San Joaquin Area Flood Control Agency

Levee Construction and Maintenance Assessment (LCMA)

PRELIMINARY ENGINEER'S REPORT

SAN JOAQUIN COUNTY

Greatness grows here.

San Joaquin Area Flood Control Agency

Date: March 16, 2023

Table of Contents

1. Introduction 1
Background 1
Purpose of this Engineer's Report 6
Report Organization 6
2. Authority and Process 8
3. Proposed Services 10
Services Funded by the Proposed Assessment 10
Levee O&M Services 10
Levee Capital Services 10
Delta Front: 10
North Stockton: 11
Central Stockton: 11
4. Financing And Funding Plan 12
Annual Budget for Levee O&M Services 12
Budget for Zone 9 Project Levee O&M 12
Budget for LSJRP Levee O&M 14
Financing Plan for Levee Capital Services 16
Initial LSJRP Cost Estimate 16
Cost Sharing 17
Smith Canal Gate 19
LERRDs 19
Project Implementation Timing 19
Assessment Timing 20
Bond Plan 20
Cash Flow Analysis 20
Total Estimated LCMA Budget 20
5. Assessment Methodology 22

General Discussion 22
Requirements of Proposition 218 22
Special Benefits vs. General Benefits 22
Assessment Boundary 24
Hydraulic Analyses Performed to Support the Assessment Methodology 24
Levee Breach Analysis for Levee O&M Services on Zone 9 Project levees 24
Levee Breach Scenarios for Levee Capital Services on LSJRP and 100-year Accreditation Assurance . 25
Assessment District Boundary Diagram 27
Accounting for Uncertainty in the Breach Analysis Results 28
Assessment Apportionment Methodology 28
Property Characteristics 31
Land Use Categories 31
Parcel Size 33
Average Structure Size per Land Use Type 34
Levee Capital and O&M Benefit Units 34
Levee O&M Benefit Units 34
Minimum OBU within Zone 9 34
Relative Land Damage Rate per Acre 36
Structure Damage Rate 36
Levee Capital Benefit Units 36
Minimum flood depth 36
Relative Land Damage Rate per Acre 41
Structure Damage Rate 41
SCAAD Factor 41
Equivalent Levee Benefit Unit (LBU) 41
General Benefits 43
Thoroughfare Damages Calculation 43
Federal Properties 43
Evaluation of Funding Sources for General Benefit 46
Proposed Special Benefit Assessment Calculation 46

Example Parcel Assessment 46
Summary of Assessments 48
Special Considerations 48
Public Parcels 48
Multiple Use Parcels 48
Minimum Assessment Amount 48
Application of the Assessment Boundary to Parcels 50
Updating the Annual Assessment Roll 50
6. Assessment Administration 51
Schedule for Collection 51
Assessment Revenue Distribution 51
Appeals of Assessments Levied to Property 51
Impact of Appeals 52
Duration of the Assessment 52
Annual Escalation of the Assessments 52
7. Conclusions 54
Example Assessment Calculations 56

List of Tables

Table 1 Levee O&M Services Budget for Zone 9 - FY 2023/24 13
Table 2 Levee Capital Services Incremental O&M Budget for LSJRP Features 15
Table 3 Lower San Joaquin River Project Base Budget 18
Table 4 Assessment District Budget - FY 2023/24 21
Table 5 Representative Levee Lengths 26
Table 6 Summary of Assessed Property Characteristics 32
Table 7 Average Structure Size per Acre 35
Table 8 Relative Land Damage Rate 37
Table 9 Structure Replacement Value and Depth Damage 38
Table 10 Contents Replacement Value and Depth Damage 39
Table 11 Summary of Resulting Levee Benefit Units 40
Table 12 Protected Throughfares 44
Table 13 Thoroughfare General Benefit Calculation 45
Table 14 Initial Proposed Assessment Rate Calculation – FY 2023/24 47
Table 15 Summary of Proposed FY 2023/24 Assessments by Land Use Category 49
Table 16 Assessment Parcel Equations and Example Calculations 55

List of Figures

Figure 1 Zone 9 Levees and Channels 2
Figure 2 Lower San Joaquin River Project 4
Figure 3 FEMA Shaded Zone X "Protected by Levee" Area 5
Figure 4 Combined USACE 100-year Floodplain and FEMA Shaded Zone X 29
Figure 5 LCMA Assessment Boundaries and Benefiting Parcels 30
Figure 6 Smith Canal Area Assessment District Boundary 42

Appendices

Appendix A: *KSN, Technical Memorandum, LCMA, Incremental O&M Costs LSJRP, February 23, 2023*

Appendix B: *LCMA Cash Flow and Financing Analysis*

Appendix C: *R&F, Technical Memorandum, LCMA, Floodplain Analysis, March 16, 2023*

Appendix D: *Assessment District Boundary Diagram*

Appendix E: *San Joaquin County Use Codes & Assessment Land Use Categories*

Appendix F: *List of Parcels & FY2023/24 Assessment Roll (Under Separate Cover)*

1. INTRODUCTION

Background

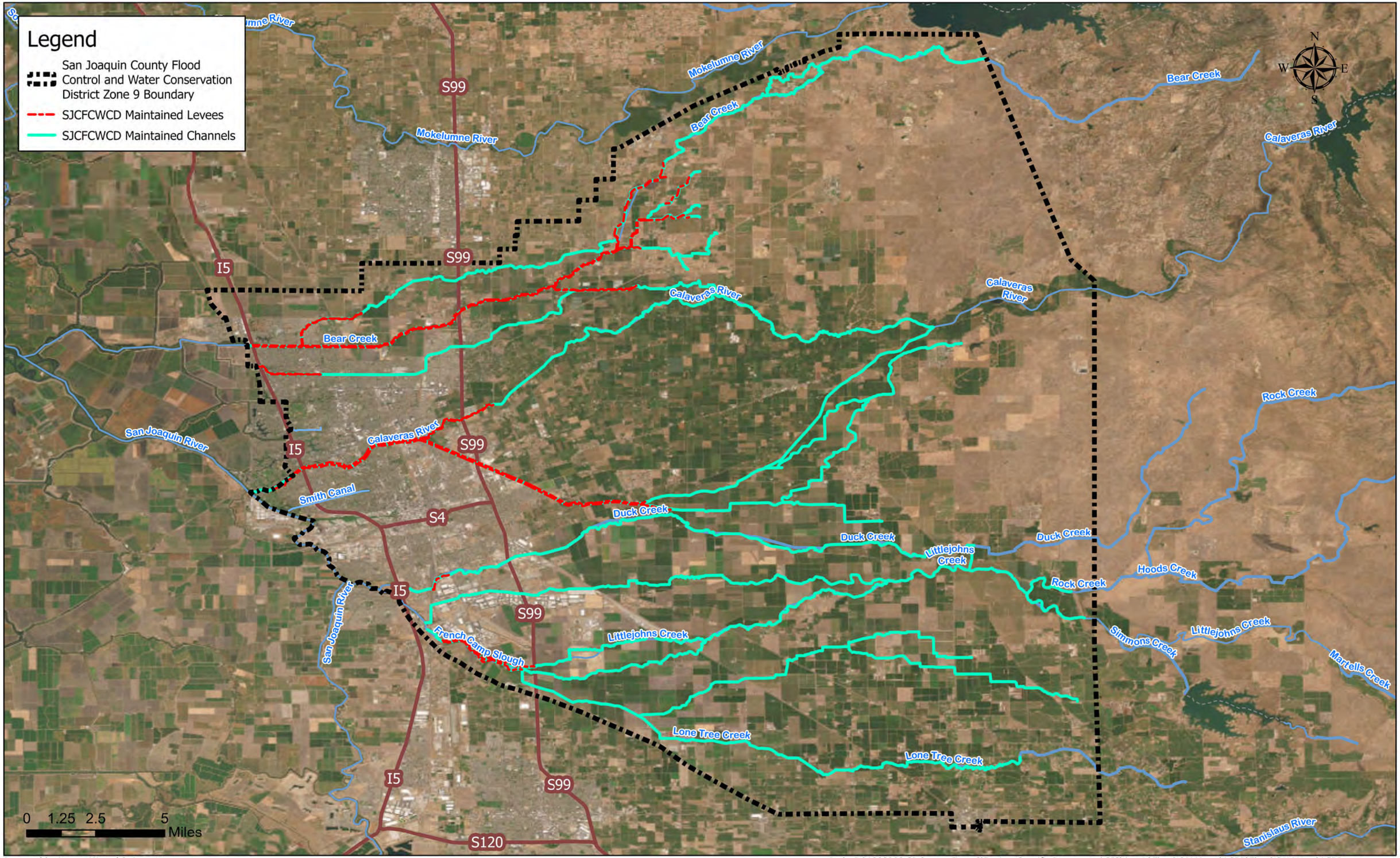
The San Joaquin County Flood Control and Water Conservation District (SJCFCWCD) was formed in 1956 to plan, construct, operate, and maintain flood control, water supply, drainage, and groundwater recharge projects. On December 19, 1961, the San Joaquin County Board of Supervisors created Flood Control Zone No. 9 (Zone 9) to provide maintenance of existing channels, levees, and associated structures **(Figure 1)**. SJCFCWCD Zone 9 currently maintains 119 miles of Project Channels and 112 miles of Project Levees[1] in accordance with agreements with the U.S. Army Corps of Engineers (USACE) and the California Department of Water Resources (DWR). Zone 9 also contains approximately 152 miles of non-project channels and 3 miles of Non-Project Levees maintained by SJCFCWCD as resources allow. Zone 9 is currently funded by a combination of property assessments and a small allocation of property taxes. The current property assessments include the Zone 9 Flood Control Benefit Assessment established in 1988 and an assessment levied by the San Joaquin Area Flood Control Agency (SJAFCA) established in 1996.

SJAFCA is a Joint Powers Authority (JPA) formed in 1995 between the City of Stockton, San Joaquin County, and SJCFCWCD with the initial goal of restoring a 100-year level of flood protection to the greater Stockton metropolitan area. In February 1995 the Federal Emergency Management Agency (FEMA) issued preliminary Flood Insurance Rate Maps (FIRMs) that placed a majority of the greater Stockton metropolitan area within a Special Flood Hazard Area (SFHA). To prevent the SFHA designation from becoming effective, the JPA parties recognized that a coordinated regional effort was needed. SJAFCA was formed to plan, design, and construct a suite of projects that became known collectively as the Flood Protection Restoration Project (FPRP). The FPRP consists of flood wall and levee improvements along 40 miles of existing levees, 12 miles of new levees, modifications to 24 bridges, and the construction of two major detention basins and pump stations. To fund construction and provide for the long-term operation and maintenance (O&M) of the FPRP, SJAFCA formed an Assessment District No. 96-1 (AD 96-1) in 1996. The completed FPRP is operated and maintained by SJCFCWCD on behalf of SJAFCA using funds generated by AD 96-1. In November 2017, SJAFCA expanded to include the Cities of Lathrop and Manteca to address the requirements of Senate Bill 5.

After significant flood damage from hurricanes Katrina and Sandy, as well as other major storms, State and Federal policies were adjusted effectively creating more stringent levee maintenance requirements. The new requirements have increased necessary levee maintenance efforts resulting in increased O&M costs. The current funding sources described above have not been sufficient to provide for the increased maintenance efforts causing both SJAFCA and Zone 9 to rely on reserve funds to maintain Project Levees. In addition, support from SJAFCA is needed by SJCFCWCD to ensure that obligations associated with the FPRP are complied with and flood protection levels are maintained consistent with the increasingly stringent regulatory requirements.

[1] Project levees are those facilities that are part of the State Plan of Flood Control as defined by the 2010 State Plan of Flood Control Descriptive Document, Central Valley Flood Management Planning Program, November 2010.

Figure 1: Zone 9 Levees and Channels



Additionally, in response to the aforementioned policy changes, in 2009, SJAFCA partnered with the Central Valley Flood Protection Board (CVFPB) and the USACE to study and evaluate ways to improve the region's flood risk. This resulted in the San Joaquin River Basin, Lower San Joaquin River, CA Final Integrated interim Feasibility Report/Environmental Impact Statement/Environmental Impact Report (Feasibility Study), completed by the USACE in January 2018[2]. The recommended plan contained within the Feasibility Study was subsequently authorized by Congress and signed into law under the Water Infrastructure Improvements for the Nation Act (Public Law 115-270) Title 1, Subtitle D, Section 1401(2), dated October 23, 2018.

Implementing the plan defined in the Feasibility Study is expected to reduce flood risk to 122,000 people, over 80,000 structures, and $28.7 billion in property. USACE uses benefit-to-cost ratios for feasibility study implementation plan recommendations. In this case, the study resulted in a benefit-to-cost ratio of 7.0, meaning that for every dollar invested in the flood risk reduction project, the region receives seven times that in economic benefit. Additionally, implementation of the Feasibility Study's recommendations is expected to reduce expected annual damages within north and central Stockton by 83 percent.

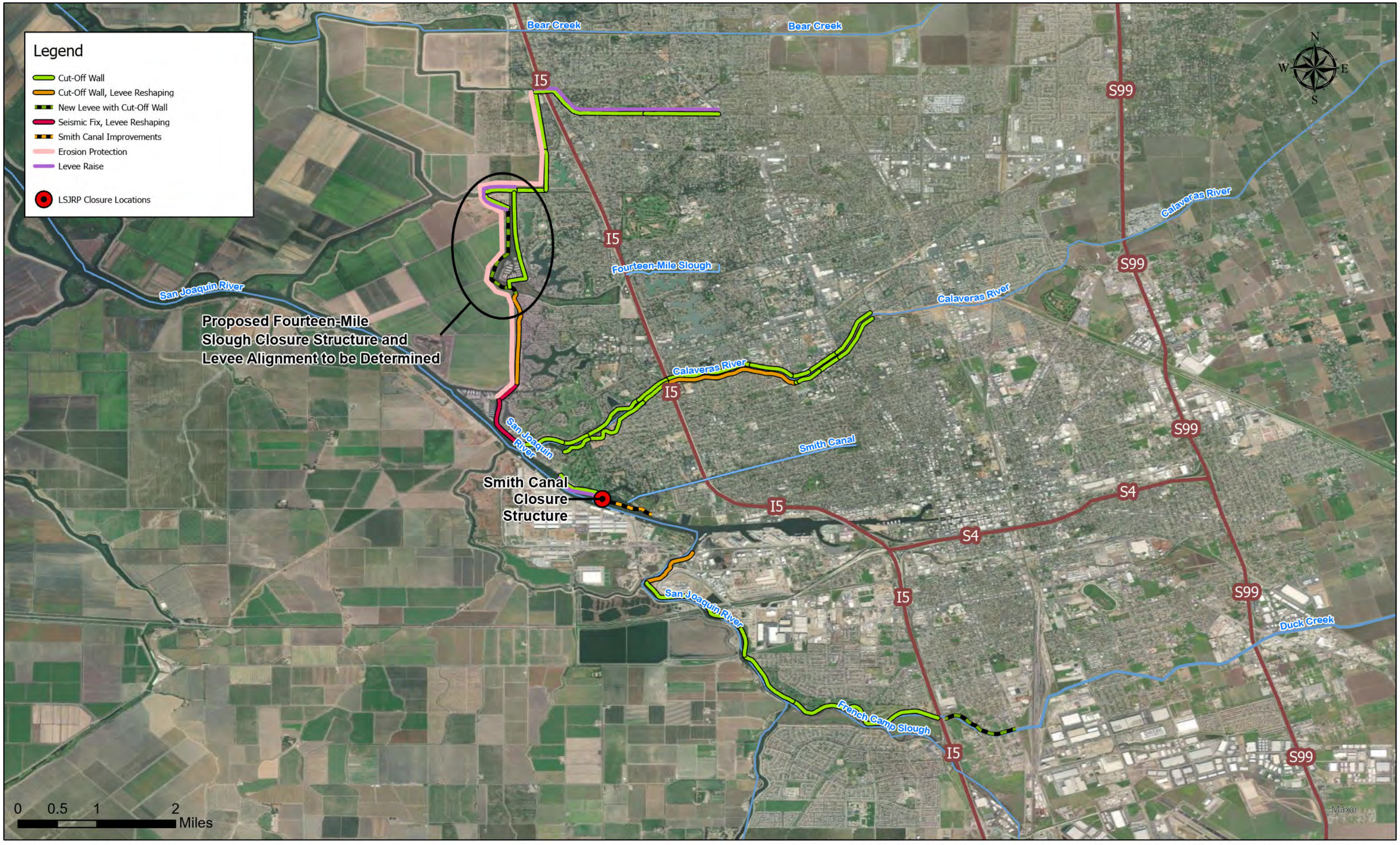
The Congressionally authorized recommended plan found in the Feasibility Study, referred to as the Lower San Joaquin River Project (LSJRP) consists of 23 miles of levee improvements and two closure structures (**Figure 2**). Construction at one of those closure structures, the Smith Canal Gate, was advanced early by SJAFCA and is a critical component of the implementation and funding approach as defined in this Engineer's Report.

After the Feasibility Study authorization, the USACE, CVFPB and SJAFCA entered into a Project Partnership Agreement (PPA) on September 30, 2020, which defines the requirements, obligations, and responsibilities of the Federal government and the Non-Federal Sponsor (NFS), which is defined as both CVFPB and SJAFCA. The CVFPB and SJAFCA entered into a Local Project Partnership Agreement (LPPA) on September 30, 2020, that specifies the obligations of each party; this includes CVFPB's and SJAFCA's commitment to contribute 24.5% and 10.5%, respectively, of the total project cost.

However, the LSJRP improvements do not improve all FEMA Accredited Levees providing protection to North and Central Stockton. **Figure 3** shows the area designated by FEMA as Shaded Zone X (FEMA Shaded Zone X). The FEMA Shaded Zone X area is the area of the accredited levee system currently designated by FEMA as protected by levees from a 100-year flood. To ensure long-term accreditation and keep up with increasing regulatory requirements and engineering standards, SJAFCA will need to complete additional capital project planning, engineering, design, and implementation of projects to FEMA Accredited Levees. Ensuring continued long-term accreditation becomes more important as the impacts of flood frequency and severity worsen over time, as the system reaches its useful life, and as regulatory compliance standards become more stringent.

[2] https://www.spk.usace.army.mil/Portals/12/documents/civil_works/lower_sj_river/final_eis-eir/01_San%20Joaquin%20River%20Basin%20Lower%20San%20Joaquin%20River_CA%20FINAL%20IIFR_EIS_EIR.pdf?ver=2018-02-01-184425-453

Figure 2: Lower San Joaquin River Project [1]



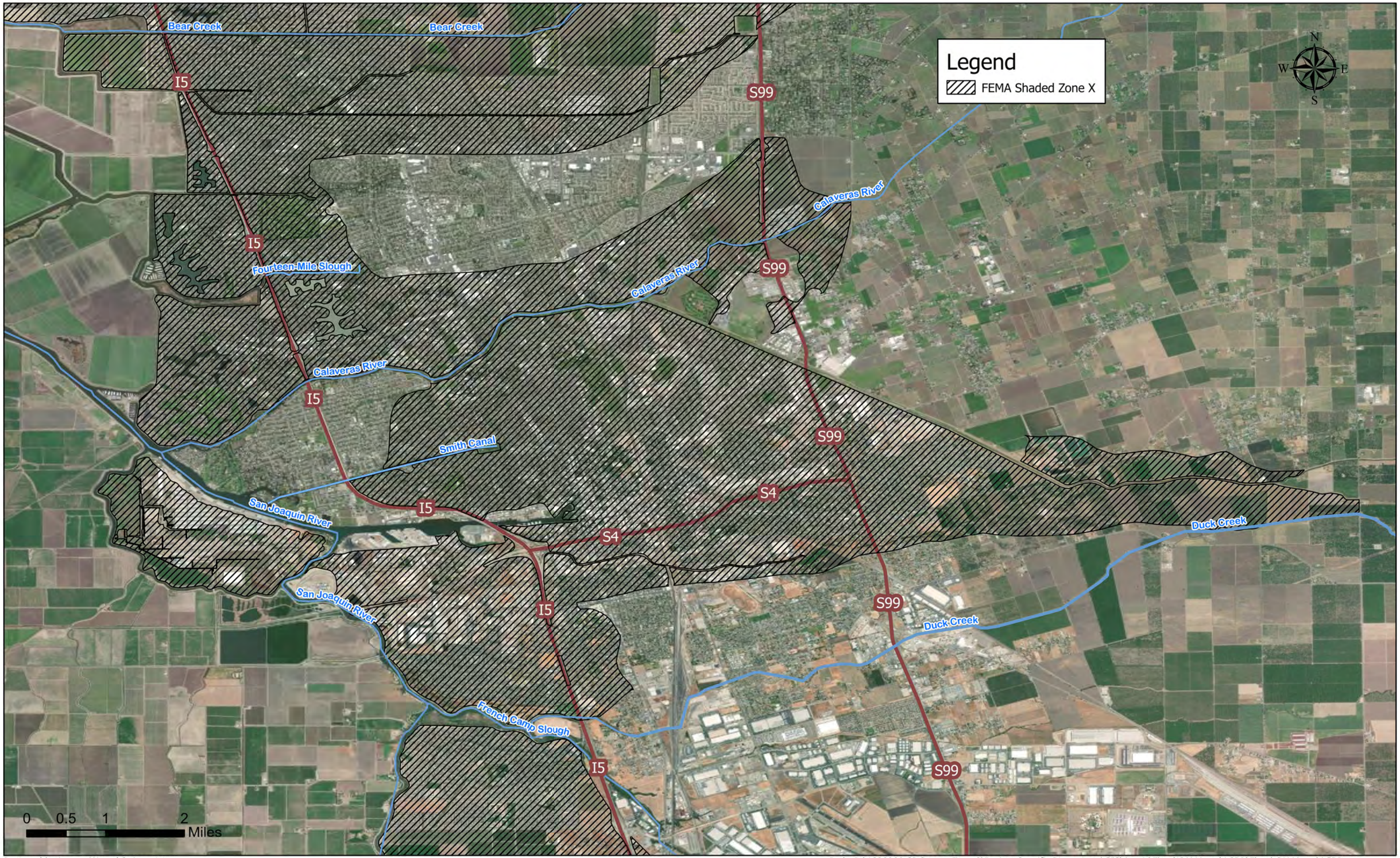
Prepared by Larsen Wurzel & Associates

Path: P:\1808000 SJ County Zone 9\Project Specific Documents\GIS\Arcgis\Flood CALM and LSRP\Flood CALM and LSRP.aprx

Source: U.S. Army Corps of Engineers, San Joaquin River Basin, Lower San Joaquin River, CA, Integrated Interim Feasibility Report/Environmental Impact Statement/Environmental Impact Report, Figure 8-1, January 2018, as modified by LWA.

[1] The LSJRP, as shown, can or may be modified to achieve the same functional equivalent benefits as contemplated by the current authorized Project.

Figure 3: FEMA Shaded Zone X



To address the funding for the activities described above, SJAFCA and SJCFCWCD jointly investigated a strategy for generating additional revenue to provide funding for levee capital improvements and O&M services. A formal arrangement for the joint investigation and implementation of a new special benefit assessment was memorialized in an MOU between the two agencies in July 2022. The result of the coordinated effort is the Levee Construction and Maintenance Assessment (LCMA or Proposed Assessment) described further within this Engineer's Report.

Purpose of this Engineer's Report

This Engineer's Report describes, in detail, the methodology for levying an assessment upon parcels that receive special benefit from the LCMA Services as defined within this Engineer's Report. In combination with the Zone 9 Flood Control Benefit Assessment, property tax revenues allocated to SJCFCWCD Zone 9, and SJAFCA's AD 96-1 Assessment, this assessment is intended to provide sufficient funding for:

1. Annual O&M services necessary to maintain SJCFCWCD Zone 9 Project levees, establish a reserve fund to support routine repairs, rehabilitation, and replacement of the infrastructure, and O&M services associated with the LSJRP capital improvements.
2. Capital improvements within the greater Stockton area as defined in the LSJRP and other system improvements to ensure long-term compliance and accreditation of the FEMA accredited levees.

Report Organization

This report is divided into seven sections with tables and a section for figures as well as five appendices, all described further below.

Section1 provides the background, purpose of this Engineer's Report, and describes the report's organization.

Section 2 outlines the authorization and process for imposing the Proposed Assessment.

Section 3 details the services to be funded by the Proposed Assessment.

Section 4 describes the financing and funding plan for LCMA Services.

Section 5 details the methodology for levying an assessment that is proportional to the special benefits received by each parcel assessed.

Section 6 describes how the annual assessment administered process.

Section 7 Provides the special benefit findings and certification by the Assessment Engineer as required by Article XIIID Section 4 (b) of California Constitution.

Appendix A provides a technical memorandum prepared by Kjeldsen, Sinnock & Neudeck, Inc. (KSN) that describes the incremental cost to operate and maintain the LSJRP levees.

Appendix B provides the financial plan cash flow model for the Capital Services funded by the Proposed Assessment.

Appendix C provides a technical memorandum prepared by R&F Engineering (R&F) that describes the supporting floodplain analyses utilized as part of special benefit analysis.

Appendix D provides the Assessment District Boundary Diagram

Appendix E provides the list of the County Assessor's use codes and identifies the assignment of Land Use Categories for use as part of the assessment methodology described herein.

Appendix F provides the list of parcels by reference to assessor parcel number (APN) subject to the Proposed Assessment as well as a schedule of the proposed assessment amounts for FY 2023/2024 (the initial maximum annual assessment roll for assessment balloting purposes).[3]

[3] The proposed Assessment Roll included with **Appendix F** is reflective of the Record Owners of parcels as defined by Government Code 53753 (j) which is based upon the last equalized secured property tax assessment roll. The last equalized secured property tax assessment roll of San Joaquin County prior to the mailing of the notice is the 2022 roll (as of lien date July 1, 2022). The 1st year of the assessments collection will be fiscal year 2023/24 and thus reflective of July 1, 2023 equalized secured property tax assessment roll. SJAFCA will be responsible for applying the assessment methodology described in this Engineer's Report to the 2023 roll and updating the roll presented in **Appendix F** should the assessment be levied in fiscal year 2023/24.

2. AUTHORITY AND PROCESS

The Levee Construction & Maintenance Assessment (LCMA) would be imposed by SJAFCA pursuant to the authority of Government Code §54703 – 54719, the Benefit Assessment Act of 1982 (1982 Act), and consistent with the requirements of Article XIIID of the California Constitution[4] (Proposition 218), Government Code §53750 et. seq. (Proposition 218 Omnibus Implementation Act). Specifically, Government Code §54710(a) of the 1982 Act authorizes SJAFCA to levy an assessment to fund the Operations & Maintenance (O&M) costs for levees. Furthermore, under Government Code §54710.5, the assessment may include the cost of installation and improvement of the levees. As further detailed herein, the Proposed Assessment will fund levee construction, a portion of the annual cost of levee O&M, as well as create a reserve for routine repairs, rehabilitation, and replacement of the levees.

Government Code §54711, requires that:

1. The amount of the assessment imposed on any parcel be related to the benefit received by the parcel;
2. The aggregate amount of the assessment not exceed the estimated annual cost of providing the service; and
3. The revenue derived from the assessment be used only for the services identified as the basis for assessment.

In addition, all special benefit assessments must also comply with Proposition 218 and the Proposition 218 Omnibus Implementation Act. These requirements outline the process for imposing the Assessment, including the requirement that this Engineer's Report document the special benefits conferred by the service provided, the process for imposing the Assessment, and property owner approval through a balloting process.

This Engineer's Report has been prepared to:

1. Contain the information required pursuant to Government Code §54716(a), including;
    a. a description of the services proposed to be financed through the revenue derived from the Assessment;
    b. a description of each lot or parcel of property to be subject to the Assessment;
    c. the amount of the Proposed Assessment for each lot or parcel;
    d. the basis of the Assessment; and,
    e. the schedule of the Assessment;
2. Determine the special benefits from the services received by benefiting properties; and,
3. Assign a method of apportioning the Proposed Assessment to benefiting parcels.

Following submittal of this report to the SJAFCA Board of Directors (Board) for preliminary approval, the Board may, by resolution, call for an assessment ballot proceeding and public hearing on the establishment of the Proposed Assessment.

[4] Article XIIID of the California Constitution is a portion of the California constitution added by Proposition 218 that addresses the requirements of benefit assessments and is applicable here.

If the Board approves such a resolution, the SJAFCA staff will initiate the notice, protest, and hearing procedure required by Government Code §54716 and Article XIIID. A notice and assessment ballot will be mailed to property owners within the Proposed Assessment boundary. Such notice will include a description of the services to be funded, the total Proposed Assessment amount, the Proposed Assessment amount for each parcel owned, the duration of the Proposed Assessment, an explanation of the method of voting, and the name and telephone number of the person designated by the Board to answer inquiries regarding the Proposed Assessment and ballot proceeding process. Each notice will specify the date, time, and place of the public hearing and a summary of the ballot return procedures. Each notice will include a ballot upon which the property owner can vote for approval or disapproval of the Proposed Assessment and affix his or her signature. Finally, each notice will include an official postage prepaid security envelope in which the ballot must be returned.

The balloting and notice period will extend for a minimum of 45 days. Government Code 53750 (i) deems that notice is given and the 45-day period commences upon the deposit of the notice and ballot with the United States Postal Service. On the last day of the balloting period, the public hearing will be held for the purpose of receiving public testimony from property owners regarding the Proposed Assessment. Property owners will have the opportunity to provide testimony to the Board and submit their ballots at the public hearing, however, in order to be included within the tabulation, all ballots must be submitted prior to the close of the public hearing. At the public hearing, and at any time prior to the close of the public hearing, property owners may also revise previously submitted ballots.

If the votes received in favor of the Assessment, weighted by the proportional financial obligation of the properties for which the ballots are submitted, outweigh the votes received opposing the Assessment, then the Board may continue with the formation of the Proposed Assessment district, the process of imposing the Proposed Assessment and its future levy. If the assessments are so confirmed and approved by the Board, the Assessment roll will be submitted to the San Joaquin County Auditor Controller for inclusion on the secured property tax rolls or may be directly billed by SJAFCA to the property owner for the Assessment pursuant to Government Code §54718. As outlined in Government Code §53739, the Board may levy the Assessment in future years without conducting a new ballot proceeding so long as the Assessment is within the stated inflation-adjusted Assessment Rate authorized by the original balloting proceeding.

3. PROPOSED SERVICES

Services Funded by the Proposed Assessment

The services to be funded by the Proposed Assessment include:

1. Levee O&M Services: O&M services are required to ensure that the design level of flood protection is maintained over time for Zone 9 Project Levees maintained by SJCFCWCD, LSJRP levees, and other levees improved in the future by SJAFCA. As footnoted in the **Introduction**, Project Levees are those facilities that are part of the State Plan of Flood Control. LSJRP levees are those built as part of the Federally authorized LSJRP as further defined under the **Levee Capital Services** section below.
2. Levee Capital Services: All work associated with the planning, design, implementation and construction of the LSJRP and other future capital improvements completed within the benefit area that ensure continued FEMA accreditation of levees providing 100-year protection into the future.

Levee O&M Services

Levee O&M Service activities may include, but are not limited to, levee inspections and evaluations, debris removal that restricts flow or damages the system, vegetation removal and control, rodent control, levee patrols, levee road resurfacing, erosion protection material replacement, flood fighting, and embankment repair. In addition, Levee O&M Services also includes all activities associated with maintaining the current level of flood protection received by benefiting properties. These activities include compliance with any existing permits, obtaining new permits, permit enforcement, removal of encroachments, coordination with State and Federal floodplain regulators and policy makers, and coordination and reporting activities that ensure compliance with FEMA, DWR, and USACE standards. These services will be performed by SJAFCA and/or local maintaining agencies, including SJCFCWCD. These agencies may utilize SJAFCA resources or other contractors to support Levee O&M Services with funding from the Proposed Assessment.

In addition to the regular on-going O&M services, the proposed assessment will also provide adequate reserves to support routine repair, rehabilitation, and replacement of levees and appurtenant facilities.

Levee Capital Services

Levee Capital Services activities include the local contribution to the Federally authorized LSJRP and other capital improvement planning, design, and construction efforts along the flood protection system to support long-term FEMA accreditation of levees providing 100-year protection to North and Central Stockton.

The LSJRP consists of 23 miles of levee improvements and two closure structures. Construction at one of those closure structures, the Smith Canal Gate (SCG), was advanced early by SJAFCA and is a critical component of the implementation and funding approach defined in this Engineer's Report. The 23 miles of levee improvement as described in the Feasibility Study currently include:

Delta Front:

- 2.05 miles of fix-in-place improvements with soil-bentonite cutoff walls of various depths with 2.5 miles of geometry improvements.
- 1.1 miles of seismic fixes along two segments of Tenmile Slough.

- 1.33 miles of new setback levee along the Delta Front to eliminate the eastern portions of the Fourteenmile Slough levee.
- 0.59 miles of height improvements between 1.8 and 2.7 feet on the Delta Front.
- 5 miles of erosion protection.
- Control structure on Fourteenmile Slough.

North Stockton:

- 9.4 miles of fix-in-place improvements with soil-bentonite cutoff walls of various depths.
- 2.03 miles of height improvements between 1.4 and 1.6 feet in North Stockton.

Central Stockton:

- 9.2 miles of fix- in-place improvements with soil-bentonite cutoff walls of various depths.
- 2 miles of levee geometry improvements along one segment of the Calaveras River and one segment of the San Joaquin River.
- 0.53 miles of height improvements of 1.8 feet.
- 0.75 miles of new levee with soil-bentonite cutoff wall on Duck Creek to address flanking of flood waters from South of Central Stockton.
- 0.28 miles of height improvements of 4 feet on the RD 404 levee.
- Control structure at Smith Canal with 0.2 miles of floodwall.

As the USACE, the CVFPB, and SJAFCA advance implementation of the LSJRP, the final configuration of the improvements may be refined consistent with the intent of the original authorization or any future changed authorization by Congress. The Levee Capital Services are intended to provide the flood protection benefits of the authorized project in its final configuration. In addition, any required project mitigation or permitting requirements of the project are included within the Levee Capital Services.

Capital improvements along other portions of the system for the purposes of ensuring the long-term FEMA accreditation may include feasibility studies, analyses, field investigations, engineering, design, and construction. Efforts have not yet been defined in detail for this work. Should the Proposed Assessment be approved, these efforts will be further investigated and defined over the coming years.

4. FINANCING AND FUNDING PLAN

The financing and funding plan is based on an estimated annual budget for the Levee O&M Services as well as an estimated budget and financing plan for the LSJRP and other necessary capital improvements. Levee O&M Services include both the SJCFCWCD Zone 9 Project Levee O&M as well as the incremental additional Levee O&M associated with LSJRP and related improvements; however, the budget for the incremental O&M associated with the LSJRP are accounted for within the financing plan analysis for Levee Capital Services as further described below.

Annual Budget for Levee O&M Services

The annual budget for Levee O&M Services has been estimated in two parts. First, the County's Public Works Department, in coordination with SJAFCA, prepared an updated budget for the SJCFCWCD, Zone 9 Project levees. Second, Kjeldsen, Sinnock & Neudeck, Inc (KSN) prepared an incremental O&M budget estimate for the levees improved by the LSJRP (**Appendix A**). The intent is that the incremental O&M budget for the LSJRP would supplement funds from local maintaining agencies who currently operate and maintain the existing levee system to ensure that the benefits received by the Levee Capital Services can be maintained into the future.

The budget for Levee O&M Services represents the current expectation of Fiscal Year (FY) 2023/24 costs based on both historical expenses and anticipated changes over the life of the assessment. It should be noted that the budget was developed for the purpose of determining the annual revenue required for the Proposed Assessment based on the increased costs SJCFCWCD has experienced associated with performing O&M of Zone 9 Project Levees and based on KSN's experience operating and maintaining levees in the region. Future annual budgets approved by the Board may vary from year to year according to actual anticipated expenses and revenues.

Budget for Zone 9 Project Levee O&M

Table 1 provides a summary of the estimated FY 2023/24 budget. This budget takes into consideration the required level of currently unfunded O&M services associated with Project levees in conjunction with the available revenues described further below.

SJCFCWCD estimates that the required total cost of O&M is $5,954,000. This estimate includes the following services: O&M, ongoing engineering support, State & Federal coordination, administration, auditing & compliance, and the legal and insurance burden associated with all services SJCFCWCD provides for Zone 9 facilities. The existing revenues available to support O&M services total $4,470,000 and are provided by the current Zone 9 Flood Control Benefit Assessment, ad valorem property taxes received by the SJCFCWCD for Zone 9, and the SJAFCA AD 96-1 Assessment. The net difference, or shortfall, is $1,484,000. This shortfall is associated with the additional costs of providing the required level of Levee O&M Services for Zone 9 Project levees.

Table 1
Levee Capital and Maintenance Assessment (LCMA)
Levee O&M Services Budget for Zone 9 - FY 2023/24

Budget Item / Category	FY 2023/24 Budget
Operations & Maintenance [1]	$5,426,000
Ongoing Engineering Support	$70,000
State & Federal Coordination (Certifications, Policy & Funding)	$305,000
Administration, Auditing & Compliance	$65,000
Legal & Insurance Burden on Services	$88,000
Subtotal Annual Services Budget	**$5,954,000**
Current Zone 9 Assessment (Government Code 56901)	($2,716,000)
Zone 9 Ad Valorem Tax Apportionment	($850,000)
SJAFCA AD 96-1 (Government Code 57594)	($904,000)
Total Current Funding Sources	**($4,470,000)**
Net equals Budget for Levee O&M Services	**$1,484,000**

[1] Includes Labor, Equipment, Supplies, Materials, Repair & Replacement for Equipment and Mitigation.

Source: San Joaquin County Public Works Dept. and SJAFCA

The current Zone 9 Flood Control Benefit Assessment is utilized by the SJCFCWCD to fund the O&M of Project Levees within Zone 9. Ad valorem property taxes, which come from a portion of the County's base 1% of net assessed value property taxes apportioned to Zone 9 of SJCFCWCD, are also used to fund Project Levee O&M services. Finally, the SJAFCA AD 96-1 is an existing assessment for parcels with the SJAFCA service area to fund O&M of the FPRP. Revenue from AD 96-1, collected by SJAFCA, is utilized to contract for services provided by SJCFCWCD on behalf of SJAFCA for the O&M of those Project Levees improved as part of the FPRP.

The Proposed Assessment will be utilized to fund the increase in cost associated with Levee O&M Services. The budget presented in **Table 1** reflects the budget for the O&M of Zone 9 Project related Levees and Channels. As costs have increased over the years, SJCFCWCD has been required to prioritize the limited resources to those areas with the greatest risk in terms of life safety and flood damages. The assessment revenues and property taxes described above have generally been fully expended on Project Channels and Levees. Even with full expenditure of revenues on Project facilities, including depletion of reserve funding, essential maintenance for Project facilities is currently being deferred until additional funding is available. The Proposed Assessment will provide the SJCFCWCD with additional resources needed to address the increased cost of Levee O&M Services.

Budget for LSJRP Levee O&M

Table 2 provides a summary of the estimated budget for incremental O&M of the LSJRP levees. This is the increase in the estimated costs to O&M the levees to the standards required by USACE once the LSJRP is turned over to the NFS. A portion of this estimate was prepared by KSN through an evaluation of current local maintaining agency resources and estimated cost of levee O&M upon the completion of improvements (**Appendix A**). The total budget for the components of the LSJRP evaluated by KSN is $425,340 escalated to January 2023. SJAFCA has also worked as part of the implementation of the Smith Canal Gate Project to estimate the cost of ongoing O&M of the gate facility. This amount is expected to be similar to the O&M of a second gate structure at 14-Mile Slough. The cost to O&M both gates is expected to be $700,000 (in January 2023 $'s) therefore the total incremental O&M is expected to be $1,125,341. Because these costs are incurred as the LSJRP capital improvements are completed over time, the incremental O&M costs for each completed element has been incorporated into the financing plan for levee capital services, described below.

Table 2
Levee Capital and Maintenance Assessment (LCMA)
Levee Capital Services Incremental O&M Budget for LSJRP Features

Budget Item / Category	Estimated Budget [1]
Mosher Slough	$20,840
Shima Tract	$17,475
Fivemile Slough	$4,291
Fourteenmile Slough	$138,403
Tenmile Slough	$31,973
Calaveras River - Right	$42,783
Calaveras River - Left	$43,072
San Joaquin River	$40,717
French Camp Slough	$18,317
Duck Creek	$67,470
Smith Canal Gate [2]	$350,000
Fourteenmile Slough Structure [2]	$350,000
Capital Project	**$1,125,341**

[1] Budget as of January 2023 and utilized as part of cash flow and financing plan analysis found in Appendix B.

[2] Estimated based on SCAAD budget for O&M of the SCG

Source: KSN Memo and SCAAD Engineer's Report

Financing Plan for Levee Capital Services

To determine the annual funding requirements necessary to fund the SJAFCA share of new facility capital costs and the associated incremental O&M, LWA prepared a financing plan including a cash flow analysis. The financing plan incorporates several assumptions, such as initial cost estimates, cost sharing, SJAFCA project delivery responsibilities, implementation timeline, cost escalation, SJAFCA and State advancement of the Smith Canal Gate, and bonding. These costs are described further below. Importantly, this model incorporates the incremental O&M cost of the LSJRP levee system as the O&M responsibility and funding requirements are layered in over time as project features are completed and turned over the NFS for O&M.

Initial LSJRP Cost Estimate

Project cost estimates, including contingency values, are derived from the Feasibility Study "first cost" estimate of $1,070,309,000 (2017 price levels). These values serve as the basis for the escalated costs utilized in the financing plan. Because this cost estimate was based on feasibility level information with limited information on or consideration for prior analyses of the levee system, several assumptions associated with the estimate were modified, as described herein, to prepare a realistic, reasonable, and fiscally prudent base cost.

The Feasibility Study was performed under USACE's 3x3x3 paradigm: defined as a study requiring no more than three years, with no more than three million dollars, and undergoing three levels of concurrent review. USACE contrived this concept to streamline and accelerate feasibility analyses, but it has resulted in some unintended consequences.

Detailed and informative analyses were often left for the design phase of a project, resulting in overly conservative project cost estimates, assuming worst-case design conditions. Indeed, during the feasibility study phase, existing information about the levee system performed by the State of California's Urban Levee Evaluation (ULE) that could have helped reduce the cost estimate went partially unused, and conservative assumptions were instead used.

For example, during the feasibility study phase, several reaches were identified as requiring a higher level of improvement than those identified from the ULE work. This resulted in higher estimated costs and higher contingencies. Although individual features were not analyzed in detail to determine specific reductions in program costs, several elements were identified as requiring much less robust re-build. These include the improvements near Brookside and Mosher Slough.

Further, recent cost projections of Ten Mile Slough, which is currently designed and awaiting environmental clearances, are now projected to come in below those prepared in the 2017 feasibility estimates. Further, comparing USACE cost-estimates to actual bid costs for over a dozen flood projects being implemented in the Sacramento area demonstrates that USACE estimates are always significantly conservative. In most cases, a conservative cost estimate is beneficial for future planning and helps minimize long-term financial risk; however, several principles of SJAFCA's program are to be financially frugal with local funding and not raise more money from property owners than will be required. SJAFCA also notes that USACE is required by statute to regularly develop new costs estimates, and such estimates have a tendency to fluctuate wildly based on

market conditions, but these updated estimates do not generate actionable information until such time as USACE incorporates the use of actual site conditions. As such, SJAFCA has decided to program funding on the lower side of the "first cost" range (i.e., lower contingency).

SJAFCA has prepared several contingency plans to mitigate for any cost increases. These include leveraging other funding sources or locally leading future phases of design and construction.

There are other funding sources that may come to fruition over the next decade. These may be used to offset upfront bond financing and/or mitigate for future increased costs. SJAFCA is currently coordinating with other flood agencies to leverage their existing, excess in-kind credit. These inter-basin credit transfers require close coordination with USACE for approval as they would be applied to the NFS's cost share, and they require negotiation on the amount. While the actual cost of these credits is not yet known, they would only be sold/purchased at a discount, and therefore they will "generate" additional resources for the program. Secondly, SJAFCA is seeking credit for its prior work on Mosher Slough that would directly offset cost sharing obligation to USACE. These efforts could result in $5-$10 Million of local funding applicable toward the local cost share of the LSJRP.

It is also feasible that SJAFCA could receive a higher state-local cost share for work on this project. Although the current cost share (70%-30%) is generous, other areas within California have seen a higher than 70% state share. For example, an additional 10% State cost share would result in a 33% reduction in the local funding match.

Additionally, in close coordination with USACE, SJAFCA could lead design and construction of one or more project features. Throughout the valley, locally led projects have been completed on Federal levees, resulting in cost savings from the initial USACE estimate. However, the precise features, extents, and expected saving remain uncertain and can't be quantified at this time.

The feasibility study estimates a "first cost" of $1.070 Billion (2017 price levels, not escalated) or estimated at $1,385 Billion in the PPA (fully escalated over time). This estimate includes a 38% contingency. For the reasons described above, SJAFCA is preparing this program estimate with 23% contingency (a 15% reduction), resulting in an initial cost of approximately $910 Million (**Table 3**), for use in the financing plan which escalates cost over the project implementation timeline.

Cost Sharing

As previously discussed, the LSJRP is Federally authorized and led. The USACE, DWR, and SJAFCA entered into a PPA defining the cost share obligations of USACE and the NFS. DWR and SJAFCA then entered into an LPPA, defining the cost sharing obligations between the NFSs. The Federal cost share is 65%, DWR cost share is 24.5%, and SJAFCA's cost share is 10.5%.

SJAFCA's cost share funding will come in the form of 1) cash contributions, 2) In-kind contributions (IKC) for work at Smith Canal and any other approved credit for work performed by the NFS, and 3) lands, easements, rights-of-way, relocations, and disposal areas (LERRDs) purchases. NFS cash contributions are estimated in the financing plan after accounting for LERRDs and IKC estimates.

Table 3
Levee Capital and Maintenance Assessment (LCMA)
Lower San Joaquin River Project Base Budget

Budget Item / Category	Cost Share	$2017 Costs [1]
Land and Damage		$68,555,900
Relocation		$72,250,000
Fish and Wildlife		$60,268,400
Levees and Floodwalls		$481,609,150
Floodway Control and Diversion Structure		$45,205,550
Planning, Engineering, Design		$123,165,850
Construction management		$58,708,650
Capital Project		**$909,763,500**
Federal	65.0%	$591,346,275
State	24.5%	$222,892,058
Local Share [2]	**10.5%**	**$95,525,168**

[1] Cost estimate used from 2018 Feasibility Study, based on Oct 1, 2017 price levels, USACE "First Cost", with adjusted contingency to 23%; Utilized as part of financing plan found in Appendix B.

[2] Local share simply based on "first cost" percent obligations, not accounting for credit from local work completed (e.g. Smith Canal Gate)

Source: San Joaquin Area Flood Control Agency and U.S. Army Corps of Engineers

Smith Canal Gate

SJAFCA and DWR are delivering the Smith Canal Gate (SCG) project as advanced work that directly supports the overall LSJRP. USACE recognizes this as IKC, and it is assumed all costs will be recognized and attributed toward the NFS cost sharing requirements. For the purposes of the cash flow financing plan for the LSJRP, the assumed creditable cost of the SCG project is $96.8 Million. It is assumed that upon review of project expenditures, USACE would approve credit in this full estimated amount. The $96.8 Million estimate is reflected in the total project cost for the purposes of calculating cost share percentages. It is also used as IKC to offset immediate NFS cash contribution requirements.

The costs of the SCG project have been funded from a combination of grant funding provided to SJAFCA by DWR and local funding from SJAFCA generated by the Smith Canal Area Assessment District (SCAAD). If the LCMA is approved by property owners and the assessment district if formed by the SJAFCA Board, the following actions would take place:

- Assessments authorized to be levied by the SCAAD would cease to be levied. In other words, the LCMA would supplant the SCAAD.
- The current outstanding bonds issued by SJAFCA to finance the local share of the project, which are secured by SCAAD assessment revenues would be redeemed by SJAFCA. See **Bond Plan** discussion below.

To account for and recognize the Levee Capital Services benefits provided to date by the SCAAD assessments, an adjustment factor has been applied to the properties located within the SCAAD. See **SCAAD Factor** discussion below.

LERRDs

LERRDs are a line-item estimate in the Feasibility Study and the timing and amounts of LERRDs purchases are incorporated into the financing plan. LERRDs have been escalated based on current project implementation assumptions as defined here and estimated at approximately $210 Million.

Project Implementation Timing

Project implementation timing has been revised from the initial estimates prepared for the Feasibility Study by USACE. The sequence of reach implementation and start timing has been updated to reflect recent project developments (including status of design efforts as of mid-2022, Federal funding commitments, and available personnel and project team resources).

Given the status of this program and timelines of similar programs in the Central Valley, the estimated time to project completion used for this engineer's report is twenty years. Therefore, the LSJRP expenditures associated with construction continue into 2043 and may extend for several years to complete financial and project close-out with USACE and DWR.

Cost estimates are escalated in alignment with the estimated reach delivery timelines. LWA utilized construction cost escalation of 2.4%, based on the average annual growth rate from 2010 to 2020 from the Department of General Services (DGS) California Construction Cost Index (CCCI). This analysis excludes 2020-

present, which reflects the effects from aftermath of COVID-19 years and the current inflationary environment in favor of reflecting a longer-term average construction escalation over the entire period of the project.

Assessment Timing

The first year of assessment collection would occur in FY 2023/24. The duration of the capital component of the assessment is assumed and is to be authorized for 30 years from a final bond issuance, which is expected to take place in 2038.

Bond Plan

Based on the project implementation timeline, cash contributions to USACE, and the redemption of the outstanding SCAAD Assessment Revenue bonds, SJAFCA plans to issue bonds secured by LCMA assessment revenues as soon as feasible after the formation of the Assessment District. The timing of the project implementation dictates the timing and amount of bond financing versus pay-go revenues to cover expected costs. The next bond issuance is expected to occur in 2033. The financing plan currently assumes that annual assessment district revenues and IKC would cover much of the cost outlays and funding match to USACE. A third and final bond issuance would occur in 2038. The financing plan assumes that each bond issuance would be structured as a conventional 30-year financing and to be paid from annual assessment collections.

Cash Flow Analysis

A cash flow analysis was developed in quarterly periods for years 2022 through 2049, however, is presented in annual periods here. The cost projections were spread over time as described above. The financing plan assumes an initial assessment need of $6.2 Million beginning in FY 2023/24 for Capital Services. The initial Capital Services budget includes the LSJRP costs, District operational soft costs to deliver LSJRP, defeasance of the existing SCAAD bonds, as well as the incremental O&M required to support this project long-term. The initial O&M assessment need is $1.125 Million (2022) and is assumed to continue in perpetuity. The assessment is assumed to be escalated annually based on the Consumer Price Index (CPI-W) for San Francisco-Oakland-Hayward, CA. For purposes of the cash flow analysis, escalation of the assessment was assumed to be 2.4% annually. Upon final payment of bonds and completion of the LSJRP, the capital portion of the annual assessment is assumed to end.

The financing and funding plan is detailed in the cash flow shown in **Appendix B**.

Total Estimated LCMA Budget

The total LCMA budget combines the FY2023/24 O&M budget for Zone 9 Project levees and the resultant capital FY2023/24 budget developed in the cash flow and financing plan analysis. These budgets are summarized in **Table 4** and result in a total estimated LCMA FY 2023/24 budget of **$7,684,000**.

Table 4
Levee Capital and Maintenance Assessment (LCMA)
Assessment District Budget - FY 2023/24

Budget Item / Category	FY 2023/24 Budget
Levee O&M Services Budget [1]	$1,484,000
Levee Capital Services Budget	$6,200,000
Total Budget [2]	**$7,684,000**

[1] Includes Labor, Equipment, Supplies, Materials, Repair & Replacement for Equipment and Mitigation.

[2] Assessment can be escalated annually, according to CPI-W San Francisco-Oakland-Hayward, not to exceed 4% (Reference Section 6, Annual Escalation of the Assessments)

Source: San Joaquin County Public Works Dept. and SJAFCA

5. ASSESSMENT METHODOLOGY

General Discussion

Requirements of Proposition 218

To levy an assessment for a property related service such as flood control, Proposition 218 has certain substantive requirements that the local agency must comply with. The local agency must:

- Separate the general benefits provided by service(s) from the special benefits conferred on a parcel;
- Identify the parcels that have special benefits conferred on them by the facility and/or service;
- Calculate the proportionate special benefit for each parcel in relation to the entirety of the benefits provided by capital and O&M services being funded;
- Apportion the costs of services to each parcel that receives special benefit in relation to that proportion; and
- Ensure that the total assessment levied does not exceed the reasonable cost of the proportionate special benefit conferred on each parcel.

Special Benefits vs. General Benefits

Proposition 218 requires any local agency proposing to increase or impose a special assessment to "separate the general benefits from the special benefits conferred on a parcel." (Cal. Const. art. XIIID §4). The rationale for separating special and general benefits is to ensure that property owners are not charged a special benefit assessment in order to pay for general benefits provided to the properties or general public at large. Thus, a local agency carrying out a project that provides both special and general benefits may levy an assessment to pay for the special benefits but must acquire separate funding to pay for the general benefits.[5]

A special benefit is a particular and distinct benefit over and above the general benefits conferred on real property located within the agency's boundary or to the public at large. The total cost of the services must be apportioned among the properties being assessed based on the proportionate special benefit the properties will receive. Moreover, the governmental agency must demonstrate through a balloting process that the ballots submitted in opposition to the assessment do not exceed the ballots submitted in favor of the assessment, weighted according to the proportional special benefit and financial obligation of the affected properties.

Because flood control work has an obvious indirect relationship to the provision of general benefits and may, upon first blush, appear to be general benefits, the issue of general benefits merits further discussion. For example, the facilities to be funded by the assessment will protect parks that are used by people regardless of whether they own property within the floodplain or not (the general public). But this indirect relationship does not mean that these facilities or services will themselves provide any general benefits. Rather, they will provide special benefits to all parcels within the floodplain, including special benefits to public parcels (such as parks) that are themselves used in the provision of general benefits.

[5] *Silicon Valley Taxpayers' Assn., Inc. v. Santa Clara County Open Space Authority*, (2008) 44 Cal. 4th 431, 450.

More to the point, the public at large will be paying for the special benefits provided to public property, and specially benefited property owners' assessments will not be used to subsidize general benefits provided to the public at large or to property outside the district. All property that is specially benefited will be assessed, including schools, parks and other parcels used in the provision of general benefits. Assessing agencies are required to assess and levy the assessment on all specially benefited property, including publicly owned property, within the assessment district.[6] Thus, the general public will pay for the provision of flood control services because the assessed public agencies within the assessment district will use general taxes or other revenues to pay their assessments.

In this instance, the Levee Capital and O&M Services provide both a general benefit to the public at large and a special benefit to those properties located within the boundaries of the Proposed Assessment by virtue of preventing flood waters due to uncontrolled flood from collecting on or flowing over a parcel and causing damages as a result of inundation. The special benefits provided by the services have been calculated for all parcels within the boundaries of the Proposed Assessment. The boundaries of the proposed district consists of only those parcels within the levee protected area.

The special benefit provided to each parcel varies based on the relative avoided damage from flooding. The relative avoided flood damages are based on an uncontrolled flood resulting from a breach along the levee system. The avoided flood damages are a function of parcel size, land use and the depth of flooding from each breach scenario, and, for Levee O&M services, the length of levee represented by each breach.

As noted above, special benefits are those "particular and distinct over and above general benefits conferred on real property located in the district or to the public at large." Cal. Const. art. XIIID §2(i). By contrast, general benefits provided to the public at large could be discussed in terms of general enhanced property values, provision of general public services such as police and fire protection and recreational opportunities that are available to people regardless of the location of their property. *See e.g.*, Cal. Const. art. XIIID §§2(i), 6(2)(b)(5); *Silicon Valley Taxpayers*, 44 Cal. 4th 431. 450–56. In this case, general benefits can be identified as the ability to move through and across the benefited area. The following considerations were evaluated to distinguish the general benefits by the Levee Capital and O&M Services.

<u>Public Property</u>

The Levee Capital and O&M Services will protect certain public properties (e.g., government buildings, schools, and parks). While the use of these public properties is a general benefit, the public properties themselves are protected by the flood protection system and receive a special benefit from the Levee Capital and O&M Services in the same manner as private property. All public properties have been included in the determination of special benefit, as described in more detail under the Assessment Apportionment Methodology below. With the exception of Federal Properties, there is no general benefit for Non-Federal public properties to be funded by the Proposed Assessment because the public properties will be assessed based on the special benefit received. As discussed further below, Federal properties are exempt from paying

[6] Reference Cal. Const. art. XIIID §4(a) with respect to the requirement to assess and *Manteca Unified School District v. Reclamation District No. 17 (2017) 10 Cal.App.5th 730* with respect to the requirement to levy.

an assessment levied by a local agency. While the special benefit and associated assessment is calculated without consideration of the Federal property exemption, the lost revenue cannot be reapportioned to assessed property owners. Therefore, the Levee Capital and O&M Services provide a general benefit by protecting federally owned property against flood damages, and the lost assessment revenue must be funded by other revenue sources.

Local Streets and Collectors

The Levee Capital and O&M Services will protect certain local streets and collectors. These roads are primarily used to access properties, as opposed to thoroughfares discussed separately below. The boundary of the Proposed Assessment has been narrowly drawn to include only those properties receiving special benefit from Levee Capital and O&M Services. Therefore, the benefit from Levee Capital and O&M Services to local streets and collectors is captured by assessing the properties they serve – as these roads have no value but in providing access to the specially benefitted parcels, and protecting these roads is a means to provide special benefit to these parcels.

Thoroughfares

The Levee Capital and O&M Services will also protect certain thoroughfares within the boundary of the Proposed Assessment. These roads are distinct from local streets and collectors in that these roads serve as primary transit routes within, through and across the community. These roads are used by the public at large regardless of residency, destination, or purpose. Therefore, the protection of these thoroughfares provides a general benefit that must be separated from the special benefit conferred on parcels by the Proposed Assessment and cannot be funded by the Proposed Assessment. Further discussion supporting the quantification and separation of this general benefit from the special benefit is provided below.

Assessment Boundary

The Proposed Assessment Boundary encompasses all properties that receive a special benefit from Levee Capital and O&M Services. Properties receiving special benefit from the Levee O&M Services were identified through the flood breach analyses prepared by R&F Engineering (R&F). Properties receiving special benefit from the Levee Capital Services were identified from a combination of floodplain mapping sources. The analyses completed by R&F have been documented and incorporated into this Engineer's Report by reference and attached as **Appendix C**.

Hydraulic Analyses Performed to Support the Assessment Methodology

Levee Breach Analysis for Levee O&M Services on Zone 9 Project levees

To determine the avoided flood damages as a result of the Levee O&M Services on the Zone 9 Project levees, as described in **Appendix** C, R&F utilized an existing levee breach analysis that evaluated 72 different breach scenarios along the SJCFCWD Zone 9 Project levees. The resulting floodplain from each breach was overlaid on the San Joaquin County Geographic Information System (GIS) parcel shapefile to determine the average flood depth and area of flooding for each individual parcel for each breach scenario. The resulting average flood depth was used as one of the inputs to the USACE Depth-Damage functions to calculate avoided flood damage. R&F also identified the length of levee represented by each breach to apportion avoided flood

damages across the project levee reaches maintained by Zone 9. The representative levee lengths can be found in **Table 5**. To account for the situation where a Project levee was maintained by an agency other than SJCFCWCD, the portion of that reach of levee maintained by others was subtracted from the representative levee length. As a result, a 1.4-mile portion of levee along the Calaveras River maintained by Reclamation District 2074 was removed from the representative levee length associated with the CSR R1 breach analysis. R&F's hydraulic analysis included a channel overtopping scenario to determine flood depths with no levee breaches when the channels and levees overtop when their capacity is reached. As the channel overtopping is not prevented by Levee O&M services, this additional scenario presented in R&F's analyses was not utilized in the analysis of special benefits.

Levee Breach Scenarios for Levee Capital Services on LSJRP and 100-year Accreditation Assurance

Properties receiving special benefit from the Levee Capital Services (and associated incremental levee O&M for the LSJRP) were identified using a combination of floodplain mapping that included:

- The 100-year composite without project floodplain based on breaches of levees to be improved by the LSJRP[7];
- The FEMA Shaded Zone X area within north and central Stockton; and,
- Additional hydraulic modeling showing the extent of the inundation from breaches of upstream FEMA Accredited Levees prepared by R&F.

To determine the avoided flood damages as a result of the Levee Capital Services from the improvements to the levee system associated with the LSJRP and FEMA Accredited levees, the Assessment Engineer utilized the without project floodplain mapping from the Feasibility Study as well as the floodplain mapping for breaches of FEMA accredited levees. The Feasibility Study does not define one single protection level but looks at levee assurances at a suite of flood scenarios, including the 100-year event. For the purpose of this Engineer's Report, the Assessment Engineer determined that the USACE's 100-year mapping best represents the level of service provided by the improved project and provides an appropriate comparison to the FEMA Shaded Zone X area. A composite without-project floodplain map, utilizing USACE floodplain mapping data, was prepared to identify the specific area benefiting from the improvements of LSRJP Project levees. To determine the extent of the floodplain for properties benefiting from FEMA Accredited levees, next, the Assessment Engineer overlaid the composite floodplain from breaches along FEMA Accredited levees prepared by R&F Engineering. This designated the extent of the area benefiting from Levee Capital Services for FEMA Accredited Levee. Because different sources of floodplain mapping were combined, the floodplain mapping associated with the FEMA Accredited levee breaches was only utilized to inform the extent of the benefit area from Levee Capital Services, not the depth of flooding for the purpose of calculating avoided flood damages.

[7] As noted above, floodplain mapping for these breaches is based on hydraulic modeling completed by the USACE. Reference the USACE Feasibility Study.

Table 5
Levee Capital and Maintenance Assessment (LCMA)
Representative Levee Lengths

Breach name	Levee Length (Miles)	Breach name	Levee Length (Miles)
Brc L10	2.3563	**Lmh R1**	1.9343
Brc L11	0.4907	**Mhc L1**	0.4615
Brc L13	0.5117	**Mhc L2**	1.3213
Brc L14	1.2882	**Mhc R1**	2.4343
Brc L2	2.7578	**Mhd L1**	0.7099
Brc L3	0.9300	**Mns L1**	0.8855
Brc L4	1.2738	**Mns L2**	1.3696
Brc L5	0.6320	**Mns R1**	0.8117
Brc L6	0.8283	**Mns R2**	1.5242
Brc L7	0.4238	**Mpc L1**	0.4808
Brc L8	0.9540	**Mpc L2**	0.9664
Brc L9	1.6391	**Pca L1**	0.8861
Brc R1	1.4009	**Pdc L1**	0.4747
Brc R10	0.8685	**Pdc L2**	0.7654
Brc R11	1.5526	**Pdc R1**	0.4658
Brc R12	0.5926	**Pdc R3**	0.8128
Brc R13	1.1358	**Pdc R6**	1.3186
Brc R14	1.1888	**Pxs L1**	1.5965
Brc R3	2.0168	**Pxs L2**	0.8936
Brc R4	1.1972	**Pxs R1**	0.3875
Brc R5	0.6819	**Pxs R2**	1.2298
Brc R6	1.1045	**Pxs R3**	0.9059
Brc R7	1.0703	**Sdc L1**	0.7090
Brc R8	0.3499	**Sdc L2**	0.8142
Brc R9	1.4818	**Sdc L3**	0.4382
Csr L1	3.1824	**Sdc L4**	0.9177
Csr L2	1.7846	**Sdc L5**	0.6785
Csr L3	2.6353	**Sdc L6**	0.6670
Csr R1	2.4215	**Sdc L7**	0.5747
Csr R2	1.0034	**Sdc R3**	2.8152
Csr R3	0.9816	**Sdc R4**	0.8204
Csr R4	1.4676	**Sdc R5**	1.1742
Csr R5	1.0943	**Spc L1**	0.8003
Fcs L1	2.8398	**Spc R1**	0.3657
Fcs R1	3.1873	**Wrs L1**	0.8674
Lmh L1	1.9767	**Wrs R1**	0.2602

Source: Appendix C - Assessment District Floodplain Analysis, DATE, prepared by R&F.

The Assessment Engineer considered all of this floodplain mapping to develop and designate the area receiving benefit from Levee Capital Services. **Figure 4** superimposes these three floodplain mapping sources and identifies the boundary of the area receiving benefit from Levee Capital Services.

Assessment District Boundary Diagram

All of the mapping sources have been combined to identify the overall area of benefit from Levee Capital and O&M Services. **Figure 5** identifies the designated boundaries of the Levee Capital and O&M Services as well as the overall Proposed Assessment Boundary. The official Assessment District Boundary Diagram is included within **Appendix D**.

Because the Proposed Assessment Boundary does not align with parcel boundaries and parcel boundaries can change over time, a process for regularly determining those parcels within the boundary subject to the assessment is warranted. (Reference

Application of the Assessment Boundary to Parcels below, for further discussion.)

Accounting for Uncertainty in the Breach Analysis Results

To account for the uncertainty associated with the hydraulic modeling assumptions, the difference in modelling tools leveraged (i.e., R&F analysis vs. USACE analysis vs. FEMA maps), and the accuracy of underlying LiDAR data used to generate the floodplains from each breach scenario (for R&F analysis), all flood depths were rounded down to the nearest foot. This rounding down of flood depths also accounts for the affects that any elevation variation within an individual parcel would have on shallow flooding. Further, given the uncertainty of flood depths and assumptions, for any parcel that is flooded based the analyses conducted or the review of the three flood mapping sources, the Assessment Engineering assigned a minimum flood depth of one foot.

The R&F hydraulic model used a standardized approach of calculating the floodwaters from the levee breach on a 250-foot square (1.4 acre) grid pattern and reporting the average depth for each grid block. Based on this grid block size, multiple parcels may reside within a single grid block, or a single parcel may span multiple grid blocks. Therefore, for parcels that are partially flooded along the boundary of the floodplain from a levee breach, the level of accuracy for the area of flooding for these parcels is uncertain. To account for this uncertainty, flood damages were excluded for parcels along the fringe of the boundary with less than 95% of their boundary within Levee Capital and O&M Service Boundary.

Assessment Apportionment Methodology

The methodology for apportioning the Proposed Assessment to each parcel in the Proposed Assessment District is based first on quantifying the total benefits received, in terms of benefit units, by each parcel from the Levee Capital and O&M Services and then second, separating the General Benefits from the Special Benefits, then third, determining each parcel's proportionate share of total benefits received, again in terms of benefits units, and finally allocating the Proposed Assessment, in terms of dollars to each parcel based upon its proportionate share of total benefit units. Through this approach, each parcel's share of the total Proposed Assessment would be equivalent to its proportionate share of benefit received from the Services. Because the General Benefits have been separated from the Special Benefits and only the Special Benefits are assessed to parcels the requirement of Proposition 218 have been met.

Figure 4: Floodplain Mapping supporting Capital Services Benefit Area

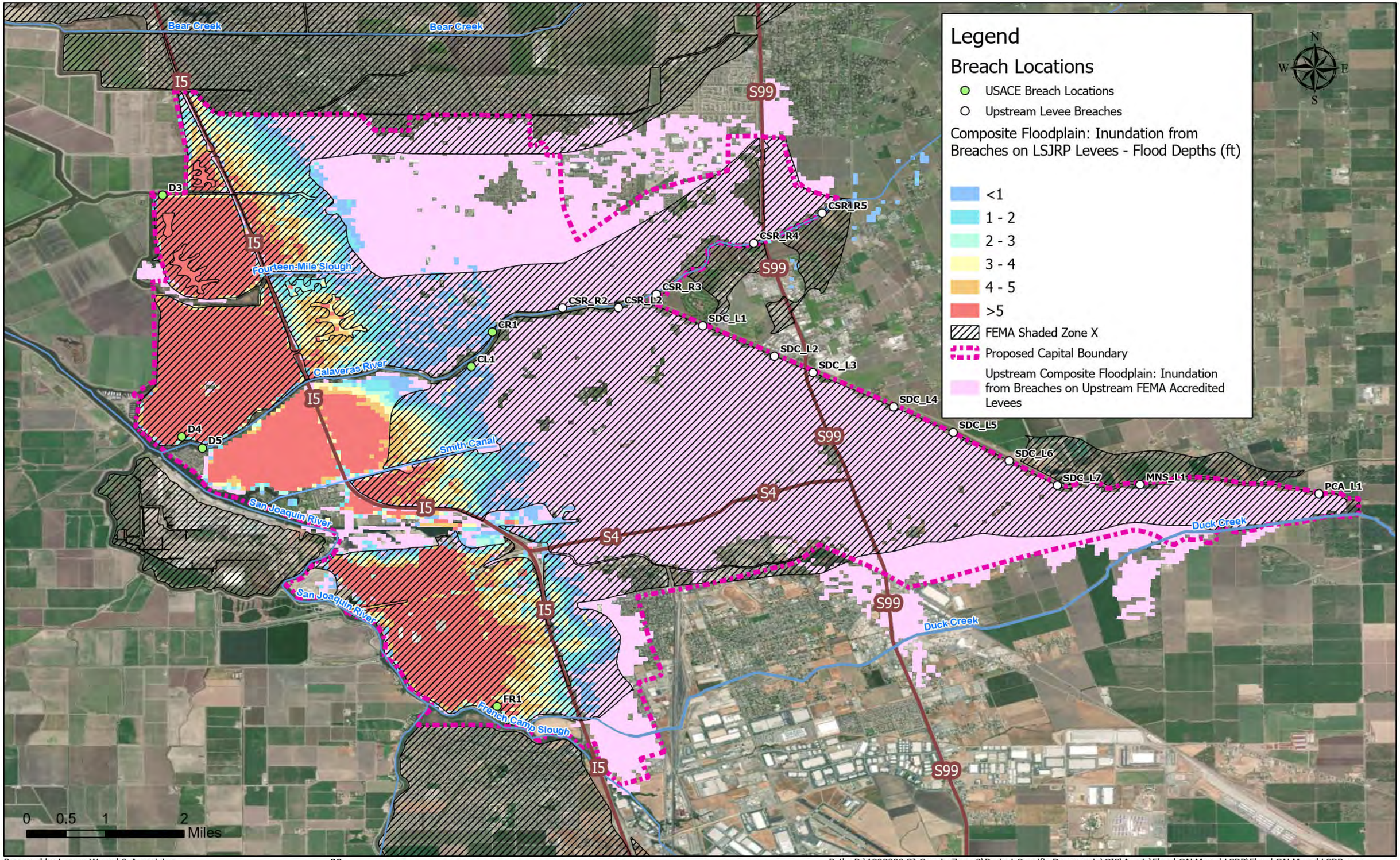
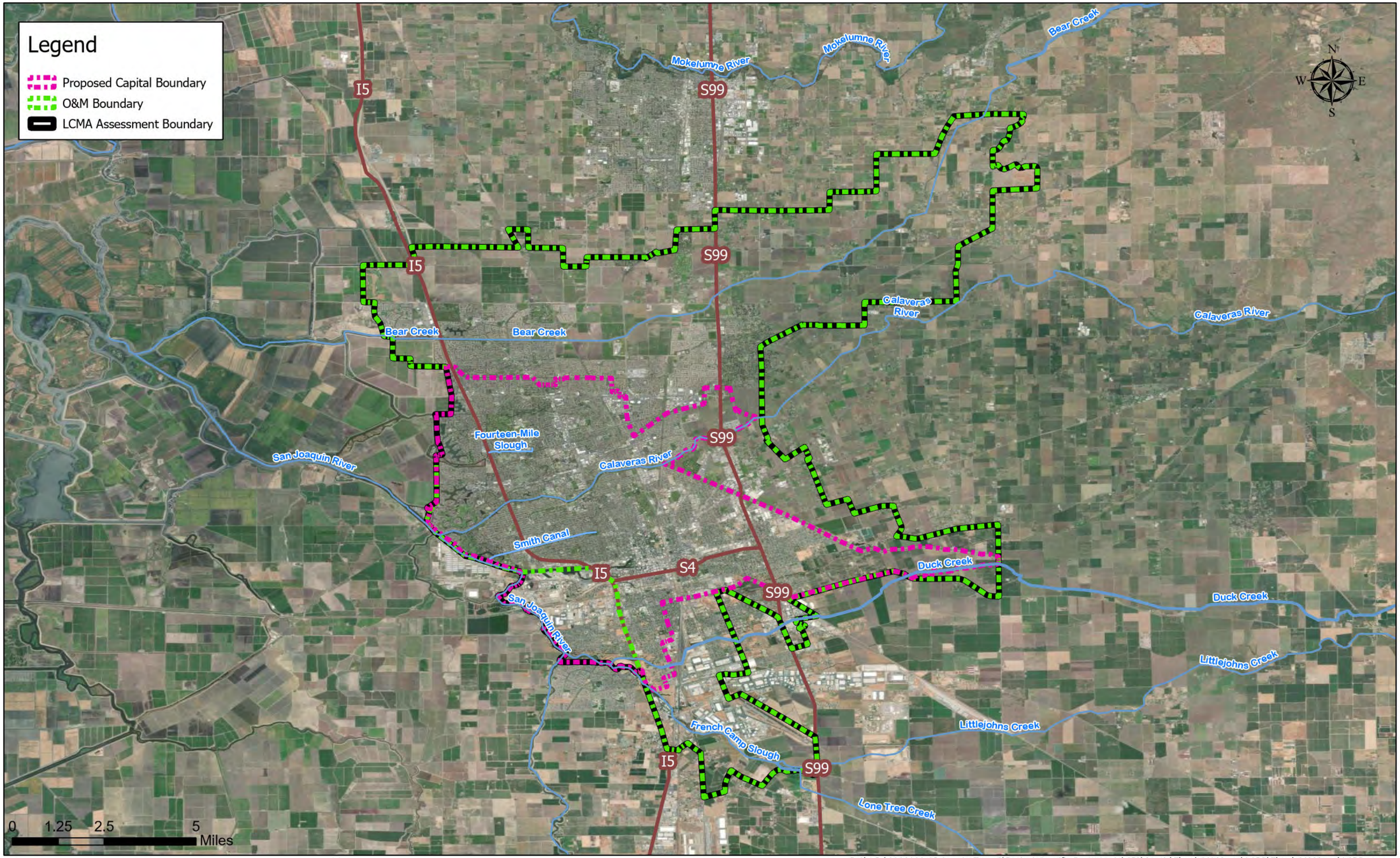


Figure 5: LCMA Area of Benefit - Levee Capital & O&M Services



The special benefit conveyed to a parcel from Levee Capital and O&M Services (in terms of Levee Benefit Units) is based on the flood damage reduction received by the parcel due to the decreased likelihood of flooding caused by a levee failure.

The methodology for calculating Levee Capital and O&M Benefit Units for each parcel utilizes the following property characteristics:

1. The size (acreage) of each parcel;
2. The Land Use Category assigned to each parcel;
3. The average structure size (square footage) per acre for each Land Use Category or sub-Category;
4. The depth of flooding from each breach scenario affecting the parcel;
5. The Relative Land Damage Rate per acre;
6. The Structure Damage Rate per square foot;
7. Whether the parcel was located within the prior SCAAD Assessment; and
8. Length of levee represented by each breach scenario (for Levee O&M Services for Zone 9 Project levees only).

A minimum flood damage reduction benefit was determined for all parcels with more than 95% of their area included within the Boundary. The minimum benefit was applied in the event a parcel's calculated flood damages was less than the minimum calculated benefit. This approach accounts for uncertainty in the model as a result of utilizing a finite number of flood breach analyses where a parcel's resulting inundation was nominal. This minimum benefit calculation is further described on Page 34.

Property Characteristics

The following property characteristics were developed for apportioning benefit. A summary of the property characteristics data is provided in **Table 6.**

Land Use Categories

Multiple land use codes are used by the San Joaquin County Assessor to categorize the properties within the boundaries. Each land use code was evaluated and assigned to a generalized Land Use Category (e.g.: Agricultural, Single-Family Residential, Commercial, etc.) for the purpose of identifying characteristics of each category for use in apportioning special benefit (**Appendix E**). A random sample of parcels for each County land use code was analyzed by reviewing aerial photographs to ensure that it had been assigned to the appropriate Land Use Category. The Land Use Categories are generally described as follows:

Agricultural land was characterized as large productive or unproductive land outside the urban area. No differentiation was made to differentiate between the crop types or use for livestock grazing.

Blended parcels are large parcels with multiple land uses present. The characteristics of these parcels are typically unique and require dedicated apportionment factors that are weighted by the portion (percent) of the parcel associated with each land use. An example would be a single large lot zoned as commercial that is half developed for a commercial use and the other half is vacant.

Table 6
Levee Capital and Maintenance Assessment (LCMA)
Summary of Assessed Property Characteristics

Land Use Category	Parcel Count	Total Acres
Agricultural	767	23,767
Blend	40	1,886
Commercial	3,378	3,124
Industrial	944	3,043
Mobile Home	143	304
Multi-Family Residential	5,904	1,336
Open Space	2,575	6,640
Open Space - Developed	3,432	3,375
Rural Residential	1,071	3,292
School	166	1,311
Single-Family Residential	75,741	14,159
Total	**94,161**	**62,236**

Source: Parcel Quest, San Joaquin County GIS and R&F Engineering

Commercial is characterized by properties with office, retail or public service buildings. This Land Use Category includes hotels, shopping centers, restaurants, offices, hospitals, etc. Some parcels within this Land Use Category have been assigned to a sub-category of Commercial Building Only. Parcels in this sub-category are commercial parcels with minimal acreage dedicated to parking and common areas within a larger commercial development. Parcels in this sub-category have adjacent parcels dedicated to supporting parking and other common areas associated with commercial uses.

Industrial is characterized by manufacturing, storage and processing facilities. This Land Use Category includes warehouses, manufacturing, processing, distribution, and public utilities.

Mobile Home Park is exclusively properties designed specifically for multiple mobile home structures. This category also includes individual parcels with Mobile Home Residential structures.

Multi-Family Residential is characterized as four or more dwelling units on a parcel. This Land Use Category includes apartments, condominiums, and townhouses. Condominium parcels within this Land Use Category have been assigned to a sub-category of Multi-Family Residential Condominium. Parcels in this sub-category are parcels designated as Condominium Units (Code 11) or Planned Unit Residential Development (Code 12) by the San Joaquin County Assessor. Parcels in this sub-category have minimal acreage not covered by structures and have adjacent parcels with open areas.

Open Space is characterized by properties with limited hardscape, without structures, that have been developed for their ultimate use. This Land Use Category includes parks, sports fields, bike paths, common areas, etc.

Open Space Developed is characterized by properties that do not have a structure, however, are generally ready to be built on. This Land Use Category includes parcels in developed areas that have been prepared for construction, parcels that are generically described as "vacant", and parcels that are entirely used as a parking lot.

Rural Residential are large lots with a Single-Family Residential structure outside the urban areas with limited amount of hardscape.

School properties are characterized as educational campuses, but do not include conversion of other land use categories for education activities (i.e. a commercial parcel utilized by a trade school). School properties can be public or private.

Single-Family Residential properties are characterized by three or fewer single-family dwelling structures on a parcel. This Land Use Category includes land with duplex and triplex buildings as they generally have the same physical characteristics as other single-family residences.

Parcel Size

The size of the parcel is used to appropriately apportion the special benefit from Levee Capital and O&M Services. Parcel data was obtained from San Joaquin County Assessor's data acquired through ParcelQuest. Parcel data was also obtained from the San Joaquin County Community Development Department GIS group

shapefiles. Where any significant discrepancy existed between the two sources, satellite imagery was used to measure and identify the more reliable source.

Average Structure Size per Land Use Type

Structure sizes were obtained from San Joaquin County Assessor's data acquired through ParcelQuest. The average structure size was calculated by summing the total square footage from all parcels for each land use and dividing by the total acres of all parcels with structures for each land use. **Table 7** summarizes the number of parcels, total parcel acreage and total structure square-footage of the parcels used to determine the average structure size associated with each Land Use Category.

Levee Capital and O&M Benefit Units

In general, flood damages were quantified for land and structures based on the depth of flooding. Levee O&M Benefit Units are calculated based on the levee breach modeling performed by R&F, as discussed above. Levee Capital Benefit Units were calculated utilizing the Feasibility Study floodplain modeling and floodplain modeling utilized to determine the extent of the Capital Boundary, as discussed above. Benefit unit calculations for each of these components are presented below, and then these two components are normalized to determine the total benefit units from both services.

Levee O&M Benefit Units

Levee O&M Benefit Units (OBU) are equal to the avoided flood damage to a parcel as a result of the Levee O&M Services associated with the Zone 9 Project levees. For the purpose of this assessment, flood damages were quantified for land and structures based on the depth of flooding from each of the breach scenarios.

The OBU for each property is calculated using the following formula:

OBU = Total [Weighted Flood Damage] for all Breach Scenarios

Where, for each Breach Scenario:

Weighted Flood Damage = [Avoided Flood Damage] x [Representative Levee Length]

Avoided Flood Damage = [Levee Breach Damage]

Levee Breach Damage = [Land Damage] + [Structure Damage]

Land Damage = [Parcel Size] x [Relative Land Damage Rate per Acre$_{\text{by land use}}$]

Structure Damage = [Average Structure SQFT] x [Parcel Size] x [Structure Damage Rate$_{\text{by structure type}}$]

Minimum OBU within Zone 9

For parcels within the Boundary shown in **Figure 5** (Page 30) that have been determined to benefit from Zone 9 levee maintenance but not inundated by any of the individual levee breach analysis scenarios, a minimum LBU is calculated as follows:

OBU = [1,000 ft of Levee] x [Parcel Size] x [Relative Land Damage Rate]

Table 7
Levee Capital and Maintenance Assessment (LCMA)
Average Structure Size per Acre

Land Use Category	Parcel Count [1]	Acres	Structure Sq. Ft.	Average Structure Sq. Ft/Acre
Agricultural	N/A	N/A	N/A	N/A
Blend	N/A	N/A	N/A	N/A
Commercial	865	1,078	9,531,904	8,800
Commercial Building Only [2]	140	41	1,522,633	36,800
Industrial	407	1,351	16,827,510	12,400
Mobile Home	108	153	156,072	1,000
Multi-Family Residential	2,106	1,065	17,644,638	16,500
Multi-Family Residential Condominium [3]	3,625	94	4,050,564	43,000
Open Space	N/A	N/A	N/A	N/A
Open Space - Developed	N/A	N/A	N/A	N/A
Rural Residential	1,027	3,096	2,048,467	600
School	29	233	516,174	2,200
Single-Family Residential	75,453	13,976	126,523,952	9,000

[1] Includes only parcels with structure building sq. ft for the purpose of calculating average structure sq. ft. per parcel.

[2] Represents commercial parcels with minimal acreage dedicated to parking and common areas within commercial developments. Parcels in this sub-category of commercial have adjacent parcels dedicated to supporting parking and other common areas within a larger commercial development. As a result the Average Structure / Sq. Ft. is much higher than the remaining parcels in the balance of the Commercial Land Use Category.

[3] Represents residential multi-family condominiums, specifically San Joaquin County use code 11 and 12. Parcels in this Multi-Family Residential sub-category have minimal acreage not covered by structures and have adjacent parcels with open areas. As a result the Average Structure / Sq. Ft. is much higher than the remaining parcels in the balance of the Multi-Family Residential Land Use Category.

Source: Parcel Quest, San Joaquin County GIS and R&F Engineering

Relative Land Damage Rate per Acre

The Relative Land Damage Rate per Acre represents the relative damage to site improvements (e.g. landscaping, utilities, etc.) that occurs as a result of inundation and deposition of sediment carried in floodwaters. The Relative Land Damage Rate per Acre was determined by assigning a Relative Land Value per Acre to each land use category and applying a 10% damage factor to the Relative Land Value per Acre. **Table 8** summarizes the Relative Land Damage Rate for each Land Use Category.

Structure Damage Rate

The Structure Damage Rate is calculated based on the methodology used in the UASCE Flood Damage Analysis (FDA) program. The FDA program assigns a relative Structure Replacement Value according to type of structure and estimates the percent structure damage based on the depth of flooding. Similarly, the FDA program assigns a relative Contents Replacement Value according to type of structure and estimates the percent of contents damage based on the depth of flooding (**Table 9** & **Table 10**). **Table 11** summarizes the OBU's by Land Use Category. Because an average structure size rate per acre was utilized for calculating structure damages, for the O&M Benefit unit calculations, the structure sizes calculated were capped at 5,000 square feet per parcel for single family residential.

Levee Capital Benefit Units

Levee Capital Benefit Units (CBU) are equal to the avoided flood damage to a parcel as a result of the Levee Capital Services. For the purpose of this assessment, flood damages were quantified for land and structures based on the depth from the without LSJRP hydraulic modeling and also through preventing flooding within this same leveed area due to the failure of a FEMA 100-year accredited levee.

The CBU for each property is calculated using the following formula:

CBU = Total Avoided Flood Damage

Avoided Flood Damage = [Levee Breach Damage] x SCAAD Factor

SCAAD Factor = 0.852

Levee Breach Damage = [Land Damage] + [Structure Damage]

Land Damage = [Parcel Size] x [Relative Land Damage Rate per Acre$_{\text{by land use}}$]

Structure Damage = [Average Structure SQFT] x [Parcel Size] x [Structure Damage Rate$_{\text{by structure type}}$]

Minimum flood depth

All parcels, which reside in the Capital Boundary floodplain receive flood protection benefits from FEMA accredited levees. As such, all parcels within the Capital Boundary of the Proposed Assessment are assumed to have a minimum flood depth of 1' for the purpose of calculating avoided flood damage to approximate the special benefit associated with regulatory accreditation.

Table 8
Levee Capital and Maintenance Assessment (LCMA)
Relative Land Damage Rate

Land Use Category	Relative Land Value per Acre A [1]	Relative Land Damage Per Acre B = A X 10%
Agricultural [2]	$25,000	$2,500
Commercial	$70,000	$7,000
Industrial	$70,000	$7,000
Mobile Home	$50,000	$5,000
Multi-Family Residential	$70,000	$7,000
Open Space	$10,000	$1,000
Open Space - Developed	$40,000	$4,000
Rural Residential	$25,000	$2,500
Single-Family Residential	$50,000	$5,000
School	$41,000	$4,100

[1] Relative land value based on previous Engineer's Reports prepared in the region.
[2] Includes Crop Damage.

Table 9
Levee Capital and Maintenance Assessment (LCMA)
Structure Replacement Value and Depth Damage

Land Use		Structure Replacement Value	Percent of Structure Damaged															
Depth			**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Agricultural	[1]	$111.67	11.4%	19.3%	26.5%	33.2%	39.3%	44.7%	49.7%	54.1%	58.0%	61.5%	64.5%	67.1%	69.3%	71.2%	72.7%	74.0%
Commercial	[2]	$85.56	7.0%	21.7%	30.2%	31.2%	32.4%	32.4%	39.8%	42.8%	51.7%	53.1%	54.1%	61.8%	64.8%	64.8%	65.5%	86.1%
Industrial	[4]	$54.51	7.0%	21.7%	30.2%	31.2%	32.4%	32.4%	39.8%	42.8%	51.7%	53.1%	54.1%	61.8%	64.8%	64.8%	65.5%	86.1%
Mobile Home	[5]	$45.85	9.9%	44.7%	45.7%	96.5%	96.5%	96.5%	96.5%	96.5%	96.5%	96.5%	96.5%	96.5%	96.5%	96.5%	96.5%	96.5%
Multi-Family Residential	[6]	$84.40	11.4%	19.3%	26.5%	33.2%	39.3%	44.7%	49.7%	54.1%	58.0%	61.5%	64.5%	67.1%	69.3%	71.2%	72.7%	74.0%
Open Space		$0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Open Space - Developed		$0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Rural Residential	[7]	$111.67	11.4%	19.3%	26.5%	33.2%	39.3%	44.7%	49.7%	54.1%	58.0%	61.5%	64.5%	67.1%	69.3%	71.2%	72.7%	74.0%
Single-Family Residential	[8]	$111.67	11.4%	19.3%	26.5%	33.2%	39.3%	44.7%	49.7%	54.1%	58.0%	61.5%	64.5%	67.1%	69.3%	71.2%	72.7%	74.0%
School	[3]	$144.46	7.0%	21.7%	30.2%	31.2%	32.4%	32.4%	39.8%	42.8%	51.7%	53.1%	54.1%	61.8%	64.8%	64.8%	65.5%	86.1%

[1] Source: Table B-33 - Good Status for Single Family Residential
[2] Source: Table B-9 - Good Status for Commercial Retail
[3] Source: Table B-29 Good Status for Public and Private Schools
[4] Source: Table B-21 - Good Status for Industrial Light
[5] Source: Table B-25 - Good Status for Mobile Home
[6] Source: Table B-26 - Good Status Construction Class and Quality for Multi-Family Residential
[7] Source: Table B-33 - Good Status for Single Family Residential
[8] Source: Table B-33 - Good Status for Single Family Residential

Source: Table C-1 2012 CVFPP HEC-FDA Structure and Damage Functions - CVFPP Attachment 8F Flood Damage Analysis

Table 10
Levee Capital and Maintenance Assessment (LCMA)
Contents Replacement Value and Depth Damage

Land Use		Structure to Contents Ratio	Percent of Contents Damaged															
Depth			**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Agricultural	[1]	50%	6.6%	11.0%	15.1%	18.8%	22.1%	25.1%	27.7%	30.1%	32.1%	33.8%	35.2%	36.3%	37.2%	37.8%	38.2%	38.5%
Commercial	[2]	51%	0.0%	79.8%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Industrial	[4]	31%	0.2%	87.6%	96.4%	99.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mobile Home	[5]	50%	0.0%	85.0%	95.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Multi-Family Residential	[6]	50%	6.6%	11.0%	15.1%	18.8%	22.1%	25.1%	27.7%	30.1%	32.1%	33.8%	35.2%	36.3%	37.2%	37.8%	38.2%	38.5%
Open Space		0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Open Space - Developed		0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Rural Residential	[7]	50%	6.6%	11.0%	15.1%	18.8%	22.1%	25.1%	27.7%	30.1%	32.1%	33.8%	35.2%	36.3%	37.2%	37.8%	38.2%	38.5%
Single-Family Residential	[8]	50%	6.6%	11.0%	15.1%	18.8%	22.1%	25.1%	27.7%	30.1%	32.1%	33.8%	35.2%	36.3%	37.2%	37.8%	38.2%	38.5%
School	[3]	38%	0.0%	87.8%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

[1] Source: Table B-33 - Good Status for Single Family Residential
[2] Source: Table B-9 - Good Status for Commercial Retail
[3] Source: Table B-29 Good Status for Public and Private Schools
[4] Source: Table B-21 - Good Status for Industrial Light
[5] Source: Table B-25 - Good Status for Mobile Home
[6] Source: Table B-26 - Good Status Construction Class and Quality for Multi-Family Residential
[7] Source: Table B-33 - Good Status for Single Family Residential
[8] Source: Table B-33 - Good Status for Single Family Residential

Source: Table C-1 2012 CVFPP HEC-FDA Structure and Damage Functions - CVFPP Attachment 8F Flood Damage Analysis

Table 11
Levee Capital and Maintenance Assessment (LCMA)
Summary of Resulting Levee Benefit Units

Land Use Category	O&M Benefit Units (OBU) A	Capital Benefit Units (CBU) B	Total Levee Benefit Units (LBU) C = A/30 + B
Agricultural	77,923,914	4,377,700	6,975,164
Blended	214,830,020	118,795,205	125,956,206
Commercial	4,003,482,162	456,928,315	590,377,720
Industrial	3,830,507,661	217,399,407	345,082,995
Mobile Home	21,631,953	3,114,756	3,835,821
Multi-Family Residential	4,020,218,444	480,368,762	614,376,044
Open Space	16,772,254	2,029,262	2,588,337
Open Space - Developed	50,095,586	7,698,085	9,367,938
Rural Residential	78,371,947	2,274,568	4,886,966
School	574,720,144	73,039,324	92,196,663
Single-Family Residential	22,450,511,025	2,863,250,973	3,611,601,341
Total	**35,339,065,110**	**4,229,276,358**	**5,407,245,195**

Source: As calculated by Larsen Wurzel & Associates, inc.

Relative Land Damage Rate per Acre

As defined under OBU methodology, the Relative Land Damage Rate per Acre represents the relative damage to site improvements (e.g. landscaping, utilities, etc.) that occurs as a result of inundation and deposition of sediment carried in floodwaters. The Relative Land Damage Rate per Acre was determined by assigning a Relative Land Value per Acre to each land use category and applying a 10% damage factor to the Relative Land Value per Acre. **Table 8** (page 37) summarizes the Relative Land Damage Rate for each Land Use Category.

Structure Damage Rate

As defined under OBU methodology, the Structure Damage Rate is calculated based on the methodology used in the USACE Flood Damage Analysis (FDA) program. The FDA program assigns a relative Structure Replacement Value according to type of structure and estimates the percent structure damage based on the depth of flooding above the finish floor. Similarly, the FDA program assigns a relative Contents Replacement Value according to type of structure and estimates the percent of contents damage based on the depth of flooding (reference again, **Table 9** & **Table 10,** pages 38 and 39 respectively). **Table 11** (page 40) summarizes the CBU's by Land Use Category.

Because an average structure size rate per acre was utilized for calculating structure damages, for the Capital Benefit unit calculations, structure sizes were capped at 5,000 square feet per parcel for single family residential. When calculating the flood depth to a finished floor, a finish floor height elevation was assumed at 1' for all structures and 2' for mobile homes.

SCAAD Factor

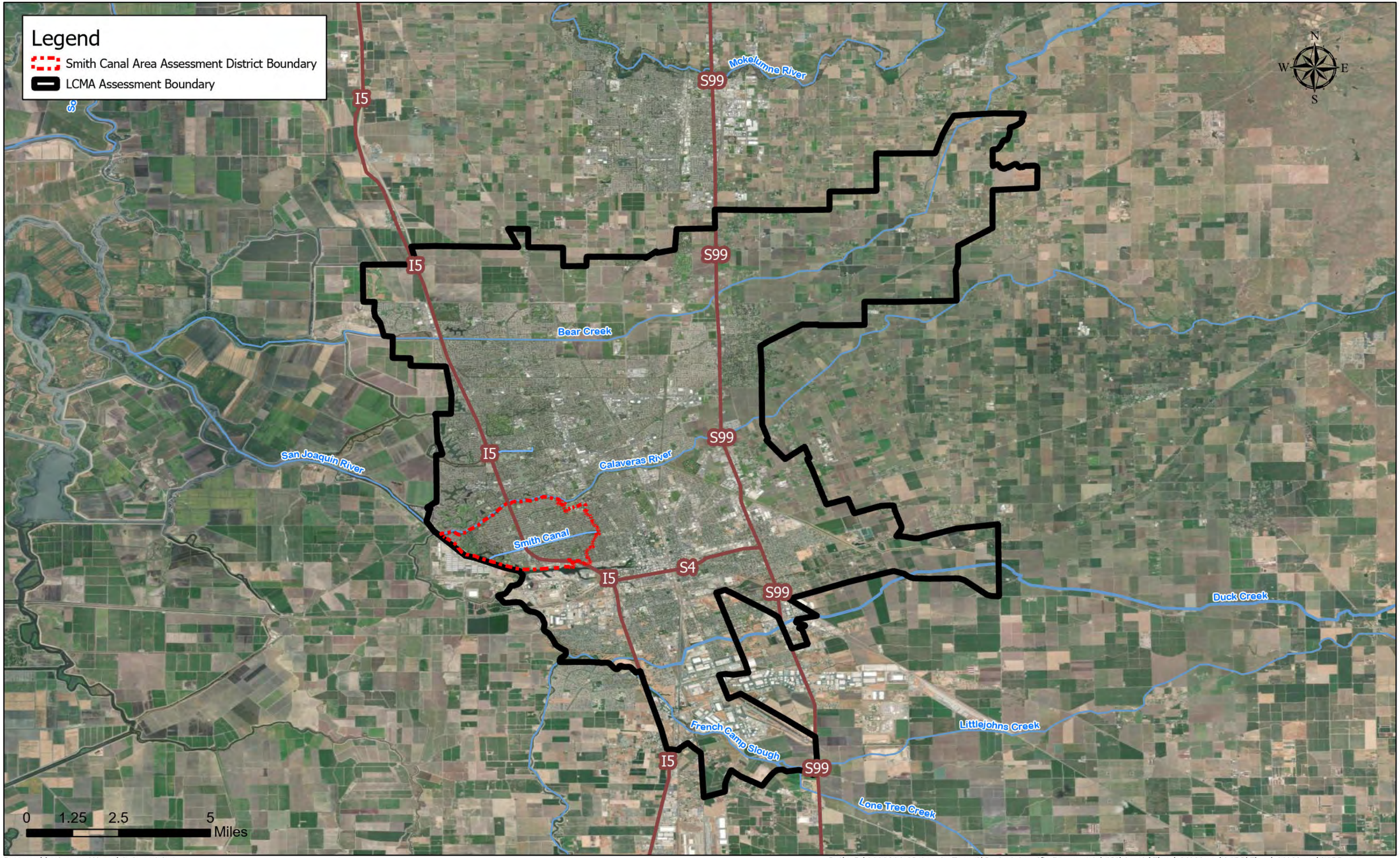
This factor is used to recognize the prior contribution of the SCAAD toward the implementation of the SCG Project. Those properties within the current SCAAD are given a SCAAD factor of 0.852 and those properties outside of the SCAAD assessment boundary are given a SCAAD factor of 1. The SCAAD factor of 0.852 was determined based on the ratio of the prior investments into the SCG Project by properties in the SCAAD, based on total annual assessment revenues provided to date, versus the investment required for the Levee Capital Services of this Proposed Assessment for the same benefitting parcels. When applied at 0.852, this factor reduces the special benefits received to account for the share of special benefits already delivered by properties in the SCAAD boundary to date and are now credited to the investment of funding for Levee Capital Services. For those properties within the SCAAD boundary (See **Figure 6**), the SCAAD factor is calculated as follows:

- SCAAD investment to date: approximately $17 Million
- SJAFCA 10.5% portion of LSJRP "first cost", adjusted for updated SCG cost, escalated to 2022 cost basis: approximately $115 Million
- Discount factor = 17/115 = 14.78%
- SCAAD Factor = 1 – 0.148
- **SCAAD Factor = 0.852**

Equivalent Levee Benefit Unit (LBU)

Benefit units have been calculated based on individual levee breaches for O&M Services and weighted by representative levee lengths. However, a composite floodplain boundary was utilized to determine the

Figure 6: Smith Canal Area Assessment District (SCAAD) Boundary



benefits from Capital Services because the capital project is considered a whole system of improvements. As a result of this approach, the total number of calculated OBU's is significantly larger than the calculated CBU's. As such an equivalency factor is needed to allow for a comparable equivalent levee benefit unit for which to serve as a basis for assessing the total special benefits and determining parcel-level assessment rates. Because O&M Services represent an ongoing service that will continue into the future and can considered on a single annual basis, and the Capital Services represent a shorter term but larger financed investment over time, the Assessment Engineer has considered the application of a factor related to the term of financing to equivocate the benefit units of the two services. The Assessment Engineer has utilized an equalization factor of 30:1, which is indicative of the capital financing term that is expected to be utilized for the Capital Services. To simply the application of the factor, and reduce the total number of calculated benefit units, the equalization factor is applied by dividing the OBU's by 30 as follows:

Total Equivalent Levee Benefit Units = Total OBU / 30 + Total CBU

Table 11 (page 40) summarizes the OBU's, CBU's and Total Levee Benefit Units (LBU's) by Land Use Category.

General Benefits

Thoroughfare Damages Calculation

As described above, the Levee Capital and O&M Services provide a general benefit to the public at large by protecting thoroughfares within the boundary of the Proposed Assessment from flood damages. The amount of general benefit associated with each thoroughfare was quantified by identifying the cost to repair the road because of the flood damages. San Joaquin County indicated that the average cost to repair flood damages for an entire reach of thoroughfare is approximately $5.00 per square-foot.

Table 12 lists the reaches of thoroughfares protected against flood damages by the Levee Capital and O&M Services; identifies the cross-street limits, reach length, and typical road width.

Table 13 calculates the general benefit from protecting thoroughfares by multiplying the area of thoroughfare pavement by the estimated cost to repair flood damages. The general benefit from protecting all thoroughfares was calculated to be 24,470,000 equivalent Levee Benefit Units.

Federal Properties

Federally owned properties, such as the United States Post Office in Stockton, receive a special benefit from the Levee Capital and O&M Services and are included in the apportionment of special benefit. The benefit for all federally owned properties is calculated as 458,523 equivalent Levee Benefit Units. However, federal law prohibits local agencies from collecting assessments due from the federal government. The lost revenue cannot be reapportioned to assessed property owners. Therefore, the benefits of Levee Capital and O&M Services provided by protecting these federally owned properties against flood damages are treated similar to general benefits, and the lost assessment revenue must be funded by other revenue sources.

Table 12
Levee Capital and Maintenance Assessment (LCMA)
Protected Throughfares

Throughfare	Reach Description	Reach Length (ft)	Width (ft)	Total SQFT
		A	B	C = A X B
HWY 99	Diverting Canal to Carpenter Road	22,800	120	2,736,000
HWY 4	SJR River to I-5	9,000	50	450,000
HWY 4	Main Street to HWY 99	8,200	120	984,000
Charter Way	I-5 to HWY 99	18,100	40	724,000
Total				**4,894,000**

Source: GIS Imagery

Table 13
Levee Capital and Maintenance Assessment (LCMA)
Thoroughfare General Benefit Calculation

Thoroughfare SQFT	Repair Rate per SQFT	Total General Benefit from Thoroughfares
A	B	C = A X B
Reference Table 11	[1]	
4,894,000	$5.00	24,470,000

[1] Based on input from San Joaquin County Public Works

Evaluation of Funding Sources for General Benefit

Together, the federal properties and thoroughfares amount to 24,928,523 units in general benefit. The total revenue required to fund the total general benefit is $40,834, using the special benefit assessment calculation found in the next section.

- Protecting thoroughfares: $40,074
- Special benefit to federally owned property: $750

Because other funding sources are provided for Levee Capital and O&M Services including from USACE and DWR, as well as San Joaquin County property tax apportionment revenues, this funding can be applied to the general benefits provided by the Services. In short, these funding sources are sufficient to fund the general benefit occurring within the area.

Proposed Special Benefit Assessment Calculation

To determine the proposed assessment for an individual parcel, the amount of Levee Benefit Units (LBU) for the parcel is calculated and multiplied by the assessment rate per LBU. The proposed assessment rate per LBU is equal to the required annual budget divided by the total quantity of LBU's as shown on **Table 14**. All factors required to calculate each Parcel's LBU have been described above and can found in the provided tables and appendices. The proposed assessment rate per LBU is **$0.001415** / LBU.

Example Parcel Assessment

Using the proposed parcel assessment equation and supporting LBU equations as well as parcel attributes including parcel size, average structure size, relative land damage rate per acre, structure damage rate per square foot, and finally the proposed assessment rate, an individual parcel's assessment can be calculated.

Assessments are rounded down to the closest multiple of $0.02 as required by the San Joaquin County Assessor's office for submission of the special assessment roll for collection on County Property Tax Bills.

The following list of steps are taken to calculate a parcel's assessment:

Step 1 – Determine the Parcel Size, Land Use, Breach Name, Representative Levee Length.

Step 2 – Using **Table 7**, determine the Average Structure Size.

Step 3 – Using **Table 8**, determine the Relative Land Damage Rate per Acre.

Step 4 – Using **Table 9**, determine the Structure Damage Rate per Square Foot.

Step 5 – Using **Table 10**, determine the Contents Damage Rate per Square Foot.

Step 6 – Calculate the Parcel **OBU** using **Equation 1.**

Step 7 – Calculate the Parcel **CBU** using **Equation 2.**

Step 8 – Determine if the parcel is within the previous SCAAD boundaries and add SCAAD Factor.

Step 9 – Calculate the Parcel **LBU** using **Equation 3**

Table 14
Levee Capital and Maintenance Assessment (LCMA)
Initial Proposed Assessment Rate Calculation - FY 2023/24

FY 2023/24 Budget	Total Benefit Units	Proposed FY 2023/24 Assessment Rate
A	**B**	**C = A /B**
Reference Table 4	Reference Tables 11 & 13 [1]	
$7,684,000	5,431,715,195	$0.001415

[1] Includes benefit from thoroughfares and federal properties.

Step 10 – Calculate the parcel assessment using **Equation 3.**

Step 11 – Round down to the closest multiple of $0.02. Raise up to $ 2.00 if it is less than the minimum[8]

A detailed example parcel assessment calculation is included at the end of this report on **Table 16** (Page 55)**.**

Summary of Assessments

A detailed listing by Assessor's parcel number of the assessments is included in **Appendix F.** The proposed assessments are summarized by Land Use Category in **Table 15**.

Special Considerations

Public Parcels

Consistent with the requirements of Proposition 218, all publicly owned parcels are assessed proportionately based upon the special benefits they receive from services provided by the proposed assessment. That is, public parcels are treated the same as privately owned parcels for assessment calculation purposes. To calculate assessments for these parcels, a land use category was assigned to each public parcel based on its current use.

As noted previously, the benefits received by Federally owned parcels are treated the same a general benefits. Because the assessments will not be collected from Federally owned parcels, the lost revenues from must be funded from an alternate sources similar to other general benefits.

Multiple Use Parcels

A property that is determined to have multiple uses but is classified under a single use code by the San Joaquin County Assessor that is not consistent with the multiple uses may be eligible to have its assessment calculated as if it were two or more parcels ("sub-parcels") with varying structure and land uses types for the purpose of apportioning benefit. The assessments of the sub-parcels would then be combined to represent a single assessment for the purpose of assessment balloting, direct billing and/or submission of the roll to the San Joaquin County Auditor for collection on the secured property tax roll.

Minimum Assessment Amount

The Agency has determined that the collection of very small annual assessments can result in a net loss to the Agency due to the costs of processing. It light of the legal obligation to ensure that property owners pay assessments in proportion to the special benefit they receive, the Agency has determined that waiving those very small assessments is not legally permissible. The Agency has therefore set a minimum assessment at $2.00. The minimum annual assessment will be $2.00 per parcel to reflect the cost to administer the Assessment Roll. All annual assessments calculated to be less than $2.00 will be raised to the $2.00 minimum. If the additional revenue collected by the SJAFCA due to the minimum assessment exceeds the cost to administer the Assessment Roll, the funds will be added to the reserve fund for the LCMA's Services.

[8] Reference Minimum Assessment Amount discussion below.

Table 15
Levee Capital and Maintenance Assessment (LCMA)
Summary of Proposed FY 2023/24 Assessments by Land Use Category

Land Use Category	Parcel Count	Average Assessment	Proposed FY 2023/24 Assessment [1]	Share of Total Assessment
Agricultural	767	$14	$10,618	0.1%
Blended	40	$4,455	$178,193	2.3%
Commercial	3,378	$247	$835,681	10.9%
Industrial	944	$517	$488,452	6.4%
Mobile Home	143	$38	$5,479	0.1%
Multi-Family Residential	5,904	$147	$870,219	11.3%
Open Space	2,575	$3	$7,673	0.1%
Open Space - Developed	3,432	$5	$16,516	0.2%
Rural Residential	1,071	$8	$8,255	0.1%
School	166	$786	$130,484	1.7%
Single-Family Residential	75,741	$68	$5,132,808	66.8%
Total	**94,161**	**$82**	**$7,684,376**	**100.0%**

[1] Includes $2 minimum assessment.

Application of the Assessment Boundary to Parcels

The Assessment Boundary described above represents a boundary driven by the hydraulics associated with flooding. The hydraulic floodplain does not align with the parcel boundaries as they are configured, assessed, and taxed by the County. The Assessment Engineer has determined that those parcels with 95% of their land area located within the Assessment Boundary will be subject to the Assessment. While the hydraulics are not expected to change significantly over time, parcel boundaries can and do change regularly. As a result, the area subject to the collection of the assessment will not align with the boundary of the assessment. The application of the Assessment Boundary to the then current set of parcels will take place annually as part of the assessment administration process.

Updating the Annual Assessment Roll

Recalculating individual property assessments will accommodate changes within LCMA over time. These changes can result from the development activity such as recordation of subdivision maps, zoning changes, conditional use permits, and lot splits or mergers. Placement of a structure on an undeveloped parcel or other changes to improvements on a parcel may trigger a recalculation of the assessment if there is a change in the land use category.

It is recognized that when compiling data for the tens of thousands of parcels within the assessment boundary, the data[9] used to derive individual parcel characteristics may not be accurate and may not precisely fit the intent of the Assessment Engineer thus leading to errors and/or circumstances that result in inaccurate assessment calculations on annual basis. Where such circumstances are discovered, either by the persons administering the assessment district or by the owners of the properties affected, SJAFCA staff shall review such circumstances and determine if corrections or adjustments are appropriate. Any such corrections or adjustments are to be consistent with the concept, intent, and parameters of the methodology for the assessment as set forth within this Engineer's Report without formal approval by the SJAFCA Executive Director. Unless such proposed changes are appealed to the SJAFCA Executive Director and determined not to be acceptable, they will be incorporated into the Assessment Roll.

[9] The Assessment Engineer has utilized data compiled from the San Joaquin County Assessor to determine the individual property characteristics used as the basis for assessing and apportioning special benefit. While the data from the San Joaquin County Assessor is assumed to be accurate, its primary purpose is for use by the San Joaquin County Assessor and is subject to the Assessor's standards for accuracy and update. As a result, the information may be inaccurate and not reflect the actual property characteristics of every parcel.

6. ASSESSMENT ADMINISTRATION

Schedule for Collection

If property owners approve the proposed assessment, SJAFCA intends to commence collection of the assessments in FY 2023/24. The assessment would be collected annually on the secured property tax rolls of San Joaquin County as described further below under "Duration of the Assessment" (Page 52).

The annual administrative expenses of LCMA would also be funded through the annual levy of assessments. Ongoing administrative expenses would include the annual calculation and preparation of the assessment roll, the actual costs of collecting the annual assessments and the costs of responding to inquiries including the review and processing of any appeals.

Assessment Revenue Distribution

Assessment revenues are collected for O&M Services and Capital Services. Since SJAFCA is not a maintaining organization, SJAFCA will transfer revenues to local maintaining agencies or fund others (i.e. contract for services) for levee O&M Services.

SJAFCA will transfer funding for the O&M of the SJCFCWCD levees to SJCFCWCD, except for the cost incurred by SJAFCA for the administration of the assessment. SJAFCA and SJCFCWCD will arrange an agreement for funding transfers if the Proposed Assessment is approved.

SJAFCA will transfer funding for the additional O&M services associated with the LSJRP to the appropriate maintaining agency or contract with others for these services. Transfer of funds for additional O&M associated with the LSJRP will occur as particular capital improvement features are finished and turned over by USACE to the NFS for long-term maintenance. If the Proposed Assessment is approved, SJAFCA will setup agreements with applicable maintainers that detail out the responsibilities and funding transfer amounts.

Appeals of Assessments Levied to Property

Any property owner who believes his or her property should be reclassified and the assessment adjusted may file a written appeal with the SJAFCA Executive Director. Any such appeal is limited to correction of an assessment during the then-current fiscal year and future years.

All appeals must include a statement of reasons why the property should be reclassified and may include supporting evidence. On the filing of any such appeal, the Executive Director will direct staff to promptly review the appeal and any information provided by the property owner and may investigate and assemble additional evidence necessary to evaluate the appeal. If the Executive Director finds that the assessment should be modified, the appropriate changes will be made to the assessment roll for the following fiscal year. Any such changes approved after the assessment roll has been filed with the County for collection, will not result in a refund of the current or any prior year's assessments paid before the appeal was filed unless so directed by the Executive Director.

Impact of Appeals

The majority of the data being used to generate the assessment rates for specific parcels comes from the San Joaquin County Assessor. Because the main purpose of the Assessor in compiling this data is not to support this and other Special Benefit Assessment efforts but rather to determine Assessed Value for the purpose of administering the County's Secured Tax Roll, the Assessment Engineer has worked to refine the Assessor's data so it properly reflects the conditions present in the physical benefit area. However, throughout the formation period (and indeed even after the formation of the assessment), data errors and discrepancies with the San Joaquin County Assessor data may surface and require modification of the assessment calculation for various parcels. Changes in the data without a corresponding change in the Assessment Rate established by this report will, by definition, change the total amount of assessments levied and collected in any one year. For example, if the data assumes the existence of a house that has since been destroyed and not been reconstructed, once the database is corrected the rates will generate a smaller total assessment. On the other hand, if the data assumes an empty lot where a house has since been constructed, once the database is corrected the rates will generate a larger total assessment. Due to the database being constantly refined (either through internal review or an external appeal process), it is infeasible to fine-tune the rates between the Preliminary Engineer's Report and the Final Engineer's Report. In addition, because changes to the database will either increase or decrease the total amount assessed, it is presumed that these amounts will roughly offset each other. Therefore, although minor changes to the database will continue to be made during the formation period, the rates proposed in this Report are not being fine-tuned, even though that will result in a total assessment which may be slightly less than or slightly more than the amount determined for the development of this report.

Duration of the Assessment

If approved by property owners in an assessment ballot proceeding conducted pursuant to Article XIIID Section 4 of the State Constitution and Government Code § 53750, *et. seq*., and subsequently approved by the SJAFCA Board of Directors, the assessment can be levied annually commencing FY 2023/24. The Executive Director will establish the assessment rate each year and while the assessment is only effective for that year, the assessment may be continued each year without another ballot proceeding with approval of the SJAFCA Board of Directors. The annual budget for Levee Capital Services will be collected by SJAFCA for 30 years following a final bond issuance which is expected in 2038. The budget for Levee O&M services will be collected each year that Levee O&M Services are provided, which is expected to be in perpetuity. On-going annual assessments cannot be increased without property owner approval, except for the annual escalation as described below.

Annual Escalation of the Assessments

To ensure that SJAFCA can provide the needed services over time, it is important to allow for an increase of the assessment over time to address the rising costs of labor, supplies, and materials. The Assessment Engineer has determined that an appropriate escalation factor is a factor that is reflective of rising labor costs and goods over time. Therefore, beginning in FY 2024/25, the maximum authorized assessment may be increased subject to an annual inflationary escalator pursuant to Government Code § 53739 (b), based on the annual change in the Consumer Price Index February to February CPI-W for San Francisco-Oakland-Hayward all Items, with Base Period 1982-84 = 100, published by the U.S. Department of Labor, Bureau of Labor

Statistics, subject to a minimum of zero percent and a maximum of 4% in any given year. The adjustment to the maximum authorized assessment would be applied to the prior year's annual assessment rate.

7. CONCLUSIONS

It is concluded that the proposed assessments do not exceed the reasonable cost of the proportional special benefit conferred on each property assessed.

_____

Scott L. Brown, P.E.

Table 16
Assessment Parcel Equations and Example Calculations

Equation 1: Levee O&M Benefit Units

$$Total\ OBU\ = OBU\ per\ breach\ for\ all\ breaches\ that\ affect\ the\ parcel$$
$$\mathbf{OBU}\ per\ breach = \ Representative\ Levee\ Length\ [1]\ \times\ \{(Parcel\ Size\ [2] \times Relative\ Land\ Damage\ Per\ Acre\ [3]) + \big(Average\ Structure\ Sq.Ft.per\ acre\ [4] \times Parcel\ Size\ [2] \times Structure\ Replacement\ Value\ [5] \times (Structure\ Depth\ Damage\ [5] + Structure\ to\ Contents\ Ratio\ [6] \times Contents\ Depth\ Damage\ [6])\big)\}$$

[1] Table 5; Parcels within the LCMA O&M Boundary without flood depths utilized a levee length of 1,000 and only receive land damage benefit.
[2] Assessor's Data
[3] Table 8
[4] Table 7
[5] Table 9
[6] Table 10

Equation 2: Capital Benefit Units

$$\mathbf{CBU}\ = \{(Parcel\ Size\ [2] \times Relative\ Land\ Damage\ Per\ Acre\ [3]) + (Average\ Structure\ Size\ per\ acre\ [4] \times Parcel\ Size\ [2] \times StructureReplacement\ Value\ [5] \times (\ Structure\ Depth\ Damage\ [5] +\ Structure\ to\ Contents\ Ratio\ [6] \times Contents\ Depth\ Damage\ [6]))\}$$
$$X\ SCAAD\ Factor\ [7]$$

[2] Assessor's Data
[3] Table 8
[4] Table 7
[5] Table 9
[6] Table 10
[7] Based on parcel location; see Figure 6.

Equation 3: Proposed Parcel Assessment

$$Parcel\ LBU\ = \frac{OBU}{30} + CBU$$

$$\mathbf{Calculated\ Parcel\ Assessment} = \boldsymbol{Parcel\ LBU} \times \boldsymbol{Assessment\ Rate\ per\ LBU}\ [\mathbf{8}]$$

[8] Table 14; **Assessment Rate per** LBU = $0.001415

Example Assessment Calculations

The following examples illustrate the application of the assessment equation to determine the annual assessment for several hypothetical properties.

Example 1

Consider a 0.16-acre single-family residential property the following property characteristics.

O&M Breach	Depth (ft)
Csr L3	8
Csr R1	1

Capital	Depth (ft)
100-Year	6

OBU Calculation

Land Use Category – Single-Family

From **Table 5**, Representative Levee Length: Csr L3- 2.6353 miles and Csr R1- 2.4215 miles

From **Table 7**, Average Structure Sq. Ft. – 9,000 sq ft per acre

From **Table 8**, the Relative Damage per Acre - $5,000 per acre

From **Table 9** and **Table 10**, the Structure Replacement Value - $111.67 per square foot; Structure Depth Damage 58.00% for 8 ft and 19.25% for 1 ft; Structure to Contents Ratio of 50.00%; Contents Depth Damage of 32.05% for 8ft and 11.00% for 1 ft

$$\begin{aligned}\boldsymbol{OBU}\ (\boldsymbol{Csr\ L3}) &= 2.6353\ miles\ \ x\ \{(0.16\ acres\ x\ \$5{,}000\ per\ acre)\\ &+\ (9{,}000\ sq\ ft\ per\ acre\ x\ 0.16\ acres\ x\ \$111.67\ x\ (58.00\% + 50\%\ X\ 32.05\%)\}\\ &=\ 315{,}817\end{aligned}$$

$$\begin{aligned}\boldsymbol{OBU}\ (\boldsymbol{Csr\ R1}) &= 2.4215\ miles\ x\ \ \{(0.16\ acres\ x\ \$5{,}000\ per\ acre)\\ &+\ 9{,}000\ sq\ ft\ per\ acre\ x\ 0.16\ acres\ x\ \$111.67\ x\ (19.25\% + 50\%\ X\ 11.00\%)\ \}\\ &=\ 98{,}309\end{aligned}$$

$$\textbf{Total OBU} = 315{,}817 + 98{,}309 =\ 414{,}126$$

CBU Calculation

From **Table 7**, Average Structure Size – 9,000 sq ft per acre

From **Table 8**, the Relative Damage per Acre - $5,000 per acre

From **Table 9** and **Table 10**, the Structure Replacement Value - $111.67 per square foot; Structure Depth Damage for 6 ft (5ft with finished floor) – 44.70%; Structure to Contents Ratio of 50.00%; Contents Depth Damage of 25.05% for 6 ft (5ft with finished floor)

SCAAD Factor of 1

$$\boldsymbol{CBU} = \{(0.16\ acres\ x\ \$5{,}000\ per\ acre) + (9{,}000\ sq\ ft\ per\ acre\ x\ 0.16\ acres\ x\ \$111.67\ x\ (44.7\% + 50\%\ x\ 25.05\%)\}\ x\ 1 = 92{,}820$$

$$\textbf{Total LBU} = 414{,}126/30 + 92{,}820 = 106{,}624$$

Assessment Calculation

$$\boldsymbol{Calculated\ Parcel\ Assessment} = (106{,}624\ x\ 0.001415) = 150.84$$

$$[\boldsymbol{Proposed\ Assessment}] = \$\mathbf{150.84}$$

<u>Example 2</u>

Assume a 1.5-acre commercial property the following property characteristics:

O&M Breach	Depth (ft)
Brc L2	3
Brc L3	4

Capital	Depth (ft)
100-Year	6

OBU Calculation

Land Use Category - Commercial

From Table 14, Representative Levee Length: Brc L2 – 2.7578 miles and Brc L3 – 0.9300 miles

From **Table 7**, Average Structure Size - 8,800 sqft per acre

From **Table 8**, the Relative Damage per Acre - $7,000 per acre

From **Table 9** and **Table 10**, the Structure Replacement Value - $85.56 per square foot; Structure Depth Damage 31.20% for 3 ft and 32.40% for 4 ft; Structure to Contents Ratio of 51.00%; Contents Depth Damage of 82.20% for 3ft and 83.40% for 4 ft

$$\boldsymbol{OBU\ (Brc\ L2)} = 2.7578\ miles\ x\ \{(1.50\ acres\ x\ \$7{,}000\ per\ acre) + (8{,}800\ sqft\ per\ acre\ x\ 1.5\ acres\ x\ \$85.56\ x\ (31.20\% + 51\%\ x\ 82.20\%)\} = 2{,}589{,}156$$

$$\boldsymbol{OBU\ (Brc\ L3)} = 0.9300\ miles\ x\ \{(1.50\ acres\ x\ \$7{,}000\ per\ acre) + (8{,}800\ sqft\ per\ acre\ x\ 1.50\ acres\ x\ \$85.56\ x\ (32.40\% + 51\%\ x\ 83.40\%)\} = 885{,}672$$

$$\textbf{Total OBU} = 2{,}589{,}156 + 885{,}672 = 3{,}474{,}828$$

CBU Calculation

From **Table 7**, Average Structure Size - 8,800 sqft per acre

From **Table 8**, the Relative Damage per Acre - $7,000 per acre

From **Table 9** and **Table 10**, the Structure Replacement Value - $85.56 per square foot; Structure Depth Damage for 6 ft (5ft with finished floor) – 32.40%; Structure to Contents Ratio of 51.00%; Contents Depth Damage of 83.40% for 6 ft (5ft with finished floor)

SCAAD Factor of 1

$$\boldsymbol{CBU} = \{(1.5\ acres\ x\ \$7{,}000\ per\ acre) + (8{,}800\ sqft\ per\ acre\ x\ 1.50\ acres\ x\ \$85.56\ x\ (32.40\% + 51\%\ x\ 83.40\%))\}\ x\ 1 = 952{,}413$$

Total LBU $= 3{,}474{,}828/30 + 952{,}413 = 1{,}068{,}241$

Assessment Calculation

$$\boldsymbol{Calculated\ Proposed\ Assessment} = (1{,}068{,}241\ x\ 0.001415) = 1{,}511.19$$

$$[\boldsymbol{Proposed\ Assessment}] = \$\mathbf{1{,}511.19}$$

San Joaquin Area Flood Control Agency

Levee Construction and Maintenance Assessment (LCMA)

Appendix A

KSN, Technical Memorandum, LCMA, Incremental O&M Costs LSJRP, February 23, 2023

SAN JOAQUIN COUNTY

Greatness grows here.

SAN JOAQUIN AREA FLOOD CONTROL AGENCY

San Joaquin Area Flood Control Agency

Date: March 16, 2023

KSN inc. KJELDSEN SINNOCK NEUDECK
CIVIL ENGINEERS & LAND SURVEYORS

Stephen K. Sinnock, P.E.
Christopher H. Neudeck, P.E.
Neal T. Colwell, P.E.
Barry O'Regan, P.E.

2494-0010
08-300

TECHNICAL MEMORANDUM

March 7, 2023
Revision 1

REGISTERED PROFESSIONAL ENGINEER
ERIK E. ALMAAS
NO. 61020
CIVIL
STATE OF CALIFORNIA
3/7/2023

Project: Levee Construction and Maintenance Assessment District

Subject: Incremental Operations and Maintenance Costs
Lower San Joaquin River Project

Prepared by: Erik E. Almaas, PE

Reviewed by: Christopher H. Neudeck, PE

1. Introduction

The San Joaquin County Flood Control and Water Conservation District (SJCFCWCD) and the San Joaquin Flood Control Agency (SJAFCA) are currently planning the Levee Construction and Maintenance Assessment (LCMA) District. The proposed assessment would provide funding for the following:

- Current budget deficiencies for operations and maintenance (O&M) of the existing Federal levee and channel facilities under the jurisdiction of SJCFCWCD within Zone 9.
- Local cost share for the capital costs for the Lower San Joaquin River Project (LSJRP).
- Incremental O&M costs resulting from the implementation of the LSJRP.

The evaluation of funding requirements for the first two components listed above is currently underway by Larsen Wurzel & Associates, Inc. (LWA). Kjeldsen, Sinnock & Neudeck, Inc. (KSN) has been requested to evaluate the third component listed above. This technical memorandum summarizes this evaluation and provides a summary of the results of the incremental O&M costs resulting from the implementation of the LSJRP.

2. Data Sources

The existing data sources that were utilized in this evaluation are as follows:

- U.S. Army Corps of Engineers (USACE). *San Joaquin River Basin, Lower San Joaquin River, CA, Final Integrated Interim Feasibility Report*. January 2018. (USACE Report)
- State of California, Department of Water Resources (DWR). *Flood System Long-Term Operations, Maintenance, Repair, Rehabilitation, and Replacement Cost Evaluation*, Central Valley Flood Protection Plan, 2017 Update. January 2017. (DWR Report)

3. Project Understanding and Assumptions

For the purposes of estimating incremental O&M costs associated with the LSJRP, the Recommended Plan (i.e., Alternative 7A) within the USACE Report was used as a basis for evaluation. The LSJRP consists of 20.4 miles of existing levees to be rehabilitated and 2.0 miles of new levees. A map of the proposed remediation measures and levee reach names used in this evaluation are shown below in Figure 1.

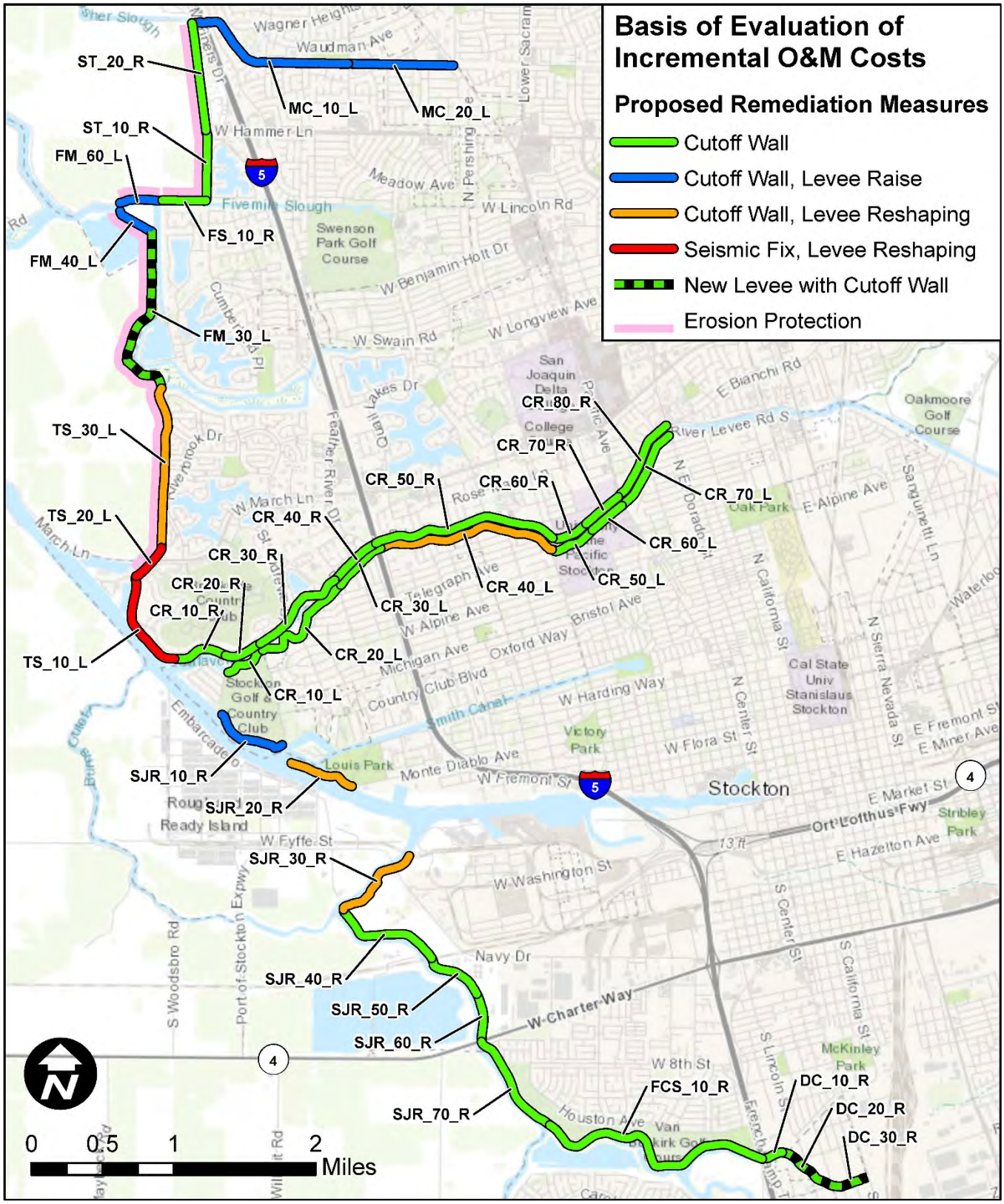


Figure 1 - Proposed Remediation Measures

The proposed new flood control measures within the LSJRP include the following:

- New levee
- New closure structure

The proposed remediation measures for the existing levees within the LSJRP include the following:

- Seepage cutoff wall
- Levee reshaping
- Seismic fix
- Levee raising
- Erosion protection

Long-term levee subsidence mitigation was also considered in evaluating the O&M costs. For the purposes of this Technical Memorandum, the evaluation of O&M costs attributed to the new closure structures at Smith Canal and Fourteenmile Slough was **not** performed. A breakdown of the proposed remediation measures on a levee reach-by-reach basis is summarized below in Table 1. A more detailed breakdown in included in Exhibit 1.

Table 1 - Summary of Proposed Remediation Measures

	Proposed Remediation Measure (1)							
Levee Reach	New Levee	Seepage Cutoff Wall	Levee Reshaping	Seismic Fix	Levee Raising	Erosion Protection	Subsidence Mitigation	**Levee Length** (miles)
Mosher Slough (left bank)								**1.96**
MC_10_L		x			x		x	1.22
MC_20_L		x			x		x	0.74
Shima Tract (right bank)								**1.25**
ST_10_R		x				x	x	0.47
ST_20_R		x				x	x	0.78
Fivemile Slough (right bank)								**0.31**
FS_10_R		x				x	x	0.31
Fourteenmile Slough (left bank)								**1.89**
FM_60_L		x			x	x	x	0.31
FM_40_L		x			x	x	x	0.27
FM_30_L	x	x				x	x	1.31
Tenmile Slough (left bank)								**2.08**
TS_30_L		x	x			x	x	1.14
TS_20_L			x	x		x	x	0.27
TS_10_L			x	x			x	0.68
Calaveras River (right bank)								**4.29**
CR_10_R		x					x	0.42
CR_20_R		x					x	0.26
CR_30_R		x					x	0.71
CR_40_R		x					x	0.54
CR_50_R		x					x	1.22
CR_60_R		x					x	0.25
CR_70_R		x					x	0.30
CR_80_R		x					x	0.59

Levee Reach	Proposed Remediation Measure (1) New Levee	Seepage Cutoff Wall	Levee Reshaping	Seismic Fix	Levee Raising	Erosion Protection	Subsidence Mitigation	Levee Length (miles)
Calaveras River (left bank)								**4.09**
CR_10_L		x					x	0.33
CR_20_L		x					x	0.90
CR_30_L		x					x	0.49
CR_40_L		x	x				x	1.20
CR_50_L		x					x	0.32
CR_60_L		x					x	0.27
CR_70_L		x					x	0.58
San Joaquin River (right bank)								**3.90**
SJR_10_R		x			x		x	0.53
SJR_20_R		x			x		x	0.42
SJR_30_R		x	x				x	0.65
SJR_40_R		x					x	0.79
SJR_50_R		x					x	0.33
SJR_60_R		x					x	0.43
SJR_70_R		x					x	0.75
French Camp Slough (right bank)								**1.84**
FCS_10_R		x					x	1.84
Duck Creek (right bank)								**0.84**
DC_10_R		x					x	0.15
DC_20_R	x	x					x	0.43
DC_30_R	x	x					x	0.27
Totals:	**2.01**	**21.51**	**3.94**	**0.94**	**3.48**	**4.86**	**22.45**	**22.45**

Notes:

*(1) The evaluation of O&M costs attributed to the new closure structures at Smith Canal and Fourteenmile Slough is **not** included in this summary.*

It should be noted that the project understanding and basis of evaluation as described above are based on the LSJRP as is currently authorized by USACE. However, as the planning and engineering processes advance, further refinement of the LSJRP elements and final design configurations may differ from what is shown in the Recommended Plan within the USACE Report. For the purpose of estimating incremental O&M costs, it has been assumed that future design refinements would likely result in reduced O&M as compared to the authorized LSJRP. Therefore, the basis of estimating incremental O&M costs described in this technical memorandum has been determined to be an appropriate, conservative approach.

A list of the major assumptions utilized in this evaluation are summarized below in Table 2.

Table 2 - Major Assumptions

Proposed Measure	Reference	Assumption
New levee	DWR Report (Table 5.1)	• For an urban levee on the Lower San Joaquin River / Delta South, the operations and maintenance costs are $50,000 per levee mile, and the repair, replace, and rehabilitate costs are $18,000 per levee mile in 2017$.
Seepage cutoff wall	USACE Report (Section 8.1.3)	• "*Cutoff wall(s) will not change long-term maintenance or replacement costs*."
Levee reshaping	USACE Report (Section 8.1.3)	• "*Right-of-way will be increased; so maintenance costs will increase to cover a larger vegetation management footprint*." • Modifying the existing levee geometry, such as widening the levee crown and flattening the levee slopes to increase stability, will increase the vegetation management footprint.
Seismic fix	USACE Report (Section 8.1.3)	• "*Right-of-way will be increased; so maintenance costs will increase to cover a larger vegetation management footprint*." • Degrading a portion of the existing levee, constructing a grid of deep soil mixing columns, and constructing a stability berm at the landside levee toe will increase the vegetation management footprint.
Levee raising	USACE Report (Section 8.1.3)	• "*Right-of-way will be increased; so maintenance costs will increase to cover a larger vegetation management footprint*." • Extending the landside levee toe landward to support raising the levee crown will increase the vegetation management footprint.
Erosion protection	n/a	• Furnish and place 25 tons of supplemental RSP per levee mile per year.
Subsidence mitigation	n/a	• Furnish and place engineered levee fill and aggregate base on the levee crown periodically to maintain the minimum top of levee elevation over time.

Where necessary, costs have been escalated to 2023 dollars based on the Construction Cost Index (CCI) published monthly by Engineering News-Record (ENR). The CCI is an indicator of general construction costs and includes labor and materials components. ENR uses the CCI to measure how much it costs to purchase a hypothetical package of goods and services and compare it to what it was in a prior year.

A breakdown of the present-day unit costs used in this evaluation is included in Exhibit 2.

4. Approach

The approach for each of the proposed measures is described below in further detail.

4.1 New Levees

Pursuant to Table 5.1 of the DWR Report for an urban levee on the Lower San Joaquin River / Delta South, the operations and maintenance costs are $50,000 per levee mile, and the repair, replace, and rehabilitate costs are $18,000 per levee mile. The combined amount of $68,000 was escalated to 2023 dollars based on ENR CCIs. The CCIs that were used in this assessment are summarized below in Table 3.

Table 3 - ENR CCIs and Escalation Factor for New Levee O&M Costs

Comparison Data		Current Data		Escalation
Date	ENR CCI	Date	ENR CCI	Factor
January 2017	10,531.68	January 2023	13,175.03	1.2510

Therefore, the O&M cost attributed to a new levee in 2023 dollars was determined to be $85,067 per levee mile per year.

4.2 Seepage Cutoff Wall

Pursuant to Section 8.1.3 of the USACE Report, "*Cutoff wall(s) will not change long-term maintenance or replacement costs*." Therefore, the incremental O&M cost attributed to seepage cutoff walls was determined to be zero.

4.3 Levee Reshaping, Seismic Fix, and Levee Raising

Levee reshaping, seismic fix, and levee raising remediation measures all include an element of widening the levee footprint in order to improve levee stability and/or the minimum top of levee. Pursuant to Section 8.1.3 of the USACE Report, "*Right-of-way will be increased; so maintenance costs will increase to cover a larger vegetation management footprint*." As a result, all three proposed remediation measures incorporate an increase in the levee vegetation management footprint. Therefore, the following approach was developed to evaluate the incremental O&M costs associated with the increase to vegetation management for levee reshaping, seismic fix, and levee raising remediation measures:

- Establish a baseline annual cost attributed to only vegetation management.
- Calculate a project footprint modifier that represents the percent increase in project footprint associated with the <u>increased</u> vegetation management.
- Calculate the incremental O&M costs associated with the <u>increased</u> vegetation management.

In order to establish a baseline annual cost attributed to only vegetation management, ten years of claims from the DWR Delta Levees Subventions Maintenance Program for the 28 reclamation districts in which KSN is the District Engineer were analyzed. The annual costs for "Levee Vegetation Control and Management" from Fiscal Year 2011-12 to Fiscal Year 2020-21 for each reclamation district was tallied and adjusted to 2023 dollars using ENR CCI values as per Table 4 below.

Table 4 - ENR CCIs and Escalation Factors for Baseline Vegetation O&M Costs

Comparison Values		Current Values		Escalation
Date	ENR CCI	Date	ENR CCI	Factor
June 2011	9,290.00	January 2023	13,175.03	1.4182
June 2012	9,542.33	January 2023	13,175.03	1.3807
June 2013	9,800.38	January 2023	13,175.03	1.3443
June 2014	10,036.38	January 2023	13,175.03	1.3127
June 2015	10,337.05	January 2023	13,175.03	1.2745
June 2016	10,702.81	January 2023	13,175.03	1.2310
June 2017	11,068.35	January 2023	13,175.03	1.1903
June 2018	11,268.48	January 2023	13,175.03	1.1692
June 2019	11,436.23	January 2023	13,175.03	1.1520
June 2020	12,112.05	January 2023	13,175.03	1.0878

An average annual baseline cost attributed to only vegetation management was calculated to be $3,635 per levee mile. A breakdown of the annual costs per reclamation district for said ten-year period is included in Exhibit 3.

Assumptions were made regarding the increased levee footprint width associated with levee reshaping, seismic fix, and levee raise measures. Levee widths for both pre- and post-project conditions and project footprint modifiers are summarized below in Table 5, and the basis of footprint calculations is described in Exhibit 4.

Table 5 - Increase in Project Footprint Associated with Increased Vegetation Management

Remediation Measure	**Pre-Project Width** (feet)	**Post-Project Width** (feet)	**Project Footprint Modifier**
Levee reshaping	108	164	+51.9%
Seismic fix	148	221	+49.3%
Levee raising	130	154	+18.5%

The incremental O&M costs associated with increased vegetation management were calculated by multiplying the baseline vegetation management costs (i.e., $3,655 per levee mile per year) and the project footprint multipliers shown in Table 5. Therefore, the incremental O&M costs attributed to levee reshaping, seismic fix, and levee raising in 2023 dollars were calculated and are summarized below in Table 6.

Table 6 - Incremental O&M Costs Associated with Levee Reshaping, Seismic Fix, and Levee Raising Measures

Remediation Measure	**Incremental O&M Cost** (per levee mile per year)
Levee reshaping	$1,885
Seismic fix	$1,793
Levee raising	$671

4.4 Erosion Protection

Erosion protection measures were assumed to include the placement of Rock Slope Protection (RSP) consisting of 18-inch minus quarry stone riprap on the levee slope. The incremental O&M costs associated with erosion protection were calculated based on furnishing and placing a standard truck load (i.e., 25 tons) of supplemental RSP per levee mile per year. Based on a unit cost of $159 per ton of RSP, the incremental O&M cost attributed to erosion protection in 2023 dollars was determined to be $3,985 per levee mile per year.

4.5 Subsidence Mitigation

Pursuant to Section 8.1.3 of the USACE Report, "*Localized ground subsidence may require periodic placement of levee fill to maintain the levee crest elevation*." The approach for evaluating the incremental O&M costs associated with subsidence mitigation was developed assuming that new engineered levee fill and aggregate base will need to be furnished and placed on the levee crown periodically to maintain the minimum top of levee elevation over time. The assumptions used in the calculations of new materials are summarized below in Table 7.

Table 7 - New Materials Associated with Subsidence Mitigation

Material	Width (feet)	Thickness (inches)	Quantity (cubic yards per mile)	Frequency (years)	Quantity (tons per mile per year)
Engineered levee fill	20	6	1,956	50	70.4
Aggregate base	20	4	1,304	50	52.1

Based on a unit cost of $75 per ton of engineered levee fill and a unit cost of $90 per ton of aggregate base, the incremental O&M cost attributed to subsidence mitigation in 2023 dollars was determined to be $9,974 per levee mile per year.

5. Results

The incremental O&M unit costs associated with each of the proposed measures is summarized below in Table 8.

Table 8 - Summary of Incremental O&M Unit Costs

Remediation Measure	Incremental O&M Cost (per levee mile per year)
New levee	$85,067
Seepage cutoff wall	$0
Levee reshaping	$1,885
Seismic fix	$1,793
Levee raising	$671
Erosion protection	$3,985
Subsidence mitigation	$9,974

The overall incremental O&M annual cost was then calculated by multiplying the incremental O&M unit costs for each proposed measure by the levee miles for each levee reach. A breakdown of the overall incremental O&M annual cost on a levee reach-by-reach basis is summarized below in Table 9. A more detailed breakdown is included in Exhibit 5.

Table 9 - Summary of Overall Incremental O&M Annual Costs

Levee Reach	Levee Length (miles)	Incremental O&M Annual Cost
Mosher Slough (left bank)		**$20,840**
MC_10_L	1.22	$12,979
MC_20_L	0.74	$7,861
Shima Tract (right bank)		**$17,475**
ST_10_R	0.47	$6,577
ST_20_R	0.78	$10,897
Fivemile Slough (right bank)		**$4,291**
FS_10_R	0.31	$4,291
Fourteenmile Slough (left bank)		**$138,403**
FM_60_L	0.31	$4,527
FM_40_L	0.27	$3,979
FM_30_L	1.31	$129,896

Levee Reach	Levee Length (miles)	Incremental O&M Annual Cost
Tenmile Slough (left bank)		**$31,973**
TS_30_L	1.14	$18,016
TS_20_L	0.27	$4,737
TS_10_L	0.68	$9,220
Calaveras River (right bank)		**$42,783**
CR_10_R	0.42	$4,175
CR_20_R	0.26	$2,618
CR_30_R	0.71	$7,038
CR_40_R	0.54	$5,434
CR_50_R	1.22	$12,135
CR_60_R	0.25	$2,539
CR_70_R	0.30	$3,000
CR_80_R	0.59	$5,844
Calaveras River (left bank)		**$43,072**
CR_10_L	0.33	$3,279
CR_20_L	0.90	$8,993
CR_30_L	0.49	$4,870
CR_40_L	1.20	$14,289
CR_50_L	0.32	$3,149
CR_60_L	0.27	$2,731
CR_70_L	0.58	$5,761
San Joaquin River (right bank)		**$40,717**
SJR_10_R	0.53	$5,595
SJR_20_R	0.42	$4,460
SJR_30_R	0.65	$7,699
SJR_40_R	0.79	$7,884
SJR_50_R	0.33	$3,332
SJR_60_R	0.43	$4,301
SJR_70_R	0.75	$7,446
French Camp Slough (right bank)		**$18,317**
FCS_10_R	1.84	$18,317
Duck Creek (right bank)		**$67,470**
DC_10_R	0.15	$1,500
DC_20_R	0.43	$40,680
DC_30_R	0.27	$25,290
Totals:	**22.45**	**$425,340**

Notes:

*(1) The evaluation of O&M costs attributed to the new closure structures at Smith Canal and Fourteenmile Slough is **not** included in this summary.*

6. Conclusions

The overall incremental O&M annual cost attributed to the LSJRP amounts to $425,402 per year, with one exception. For the purposes of this Technical Memorandum, the evaluation of O&M costs attributed to the new closure structures at Smith Canal and Fourteenmile Slough was **not** performed.

Levee Construction and Maintenance Assessment District

Incremental Operations and Maintenance Costs
Lower San Joaquin River Project

EXHIBIT 1

Proposed Remediation Measures

LCMA District
Incremental Operations and Maintenance Costs
Lower San Joaquin River Project

PROPOSED REMEDIATION MEASURES

					Levee Type			Proposed Remediation Measure								
Levee Reach	Waterway	Bank	Reach Description	Current LMA[1]	Federal Levee	Non-Fed to Become Fed	New Levee to Become Fed Levee	New Levee	Seepage Cutoff Wall	Levee Reshaping	Seismic Fix	Levee Raising	Erosion Protection	New Closure Structure	Subsidence Mitigation	Length (miles)
MC_10_L	Mosher Slough	Left	Southern levee along Mosher Slough with heavy amounts of vegatation, neighboring residential area.	SJCFCWCD[2]		X			X			X			X	1.22
MC_20_L	Mosher Slough	Left	Southern levee along Mosher Slough with heavy amounts of vegatation, neighboring residential area.	SJCFCWCD		X			X			X			X	0.74
ST_10_R	Shima Tract	Right	Dry land levee along east end of Shima Tract between agricultural land (west) and a residential area (east).	SJCFCWCD		X			X				X		X	0.47
ST_20_R	Shima Tract	Right	Dry land levee along east end of Shima Tract between agricultural land (west) and a residential area (east).	SJCFCWCD		X			X				X		X	0.78
FS_10_R	Fivemile Slough	Right	Northern levee along Fivemile Slough along south end of Shima Tract with minimal amounts of vegatation, neighboring agricultural area.	RD 2115 Shima Tract		X			X				X		X	0.31
FM_60_L	Fourteenmile Slough	Right	North levee along Fourteenmile Slough along south end of Shima Tract.	RD 2115 Shima Tract		X			X			X	X		X	0.31
FM_50_L	Fourteenmile Slough	Left	Fourteen Mile Slough Closure Structure	n/a										X[3]		0.00
FM_40_L	Fourteenmile Slough	Left	Levee with future plan of implementing Fourteen Mile Slough Closure Structure. Levee will be implemented inland on Wright-Elmwood Tract.	n/a		X			X			X	X		X	0.27
FM_30_L	Fourteenmile Slough	Left	Western levee along Fourteenmile Slough along the east end of Wright-Elmwood Tract. Village West Marina Resort East of Fourteenmile Slough.	n/a			X	X	X				X		X	1.31
TS_30_L	Tenmile Slough	Left	Eastern levee along Tenmile Slough along the boundary between Wright-Elmwood Tract and Sargen-Barnhart Tract. Residential area east of levee.	RD 2074 Sargent-Barnhart Tract		X			X	X			X		X	1.14
TS_20_L	Tenmile Slough	Left	Levee transitioning from Tenmile Slough.	RD 2074 Sargent-Barnhart Tract		X				X	X		X		X	0.27
TS_10_L	Tenmile Slough	Left	Eastern levee along San Joaquin River along the west end Sargent-Barnhart Tract. Residential area east of levee.	RD 2074 Sargent-Barnhart Tract		X				X	X				X	0.68
CR_10_R	Calaveras River	Right	Northern levee along Calaveras River along the south end of Sargent-Barnhart Tract. Residential area north of levee with residential homes close to levee.	SJCFCWCD	X				X						X	0.42
CR_20_R	Calaveras River	Right	Northern levee along Calaveras River along the south end of Sargent-Barnhart Tract. Residential area north of levee with residential homes close to levee.	SJCFCWCD	X				X						X	0.26
CR_30_R	Calaveras River	Right	Northern levee along Calaveras River along the south end of Sargent-Barnhart Tract. Residential area north of levee with residential homes close to levee.	SJCFCWCD	X				X						X	0.71
CR_40_R	Calaveras River	Right	Northern levee along Calaveras River. Residential area north of levee.	SJCFCWCD	X				X						X	0.54
CR_50_R	Calaveras River	Right	Northern levee along Calaveras River. Residential area north of levee.	SJCFCWCD	X				X						X	1.22
CR_60_R	Calaveras River	Right	Northern levee along Calaveras River . Residential area north of levee with school facilities close to levee.	SJCFCWCD	X				X						X	0.25
CR_70_R	Calaveras River	Right	Northern levee along Calaveras River . Residential area north of levee with church facilities close to levee.	SJCFCWCD	X				X						X	0.30

LCMA District
Incremental Operations and Maintenance Costs
Lower San Joaquin River Project

PROPOSED REMEDIATION MEASURES

					Levee Type			Proposed Remediation Measure								
Levee Reach	Waterway	Bank	Reach Description	Current LMA[1]	Federal Levee	Non-Fed to Become Fed	New Levee to Become Fed Levee	New Levee	Seepage Cutoff Wall	Levee Reshaping	Seismic Fix	Levee Raising	Erosion Protection	New Closure Structure	Subsidence Mitigation	Length (miles)
CR_80_R	Calaveras River	Right	Northern levee along Calaveras River. Residential area north of levee with residential homes close to levee.	SJCFCWCD	X				X						X	0.59
CR_10_L	Calaveras River	Left	Southern levee along Calaveras River along the north end of Smith Tract. Residential area south of levee with residential homes close to levee.	SJCFCWCD	X				X						X	0.33
CR_20_L	Calaveras River	Left	Southern levee along Calaveras River along the north end of Smith Tract. Residential area south of levee with residential homes close to levee.	SJCFCWCD	X				X						X	0.90
CR_30_L	Calaveras River	Left	Southern levee along Calaveras River along the north end of Smith Tract. Residential area south of levee with residential homes close to levee.	SJCFCWCD	X				X						X	0.49
CR_40_L	Calaveras River	Left	Southern levee along Calaveras River along the north end of Smith Tract. Residential area south of levee with residential homes close to levee.	SJCFCWCD	X				X	X					X	1.20
CR_50_L	Calaveras River	Left	Southern levee along Calaveras River. Residential area south of levee with school facilities close to levee.	SJCFCWCD	X				X						X	0.32
CR_60_L	Calaveras River	Left	Southern levee along Calaveras River. Residential area south of levee with school facilities close to levee.	SJCFCWCD	X				X						X	0.27
CR_70_L	Calaveras River	Left	Southern levee along Calaveras River. Residential area south of levee with residential homes close to levee.	SJCFCWCD	X				X						X	0.58
SC_30	Smith Canal		Smith Canal Closure Structure	n/a										X[4]		0.00
SJR_10_R	San Joaquin River	Right	Area west of Smith Canal Gate adjacent to Stockton Golf & Country Club.	RD 1614 Smith Tract		X			X			X			X	0.53
SJR_20_R	San Joaquin River	Right	Area east of Smith Canal Gate along Dad's Point connecting to Louis Park.	n/a		X			X			X			X	0.42
SJR_30_R	San Joaquin River	Right	Eastern levee along San Joaquin River along the west end of Boggs Tract. Port of Stockton facilities east of levee.	RD 404 Boggs Tract		X			X	X					X	0.65
SJR_40_R	San Joaquin River	Right	Eastern levee along San Joaquin River along the west end of Boggs Tract. Port of Stockton facilities east of levee.	RD 404 Boggs Tract	X				X						X	0.79
SJR_50_R	San Joaquin River	Right	Eastern levee along San Joaquin River along the west end of Boggs Tract. Port of Stockton facilities east of levee.	RD 404 Boggs Tract	X				X						X	0.33
SJR_60_R	San Joaquin River	Right	Eastern levee along San Joaquin River along the west end of Boggs Tract. Port of Stockton facilities east of levee.	RD 404 Boggs Tract	X				X						X	0.43
SJR_70_R	San Joaquin River	Right	Eastern levee along San Joaquin River along the west end of Boggs Tract. Residential area east of levee with former Van Buskirk Park close to levee.	RD 404 Boggs Tract	X				X						X	0.75
FCS_10_R	French Camp Slough	Right	Northern levee along French Camp Slough along the south end of Boggs Tract. Residential area north of levee with former Van Buskirk Park close to levee.	RD 404 Boggs Tract	X				X						X	1.84

LCMA District
Incremental Operations and Maintenance Costs
Lower San Joaquin River Project

PROPOSED REMEDIATION MEASURES

					Levee Type			Proposed Remediation Measure								
Levee Reach	Waterway	Bank	Reach Description	Current LMA[1]	Federal Levee	Non-Fed to Become Fed	New Levee to Become Fed Levee	New Levee	Seepage Cutoff Wall	Levee Reshaping	Seismic Fix	Levee Raising	Erosion Protection	New Closure Structure	Subsidence Mitigation	Length (miles)
DC_10_R	Duck Creek	Right	Northern levee along Duck Creek east of I-5. Commercial and residential areas north of levee.	SJCFCWCD	X				X						X	0.15
DC_20_R	Duck Creek	Right	Northern levee along Duck Creek. Commercial and residential areas north of levee.	n/a			X	X	X						X	0.43
DC_30_R	Duck Creek	Right	Northern levee along Duck Creek. Commercial and residential areas north of levee.	n/a			X	X	X						X	0.27
				Levee Mile Totals:	**12.67**	**7.77**	**2.01**	**2.01**	**21.51**	**3.94**	**0.94**	**3.48**	**4.86**	**0.00**	**22.45**	**22.45**

Notes:

(1) LMA = Local Maintaining Agency
(2) SJCFCWCD = San Joaquin County Flood Control and Water Conservation District
*(3) For the purposes of this Technical Memorandum, the evaluation of O&M costs attributed to the new closure structure at Fourteenmile Slough was **not** performed*
*(4) For the purposes of this Technical Memorandum, the evaluation of O&M costs attributed to the new closure structure at Smith Canal was **not** performed*

Levee Construction and Maintenance Assessment District

Incremental Operations and Maintenance Costs
Lower San Joaquin River Project

EXHIBIT 2

Unit Cost Calculations

LCMA District
Incremental Operations and Maintenance Costs
Lower San Joaquin River Project

UNIT COST CALCULATIONS

ROCK SLOPE PROTECTION
OPINION OF PROBABLE COSTS

Item	Description	Qty	Unit	Unit Price	Total
Construction					**$94,300**
1.	Mobilization			3%	$2,700
2.	Erosion Control			3%	$2,700
3.	Clearing and Grubbing	0.22	AC	$5,000	$1,100
4.	Quarry Stone Riprap	1,000	TN	$70	$70,000
5.	Miscellaneous			25%	$17,800
Soft Costs				30%	**$28,300**
Contingency				30%	**$36,800**
				Total Cost:	**$159,400**
				Unit Cost:	**$159**

LEVEE FILL
OPINION OF PROBABLE COSTS

Item	Description	Qty	Unit	Unit Price	Total
Construction					**$44,500**
1.	Mobilization			3%	$1,300
2.	Erosion Control			3%	$1,300
3.	Clearing and Grubbing	0.69	AC	$5,000	$3,500
4.	Levee Fill	1,000	TN	$30	$30,000
5.	Miscellaneous			25%	$8,400
Soft Costs				30%	**$13,400**
Contingency				30%	**$17,400**
				Total Cost:	**$75,300**
				Unit Cost:	**$75**

AGGREGATE BASE
OPINION OF PROBABLE COSTS

Item	Description	Qty	Unit	Unit Price	Total
Construction					**$53,000**
1.	Mobilization			3%	$1,500
2.	Erosion Control			3%	$1,500
3.	Aggregate Base	1,000	TN	$40	$40,000
4.	Miscellaneous			25%	$10,000
Soft Costs				30%	**$15,900**
Contingency				30%	**$20,700**
				Total Cost:	**$89,600**
				Unit Cost:	**$90**

Levee Construction and Maintenance Assessment District

Incremental Operations and Maintenance Costs
Lower San Joaquin River Project

EXHIBIT 3

Summary of Vegetation Management Costs
Delta Levees Subventions Maintenance Program
FY 2011-12 to FY 2020-21

LCMA District
Incremental Operations and Maintenance Costs
Lower San Joaquin River Project

SUMMARY OF VEGETATION MANAGEMENT COSTS
DWR DELTA LEVEES SUBVENTIONS MAINTENANCE PROGRAM
FY 2011-12 TO FY 2020-21

RD No.	RD Name	Vegetation Management Costs per Fiscal Year[1] 2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Levee Miles
1	Union - East	$74,116	$118,742	$108,702	$108,063	$84,222	$104,544	$45,335	$65,573	$61,268	$81,357	14.0
2	Union - West	$12,224	$7,399	$38,411	$36,221	$16,123	$0	$49,939	$12,195	$27,855	$13,313	16.2
307	Lisbon	$49,800	$32,010	$16,320	$18,000	$20,840	$29,107	$24,999	$25,585	$25,217	$26,803	6.6
403	Rough & Ready	$0	$0	$0	$0	$0	$0	$0	$93	$0	$1,713	6.8
404	Boggs	$499	$1,401	$1,746	$1,565	$1,379	$6,284	$1,733	$1,269	$1,814	$8,225	0.7
501	Ryer	$25,633	$61,642	$31,432	$31,377	$32,540	$7,379	$27,212	$38,469	$31,230	$48,406	20.6
524	Middle Roberts	$18,800	$17,725	$54,262	$33,905	$34	$19,033	$20,860	$37,574	$22,611	$86,512	9.7
544	Upper Roberts	$119,393	$7,069	$0	$44,499	n.r. [2]	$0	$211,413	$52,812	$46,646	$81,895	15.0
563	Tyler	$66,117	$46,868	$40,013	$40,372	$63,964	$87,344	$68,675	$68,182	$49,581	$41,744	22.9
773	Fabian	$21,145	$22,829	$13,770	$38,572	$121,726	$16,092	$59,719	$97,485	$100,003	$83,732	18.8
800	Byron	$39,401	$40,919	$35,991	$37,180	$32,522	$28,932	$52,156	$52,625	$54,139	$47,568	9.7
828	Weber	n.r.	n.r.	$0	$0	$31,022	$32,903	$14,462	$34,581	$3,711	$2,540	1.7
1601	Twitchell	$36,910	$28,303	$35,388	$27,723	$22,720	$29,925	$12,806	$32,291	$38,439	$11,536	11.9
1608	Lincoln Village West	n.r.	n.r.	n.r.	$46,662	$15,342	$17,657	$23,424	$18,554	$71,668	$56,577	3.6
1614	Smith	$15,713	$13,909	$0	$73	$324	$0	$0	$0	$1,894	$1,844	2.8
2023	Venice	$20,975	$42,138	$52,695	$7,577	$1,674	$24,653	$23,577	$21,132	$57,944	$39,065	12.3
2027	Mandeville	$30,290	$24,262	$18,990	$34,370	n.r.	$32,836	$46,170	$38,847	$30,548	$32,854	14.3
2030	McDonald	$13,132	$27,269	$18,468	$35,712	$59,194	$51,898	$34,906	$45,349	$28,870	$74,148	13.7
2040	Victoria	$20,204	$52,456	$129,191	$61,294	$19,596	$20,002	$9,781	$46,446	$21,470	$13,412	15.1
2042	Bishop	$18,770	$25,335	$16,404	$0	$12,823	$29,175	$17,632	$55,709	$56,888	$82,489	7.8
2089	Stark	$11,275	$18,250	$6,850	$7,450	$31,925	$503	$8,167	$320	$41	$1,073	3.5
2090	Quimby	$35,232	$30,419	$8,020	$19,821	n.r.	$438	n.r.	n.r.	n.r.	n.r.	7.0
2111	Dead Horse	$0	$0	n.r.	n.r.	$0	$0	$0	$0	$0	$0	2.6
2113	Fay	$32,478	$32,725	$10,982	$8,712	$7,988	$8,245	$7,740	$12,426	$18,633	$48,533	1.6
2115	Shima	$0	n.r.	n.r.	n.r.	$0	$381	$0	$0	$0	$0	6.6
2117	Coney	n.r.	n.r.	n.r.	n.r.	n.r.	$0	$8,164	$20,558	$37,892	$14,259	5.4
2119	Wright-Elmwood	$8,350	$16,642	$23,401	$20,886	$15,501	$21,982	$22,130	$10,243	$26,970	$16,938	7.1
2126	Atlas	$7,170	$300	$16,769	$34	$9,344	$6,497	$11,086	$8,687	$30,504	$14,132	3.0
Subtotal Cost (cost year varies)[3]:		**$677,629**	**$668,611**	**$677,804**	**$660,068**	**$600,802**	**$575,811**	**$802,085**	**$797,005**	**$845,834**	**$930,667**	**261.0**
ENR CCI (cost year varies):		9,290.00	9,542.33	9,800.38	10,036.38	10,337.05	10,702.81	11,068.35	11,268.48	11,436.23	12,112.05	
ENR CCI (Jan 2023):		13,175.03	13,175.03	13,175.03	13,175.03	13,175.03	13,175.03	13,175.03	13,175.03	13,175.03	13,175.03	
Escalation Factor:		1.4182	1.3807	1.3443	1.3127	1.2745	1.2310	1.1903	1.1692	1.1520	1.0878	
Total Cost (2023$)[4]:		**$961,009**	**$923,147**	**$911,198**	**$866,490**	**$765,749**	**$708,817**	**$954,748**	**$931,853**	**$974,437**	**$1,012,344**	**261.0**
Cost per Levee Mile (2023$):		***$3,839***	***$3,788***	***$3,753***	***$3,517***	***$3,492***	***$2,716***	***$3,759***	***$3,669***	***$3,836***	***$3,986***	
Average (2023$):						***$3,635 per levee mile per year***						

Notes:

(1) Annual costs were derived from the "Levee Vegetation Control and Management" costs as shown in the final claims from 28 reclamation districts within the Delta through the DWR Delta Levees Subventions Maintenance Program.

(2) n.r. = not recorded. Not all records were available for all reclamation districts and all years.

(3) Subtotal costs are based on dollars specific to each fiscal year shown and have not been escalated.

(4) Total costs have been escalated to 2023 dollars using ENR-published Construction Cost Indecies (CCIs).

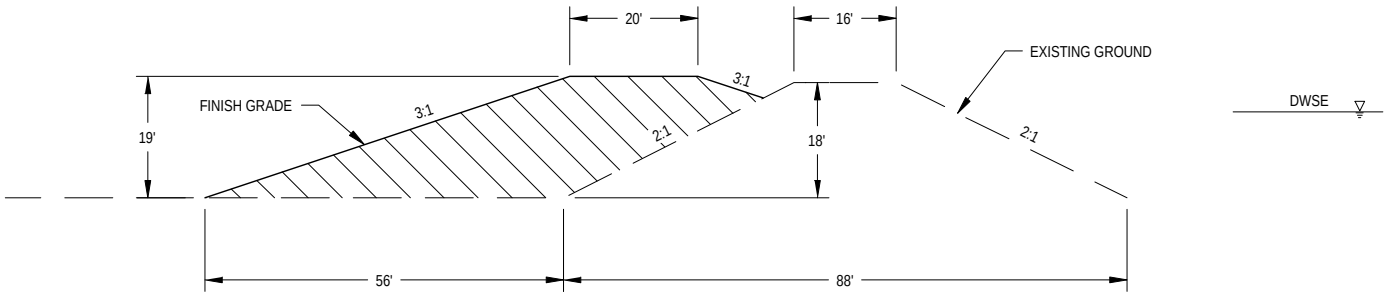
Levee Construction and Maintenance Assessment District

Incremental Operations and Maintenance Costs
Lower San Joaquin River Project

EXHIBIT 4

Basis of Levee Footprint Calculations

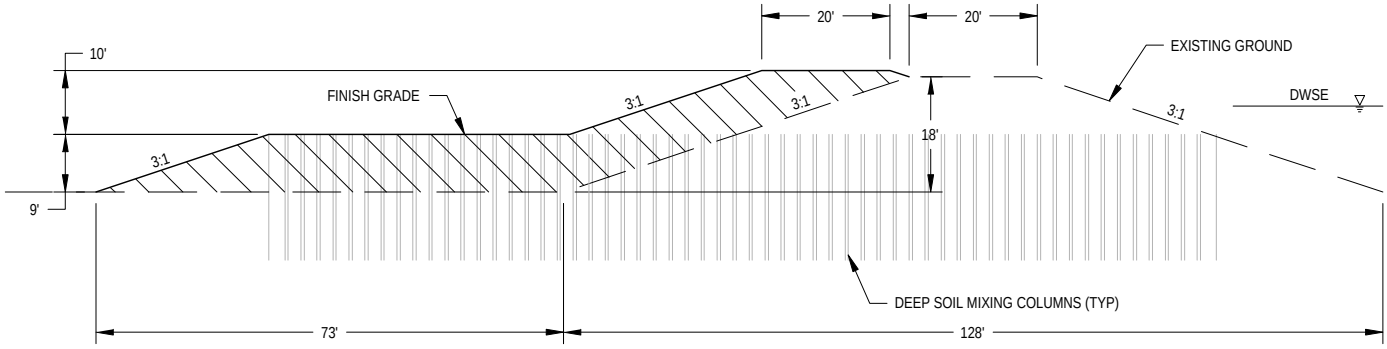
LEVEE RESHAPING



FOOTPRINT CALCULATIONS:

PRE-CONSTRUCTION WIDTH:	88 FEET + 20 FEET LANDSIDE RIGHT-OF-WAY =	108 FEET
POST-CONSTRUCTION WIDTH:	88 FEET + 56 FEET + 20 FEET LANDSIDE RIGHT-OF WAY =	164 FEET
DIFFERENCE:	+51.9%	

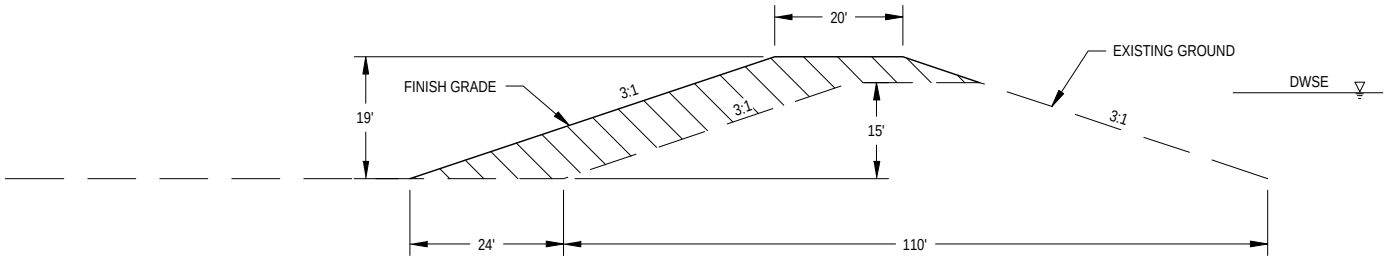
SEISMIC FIX



FOOTPRINT CALCULATIONS:

PRE-CONSTRUCTION WIDTH:	128 FEET + 20 FEET LANDSIDE RIGHT-OF-WAY =	148 FEET
POST-CONSTRUCTION WIDTH:	128 FEET + 73 FEET + 20 FEET LANDSIDE RIGHT-OF WAY =	221 FEET
DIFFERENCE:	+49.3%	

LEVEE RAISE



FOOTPRINT CALCULATIONS:

PRE-CONSTRUCTION WIDTH:	110 FEET + 20 FEET LANDSIDE RIGHT-OF-WAY =	130 FEET
POST-CONSTRUCTION WIDTH:	110 FEET + 24 FEET + 20 FEET LANDSIDE RIGHT-OF WAY =	154 FEET
DIFFERENCE:	+18.5%	

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SJAFCA / SJCFCWCD
ZONE 9 OVERLAY ASSESSMENT
LOWER SAN JOAQUIN RIVER PROJECT O&M
BASIS OF FOOTPRINT CALCULATIONS

DRAWING SCALE: N.T.S.

ORIG. DRAWING SCALE: 0 ¼" ½"

EXHIBIT NO. 1

PAGE NO. 1

FILE SPEC: P:\2494_SJCFCWCD_Zone_9_Assessment\0010_SJAFCA LSJRP O&M\08_Civil\400_Plans\020_CAD\Exhibits\Exh_Basis of Calcs.dwg
PLOT DATE: Feb 01, 2023 – 9:34am

Levee Construction and Maintenance Assessment District

Incremental Operations and Maintenance Costs
Lower San Joaquin River Project

EXHIBIT 5

Overall Incremental O&M Annual Costs

LCMA District
Incremental Operations and Maintenance Costs
Lower San Joaquin River Project

OVERALL INCREMENTAL O&M ANNUAL COSTS

				Incremental O&M Annual Cost per Proposed Remediation Measure								Total
Levee Reach	Waterway	Bank	Length (miles)	New Levee	Seepage Cutoff Wall	Levee Reshaping	Seismic Fix	Levee Raising	Erosion Protection	New Closure Structure	Subsidence Mitigation	Incremental O&M Annual Cost
MC_10_L	Mosher Slough	Left	1.22	$0	$0	$0	$0	$818	$0	$0	$12,161	$12,979
MC_20_L	Mosher Slough	Left	0.74	$0	$0	$0	$0	$496	$0	$0	$7,365	$7,861
ST_10_R	Shima Tract	Right	0.47	$0	$0	$0	$0	$0	$1,878	$0	$4,700	$6,577
ST_20_R	Shima Tract	Right	0.78	$0	$0	$0	$0	$0	$3,111	$0	$7,786	$10,897
FS_10_R	Fivemile Slough	Right	0.31	$0	$0	$0	$0	$0	$1,225	$0	$3,066	$4,291
FM_60_L	Fourteenmile Slough	Right	0.31	$0	$0	$0	$0	$208	$1,233	$0	$3,087	$4,527
FM_50_L	Fourteenmile Slough	Left	0.00	$0	$0	$0	$0	$0	$0	$0(1)	$0	$0(1)
FM_40_L	Fourteenmile Slough	Left	0.27	$0	$0	$0	$0	$183	$1,084	$0	$2,713	$3,979
FM_30_L	Fourteenmile Slough	Left	1.31	$111,586	$0	$0	$0	$0	$5,227	$0	$13,083	$129,896
TS_30_L	Tenmile Slough	Left	1.14	$0	$0	$2,144	$0	$0	$4,531	$0	$11,341	$18,016
TS_20_L	Tenmile Slough	Left	0.27	$0	$0	$506	$482	$0	$1,070	$0	$2,679	$4,737
TS_10_L	Tenmile Slough	Left	0.68	$0	$0	$1,273	$1,211	$0	$0	$0	$6,736	$9,220
CR_10_R	Calaveras River	Right	0.42	$0	$0	$0	$0	$0	$0	$0	$4,175	$4,175
CR_20_R	Calaveras River	Right	0.26	$0	$0	$0	$0	$0	$0	$0	$2,618	$2,618
CR_30_R	Calaveras River	Right	0.71	$0	$0	$0	$0	$0	$0	$0	$7,038	$7,038
CR_40_R	Calaveras River	Right	0.54	$0	$0	$0	$0	$0	$0	$0	$5,434	$5,434
CR_50_R	Calaveras River	Right	1.22	$0	$0	$0	$0	$0	$0	$0	$12,135	$12,135
CR_60_R	Calaveras River	Right	0.25	$0	$0	$0	$0	$0	$0	$0	$2,539	$2,539
CR_70_R	Calaveras River	Right	0.30	$0	$0	$0	$0	$0	$0	$0	$3,000	$3,000
CR_80_R	Calaveras River	Right	0.59	$0	$0	$0	$0	$0	$0	$0	$5,844	$5,844
CR_10_L	Calaveras River	Left	0.33	$0	$0	$0	$0	$0	$0	$0	$3,279	$3,279
CR_20_L	Calaveras River	Left	0.90	$0	$0	$0	$0	$0	$0	$0	$8,993	$8,993
CR_30_L	Calaveras River	Left	0.49	$0	$0	$0	$0	$0	$0	$0	$4,870	$4,870
CR_40_L	Calaveras River	Left	1.20	$0	$0	$2,271	$0	$0	$0	$0	$12,017	$14,289
CR_50_L	Calaveras River	Left	0.32	$0	$0	$0	$0	$0	$0	$0	$3,149	$3,149
CR_60_L	Calaveras River	Left	0.27	$0	$0	$0	$0	$0	$0	$0	$2,731	$2,731
CR_70_L	Calaveras River	Left	0.58	$0	$0	$0	$0	$0	$0	$0	$5,761	$5,761
SC_30	Smith Canal		0.00	$0	$0	$0	$0	$0	$0	$0(2)	$0	$0(2)
SJR_10_R	San Joaquin River	Right	0.53	$0	$0	$0	$0	$353	$0	$0	$5,242	$5,595
SJR_20_R	San Joaquin River	Right	0.42	$0	$0	$0	$0	$281	$0	$0	$4,178	$4,460
SJR_30_R	San Joaquin River	Right	0.65	$0	$0	$1,224	$0	$0	$0	$0	$6,475	$7,699
SJR_40_R	San Joaquin River	Right	0.79	$0	$0	$0	$0	$0	$0	$0	$7,884	$7,884
SJR_50_R	San Joaquin River	Right	0.33	$0	$0	$0	$0	$0	$0	$0	$3,332	$3,332
SJR_60_R	San Joaquin River	Right	0.43	$0	$0	$0	$0	$0	$0	$0	$4,301	$4,301
SJR_70_R	San Joaquin River	Right	0.75	$0	$0	$0	$0	$0	$0	$0	$7,446	$7,446
FCS_10_R	French Camp Slough	Right	1.84	$0	$0	$0	$0	$0	$0	$0	$18,317	$18,317
DC_10_R	Duck Creek	Right	0.15	$0	$0	$0	$0	$0	$0	$0	$1,500	$1,500
DC_20_R	Duck Creek	Right	0.43	$36,411	$0	$0	$0	$0	$0	$0	$4,269	$40,680
DC_30_R	Duck Creek	Right	0.27	$22,636	$0	$0	$0	$0	$0	$0	$2,654	$25,290
	Totals:		**22.45**	**$170,634**	**$0**	**$7,418**	**$1,693**	**$2,338**	**$19,360**	**$0**	**$223,898**	**$425,340**

Notes:

*(1) For the purposes of this Technical Memorandum, the evaluation of O&M costs attributed to the new closure structure at Fourteenmile Slough was **not** performed*

*(2) For the purposes of this Technical Memorandum, the evaluation of O&M costs attributed to the new closure structure at Smith Canal was **not** performed*

San Joaquin Area Flood Control Agency

Levee Construction and Maintenance Assessment (LCMA)

Appendix B
LCMA Cash Flow and Financing Analysis

SAN JOAQUIN COUNTY
Greatness grows here.

SAN JOAQUIN AREA FLOOD CONTROL AGENCY

San Joaquin Area Flood Control Agency

Date: March 16, 2023

Appendix B
Levee Capital and Maintenance Assessment (LCMA)
Cash Flow and Financing Plan Analysis ($1,000's)

	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
N/C Stockton Flood Program - Beginning Balance [1]		2,218	1,904	5,359	7,468	9,285	7,581	5,905	5,643	4,101	3,447	5,499	4,967	13,968	7,521	8,975	6,949	5,878	62,927	38,095	20,763	19,259	12,595	5,871	-594	-337	519	1,578	3,245
LSJRP - USACE Authorized Program Expenditures																													
Funding Implementation Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SJAFCA Net Contribution Required [2]	119,750	134	1,507	452	1,038	4,680	4,696	3,417	4,730	3,610	960	3,692	4,175	9,025	1,278	4,913	4,120	6,164	23,991	16,663	1,012	6,352	6,597	6,528	0	0	0	0	0
Operational Soft Costs [3]	24,270	180	450	800	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	600	600	200	200
Operations and Maintenance																													
Incremental O&M for LSJRP	36,165	0	90	374	383	415	526	552	682	1,081	1,196	1,225	1,388	1,467	1,502	1,539	1,576	1,614	1,653	1,693	1,734	1,776	1,819	1,863	1,909	1,955	2,002	2,051	2,100
Smith Canal Gate [4]																													
SCAAD Assessment Revenue Bond Redemption	24,498	0	24,498	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Expenditures	204,683	314	26,544	1,626	2,421	6,094	6,221	4,969	6,412	5,691	3,157	5,917	6,563	11,492	3,780	7,452	6,696	8,778	26,644	19,357	3,746	9,129	9,417	9,392	2,909	2,555	2,602	2,251	2,300
State Sources																													
State TBD for N-C Stockton Additional Flood Program	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Sources																													
Proposed LCMA Assessment Net Revenues for Capital Services [4]	220,274	0	0	6,200	6,349	6,501	6,657	6,817	6,981	7,148	7,320	7,495	7,675	7,859	8,048	8,241	8,439	8,642	8,849	9,061	9,279	9,501	9,730	9,963	10,202	10,447	10,698	10,954	11,217
Total LSJR Revenues	220,274	0	0	6,200	6,349	6,501	6,657	6,817	6,981	7,148	7,320	7,495	7,675	7,859	8,048	8,241	8,439	8,642	8,849	9,061	9,279	9,501	9,730	9,963	10,202	10,447	10,698	10,954	11,217
Program Financing: Assessment District Borrowing																													
Proceeds from Bond Issuance [5]	100,000	0	30,000	0	0	0	0	0	0	0	0	0	10,000	0	0	0	0	60,000	0	0	0	0	0	0	0	0	0	0	0
Debt Service Costs [6]	-112,939	0	0	-2,466	-2,111	-2,111	-2,111	-2,111	-2,111	-2,111	-2,111	-2,111	-2,111	-2,814	-2,814	-2,814	-2,814	-2,814	-7,037	-7,037	-7,037	-7,037	-7,037	-7,037	-7,037	-7,037	-7,037	-7,037	-7,037
N/C Stockton Program - Preliminary Ending Balance		1,904	5,359	7,468	9,285	7,581	5,905	5,643	4,101	3,447	5,499	4,967	13,968	7,521	8,975	6,949	5,878	62,927	38,095	20,763	19,259	12,595	5,871	-594	-337	519	1,578	3,245	5,125

[1] Beginning balance in 2022 is based on annual FY 2022/23 budget adopted by SJAFCA

[2] Combination of cash, LERRDs contribution net of funding provided (cash to USACE under DA totals $666,192.46 thru 4/30/2021), and expected credit (e.g. Smith Canal Gate); LERRDs split at NFS cost share amounts; Internal SJAFCA cost, G&A, and consultant costs are credit not accounted for as part of this line item but the upfront cash requirement is captured under "Operational Soft Costs"

[3] Soft costs include SJAFCA staff and consultants (e.g. CEQA, project management, technical review and assistance) for costs not likely to be creditable to the Federal Project; Assume 4 FTEs at peak and tapers following project completion; Assume no assessment administration which would be captured in the LCMA budget; Assumes no long-term G&A costs.

[4] Annual escalation assumed at 2.4% (consistent with the authorized escalation described in the Engineer's Report.)

[5] Assumes SJAFCA will issue new debt secured by LCMA revenues to redeem outstanding SCAAD series 2019 bonds.

[6] Assumes three Bond Issues in 2023, 2033, 2038, that generate net proceeds of $30M, $10M, and $60M, respectively.

[7] Assumes level debt service for all bond issuances.

Source Model: 1820000_2023 0123_N-C_Stockton_LSJRP_Financing_Model

San Joaquin Area Flood Control Agency

Levee Construction and Maintenance Assessment (LCMA)

Appendix C
LCMA Floodplain Analysis, March 16, 2023
(Prepared by R&F Engineering)

SAN JOAQUIN COUNTY
Greatness grows here.

SAN JOAQUIN AREA FLOOD CONTROL AGENCY

San Joaquin Area Flood Control Agency

Date: March 16, 2023

Levee Construction and Maintenance Assessment (LCMA) Floodplain Analysis

Prepared for: San Joaquin Area Flood Control Agency

Date: March 16, 2023

Prepared by: Brittney O'Connell, PE and Baron Creager, PE

Reviewed by: Mike Rossiter, PE

Introduction

The San Joaquin Area Flood Control Agency (SJAFCA) is advancing a combined assessment district, known as the Levee Construction and Maintenance Assessment (LCMA) District, to fund the (1) additional Operations & Maintenance (O&M) needs of the San Joaquin County Flood Control and Water Conservation District Zone 9 (Zone 9) maintained project levees and (2) the local cost share component associated with the flood risk reduction measures being implemented as part of the U.S. Army Corps of Engineers (USACE) Lower San Joaquin River Project (LSJRP).

As part of the assessment district formation process, R&F Engineering Inc. (R&F) was retained by Larsen Wurzel & Associates (LWA) to assist with floodplain analyses to inform the proportionate level of special benefit that each parcel within the proposed assessment will receive from the activities being funded by LCMA.

The floodplain analysis will be used to identify: which parcels would potentially be flooded from a breach on a LSJRP levee or a Zone 9-maintained project levee, to what extent would the parcel be flooded, what flood depths would the parcel experience, and how many levee miles is each parcel relying on to protect it from flooding.

This Technical Memorandum (TM) outlines the data sources and methodology of R&F's floodplain analyses. Throughout the TM, the O&M of Zone 9 project levees will be referred to as the "O&M services" and the work being completed as part of the USACE LSJRP will be referred to as "capital improvements".

Baseline Data

To the extent available, existing analyses were used to estimate the floodplain depths and extents for this effort. The following subsections summarize the data sources that were used for the floodplain analyses as part of defining the benefit areas for the O&M services and the capital improvements.

O&M Services

The floodplains for the O&M analysis originated from two sources: the California Department of Water Resources (DWR) Central Valley Floodplain Evaluation and Delineation (CVFED) Task Order (TO) 306 analysis[1] and the Peterson Brustad Inc. (PBI) floodplain analysis[2].

As part of DWR's TO306 work, a hydraulic model was developed and various levee breach scenarios were analyzed. The model and levee breach scenarios covers a large portion of the SJAFCA LCMA study area. The primary resources used for this DWR analyses include:

- DWR Central Valley Floodplain evaluation and Delineation (CVFED) TO306 FLO2D model
- DWR's CVFED TO24 and HEC-RAS v4.1 model[3]
- United States Army Corps of Engineers (USACE) Lower San Joaquin River Feasibility Study (LSJRFS)[4] hydrologic analysis

For the portion of the LCMA study area that was not covered by the CVFED analyses, PBI developed a 1D/2D HEC-RAS 5.0 model from the DWR CVFED HEC-RAS 4.1 model to perform additional levee breach scenarios.

PBI breach parameters were set to match the parameters used in the CVFED analyses. Breach formation time was set to be instant, breach width set to be equal to 50 times the levee height, and breaches were set to erode to the elevation of the landside toe of the levee. The 1D reaches from the DWR HEC-RAS 4.1 model were not altered when updating to the 1D/2D HEC-RAS 5.0 model. The modifications to the model included converting overbank areas to a 2D mesh using the following steps:

- Importing DWR's 1-meter resolution CVFED LiDAR ground elevation data[5] into the model
- Converting 1D storage areas to 2D gridded flow areas at 250ft x 250ft resolution

[1] DWR. CVFED TO 306: Technical Memorandum- Hydraulic Analysis for 200-Year Floodplain Inundation Data in Technical Support of Local Communities, prepared by HDR, Inc., December 2014.
[2] PBI. FloodCALM Assessment District Floodplain Analysis. August 2019.
[3] DWR. CVFED Program for the Lower San Joaquin River: Task Orders 24 and 25, Technical Memorandum Lower San Joaquin River System HEC-RAS Model Development, Prepared by HDR, Inc., February 2010.
[4] USACE Lower San Joaquin River Feasibility Study F3 Hydrology Appendix, prepared by PBI, July 2012.
[5] HDR Engineering, Inc. CVFED LiDAR Data, Task Order 20, "Secondary LiDAR Post Processing in Support of Hydraulic Model Development", June 2010.

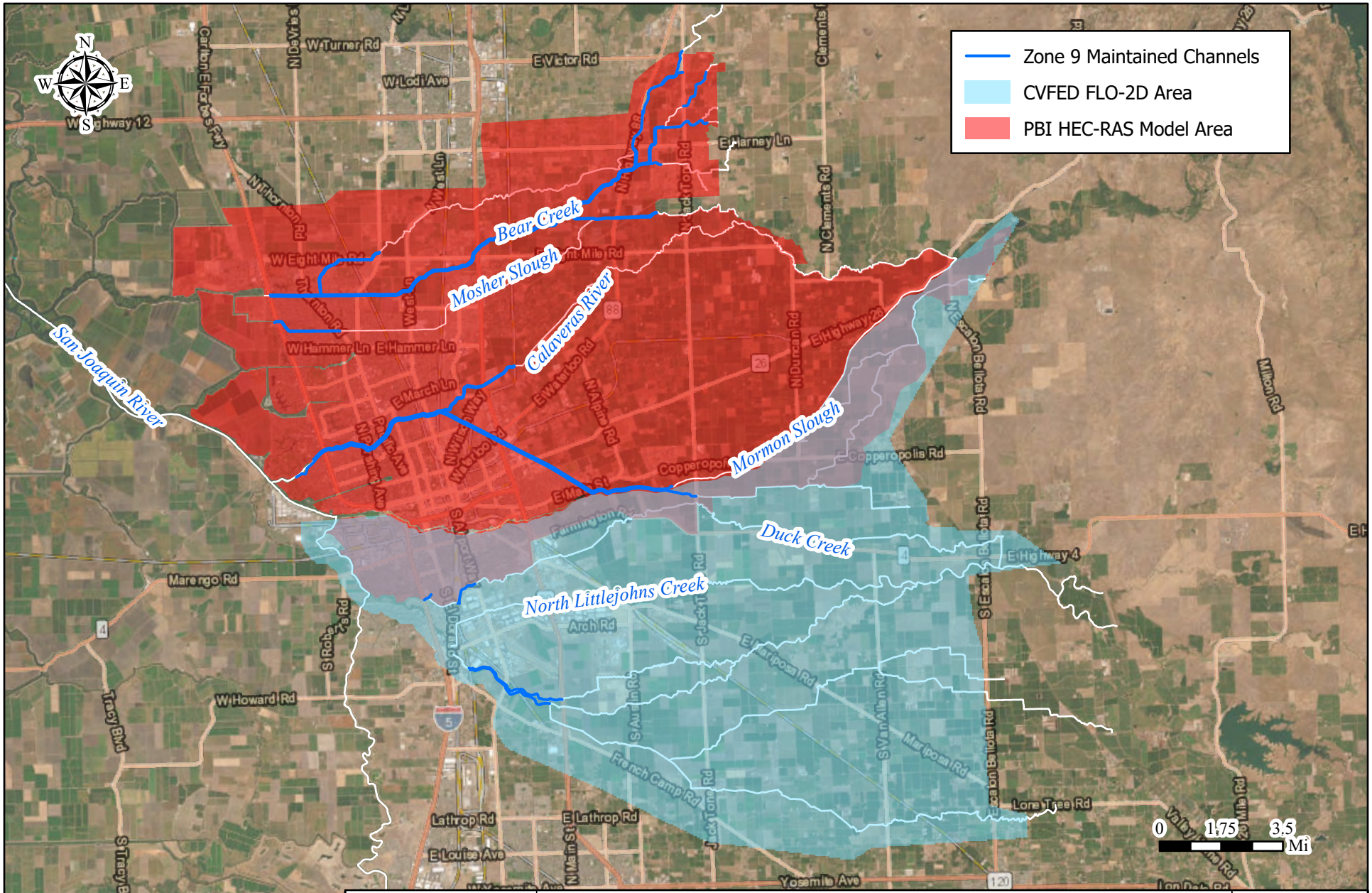
- Assigning Manning's n values for the overland 2D areas based on land use type. San Joaquin County zoning GIS data[6] was used to identify land use types in the floodplain. Guidance from the DWR CVFED FLO2D analysis was used in assigning n-values to the various land use types.

Figure 1 shows the extents of the CVFED and PBI modeling that was used to support the O&M floodplain analysis.

Capital Improvements

The floodplains for the USACE LSJRP capital improvement area originated from the USACE Risk and Uncertainty (R&U) composite floodplains developed as part of the USACE Lower San Joaquin River Feasibility Study (LSJRFS)[7]. The USACE composite floodplains were developed to compare the extents of flooding with- and without the LSJRP (Phase 1) improvements in place.

[6] San Joaquin County. "Zoning.shp". GIS Shapefile Acquired July 2015.
[7] USACE. Integrated Interim Feasibility Report/ Environmental Impact Statement/ Environmental Impact Report. San Joaquin River Basin, Lower San Joaquin River.



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O&M Services
Models Supporting Evaluation of Benefit from O&M

Figure 1

Date: 2/3/2023

Path: C:\Users\NickMcGuire\R&F Engineering, Inc\R&F Engineering - Documents\4.0 GIS\Project\SJAFCA\LSJR-O&M Assessment\APRX\Presentation Model Extent Figure.aprx

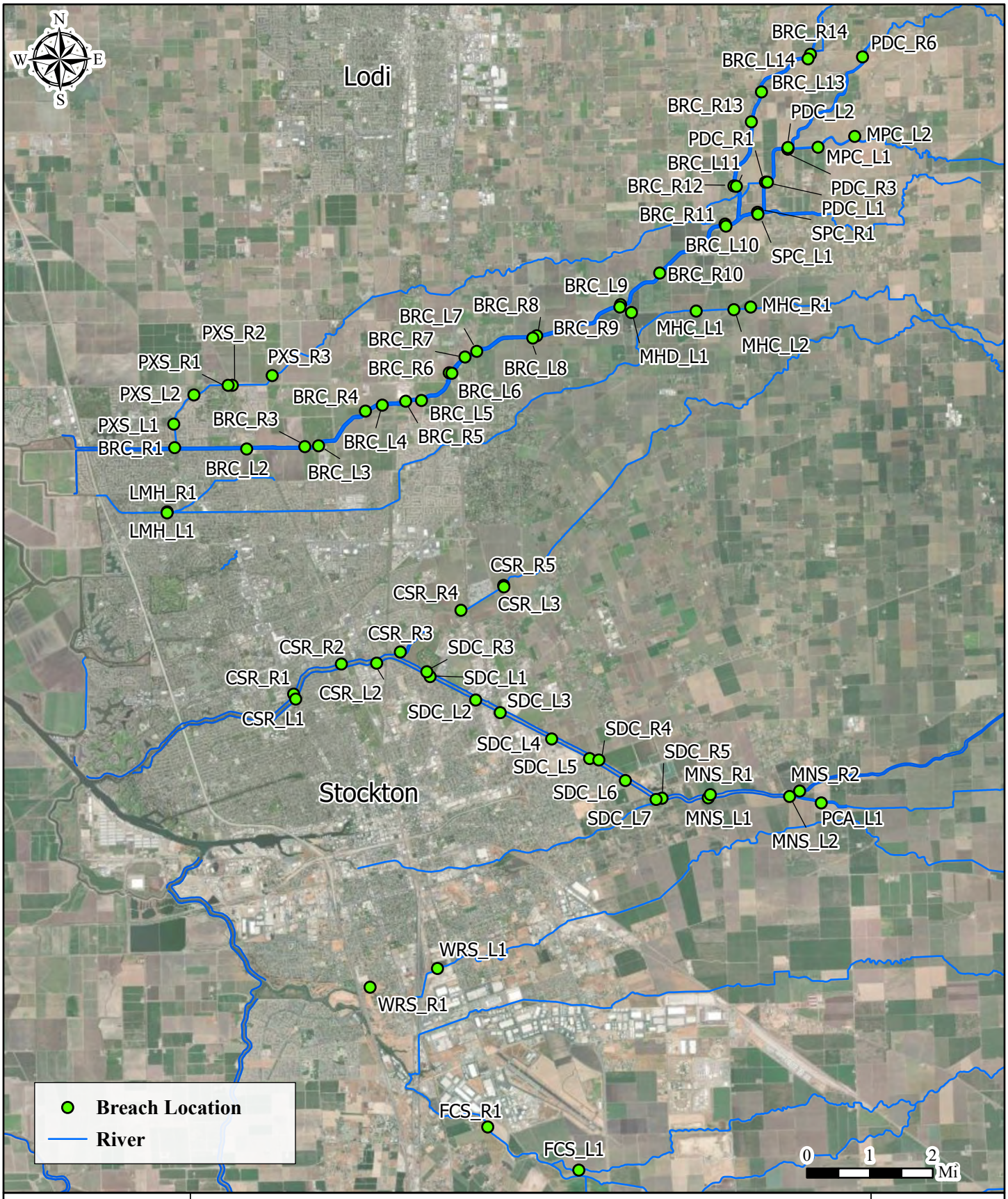
Methodology

The following subsections summarize the methodology used to help identify proportionate benefit provided to each parcel from the O&M services and from the USACE LSJRP capital improvements.

O&M Services

To identify the areas protected by Zone 9-maintained project levees, a levee breach modeling analysis was conducted to identify flood extents and depths that would result in a levee failure scenario on these levees. A total of 72 breach scenarios were completed to represent flooding that could occur if a Zone 9-maintained levee were to fail at a specific location within the system. A 200-year flow event was used as the basis of the breach analysis to show the potential floodplains in a scenario where the system was flowing full. Figure 2 provides an overview of the breach locations included in this analysis

The DWR CVFED modeling covered 54 breach scenarios throughout the study area. A portion of the levee on the Calaveras River downstream of Brookside Road is maintained by others and that portion was excluded from the breach analysis. The PBI model covered the 18 additional breach locations (for a total of 72 breach scenarios) . A channel overtopping scenario was also included in this analysis to determine flood depths that result without levee breaches when the channels exceed their capacity. As the channel overtopping is not prevented by Levee O&M services, this additional scenario was ultimately not utilized in LWA's analysis of special benefits.



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Breach Location Overview for Zone 9 O&M Project Levees

Figure 2

Date: 2/3/2023

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During the analysis, it was observed that some of the floodplains from the DWR CVFED FLO2D model needed to be refined due to the coarse resolution of the model grid cells (250ft x 250ft). Parcels adjacent to levees and waterways were not captured as being within the floodplain due to the model's grid cell size. Refinements were made within GIS to assign flood depths to these areas by interpolating adjacent flooded cells. An example of this correction is shown below in Figures 3 & 4.

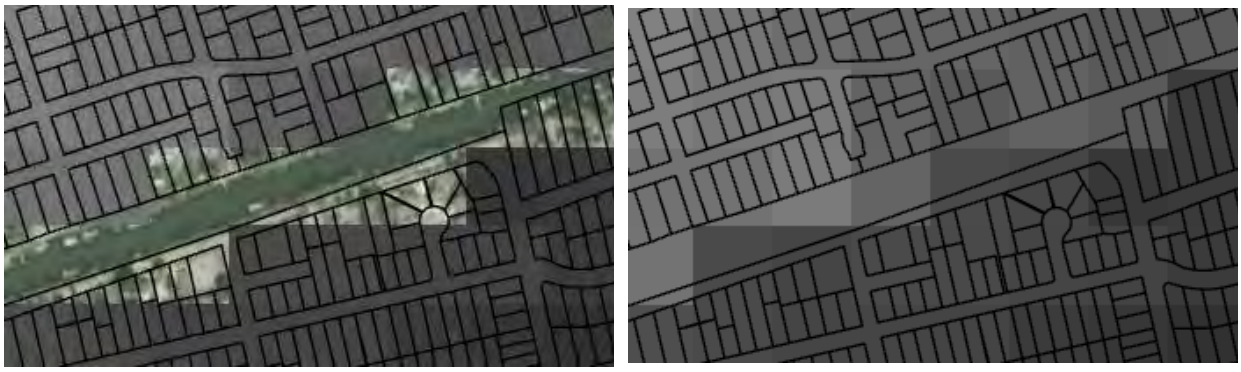


Figure 3 (left) & Figure 4 (right): FLO2D Floodplain Shows No Flooding in Various Parcels Along the landside levee toes (Left). And Modified Floodplain to More Accurately Estimate Flooding in Parcels Along the Levee toes (Right).

To generate flooding statistics for each parcel in the study area, GIS shapefiles with parcel-level data were generated for the 72 levee breach scenarios. The parcel-level data include the average floodplain depth (feet) and total wetted area (acres) for each parcel and each scenario, as described in Attachment A.

Additionally, levee reaches (and the corresponding breach scenarios) were categorized by whether they were FEMA accredited, cost-shared with other public entities, and/or if they are USACE Project Levees.

Capital Improvements

To assist in the determination of the proportionate benefit provided to each parcel by the USACE LSJRP capital improvements, floodplain modeling from the USACE LSJRFS for the 100-year flow scenario was used.

A "composite" floodplain was created from the individual levee breach scenarios that were modeled by USACE on levees that are part of the USACE LSJRP. The composite floodplain captures the anticipated worst-case scenario of flooding of all the breach scenarios for each parcel.

Similar to the O&M analysis, GIS shapefiles with parcel-level flooding data were generated and to identify the average floodplain depth (feet) and total wetted area (acres) for each parcel, as presented in Attachment B.

Floodplain Analyses Results

The following subsections and figures summarize the results of the floodplain analyses.

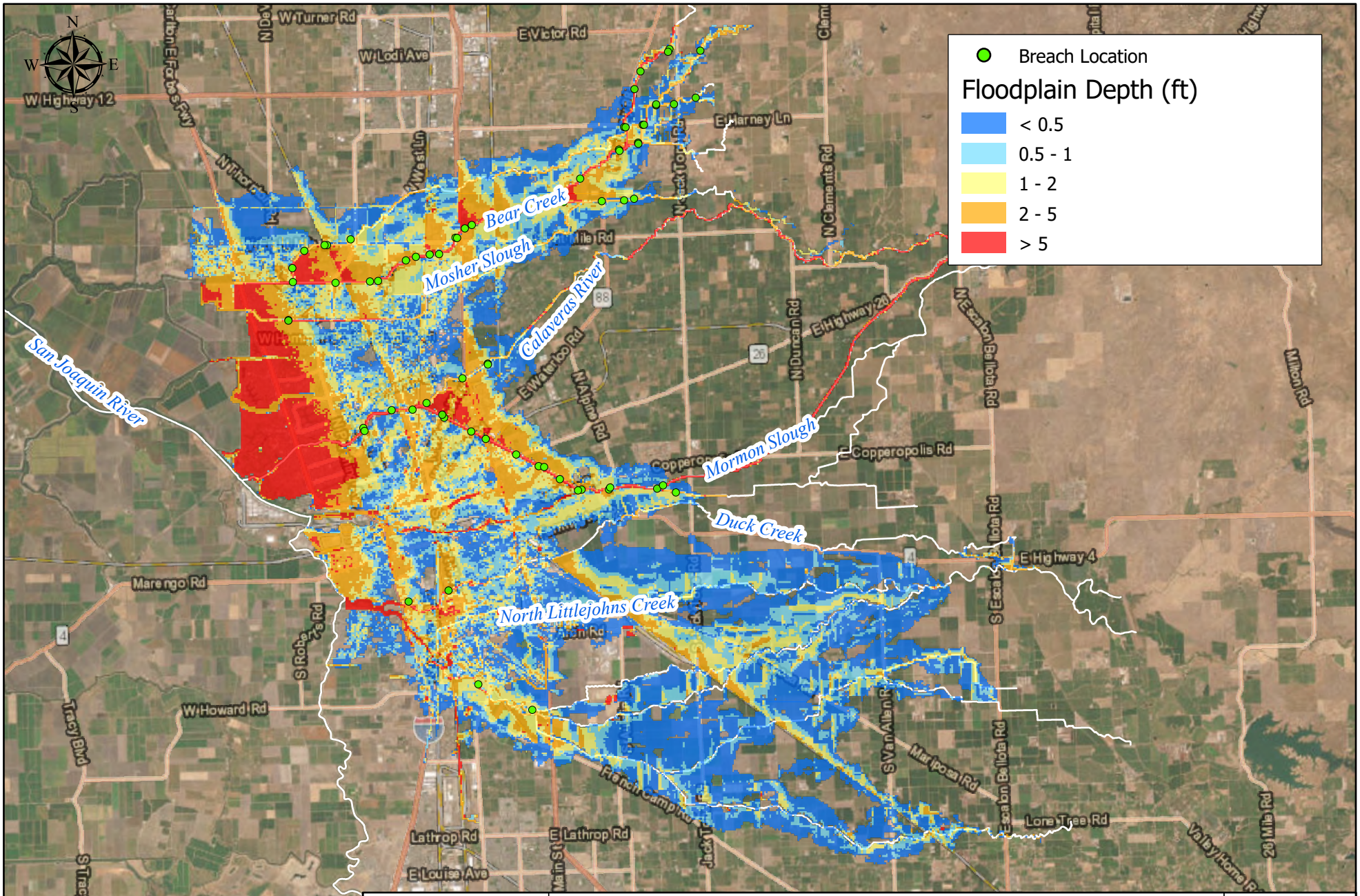
O&M Services

The results of the O&M floodplain analysis are shown in Figure 5 which includes a composite of the 72 individual levee breach scenarios located on Zone 9 maintained Project levees. The map also includes flooding in areas where channels exceed capacity and are overtopped, however this “overtopping” flooding was backed out of LWAs assessment analysis as channel overtopping is not prevented by Levee O&M services.

Capital Improvements

The results of the capital improvement levee breach analysis are shown in Figure 6, which are areas that could be inundated if a levee breach were to occur on a USACE LSJRP levee.

Summaries of parcel-level flooding data for the O&M Services and the USACE LSJRP capital improvements were generated in GIS and are included in Attachments A and B, respectively.



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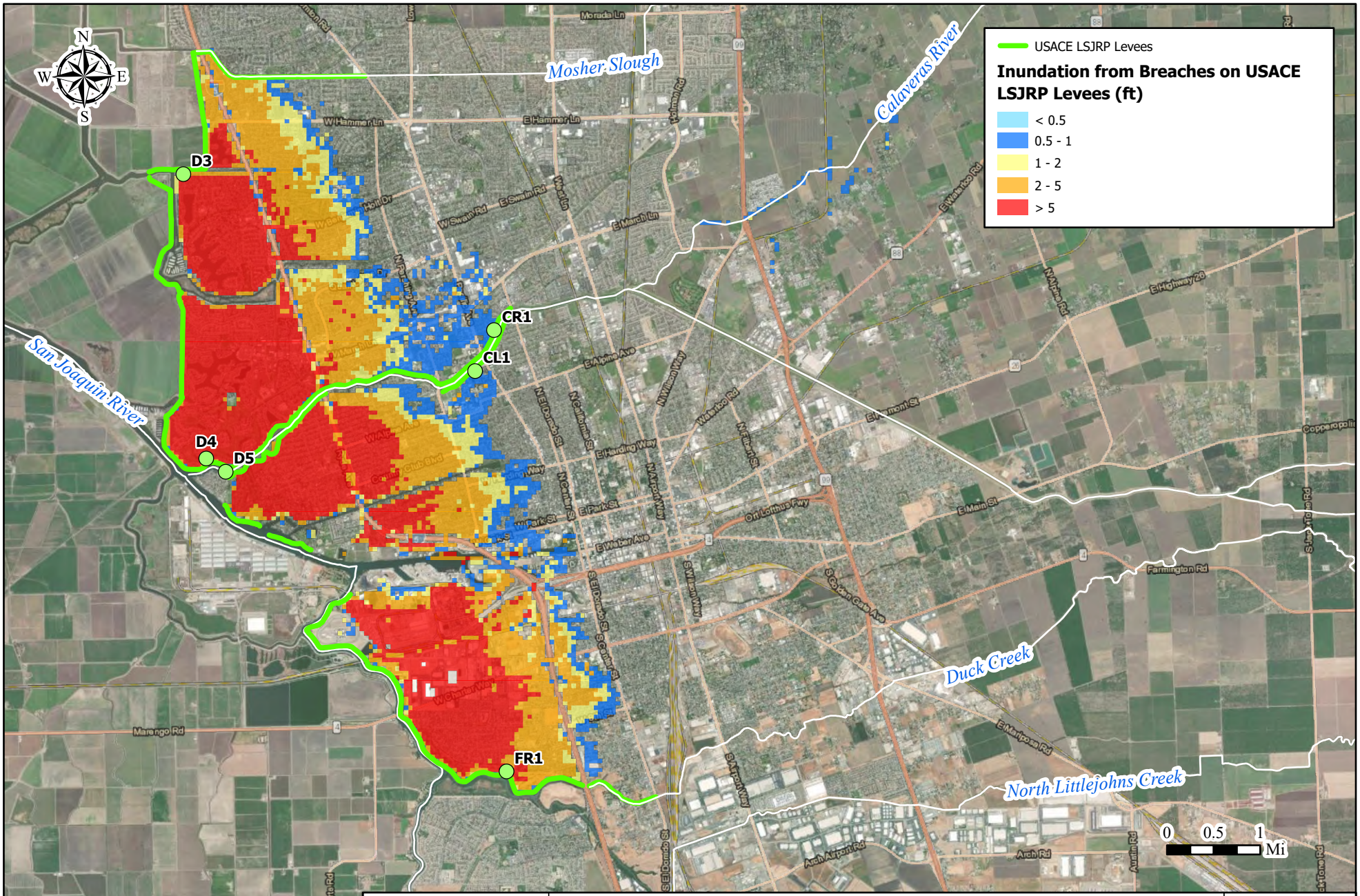
O&M Services
Composite Floodplain of Areas Maintained by San Joaquin County Zone 9

Figure 5

Date: 2/3/2023

Path: C:\Users\NickMcGuire\R&F Engineering, Inc\R&F Engineering - Documents\4.0 GIS\Project\SJAFCA\LSJR-O&M Assessment\APRX\Presentation Floodplain Figure.aprx



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Composite Floodplain of Levee Breaches Occurring on USACE LSJRP Levees

Figure 6

Date: 2/3/2023

Path: C:\Users\NickMcGuire\R&F Engineering, Inc\R&F Engineering - Documents\4.0 GIS\Project\SJAFCA\LSJR-O&M Assessment\APRX\Presentation AD Project Breaches.aprx

Assessment Boundary Delineations

The Proposed Assessment Boundary encompasses all properties that receive a special benefit from Zone 9 O&M Services and from the USACE LSJRP. The floodplain analyses discussed above were used as a starting point in developing a proposed benefit area for the LCMA District. The following subsections summarize the process that was used to delineate the final area of benefit.

O&M Assessment Boundary

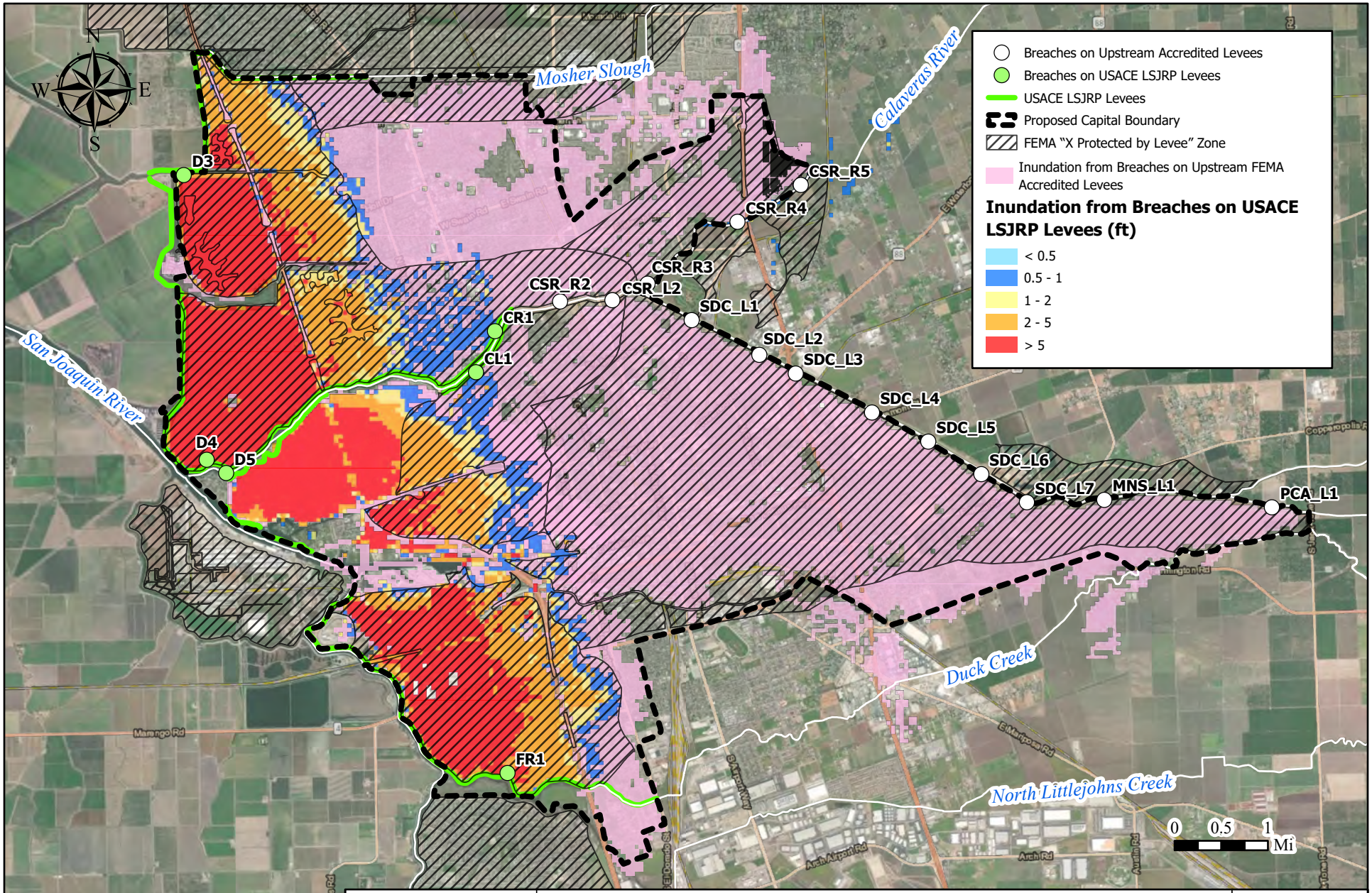
As described in the previous sections, to determine areas that benefit from the Levee O&M Services on the Zone 9 Project levees, modeling of various levee breach scenarios was performed to identify properties that would be inundated if those levees were to break. From these analyses, a composite floodplain was developed (previously shown in Figure 5). The resulting floodplain from each breach was overlaid in GIS onto the San Joaquin County parcel database to identify the average flood depth, total area of flooding, and length of levee that is providing protection for each parcel. The final assessment boundary for Levee O&M Services was delineated based on the boundaries of the parcels that are flooded from levee breaches on Zone 9 maintained Project levees.

Capital Assessment Boundary

Properties receiving special benefit from the USACE LSJRP (and associated incremental levee O&M for the LSJRP) were identified using a combination of floodplain mapping that included:

a) The 100-year composite without project floodplain based on breaches of levees to be improved by the USACE LSJRP (previously shown in Figure 6);
b) The FEMA Shaded Zone X mapping for north and central Stockton; and,
c) Additional hydraulic modeling showing the extent of the inundation from breaches of upstream FEMA Accredited Levees.

Benefits to properties can be due to avoidance of actual flood damage and/or avoidance of regulatory impacts. The composite without-project floodplain map, utilizing USACE floodplain mapping data, was prepared to identify the specific area benefiting from the improvements on the LSRJP levees. To further acknowledge the risk of regulatory impacts and the need to continue FEMA accreditation of this area, the extent of the floodplain for properties benefiting from FEMA Accredited levees in the same levee system was overlaid onto the composite breach floodplain (see Figure 7). To further confirm the extents of flooding that would result from a break on the upstream FEMA-accredited levees, modeling of breaches on these levees is also included on Figure 7.



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Overlay of Capital Improvement Floodplain Boundaries

Figure 7

Date: 3/16/2023

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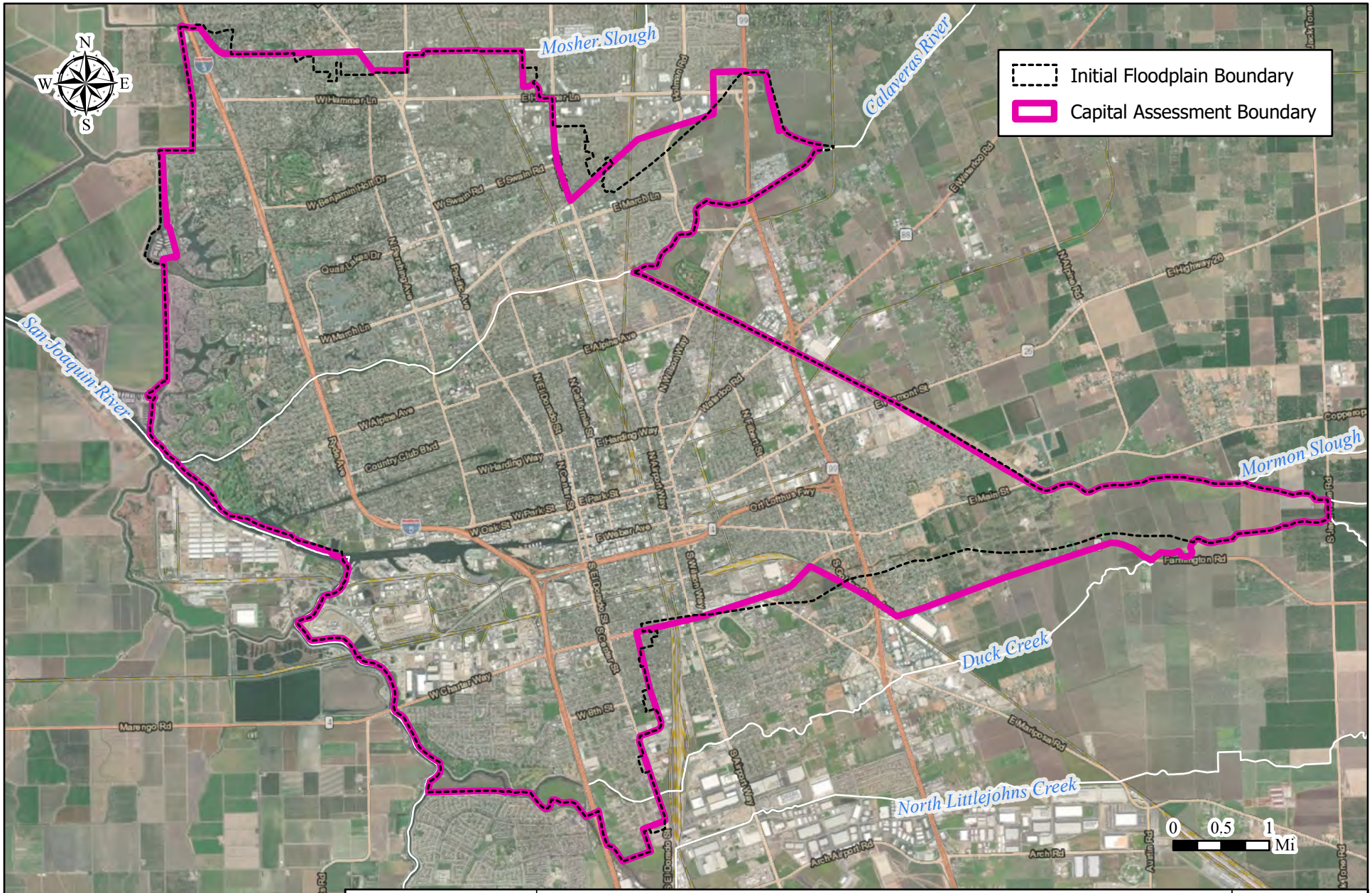
The three described components designate the full extent of the area benefiting from Levee Capital Services for FEMA Accredited Levees. Because different sources of floodplain mapping were combined, the floodplain mapping associated with the FEMA Accredited levee breaches was only utilized to inform the extent of the benefit area from Levee Capital Services, not floodplain depths. The final capital assessment boundary (Figure 8) follows the impacted parcel boundaries.



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Capital Assessment Boundary

Figure 8

Date: 3/16/2023

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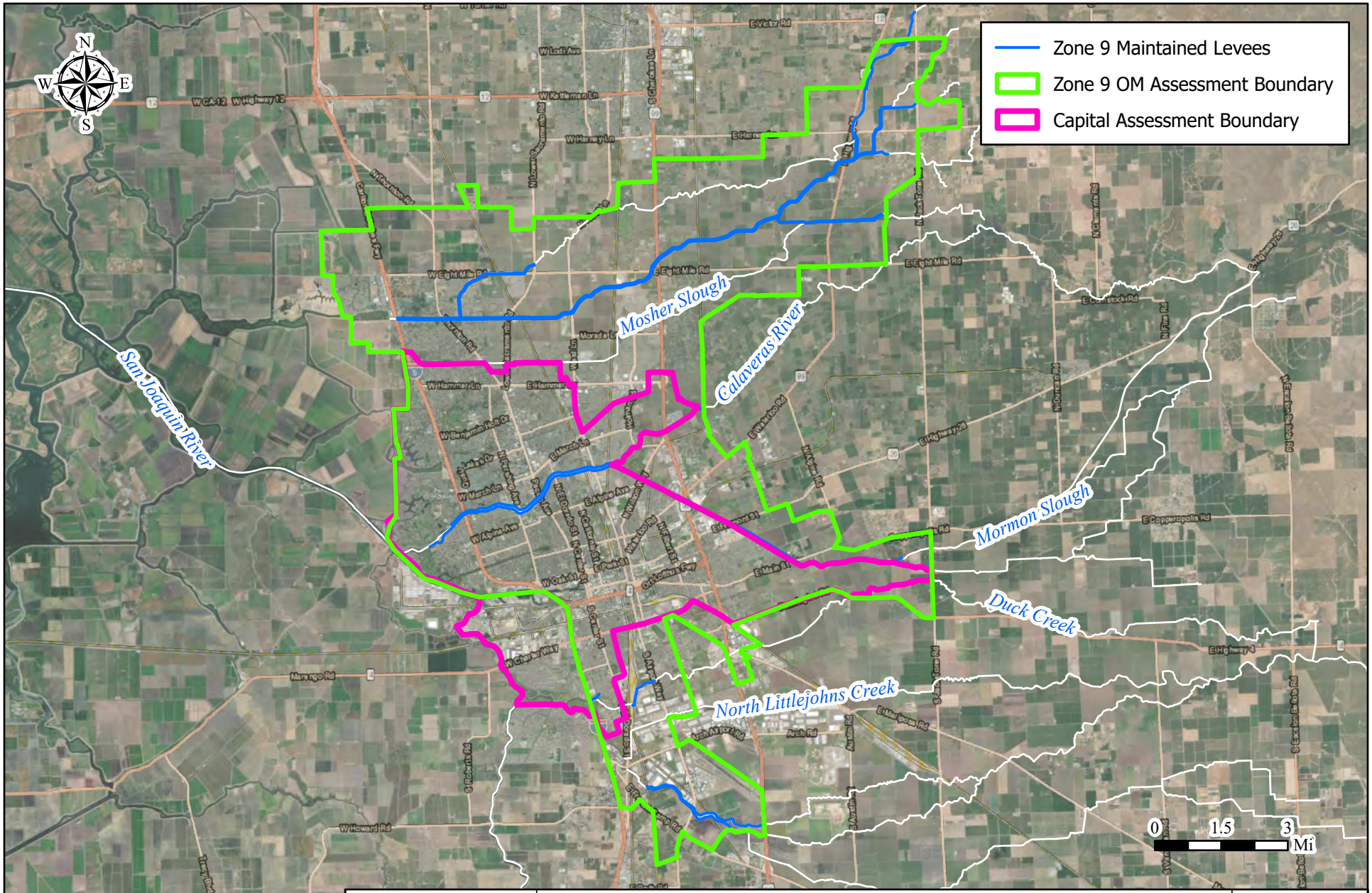
LCMA District Boundary

The area of special benefit from O&M Services and from the USACE LSJRP capital improvements were combined (Figure 9). The final LCMA Boundary is presented in Figure 10.



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SJAFCA LCMA

Combined Boundaries
O&M Services & Capital Improvements

Figure 9

Date: 3/16/2023

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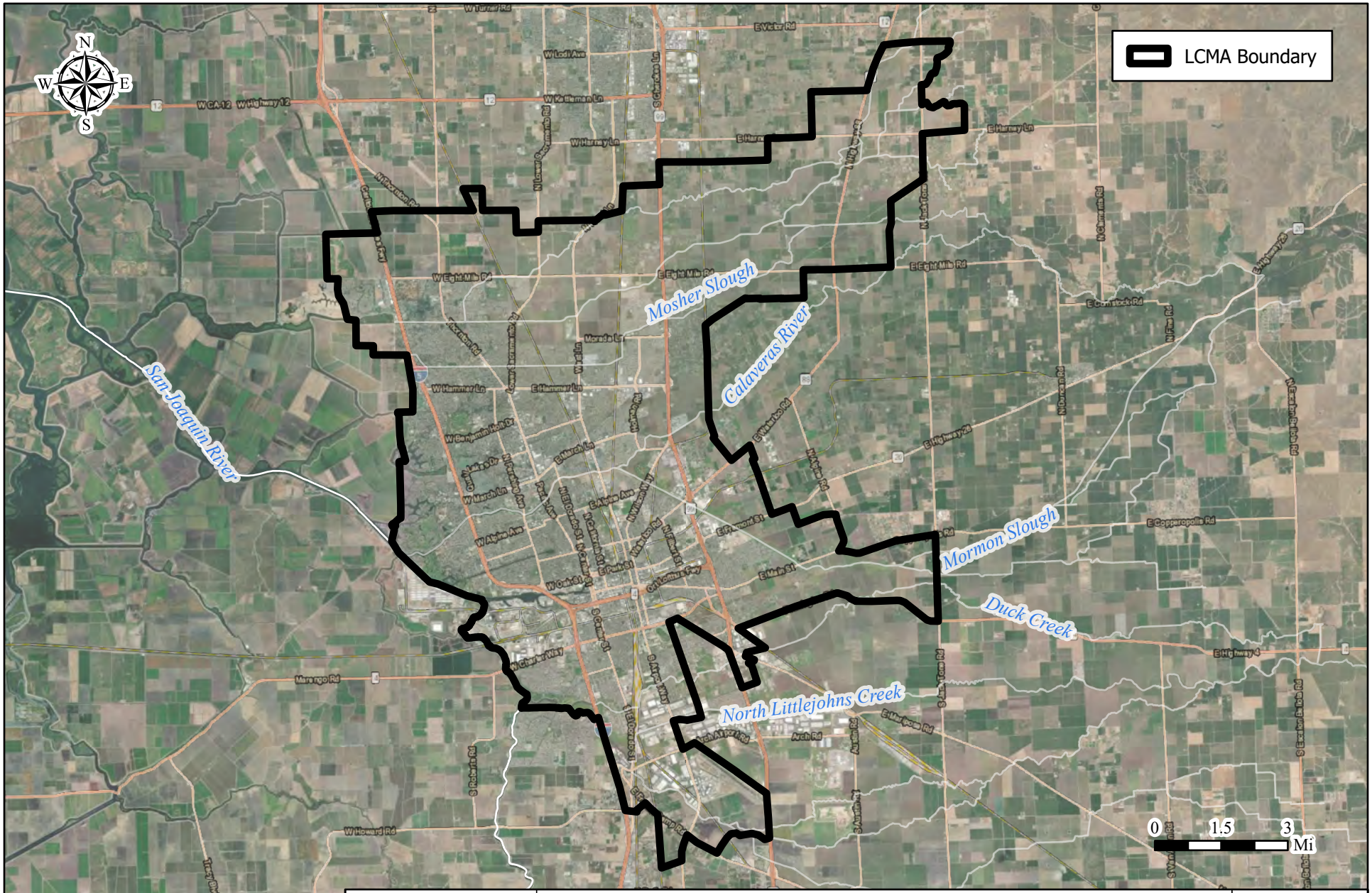

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SJAFCA Levee Construction and Maintenance Assessment

LCMA District Boundary

Figure 10

Date: 3/16/2023

Path: C:\Users\AndrewNisenberg\R&F Engineering, Inc\R&F Engineering - Documents\4.0 GIS\Project\SJAFCA\LSJR-O&M Assessment\APRX\Presentation LCMA Boundary Figure.aprx

ATTACHMENT A

Metadata for GIS Deliverables

for the O&M Assessment Analyses

Assessment Reaches.shp:

Description: All of the levees in the study area were broken down into segments. Each levee segment is associated with a modeled levee breach (see Breach Location Final.shp).

Brch_Rch: Name of reach

Breach Location Final.shp:

Description: 72 levee breaches were modeled for this study. This shapefile shows location and name/ID of each breach. It also indicates whether or not the breach location is on a Project levee, a SJAFCA levee, or a FEMA-accredited levee.

River: River the breach is located on
Code Name: Name of the breach. Note: some breaches are grouped together from original source.
Project: Is the breach on a Project or non-Project levee?
SJAFCA: Is the breach on a levee cost shared with SJAFCA?
FEMA: Is the breach on a FEMA accredited levee?

Parcel Ave Depth.shp:

Description: This shapefile shows the average depth of flooding on each parcel for each of the 72 levee breach scenarios that were run for this study. Levee breach locations were named according to the river that they are on and whether they're on the left bank or right bank levee. This shapefile also shows the average depth of flooding on each parcel for the no breach/overtopping only scenario in the PBI (HEC-RAS) model.

The average flood depth recorded is for the wetted area of the parcel only (zero depth/dry areas were not included in calculating the average depth of flooding).

The shapefile also has columns that show the total area of the parcel (acres) and the worst-case flood depth (feet) on each parcel.

Note: See the shapefile "Parcel Wetted Area.shp" which indicates how many acres of the parcel got wet for each breach scenario.

APN: APN

Area_acre: Total area of the parcel (in acres)

BRC_L2 through WRS_L1: The column headers are the name given to each breach location. Average depth of flooding (in feet) associated with each breach per the name of the field
NoBreach: Average depth of flooding (in feet) associated with the no breach/overtopping only scenario in the PBI (HEC-RAS) model

Parcel Wetted Area.shp:

Description: See description for the "Parcel Ave Depth.shp" shapefile. Everything is set up the same, except the values in this shapefile indicate how many acres of the parcel got wet for each breach scenario.

ATTACHMENT B

Metadata for GIS Deliverables

for the Capital Assessment Analyses

Parcel Average Depth.shp:

Description: This shapefile shows the average depth of flooding of each parcel for each of the 12 flood scenarios that were analyzed for this study. Scenarios are labeled according to "with project" and "without project" conditions and each return period event. The average flood depth recorded is for the wetted area of the parcel only (zero depth/dry areas were not included in calculating the average depth of flooding).

The shapefile also has columns that show: What is the total area of the parcel in acres? What is the worst-case flood depth on each parcel?

Notes:

1. There are no parcels with flooding for the 2-, 10-, and 25-year with-project events.
2. See the shapefile "Parcel Wetted Area.shp" which indicates how many acres of the parcel got wet for each flood scenario.

APN: APN
Area: Total area of the parcel (in acres)
Max: The worst-case average depth of flooding (in feet) across all scenarios
WP_2YR through WOP_200YR: The column headers are the name given to each flood scenario. Average depth of flooding (in feet) is associated with each scenario per the name of the field

Parcel Wetted Area.shp:

Description: See description for the "Parcel Ave Depth.shp" shapefile. Everything is set up the same, except the values in this shapefile indicate how many acres of the parcel got wet for each breach scenario

San Joaquin Area Flood Control Agency

Levee Construction and Maintenance Assessment (LCMA)

Appendix D

Assessment District Boundary Diagram

(reduced from 18"x26" to 11"x17")

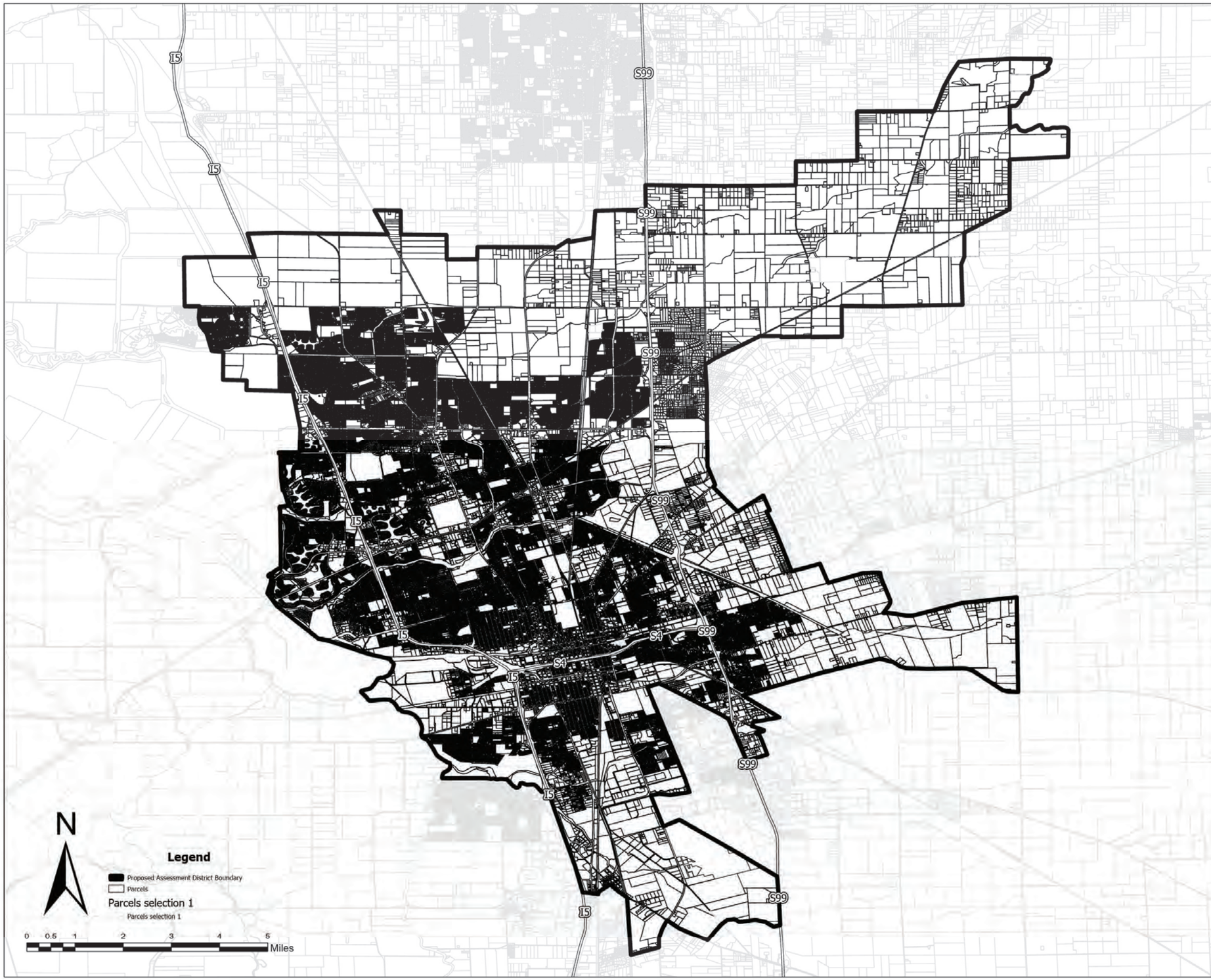
SAN JOAQUIN COUNTY

Greatness grows here.

SAN JOAQUIN AREA FLOOD CONTROL AGENCY

San Joaquin Area Flood Control Agency

Date: March 16, 2023



Proposed Boundaries of
SAN JOAQUIN AREA FLOOD CONTROL AGENCY
LEVEE CONSTRUCTON AND MAINTENANCE
ASSESSMENT DISTRICT

COUNTY OF SAN JOAQUIN
STATE OF CALIFORNIA

FILED IN THE OFFICE OF THE SECRETARY OF THE SAN JOAQUIN AREA FLOOD CONTROL AGENCY THIS ___ DAY OF _____, 20____.

_____
SECRETARY OF THE
SAN JOAQUIN AREA FLOOD CONTROL AGENCY

I HEREBY CERTIFY THAT THE WITHIN MAP SHOWING PROPOSED BOUNDARIES OF THE LEVEE CONSTRUCTION AND MAINTENANCE ASSESSMENT DISTRICT OF THE COUNTY OF SAN JOAQUIN, STATE OF CALIFORNIA, WAS APPROVED BY THE BOARD OF DIRECTORS OF THE SAN JOAQUIN AREA FLOOD CONTROL AGENCY AT A REGULAR MEETING THEREOF, HELD ON ___ DAY OF _____, 20___, BY ITS RESOLUTION NO. _____

_____
SECRETARY OF THE
SAN JOAQUIN AREA FLOOD CONTROL AGENCY

FILED THIS ___ DAY OF _____, 20___, AT THE HOUR OF _____ O'CLOCK ___M. IN BOOK _____ OF MAPS OF ASSESSMENT AND COMMUNITY FACILITIES DISTRICTS AT PAGE ___, IN THE OFFICE OF THE COUNTY RECORDER IN THE COUNTY OF SAN JOAQUIN, STATE OF CALIFORNIA

_____
COUNTY RECORDER OF
SAN JOAQUIN COUNTY

LWA
LARSEN WURZEL
& Associates, Inc.

San Joaquin Area Flood Control Agency

Levee Construction and Maintenance Assessment (LCMA)

Appendix E
San Joaquin County Use Codes
& Assessment Land Use Categories

SAN JOAQUIN COUNTY
Greatness grows here.

SAN JOAQUIN AREA FLOOD CONTROL AGENCY

San Joaquin Area Flood Control Agency

Date: March 16, 2023

Appendix E
Levee Capital and Maintenance Assessment (LCMA)
San Joaquin County Use Codes & Assessment Land Use Categories

Use Code	County Description	Land Use Category / Sub-Category
1	Vacant Residential Lot – Development with Utilities	Open Space - Developed
2	Vacant Lot with PROB. W/C Precludes Building A RE	Open Space
3	Vacant Lot – Totally Unusable (incurable)	Open Space
4	Vacant Residential Lot with miscellaneous Residential IMPRS (garage)	Open Space - Developed
5	Vacant Residential Subdivision Site	Open Space
6	Vacant Residential Lot- Undeveloped	Open Space
7	Potential Residential Subdivision	Open Space
10	Single-Family Dwelling (SFD)	Single-Family Residential
11	Condominium Unit	Multi-Family Residential
12	Planned Unit Residential Development (PURD)	Single-Family Residential
13	Single-Family Residence with Secondary Residential Square Footage	Single-Family Residential
14	SFD with Secondary Use (i.e., barber shop)	Single-Family Residential
15	Zero Lot Line Residential	Single-Family Residential
16	Residential Lot with Mobile Home	Mobile Home
17	Single-Family with Common Wall (duet, halfplex, etc.)	Single-Family Residential
20	Vacant Lot (zoned for two units)	Open Space
21	One Duplex – One Building	Single-Family Residential
22	Two SFDs On Single Parcel	Multi-Family Residential
30	Vacant Lot Zoned for 3 or 4 Units	Open Space
31	Single Triplex – (3 units, 1 structure)	Single-Family Residential
32	Three Units - 2 or More Structures	Multi-Family Residential
34	Single Fourplex	Multi-Family Residential
35	Four Units, 2 or More Structures	Multi-Family Residential
40	Vacant Lots Zoned for Apartments	Open Space
41	5-10 Residential Units – Single Building	Multi-Family Residential
42	5-10 Residential Units – 2 or more Buildings	Multi-Family Residential
43	11-20 Residential Units – One Structure	Multi-Family Residential
44	11-20 Residential Units – 2 or more Buildings	Multi-Family Residential
45	21-40 Units	Multi-Family Residential
46	41-100 Units	Multi-Family Residential
47	Over 100 Units	Multi-Family Residential
48	High-Rise Apartments	Multi-Family Residential
50	Rural Residential – Vacant Homesite	Agricultural
51	Rural Residence – 1 Residence	Rural Residential
52	Rural Residential – 2 or more residences	Rural Residential
53	Rural Residential – Vacant – Development with	Open Space - Developed
54	Rural Residences. - with Miscellaneous Residences. IMPS; Only	Open Space
55	Labor Camp	Rural Residential
56	Rural Residential with Mobil Home	Mobile Home

Appendix E
Levee Capital and Maintenance Assessment (LCMA)
San Joaquin County Use Codes & Assessment Land Use Categories

Use Code	County Description	Land Use Category / Sub-Category
59	Residential Care Home (6 units or less)	Multi-Family Residential
60	Motels Less Than 50 Units	Commercial
61	Motels Over 50 Units	Commercial
62	Motels less than 50 units with some kitchens	Commercial
63	Motels over 50 Units with some Kitchens	Commercial
64	Motels Less Than 50 Units with Shops	Commercial
65	Motels Over 50 Units with Shops	Commercial
68	Resort Motels – Cabins, Etc.	Commercial
70	Hotel without Restaurant	Commercial
71	Hotel with Restaurant	Commercial
78	Rooming House – Convent – Rectory, Etc.	Commercial
80	Common Areas – No Structures	Open Space
81	Common Areas – with Structures	Open Space - Developed
82	Common Areas – Roads and Streets	Open Space
90	Mobile Home Park	Mobile Home
91	Overnight Type Trailer Park	Open Space
92	Mobile Home Park with Overnight Facilities	Mobile Home
93	Resort Type Trailer Park	Mobile Home
94	Mobile Home Condominium Lot	Mobile Home
95	Mobile Home Appurtenances	Mobile Home
96	Mobile Home	Mobile Home
100	Vacant Commercial Land – Undeveloped	Open Space
101	Vacant Commercial Land with Utilities	Open Space - Developed
102	Vacant Commercial Land with Miscellaneous IMPS	Open Space - Developed
107	Potential Commercial Subdivision	Open Space
110	Single-Story	Commercial
111	Multiple-Story Stories	Commercial
112	Multiple Stores in one Building	Commercial
113	Store with Residential Unit or Units	Commercial
114	Store Condo	Commercial
120	1 store and 1 office	Commercial
121	Multiple Combination of Offices, Shops	Commercial
130	1-Story Department Store	Commercial
131	2-Story Department Store	Commercial
140	Grocery Store	Commercial
141	Supermarkets	Commercial
142	Convenience Store	Commercial
143	Convenience Store with Gas Sales	Commercial
144	Fruit Stand	Commercial
150	Regional Shopping Center	Commercial
151	Community Shopping Center	Commercial
152	Neighborhood Shopping Center	Commercial

Appendix E
Levee Capital and Maintenance Assessment (LCMA)
San Joaquin County Use Codes & Assessment Land Use Categories

Use Code	County Description	Land Use Category / Sub-Category
153	Individual Parcel Within Regional Shopping	Commercial
154	Individual Parcel Within Community Center	Commercial
155	Individual Parcel within neighborhood Shopping	Commercial
156	Shopping Center Common Area	Commercial
170	1-Story Office Building	Commercial
171	2-Story Office Building	Commercial
172	3 or More Story Office Building	Commercial
173	Office Building with Residential Unit or Units	Commercial
180	Assisted Living Residence	Multi-Family Residential
181	Congregate Seniors Housing	Multi-Family Residential
182	Continuing Care Retirement Community	Multi-Family Residential
183	Skilled Nursing Facility	Multi-Family Residential
184	Specialty Home (Developmentally Disable)	Multi-Family Residential
190	Medical Offices	Commercial
191	Dental Offices	Commercial
192	Medical Dental Complex	Commercial
193	Veterinary Hospitals	Commercial
194	One-Story Office Condo	Commercial
195	Two-Story Office Condo	Commercial
196	Medical Office Condo	Commercial
197	Dental Office Condo	Commercial
200	Commercial Common Area – Non Shopping C	Commercial
201	Miscellaneous Multiple Uses – None Fully Dominant	Commercial
202	Commercial Use	Commercial
203	Animal Training Facility	Commercial
204	Day Care Center	Commercial
210	Restaurants	Commercial
211	Fast Food Restaurants	Commercial
212	Food Preparation – Take Out Only	Commercial
213	Cocktail Lounge – Bars	Commercial
214	Restaurant with Residential Unit or Units	Commercial
230	Walk-In Theaters	Commercial
231	Multiple Screen Theaters	Commercial
240	Banks	Commercial
250	Full Service Stations	Commercial
251	Self Service. Station (has no facilities)	Commercial
252	Service Station with Car Wash	Commercial
253	Truck Terminals	Commercial
254	Bulk Plants	Commercial
255	Self Service Station with Mini Mart	Commercial
256	Convenience Store (mini-mart) with gas station	Commercial
260	Auto Sales with Service Center	Commercial

Appendix E
Levee Capital and Maintenance Assessment (LCMA)
San Joaquin County Use Codes & Assessment Land Use Categories

Use Code	County Description	Land Use Category / Sub-Category
261	Auto Sales without Service Center	Commercial
262	Used Car Lot	Commercial
263	Other Sales Centers (Trailers, mobile home	Commercial
270	Farm or CONTS. Machine Sales and Service	Commercial
271	Farm or CONTS. Machine Sales Only	Commercial
272	Farm or CONST. Machine Sales Only	Commercial
280	Auto and Truck Repairs and Accessories	Commercial
281	Specialty Shops (Tires, Brakes, Etc.)	Commercial
282	Car Wash	Commercial
283	Self Service Car Wash	Commercial
284	Laundry	Commercial
285	Auto Body Shop	Commercial
290	Retail Nursery	Commercial
291	Commercial/Wholesale Nursery	Commercial
296	Commercial	Commercial
300	Vacant Industrial Land Undeveloped	Open Space
301	Vacant Industrial Land – Developed With	Open Space - Developed
302	Vacant Industrial Land with Miscellaneous IMPS	Open Space - Developed
307	Potential Industrial Subdivision	Open Space
310	Light Manufacturing and Light Industrial	Industrial
311	Light Industrial and Warehousing	Industrial
312	Light Industrial Warehouse Multiple Tenants	Industrial
313	Industrial Condo	Industrial
314	Shop-Work Area with Small Office	Commercial
320	Warehousing – Active	Industrial
321	Warehousing – Inactive	Industrial
323	Warehousing – Yard	Industrial
324	Mini Storage Warehousing	Industrial
330	Lumber Mills	Industrial
331	Retail Lumber Yards	Industrial
332	Specialty Lumber Products (Mouldings, SA	Industrial
340	Packing Plants	Industrial
341	Cold Storage or Refrigerated Warehouse	Industrial
350	Fruit and Vegetable	Industrial
351	Meat Products	Industrial
352	Large Winery	Industrial
353	Small/Boutique Winery	Commercial
355	Other Food Processing	Industrial
360	Feed and Grain Mills	Industrial
361	Retail Feed and Grain Sales	Industrial
362	Stockyards	Industrial
363	AG Chemical Sales and/or Application	Industrial

Appendix E
Levee Capital and Maintenance Assessment (LCMA)
San Joaquin County Use Codes & Assessment Land Use Categories

Use Code	County Description	Land Use Category / Sub-Category
370	Heavy Industry	Industrial
371	Shipyard	Industrial
380	Mineral Processing	Industrial
381	Sand and Gravel – Shale	Industrial
390	Industrial Common Area	Industrial
391	Miscellaneous Industrial Multiple Uses – None Full	Industrial
392	Industrial Use (doesn't reasonably fit any	Industrial
393	Airport (private	Commercial
400	Irrigated Orchard	Agricultural
401	Irrigated Orchard with Residence	Agricultural
410	Irrigated	Agricultural
411	Irrigated	Agricultural
420	Irrigated Vineyard	Agricultural
421	Irrigated Vineyard with Residence	Agricultural
450	Irrigated Row Crops	Agricultural
451	Irrigated Row Crops with Residence	Agricultural
460	Irrigated Pasture	Agricultural
461	Irrigated Pasture with Residence	Agricultural
462	Horse Ranch	Agricultural
463	Horse Ranch with Residence	Agricultural
470	Dairy	Agricultural
471	Dairy with Residence	Agricultural
480	Poultry Ranch	Agricultural
481	Poultry Ranch with Residence	Agricultural
490	Feed Lots	Agricultural
500	Dry Farm	Agricultural
501	Dry Farm with Residence	Agricultural
510	Dry Graze	Agricultural
511	Dry Graze with Residence	Agricultural
520	Non-Irrigated Vineyards	Agricultural
521	Non-Irrigated Vineyards with Residence	Agricultural
530	Specialty Farms	Agricultural
540	Agricultural	Agricultural
550	Tree Farm	Agricultural
551	Tree Farm (with or without residence)	Agricultural
570	Agricultural	Agricultural
590	Waste Lands	Open Space
591	Berms	Open Space
610	Swim Centers	Commercial
611	Recreational Centers	Commercial
612	Marina or Yachting Club	Commercial
613	Racquetball Club	Commercial

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Levee Capital and Maintenance Assessment (LCMA)
San Joaquin County Use Codes & Assessment Land Use Categories

Use Code	County Description	Land Use Category / Sub-Category
614	Tennis Club	Commercial
615	Private Campground or Resort	Commercial
620	Privately Owned Dance Halls	Commercial
630	Bowling Alleys	Commercial
631	Arcades and Amusement Centers	Commercial
632	Skating Rink	Commercial
640	Clubs, Lodge Halls	Commercial
650	Privately Owned Auditoriums and Stadiums	Commercial
660	18-Hole Public Golf Course	Open Space
661	9-Hole Public Golf Course	Open Space
662	Country Club	Open Space
664	Driving Range	Open Space
670	Privately Owned Race Tracks	Commercial
680	Non-Profit Organizations Camps (Boy Scouts, Etc.)	Commercial
690	Privately Owned Parks	Open Space
710	Church, Synagogue or Temple	Commercial
711	Other Church Property	Commercial
720	Private School	School
721	Parochial School	School
722	Special School	School
730	Private Colleges	School
740	Full Service Hospital	Commercial
742	Clinic	Commercial
760	Orphanages	Commercial
770	Cemeteries (non-profit)	Open Space
771	Mortuaries and Funeral Homes	Commercial
772	Cemetery Taxable (profit)	Open Space
810	SBE valued	Open Space - Developed
811	Utility Water Company	Open Space
812	Mutual Water Company	Open Space
813	Cable TV	Open Space
814	Radio and TV Broadcast Site	Open Space
815	Pipeline Right-Of-Way	Open Space
816	Open Space	Open Space
850	Right-Of-Way	Open Space
851	Private Road	Open Space - Developed
860	Well Site	Open Space
861	Tank Site	Open Space
862	Springs and Other Water Sources	Open Space
870	Rivers and Lakes	Open Space
890	Parking Lots – Fee	Open Space - Developed
891	Parking Lots – No Fee	Open Space - Developed

Appendix E
Levee Capital and Maintenance Assessment (LCMA)
San Joaquin County Use Codes & Assessment Land Use Categories

Use Code	County Description	Land Use Category / Sub-Category
892	Parking Garages	Commercial
900	Vacant Federal Lands	Open Space
901	Federal Buildings	Commercial
902	Military Installation	Commercial
903	Miscellaneous Federal Property	Commercial
910	Vacant State Lands	Open Space
911	State Buildings	Commercial
912	State Shops & Yards	Commercial
913	State Parks and Other Recreational Facilities	Open Space - Developed
914	State Schools, Colleges	School
916	Miscellaneous State Property	Commercial
920	Vacant County Land	Open Space
921	County Buildings	Commercial
923	County Parks and Other Recreational Facilities	Open Space
924	County Hospitals	Commercial
925	Miscellaneous County Property	Commercial
930	Vacant City Lands	Open Space
931	City Buildings	Commercial
932	City Shops and Yard	Commercial
933	City Parks and Other Recreational Facilities	Open Space
934	Municipal Utility Prop. (reservoirs, sewer pipeline)	Open Space - Developed
935	Parking Lots – Garages	Open Space - Developed
936	Municipal Airports	Commercial
937	Miscellaneous City Property	Commercial
940	School District Properties	Commercial
941	Fire Districts	Commercial
942	Flood Control District Property	Open Space
943	Water District Property	Open Space
944	Miscellaneous District property	Open Space
950	Public Owned Land – Non- Taxable	Open Space
951	Public Owned Land – Taxable [Section 11]	Open Space
1000	Calaveras AG	Agricultural
1001	Stanislaus AG	Agricultural
1002	Blended	Blended

Source: ParcelQuest, San Joaquin County

San Joaquin Area Flood Control Agency

Levee Construction and Maintenance Assessment (LCMA)

Appendix F

List of Parcels and FY 2023/24 Assessment Roll

(Under Separate Cover)

SAN JOAQUIN COUNTY

Greatness grows here.

SAN JOAQUIN AREA FLOOD CONTROL AGENCY

San Joaquin Area Flood Control Agency

Date: March 16, 2023