

## TECHNICAL MEMORANDUM

January 18, 2016

Project: Cities of Lathrop and Manteca  
Urban Levee Design Criteria (ULDC) Evaluation

Subject: 7.15 – Animal Burrows

Prepared by: Erik E. Almaas, P.E.

Reviewed by: Christopher H. Neudeck, P.E.  
David A. Peterson, P.E.

---

### 1.0 PURPOSE

Detailed analyses and documentation have been performed and developed of the existing levee system of Reclamation District No. 17 (RD17) in order to determine the extent of Urban Levee Design Criteria (ULDC) compliance. The purpose of this technical memorandum is to present the data sources, assumptions, analyses, and results as they pertain to ULDC Item No. 7.15 – Animal Burrows. The team responsible for undertaking this effort consists of Peterson, Brustad, Inc. (PBI), Kjeldsen, Sinnock and Neudeck, Inc. (KSN), and ENGEQ, Inc.

### 2.0 PROJECT BACKGROUND

Legislation passed in 2007 substantially limits the ability of urban communities to approve residential, commercial and industrial development after July 2016 unless they have an Urban Level of Flood Protection (ULOP) or are making adequate progress toward achieving ULOP 200-year flood protection. Background on this mandate was summarized in "*Position Paper for City of Lathrop, Compliance with SB5: ULOP 200-Year Flood Protection for Lathrop (RD 17)*" dated February 3, 2014, by Glenn Gebhardt, City Engineer for the City of Lathrop.

In April 2014, PBI prepared a Strategic Plan for ULOP Compliance for RD17 communities, which outlined a strategic plan for complying with SB5 for the area protected by RD17 levees on a schedule that will meet the requirements of the law. The main component of this Strategic Plan was to perform a comprehensive ULDC analysis and identify areas of deficiencies for each of the ULDC criteria. The analyses presented in this technical memorandum pertain to one of these ULDC criteria: 7.15 – Animal Burrows.

### 3.0 LEVEE ASSESSMENT

The analyses described in this technical memorandum have been developed at a detailed level using an assessment of the existing levee system to determine the extent of ULDC deficiencies. The assessment was based on a combination of new and existing information.

### 3.1 Data Sources

Existing data sources that were utilized in the levee assessment are as follows:

- Field Survey of Levee Conditions, performed by KSN in September 2015

### 3.2 Assumptions

Assumptions that were made in the levee assessment are as follows:

*Separate Ongoing Projects:*

Construction is currently underway on the RD17 Levee Seepage Repair Project (LSRP). The purpose of this project is to provide seepage remediation of various RD17 levee reaches along the San Joaquin River. Phase I and Phase II have both been completed at a combined cost of approximately \$9 million. Phase III is in the midst of the design and permitting stages and is estimated to cost \$35 million. The source of funding for LSRP is primarily from annual RD17 property owner assessments and DWR Early Implementation Program (EIP) grants. For purposes of this ULDC analysis, it was assumed that LSRP Phase III will be completed.

*Basis of ULDC Analysis:*

ULDC states that burrowing animals can present a significant threat to levee integrity, and therefore, proactive animal control and damage repair are two required levee maintenance practices where burrowing animals are present. RD17 currently implements a comprehensive animal control program that primarily includes baiting and grouting.

### 3.3 Analysis

The analysis of animal burrows consisted of performing a field survey of the RD17 levees. Levee reaches were categorized based on the level of visible rodent activity. Levee reaches that contained little to no rodent activity were deemed a Low Hazard. Levee reaches that contained light to medium rodent activity were deemed a Medium Hazard. Levee reaches that contained heavy rodent activity were deemed a High Hazard. Representative photographs of Medium Hazard and High Hazard levee reaches are shown below in Figures 1 and 2.



**Figure 1 - Representative Photo of Medium Hazard Area**



**Figure 2 - Representative Photo of High Hazard Area**

It should be noted that the analysis of animal burrows was based on a snapshot in time pursuant to when the field survey was performed. The levee reaches that were deemed Medium and High Hazards may be overstated due to the fact that RD17’s animal control program is ongoing throughout the year and that some of the noted deficient areas may have already been addressed subsequent to the field survey.

## 4.0 DEFICIENCY RESULTS

The levee reaches that were identified as a Low Hazard are indicated below in Table 1. These reaches require only regular, ongoing maintenance and have historically performed well. Therefore, they are deemed compliant and no further action is required.

**Table 1 - Animal Burrows - Low Hazard**

Station from	Station to	Length (feet)
0+00	158+44	15,844
164+68	212+17	4,749
216+14	282+89	6,675
306+68	332+00	2,532
359+22	387+94	2,872
447+25	494+00	4,675
515+16	546+81	3,165
557+10	568+88	1,178
574+40	590+11	1,571
69+90	670+67	6,077
695+69	773+55	7,786
806+73	824+60	1,787
852+75	854+16	143
881+34	985+95	10,461
		<b>69,515</b>

The levee sections that were identified as a Medium Hazard are indicated below in Table 2. These sections are deemed deficient.

**Table 2 – Animal Burrows - Medium Hazard**

Station from	Station to	Length (feet)
158+44	164+68	624
212+17	216+14	397
291+46	306+68	1,522
332+00	337+40	540
387+94	447+25	5,931
494+00	515+16	2,116
546+81	557+10	1,029
590+11	609+90	1,979
670+67	695+69	2,502
824+60	852+75	2,815
		<b>19,455</b>

The levee sections that were identified as a High Hazard are indicated below in Table 3. These sections are also deemed deficient.

**Table 3 – Animal Burrows - High Hazard**

Station from	Station to	Length (feet)
282+89	291+46	857
337+40	359+22	2,182
568+88	574+40	552
773+55	806+73	3,318
854+18	881+34	2,716
		<b>9,625</b>

As stated earlier, RD17 already implements a comprehensive animal control program. It is recommended that existing, ongoing operations and maintenance efforts for all levee reaches deemed a Medium or High Hazard be augmented to emphasize and better address animal control at these particular reaches. Figure 3 consists of an overall map that summarizes the deficiencies of the RD17 levee system with respect to animal burrows.

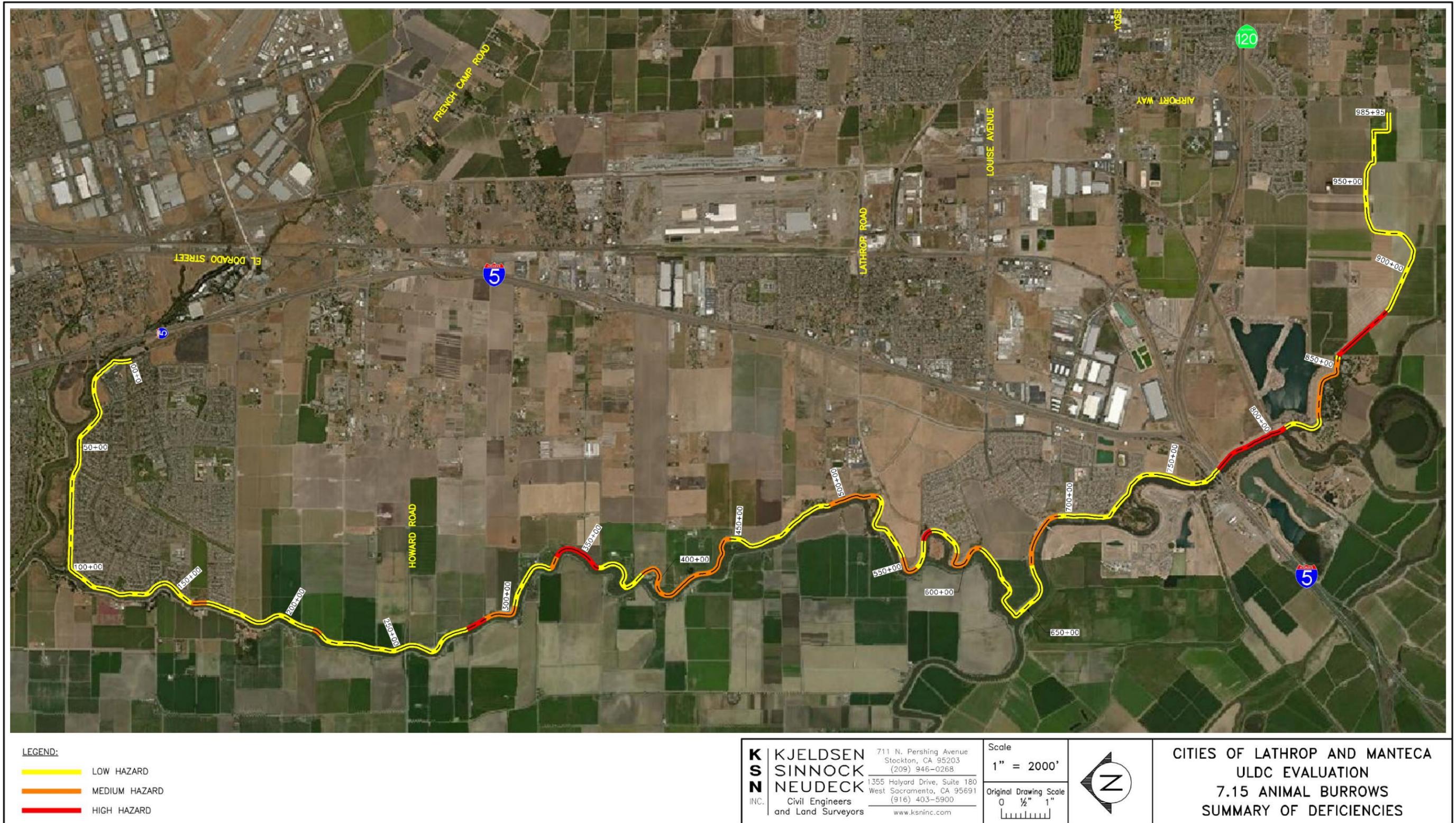


Figure 1 - Summary of Deficiencies