATER TABLE
200'
150.00'
PRE-TREATMENT WETLANDS AREA
EAST LINE OF PARCEL 6
PRE-TREATMENT BOUNDARY VARIES 100'-200' (AVG. 150')
ISLAND +3
SOUTHERN PACIFIC RAILROAD CO.
NOT A PART
MARSH STREET
WEST PROPERTY LINE OF WEST HILLS COLLEGE
PARCEL 6
+2 ISLAND
40' UTILITY EASEMENT GRANTED TO PG&E, DOC. NO. 7455, REC. 5/17/1962 K.C.R.
TOP OF WETLANDS AND EDGE OF 25' ACCESS ROAD
PARCEL 7
APPROVAL
CITY ENGINEER
DATE
EXHIBIT "D"
CITY OF LEMOORE
PARCEL 5 AND A PORTION OF PARCEL 6 OF PARCEL MAP NO. 2006-03
GRADING PLAN

APPENDIX K

GROWTH FACILITIES COST CALCULATIONS (DEVELOPER FUNDED) AREA TWO

Appendix K

Growth Facilities Calculations (Developer Funded) – Area Two

A. Detention Basins

∴ Total basin area volume required = 140-acre feet		
∴ Total detention area required, (a) 6’ usable depth + 10% for access roadway, slopes = 26 acres		
∴ Land costs, @$100,000/acre: 26 x $100,000		$2,600,000
Rough grading costs = $0 (soil sale to developers)		$0
Fine grading/compaction costs = $0 (soil sale to developer)		$0
Access roadways (AB) surfacing costs (171,000sq. ft. @ $1 sq. ft.)		$171,000
Fencing costs (7,000 lineal feet @ $30)		$210,000
Discharge pump stations (6 @ $350,000)		$2,100,000
	Total	$5,081,000

B. Discharge piping to ‘A Ditch’ and Lemoore Canal

9,000 feet of 8” @ $35/foot =		$315,000
6,600 feet of 12” @ $60/foot =		$396,000
300 feet of 24” @ $120/foot=		$36,000
	Total	$747,000

∴ Total direct costs, Area Two detention and transport: 5,081,000 + 747,000 = 5,828,000		$5,828,000
Estimated costs of appraisals, legal, engineering, surveying and inspection @ 20% =		$1,165,600
	Total	$6,993,600

C. Impact Fee Approximation

Total single-family residential disposal volume in Area Two= 135-acre feet	
Total drainage volume, Area Two = 140-acre feet	
∴ % of total costs to be borne by single-family residential units = (135/140)	96%
∴ estimated cost to be borne by such units=	$6,713,856
Estimated total number of single-family residential units (at 4.5 units per gross acre) =	4,806 units
Estimated impact fee per residential unit	$1,397
Estimated impact fee per single family acre = ($1,397)(4.5) =	$6,286

APPENDIX L

EXISTING FACILITIES COST ESTIMATES (CITY FUNDED)

Appendix L
Existing Facilities Cost Estimate (City Funded)

I. The Downtown/High School Basin System

The existing ponding problems, requiring sandbagging during rainfall/runoff events, near the downtown D and Follet intersection, and on D Street 400 feet east of Lemoore Avenue, are a result of topography and incremental drainage facility installations since the City's founding:

- The 'downtown', east-west, 12" and 18" D Street piping toward Lemoore avenue is of inadequate pipe size.

- The major trunkline on Lemoore Avenue serving the drainage area is only 24" in diameter.

- The trunkline terminates below the bottom of the High School Basin, reducing pipe grade and capacity.

The step by step correction of these problems involves (see Figure L-1):

1. Deepen the High School Basin to permit increased 24" pipe flow, reduce current surcharge (dirt sale to developers)	$0
2. Supplementation of the D/Follet to Lemoore Avenue pipeline with a 24" line providing both increased flow capacity and storage; cross-connection of a D/Follet intersection drop inlet to a 12" line connecting to the Vierra Basin drainage system at the alley piping south of the intersection of D Street and Follet	$102,730
3. Supplementation of the existing pipeline in D Street to 400 feet east of Lemoore Avenue with a 24" pipeline	$52,000
4. Installation of an underground pump station at the southeast corner of Lemoore Avenue and Bush Street to pump flows from the Lemoore Avenue storm drainage piping at that location and from the Bush Street laterals east and west of Lemoore Avenue, to a 12" pressure line to the High School Basin	$478,400
5. Installation, if needed, of a 30" supplemental pipeline in Lemoore Avenue from D Street to Bush Street	$192,400
6. Installation of a replacement pump at the High School Basin discharging the increased flows to the Basin to a 14" pressure line discharging to the Lemoore Canal (the existing point of	

connection to the Fox Ditch would be retained but utilized only as an "emergency backup").

(It should be noted that this revised discharge point, the Lemoore Canal, has been recommended in previous studies over several decades. It has the corollary, and equally important, benefit of reducing Fox Ditch/pipeline flows to the degree necessary to mitigate ponding problems on that drainage system as modified in Section III of this Appendix.) $650,000

Total direct costs	$1,475,530
Engineering, surveying and inspection at 20%	$295,106
Total	$1,770,636

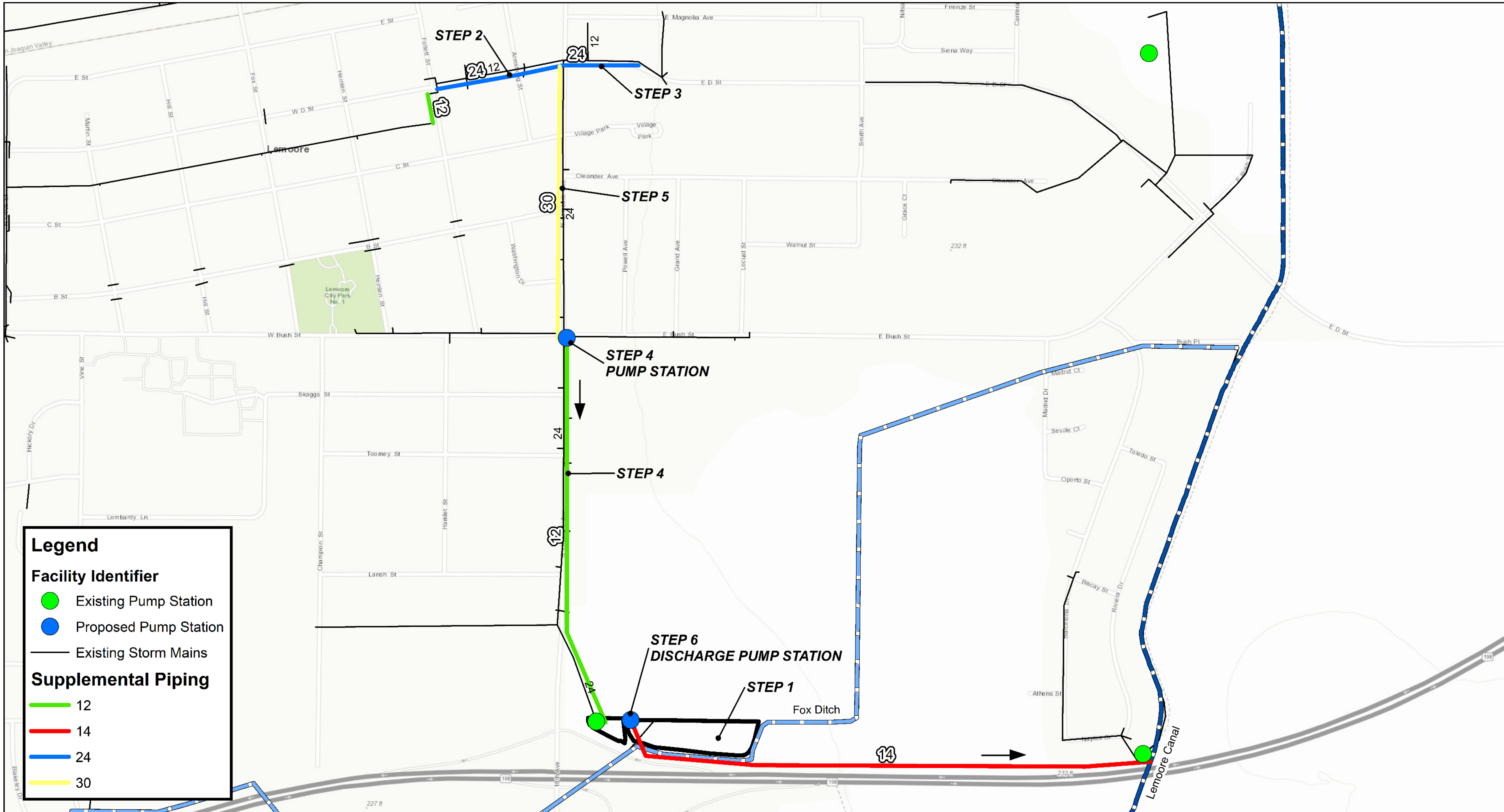


Figure L-1

Downtown/High School Basin System

II. The Hess Basin Storm Drainage System

This drainage area includes the industrial/service area development and zoned area south of State Route 198 and east of State Route 41, excluding the City wastewater facilities, Leprino's wastewater treatment facilities, and major industries such as Olam which currently have onsite storm water retention. Drainage subareas are defined on Figure L-2, as is the current location of Hess Basin, a possible future location of the Basin, and piping/pumpage recommendations.

1. The industrial service area development of 121 acres requires improvements at City cost. The existing storm drainage piping and pump station serving this area have been evaluated and recommended changes to alleviate the ponding which occurs in the area with major rain events are depicted on Figure L-2. The recommendations are based on full development, all with offsite drainage, of these subareas.

   These recommended facilities assume no further drainage to or through the sub-basins from the 24" line under 198 carrying alternative-routed Vierra Basin discharge. Such discharge now exacerbates area ponding and cannot be accommodated with current or recommended piping and pump facilities.

   Industrial Area: The required supplementation/replacement facilities include (see Figure L-2):

1300' of 18" @ $90/ft =		$117,000
800' of 24" @ $130/ft =		$104,000
1,100' of 30" @ $130/ft =		$143,000
	Total direct costs	$364,000
	Engineering, surveying and inspection at 20%	$72,800
	Total costs	$436,800

No changes in the pump station or irrigation ditch south of the pump station are recommended pending implementation of the piping recommendations. Neither are any changes in Hess Basin size prior to its possible relocation. It should be noted that, pending 19th Avenue pipeline and relocated Hess Basin construction, the existing developed area flooding will be little improved. A temporary increase in pump size or ditch size may be required.

*Including no new electrical service; now on Olam's power network

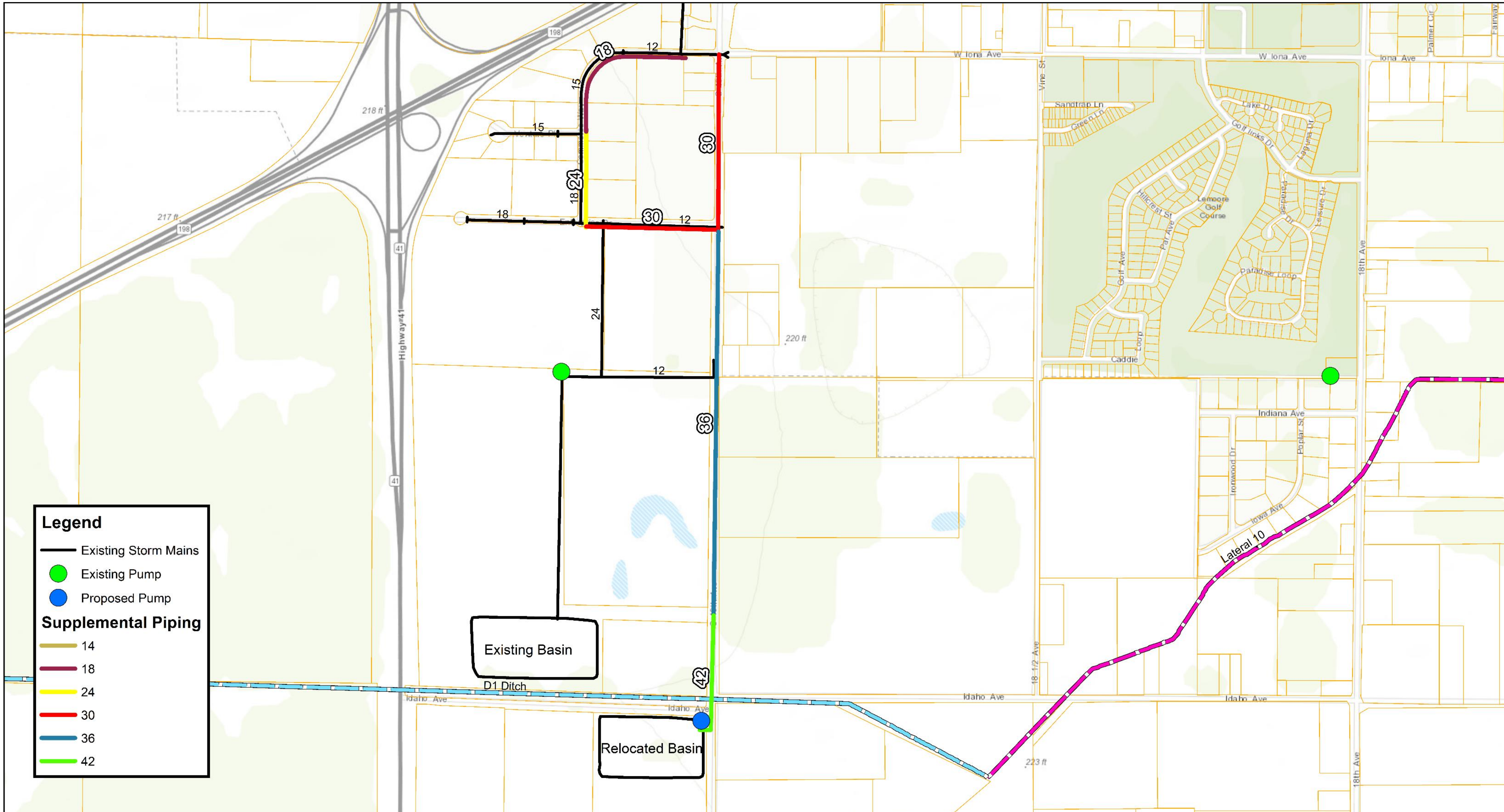


Figure L-2

Hess Basin System

2. 19th Avenue: Assuming that the Hess Basin must be relocated to the southwest corner of the 19th/Idaho Avenues intersection, on City-owned land, to accommodate development of the 85-acre parcel on which it is now located (see Figure L-2) the following facilities will be required:

1,425' of 30" @ $130/ft =		$185,250
3,200' of 36" @ $130/ft =		$416,000
1,040 of 42" @ $150/ft =		$156,000
	Subtotal =	$757,250
	Pump Station* =	$350,000
	Total Direct Costs	$1,107,250
	Engineering, surveying and inspection at 20%	$221,450
	Total	$1,328,700

*It should be noted that this drainage system provides corollary benefits: drainage facilities for development of industry along the eastside of 19th Avenue. The pump station must include pumping facilities both into the Hess Basin and to the D-1 Ditch.

III. The Fox Ditch Pipeline System

The existing Fox Ditch-alignment pipeline from the Vierra (19th Street) Basin to the Disposal Area changes from a 30" diameter line to a 24" diameter line approximately 2,000 feet west of State Route 41.

With essentially the same topographic "fall" as that of the existing 'upstream' 30" line east of State Route 41, it is necessary to supplement the 4,000' length of existing 24" pipeline with an additional, supplemental, pipeline. It is recommended that a supplemental 24" pipe be installed in the existing right-of-way.

The approximate location of this supplemental pipeline is depicted on Figure 3-1.

The cost of the pipeline is estimated to be: 4,000 feet of 24" pipe @$40/foot:	$160,000
Engineering, surveying and inspection at 15%	$32,000
Total costs	$192,000

Note: See High School Basin Storm Drainage System and Hess Basin Storm Drainage System descriptions for "shut-off" of flows from the Vierra Basin to the Hess Basin system and the re-routing of Downtown/High School Basin flows away from the Fox Ditch to the Lemoore Canal.

APPENDIX M

SERVICE FEE CALCULATIONS

Appendix M

Service Fee Calculations

- Total cost of facilities to be financed:

Downtown/High School Bain	$1,770,000
Hess Basin/19th	$1,765,000
Fox Ditch	$192,000
Minor facilities allowance	$1,500,000
Total	$5,227,000

- Cost-sharing, residential vs. commercial/industrial (developed areas)

  Residential: 1,900 acres x .11[i] x .40[ii] = 84
  Commercial/industrial: 190 acres x .15[i] x .80[ii] = 23

  Residential share = 84/(84+23) = .79

- Annual cost, $5,227,000, 20 years, 6% = .08718 x $5,227,000 = $455,700

- Cost to be paid by 'residential connections'[iii] = .79 x 455,700 = $356,000

- Cost to be paid by each ratepayer = $356,000/6,541 = $55.04 annually
  $54.35/12 = $4.59/month

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[i] Design storm intensity
[ii] Runoff coefficient
[iii] Residential connections per City staff

City of LEMOORE CALIFORNIA

711 West Cinnamon Drive ● Lemoore, California 93245 ● (559) 924-6744

Staff Report

To:	**Lemoore City Council**		
From:	**Marisa Avalos, City Clerk**		
Date:	**August 12, 2021**	**Meeting Date:**	**August 17, 2021**
Subject:	**Activity Update**		
Strategic Initiative:	☐ Safe & Vibrant Community ☐ Fiscally Sound Government ☐ Community & Neighborhood Livability	☐ Growing & Dynamic Economy ☐ Operational Excellence ☒ Not Applicable	

Reports

- ➢ Warrant Register – FY 21/22 — August 6, 2021

PEI   PAGE NUMBER: 1
DATE: 08/06/2021   CITY OF LEMOORE   AUDIT11
TIME: 11:24:17   EXPENDITURE TRANSACTION ANALYSIS

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 001 - GENERAL FUND
BUDGET UNIT - 4211 - CITY COUNCIL

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4360	TRAINING								
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		1,650.00	.00	FY21 ANNUAL CONFEREN
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		2,200.00	.00	FY21 ANNUAL CONFEREN
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		-550.00	.00	FY21 ANNUAL CONFEREN
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		-550.00	.00	FY21 ANNUAL CONFEREN
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		-550.00	.00	FY21 ANNUAL CONFEREN
TOTAL	TRAINING					.00	2,200.00	.00	
TOTAL	CITY COUNCIL					.00	2,200.00	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 001 - GENERAL FUND
BUDGET UNIT - 4215 - FINANCE

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220	OPERATING SUPPLIES								
2 /22	08/06/21	21		11408	7251 U.S. BANK NATION		42.35	.00	FY22 CALENDAR
TOTAL	OPERATING SUPPLIES					.00	42.35	.00	
TOTAL	FINANCE					.00	42.35	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 001 - GENERAL FUND
BUDGET UNIT - 4216 - PLANNING

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4310	PROFESSIONAL CONTRACT SVC								
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		730.00	.00	FY21 PO #10877
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		5,081.58	.00	FY21 PO #10417-01
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		35.82	.00	FY21 PO #10417-01 PRO
2 /22	08/06/21	21		11409	7251 U.S. BANK NATION		66.62	.00	FY22 NOTICE OF EXEMPT
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		306.72	.00	FY21 PO #10417-03
TOTAL	PROFESSIONAL CONTRACT SVC					.00	6,220.74	.00	
TOTAL	PLANNING					.00	6,220.74	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 001 - GENERAL FUND
BUDGET UNIT - 4220 - MAINTENANCE DIVISION

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4170	UNIFORM ALLOWANCE								
2 /22	08/06/21	21		11423	6703 SALVADOR VARGAS		189.57	.00	FY22 REIMBURSE BOOT
TOTAL	UNIFORM ALLOWANCE					.00	189.57	.00	
4220	OPERATING SUPPLIES								
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		2.09	.00	FY22 NUTS & BOLTS
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		9.42	.00	FY22 JOINT NUT KIT
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		21.27	.00	FY22 QUICK LINK
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		26.24	.00	FY22 NUTS & BOLTS
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		32.25	.00	FY22 TOIL BOLT SET
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		36.42	.00	FY22 EZ TORCH LIGHER
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		36.44	.00	FY22 BLK LOBBY DUST P
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		44.32	.00	FY22 ELEC TAPE
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		46.58	.00	FY22 GLASS CLEANER
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		47.65	.00	FY22 GLASS CLEANER
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		67.33	.00	FY22 12/2 W/G NMB CAB
2 /22	08/06/21	21		11412	7251 U.S. BANK NATION		170.30	.00	FY22 STAPES 8.5 X 11"
2 /22	08/06/21	21		11412	7251 U.S. BANK NATION		235.90	.00	FY22 BAUER BATTER
TOTAL	OPERATING SUPPLIES					.00	776.21	.00	
4340	UTILITIES								
2 /22	08/06/21	21		11402	0423 SOCALGAS		25.45	.00	FY21 06/21/21-7/21/21
2 /22	08/06/21	21		11402	0423 SOCALGAS		84.85	.00	FY21 6/21/21-7/21/21
TOTAL	UTILITIES					.00	110.30	.00	
4995	RISK MANAGEMENT EXPENSE								
2 /22	08/06/21	21		11380	0242 JORGENSEN COMPAN		938.31	.00	FY21 ANNUAL FX SERVIC
TOTAL	RISK MANAGEMENT EXPENSE					.00	938.31	.00	
TOTAL	MAINTENANCE DIVISION					.00	2,014.39	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 001 - GENERAL FUND
BUDGET UNIT - 4221 - POLICE

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220	OPERATING SUPPLIES								
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		15.00	.00	FY22 SUPPLIES
2 /22	08/06/21	21	C766 -04	11410	7251 U.S. BANK NATION		199.98	-199.98	FY22 MEN'S DEFENDER S
2 /22	08/06/21	21	C766 -05	11410	7251 U.S. BANK NATION		259.98	-259.98	FY22 MEN'S DEFENDER P
2 /22	08/06/21	21	C766 -06	11410	7251 U.S. BANK NATION		33.35	-33.35	FY22 TAX
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		33.00	.00	FY21 SAVEMART
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		37.49	.00	FY21 2 PHONE CASES/SC
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		40.82	.00	FY22 SUPPLIES
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		45.02	.00	FY22 OFFICE SUPPLIES
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		69.67	.00	FY22 EVIDENT INC
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		80.62	.00	FY22 OFFICES SUPPLIES
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		85.80	.00	FY21 AT&T
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		90.32	.00	FY22 OFFICE SUPPLIES
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		104.46	.00	FY22 ARROWHEAD FORENS
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		171.26	.00	FY22 OFFICE SUPPLIES
TOTAL	OPERATING SUPPLIES					.00	1,266.77	-493.31	
4310	PROFESSIONAL CONTRACT SVC								
2 /22	08/06/21	21	10894 -01	11377	5814 CITY OF HANFORD		16,343.93	-16,343.93	FY22 DISPATCH SERVICE
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		75.00	.00	FY22 DETECTIVES
TOTAL	PROFESSIONAL CONTRACT SVC					.00	16,418.93	-16,343.93	
4340	UTILITIES								
2 /22	08/06/21	21		11425	0116 VERIZON WIRELESS		2,194.05	.00	FY 21 6/17/21-7/16/21
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		35.44	.00	FY22 WATER RENTAL
TOTAL	UTILITIES					.00	2,229.49	.00	
4360	TRAINING								
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		701.95	.00	FY21 HOTEL FOR ICI NA
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		804.35	.00	FY21 HOTEL FOR ICI
2 /22	08/06/21	21	10965 -01	11393	7254 PACIFIC INSTITUT		2,308.00	-2,308.00	FY22 DEFENSIVE TACTIC
2 /22	08/06/21	21	C765 -01	11406	7251 U.S. BANK NATION		850.00	-850.00	FY22 BASIC SWAT TRAIN
2 /22	08/06/21	21		11372	0719 FRESNO CITY COLL		150.00	.00	FY22 REGISTRAION
TOTAL	TRAINING					.00	4,814.30	-3,158.00	
TOTAL	POLICE					.00	24,729.49	-19,995.24	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 001 - GENERAL FUND
BUDGET UNIT - 4222 - FIRE

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220	OPERATING SUPPLIES								
2 /22	08/06/21	21		11384	0314 LEMOORE AUTO SUP		20.80	.00	FY22 COTTON DUSTER
2 /22	08/06/21	21		11413	7251 U.S. BANK NATION		42.85	.00	FY22 AMERICAN FLAG
2 /22	08/06/21	21		11413	7251 U.S. BANK NATION		46.79	.00	FY21 FAITH OFFICE PRI
2 /22	08/06/21	21		11413	7251 U.S. BANK NATION		48.20	.00	FY22 PLASTIC STORAGE
2 /22	08/06/21	21		11413	7251 U.S. BANK NATION		54.15	.00	FY21 NATE OFFICE PRIN
2 /22	08/06/21	21		11413	7251 U.S. BANK NATION		318.00	.00	FY22 PAGER BATTERIES
TOTAL	OPERATING SUPPLIES					.00	530.79	.00	
4230	REPAIR/MAINT SUPPLIES								
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		7.48	.00	FY22 FOR TRUCK #12
2 /22	08/06/21	21		11384	0314 LEMOORE AUTO SUP		26.80	.00	FY22 BRAKE FLUID
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		85.51	.00	FY22 TOOLS FOR 12 ROO
TOTAL	REPAIR/MAINT SUPPLIES					.00	119.79	.00	
4310	PROFESSIONAL CONTRACT SVC								
2 /22	08/06/21	21	10901 -01	11377	5814 CITY OF HANFORD		12,257.95	-12,257.95	FY22 LEMOORE FIRE MO
TOTAL	PROFESSIONAL CONTRACT SVC					.00	12,257.95	-12,257.95	
4360	TRAINING								
2 /22	08/06/21	21		11363	T2610 BRUCE GERMAN		105.00	.00	FY22 DOT PHYSICAL-BRU
TOTAL	TRAINING					.00	105.00	.00	
TOTAL	FIRE					.00	13,013.53	-12,257.95	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 001 - GENERAL FUND
BUDGET UNIT - 4224 - BUILDING INSPECTION

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4360	TRAINING								
2 /22	08/06/21	21		11409	7251 U.S. BANK NATION		500.00	.00	FY21 PO #C763
TOTAL	TRAINING					.00	500.00	.00	
TOTAL	BUILDING INSPECTION					.00	500.00	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 001 - GENERAL FUND
BUDGET UNIT - 4230 - PUBLIC WORKS

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4310	PROFESSIONAL CONTRACT SVC								
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		421.20	.00	FY21 PO #10343
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		519.75	.00	FY21 PO #10343
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		565.92	.00	FY21 PO #10343
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		604.71	.00	FY21 PRO 200087 MAY-J
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		855.54	.00	FY21 PRJ 210238
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		1,031.76	.00	FY21 210066 JUNE
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		1,195.92	.00	FY21 PRO 190252 MAY-J
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		1,571.49	.00	FY21 PRO 210191 MAY-J
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		1,975.32	.00	FY21 PRJ 210238
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		2,046.87	.00	FY21 PO #10343
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		2,388.51	.00	FY21 PRO 210239 MAY-J
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		5,538.60	.00	FY21 PRO 200087 JUNE
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		35.82	.00	FY21 PO #10343
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		65.52	.00	FY21 PROJ 200234
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		71.64	.00	FY21 PROJ 210016
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		85.32	.00	FY21 PRO 210191 JUNE
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		124.92	.00	FY21 PROJ 200088
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		147.24	.00	FY21 PRO 190252 MAY-J
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		170.10	.00	FY21 PO #10343
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		196.56	.00	FY21 PROJ 200234
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		216.36	.00	FY21 210066 MAY-JUNE
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		261.54	.00	FY21 PROJ 200088
TOTAL	PROFESSIONAL CONTRACT SVC					.00	20,090.61	.00	
TOTAL	PUBLIC WORKS					.00	20,090.61	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 001 - GENERAL FUND
BUDGET UNIT - 4231 - STREETS

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220	OPERATING SUPPLIES								
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		14.11	.00	FY22 TOOL BIN
2 /22	08/06/21	21	10962 -01	11379	2472 JENSEN & PILEGAR		598.53	-700.00	FY22 DEBRIS BAGS AND
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		7.28	.00	FY22 MARKING PAINT
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		21.85	.00	FY22 WHT MARKING PAIN
TOTAL	OPERATING SUPPLIES					.00	641.77	-700.00	
4350	REPAIR/MAINT SERVICES								
2 /22	08/06/21	21	10973 -01	11360	2828 A-C ELECTRIC COM		812.00	-812.00	FY21 REPAIR SIGNAL LI
TOTAL	REPAIR/MAINT SERVICES					.00	812.00	-812.00	
TOTAL	STREETS					.00	1,453.77	-1,512.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 001 - GENERAL FUND
BUDGET UNIT - 4241 - PARKS

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220	OPERATING SUPPLIES								
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		17.12	.00	FY22 SUN YEL ENAMEL
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		31.09	.00	FY22 AUTO VAC BREAKER
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		39.65	.00	FY22 BOWL BRUSH
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		80.41	.00	FY22 ROUGH REFUSE CAN
2 /22	08/06/21	21		11412	7251 U.S. BANK NATION		150.09	.00	FY22 50-FT WATER HOSE
TOTAL	OPERATING SUPPLIES					.00	318.36	.00	
TOTAL	PARKS					.00	318.36	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 001 - GENERAL FUND
BUDGET UNIT - 4242 - RECREATION

ACCOUNT DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220 OPERATING SUPPLIES								
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		11.99	.00	FY22 SAVECO
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		17.26	.00	FY22 DOLLAR TREE
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		17.98	.00	FY22 SAVEMART
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		18.36	.00	FY22 SAVECO
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		8.06	.00	FY21 SAVEMART
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		8.06	.00	FY22 SAVEMART
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		9.99	.00	FY22 SAVECO
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		24.81	.00	FY21 SAVEMART
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		25.51	.00	FY21 SAVECO
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		26.46	.00	FY22 SAVECO
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		28.00	.00	FY22 DOLLAR TREE
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		32.93	.00	FY21 DOLLAR TREE
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		42.80	.00	FY21 SAVECO
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		52.27	.00	FY22 SAVECO
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		53.57	.00	FY22 OTC BRANDS
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		60.32	.00	FY22 SAVECO
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		62.28	.00	FY22 WATER FOR 4TH
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		68.55	.00	FY21 LITTLE CEASERS
2 /22 08/06/21	21		11411	7251 U.S. BANK NATION		71.05	.00	FY22 SAVECO
TOTAL OPERATING SUPPLIES					.00	640.25	.00	
4310 PROFESSIONAL CONTRACT SVC								
2 /22 08/06/21	21		11376	7090 CLARISA GOMEZ		476.00	.00	FY22 CHEERLEADING JUL
2 /22 08/06/21	21		11424	6371 MANUEL VELARDE		735.00	.00	FY22 KARATE JULY 2021
2 /22 08/06/21	21		11375	5962 JASON GLASPIE		1,232.20	.00	FY22 BOXING JULY 2021
2 /22 08/06/21	21		11403	5235 STATE DISBURSEME		150.00	.00	FY22 JASON GLASPIE
2 /22 08/06/21	21		11388	T3184 EVELYN LOPEZ		200.00	.00	FY22 VOLUNTEEN 2021
2 /22 08/06/21	21		11399	T3177 CLARK ROCA		200.00	.00	FY22 VOLUNTEEN 2021
2 /22 08/06/21	21		11401	T3183 GENESIS SANTOS		200.00	.00	FY22 VOLUNTEEN 2021
TOTAL PROFESSIONAL CONTRACT SVC					.00	3,193.20	.00	
TOTAL RECREATION					.00	3,833.45	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 001 - GENERAL FUND
BUDGET UNIT - 4296 - INFORMATION TECHNOLOGY

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220	OPERATING SUPPLIES								
2 /22	08/06/21	21		11365	7263 CISCO SYSTEMS, I		20.00	.00	FY21 SUBSCRIPTION
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		49.00	.00	FY22 ELEMENTOR PRO
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		85.79	.00	FY21 IPAD
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		88.44	.00	FY22 BATTERY FOR DELL
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		100.82	.00	FY21 APPLE PENCIL
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		120.89	.00	FY21 LOGITECH 270
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		144.94	.00	FY21 15.6-INCH WIDESC
TOTAL	OPERATING SUPPLIES					.00	609.88	.00	
4340	UTILITIES								
2 /22	08/06/21	21		11394	7070 PANTERRA NETWORK		1,559.19	.00	FY22 07/01/21-0831/21
2 /22	08/06/21	21		11421	5818 UNWIRED BROADBAN		98.55	.00	FY22 7/29/21-8/28/21
2 /22	08/06/21	21		11421	5818 UNWIRED BROADBAN		210.00	.00	FY22 8/1/21-8/31/21
2 /22	08/06/21	21		11371	7262 FRANKLIN COLLECT		278.24	.00	FY21 AT&T
TOTAL	UTILITIES					.00	2,145.98	.00	
TOTAL	INFORMATION TECHNOLOGY					.00	2,755.86	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 001 - GENERAL FUND
BUDGET UNIT - 4297 - HUMAN RESOURCES

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220	OPERATING SUPPLIES								
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		20.44	.00	FY21 CPL. INT. BREAKF
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		42.11	.00	FY22 LA FIESTA RESTAU
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		60.89	.00	FY21 CPL PANEL
TOTAL	OPERATING SUPPLIES					.00	123.44	.00	
4310	PROFESSIONAL CONTRACT SVC								
2 /22	08/06/21	21	10964 -01	11404	0809 TAG-AMS, INC.		175.00	-175.00	FY22 EMPLOYEE RANDOM
TOTAL	PROFESSIONAL CONTRACT SVC					.00	175.00	-175.00	
TOTAL	HUMAN RESOURCES					.00	298.44	-175.00	
TOTAL	GENERAL FUND					.00	77,470.99	-33,940.19	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 020 - TRAFFIC SAFETY
BUDGET UNIT - 4722 - TRAFFIC SAFETY

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220	OPERATING SUPPLIES								
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		16.09	.00	FY22 SIGNS @CEDAR & 1
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		58.26	.00	FY21 SIGNS @CEDAR & 1
TOTAL	OPERATING SUPPLIES					.00	74.35	.00	
TOTAL	TRAFFIC SAFETY					.00	74.35	.00	
TOTAL	TRAFFIC SAFETY					.00	74.35	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 033 - LOCAL TRANSPORTATION FUND
BUDGET UNIT - 5015 - VINE STREET PEDESTRIAN PA

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4310	PROFESSIONAL CONTRACT SVC								
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		1,744.50	.00	FY21 PO #10369
TOTAL	PROFESSIONAL CONTRACT SVC					.00	1,744.50	.00	
TOTAL	VINE STREET PEDESTRIAN PA					.00	1,744.50	.00	
TOTAL	LOCAL TRANSPORTATION FUND					.00	1,744.50	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 034 - GAS TAX SECTION 2103
BUDGET UNIT - 5005 - 2020 SLURRY SB1 PROJECT

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4310	PROFESSIONAL CONTRACT SVC								
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		2,291.00	.00	FY21 PO #10829 PRO 21
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		17,920.00	.00	FY21 PO #10829 PRO 21
TOTAL	PROFESSIONAL CONTRACT SVC					.00	20,211.00	.00	
TOTAL	2020 SLURRY SB1 PROJECT					.00	20,211.00	.00	
TOTAL	GAS TAX SECTION 2103					.00	20,211.00	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 040 - FLEET MAINTENANCE
BUDGET UNIT - 4265 - FLEET MAINTENANCE

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220	OPERATING SUPPLIES								
2 /22	08/06/21	21		11382	2990 KIMBALL-MIDWEST		7.51	.00	FY22 O-RING
2 /22	08/06/21	21		11392	6120 O'REILLY AUTO PA		31.95	.00	FY22 SEALED BEAM
2 /22	08/06/21	21		11416	7251 U.S. BANK NATION		55.80	.00	FY22 FUEL FOR FORKLIF
2 /22	08/06/21	21		11416	7251 U.S. BANK NATION		259.12	.00	FY22 METAL POLISH GAL
2 /22	08/06/21	21		11400	0535 RUCKSTELL CALIF		397.89	.00	FY22 HIGH PRESSURE FI
TOTAL	OPERATING SUPPLIES					.00	752.27	.00	
4220F	OPERATING SUPPLIES FUEL								
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		44.99	.00	FY21 ICI NARC SCHOOL
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		49.55	.00	FY21 K. ESCOBAR ICI S
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		64.32	.00	FY21 K. ESCOBAR ICI S
2 /22	08/06/21	21		11410	7251 U.S. BANK NATION		70.08	.00	FY22 JAQUES& GRESHAM,
TOTAL	OPERATING SUPPLIES FUEL					.00	228.94	.00	
4230	REPAIR/MAINT SUPPLIES								
2 /22	08/06/21	21	10961	-01 11378	6715 INTERSTATE BILLI		789.71	-789.71	FY22 D21-6014 THROTTL
2 /22	08/06/21	21	10961	-02 11378	6715 INTERSTATE BILLI		57.25	-57.25	FY22 TAX
2 /22	08/06/21	21		11392	6120 O'REILLY AUTO PA		8.94	.00	FY22 CABIN FILTER
2 /22	08/06/21	21		11392	6120 O'REILLY AUTO PA		8.94	.00	FY22 CABIN FILTER
2 /22	08/06/21	21		11361	6145 AUTOZONE		38.60	.00	FY22 DISC BRAKE PADS
2 /22	08/06/21	21		11392	6120 O'REILLY AUTO PA		41.63	.00	FY22 PRESS SWITCH
2 /22	08/06/21	21		11384	0314 LEMOORE AUTO SUP		46.28	.00	FY22 AIR FILTER
2 /22	08/06/21	21		11361	6145 AUTOZONE		84.18	.00	FY22 DL DISC BRAKE PA
2 /22	08/06/21	21		11361	6145 AUTOZONE		146.05	.00	FY22 DL PURSUIT ROTOR
2 /22	08/06/21	21		11361	6145 AUTOZONE		193.24	.00	FY22 DL PURSUIT ROTOR
2 /22	08/06/21	21		11374	0068 GARY V. BURROWS,		319.82	.00	FY22 ULTRA DUTY GREAS
TOTAL	REPAIR/MAINT SUPPLIES					.00	1,734.64	-846.96	
4350	REPAIR/MAINT SERVICES								
2 /22	08/06/21	21	10910	-01 11362	0056 BILLINGSLEY TIRE		25.00	-25.00	FY22 TIRE REPAIR
2 /22	08/06/21	21	10910	-01 11362	0056 BILLINGSLEY TIRE		99.00	-99.00	FY22 TIRE REPAIR
2 /22	08/06/21	21	10910	-01 11362	0056 BILLINGSLEY TIRE		637.50	-637.50	FY22 TIRE REPAIR
2 /22	08/06/21	21	10910	-01 11362	0056 BILLINGSLEY TIRE		647.59	-647.59	FY22 TIRE REPAIR
2 /22	08/06/21	21	10910	-01 11362	0056 BILLINGSLEY TIRE		723.22	-723.22	FY22 TIRE REPAIR
2 /22	08/06/21	21	10910	-01 11362	0056 BILLINGSLEY TIRE		853.16	-853.16	FY22 TIRE REPAIR
2 /22	08/06/21	21	10910	-01 11362	0056 BILLINGSLEY TIRE		1,295.18	-1,295.18	FY22 TIRE REPAIR
2 /22	08/06/21	21	10910	-01 11362	0056 BILLINGSLEY TIRE		1,822.07	-1,822.07	FY22 TIRE REPAIR
2 /22	08/06/21	21		11381	2671 KELLER MOTORS		135.00	.00	FY22 PRODUCT SAFETY R
2 /22	08/06/21	21		11427	6741 VISION GLASS WER		257.32	.00	FY22 DW1540
2 /22	08/06/21	21		11427	6741 VISION GLASS WER		337.75	.00	FY22 CUT & INSTALL42X
TOTAL	REPAIR/MAINT SERVICES					.00	6,832.79	-6,102.72	
TOTAL	FLEET MAINTENANCE					.00	9,548.64	-6,949.68	
TOTAL	FLEET MAINTENANCE					.00	9,548.64	-6,949.68	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 045 - GOLF COURSE - CITY
BUDGET UNIT - 4245 - GOLF COURSE-CITY

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4000P	COST OF REVENUE-PRO SHOP								

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 045 - GOLF COURSE - CITY
BUDGET UNIT - 4245 - GOLF COURSE-CITY

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4000P	COST OF REVENUE-PRO SHOP								
2 /22	08/06/21	21		11364	6476 CALLAWAY		788.52	.00	FY21 PO #10395 GOLF
2 /22	08/06/21	21		11364	6476 CALLAWAY		1,116.00	.00	FY21 PO #10395 GOLF
2 /22	08/06/21	21		11364	6476 CALLAWAY		-823.64	.00	FY21 ON ACCT. CK#6811
2 /22	08/06/21	21		11364	6476 CALLAWAY		-691.43	.00	FY21 ON ACCT CK#67294
2 /22	08/06/21	21		11364	6476 CALLAWAY		-98.78	.00	FY21 ON ACCT CK#67294
2 /22	08/06/21	21		11364	6476 CALLAWAY		-50.21	.00	FY21 ON ACCT CK
2 /22	08/06/21	21		11364	6476 CALLAWAY		143.00	.00	FY21 MONTHLY FINANCE
2 /22	08/06/21	21		11364	6476 CALLAWAY		225.48	.00	FY21 BL CG CHROME SOF
2 /22	08/06/21	21		11364	6476 CALLAWAY		270.00	.00	FY21 CM PRV USED CHK#
2 /22	08/06/21	21		11364	6476 CALLAWAY		337.56	.00	FY21 BL CG ERC OFT 21
2 /22	08/06/21	21		11364	6476 CALLAWAY		384.75	.00	FY21 CM PRV USED CHK#
TOTAL	COST OF REVENUE-PRO SHOP					.00	1,601.25	.00	
4340	UTILITIES								
2 /22	08/06/21	21		11395	0363 PG&E		8,530.42	.00	FY21 6/7/21-7/1/21
2 /22	08/06/21	21		11385	0297 LEMOORE CANAL &		276.00	.00	FY22 952/953 CITY/LAG
TOTAL	UTILITIES					.00	8,806.42	.00	
TOTAL	GOLF COURSE-CITY					.00	10,407.67	.00	
TOTAL	GOLF COURSE - CITY					.00	10,407.67	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 050 - WATER
BUDGET UNIT - 4250 - WATER

ACCOUNT DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220 OPERATING SUPPLIES								
2 /22 08/06/21	21	10971 -02	11389	7175 MATHESON TRI-GAS		1,045.00	-1,045.00	FY22 STA11 - LIQUID O
2 /22 08/06/21	21		11387	0304 LEMOORE HARDWARE		404.16	.00	FY22 LHRP DIGGING SHO
2 /22 08/06/21	21		11387	0304 LEMOORE HARDWARE		4.21	.00	FY22 WELL #11 BOOSTER
2 /22 08/06/21	21		11387	0304 LEMOORE HARDWARE		10.71	.00	FY22 AA PR BATTERY
2 /22 08/06/21	21		11387	0304 LEMOORE HARDWARE		27.75	.00	FY22 WELL #7
2 /22 08/06/21	21		11387	0304 LEMOORE HARDWARE		44.49	.00	FY22 STD HOSE BIBB
2 /22 08/06/21	21		11373	6751 FURTADO WELDING		62.81	.00	FY22 SAFETY VEST
2 /22 08/06/21	21		11373	6751 FURTADO WELDING		82.97	.00	FY22 SAFETY GLASSES
2 /22 08/06/21	21		11387	0304 LEMOORE HARDWARE		196.24	.00	FY22 WELL 7
TOTAL OPERATING SUPPLIES					.00	1,878.34	-1,045.00	
4220CH CHLORINE OPERATING SUPPLY								
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		579.14	-579.14	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		661.88	-661.88	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		661.88	-661.88	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		678.43	-678.43	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		728.76	-728.76	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		749.82	-749.82	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		834.03	-834.03	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		910.08	-910.08	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		1,058.57	-1,058.57	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		1,166.02	-1,166.02	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		1,182.07	-1,182.07	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		1,207.94	-1,207.94	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		1,214.61	-1,214.61	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		1,295.58	-1,295.58	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		1,295.58	-1,295.58	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		1,370.09	-1,370.09	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		1,411.42	-1,411.42	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		1,630.81	-1,630.81	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		1,654.70	-1,654.70	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		1,737.43	-1,737.43	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		2,018.73	-2,018.73	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		2,308.31	-2,308.31	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		2,438.23	-2,438.23	FY22 HYPOCHLORITE- CH
2 /22 08/06/21	21	10972 -01	11420	6058 UNIVAR		2,854.35	-2,854.35	FY22 HYPOCHLORITE- CH
TOTAL CHLORINE OPERATING SUPPLY					.00	31,648.46	-31,648.46	
4230 REPAIR/MAINT SUPPLIES								
2 /22 08/06/21	21	10953 -01	11426	5277 VISA PETROLEUM		905.46	-905.46	FY22 GUARDIAN DEEP WE
2 /22 08/06/21	21		11415	7251 U.S. BANK NATION		22.49	.00	FY21 5/8X6 WEDGE
2 /22 08/06/21	21		11383	0286 LAWRENCE TRACTOR		46.94	.00	FY22 SPARK PLUGS
TOTAL REPAIR/MAINT SUPPLIES					.00	974.89	-905.46	
4310 PROFESSIONAL CONTRACT SVC								
2 /22 08/06/21	21		11397	0876 QUAD KNOPF, INC.		523.17	.00	FY21 PO #10797

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 050 - WATER
BUDGET UNIT - 4250 - WATER

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4310	PROFESSIONAL CONTRACT SVC (cont'd)								
2 /22	08/06/21	21	10905 -01	11377	5814 CITY OF HANFORD		4,085.98	-4,085.98	FY22 WATER
2 /22	08/06/21	21		11415	7251 U.S. BANK NATION		6.00	.00	FY21 06/1/21-6/30/21
2 /22	08/06/21	21		11390	4051 MATSON ALARM CO.		42.50	.00	FY22 08/01/21-8/31/21
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		63.17	.00	FY21 PO #10797
TOTAL	PROFESSIONAL CONTRACT SVC					.00	4,720.82	-4,085.98	
4340	UTILITIES								
2 /22	08/06/21	21		11395	0363 PG&E		17,182.52	.00	FY21 6/17/21-7/18/21
TOTAL	UTILITIES					.00	17,182.52	.00	
4350	REPAIR/MAINT SERVICES								
2 /22	08/06/21	21		11398	0388 REED ELECTRIC, L		130.00	.00	FY21 G ST BOOSTER #5
2 /22	08/06/21	21		11398	0388 REED ELECTRIC, L		130.00	.00	FY21 WELL #13 AND #14
2 /22	08/06/21	21		11370	7176 FLOW TECH		225.00	.00	FY21 BACKFLOW TEST
2 /22	08/06/21	21		11398	0388 REED ELECTRIC, L		260.00	.00	FY21 WELL #7 BOOSTER
TOTAL	REPAIR/MAINT SERVICES					.00	745.00	.00	
4380	RENTALS & LEASES								
2 /22	08/06/21	21		11418	1664 UNITED RENTALS		297.80	.00	FY22 SKID STEER PICKU
TOTAL	RENTALS & LEASES					.00	297.80	.00	
TOTAL	WATER					.00	57,447.83	-37,684.90	
TOTAL	WATER					.00	57,447.83	-37,684.90	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 052 - WATER INCIDENT FUND
BUDGET UNIT - 4752 - WATER INCIDENT

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220	OPERATING SUPPLIES								
2 /22	08/06/21	21	C779 -01	11412	7251 U.S. BANK NATION		560.00	-560.00	FY22 JUMP STARTER AND
2 /22	08/06/21	21	C779 -02	11412	7251 U.S. BANK NATION		40.60	-40.60	FY22 TAX
2 /22	08/06/21	21	C780 -01	11412	7251 U.S. BANK NATION		472.99	-472.99	FY22 INDUCTIVE SIGNAL
2 /22	08/06/21	21	C780 -02	11412	7251 U.S. BANK NATION		34.29	-34.29	FY22 TAX
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		24.69	.00	FY21 OSHA PRA
2 /22	08/06/21	21		11414	7251 U.S. BANK NATION		31.62	.00	FY21 COPIES OF PLANS
2 /22	08/06/21	21		11414	7251 U.S. BANK NATION		35.90	.00	FY21 COFFEE TRAVELORS
2 /22	08/06/21	21		11414	7251 U.S. BANK NATION		54.97	.00	FY21 LUNCH FOR WATER
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		64.82	.00	FY21 PANCHOS
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		75.07	.00	FY22 THE VINEYARD
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		85.78	.00	FY21 LUNCH FOR WELL 7
2 /22	08/06/21	21		11412	7251 U.S. BANK NATION		127.63	.00	FY22 TEST POWER
2 /22	08/06/21	21		11412	7251 U.S. BANK NATION		261.62	.00	FY22 TOOLS ON HOOK TR
2 /22	08/06/21	21		11407	7251 U.S. BANK NATION		377.87	.00	FY22 PODS
TOTAL	OPERATING SUPPLIES					.00	2,247.85	-1,107.88	
4350	REPAIR/MAINT SERVICES								
2 /22	08/06/21	21	10967 -01	11405	2799 TELSTAR INSTRUME		22,045.25	-22,045.25	FY22 LABORHR 7/7/21-7
TOTAL	REPAIR/MAINT SERVICES					.00	22,045.25	-22,045.25	
TOTAL	WATER INCIDENT					.00	24,293.10	-23,153.13	
TOTAL	WATER INCIDENT FUND					.00	24,293.10	-23,153.13	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 056 - REFUSE
BUDGET UNIT - 4256 - REFUSE

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4230	REPAIR/MAINT SUPPLIES								
2 /22	08/06/21	21		11416	7251 U.S. BANK NATION		478.76	.00	FY22 580FL STRMCOAT
TOTAL	REPAIR/MAINT SUPPLIES					.00	478.76	.00	
4310	PROFESSIONAL CONTRACT SVC								
2 /22	08/06/21	21	10903 -01	11368	6869 WELLS FARGO BANK		654.08	-654.08	FY22 TEMP POSITION
2 /22	08/06/21	21	10905 -02	11377	5814 CITY OF HANFORD		4,085.98	-4,085.98	FY22 REFUSE
TOTAL	PROFESSIONAL CONTRACT SVC					.00	4,740.06	-4,740.06	
TOTAL	REFUSE					.00	5,218.82	-4,740.06	
TOTAL	REFUSE					.00	5,218.82	-4,740.06	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 060 - SEWER& STORM WTR DRAINAGE
BUDGET UNIT - 4260 - SEWER

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220	OPERATING SUPPLIES								
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		13.90	.00	FY22 TV KWIKSETLOCK
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		14.39	.00	FY22 WWTP
2 /22	08/06/21	21		11367	7242 CLOVIS MARINE, I		2,877.67	.00	FY21 PO #10812 9.9 HO
2 /22	08/06/21	21		11417	7251 U.S. BANK NATION		-212.36	.00	FY21 HOME DEPOT
2 /22	08/06/21	21		11369	5866 FASTENAL COMPANY		2.18	.00	FY22 DPTFETAPE
2 /22	08/06/21	21		11369	5866 FASTENAL COMPANY		9.17	.00	FY22 BLK ELC TRAPE
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		10.88	.00	FY22 MIN CLAMP
2 /22	08/06/21	21		11417	7251 U.S. BANK NATION		30.46	.00	FY21 OUTBOARD HOISTIN
2 /22	08/06/21	21		11373	6751 FURTADO WELDING		36.96	.00	FY22 GLOVE DRIVER COW
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		62.86	.00	FY21 BLK DRAIN HOSE
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		101.12	.00	FY21 BLK DRAIN HOSE
2 /22	08/06/21	21		11369	5866 FASTENAL COMPANY		121.76	.00	FY22 SHFT NUT DRVRSET
2 /22	08/06/21	21		11417	7251 U.S. BANK NATION		212.36	.00	FY21 HOME DEPOT
2 /22	08/06/21	21		11380	0242 JORGENSEN COMPAN		213.78	.00	FY22 DEM FLOW REG.
2 /22	08/06/21	21		11373	6751 FURTADO WELDING		217.72	.00	FY22 44PC 1/4DR METRI
TOTAL	OPERATING SUPPLIES					.00	3,712.85	.00	
4310	PROFESSIONAL CONTRACT SVC								
2 /22	08/06/21	21		11398	0388 REED ELECTRIC, L		431.24	.00	FY21 COUNTRY CLUB STO
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		1,046.33	.00	FY21 PO #10797
2 /22	08/06/21	21		11422	7071 VANIR CONSTRUCTI		3,825.00	.00	FY21 PO #10788
2 /22	08/06/21	21	10905 -03	11377	5814 CITY OF HANFORD		4,085.98	-4,085.98	FY22 SEWER
2 /22	08/06/21	21	10939 -01	11391	6245 MOORE TWINING AS		60.00	-60.00	FY22 ANALYTICAL TESTI
2 /22	08/06/21	21	10939 -01	11391	6245 MOORE TWINING AS		95.00	-95.00	FY22 ANALYTICAL TESTI
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		126.33	.00	FY21 PO #10797
2 /22	08/06/21	21		11398	0388 REED ELECTRIC, L		260.00	.00	FY21 LEPRINO LIFT STA
TOTAL	PROFESSIONAL CONTRACT SVC					.00	9,929.88	-4,240.98	
4350	REPAIR/MAINT SERVICES								
2 /22	08/06/21	21	10940 -01	11405	2799 TELSTAR INSTRUME		691.25	-691.25	FY22 FLOW METER CLAIB
2 /22	08/06/21	21		11429	2924 WESTERN PLUMBING		95.00	.00	FY22 CLEAN INDOOR & O
TOTAL	REPAIR/MAINT SERVICES					.00	786.25	-691.25	
4360	TRAINING								
2 /22	08/06/21	21		11428	6915 WASTEWATER TECHN		1,650.00	.00	FY21 TRAINING ONLINE
TOTAL	TRAINING					.00	1,650.00	.00	
TOTAL	SEWER					.00	16,078.98	-4,932.23	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 060 - SEWER& STORM WTR DRAINAGE
BUDGET UNIT - 5303 - THOMAS LIFT STATION

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4310	PROFESSIONAL CONTRACT SVC								
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		6,496.00	.00	FY21 PO #10560 PRO 20
TOTAL	PROFESSIONAL CONTRACT SVC					.00	6,496.00	.00	
TOTAL	THOMAS LIFT STATION					.00	6,496.00	.00	

CITY OF LEMOORE
EXPENDITURE TRANSACTION ANALYSIS

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 060 - SEWER& STORM WTR DRAINAGE
BUDGET UNIT - 5313 - 19TH & BUSH PIPELINE UPGR

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4310	PROFESSIONAL CONTRACT SVC								
2 /22	08/06/21	21		11397	0876 QUAD KNOPF, INC.		4,500.00	.00	FY21 PO #10828
TOTAL	PROFESSIONAL CONTRACT SVC					.00	4,500.00	.00	
TOTAL	19TH & BUSH PIPELINE UPGR					.00	4,500.00	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 060 - SEWER& STORM WTR DRAINAGE
BUDGET UNIT - 5508 - ENTERPRISE DR DRAINAGE

ACCOUNT DATE	T/C ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4310	PROFESSIONAL CONTRACT SVC						
2 /22 08/06/21	21	11397	0876 QUAD KNOPF, INC.		171.81	.00	FY21 PO #10576
TOTAL	PROFESSIONAL CONTRACT SVC			.00	171.81	.00	
TOTAL	ENTERPRISE DR DRAINAGE			.00	171.81	.00	
TOTAL	SEWER& STORM WTR DRAINAGE			.00	27,246.79	-4,932.23	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 085 - PBIA
BUDGET UNIT - 4270 - PBIA

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4220	OPERATING SUPPLIES								
2 /22	08/06/21	21		11387	0304 LEMOORE HARDWARE		13.40	.00	FY21 YELLOW CAUTION T
TOTAL	OPERATING SUPPLIES					.00	13.40	.00	
4340	UTILITIES								
2 /22	08/06/21	21		11366	2320 CITY OF LEMOORE		90.86	.00	FY22 07/12/21
TOTAL	UTILITIES					.00	90.86	.00	
TOTAL	PBIA					.00	104.26	.00	
TOTAL	PBIA					.00	104.26	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 155 - HOUSING AUTHORITY FUND
BUDGET UNIT - 4953 - HOUSING AUTHORITY FUNDS

ACCOUNT	DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4310	PROFESSIONAL CONTRACT SVC								
2 /22	08/06/21	21		2642	7251 U.S. BANK NATION		20.50	.00	FY22 HOUSING LOAN REL
TOTAL	PROFESSIONAL CONTRACT SVC					.00	20.50	.00	
TOTAL	HOUSING AUTHORITY FUNDS					.00	20.50	.00	
TOTAL	HOUSING AUTHORITY FUND					.00	20.50	.00	

SELECTION CRITERIA: transact.yr='22' and transact.fund between '001' and '800' and transact.batch='VM080621'
ACCOUNTING PERIOD: 2/22

FUND - 406 - WASTEWATER CIP
BUDGET UNIT - 5309 - UPGR CIMARRON PARK ST

ACCOUNT DATE	T/C	ENCUMBRANC	REFERENCE	VENDOR	BUDGET	EXPENDITURES	ENCUMBRANCES	DESCRIPTION
4310 PROFESSIONAL CONTRACT SVC								
2 /22 08/06/21	21		11397	0876 QUAD KNOPF, INC.		5,338.00	.00	FY21 PO #10561
TOTAL PROFESSIONAL CONTRACT SVC					.00	5,338.00	.00	
TOTAL UPGR CIMARRON PARK ST					.00	5,338.00	.00	
TOTAL WASTEWATER CIP					.00	5,338.00	.00	
TOTAL REPORT					.00	239,126.45	-111,400.19	