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Cities of Lathrop & Manteca

Urban Levee Design Criteria (ULDC) Evaluation of the RD17 Levee

Prepared for: City of Lathrop & City of Manteca *March 22, 2016*

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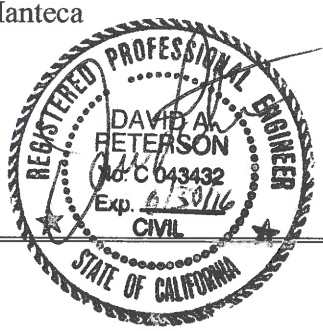

1.0 Introduction

The cities of Lathrop and Manteca began in 2014 to evaluate the RD 17 levees utilizing the State of California Urban Levee Design Criteria (ULDC), and to identify deficiencies and countermeasures. The cities desire to achieve an Urban Level of Protection (ULOP) by 2025 and to meet the requirements of making a ULOP "finding" by the July 1, 2016 deadline set forth by the State. The enclosed is intended to serve as key elements representing "substantial evidence in the record" per ULDC Type 3 Adequate Progress requirements:

1. Engineer's Report
2. Adequate Progress Report Element 1: Scope, schedule, and cost of the flood protection system needed to meet the ULDC

ULOP findings made pursuant to this Engineer's Report must be supported by all 6 findings in the ULOP (FND-1 through FND-6), and be supported by substantial evidence in the record per EVD-1 or EVD-3. Periodic reviews under FND-3 and FND-4 must be performed at least every 5 years commencing with the initial finding, and consider changes in engineering standards and practice, changing hydrology, sea-level rise, climate change, physical changes in the system, new data, system performance, physical condition, and any other relevant factor affecting sustainable performance.

2.0 Background of the RD17 Levee System

The RD17 levees are currently accredited to 100-year FEMA standards per 44CFR 65.10 and are currently in the midst of a 3-phase Levee Seepage Repair Project (LSRP), intended to improve seepage performance. The extents of the LSRP project scope are shown in Figure 1. Improvement Plans for all 3 phases of the LSRP are provided in Volume 11 of this ULDC deliverable.

All ULDC analyses in the enclosed deliverable assume that Phases 1 through 3 of the LSRP are complete. The ULDC improvements that are called out in the enclosed Engineer's Report will be implemented as Phase 4 of the RD17 project. The total program for achieving a ULOP by 2025 includes the following projects:

Table 1. Summary of RD17 improvement program for achieving ULOP by 2025.

Project	Schedule	Cost
RD17 LSRP Phase 1	Completed 2009	$2.8M
RD17 LSRP Phase 2	Completed 2010	$10.8M
RD17 LSRP Phase 3	2016-2019	$46.8M
Lathrop/Manteca ULDC	Complete Before 2025	$136.8M

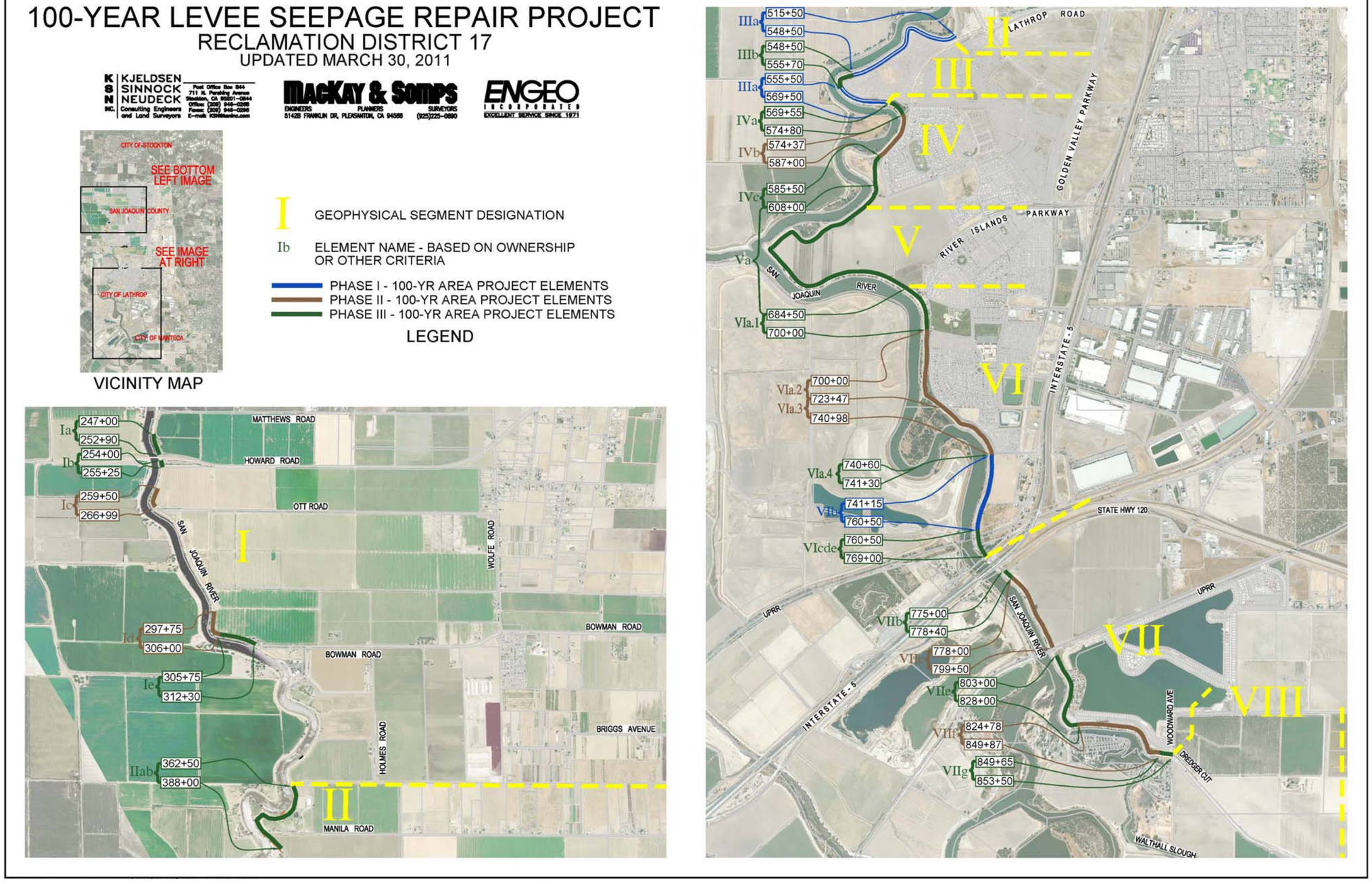

Figure 1. Extents of RD17 Levee Seepage Repair Project (LSRP) Phases 1, 2, and 3.

3.0 Contents of the ULDC Binders

The engineer's report herein includes 11 volumes of binders covering the subjects that are required for a ULDC evaluation. The following table identifies the author and the location of each required ULDC analysis:

Table 2. Responsible party and location of required ULDC analyses.

Required ULDC Section		Responsible Party	Memo Location
7.1	Design Water Surface Elevation	PBI	Volume 1
7.2	Minimum Top of Levee	PBI	Volume 1
7.3	Soil Sampling, Testing and Logging	ENGEO	Volume 3
7.4	Slope Stability for Intermittently Loaded Levees	ENGEO	Volume 3
7.5	Underseepage for Intermittently Loaded Levees	ENGEO	Volume 3
7.6	Frequently Loaded Levees	PBI	Volume 1
7.7	Seismic Vulnerability	ENGEO	Volume 3
7.8	Levee Geometry	KSN	Volume 2
7.9	Interfaces and Transitions	ENGEO	Volume 3
7.10	Erosion	KSN	Volume 2
7.11	Right-of-Way	KSN	Volume 2
7.12	Encroachments	KSN	Volume 2
7.13	Penetrations	PBI	Volume 1
7.14	Floodwalls, Retaining Walls, and Closure Structures	ENGEO	Volume 3
7.15	Animal Burrows	KSN	Volume 2
7.16	Levee Vegetation	KSN	Volume 2
7.17	Wind Setup and Wave Runup	PBI	Volume 1
7.18	Security	KSN	Volume 2
7.19	Sea Level Rise	PBI	Volume 1
7.20	Emergency Actions	KSN	Volume 2
8.0	O&M, Inspection, Monitoring, and Remediation of Poor Performance	KSN	Volume 2

The main reports are all contained within **Volumes 1 through 3**.

The geotechnical report includes a significant amount of figures and appendices that make up **Volumes 4 through 10**.

Volume 2 includes the 10% plans and cost estimate for Phase 4 additional work that is required to achieve ULDC.

Volume 11 includes improvement plans for RD17's ongoing levee seepage repair projects (Phases 1 through 3) which were discussed in Section 2.0.

4.0 Summary of ULDC Deficiencies and Proposed Construction Improvements

Each of the required ULDC analyses that were identified in Table 2 concluded that either (a) the RD17 levee system met ULDC standards, or (b) levee improvements are required in order to meet ULDC standards. Figure 2 and Table 3 on the following page summarize the deficiencies that were found in the ULDC analyses and identify proposed levee improvements that would address these deficiencies. This information is discussed further in the *Improvements/Cost Estimate* section of Volume 2.

5.0 200-year Floodplains in RD17

PBI completed a hydraulics study in 2014 which provided the Cities of Lathrop and Manteca with the first critical steps toward meeting ULDC and ULOP criteria. The hydraulics study: (a) identified the design water surface profiles along RD 17 levees and (b) provided an understanding of the magnitude (depth and extent) of the without-project 200-year floodplain near the cities' spheres of influence. The PBI report, *200-year Freeboard Analysis & Floodplain Mapping within RD17* (dated May 23, 2014) discusses the details of the hydraulics study and is provided in Volume 1 of this ULDC deliverable, as an attachment to the *7.1 Design Water Surface Elevation* section.

The study resulted in a 200-year, without-project flood map within RD17 which is presented in Figure 3.

Once the proposed RD17 levee improvements are complete and the levee system meets the ULDC, the 200-year floodplain will be revised as shown in Figure 4. All portions of the Lathrop and Manteca spheres that are behind the RD17 levee will achieve a 200-year Urban Level of Protection, once the 4-phase improvement program is complete.

Figure 2. ULDC deficiencies and proposed construction improvements.

Table 3. Proposed construction improvements to address ULDC deficiencies.

Project No.	Project Name	7.2 MTOL	7.4 Stability	7.5 Seepage	7.8 Geometry	7.10 Erosion	7.12 Encroachments	7.13 Penetrations
2.1	Dryland Levee Reconstruction and Seepage Berm			X	X			X
5.1	Cutoff Wall		X	X				X
5.2	Seepage Berm		X	X				X
5.3	Cutoff Wall		X	X				X
10.1	Erosion Repairs					X		
12.1	Encroachment Remediation						X	
13.1	Pipe Penetration Rehabilitation							X

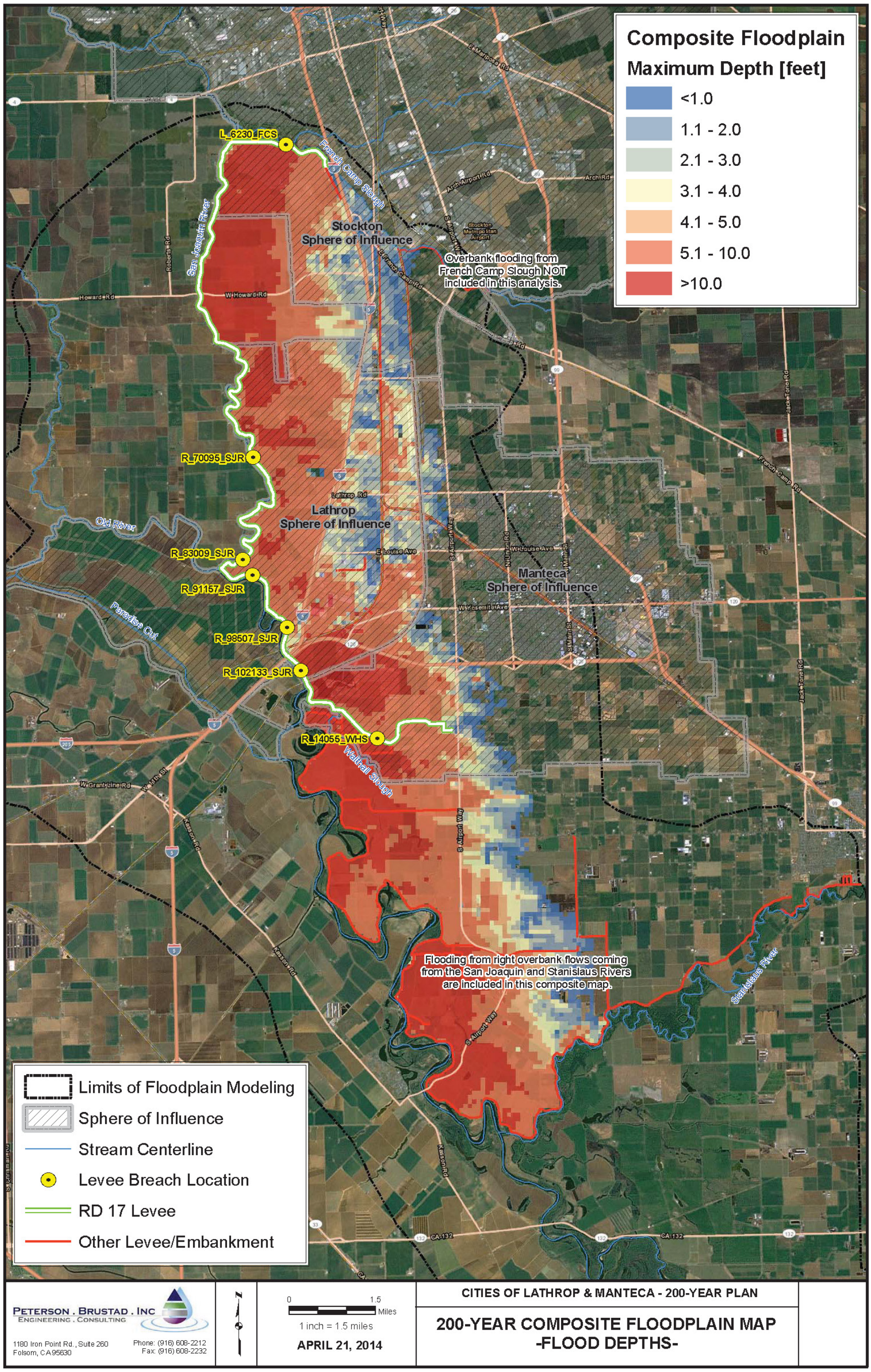

Figure 3. Without-project 200-year floodplain within RD17. (Source: *200-year Freeboard Analysis & Floodplain Mapping within RD17*. PBI, May 23, 2014).

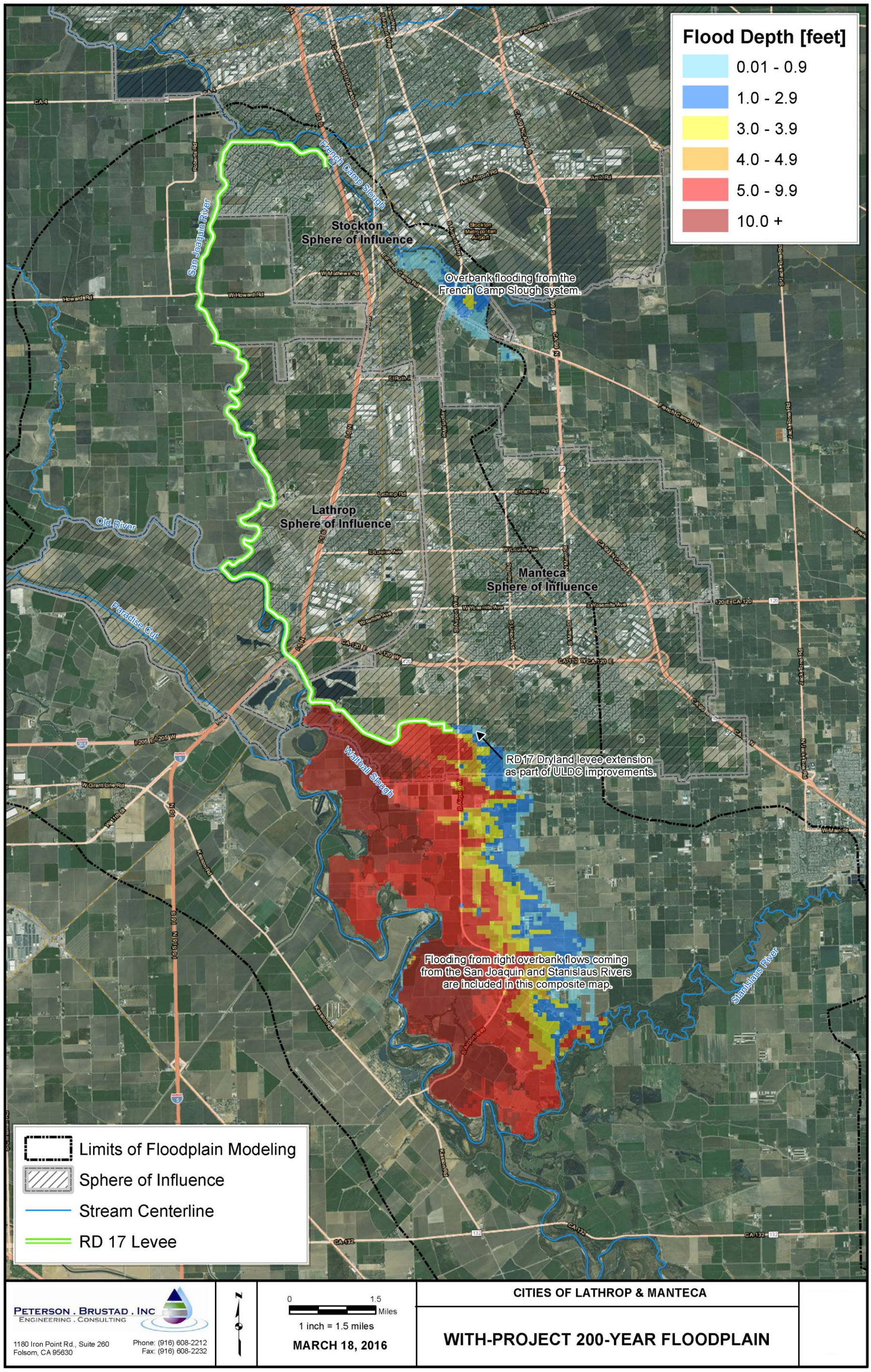

Figure 4. With-project 200-year floodplain surrounding RD17.