SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE MANUAL

SACRAMENTO RIVER
FLOOD CONTROL PROJECT

UNIT No. 152

WEST LEVEE OF FEATHER RIVER
FROM
NORTH BOUNDARY OF MAINTENANCE AREA No. 16
TO
THE WESTERN CANAL INTAKE
(MAINTENANCE AREA No. 7)

US Army Corps of Engineers®

U.S. ARMY CORPS OF ENGINEERS

SACRAMENTO DISTRICT

SACRAMENTO, CALIFORNIA

August 2015 - DRAFT

SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE MANUAL
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FROM NORTH BOUNDARY OF MAINTENANCE AREA No. 16
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LOCATION	ADDITION OR REVISION	DATE
Supplemental Manual	This entire supplemental manual was revised to reflect the new format and incorporate the improvements made to the levee as part of Project Area D of the Feather River West Levee Project 1. For historical reference, the previous supplemental manual text and previous revisions can be found in Appendix L.	August 2015

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SECTION 1 GENERAL

1-01. This O&M Manual has been prepared in accordance with the guidelines contained in the U.S. Army Corps of Engineers' (USACE) Engineering Regulation (ER) 1110-2-401, "*Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual for Projects and Separable Elements Managed by Project Sponsors*."

1-02. The levee of Unit No. 152 provides protection to adjacent agricultural lands and the towns of Gridley and Live Oak against flood waters of the Feather River and is an essential feature of the Sacramento River Flood Control Project (SRFCP).

1-03. The project works covered by this manual include the west levee and banks of the Feather River from the north boundary of Maintenance Area No. 16 (also the northern boundary of Sutter County) to the Western Canal Intake.

1-04. The grade of the adopted flood plane profile in the Feather River varies from elevation 149.0 at the north boundary of Unit No. 152 to elevation 92.0 at the south boundary (or north boundary of Maintenance Area No. 16). Note: Elevations are referred to in USACE datum. Within Unit No. 152, freeboard above the project floodplain of 3 feet has been equaled or exceeded. The project design capacity is 210,000 cubic feet per second (cfs).

1-05. Environmental compliance and mitigation requirements are briefly described in Section 10-05 of this Supplement and in Appendix K.

SECTION 2 AUTHORIZATION

2-01. See the SRFCP Standard Manual for the authorization.

2-02. Responsibility for the operating and maintaining the completed works of Unit No. 152 was officially accepted by The Reclamation Board of the State of California (now known as the Central Valley Flood Protection Board (CVFPB)) on December 18, 1951 and June 15, 1955, as shown on the attached letters of acceptance included in Appendix G.

2-03. Flood and Costal Storm Emergencies Act, Public Law 84-99.

2-04. Fiscal Year 1997 Emergency Supplemental Appropriations Act, Public Law 105-18.

2-05 Work for Project Area D of the Feather River West Levee Project (FRWLP) was administratively authorized by 33 U.S.C. Section 408 permission dated March 3, 2014 and CVFPB Permit No. 18793-3BD.

SECTION 3 LOCATION

3-01. The Unit No. 152 levee provides protection to adjacent agricultural lands and the towns of Gridley and Live Oak against flood waters of the Feather River. The project works covered by this manual include the west levee of the Feather River from the north boundary of Maintenance Area No. 16 (also north boundary of Sutter County) to the Western Canal Intake, all within Maintenance Area No. 7, Butte County, California.

3-02. Appendix B contains maps and aerial photos of the alignment of the Unit No. 152 Feather River West Levee and depicts improvements made to Unit No. 152 as part of Project Area D of the FRWLP. There are 15.0 levee miles (LM) within Unit No. 152.

SECTION 4 PERTINENT INFORMATION

4-01. Overview of Improvements to Unit No. 152

As part of the FRWLP, soil-bentonite (SB) and cement-bentonite (CB) cutoff walls were constructed at the levee centerline to reduce the hydraulic gradient and seepage flows to acceptable levels in accordance with USACE requirements.

Between LM 2.98 and 12.04, the top of the cutoff wall is located at an elevation corresponding to two-thirds of the total levee height.

A landside seepage berm was constructed from LM 12.02 to LM 12.25 and LM 12.78 to LM 13.48. Numerous encroachments and penetrations were also addressed along the Unit No. 152 levee. The As-Built drawings containing specific details of the improvements constructed as part of Project Area D of the FRWLP are included in Appendix C.

An overview of the improvements made as part of Project Area D of the FRWLP to the Unit No. 152 levee is shown on Exhibit 2 included in Appendix B. Appendix M contains a table correlating LM, River Mile, and Station for Unit No. 152.

4-02. Design Water Surface Elevation

As part of the FRWLP, the levee and appurtenant flood control systems were improved. The design water surface elevation was obtained using the USACE Common Features hydraulic model, version 3 (2011). Peterson Brustad, Inc. updated this model to include work performed for the FRWLP in order to evaluate levee performance. It should also be noted that the FRWLP did not change the authorized design profiles or flows of the federal project.

a. Top of Levee

The design water surface elevation was used as the basis for determining the minimum top of levee elevation. During design, it was determined the existing levee had more than 3 feet of freeboard above the 200-year design water surface elevation at all locations.

b. Seepage and Slope Stability

Seepage and slope stability were analyzed at 4 feet above 200-year water surface elevation in accordance with USACE Engineering Manual (EM) 1110-2-1913, "*Design and Construction of Levees.*" Where this exceeded the actual top of levee, the elevation at the physical top of levee was used. Exit gradients were limited to the following values:

- Landside levee toe: < 0.5
- Toe of seepage berm: < 0.8
- Landside levee toe with seepage berm: < 0.5
- Landside levee toe with relief wells: < 0.5
- Bottom of empty ditch at landside toe: < 0.5
- Bottom of empty ditch 150 feet or more from landside toe: < 0.8

4-03. Borrow Material

The Project Area D of the FRWLP levee improvements were constructed using existing levee embankment material as well as approximately 166,000 cubic yards of imported embankment material and approximately 168,000 of imported drainage material meeting the requirements of USACE EM 1110-2-1913, "*Design and Construction of Levees,"* Sacramento USACE District Standard Operating Procedure SOP-EDG-03, "*Geotechnical Levee Practice*," and the *California Code of Regulations, Title 23*. Borrow material was obtained from the Live Oak borrow site, Biggs Wastewater Treatment Plant site, and Mathews Contracting site.

4-04. Right of Way Acquisitions

In general, land was acquired in fee title for the entire levee footprint (landside levee toe to waterside levee toe). In addition to acquiring land for the levee footprint, fee title was also generally obtained 20 feet beyond the landside toe, and 15 feet beyond the waterside toe. Finally, an easement was obtained 10 feet beyond the landside fee title acquisition, resulting in a total of 30 feet of fee and easement acquisitions on the landside. An overview of the right-of-way acquired as part of Project Area D of the FRWLP is shown on Exhibit 3 included in Appendix B.

SECTION 5 CONSTRUCTION HISTORY

5-01. Unit No. 152 was originally built by local interests and later re-constructed in various stages to the grades and sections adopted by the USACE. In general, all construction features are based on standard plans and specifications, details being fully covered in the As-Built drawings included in Appendix C. The construction work required to bring the locally built levee to project grade and section was accomplished under the following contracts:

a. Construction of the west levee of the Feather River from opposite Rio Bonito Station upstream to the Western Canal Intake was accomplished by Excavators, Inc., under Contract No. W-04-167-eng-1240. Work on this contract was started on April 4, 1947 and completed on December 19, 1947. Maintenance and operation of the Sutter-Butte Canal Headgates, which lies within this reach of levee, will be covered under another manual, Unit No 160.

b. Reconstruction of the West Levee of the Feather River from Cox Ranch upstream to opposite Rio Bonito Station was accomplished by H. Earl Parker, Inc., under Contract No.DA-04-167-eng-ll46 during the period from March 8, 1954 to December 23, 1954.

c. The work completed under Project Area D of the FRWLP included construction of SB and CB cutoff walls ranging between 17 and 99 feet in depth along the centerline of the levee from LM 2.98 to LM 12.04 and reconstruction of the levee, under Contract No. 18793-3BD.

SECTION 6 PROJECT PERFORMANCE

6-01. As constructed, the levee height provides for a freeboard of at least 3 feet above the adopted floodplain profile.

6-02. The Federal project design flow is 210,000 cfs. The authorized water surface profile of the Federal project is the 1957 Profile. These flows and profiles remain unchanged by the improvements made as part of Project Area D of the FRWLP.

6-03. If the levee capacity is exceeded or fails, flooding occurs in the Sutter Basin, which includes a portion of Sutter and Butte Counties; the city of Yuba City; the towns of Live Oak and Gridley; and adjacent agricultural areas.

6-04. For purposes of this manual, the term "flood" or "high water period" shall refer to flows when the water surface in the Feather River reaches of exceeds a reading of 95.0 on the California Data Exchange Center (CDEC) Gridley (GRL) continuous water stage recorder end staff gage located on the east side (left bank) of the Feather River on the down stream side of the abutment of the bridge on the Gridley-Oroville Road about two and one-half miles east of Gridley.

SECTION 7 PROJECT COOPERATION AGREEMENT

7.01. Assurance of cooperation by local interests is provided by California State Legislation as contained in Chapter 3, Part 2, Division 5 of the California State Water Code (see paragraph 2-02a of the Standard Manual).

7-02. Responsibility for the operating and maintaining the completed works of Unit No. 152 was officially accepted by The Reclamation Board of the State of California (now known as the CVFPB) on December 18, 1951 and June 15, 1955, as shown on the attached letters of acceptance included in Appendix G.

7.03 The name and address of the Superintendent appointed by local interests to be responsible for the continuous inspection, operation and maintenance of the project works shall be furnished to the District Engineer, and in case of any change of Superintendent, the District Engineer shall be so notified.

7-04. Letters of acceptance and transfers can be found in Appendix G.

7-05. Cooperation Agreements can be found in Appendix I.

SECTION 8 OPERATION

8-01. Operation of the improved levees is to be carried out in the same manner as the existing levee system was operated prior to the improvements.

8-02. Slide gates and other positive closure devices on irrigation pipelines penetrating the levee should be closed at the conclusion of the irrigation season and confirmed to be closed at each routine patrol during the flood season.

8-03. See Section 10 for maintenance and inspection requirements for Unit No. 152.

SECTION 9 EMERGENCY OPERATIONS

9-01. Emergency surveillance, communication, and chain of responsibility for the Unit No. 152 levee and associated infrastructure are to be performed under existing protocols by the Superintendent, under the supervision by the State of California Department of Water Resources (DWR).

9-02. The emergency operations are as recommended in Section 8 of the USACE's "*Standard Operation and Maintenance Manual for the Sacramento River Flood Control Project.*"

9-03. Repair of Damage

In the event of serious damage to the project works, whether due to flood conditions or other causes, and which may be beyond the capability of local interests to repair, the Superintendent will contact a representative of the DWR, who coordinates maintenance of project works of the SRFCP. The DWR representative will give assistance or advice, or will determine appropriate action to be taken.

9-04. Applicable Methods

For applicable methods of combating flood conditions, reference is made to Section VIII of the Revised Standard Manual, where the subject is fully covered.

9-05. Slide Gate Operation

Positive closures on irrigation pipelines should be confirmed to be closed at each routine patrol during the flood season. During emergency high water events, positive closures on other utilities need to be closed. Positive closures on interior drainage pipelines shall be closed on a case-by-basis as determined by the Superintendent.

9-06. Monitoring of the System

Particular attention should be given to monitoring the performance of the levees during high water events to ensure the improvements function as designed. Attention should be paid to any cracking or slumping of the slopes or crown.

Standard flood-fighting techniques should be employed during high water events and observed problem areas should be addressed promptly. Proper response during high water conditions will include measures to prevent erosion and promptly repair wave wash and scour damage. Typical flood fighting methods will include the following:

- High water patrolling and reporting of trouble spots
- Wave wash protection of eroded slopes
- Caving bank protection
- Scour hole repair
- Topping of low or eroding spots on the levee crown using sandbags, lumber and sack, or mud box bulkhead construction
- Flood barrier construction

- Sandbagging to control boils that are issuing sediment
- Brushing and sacking the landside levee slope
- Draining the landside levee slope

9-07. Other references include:

a. "*Design and Construction of Levees*," USACE, EM 1110-2-1913, April 30, 2000.

b. "*Flood Fighting Methods*," DWR, August 2010 (included in Appendix D).

SECTION 10 MAINTENANCE AND INSPECTION

10-01 Levee

a. The Unit No. 152 levee described in this manual is located along the westly side of the Feather River from the north boundary of Maintenance Area No. 16 (also the northern boundary of Sutter County) to the Western Canal Intake. The levee has been constructed with slopes of 1 to 3 on the riverside and 1 to 2 on the landside with a crown width of 20 feet. Construction also included a gravel road surfacing 12 feet wide on top of the levee with turnouts at about 1,000 feet intervals. The necessary drainage structures, road approaches and appurtenances were also included in the work.

b. For pertinent Requirements of the Code of Federal Regulations and other requirements see the following:

(1) Maintenance – paragraph 4-02 of the Standard Manual.

(2) Check Lists – Appendix E and F of this Supplement to the Standard Manual.

(3) Operation – paragraph 4-04 of the Standard Manual.

(4) Special Instructions – paragraph 4-05 of the Standard Manual.

c. Modification or repair work in the vicinity of the SB or CB cutoff wall should include provisions to avoid damaging the cutoff wall. The cutoff wall acts as an impervious barrier and shall not be penetrated at any point along its length or depth. Proposed future utilities shall be placed over the existing cutoff wall.

10-02. Drainage and Irrigation Structures

a. A list of penetrations encountered as part of Project Area D of the FRWLP is included in Appendix N.

b. For pertinent Requirements of the Code of Federal Regulations and other requirements see the following:

(1) Maintenance – paragraph 5-02 of the Standard Manual

(2) Check Lists – Appendix E and F of this Supplement to the Standard Manual

(3) Operation – paragraph 5-04 of the Standard Manual

(4) Additional Requirements – paragraph 5-05 of the Standard Manual

(5) Safety Requirements – paragraph 5-06 of the Standard Manual

10-03. Channel

a. The low water channel of the Feather River within Unit No. 152 meanders along a comparatively wide overflow area with a levee along the west side (right bank) from the Western Chanel Intake to the north boundary of Maintenance Area No. 16 (near the mouth of Honcut Creek). The channel within Unit No. 152 has a project design capacity of about 210,000 cfs. Dredge tailings piles are located within the flood plane in this unit.

b. For pertinent Requirements of the Code of Federal Regulations and other requirements see the following:

(1) Maintenance – paragraph 6-02 of the Standard Manual

(2) Check Lists – Appendix E and F of this Supplement Manual

(3) Operation – paragraph 6-04 of the Standard Manual

(4) Safety Requirements – paragraph 6-05 of the Standard Manual.

c. It shall be the duty of the Superintendent to maintain a patrol of the project works during all periods of flood flow in excess of a reading defined in section 6-04 of this Supplement Manual. The Superintendent shall dispatch a message by the most suitable means to the District Engineer whenever the water surface at Gridley Bridge reaches the gage reading indicated above. The Superintendent shall take readings at said gauges at intervals of two to four hours during the period when the water surface is above the flood-flow stage indicated above and record the time of the observations. One copy of the readings shall be forwarded to the District Engineer immediately following the flood, and a second copy transmitted as an enclosure to the semi-annual report in compliance with paragraph 3-05 of the Standard Manual.

10-04. Miscellaneous Facilities

a. Miscellaneous structures of facilities which were constructed as a part of, or existed in conjunction with, the protective works, and which might affect their functioning, include the following:

(1) Bridges

a. Gridley Bridge at approximate LM 4.66.

(2) Utility Relocations

a. A portion of the 24-inch Maintenance Area 7 (Waller Family) gravity storm drain pipe at LM 2.29

b. A portion of the 24-inch Maintenance Area 7 (Waller Family) gravity storm drain pipe at LM 2.44

c. A portion of the 36-inch Maintenance Area 7 (Waller Family) gravity storm drain pipe at LM 2.59

d. A portion of the 8-inch Waller Family irrigation pipe at LM 2.71

e. A portion of the 24-inch Maintenance Area 7 (Peekma Family) gravity storm drain pipe at LM 2.91

f. A portion of the 36-inch Maintenance Area 7 gravity storm drain pipe at LM 3.08

g. A portion of the 36-inch Farmland Reserve gravity irrigation pipe at LM 3.38

h. A portion of the 18-inch City of Gridley effluent wastewater discharge pipe at LM 3.67

i. A portion of the 36-inch Cilker Irrigation irrigation pipe at LM 5.68

j. A portion of the 36-inch Maintenance Area 7 gravity storm drain pipe at LM 5.78

k. A portion of the 7-inch Jack Mariani irrigation pipe at LM 6.60

l. A portion of the 12-inch Jack Mariani irrigation pipe at LM 6.85

m. A portion of the 5-inch John Kucek irrigation pipe at LM 8.10

n. A portion of the telephone cable at LM 8.27

o. A portion of the 2-inch Clinton Moffit irrigation pipe at LM 8.59

p. A portion of the 2-inch Clinton Moffit irrigation pipe at LM 8.92

q. A portion of the 16-inch James Banes irrigation pipe at LM 9.89

r. A portion of the 10-inch James Banes irrigation pipe at LM 10.34

s. A portion of the 36-inch Williams storm drainage pipe at LM 11.49

t. A portion of the 36-inch Williams storm drainage pipe at LM 11.72

u. A portion of the 1-inch Fredericks Irrigation domestic water pipe at LM 11.84

v. A portion of the 8-inch Fredericks storm drainage pipe at LM 11.88

w. A portion of the 36-inch Fredericks storm drainage pipe at LM 11.89

(3) Hydrographic Facilities (to be maintained by other agencies)

a. Department of Water Resources station on left bank of Feather River on abutment of bridge on Gridley – Oroville Road.

b. Maintenance and operation of the Sutter-Butte Canal Headgates, which lies within this reach of levee, will be covered under another manual, Unit No. 160.

b. For pertinent Requirements of the Code of Federal Regulations and other requirements see the following:

(1) Maintenance – paragraph 7-02 of the Standard Manual

(2) Check Lists – paragraph 7-03 of the Standard Manual

(3) Operation – paragraph 7-04 of the Standard Manual

10-05. Environmental Protection

a. The USFWS B.O. #08ESMF00-2013-F-0342-1 within Appendix K pertains to the Project Area D of the FRWLP.

SECTION 11 SURVEILLANCE

11-01. See Section 10 for required project surveillance.

11-02. Information will be added to future drafts of this Supplement Manual for levee instrumentation.

SECTION 12 REPAIR, REPLACEMENT AND REHABILITATION

12-01. Repair is considered to entail those activities of a routine nature that maintain the project in a well-kept condition. Replacement covers those activities taken when a worn-out element or portion thereof is replaced. Rehabilitation refers to a set of activities as necessary to bring a deteriorated project back to its original condition. Repair, replacement and rehabilitation actions are to conform to the project As-Built plans and specifications unless other arrangements are made with the District Commander. These activities are the responsibility of the Superintendent.

12-02. All repairs, replacements, and/or rehabilitations should be made as recommended in the USACE's "*Standard Operation and Maintenance Manual for the Sacramento River Flood Control Project,*" and to the specifications for the original project construction.

12-03. The Superintendent should take into consideration the timing and urgency of the specific repairs. Depending upon the nature and severity of the repair it may be advisable to proceed with the repairs prior the next flood season, or proceed cautiously during a current flood season. Other methods or procedures may need to be deployed by the Superintendent and approved by the USACE if the repairs are required during an immediate flood season.

SECTION 13 NOTIFICATION OF DISTRESS

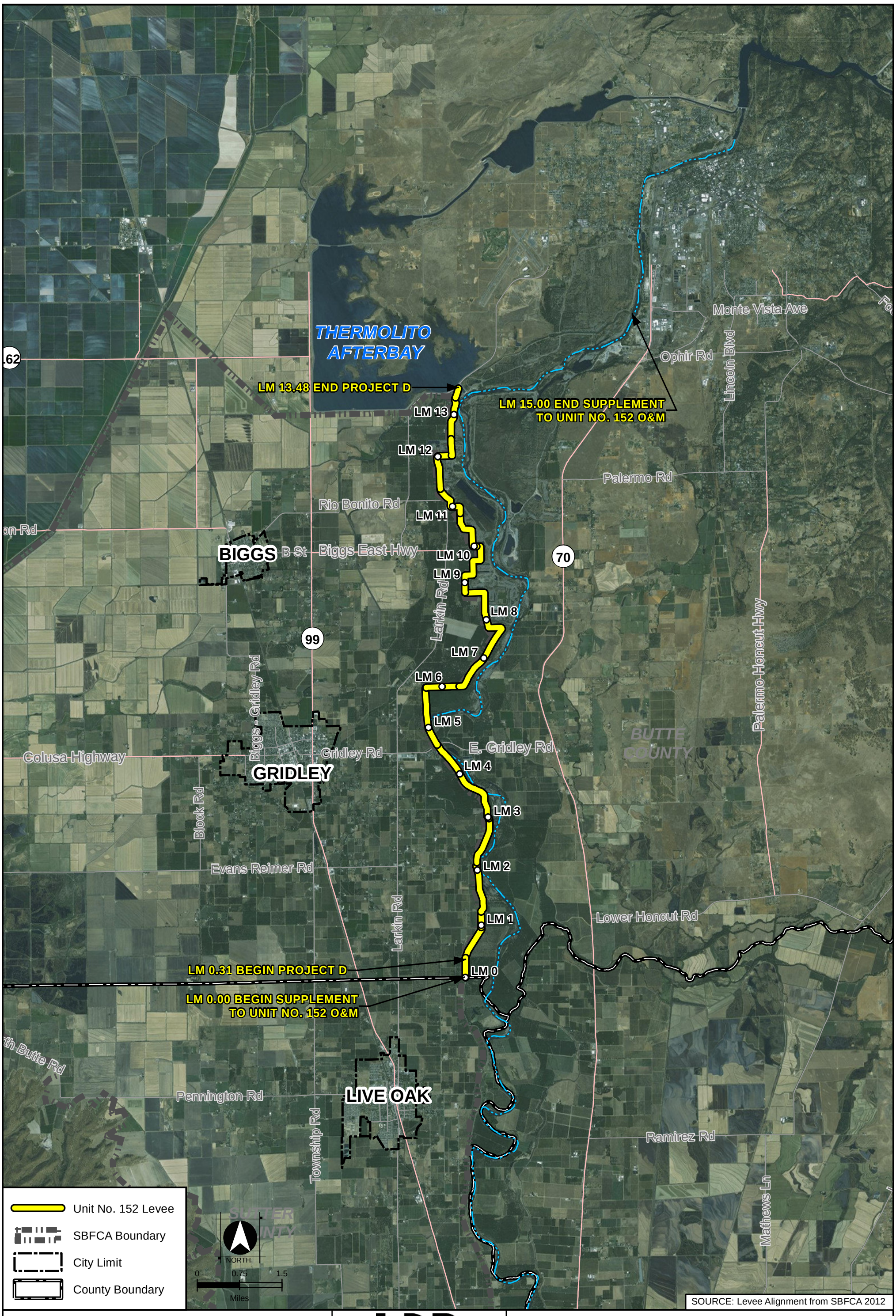
13-01. Notification of distress should be reported in accordance with USACE's ER 1110-2-101, "*Reporting of Evidenced of Distress of Civil Works Structures.*"

APPENDIX A

FLOOD CONTROL REGULATIONS
(See Standard Manual)

APPENDIX B

LOCATION DRAWINGS



Supplement to Standard O & M Manual
VICINITY MAP

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

August, 2015

EXHIBIT 1

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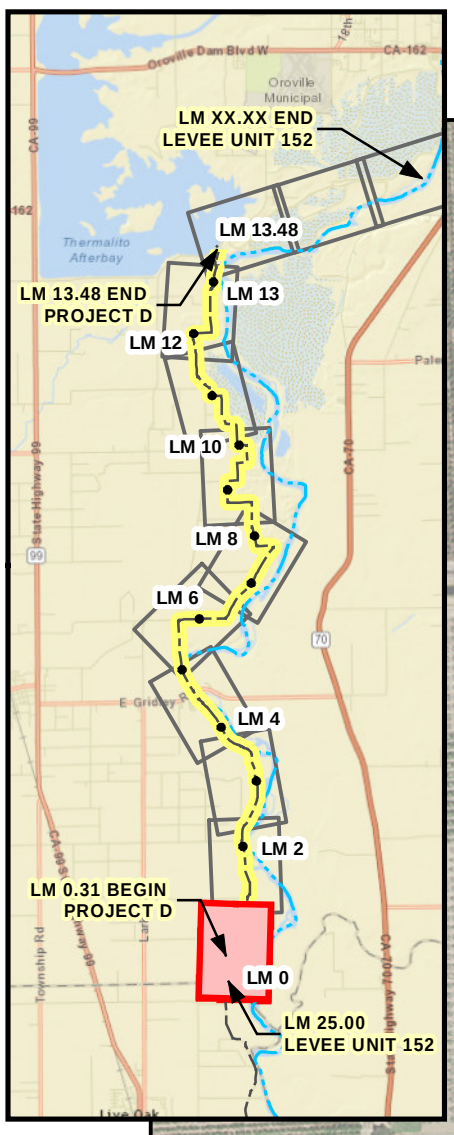

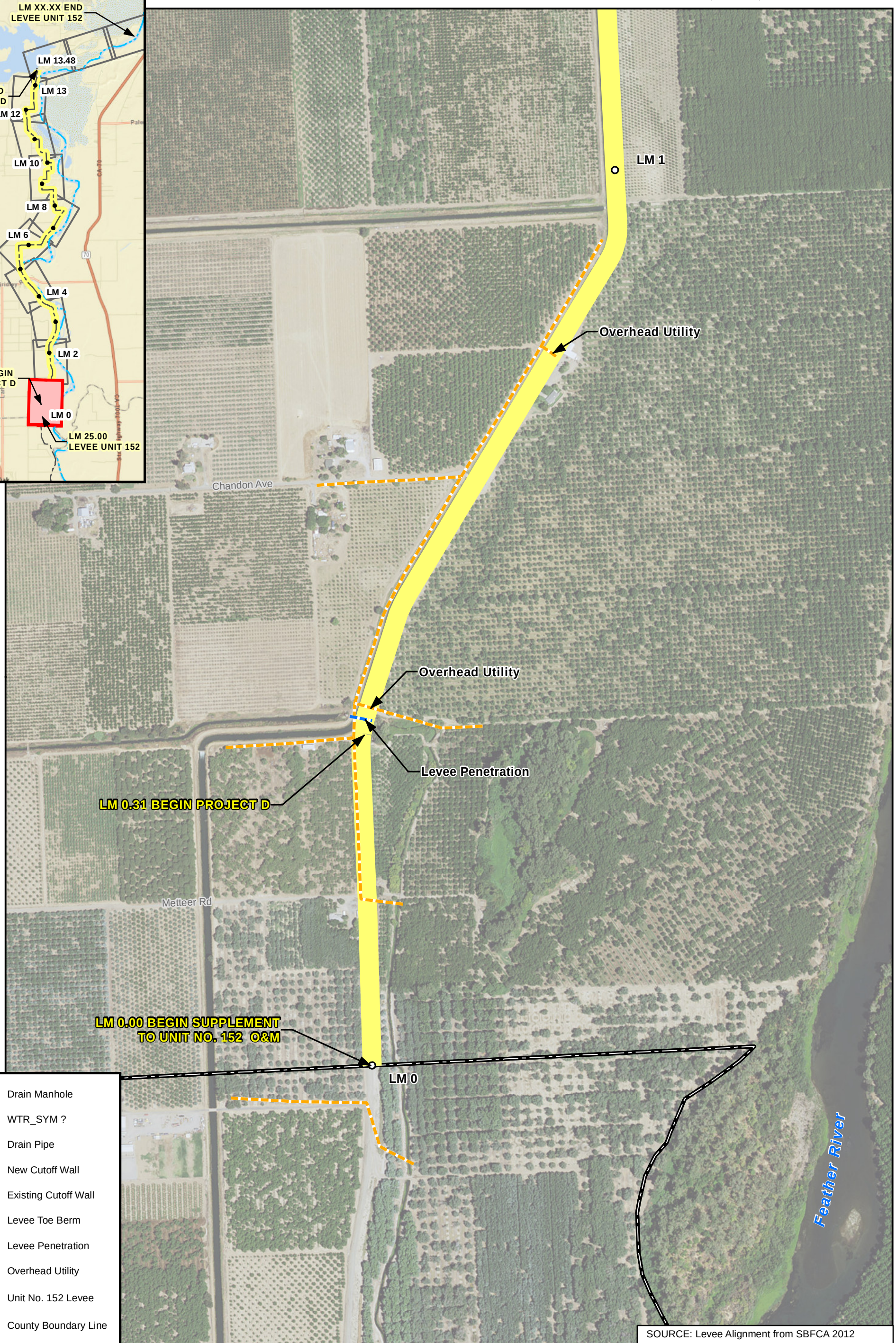

SOURCE: Levee Alignment from SBFCA 2012

Supplement to Standard O & M Manual
PROJECT FEATURES

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
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August, 2015

EXHIBIT 2

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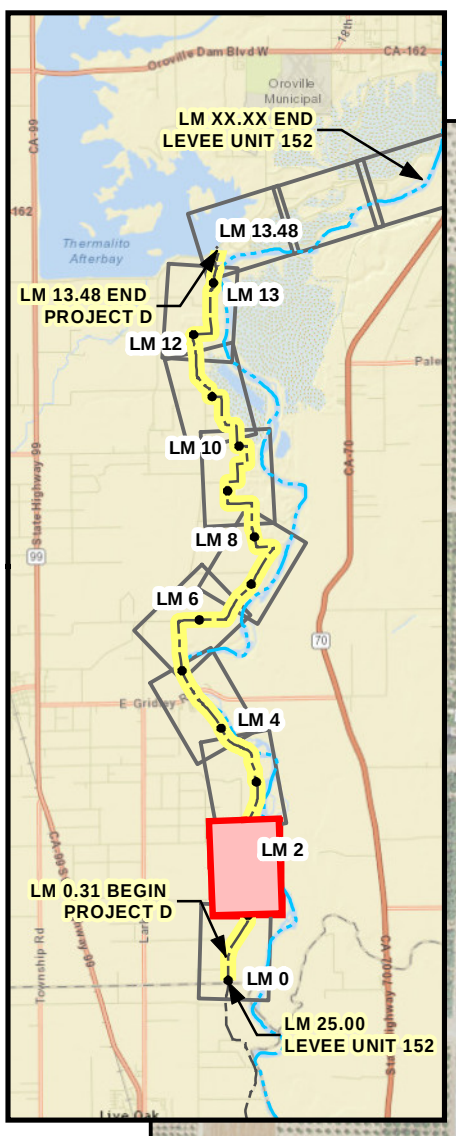

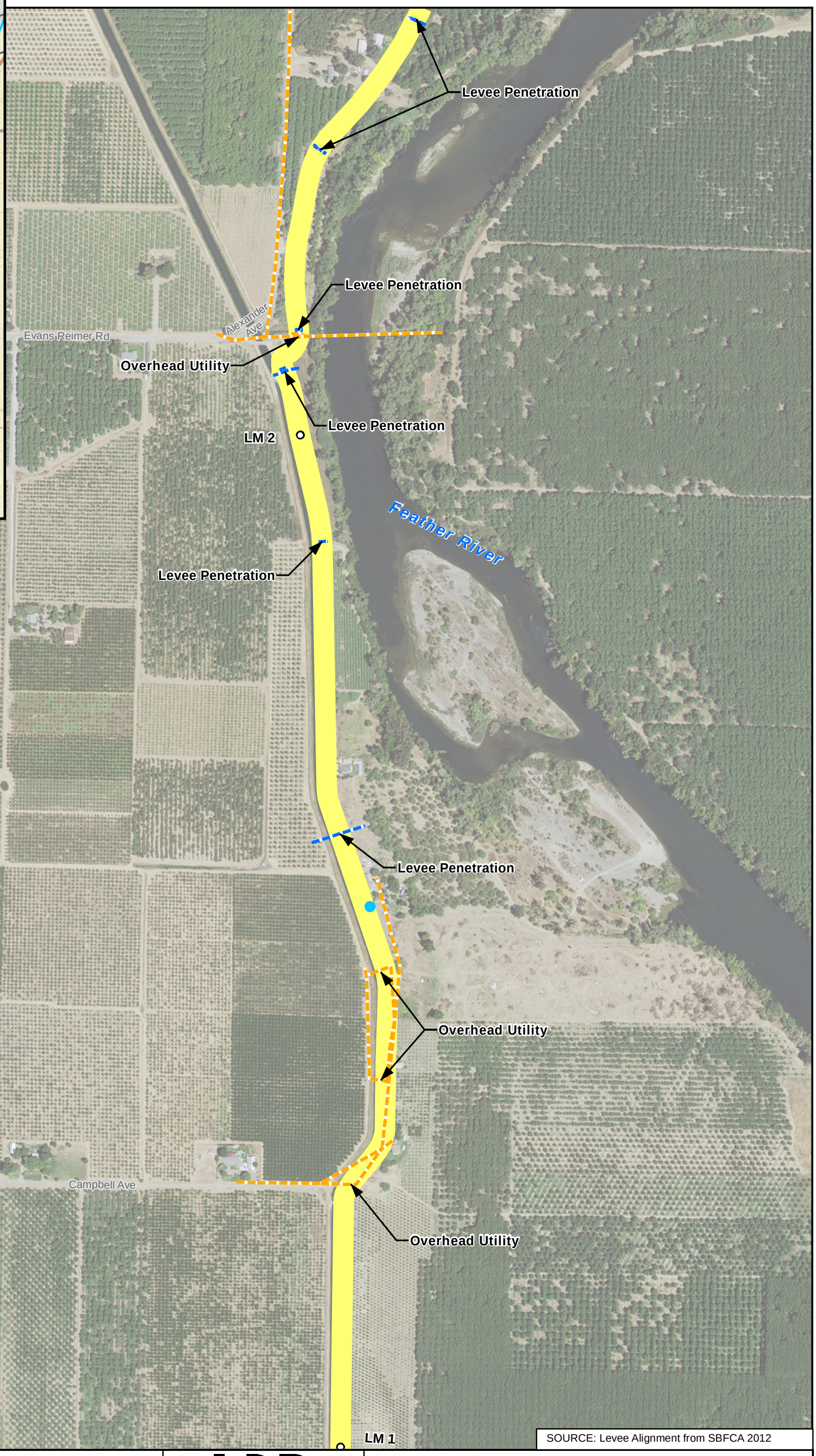

SOURCE: Levee Alignment from SBFCA 2012

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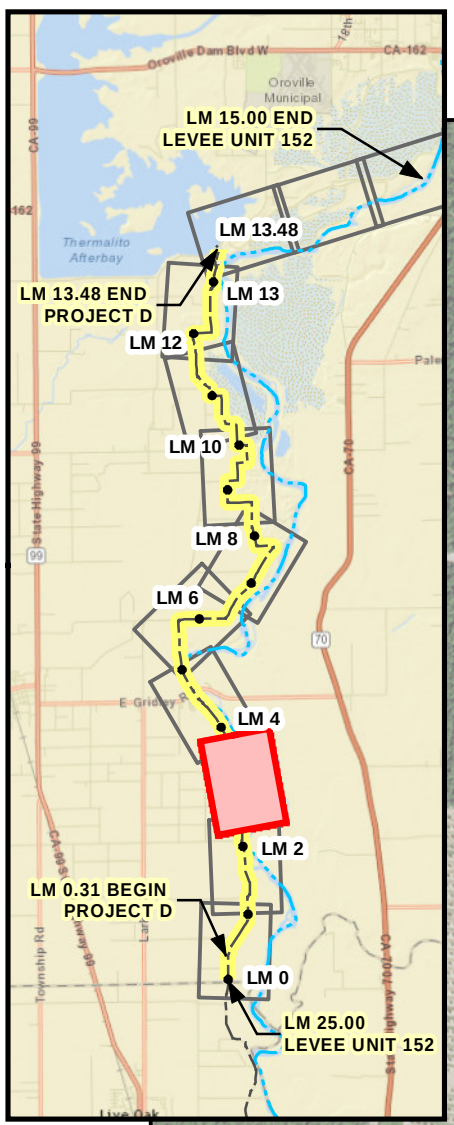

NORTH

0 250 500
Feet

Levee Penetration
Feather River
Levee Penetration
New Cutoff Wall
Levee Penetration
Existing Cutoff Wall
Richards Ave
LM 3
Levee Penetration
Feather River
Clardy Ave
Alexander Ave
Levee Penetration
Levee Penetration

- Drain Manhole
- WTR_SYM ?
- Drain Pipe
- New Cutoff Wall
- Existing Cutoff Wall
- Levee Toe Berm
- Levee Penetration
- Overhead Utility
- Unit No. 152 Levee
- County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012

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PROJECT FEATURES

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

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EXHIBIT 2

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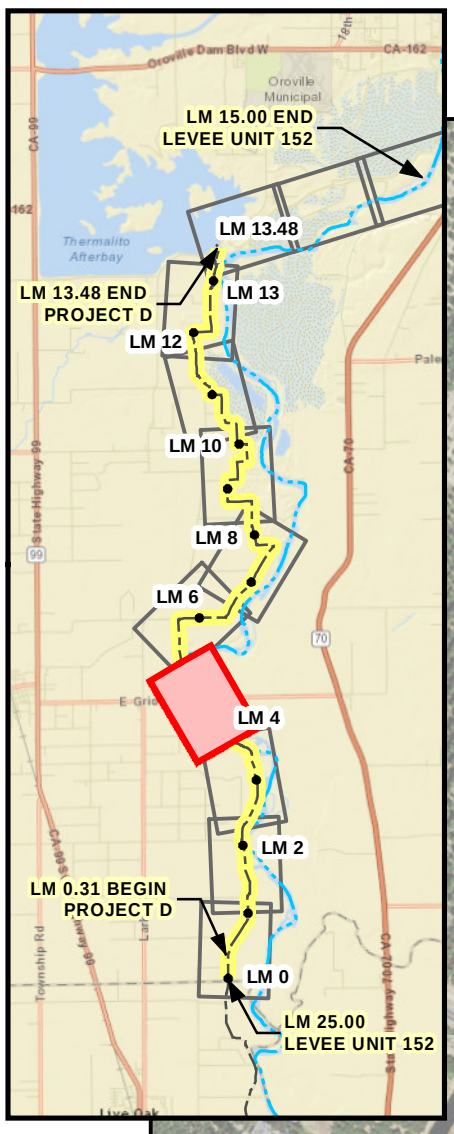

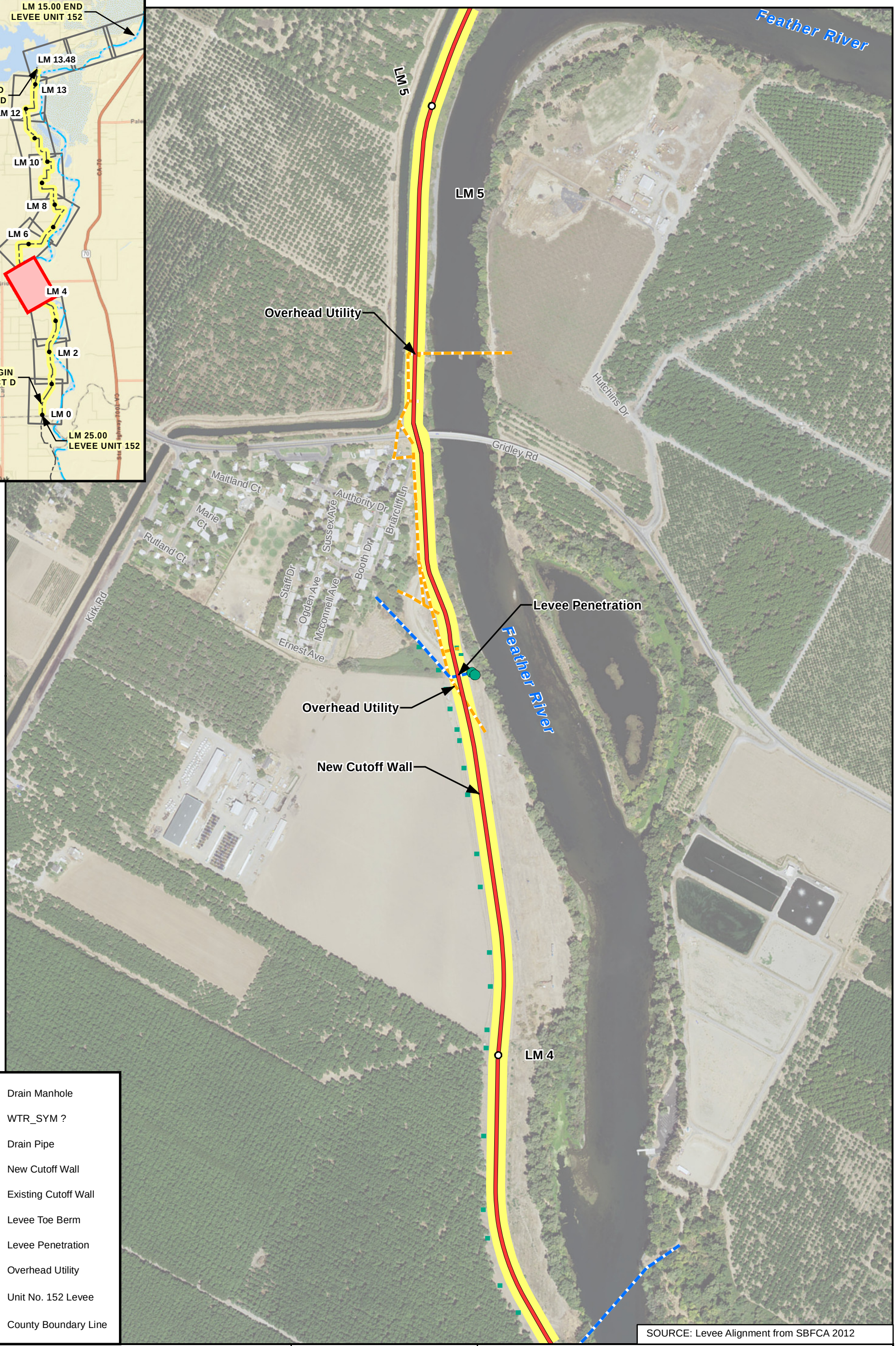

SOURCE: Levee Alignment from SBFCA 2012

Supplement to Standard O & M Manual
PROJECT FEATURES

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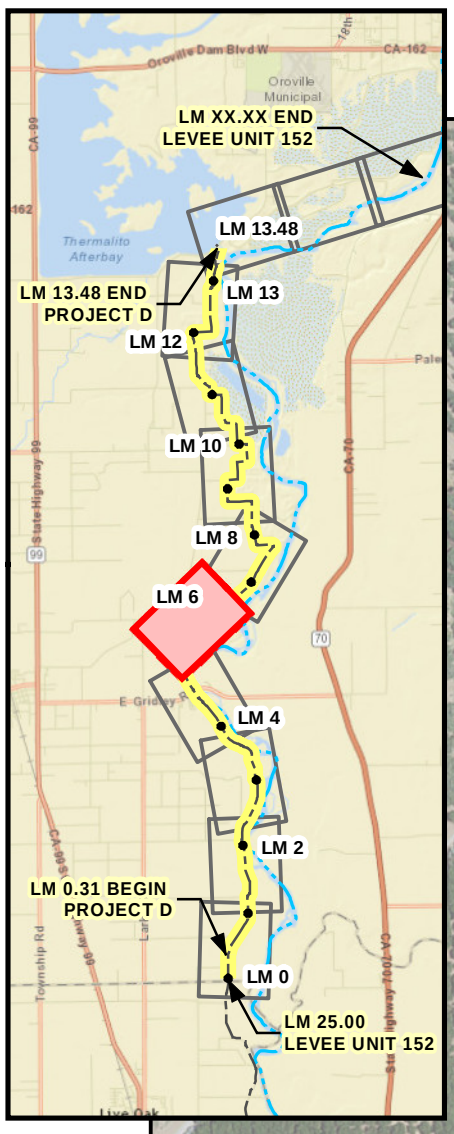
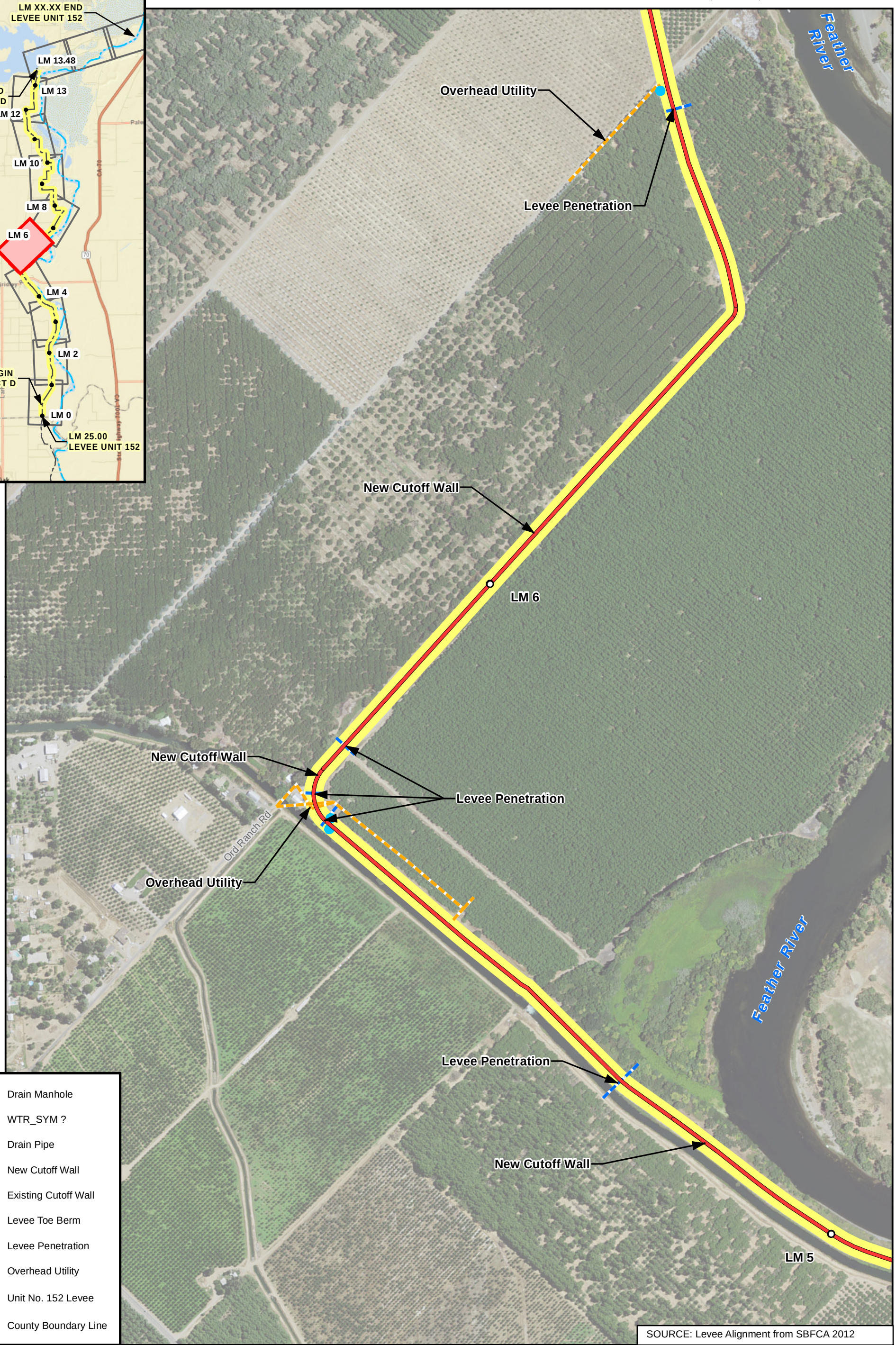
Sheet 5 of 12





SOURCE: Levee Alignment from SBFCA 2012

Supplement to Standard O & M Manual
PROJECT FEATURES

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

August, 2015

EXHIBIT 2

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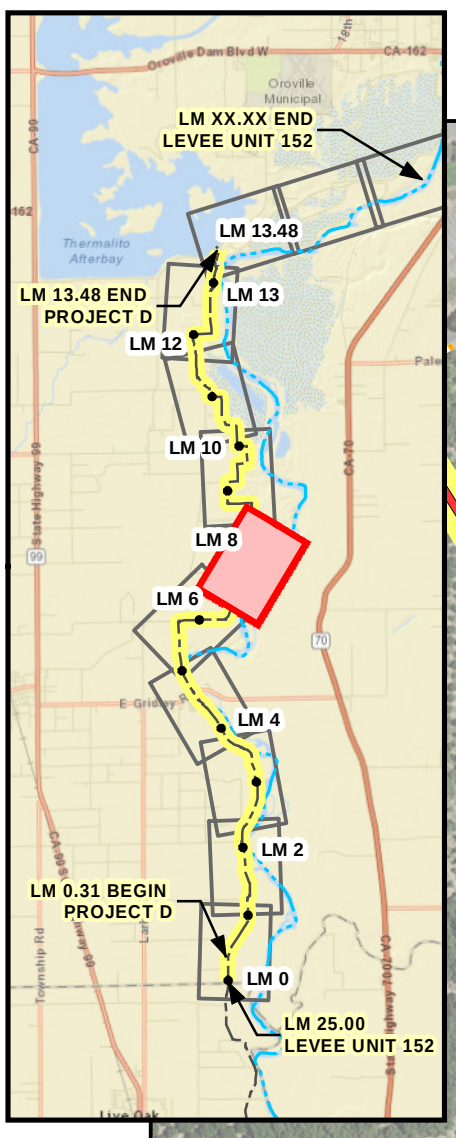

NORTH

0 250 500
Feet

Almond Ave

Levee Penetration

LM 8

Overhead Utility

New Cutoff Wall

Steadman Rd

LM 7

Feather River

Levee Penetration

Overhead Utility

- Drain Manhole
- WTR_SYM ?
- Drain Pipe
- New Cutoff Wall
- Existing Cutoff Wall
- Levee Toe Berm
- Levee Penetration
- Overhead Utility
- Unit No. 152 Levee
- County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012

Supplement to Standard O & M Manual
PROJECT FEATURES

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

August, 2015

EXHIBIT 2

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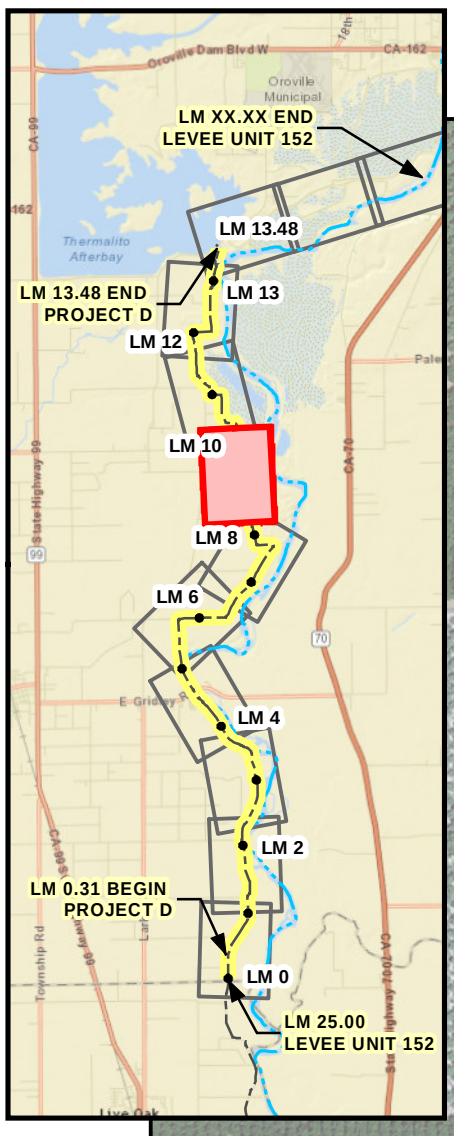

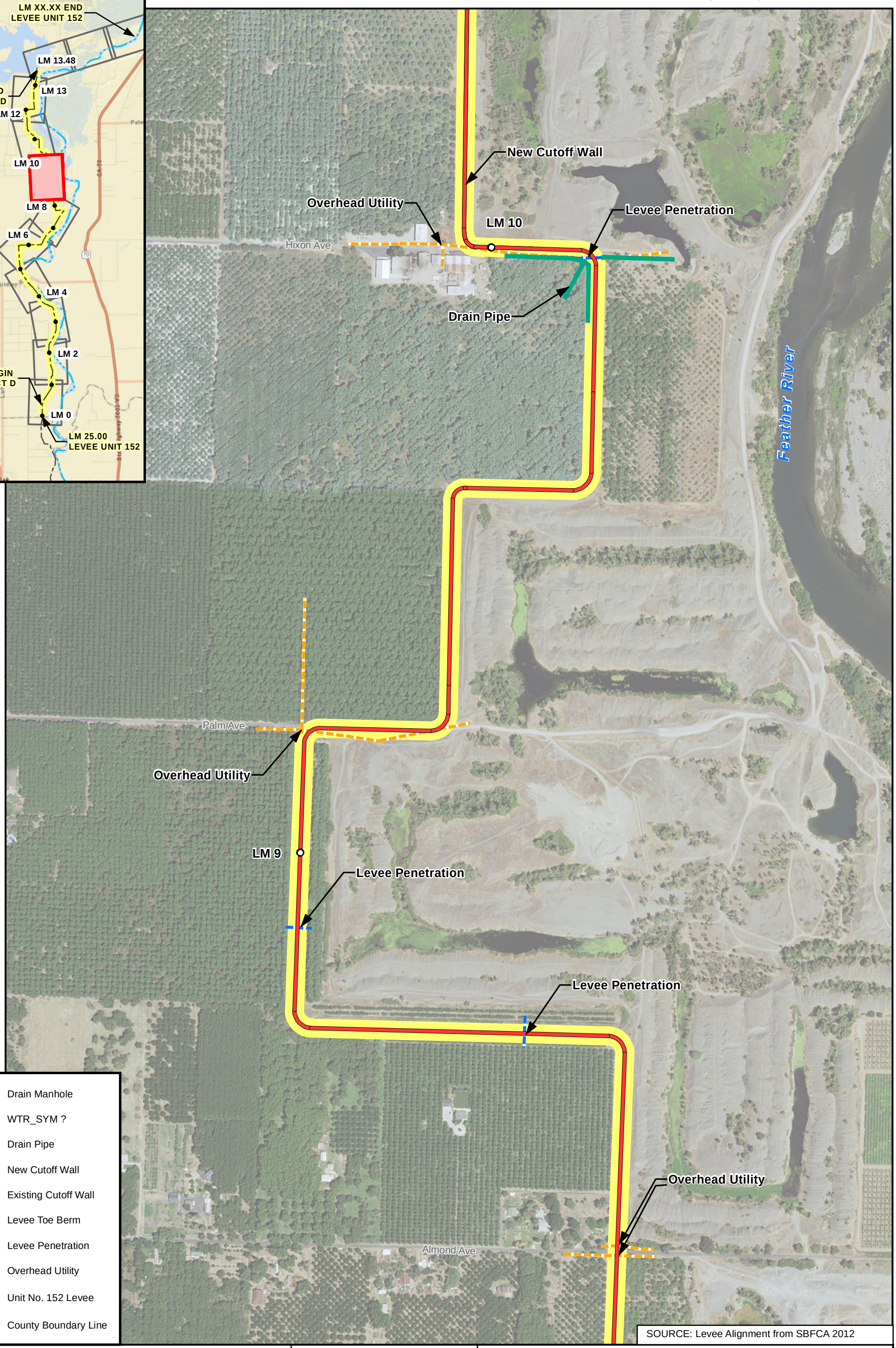

SOURCE: Levee Alignment from SBFCA 2012

Supplement to Standard O & M Manual
PROJECT FEATURES

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

August, 2015

EXHIBIT 2

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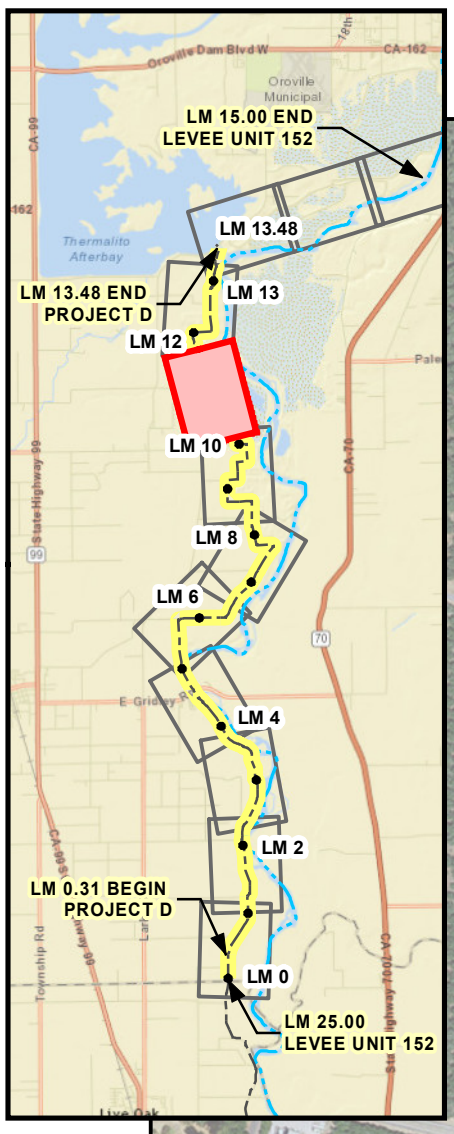

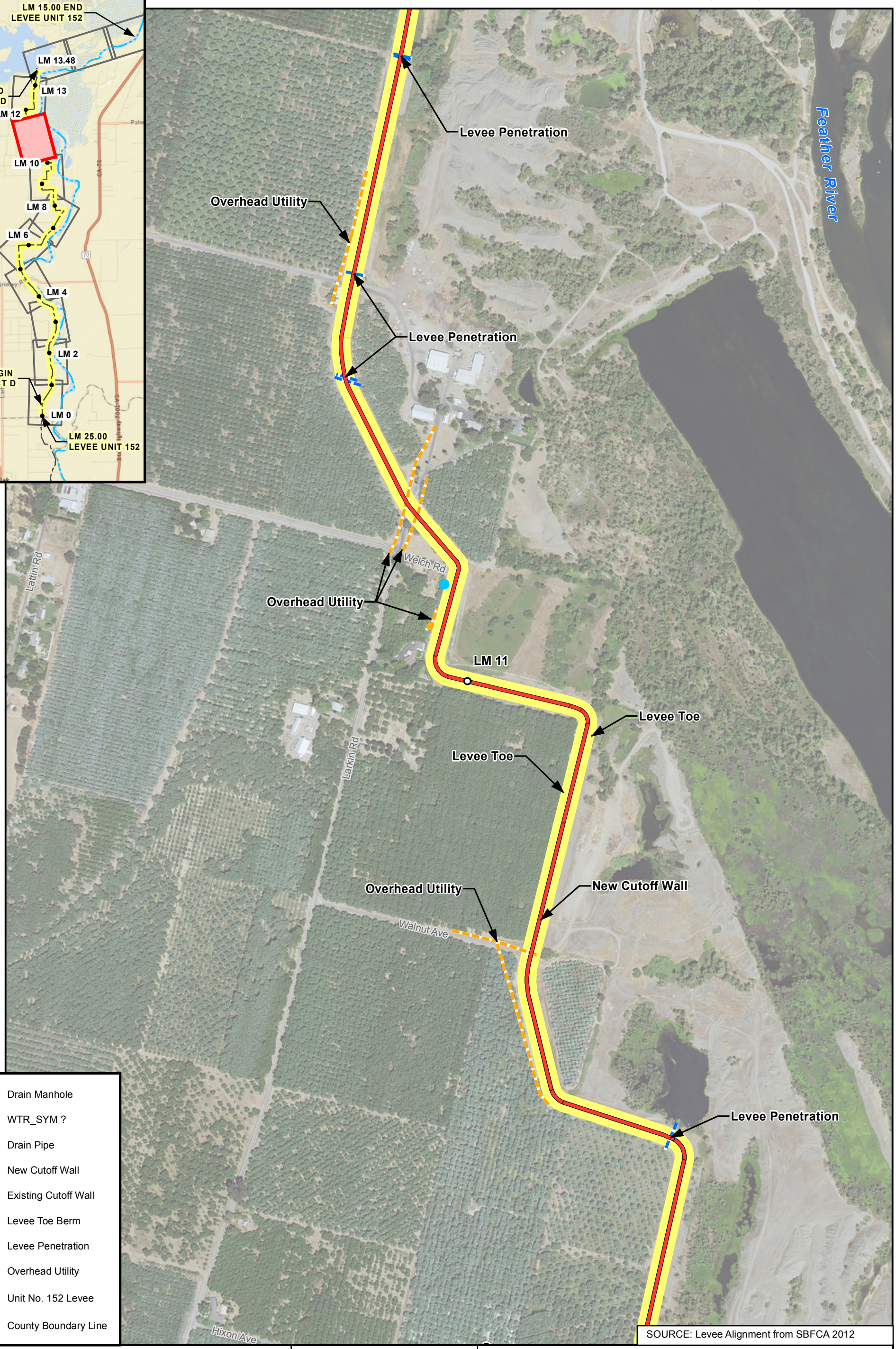

SOURCE: Levee Alignment from SBFCA 2012

Supplement to Standard O & M Manual
PROJECT FEATURES

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

August, 2015

EXHIBIT 2

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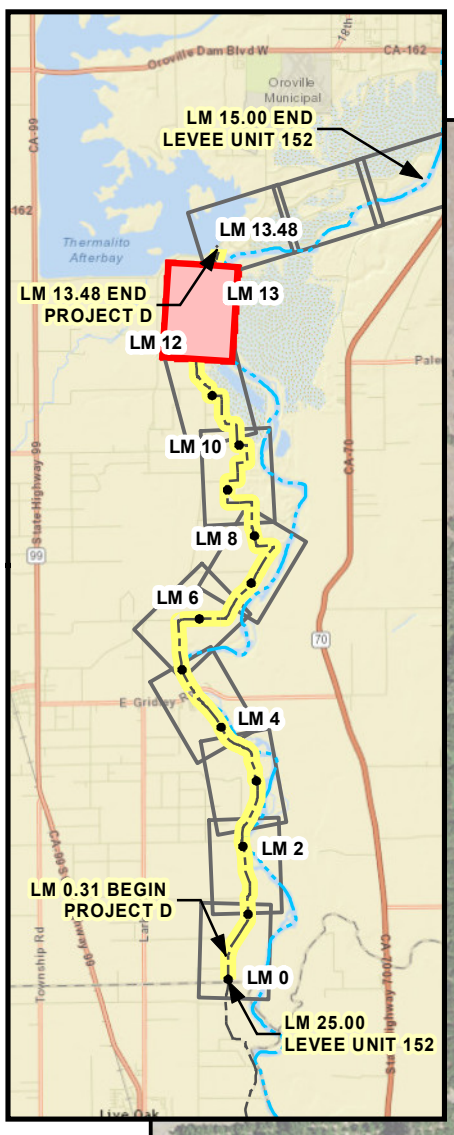

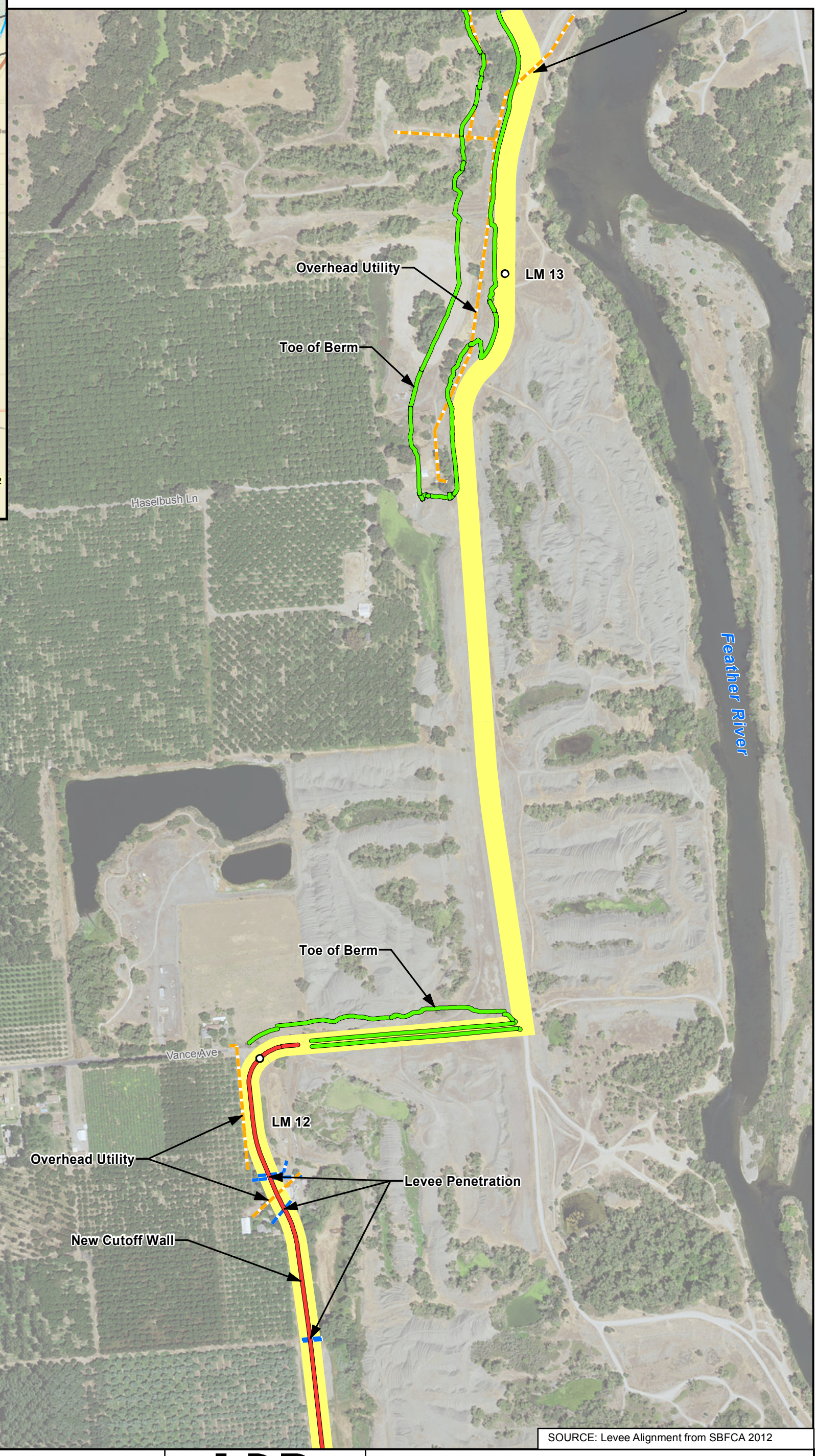

SOURCE: Levee Alignment from SBFCA 2012

Supplement to Standard O & M Manual
PROJECT FEATURES

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

August, 2015

EXHIBIT 2

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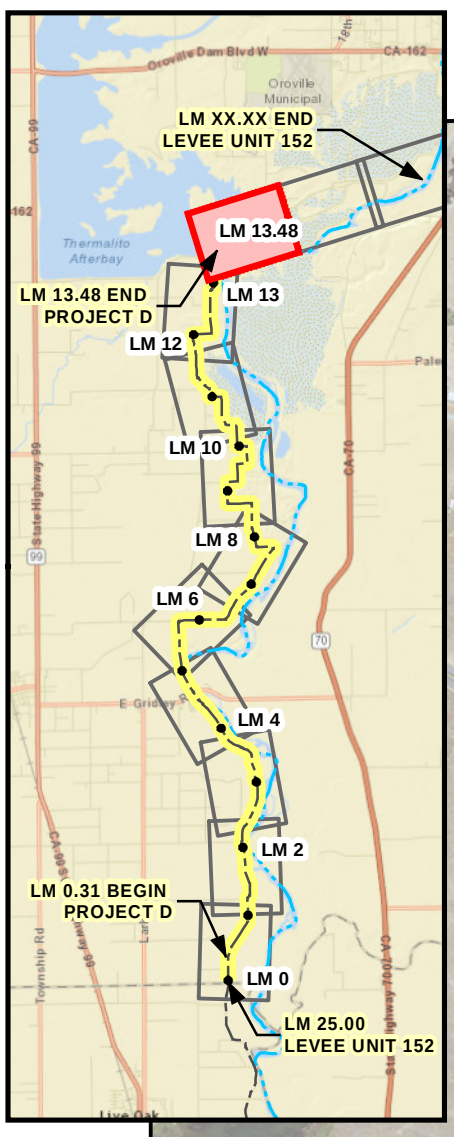

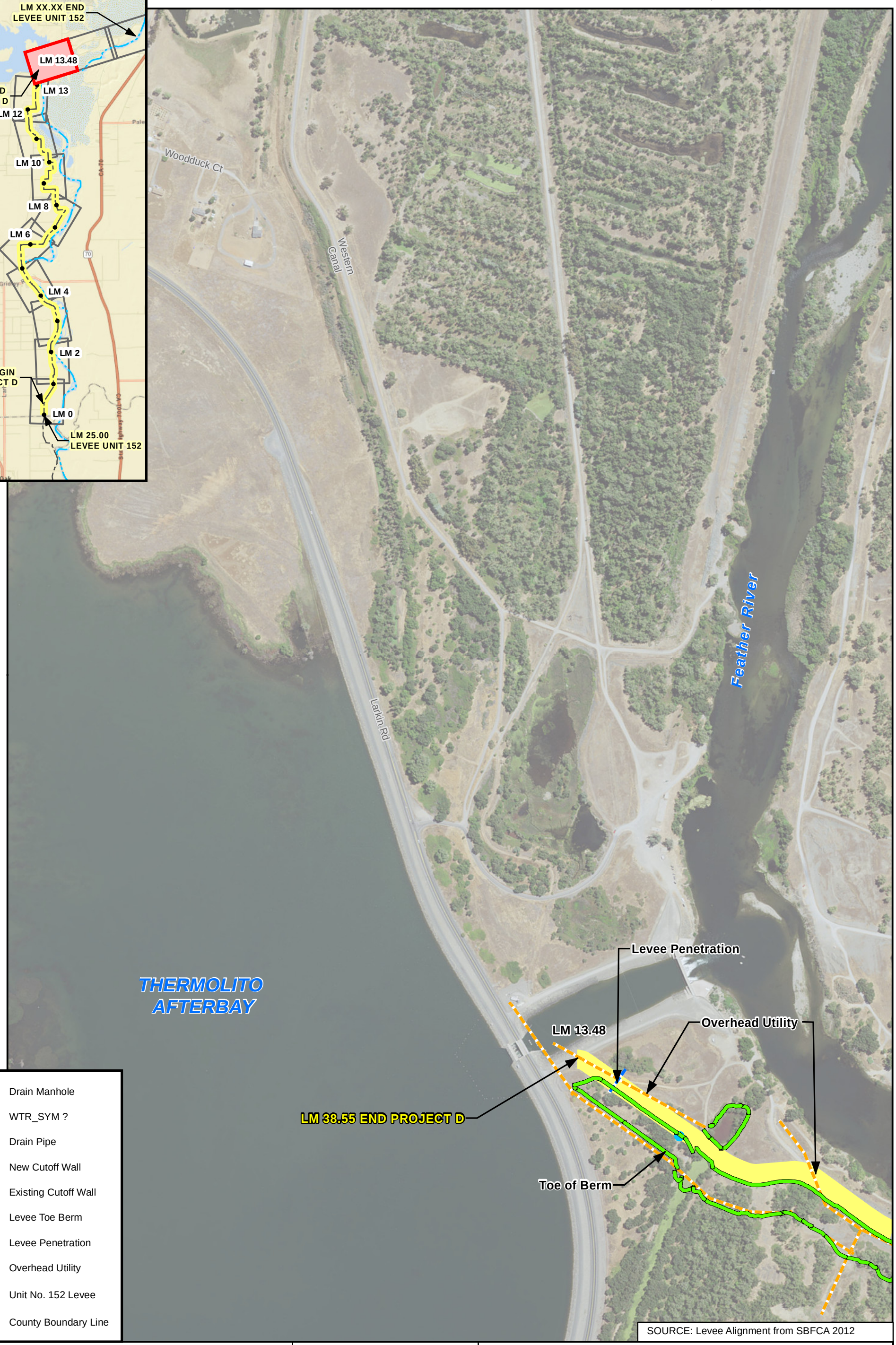

SOURCE: Levee Alignment from SBFCA 2012

Supplement to Standard O & M Manual
PROJECT FEATURES

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

August, 2015

EXHIBIT 2

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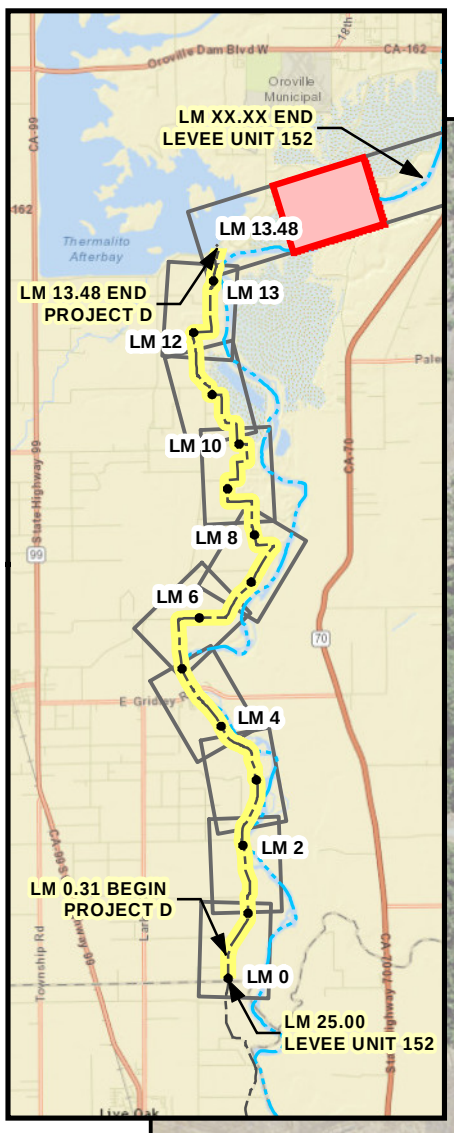

Drain Manhole
WTR_SYM ?
Drain Pipe
New Cutoff Wall
Existing Cutoff Wall
Levee Toe Berm
Levee Penetration
Overhead Utility
Unit No. 152 Levee
County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012

Supplement to Standard O & M Manual
PROJECT FEATURES

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

August, 2015

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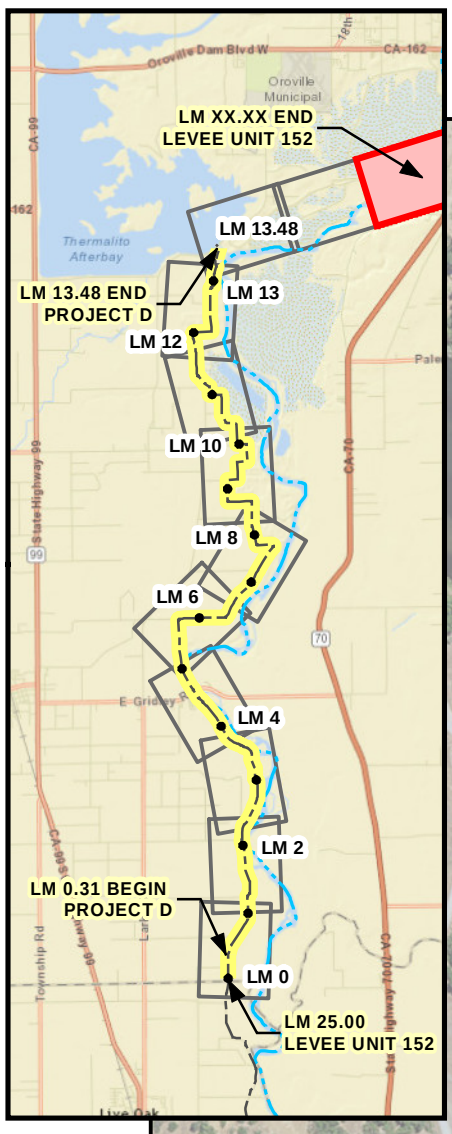

NORTH

0 250 500
Feet

- Drain Manhole
- WTR_SYM ?
- Drain Pipe
- New Cutoff Wall
- Existing Cutoff Wall
- Levee Toe Berm
- Levee Penetration
- Overhead Utility
- Unit No. 152 Levee
- County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012

Supplement to Standard O & M Manual
PROJECT FEATURES

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

August, 2015

EXHIBIT 2

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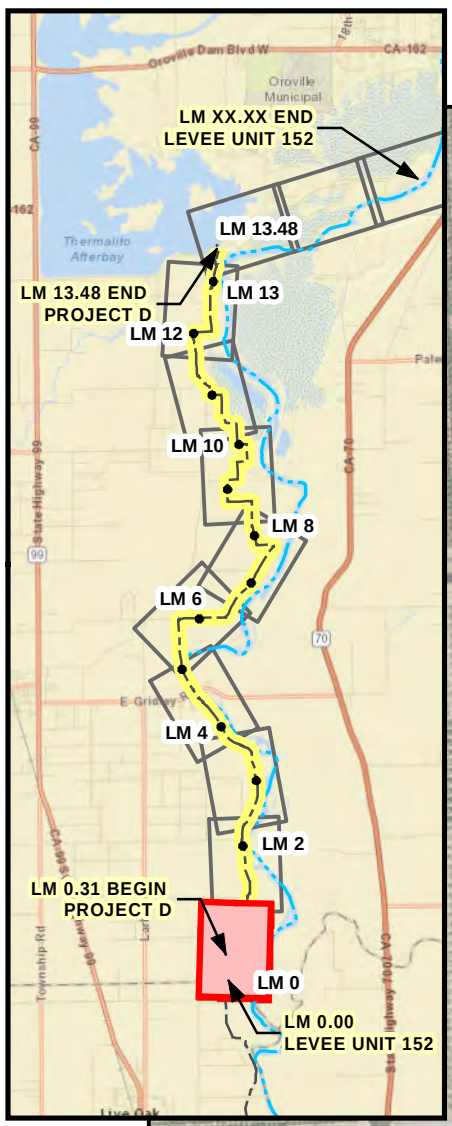
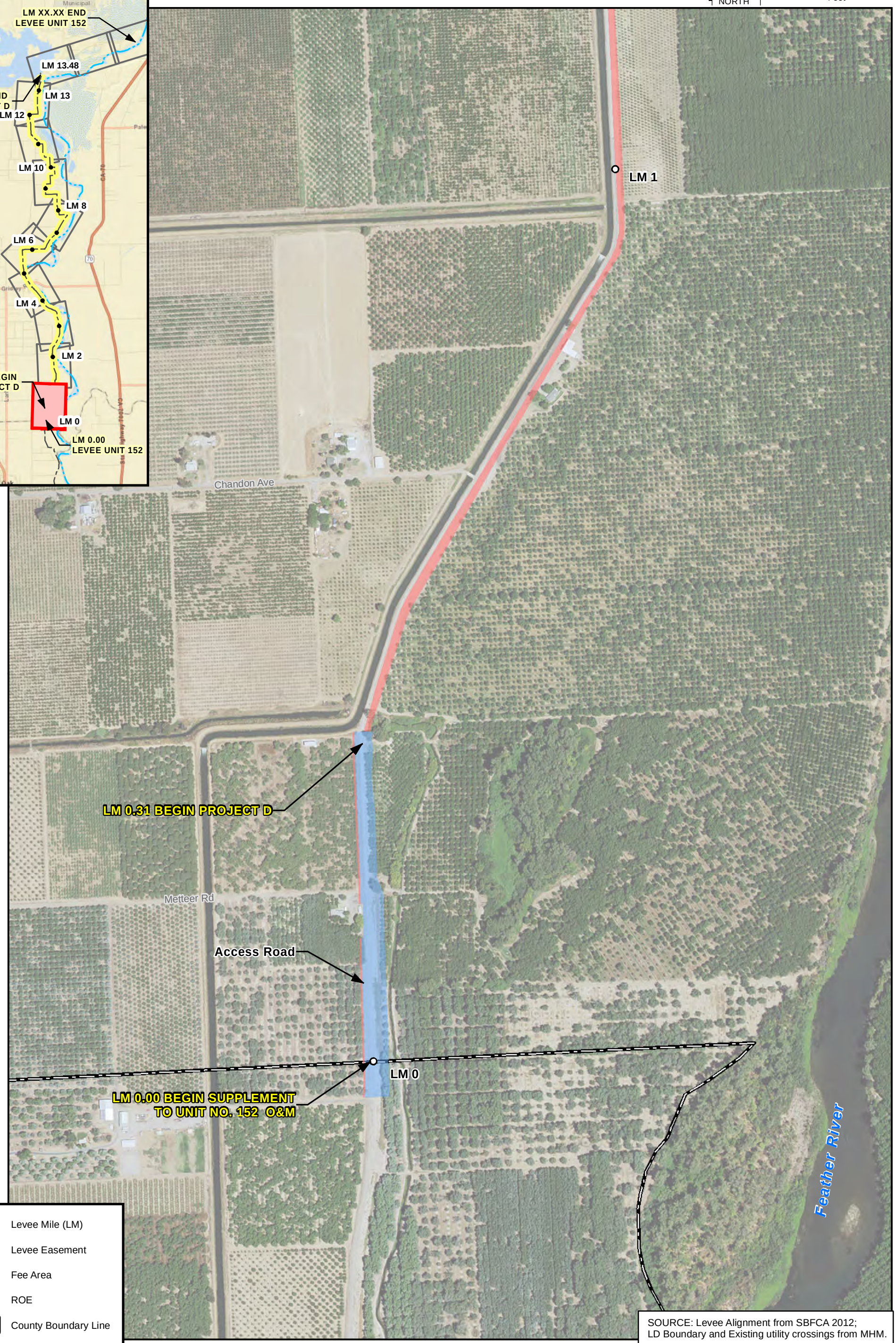
Sheet 1 of 12





Levee Mile (LM)
Levee Easement
Fee Area
ROE
County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012;
LD Boundary and Existing utility crossings from MHM.

Supplement to Standard O & M Manual
PROJECT RIGHT-OF-WAYS

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

March, 2016

EXHIBIT 3

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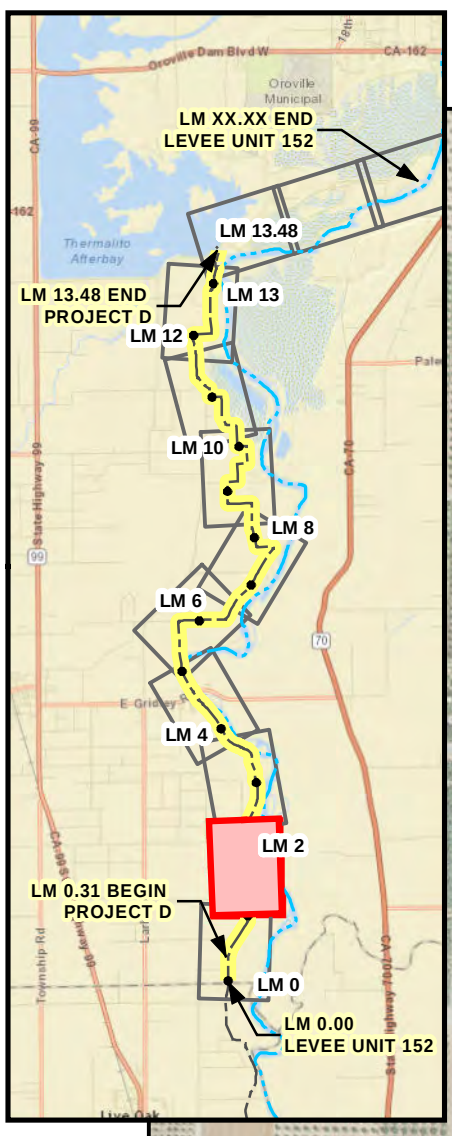
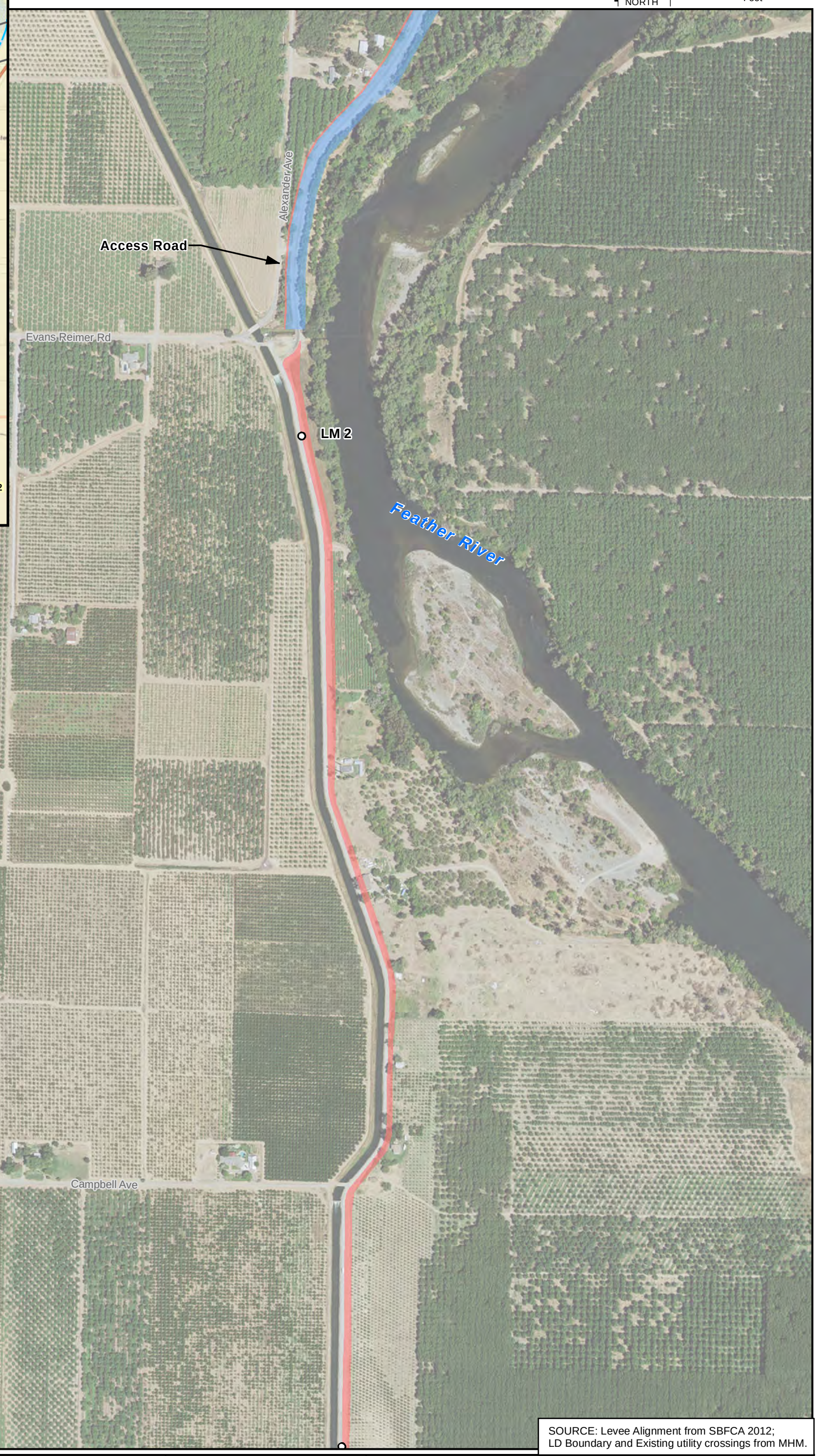
Sheet 2 of 12





Levee Mile (LM)
Levee Easement
Fee Area
ROE
County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012;
LD Boundary and Existing utility crossings from MHM.

Supplement to Standard O & M Manual
PROJECT RIGHT-OF-WAYS

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

March, 2016

EXHIBIT 3

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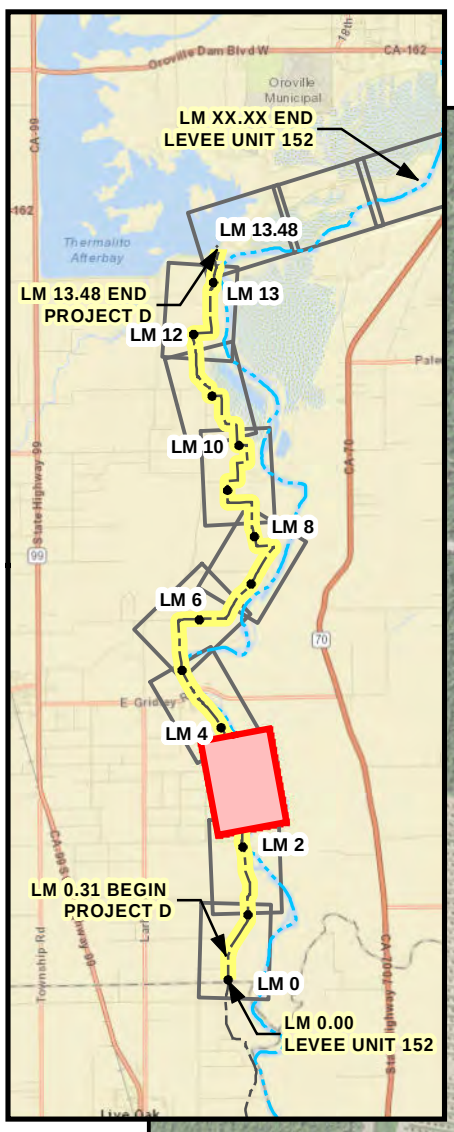
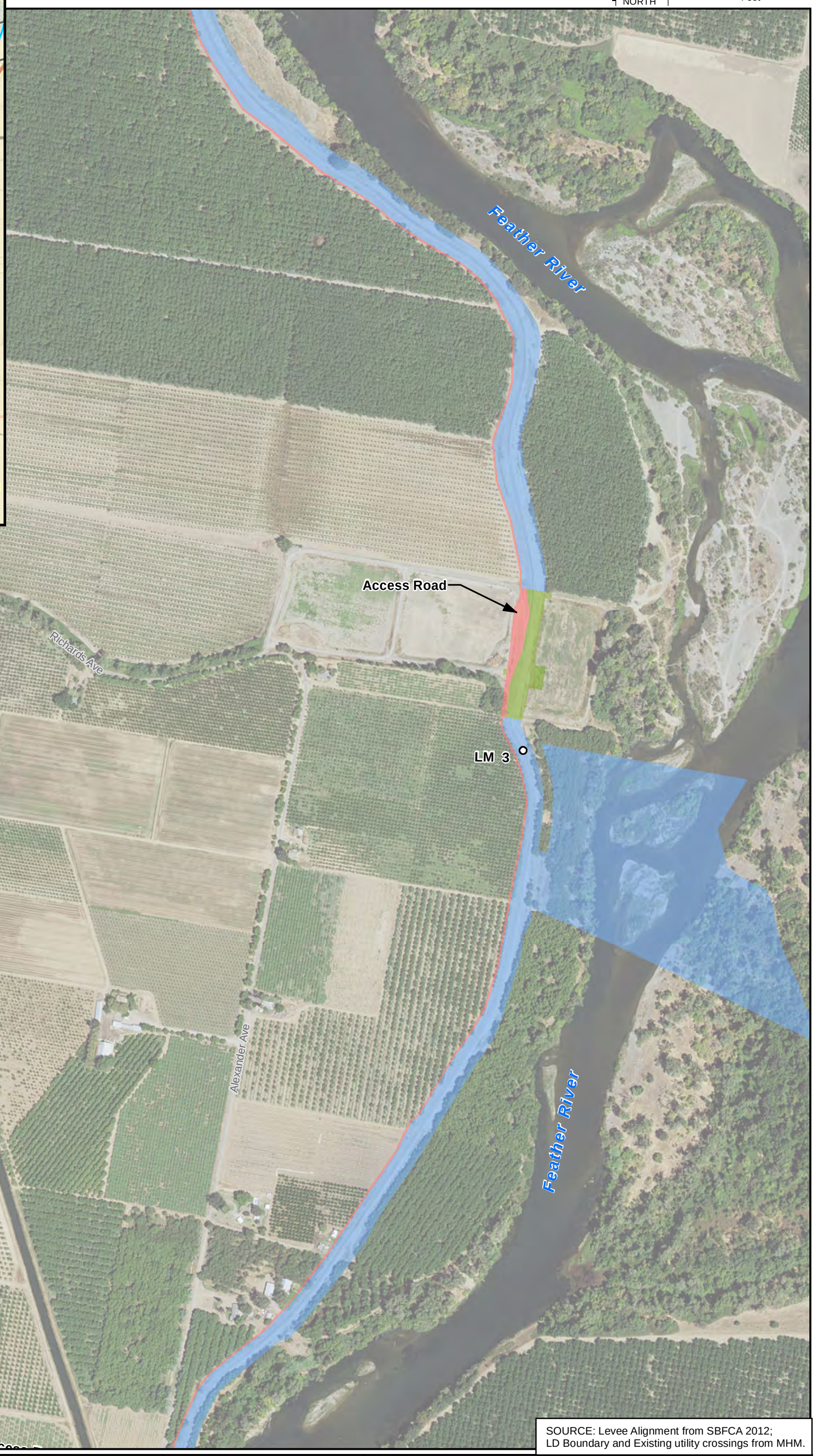
Sheet 3 of 12





- Levee Mile (LM)
- Levee Easement
- Fee Area
- ROE
- County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012;
LD Boundary and Existing utility crossings from MHM.

Supplement to Standard O & M Manual
PROJECT RIGHT-OF-WAYS

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

March, 2016

EXHIBIT 3

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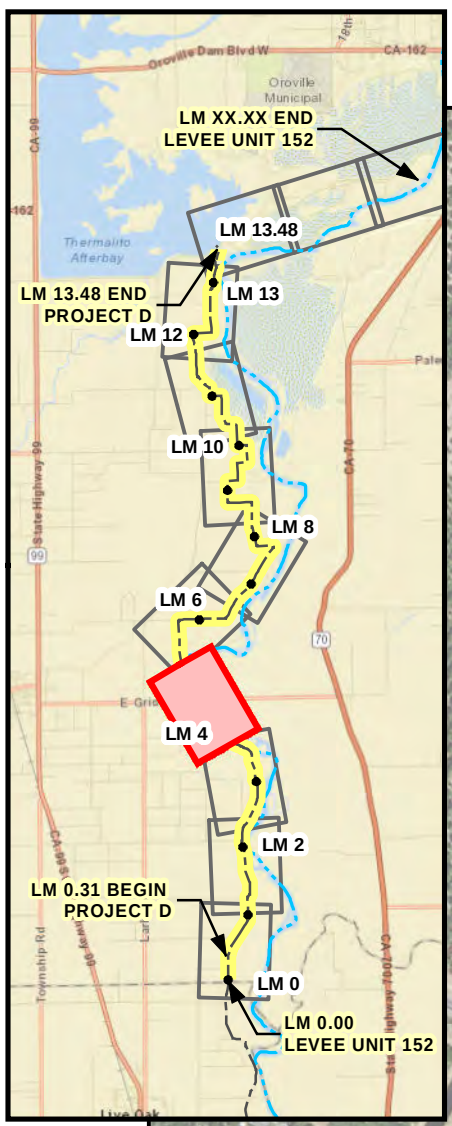

NORTH

0 250 500
Feet

Feather River

LM 5

Hutchins Dr

Gridley Rd

Maitland Ct

Marie
Ct

Rutland Ct

Authority Dr

Briarcliff Ln

Sussex Ave

Booth Dr

Staff Dr

Ogden Ave

Mcconnell Ave

Ernest Ave

Kirk Rd

Access Road

Feather River

LM 4

- Levee Mile (LM)
- Levee Easement
- Fee Area
- ROE
- County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012;
LD Boundary and Existing utility crossings from MHM.

Supplement to Standard O & M Manual
PROJECT RIGHT-OF-WAYS

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

March, 2016

EXHIBIT 3

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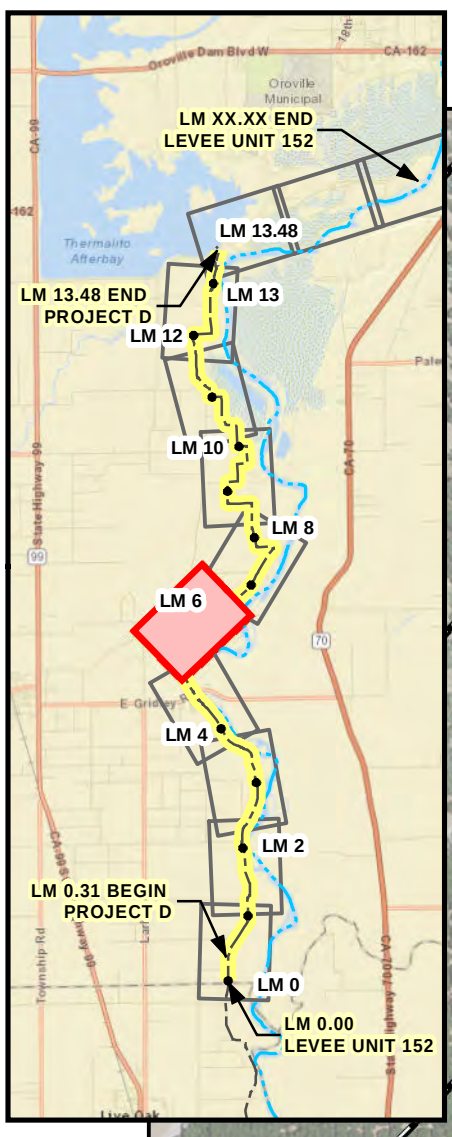

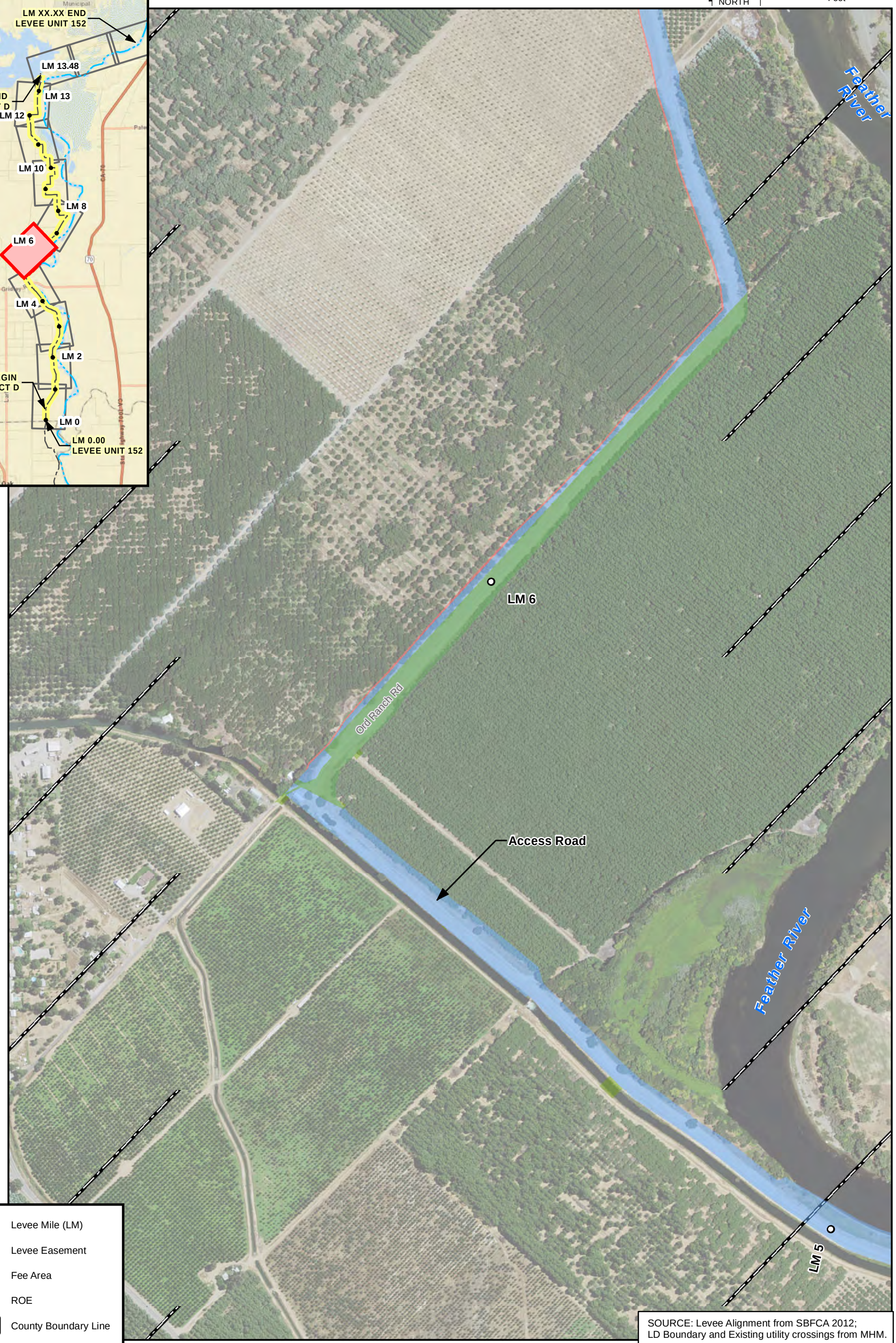

SOURCE: Levee Alignment from SBFCA 2012;
LD Boundary and Existing utility crossings from MHM.

Supplement to Standard O & M Manual
PROJECT RIGHT-OF-WAYS

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

March, 2016

EXHIBIT 3

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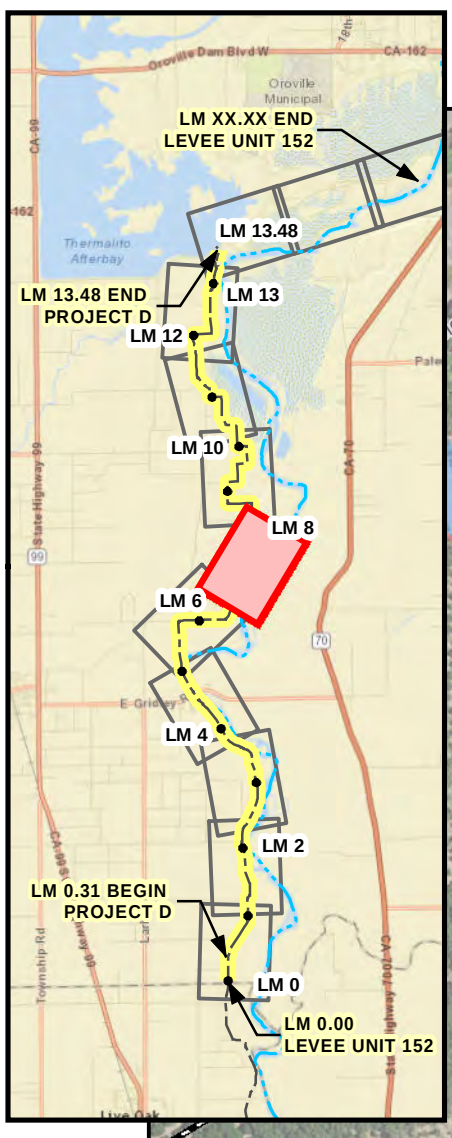

NORTH

0 250 500
Feet

LM 8

Access Road

Steadman Rd

LM 7

Feather River

Levee Mile (LM)

Levee Easement

Fee Area

ROE

County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012;
LD Boundary and Existing utility crossings from MHM.

Supplement to Standard O & M Manual
PROJECT RIGHT-OF-WAYS

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

March, 2016

EXHIBIT 3

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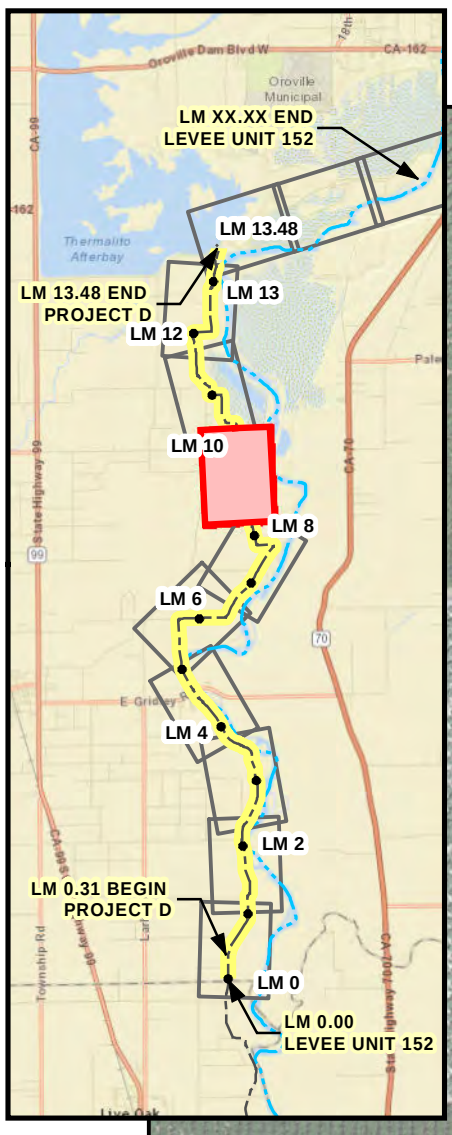

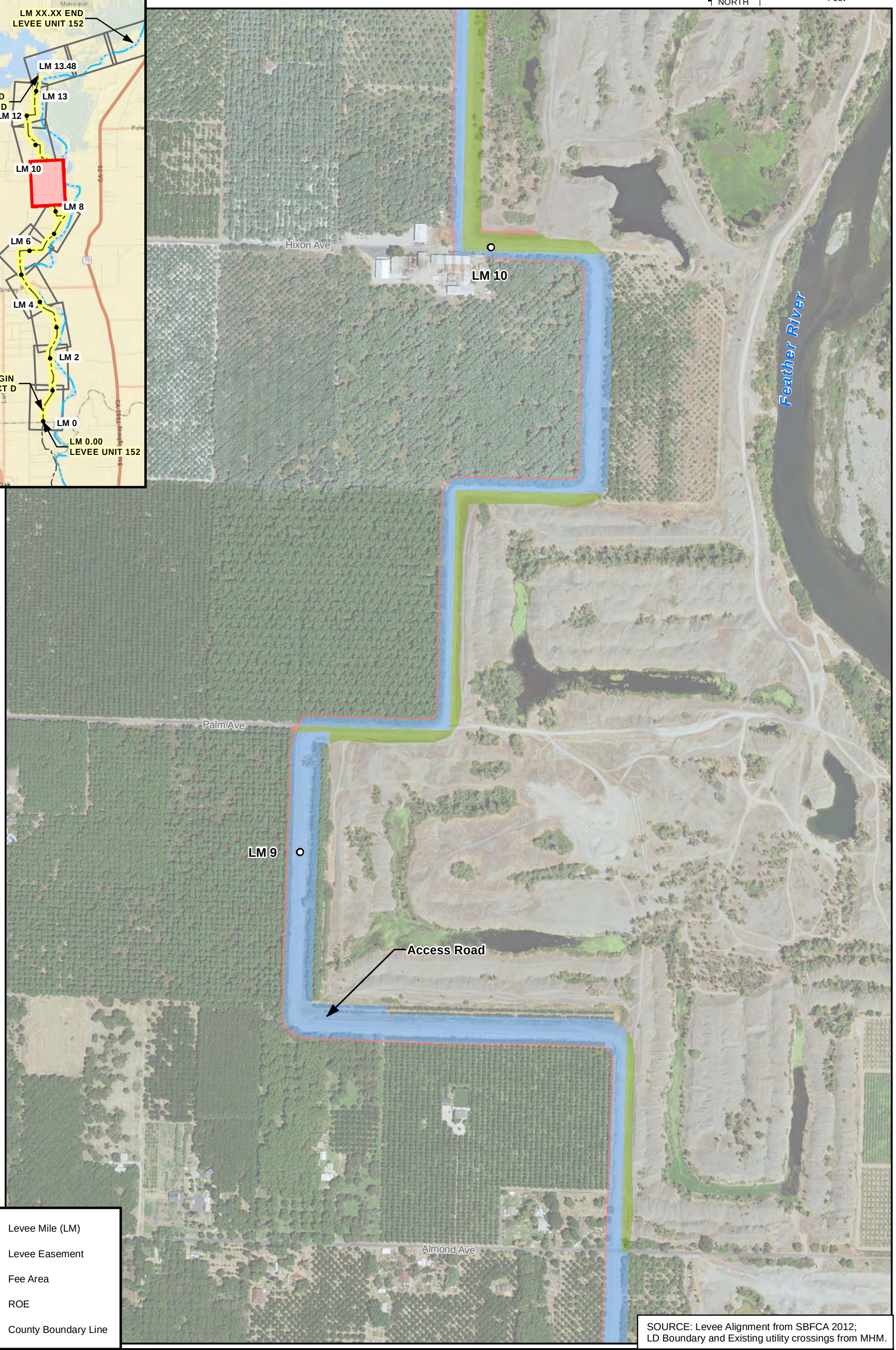

SOURCE: Levee Alignment from SBFCA 2012;
LD Boundary and Existing utility crossings from MHM.

Supplement to Standard O & M Manual **PROJECT RIGHT-OF-WAYS**	HDR 2365 Iron Point Road Suite #300 Folsom, California 95630	**FEATHER RIVER WEST LEVEE, UNIT NO.152** **OF SACRAMENTO RIVER FLOOD CONTROL PROJECT**
DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY		March, 2016 — EXHIBIT 3

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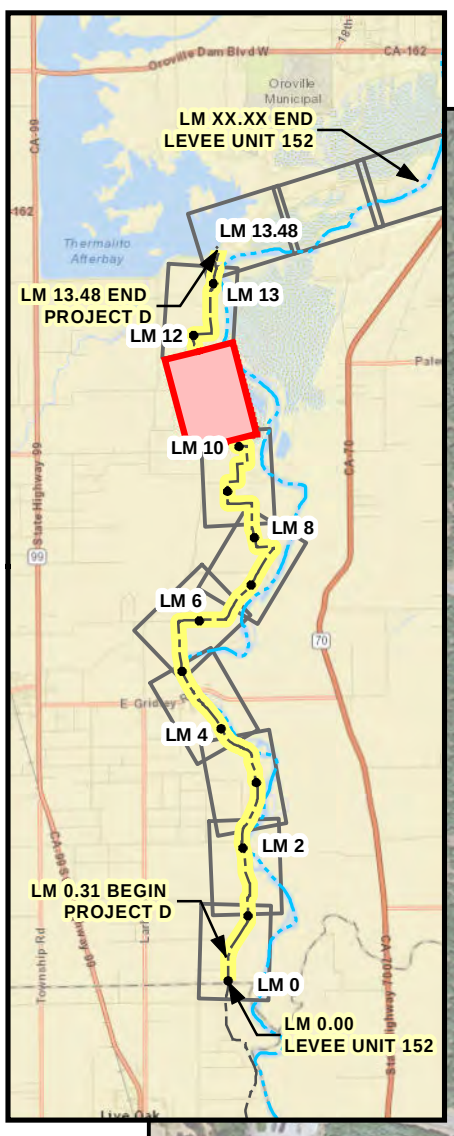

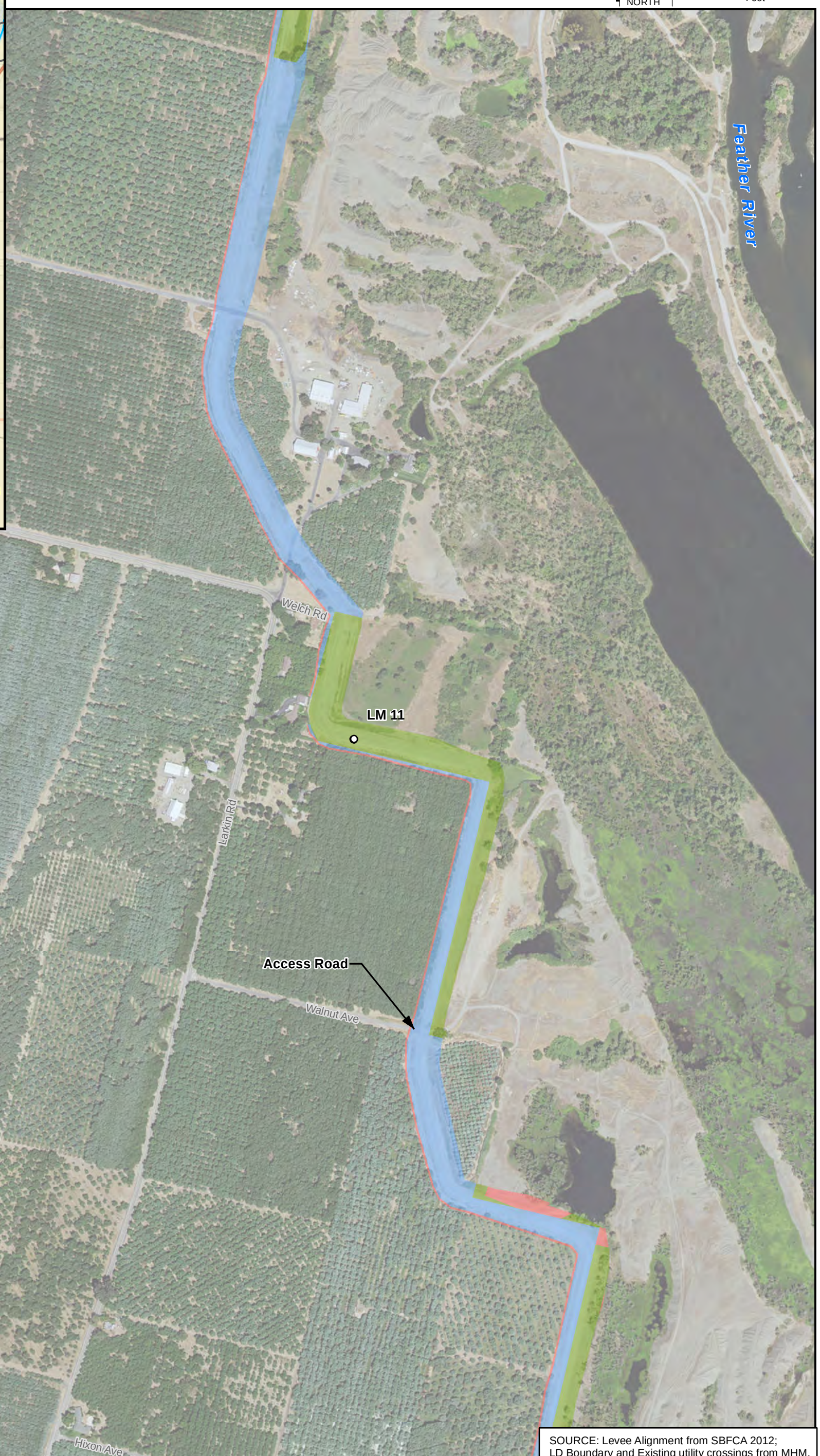

Levee Mile (LM)

Levee Easement

Fee Area

ROE

County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012;
LD Boundary and Existing utility crossings from MHM.

Supplement to Standard O & M Manual
PROJECT RIGHT-OF-WAYS

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

March, 2016

EXHIBIT 3

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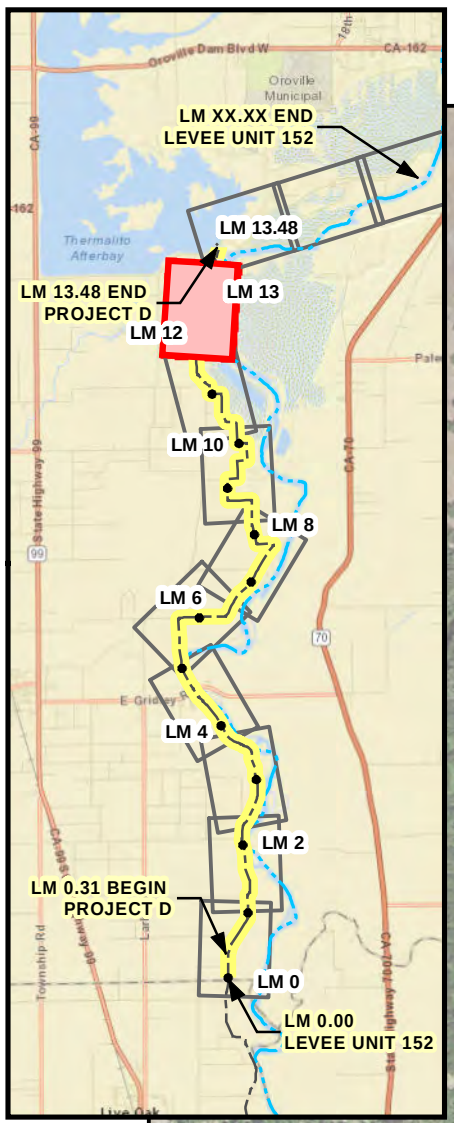

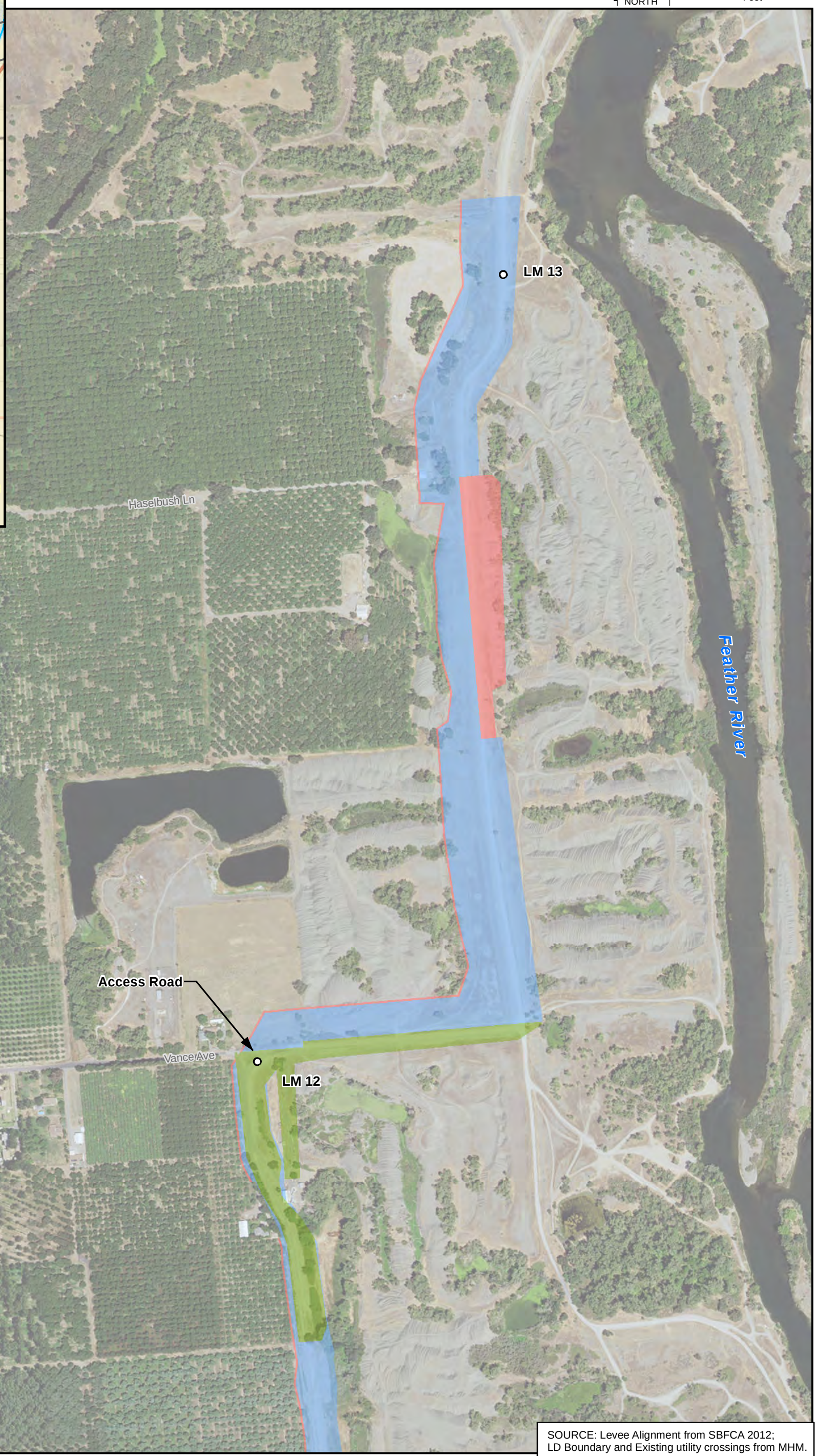

Levee Mile (LM)
Levee Easement
Fee Area
ROE
County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012;
LD Boundary and Existing utility crossings from MHM.

Supplement to Standard O & M Manual
PROJECT RIGHT-OF-WAYS

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

March, 2016

EXHIBIT 3

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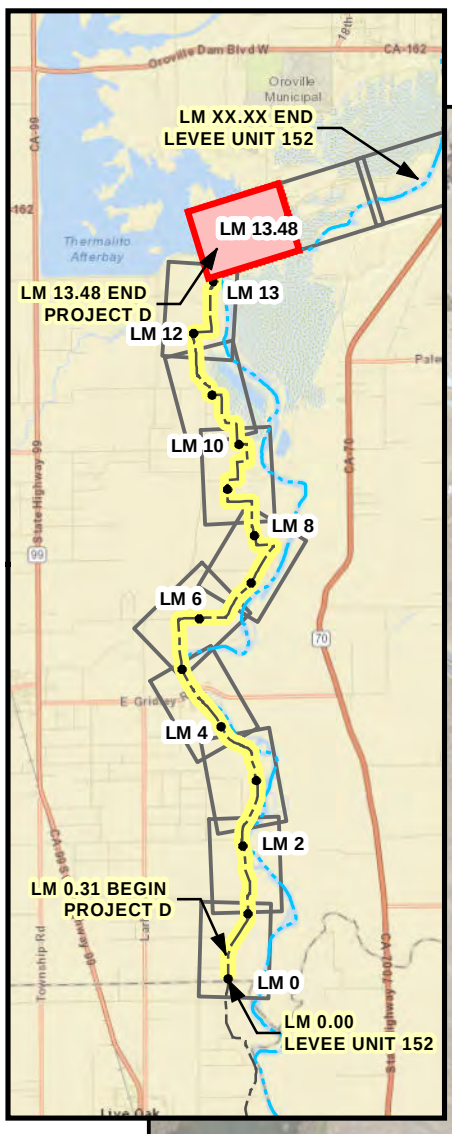
NORTH

0 250 500
Feet



Woodduck Ct
Western Canal
Larkin Rd
Feather River
THERMOLITO AFTERBAY
Access Road
LM 13.48
LM 13.48 END PROJECT D

Levee Mile (LM)
Levee Easement
Fee Area
ROE
County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012;
LD Boundary and Existing utility crossings from MHM.

Supplement to Standard O & M Manual
PROJECT RIGHT-OF-WAYS

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

HDR
2365 Iron Point Road Suite #300
Folsom, California 95630

FEATHER RIVER WEST LEVEE, UNIT NO.152
OF SACRAMENTO RIVER FLOOD CONTROL PROJECT

March, 2016

EXHIBIT 3

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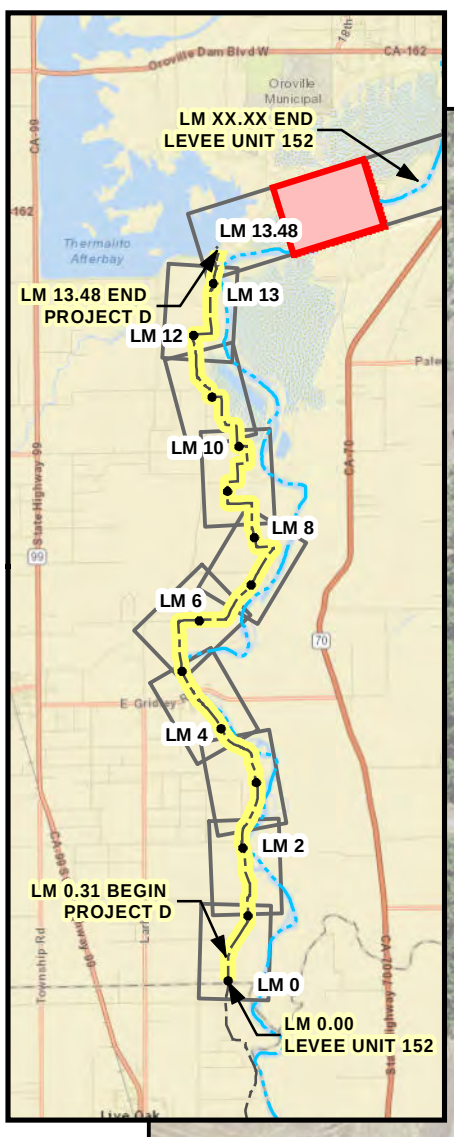
Sheet 11 of 12



Levee Mile (LM)
Levee Easement
Fee Area
ROE
County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012;
LD Boundary and Existing utility crossings from MHM.

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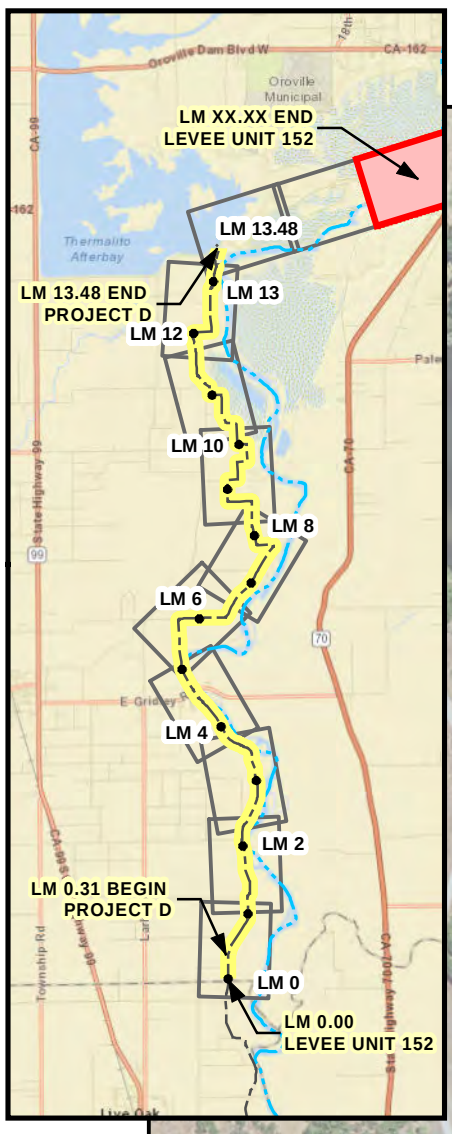
Sheet 12 of 12



- Levee Mile (LM)
- Levee Easement
- Fee Area
- ROE
- County Boundary Line

SOURCE: Levee Alignment from SBFCA 2012;
LD Boundary and Existing utility crossings from MHM.

Supplement to Standard O & M Manual
PROJECT RIGHT-OF-WAYS

DRAINAGE DISTRICT NO. 1 OF BUTTE COUNTY

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APPENDIX C

AS-BUILT INFORMATION

APPENDIX D

STATE OF CALIFORNIA DWR EMERGENCY FLOOD FIGHTING METHODS, AUGUST 2010

APPENDIX E

CHECK LIST NO. 1 -LEVEE INSPECTION REPORT
(See Standard Manual)

APPENDIX F

CHECK LISTS - LEVEES, CHANNEL AND STRUCTURES

CHECK LIST No. 2 - LEVEES

UNIT No. 152

Inspector's Report Sheet No. _____ Inspector _____
Date _____ Superintendent _____

Item	Remarks
(a) Location by Station	
(b) Settlement, sloughing, or loss of grade	
(c) Erosion of both slopes	
(d) Condition of roadways, including ramps	
(e) Evidence of seepage	
(f) Condition of farm gates and fencing	
(g) Maintenance measures taken since last inspection	
(h) Comments	

INSTRUCTIONS FOR COMPLETING CHECK LIST No. 2
(To be printed on back of Check List No. 2)

Item (a) Indicate levee station of observation, obtained by pacing from nearest reference point, indicate right or left bank.

Item (b) If sufficient settlement of earthwork has taken place to be noticeable by visual observation, indicate amount of settlement in tenths of a foot. If sloughing has caused a change in slope of the embankment sections, determine the new slope. Note areas where erosion or gullying of the section has occurred.

Item (c) If sufficient erosion or gullying of back face of back toe of levee has taken place to be noticeable by visual inspection, indicate area affected and depth.

Item (d) Note any natural change in any section of roadway or ramps. Indicate any inadequacy in surface drainage system.

Item (e) Indicate any evidence of seepage through the embankment section.

Item (f) Indicate the serviceability of all farm gates across the embankments and roadway, and indicate if repainting is required.

Item (g) Indicate maintenance measures that have been performed since last inspection and their condition at the time of this inspection.

Item (h) Record opinion, if any, of contributory causes for conditions observed and also any observations not covered under other columns.

Note: One copy of the Inspector's Report is to be mailed to the District Engineer immediately on completion, and one copy is to be attached to and submitted with the Superintendent's semi-annual report.

CHECK LIST No. 3 - CHANNEL AND RIGHT-OF-WAY

UNIT No. 152

Inspector's Report Sheet No. _____ Inspector _____
Date _____ Superintendent _____

Item		Remarks
(a)	Name of channel and location by stations	
(b)	Vegetal growth in channel	
(c)	Debris and refuse in channel	
(d)	New construction within right-of-way	
(e)	Extent of aggradation or degradation	
(f)	Condition of riprapped section	
(g)	Condition of bridges	
(h)	Measures taken since last inspection	
(i)	Comments	

INSTRUCTIONS FOR COMPLETING CHECK LIST No. 3
(To be printed on back of Check List No. 3)

Item (a) Indicate station of observation, obtained by pacing from nearest reference point

Item (b) Note nature, extent, and size of vegetal growth within the limits of flood flow channel

Item (c) Note nature and extent of debris and refuse that might cause clogging of the conduits of the irrigation intake works, fouling of the tainter gate, or the bridges over the channel.

Item (d) Report any construction along the diversion channel or above the diversion works that has come to the attention of the inspector and that might affect the functioning of the project.

Item (e) Indicate any change in grade or alignment of the channels, either by deposition or sediment or scour, that is noticeable by visual inspection. Estimate amount and extent.

Item (f) Indicate any change that has taken place in the riprap such as disintegration of the rock, erosion, or movement of the rock. Note the presence of vegetal growth through the riprap.

Item (g) Note any damage or settlement of the footings of the bridges. Indicate condition of wooden structures and if repainting is required. Indicate condition of wooden structures and ir repainting is required. Indicate condition of bridge approaches, headwalls, and other appurtenances.

Item (h) Indicate maintenance measures that have been performed since the last inspection and their condition at time of tis inspection.

Item (i) Record opinion, if any, of contributory causes for conditions observed, also any observations not covered under columns.

Note: One copy of the Inspector's Report is to be mailed to the District Engineer immediately on completion, and one copy is to be attached to and submitted with the Superintendent's semi-annual report.

CHECK LIST No. 4 - DRAINAGE AND IRRIGATION STRUCTURES

UNIT No. 152

Inspector's Report Sheet No. _____ Inspector _____

Date _____ Superintendent _____

(a) Location by Station	(b) Bank	(c) Debris or other obstruction to flow	(d) Damage or settlement of pipe or conduit	(e) Condition of concrete headwall or invert paving	(f) Condition of right-of-way adjacent to structure	(g) Repair measures taken since last inspection	(h) Comments
1+90	Right						
12+00	Right						
19+00	Right						
19+30	Right						
28+00	Right						
44+50	Right						
48+00	Right						
52+50	Right						
56+90	Right						
69+00	Right						
126+18	Right						
127+00	Right						
127+40	Right						
128+00	Right						
191+13	Right						
195+80	Right						
239+50	Right						
252+10	Right						
260+70	Right						
267+20	Right						
413+60	Right						
437+30	Right						
471+26	Right						
128+40	Right						

INSTRUCTIONS FOR COMPLETING CHECK LIST No. 4
(To be printed on back of Check List No. 4)

(1) Enter station of all structure under Column (a) for check list.
(2) Inspect inlet, barrel, and outlet for accumulation of sediment, rubbish, and vegetal matter.
(3) Note condition under Column (c).
(4) If any settlement or damage to the pipe, barrel, or invert of the drain has occurred, estimate the location and amount. Note particularly if any backfill has come into the pipe or been distributed. Record observations under Column (d).
(5) Inspect the concrete portions of the structures for evidence of settlement, cracks, “pop-outs”, spaces, abrasive wear, or other deterioration. Record conditions under Column (e).
(6) Inspect backfill area adjacent to structure for evidence of erosion caused by overflow of the drainage structure and note conditions in Column (f).
(7) Under Column (g) indicate physical measure that have been taken to correct conditions reported in last inspection, and their condition at time of this inspection.
(8) Under Column (h) record, opinion, if any, of contributory causes for conditions observed, also any observations not covered under other columns.

A copy of the inspector’s report is to be mailed to the District Engineer immediately on completion, and a record copy shall be attached to the Superintendent’s semi-annual report.

APPENDIX G

LETTER OF ACCEPTANCE BY CENTRAL VALLEY FLOOD PROTECTION BOARD (PREVIOUSLY THE STATE RECLAMATION BOARD) AND TRANSFER LETTERS

APPENDIX H

SEMI-ANNUAL REPORT FORM

U.S. ARMY CORPS OF ENGINEERS
Office of the District Engineer
SACRAMENTO DISTRICT
1325 J Street
Sacramento, California

TO: The District Engineer (1 May 20__)
Sacramento District (1 Nov 20__)
U.S. Army Corps of Engineers
1325 J Street
Sacramento, California

Dear Sir:

The semi-annual report for the period (1 May 20__ to 31 October 20__) (1 November 20__ to 20 April 20__)

a. The physical condition of the protective works is indicated by the inspector's report, copies of which are enclosed, and may be summarized as follows:

(Superintendent's summary of conditions)

It is our intention to perform the following maintenance work in order to repair or correct the conditions indicated:
(Outline the anticipated maintenance operations for the following 6 months.)

b. During this report period, major high water periods (water surface at Gridley Bridge gage reached or exceeded a reading of 95.0) occurred on the following dates:

Dates	Maximum Elevation

Comments on the behavior of the protective works during such high water periods are as follows:

(Superintendent's log of flood observations)

During the high water stages when the water level reached a height of _____, on the gage or excess thereof (dates) _____, it was necessary to organize and carry out flood operations as follows:

(See Maintenance Manual _____)

c. The inspection have indicated (no) or (the following) encroachments or trespasses upon the project right-of-way.

d. (No) (_____) permits have been issued for (the following) improvements or construction within the project right-of-way.

Executed copies of the permit documents issued are transmitted for your files.

e. The status of maintenance measures, indicated in the previous semi-annual report as being required or as suggested by the representatives of the District Engineer, is as follows:

(Statement of maintenance operations, item by item with percent completion.)

f. The fiscal statement of the Superintendent's operation for the current report period is as follows:

	Labor	Material	Equipment	Overhead	Total
1. Inspection					
2. Maintenance					
3. Flood Fighting Operations					
TOTAL					

Respectfully submitted,

_____

Superintendent of Works

APPENDIX I

COOPERATION AGREEMENTS

APPENDIX J

SECTION 408 PERMISSIONS

APPENDIX K

USFWS B.O. #08ESMF00-2013-F-0342-1

APPENDIX L

OLD SUPPLEMENT MANUAL
(list of previous revisions and main text)

APPENDIX M

Unit No. 152 Levee Mile, River Mile, and Station Conversion Table

Unit No. 152 Levee Mile, River Mile and Station Conversion Table		
River Mile	**Design Station**	**Levee Mile**
45.26	1657+26	25.18
45.44	1669+24	25.41
45.58	1683+12	25.67
45.71	1693+31	25.86
45.98	1705+21	26.09
46.2	1711+28	26.20
46.45	1714+55	26.26
46.53	1717+92	26.33
46.69	1724+99	26.46
47.04	1733+46	26.62
47.2	1741+03	26.77
47.55	1759+68	27.12
47.7	1769+34	27.30
48.07	1791+09	27.71
48.21	1794+60	27.78
48.39	1804+54	27.97
48.66	1818+02	28.22
48.85	1827+54	28.40
48.99	1830+56	28.46
49.21	1835+14	28.55
49.38	1841+39	28.67
49.58	1852+94	28.89
49.78	1866+63	29.15
50.06	1878+23	29.36
50.2	1884+71	29.49
50.487	1901+67	29.81
50.489	1901+77	29.81
50.496	1902+19	29.82
50.498	1902+31	29.82
50.59	1907+06	29.91
50.7	1912+79	30.02
50.84	1920+86	30.17
51.04	1938+17	30.50
51.1777	1957+37	30.86
51.35	1978+83	31.27
51.95	1987+75	31.44
52.21	1996+19	31.60
52.6	2011+84	31.90
52.89	2027+57	32.19
53.22	2042+66	32.48
53.52	2057+14	32.75
53.84	2085+00	33.28
54.04	2095+63	33.48
54.2	2101+58	33.60
54.45	2129+26	34.12

Unit No. 152 Levee Mile, River Mile and Station Conversion Table		
River Mile	**Design Station**	**Levee Mile**
55.03	2146+64	34.45
55.35	2169+84	34.89
55.55	2191+91	35.31
55.8	2197+87	35.42
56.02	2200+58	35.47
56.2	2205+16	35.56
56.43	2210+68	35.66
56.61	2220+93	35.86
56.94	2238+37	36.19
57.17	2265+47	36.70
57.45	2304+92	37.45
57.7	2313+47	37.61
57.95	2327+96	37.88
58.26	2336+25	38.04
58.51	2357+49	38.44
-	2368+00	38.64

APPENDIX N

ENCROACHMENT AND PENETRATIONS

Table N-1: Irrigation, Drainage, Water and Sewer Penetrations

Design Station	Approximate Levee Mile	Size and Kind of Pipe	Latitude	Longitude	Structure Description
1675+27	0.36	60-inch by 72-inch box culvert			Butte County Drainage District No. 1. 60" x 72" RCP culvert through levee. Slide gate in concrete well on waterside slope.
1741+32	1.61	16-inch			Butte County Drainage District No. 1. A 16-Inch pipe through Levee. Emergency Repair Work on Pipe 3/5/02. Pipe not physically located.
1756+27	1.90	12-inch CMP			12-inch CM pipe through the Levee. Slide Gate on the landside end and concrete distribution box on waterside.
1765+33	2.07	12-inch CMP			12-inch CM pipe through the Levee. Slide Gate on the landside end and concrete distribution box on waterside
1767+57	2.11	60-inch CMP			Cox Spillway. South 60 Inch drain pipes through Levee. Slide Gates in 78 inch CM pipe wells on the waterside slope. Concrete bulkhead on both ends. Reinforced concrete spillway at the waterside end.
1767+67	2.11	60-inch CMP			Cox Spillway. North 60 Inch drain pipes through Levee. Slide Gates in 78 inch CM pipe wells on the waterside slope. Concrete bulkhead on both ends. Reinforced concrete spillway at the waterside end.
1777+00	2.29	24-inch steel			Maintance Area 7 (Waller Family) - 24 Inch Gravity Storm Drain Pipe Crossing - The crossing is a gravity storm drainage pipe consisting of an 25-1/2" OD x 3/8" wall thickness cement mortar coated and lined welded steel pipe.
1785+24	2.44	24-inch steel			Maintance Area 7 (Waller Family) - 24 Inch Gravity Storm Drain Pipe Crossing - The crossing is a gravity storm drainage pipe consisting of an 25-1/2" OD x 3/8" wall thickness cement mortar coated and lined welded steel pipe
1792+96	2.59	36-inch steel			Maintance Area 7 (Waller Family) - 36 Inch Gravity Storm Drain Pipe Crossing - The crossing is a gravity storm drainage pipe consisting of an 37-7/8" OD x STD weight (3/8" wall thickness) cement mortar coated and lined welded steel pipe.
1799+44	2.71	8-inch			Waller Family Irrigation Pipe Crossing - 8" x .25" thick wall with exterior taped wrapped to a minimum thickness of 30 mil.
1809+65	2.91	24-inch steel			Maintance Area 7 (Peekema Family) - 24 Inch Gravity Storm Drain Pipe Crossing - The crossing is a gravity storm drainage pipe consisting of an 25-1/2" OD x 3/8" wall thickness cement mortar coated and lined welded steel pipe.

Design Station	Approximate Levee Mile	Size and Kind of Pipe	Latitude	Longitude	Structure Description
1818+72	3.08	36-inch steel			Maintance Area 7 (City of Gridley) - 36 Inch Gravity Storm Drain Pipe Crossing - The crossing is a gravity storm drainage pipe consisting of an 37-7/8" OD x STD weight (3/8" wall thickness) cement mortar coated and lined welded steel pipe.
1834+42	3.38	36-inch steel			Farmland Reserve - 36 Inch Gravity Irrigation Pipe Crossing - The crossing is a gravity storm drainage pipe consisting of an 37-7/8" OD x STD weight (3/8" wall thickness) cement mortar coated and lined welded steel pipe.
1849+74	3.67	18-inch steel			City of Gridley - Effluent Wastewater Discharge Pipe Crossing - The crossing is a pressurized wastewater pipe consisting of an 18.00" OD x 3/8" wall thickness cement mortar coated and lined welded steel pipe.
1956+20	5.68	36-inch steel			Cilker Irrigation - 36 Inch Gravity Irrigation Pipe Crossing - The crossing is a gravity irrigation pipe consisting of an 37-7/8" OD x STD weight (3/8" wall thickness) cement mortar coated and lined welded steel pipe.
1961+08	5.78	36-inch steel			Maintenance Area 7 (Historically was 2-60 inch pipes) - 36 Inch Gravity Strom Drain Pipe Crossing - The crossing is a gravity storm drainage pipe consisting of an 37-7/8" OD x STD weight (3/8" wall thickness) cement mortar coated and lined welded steel pipe.
2004+86	6.60	7-inch steel			Jack Mariani - 7 Inch Irrigation Pipe Crossing - The crossing is a pressurized irrigation pipe consisting of an 8.0" OD x .322" wall thickness epoxy coated and lined welded steel pipe.
2017+70	6.85	12-inch steel			Jack Mariani - 12 Inch Irrigation Pipe Crossing - The crossing is a pressurized irrigation pipe consisting of an 12.75" OD x STD Weight (3/8" wall thickness) cement mortoar coated and lined welded steel pipe.
2084+03	8.10	5-inch steel			John Kucek - 5 Inch Irrigation Pipe Crossing - The crossing is a pressurized irrigation pipe consisting of an 5-9/16" OD x STD weight (.258" wall thickness) cement mortar coated and lined welded steel pipe.
2109+57	8.59	2-inch steel			Blain Moffitt - 2 Inch Irrigation Pipe Crossing - The crossing is a pressurized irrigation pipe consisting of an 2.375" OD x STD weight (.154" wall thickness) cement mortar coated and lined welded steel pipe.
2127+33	8.92	2-inch steel			Clinton Moffitt - 2 Inch Irrigation Pipe Crossing - The crossing is a pressurized irrigation pipe consisting of an 2.375" OD x STD weight (.154" wall thickness) cement mortar coated and lined welded steel pipe

Design Station	Approximate Levee Mile	Size and Kind of Pipe	Latitude	Longitude	Structure Description
2178+39	9.89	16-inch steel			James Banes - 16 Inch Irrigation Pipe Crossing - The crossing is a pressurized irrigation pipe consisting of an 18.0" OD x STD Weight (3/8" wall thickness) cement mortoar coated and lined welded steel pipe.
2201+87	10.34	10-inch steel			James Banes - 10 Inch Irrigation Pipe Crossing - The crossing is a pressurized irrigation pipe consisting of an 10.75" OD x STD Weight (.365" wall thickness) cement mortoar coated and lined welded steel pipe.
2262+69	11.49	36-inch steel			Williams Storm Drainage - 36 Inch Gravity Storm Drainage Pipe Crossing - The crossing is a gravity irrigation pipe consisting of an 37-7/8" OD x STD weight (3/8" wall thickness) cement mortar coated and lined welded steel pipe.
2274+95	11.72	36-inch steel			Williams Storm Drainage - 36 Inch Gravity Storm Drainage Pipe Crossing - The crossing is a gravity irrigation pipe consisting of an 37-7/8" OD x STD weight (3/8" wall thickness) cement mortar coated and lined welded steel pipe.
2281+52	11.84	1-inch steel			Fredericks Irrigation - 1 Inch Domestic Water Pipe Crossing - The crossing is a pressurized irrigation pipe consisting of an 1.315" OD x STD Weight (.133" wall thickness) epoxy coated and lined welded steel pipe.
2283+20	11.88	8-inch steel			Fredericks Irrigation - 8 Inch Irrigation Pipe Crossing - The crossing is a pressurized irrigation pipe consisting of an 8.625" OD x STD Weight (.322" wall thickness) cement mortar coated and lined welded steel pipe.
2283+95	11.89	36-inch steel			Fredericks Storm Drainage - 36 Inch Gravity Storm Drainage Pipe Crossing - The crossing is a gravity irrigation pipe consisting of an 37-7/8" OD x STD weight (3/8" wall thickness) cement mortar coated and lined welded steel pipe.

Table N-2: Other Penetrations and Encroachments

Design Station	Approximate Levee Mile	Size and Kind of Pipe	Latitude	Longitude	Structure Description
2092+90	8.27	Unknown			Underground telephone cable through levee on north side of paved road over the top of the levee.
2084+03	8.10	3/4-Inch			3/4" micro sprinkler irrigation system approximately 6 inches below ground on the right (west) bank overflow of the Feather River.
1901+79	4.65	Unknown			AT&T communication wires. An exchange fiber and high capacity 300 pair cooper cable. According to AT&T, these cables are not considered trunk cables.