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# NAPA RIVER LEFT BANK ABOVE TULOCAY CREEK LEVEE

NAPA RIVER/NAPA CREEK FLOOD PROTECTION PROJECT  
NAPA, CALIFORNIA  
NLD SYSTEM ID NO. 5305000080; SEGMENT ID NO. 5304000080

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PERIODIC INSPECTION REPORT NO. 1  
SEPTEMBER 2020



**US Army Corps  
of Engineers®**  
San Francisco District

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## **QUALITY CONTROL CERTIFICATION**

### **COMPLETION OF QUALITY CONTROL ACTIVITIES**

**The Walla Walla District has completed the Periodic Inspection Report No. 1 for the Napa River Left Bank above Tulocay Creek Levee also known as Old Nord Vineyard Levee in Napa, California for San Francisco District. Notice is hereby given that the DQC Review has been conducted in accordance with District policy. During this review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified.**

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Levee Safety Program Manager  
San Francisco District**

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## **Appendices**

Appendix A	Pertinent Plates and Drawings
Appendix B	Flood Damage Reduction Segment/System Inspection Report
Appendix C	2014 Geotechnical Design Documentation Report
Appendix D	2010 Napa River H&H Memorandum for Record
Appendix E	DQC and Independent Technical Review

## ACRONYMS AND ABBREVIATIONS

A	Acceptable
ASTM	American Society for Testing and Materials
cfs	cubic feet per second
CGS	California Geological Survey
DDR	Design Documentation Report
EM	Engineering Manual
ER	Engineering Regulation
ETL	Engineering Technical Letter
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FOUO	For Official Use Only
ft	foot or feet
H:V	Horizontal:Vertical
in.	inch or inches
ITR	Independent Technical Review
lb	Pounds
LIS	Levee Inspection System
LSO	Levee Safety Officer
M	Minimally Acceptable
n	Coefficient of Roughness
NA	Not Applicable
NAVD88	North American Vertical Datum of 1988
NCFCWCD	Napa County Flood Control and Water Conservation District
NGS	National Geodetic Survey
NGVD29	National Geodetic Vertical Datum of 1929
NSD	Napa Sanitation District
NLD	National Levee Database
NWW	Walla Walla District
O&M	Operations & Maintenance

Project	Napa River/Napa Creek Flood Protection Project
PGA	Peak Ground Acceleration
PI	Periodic Inspection
PL	Public Law
psf	pounds per square foot
psi	pounds per square inch
ROW	Right-Of-Way
SGDM	Supplemental General Design Memorandum
SPN	San Francisco District
U	Unacceptable
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey

## **PART 1 - EXECUTIVE SUMMARY**

This Executive Summary provides the scope and purpose of the periodic inspection (PI), an overview of the Napa River Left Bank above Tulocay Creek Levee previously known as Old Nord Vineyard Levee, a summary of the major findings of the PI, and the overall levee system rating.

### **1.1 Scope and Purpose of Periodic Inspection**

The purpose of the Napa River Left Bank above Tulocay Creek Levee PI is to identify deficiencies that pose hazards to human life or property, and to determine design adequacy relative to present day criteria. The inspection is intended to identify the issues in order to facilitate future studies and associated repairs, as appropriate. This assessment of the general condition of the Napa River Left Bank above Tulocay Creek Levee is based on available data and visual inspections. Detailed investigation and analysis involving hydrologic design, topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of this PI.

### **1.2 System Summary**

The Napa River/Napa Creek Flood Protection Project is a federally authorized, multiphase urban project that was designed to provide 100-year level of flood protection and also referred to as the 1% annual chance of exceedance (ACE) flood event to the city of Napa, California. Herein, this overall flood protection project will simply be referred to as the “Project”. The Project spans almost 7 miles of the Napa River from Trancas Street to the Highway 29 crossing. A levee system of the Project is the Napa River Left Bank above Tulocay Creek Levee previously known as Old Nord Vineyard Levee, which is located on the left bank of the Napa River immediately upstream of Tulocay Creek. The levee was completed in 2005, running north to south spanning a total of 0.15 miles. The Levee Inspection System (LIS) database refers to the Napa River Left Bank above Tulocay Creek Levee as NAP7. Herein, the levee will be referred to as the Left Bank above Tulocay Creek Levee or as the “Levee”. A general location map is shown in Figure 1-1.

The local sponsor is the Napa County Flood Control and Water Conservation District (NCFCWCD). The U.S. Army Corps of Engineers (USACE) Sacramento District recently transferred the Left Bank above Tulocay Creek Levee to NCFCWCD for long-term operation and maintenance. A final inspection or PI is required for the transfer of all levee/floodwall segments.

The Project was authorized by the Flood Control Act of 1965 (Public Law 89-298). Recreation features were included as an allied purpose in the authorizing document, House Document 222, 89th Congress, 1st Session, and are also an authorized purpose for the Project. The recreational elements within the levee include a recreation and maintenance trail along the top of the levee.

### **1.3 Summary of Major Deficiencies**

There were no major deficiencies observed by the inspection team or issues rated as “unacceptable” for this PI.

### **1.4 Overall Rating**

The overall rating of the Napa River Left Bank above Tulocay Creek Levee is “acceptable” based on USACE Levee Safety Program rating criteria and the results of this periodic inspection. The levee appears to have the ability to continue safe operation as a flood reduction system and function

as authorized. See Appendix B, Flood Damage Reduction Segment/System Inspection Report, and Part 5 of this report for more information.



Figure 1-1: Location Map of the Napa River Left Bank above Tulocay Creek Levee

## **PART 2 - INSPECTION TEAM AND DATE OF INSPECTION**

The following section contains a summary of general information pertaining to the inspection team and conditions during the PI of the Napa River, Left Bank above Tulocay Creek Levee. The information presented below was obtained through readily available data sources and is accurate and complete to the best of our knowledge at the time of preparation of this report.

### **2.1 Inspection Team**

The inspection team consisted of one representative from NCFWCWD and three representatives from USACE. Mr. Jeremy Sarrow represented NCFWCWD and is their designated lead point of contact for the Project. Mr. John Conway represented USACE San Francisco District and is the Levee Safety Program Manager. Mr. Michael Franssen, USACE Walla Walla District served as the inspection team lead, and has a background in Civil Engineering. Mr. Nathan DeLannoy, USACE Walla Walla District, served as the inspection recorder and has a background as a Civil Engineering Technician.

### **2.2 Date of Inspection**

The PI was conducted on 22 July 2020.

### **2.3 Weather During Inspection**

The weather on the day of the PI was partly cloudy, with light winds and temperatures in the mid to high 70s (degrees Fahrenheit).

### **2.4 River Gauge or Elevation Readings During Inspection**

The closest stream gage to the Napa River Left Bank above Tulocay Creek Levee, as discussed in further detail in Section 3.3.1, recorded a gage height of approximately 1.97 feet (ft) during the PI, which results in no apparent discharge on the Napa River.

### **PART 3 - SYSTEM BACKGROUND INFORMATION**

The following section contains detailed information pertaining to the Left Bank above Tulocay Creek Levee relating to design and expected project performance. Additional information, including as-built drawings, is in the appendices of this inspection report.

#### **3.1 Project Description**

The Project is designed to provide protection for the 100-year flood event, which has a 1% chance of occurrence in any given year. The 100-year flood is also referred to as the 1% ACE flood event. The Left Bank above Tulocay Creek Levee consists of one levee segment. Before the national levee database this levee was known as Old Nord Vineyard Levee.

The Levee begins at an inlet of the Napa River just east of Jacks Bend. According to *Napa River Contract 2 East Geotechnical Design Document Report* (February 2014), the inlet of the Napa River is also known as New Tulocay Creek. It continues upstream for 0.15 mile or 792 feet. The profile of the Levee across the length ranges from elevation 15.7 feet to 16.0 feet NGVD29 and averages between 4 and 6 feet above existing ground.

##### **3.1.1 Project Type**

The Project is a federally authorized urban flood protection project. The Project will be locally operated and maintained after transfer to the local sponsor.

##### **3.1.2 Authority**

Construction of the local flood protection measures along the Napa River from Edgerly Island to Trancas Street was authorized by the Flood Control Act of 1965 (Public Law 89-298). Recreation features were included as an allied purpose in the authorizing document, House Document 222, 89<sup>th</sup> Congress, 1<sup>st</sup> Session, and are also an authorized purpose for the Project. Napa Creek was added to the Project authorization by the Flood Control Act of 1976 (Public Law 94-587).

##### **3.1.3 Cost**

*The Operations, Maintenance, Repair, Replacement and Rehabilitation Manual for the Napa River / Napa Creek Flood Protection Project* (USACE 2018) indicates that the overall cost of the Left Bank above Tulocay Creek Levee / Old Nord Vineyard Levee Contract, which was included in contract 2E: 6<sup>th</sup> to 3<sup>rd</sup> was \$2,556,986. Herein, the manual will simply be referred to as the “OMRR&R Manual”.

##### **3.1.4 Completion Date**

The Levee was started in July 2004 and completed in September 2005.

##### **3.1.5 Public Sponsor**

NCFCWCD is the public sponsor and will operate and maintain the Levee. The point-of-contacts for NCFCWCD are referenced in Table 3-1.

**Table 3-1: NCFCWCD Points of Contact**

Name	Address	Phone	Email
Jeremy Sarrow (Primary Point of Contact)	804 First Street Napa, California 94559-2623	(707) 259-8204	Jeremy.Sarrow@CountyofNapa.org
Andrew Butler	804 First Street Napa, California 94559-2623	(707) 259-8671	Andrew.Butler@CountyofNapa.org
Richard Thomasser	804 First Street Napa, California 94559-2623	(707) 259-0407	Richard.Thomasser@CountyofNapa.org

**3.1.6 Location**

The Project is located in Napa County, California, with the majority of the work occurring within the city of Napa. The limits of the Project start at the State Highway 29 Bridge over the Napa River and extends approximately 6.9 miles upriver (north) to Trancas Street. The Project also includes approximately two-thirds of a mile of Napa Creek starting at its confluence with the Napa River and extending upstream to Jefferson Street. This PI report only covers the Napa River Left Bank above Tulocay Creek Levee which starts at Tulocay Creek confluence and continues upstream on the Napa River for 0.15 mile. This is shown in Figure 3-1 below, as NAP7.

**3.1.7 Potential Consequences**

The *Supplemental General Design Memorandum* (USACE 1998) identified average annual flood damages of \$247,704,000 for the “largest floodplain” (1430 to 500-year) and \$163,834,000 for the “medium floodplain (65 to 50-year), in October 1997 dollars, for the Project. Herein, the *Supplemental General Design Memorandum* will simply be referred to as the “SGDM”. Average annual flood damages specific to the Napa River Left Bank above Tulocay Creek Levee is not given in the *SGDM*.

**3.1.8 Investigations Prior to Construction**

A summary of geotechnical investigations is included in the *SGDM* and the *Napa River Contract 2 East Geotechnical Design Document Report* (February 2014). Herein, the *Contract 2 East Geotechnical Design Document Report* will be referred to as the “2 East GDR”.

**3.1.9 History of Remedial Measures**

According to the *Flood Project OMMaintenance Report Semi-Annual 2019*. Contract Area 2 East inspections were performed on the Levee and the short section of levee north of New Tulocay Creek and south of the Third Street Bridge as well as the paved “river trail” maintenance road/recreation trail extending from the “Old Tulocay” Creek pedestrian bridge north to the Third Street Bridge (691+00-770+00). No other repairs have been noted.

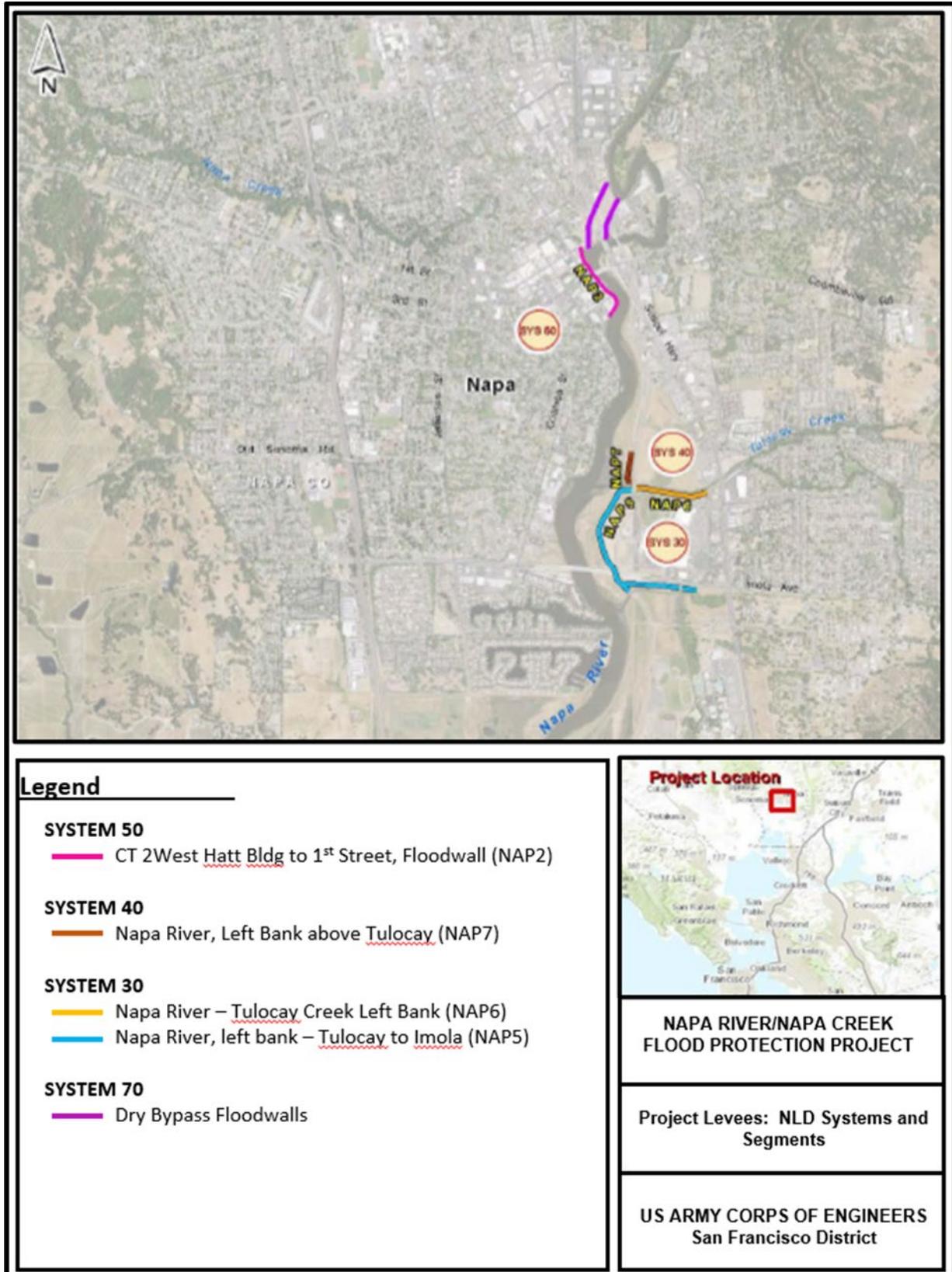


Figure 3-1: Napa Levee Safety System Map

### 3.2 Description of Pertinent Features

#### 3.2.1 Napa River Left Bank Above Tulocay Creek Levee

Napa River Left Bank above Tulocay Creek Levee previously known as Old Nord Vineyard Levee starts at Tulocay Creek confluence and continues upstream on the Napa River for 0.15 mile long. The levee height is 4 to 6 feet tall. The profile of the Levee across the length ranges from elevation 15.7 feet to 16.0 feet NGVD29.

#### 3.2.2 Embankment

The Levee crest is 15 feet wide and consists of 6 inches of aggregate base course and asphalt pavement. Embankment slopes were constructed to 3H:1V and are covered with grass. The levee was constructed with a 12-foot-wide inspection trench with 1H:1V side slopes centered on the levee centerline. A typical levee cross section from the as-built drawings (USACE 2004 Sheet C-316) is shown in Figure 3-3.

#### 3.2.3 Typical Levee Section

Specifications required the levee fill to consist of lean clay, silt, sandy clay, sandy silt, sandy gravel or clayey gravel materials free from particles greater than 2 inches in size. The materials were to contain no less than 15 percent of the particles finer than the No. 200 sieve. The liquid limit was required to be a maximum of 45, and the plasticity index between 7 and 25. Fill material was to be placed in layers not more than 8 inches in uncompacted thickness and compacted to a minimum of 95 percent of the maximum dry density. A typical levee cross section from the as-built drawings (USACE 2004 Sheet C-3-19) is shown in Figure 3-2.

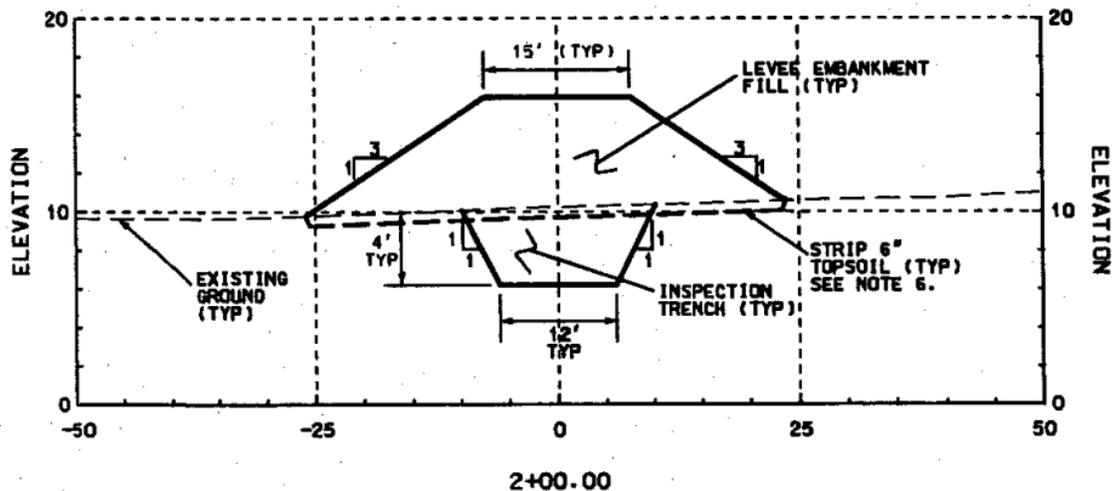


Figure 3-2: Typical Levee Cross Section

### 3.3 Topography, Geology, Seismicity, and Groundwater

The topographic, geologic, and foundation conditions for the Left Bank above Tulocay Creek Levee are characterized in the *SGDM*, the *2 East GDDR* and the as-built drawings (USACE

2004). They are summarized below. Seismic analysis was not discussed in the *2E GDDR*, however it is discussed in the Napa Dry Bypass DDR (USACE 2011) and some of the information from that report is included in the following.

### 3.3.1 Regional Geologic Setting, Site Specific Geology, and Topography

The Project is located in the Coast Ranges Physiographic Province, which is composed of the Southern Coast Ranges and Northern Coast Ranges, extend to the Great Valley Province to the east, the Pacific Ocean to the west, the Klamath Mountains Province to the north, and Transverse Ranges in the south. The Northern Coast Ranges Physiographic Province typically trend parallel to the California coastline with north-to-south trending mountain ranges and valleys, including the Napa Valley. The Northern Coast Ranges are dominated by extensive hills with landside characteristics from the Franciscan Complex. In several areas, Franciscan rocks are overlain by volcanic cones and flows of the Quian Sabe, Sonoma, and Clear Lake volcanic fields (California Geological Survey [CGS] 2002).

The Napa Valley is a northwest-trending with the Napa River flowing south through the Napa Valley and into San Francisco Bay. The valley is bounded to the west by sedimentary rocks of the Late Jurassic/Early Cretaceous Franciscan Formation and Late Jurassic to Cretaceous Great Valley Formation. To the north and east, the valley is bounded by overlying Pliocene and early Miocene volcanic rocks (United States Geological Survey [USGS], 2006). The valley floor is covered by alluvium and older alluvium composed of sediment derived from both sides of the valley.

### 3.3.2 Seismicity

According to the *Napa Dry Bypass DDR*, a peak ground acceleration of 0.27g was estimated for a 100-year event (estimated magnitude 6.7) from the 2008 Probabilistic Seismic Hazard Analysis (PSHA) USGS model. This peak ground acceleration was used for the seismic evaluation of the Dry Bypass and is appropriate for the other Napa River Flood Protection Project features.

On August 24, 2014, the Main Street USGS Station N016 measured a 6.0 magnitude earthquake, 9.1 miles from the epicenter, with a peak ground acceleration of 0.61g. This monitoring station is within 1 mile of the Left bank above Tulocay Creek Levee. (Strong-Motion Center 2016).

### 3.3.3 Groundwater Conditions

The various exploratory programs performed for the Project indicate that the groundwater elevation for the levee varied between elevation -6 ft and 1 ft NGVD29 and is expected to vary due to seasonal and tidal influences.

### 3.3.4 Subsurface Investigation and Foundation Conditions

Within the levee area, multiple subsurface investigations were conducted between 1998 and 2001 which included soil borings, test pit excavations, and cone penetrometer soundings. The borings extended from 20 to 40 feet below the ground surface. Locations of subsurface investigations are shown in the as-built drawings (USACE 2004). Laboratory testing included index testing to determine moisture, plasticity, and grain size, and triaxial shear test modes including unconsolidated-undrained, consolidated-undrained, and consolidated-drained, and direct shear test. A summary of the site conditions is documented in the *2 East GDDR*. The borings encountered clayey soils to the bottom of the hole which ranged from 20 to 40 ft from the ground surface.

### 3.4 Hydrologic/Hydraulic

The Napa River Basin lies in California's Central Coast Mountain Range, draining 426 square miles in Napa and Solano County. The headwaters of the basin are on the southeast slope of Mount Saint Helena. The basin is approximately 50 miles long and 10 miles wide (USACE 1998).

#### 3.4.1 Past Project Performance

The construction of the Left Bank above Tulocay Creek Levee was completed in 2005. Therefore, this section will only refer to flows on the Napa River that occurred between 2005 and the date of this PI. The closest stream gage to the area is USGS Stream Gage 11458000, located on the Napa River near Oak Knoll Avenue, approximately 5 miles upstream of the Levee. The largest flow at the gage was on December 31, 2005 with a recorded flow of 29,600 cfs and a gage height of 29.85 feet. There is no record of poor performance or whether the levee experienced flood loading.

#### 3.4.2 Flood Insurance Study

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) 06055C0516F and 06055C0517F covers the NAP7-System. Both FEMA FIRMs indicate that area behind the Levee above Tulocay Creek are classified in the Zone AE and Zone X floodplains. The Zone AE floodplain is defined by FEMA as areas subjected to inundation by the 1% annual chance (100-year) flood event. The Zone X floodplain is defined by FEMA as areas subject to inundation by the 0.2% annual chance (500-year) flood event. However, the map was last updated in September 2010, prior to construction of the Dry Bypass. It is anticipated that if this levee were to be certificated a revision of the maps would indicate the area behind to levee as only Zone X.

### 3.5 References

Below is a list of references that are used in this report. Note: these do not include the USACE design references (such engineering manuals and engineering regulations) that are included at the end of Part 4 of this report.

- American Society of Testing and Materials (ASTM), 2012. *D1557-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>))*, ASTM International, West Conshohocken, PA.
- California Geologic Survey (CGS). 2002. *Note 26 California Geomorphic Provinces, by the California Department of Conservation, revised December 2002.*
- California Geologic Survey (CGS). 2004. *Geologic Map of the Napa 7.5' Quadrangle, Napa County, California: a Database Version 1.0* By Kevin B. Clahan, David L. Wagner, George J. Saucedo, Carolyn E. Randolph-Loar, and Janet M. Sowers. Digital Database by: Carlos I.
- Gutierrez. U.S. Geological Survey (USGS). 2006. *Scientific Investigations Map 2918, Geologic Map of the San Francisco Bay Region* by R.W. Graymer, B.C. Moring, G.J. Saucedo, C. M. Wentworth, E.E. Brabb and K.L. Knudsen.
- Jennings, C.W., and Bryant, W.A., 2010. *Fault activity map of California: California Geological Survey, Geologic Data Map No. 6, Map Scale 1:750,000.*
- Strong Motion Center, 2016. *CESMD, Information for Strong-Motion Station, Main St, Napa, CA, USGS-NCSN Station N016.* <http://www.strongmotioncenter.org/cgi->

<bin/CESMD/stationhtml.pl?stationID=NCN016&network=NCSN>

- U.S. Army Corps of Engineers (USACE), 1998. *Napa River/Napa Creek Flood Protection Project, Final Supplemental General Design Memorandum.*
- U.S. Army Corps of Engineers (USACE), 2014. *Napa River/Napa Creek Flood Protection Project, Napa, California – Contract 2 East Geotechnical Design Document Report.*
- U.S. Army Corps of Engineers (USACE), 2011. *Napa Dry Bypass Plans and Specifications for the Napa River Flood Protection Project, Napa, California – 100% Design Submittal Design Documentation Report.* Prepared by McMillen.
- U.S. Army Corps of Engineers (USACE), 2005. *Napa River/Napa Creek Flood Protection Project, Contract 2 East NSD (Imola Avenue to Tulocay Creek)*
- U.S. Army Corps of Engineers (USACE), 2004. *Napa River/Napa Creek Flood Protection Project, Contract 2 East Duden (Between Old Tulocay Creek & Imola Ave)*
- U.S. Geological Survey (USGS), 2019. Napa River, Near Napa, California Stream Gage.

## **PART 4 - DESIGN CRITERIA REVIEW**

The results of the design criteria review are described in the following sections. The purpose of this review is to determine design adequacy with existing criteria. Design for the Levee was performed by the US Army Corps of Engineers, Sacramento District. The inspection team reviewed the documentation referenced in the Introduction section and evaluated the levee system's documented design criteria against current design criteria. The results of the design criteria review demonstrate no concerns with the design and specifics for each feature are described in the following sections.

### **4.1 Geotechnical**

#### **4.1.1 Soil Investigations**

The subsurface investigation and laboratory testing program supporting the project basis of design is summarized in Part 3. Explorations near the Levee alignment consisted of thirty-four borings and one Cone Penetrometer Test (CPT). The typical boring depth was less than 50 ft. Except for boring 2F-24, 2F-71, 2F-70, 2F-25, 2F-130, 2F-26, 2F-27, 2F-94-16, 2F-28, 2F-132, typically the soils consist of lean clays, fat clays, and sandy clays went to a depth of approximately 15 feet below ground. Underlined by silty sand and sand with gravel. Soils are non-homogenous and can change depending on depth and location.

The *2 East GDDR* states that the Old Nord Vineyard Levee explorations were conducted along and near the levee alignment (from downstream to upstream) 2F-00-16, 2F-94-12, 2F-00-18, and BH-2. Explorations show the foundation soils to a minimum depth of 20 feet consist mostly of lean clay and sandy lean clay, with occasional zones of fat clay and silty or clayey sand (24-42 percent fines).

*EM 1110-2-1913, Design and Construction of Levees* states that Phase 1 spacing for borings usually varies from 200 to 1,000 ft. In Phase 2, additional locations of borings are selected based on Phase 1 results. *EM 1110-2-1913* also states that borings should be drilled to depths at least equal to the height of the proposed levee at its highest points but not less than 10 ft. The level of investigation is compliant with a Phase 2 exploration and testing parameters described in *EM 1110-2-1913*.

#### **4.1.2 Slope Stability**

Limited slope stability analysis (end of construction, long-term with no flood, and rapid drawdown) was conducted for the SGDM. No slope stability analysis was conducted during final design of the Left Bank above Tulocay Creek Levee due to the short levee height and the similarity of the crest width, side slopes, and subsurface conditions to the Imola Levee. According to the *2 East GDDR* the Imola levee was analyzed for slope stability and meets USACE factor of safety requirements.

#### **4.1.3 Seepage**

*EM 1110-2-1913* requires an evaluation of seepage control if unsafe seepage forces are present. No underseepage analysis was conducted for this levee during design. Explorations did not indicate pervious foundation soils. A semi-pervious zone of clayey sand (28 percent fines) exists in boring 2F-00-18 between 2.5 and 4.5 feet below ground surface. This zone was cut off by the inspection trench underneath the levee. The analysis performed in the *2 East GDDR* meets current seepage analysis requirements as unsafe seepage forces are not expected to be present.

#### 4.1.4 Settlement

The 2 East GDDR sites the Imola levee as reference to settlement for the Left Bank above Tulocay Creek Levee. *EM 1110-2-1913*, requires the final levee grade of the levee to be based on deterministic risk-based analysis to account for settlement. Settlement analysis was conducted in accordance with *EM 1110-2-1904, Settlement Analysis*. As stated in the *SGDM*, the insitu clay soils at Napa are overconsolidated. The added surcharge from the levee results in soil pressures less than the preconsolidation pressure ( $\sigma_p'$ ), so the coefficient of recompression  $C_r$  (average slope of the recompression line) instead of the coefficient of consolidation  $C_c$  (average slope of the virgin consolidation curve) is used to calculate consolidation settlement. Consolidation data for the Contract 2 East area is given on Plate 66 of the Geotechnical Appendix to the *SGDM*. Consolidation calculations were done for levee heights of 6 feet and 9 feet. A clay thickness of 30 feet was used, with the ground water table at 10 feet depth. Foundation consolidation settlement was calculated as 0.07 inch for a 6-foot tall levee and 0.11 inch for a 9-foot tall levee. Secondary compression could not be calculated as time-rate histories were not provided for the consolidation tests. The Perloff Approximation was used to calculate immediate settlement. Immediate settlement was calculated as 1.5 inches for a 6-foot tall levee and 2.86 inches for a 9-foot tall levee. The analysis performed in the *SGDM* meets current settlement requirements.

#### 4.1.5 Seismic Evaluation and Liquefaction

*ER 1110-2-1806, Earthquake Design and Evaluation for Civil Works Projects* indicates an evaluation shall be performed on embankments, slopes and/or foundation that are susceptible to liquefaction or excessive deformation for all projects located in high seismic hazard regions. In addition, *EM 1110-2-1913* indicates that earthquake loadings are not normally considered in analyzing the stability of levees because of the low probability of earthquake coinciding with periods of high water. Levee constructed of loose cohesionless materials or founded on loose cohesionless material are particularly susceptible to failure due to liquefaction during earthquakes. The *SGDM* performed a comprehensive analysis and review of the data and concluded that the levees did not need a liquefaction analysis per *EM 1110-2-1913*.

Liquefaction was reviewed for the Dry Bypass portion of the project located approximately 1 mile upstream of the levee. The *Dry Bypass DDR* briefly summarized conclusions from liquefaction analyses performed by USACE which concluded little potential for liquefaction or surface rupture using a peak ground acceleration of 0.27. Soil conditions at the Dry Bypass generally include clay soil overlying medium dense to dense clayey gravel. The liquefaction evaluation found that these soils are generally not susceptible to potential liquefaction at the accelerations considered for this project, because of the amount of clay present and plasticity of the soil.

The soils in the foundation below the Left Bank above Tulocay Creek levee are the same type of clays and clayey gravel and the ground motions at this location would be very similar to those expected at the Imola Levee and Dry Bypass. Additionally, the levee is short with a maximum height of 6 feet and constructed of well compacted fine-grained soils. The assessment detailed in the *Dry Bypass DDR* is compliant with *EM 1110-2-1913*.

## 4.2 Hydrologic/Hydraulic

### 4.2.1 Design Capacity

The Project, which includes the Napa River Left Bank above Tulocay Creek Levee, is designed to provide protection to the city of Napa for the 1% annual chance of exceedance flood event. The

current design-flood peak discharge for the Projects is based on the Project-Specific National Economic Development plan, as specified in ER 1105-2-100.

The most recent hydrologic analysis is presented in Table 9 of the Memorandum for Record (USACE, 2010), Napa River Hydrology, Computed Probability Flows (USACE, 2010). The computed Napa River summary of discharges along the levees are shown in Figure 4-1 below. The levee is designed for the 1% ACE flood event discharge. The design elevation for the levees is elevation 12.5 feet.

<b>Table 9</b>								
Peak flows in Tulucay Creek								
with concurrent flows in the Napa River (existing conditions). Flows in cfs.								
Location	2-year	5-year	10-year	50-year	100-year	200-year	500-year	1000-year
Napa River upstream of Tulucay Creek (concurrent flow)	11,720	17,760	21,010	29,360	33,130	36,600	41,600	45,580
Tulucay Creek at mouth (peak flow)	1,080	1,890	2,880	3,890	4,530	5,160	6,000	6,660
Local above Tulucay Creek (concurrent flow)	360	460	520	660	720	770	850	920
Napa River Downstream of Tulucay Creek (concurrent flow)	13,160	20,110	24,410	33,920	38,370	42,530	48,450	53,160
Values were determined from HMS and HEC-1 model outputs on 30 Aug 2010.								

**Figure 4-1: Table 9 Memorandum for Record (USACE, 2010)**

#### 4.2.2 Hydraulic Analysis

Flood protection on the Napa River extends from about one-half mile below Trancas Street to Imola Avenue. The Napa Project includes floodplain restoration, terraced bank excavation, and a raised bed oxbow cutoff channel to increase the conveyance of the existing river corridor and reduce water surface elevations.

Hydraulic design of the Napa Project was performed using both one and two-dimensional numerical hydraulic models. RMA-2, a two-dimensional finite element hydrodynamic model, was selected to model the restoration of the historic floodplain south of the Imola Avenue Bridge. For the reach extending from the downstream Project limit (station 550+00) upstream to station 685+00, RMA-2 model results were used for hydraulic design.

The crest of the training dike in the Contract 1B area was set to match the elevation of the pre-Project dike formerly located along the riverbank. The pre-Project riverbank dike was removed and replaced with the training dike, which is set back at least 300 feet from the riverbank. This

allows water to spread out over a larger area downstream of Imola Avenue during floods in order to lower the flood water elevation upstream of Imola Avenue. The existing west bank river development downstream of Imola Avenue is set at or above the 100-year storm peak stage. Design profile distance heights were selected through town to provide consistent flood water containment levels for both levees and floodwalls.

#### **4.2.3 Adequacy of Erosion Protection**

Erosion protection for the levees is provided by vegetation. Flows are expected to be low against the levee embankment and vegetated slopes are adequate.

#### **4.3 Maintenance Access Roads**

*EM 1110-2-1913* requires that vehicular access to the levee should be provided at reasonably close intervals for maintenance access. Per the details on the as-built drawings, a maintenance access road had been provided along the top of the levee and at either end. The width of the maintenance access roads varies from 8 to 12 ft and is sufficient to provide access to maintenance vehicles.

#### **4.4 Survey Datum**

The 2 East Left Bank above Tulocay Creek Levee was designed and constructed using NAVD88 consistent with the requirements in *ER 1110-2-8160 Policies for Referencing Project Evaluation Grades to Nationwide Vertical Datums*.

**PART 5 - INSPECTION FINDINGS AND EVALUATIONS**

The PI was conducted on 22 July 2020. Table 5-1 shows the key team members and the role each assumed during the PI. The inspection team lead was Mr. Michael Franssen.

**Table 5-1: List of Key Inspection Staff**

Title	Name
Local Sponsor Representative (NCFCWCD)	Jeremy Sarrow
Civil/Team Lead (USACE Walla Walla District)	Michael Franssen, PE
Geotechnical/LSPM (USACE San Francisco District)	John Conway, PG
Civil Technician (USACE Walla Walla District)	Nathan DeLannoy

**5.1 Inspection Summary**

An overall summary of the PI ratings is shown in Table 5-2. Specific detailed related to acceptable, minimally acceptable, and unacceptable rated items are discussed in the subsequent sections.

**5.2 General Items for All Flood Damage Reduction Segments/Systems**

A summary of the rated items contained in the checklist titled “General Items for All Flood Damage Reduction Segments/Systems” is shown in Table 5-2. The following subsections provide additional detail on these items.

**5.2.1 Operation and Maintenance Manuals**

The operation and maintenance (O&M) manual for the Napa River / Napa Creek Flood Protection Project was made final in April 2018 by USACE Sacramento District and provided to NCFCWCD. The Dry Bypass is a component of the Project.

**5.2.2 Emergency Supplies and Equipment**

NCFCWCD maintains a supply of empty sandbags, stockpile sand, chain saws, various hand tools, and other emergency supplies at the maintenance yard located on 933 Water Street in Napa, CA. The majority of sand that would be used for sandbags is stored at 770 Jackson Street in Napa, CA. Both of these locations are within 1.5 miles of the Levees. NCFCWCD has emergency contracts with general contractors when emergency services are needed. NCFCWCD informed the inspection team that the location on 933 Water Street may be bought out or leased to an external organization in the near future.

**5.2.3 Flood Preparedness and Training**

NCFCWCD has developed a flood emergency operation plan. Annual flood fight training program is conducted by the California Department of Water Resources at the Napa Sheriff’s Department each fall. NCFCWCD has previously attended the USACE San Francisco District’s Levee Owner Workshop in Sausalito, CA.

**Table 5-2: PI Rated Summary**

Category	Rated Item	Rating <sup>1</sup>
General Items for All Flood Damage Reduction Segments/Systems	1. Operation and Maintenance Manuals	A
	2. Emergency Supplies and Equipment	A
	3. Flood Preparedness and Training	A
Levee Embankments	1. Non-Compliant Vegetation Growth	A
	2. Sod Cover	NA
	3. Encroachments	A
	4. Closure Structures	NA
	5. Slope Stability	A
	6. Erosion Bank Caving	A
	7. Settlement	A
	8. Depressions/Rutting	A
	9. Cracking	A
	10. Animal Control	A
	11. Culverts/Discharge Pipes	NA
	12. Riprap Revetments & Bank Protection	NA
	13. Revetments other than Riprap	NA
	14. Underseepage Relief Wells/Toe Drainage Systems	NA
	15. Seepage	A

<sup>1</sup>Note: Acceptable (A), Minimally Acceptable (M), Unacceptable (U), Not Applicable (NA)

### 5.3 Levee Embankments

A summary of the rated items contained in the checklist titled “Levee Embankments” is shown in Table 5-2. Figure 5-1 provides a photo of the downstream end of the levee. The following subsections provide additional detail on these items.

#### 5.3.1 Non-Compliant Vegetation Growth

This item was rated “acceptable”. Plantings that were observed on the PI were part of the original construction contract of the levee and have minimal risk to the integrity of the levee.

#### 5.3.2 Encroachments

This item was rated “acceptable”. No encroachments were noted during the inspection.



**Figure 5-1: Inspection Point NLT1\_2020\_a\_0001: Downstream end of levee segment.**

#### 5.3.3 Slope Stability

This item was rated “acceptable”. No indications of slope instability were observed during the inspection.

#### 5.3.4 Erosion/Bank Caving

This item was rated “acceptable”. NLT1\_2020\_a\_0002: Drop in crown elevation for the last 200 feet needs to be monitored.



**Figure 5-2: Inspection Point NLT1\_2020\_a\_0002: Drop in crown elevation.**



**Figure 5-3: Inspection Point NLT1\_2020\_a\_0002: Drop in crown elevation.**

### 5.3.5 Settlement

This item was rated “acceptable”. No settlement was observed during the inspection.

**5.3.6 Depressions and Rutting**

This item was rated “acceptable”. No rutting/depressions were observed during the inspection.

**5.3.7 Cracking**

This item was rated “acceptable”. No cracking was observed during the inspection.

**5.3.8 Animal Control**

This item was rated “acceptable”. No animal burrows were observed during the inspection.

**5.3.9 Seepage**

This item was rated “acceptable”. There was no evidence of seepage, boils, or saturated areas were observed by the inspection team.

## PART 6 - CONCLUSIONS AND RECOMMENDATIONS

This section summarizes items that received either “minimally acceptable” or “unacceptable” ratings for each feature of the Napa River, Left Bank above Tulocay Creek Levee, and it includes the recommended actions for each of these items. A discussion of levee safety issues and a summary of the needs related to the design criteria review follow the inspection recommendations.

### 6.1 Recommendations

#### 6.1.1 General Items for All Flood Damage Reduction Segments/Systems

All of the General Items for All Flood Damage Reduction Segments/Systems items received an “acceptable” rating.

#### 6.1.2 Levee Embankment

Recommendations for Levee Embankment items are summarized in Table 6-1.

**Table 6-1: Earthen Embankments Deficiencies and Recommended Actions**

<b>Rated Item</b>	<b>Rating<sup>1</sup></b>	<b>Recommended Action</b>
1. Non-Compliant Vegetation Growth	A	No recommended actions
2. Sod Cover	NA	NA
3. Encroachments	A	No recommended actions.
4. Closure Structures	NA	
5. Slope Stability	A	No recommended actions
6. Erosion/Bank Caving	A	Monitor drop in crown elevation for the last 200 feet.
7. Settlement	A	No recommended actions.
8. Depressions/Rutting	A	No recommended actions.
9. Cracking	A	No recommended actions.
10. Animal Control	A	No recommended actions.
11. Culverts Discharge Pipes	NA	NA
12. Riprap Revetments & Bank Protection	NA	NA
13. Revetments other than Riprap	NA	NA
14. Underseepage Relief Wells/Toe Drain Systems	NA	NA
15. Seepage	A	No recommended actions.

<sup>1</sup> Note: Acceptable (A), Minimally Acceptable (M), Unacceptable (U), Not Applicable (NA)

## **6.2 Rating**

The overall rating of the Napa River, Left Bank above Tulocay Creek Levee is “acceptable”.

## **6.3 Future Periodic Inspection**

The next PI of the Napa River, Left Bank above Tulocay Creek Levee should be at 5 years from the levee screening to take place in 2021.

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**Appendix A**

**Pertinent Plates and Drawings**



US Army Corps  
of Engineers  
Sacramento District

# NAPA RIVER/NAPA CREEK FLOOD PROTECTION PROJECT CONTRACT 2 EAST (SIXTH ST TO THIRD ST)

## NAPA CALIFORNIA

**RECORD DRAWING:**  
THIS DRAWING IS THE LATEST  
RECORD AVAILABLE AS OF JULY  
29, 2004. IT PRESENTS DESIGN  
INFORMATION ONLY AND MAY NOT  
REFLECT AS-BUILT CONDITIONS.  
FIELD VERIFY BEFORE USE.

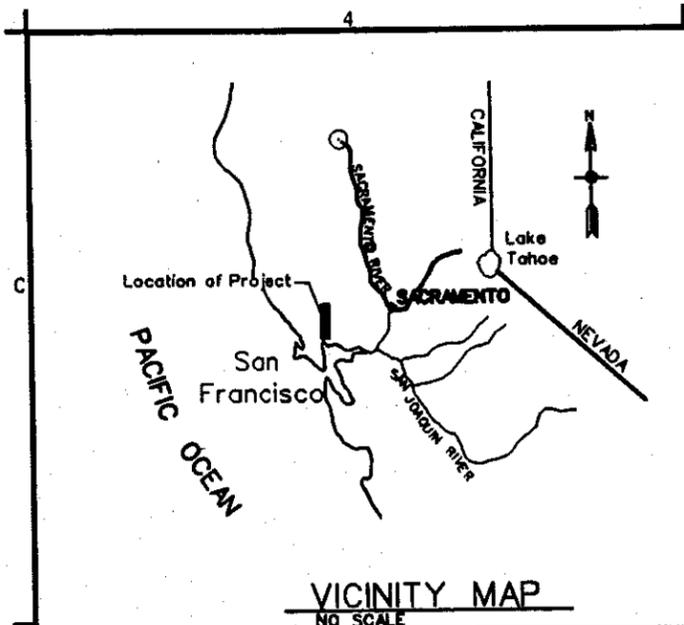
This project was designed by the Sacramento District of the U. S. Army Corps of Engineers. The initials or signatures and registration designations of individuals appear on these project documents within the scope of their employment as required by ER 1110-1-6152

Approved	/S/THOMAS E. TRAINER 05/06/2004 Chief, Engineering Division Dates
Prepared under the direction of	COL MICHAEL J. CORRAD, JR. Col. Corps of Engineers District Engineer
Drawing Code:	NA-04-01B
Approved Functional Adequacy	/S/PETER VALENTINE 05/06/2004 Chief, Civil Design, Sec A Dates
Chief, Civil Design, Sec A	Spec No. 1299
Designed by	BMH
Drawn by	JMA
Design File No.	NA-04-01B
Prepared by	SACRAMENTO DISTRICT CIVIL DESIGN BRANCH

CALIFORNIA  
NAPA RIVER/NAPA CREEK  
FLOOD PROTECTION PROJECT  
CONTRACT 2 EAST (SIXTH ST TO THIRD ST)  
TITLE SHEET

Sheet  
reference  
number:  
G-0-01  
Sheet 1 of 32

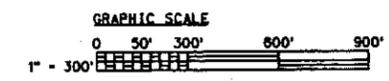
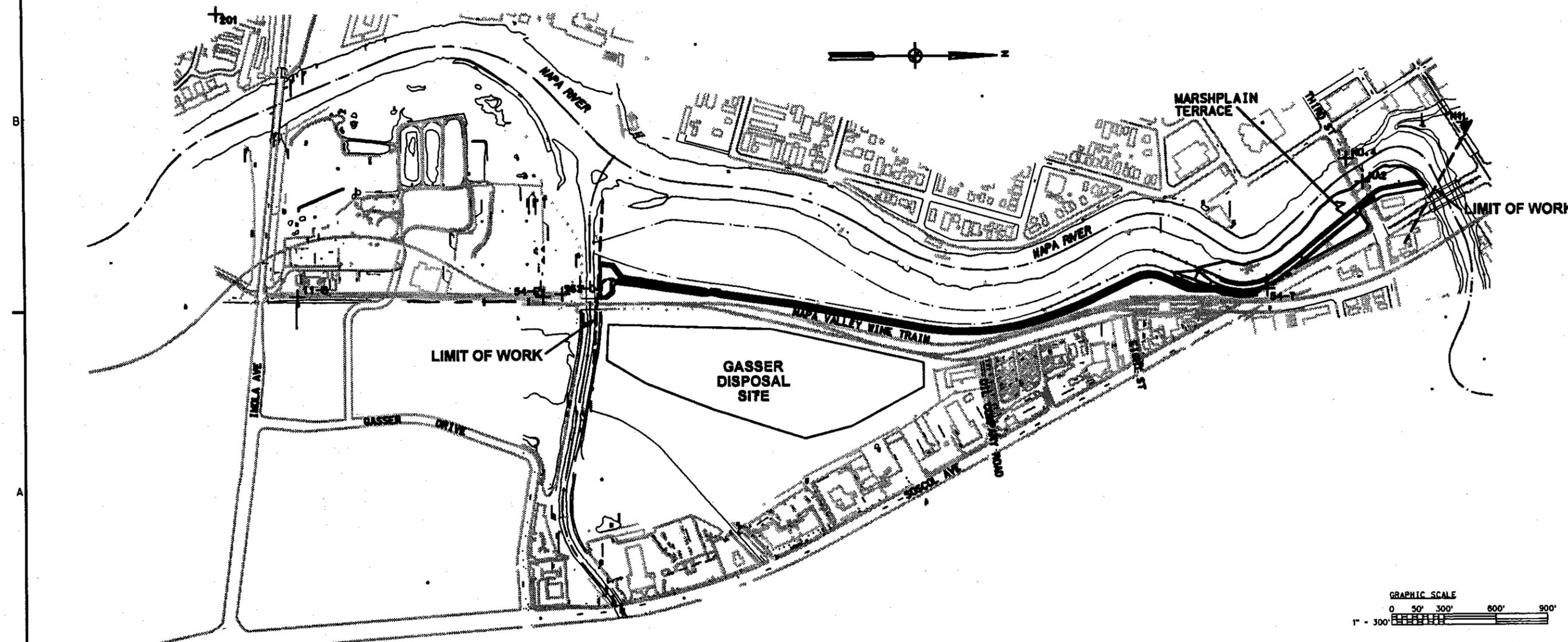
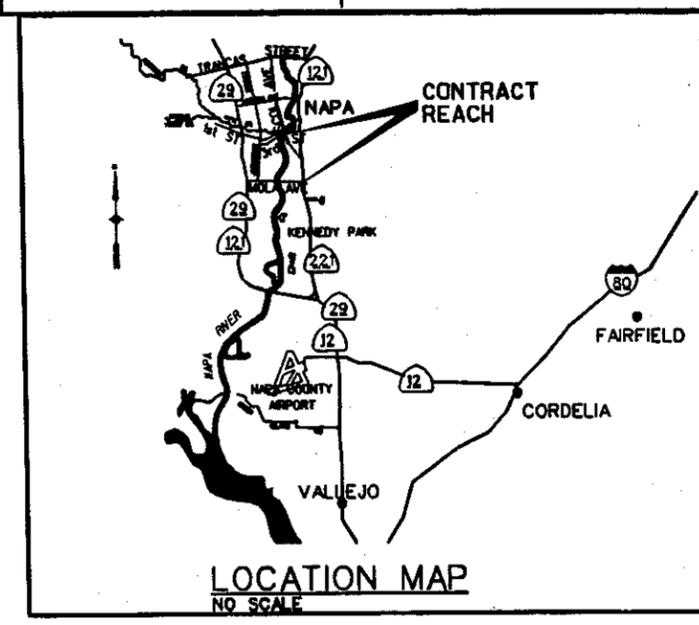




**SURVEY NOTES:**  
 1. GRID COORDINATES IN U.S. FEET REFER TO CALIFORNIA STATE PLANE ZONE 2, NAD 83 AND ARE BASED ON CALTRANS HPGN D CA 04 LG, NGS BLUE, QUARRY, AND USC&S DRY  
 2. ELEVATIONS IN U.S. FEET REFER TO NGVD 29 BASED ON CITY OF NAPA 11-B, 54-C, 54-7, 54-8, 75-A, 75-C, 78-B, USE NA2, USC&S NO.4 TIDAL, AND USCE SAC, DIST. N1.  
 3. NA 2000 ELECTRONIC LEVEL RUN RESET 54-E HOLDING N1, 54-7, 54-8 AND CHECKED WITH NA 2, NO.4 TIDAL  
 4. UNLESS NOTED "\*" IS LEVEL WITH GROUND

STATION	NORTHING	EASTING	MON. ELEV.	RIM ELEV.	MARKER
54-C			3.85	*	CITY OF NAPA METAL PLATE
54-7	1870028.18	6480981.15	14.38	*	CITY OF NAPA BRASS CAP
54-8			11.02	*	CITY OF NAPA BRASS CAP
75A			23.10	N/A	CITY OF NAPA BRASS CAP IN WELL
75-C			11.19	*	CITY OF NAPA BRASS CAP
78B			13.50	N/A	CITY OF NAPA BRASS CAP IN WELL
NA2	1870576.07	6480369.24	18.50	*	USE BRASS DISC
NO.4	1870484.63	6480235.97	18.62	*	TIDAL STATION DISK USC&S
952-02	1866717.65	6476871.72	20.68	*	SPIKE ANDREGG WASHER
952-05	1855720.69	6482077.88	7.54	*	2" BRASS DISC FND
952-06	1850861.57	6482594.18	95.37	*	SPIKE ANDREGG WASHER
952-07	1850897.72	6478011.98	7.42	*	SPIKE ANDREGG WASHER
952-08	1855986.94	6473867.23	23.19	*	SPIKE ANDREGG WASHER
04 LG	1860692.69	6475726.22	7.10	*	HPGN ALUM. DISC
BLUE	1854608.58	6484325.81	181.00	*	NGS BRASS DISC
DRY	1894737.84	6464843.33	100.13	*	USC&S BRASS DISC
QUARRY	1866478.01	6487261.67	159.20	*	CITY OF NAPA BRASS DISC
N1	1871162.74	6480030.30	19.25	*	USCE GEAR SPIKE & WASHER
PHOTO CONTROL PANELS					
201	1894081.31	6479353.45	10.90	*	PK NAIL W/WASHER
11-B	1864812.88	6480988.82	11.10	12.04	CITY OF NAPA BRASS CAP IN WELL
54-E	1865907.88	6480998.03	12.41	13.28	CITY OF NAPA BRASS CAP IN WELL
952-04	1866018.53	6480983.51	12.98	*	SPIKE ANDREGG WASHER

11-B & 54-E ARE IN MONUMENT WELLS 11-B IS 0.94' BELOW RIM  
 54-E IS 0.87' BELOW RIM



US Army Corps of Engineers  
Sacramento District

Design	06/04/2004	Design File No.	NA-04-015
Drawn by	JUN	Reviewed by	WAS
Checked by	JUN	Submitted by	WAS
File name	C:\PROJECTS\NA-04-015\NA-04-015.dwg		
Plot name	NA-04-015-003.dwg		

DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA  
SACRAMENTO DISTRICT  
14-1500 J STREET  
SACRAMENTO, CA 95814-2022

CALIFORNIA  
NAPA RIVER/NAPA CREEK  
FLOOD PROTECTION PROJECT  
CONTRACT 2 EAST (SIXTH ST TO THIRD ST)  
PROJECT LOCATION:  
VICINITY MAP, SURVEY NOTES  
CONTROL POINTS, SURVEY NOTES

Sheet reference number:  
G-0-03  
Sheet 3 of 52

**2 F - 9 4 - 1 1**  
N ±1,866,127; E ±6,480,862

DEPTH	N	GR	SA	FI	LL	PI	MC	7d	Description
El. 17.4' ± = 0									At surface no recovery (cleaned out)
1.0'	(SC) 48								CLAYEY SAND, (SC): Very firm to dense; moist; brown; about 55% fine to medium, subangular to subrounded sand; about 45% low to medium plasticity fines
4.0'	CL 29	0	41	59	29	12	3		SANDY LEAN CLAY, (CL): (Field: Very stiff; moist; dark brown); low plasticity fines; fine to medium (with scattered coarse); (Field: Subangular to subrounded) sand; (Field: No reaction to HCl; trace of organic material)
5.5'	(CL) 19								SANDY LEAN CLAY, (CL): Very firm; moist; dark brown; about 55% medium plasticity fines; about 45% fine to coarse, subangular to subrounded sand; no reaction to HCl; trace of organic material
7.0'	CL 8	0	38	62	29	12	4		SANDY LEAN CLAY, (CL): (Field: Firm; moist; dark brown); low plasticity fines; fine to medium (mostly fine) sand; (Field: No reaction to HCl)
8.5'	(SC) 18								CLAYEY SAND, (SC): Firm; moist; dark brown; about 55% fine sand; about 45% medium plasticity fines; no reaction to HCl
16.0'	CL 21	0	8	92	39	20	25		LEAN CLAY, (CL): (Field: Very stiff; wet; light brown); medium plasticity fines; fine (with scattered medium to coarse) sand
17.5'	(CL) 38								LEAN CLAY WITH SAND, (CL): Hard; wet; light brown; about 75% medium plasticity fines; about 25% fine sand
20.5'	B.O.H.								(9 JUN 95)

**2 F - 9 4 - 1 2**  
N ±1,866,256; E ±6,480,858

DEPTH	N	GR	SA	FI	LL	PI	MC	7d	Description
El. 9.7' ± = 0	(CL) 14								LEAN CLAY, (CL): Stiff; moist; dark brown; about 90% medium plasticity fines; about 10% fine to medium sand; no reaction to HCl
4.0'	(CL) 12								SANDY LEAN CLAY, (CL): (Field: Stiff; moist; dark brown); medium plasticity fines; (Field: Fine to medium sand; no reaction to HCl)
5.5'	CL 9	0	37	63	35	13	13		LEAN CLAY WITH SAND, (CL): Firm; moist; olive-brown; about 85% medium plasticity fines; about 15% fine to medium sand; no reaction to HCl
7.0'	(CH) 7								FAT CLAY, (CH): Soft; mottled olive-brown to dark gray; about 95% high plasticity fines; about 5% fine sand; no reaction to HCl
8.5'	CL 4								SANDY LEAN CLAY, (CL): (Field: Soft; mottled olive-brown to dark gray); medium plasticity fines; (Field: Fine sand); (Field: No reaction to HCl)
10.0'	(CH) 3								FAT CLAY, (CH): Soft; mottled olive-brown to dark gray; about 95% high plasticity fines; about 5% fine sand; no reaction to HCl; very easy drilling.
16.0'	SM 2	0	76	24		NP	31		SILTY SAND, (SM): (Field: Very loose; wet; dark brown; fine to medium (with scattered coarse), subangular to subrounded sand); nonplastic fines; (Field: No reaction to HCl)
16.5'	(SC) 2								CLAYEY SAND, (SC): Very loose; wet; dark brown; about 70% fine to medium (with a trace of coarse), subangular to subrounded sand; about 30% low to medium plasticity fines; no reaction to HCl
17.5'									(25 OCT 94)
20.5'	B.O.H.								

**2 F - 0 0 - 1 5**  
N ±1,866,107; E ±6,480,987

DEPTH	N	N60	GR	SA	FI	LL	PI	MC	7d	Description
El. 14.6' ± = 0										LEAN CLAY WITH SAND, (CL): Hard; dry; brown; 80% medium plasticity fines; 20% fine to coarse sand; trace of organic material
2.5'	25	33								SANDY LEAN CLAY, (CL): Very stiff; dry; brown; trace of organic material
7.5'	13	17								LEAN CLAY WITH SAND, (CL): Stiff; moist; brown; 80% medium plasticity fines; 20% fine sand; trace of organic material
8.5'	8	11								LEAN CLAY, (CL): Stiff; moist; dark brown; 95% medium plasticity fines; 5% fine sand
9.5'	8	11								LEAN CLAY, (CL): Stiff; moist; dark brown; 95% medium plasticity fines; 5% fine sand
13.0'	9	12								At 11.5' trace of charcoal; trace of iron oxide staining
13.5'	CL									LEAN CLAY WITH SAND, (CL): Wet
16.0'	2	3			42	21	32			LEAN CLAY, (CL): Soft; wet; dark brown; 90% to 95% medium plasticity fines; 5% to 10% fine sand; trace of organic material; trace of iron oxide staining
16.5'	7	9								At 18.0' firm to stiff; moist; gray to turquoise
17.5'	9	12								
18.5'	9	12								
30.0'	6	8			44	22	29			
	5	7								
	5	7								
	B.O.H.									(25 AUG 2000)

**2 F - 0 0 - 1 6**  
N ±1,866,254; E ±6,480,981

DEPTH	N	N60	GR	SA	FI	LL	PI	MC	7d	Description
El. 11.4' ± = 0	12	16								LEAN CLAY, (CL): Very stiff; dry; brown; 90% medium plasticity fines; 10% fine sand; trace of organic material
2.5'	4	5								LEAN CLAY WITH SAND, (CL): Firm; moist; dark brown; trace of organic material
4.0'	Shelby	Tube	0	38	52	27	9	17	98.7	SANDY LEAN CLAY, (CL):
5.5'	CL		0	50	50	25	6	16	108.4	SANDY SILTY CLAY, (CL-ML):
6.0'	ML		0	24	76	35	15	27	106.9	LEAN CLAY, (CL): Firm to stiff; moist; dark brown to dark gray; trace of organic matter; trace of charcoal
11.5'	9	12								At 11.5' no charcoal, trace of iron oxide staining
16.0'	7	9								From 16.0' to 18.0' 5% gravel
17.5'	5	7								
22.0'	Shelby	Tube	0	10	90	46	21	28		
	7	9								
	11	15								
	7	9								
	5	7	0	19	81	42	20			LEAN CLAY WITH SAND, (CL): Soft; moist; dark brown to dark gray; trace of organic material; moderate iron oxide staining
	3	4								
	2	3								
30.0'	2	3								
	B.O.H.									(26 JULY 2000)

**2 F - 0 0 - 1 8**  
N ±1,866,558; E ±6,481,003

DEPTH	N	N60	GR	SA	FI	LL	PI	MC	7d	Description
El. 9.0' ± = 0	CL	6	8							GRAVELLY LEAN CLAY, (CL): Firm; moist; dark brown to brown
2.5'	SC	6	8	2	70	28	32	14	24	CLAYEY SAND, (SC): Firm; moist; dark brown to brown
4.5'	4	5								LEAN CLAY, (CL): Firm to very stiff; moist; dark brown; trace of organic material
8.5'	14	19								SANDY LEAN CLAY, (CL): Firm to stiff; moist; dark brown; weak iron oxide staining
14.5'	6	8								
16.0'	8	11								LEAN CLAY, (CL): Stiff; moist to wet; gray; moderate iron oxide staining
18.5'	7	9								
20.0'	SC	2	3	1	57	42	34	15	27	CLAYEY SAND, (SC): Very loose; wet; brown; moderate iron oxide staining
	B.O.H.									(26 JULY 2000)

**NOTES:**

- Legend and Notes are shown on Sheet No. B-3-01.
- Logs of Explorations are shown on Sheet Nos. B-3-01 through B-3-19.
- Location of Explorations are shown on Sheet Nos. C-1-02 through C-1-06 and C-1-10.

**GRAPHIC SCALE**

1" = 3' 0" 3' 6' 9" 12'

VERTICAL SCALE: 1" = 3'

**US Army Corps of Engineers**  
Sacramento District

---

**DEPARTMENT OF THE ARMY**  
CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA

---

**SACRAMENTO DISTRICT**  
IN-HOUSE DESIGN  
1325 J STREET  
SACRAMENTO, CA 95814-2922

---

**LOG OF EXPLORATIONS**  
2F-15, 2F-94-6 AND 2F-00-38

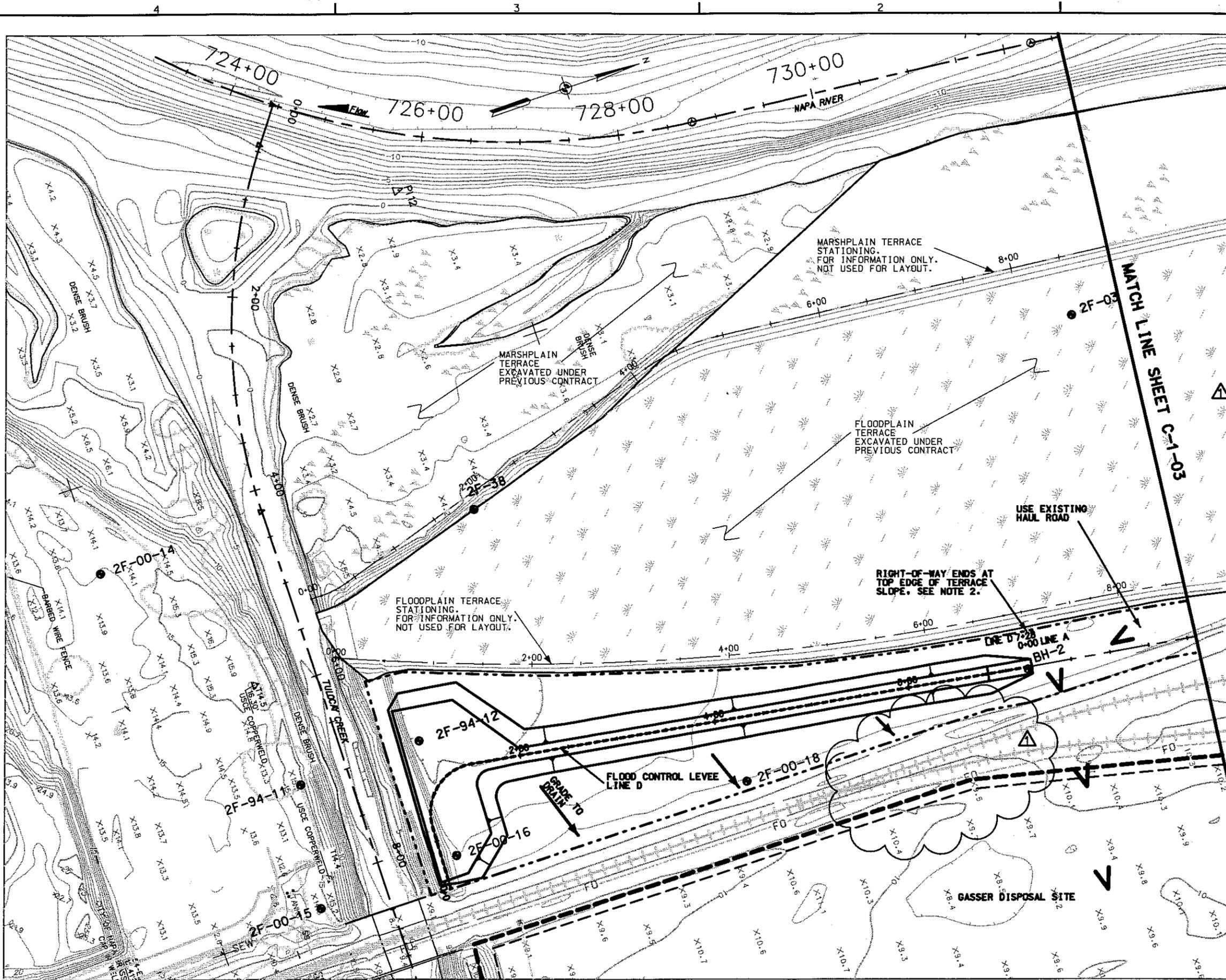
---

Sheet reference number:  
**B-3-02**  
Sheet 7 of 52



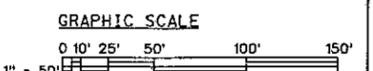






- LEGEND**
- RIGHT-OF-WAY
  - ↔ HAUL ROUTE
  - ▭ FLOODPLAIN TERRACE
  - ▭ MARSHPLAIN TERRACE
  - GASSER DISPOSAL SITE
  - ENVIRONMENTALLY SENSITIVE AREA

- NOTES:**
1. SEE SHEET C-1-09 FOR LEVEE DESIGN.
  2. CONTRACTOR SHALL NOT ENTER FLOODPLAIN TERRACE, UNLESS APPROVED BY CONTRACTING OFFICER.
  3. DELETED
  4. LOGS OF EXPLORATION ARE SHOWN ON SHEETS B-3-01 TO B-3-19.
  5. CONTRACTOR SHALL PROVIDE FENCING, BARRICADES, SAFETY SIGNS, ETC. AS REQUIRED TO RESTRICT PUBLIC ACCESS TO CONSTRUCTION AREAS AND HAUL ROADS.
  6. SEE SHEET C-3-19 FOR LEVEE CROSS-SECTION.
  7. CONTRACTOR SHALL PROVIDE TEMPORARY SAFETY FENCING ALONG RIGHT-OF-WAY LINE BETWEEN RAILROAD AND PROJECT SITE. FENCING SHALL RUN NORTH ALL THE WAY TO END OF LINE A.



REV.	DATE	DESCRIPTION
1	08/01/2004	DESIGN FILE NO. NA-04-018
2	08/01/2004	DRAWING CODE: TMC
3	08/01/2004	FILE NO. NA-04-018
4	08/01/2004	PLOT DATE
5	08/01/2004	PLOT SCALE

DESIGNED BY: JMA	DATE: 08/01/2004	REV.:
DRAWN BY: JMA	DESIGN FILE NO.: NA-04-018	DESIGN FILE NO.:
CHECKED BY: TMC	DRAWING CODE: TMC	DRAWING CODE:
APPROVED BY: WALTER VALENTINE	FILE NO.: NA-04-018	FILE NO.:
DEPARTMENT OF THE ARMY	SACRAMENTO DISTRICT	SACRAMENTO DISTRICT
CORPS OF ENGINEERS	IN-HOUSE DESIGN	IN-HOUSE DESIGN
SACRAMENTO, CALIFORNIA	1325 J STREET	1325 J STREET
	SACRAMENTO, CA 95814-2822	SACRAMENTO, CA 95814-2822

CALIFORNIA  
 NAPA RIVER/NAPA CREEK  
 FLOOD PROTECTION PROJECT  
 CONTRACT 2 EAST SIXTH ST TO THIRD ST  
 GENERAL PLAN, RIGHT-OF-WAY,  
 STAGING AREAS, PROJECT ACCESS  
 AND LOCATION OF EXPLORATIONS

Sheet  
 reference  
 number:  
**C-1-02**  
 Sheet 26 of 52









**Appendix B**

**Flood Damage Reduction Segment/System Inspection Report**

**&**

**Inspection Map**



# Flood Damage Reduction Segment / System Inspection Report

**US Army Corps  
of Engineers®**

Name of Segment / System: Napa River, left bank - above Tulocay

Public Sponsor(s): Napa County Flood Control and Water Conservation District

Public Sponsor Representative: Jeremy Sarrow

Sponsor Phone: 707-259-8204

Sponsor Email: jeremy.sarrow@countyofnapa.org

Corps of Engineers Inspector: Micheal Franssen PE and Nathan DeLannoy Inspection Start Date: 07/22/2020

Inspection End Date: 07/22/2020

Inspection Report Prepared By: Nathan DeLannoy Date Report Prepared: 08/05/2020

Internal Technical Review (for Periodic Inspections) By: \_\_\_\_\_ Date of ITR: \_\_\_\_\_

Final Approved By: Marcus Palmer, PE, Levee Safety Officer Date Approved: \_\_\_\_\_

Type of Inspection:	<input type="checkbox"/> <b>Initial Eligibility Inspection</b> <input type="checkbox"/> <b>Continuing Eligibility Inspection (Routine)</b> <input checked="" type="checkbox"/> <b>Continuing Eligibility Inspection (Periodic)</b>	Overall Segment / System Rating:	<input type="checkbox"/> <b>Acceptable</b> <input type="checkbox"/> <b>Minimally Acceptable</b> <input type="checkbox"/> <b>Unacceptable</b>
Contents of Report:	<input checked="" type="checkbox"/> <b>Instructions</b> <input type="checkbox"/> <b>Initial Eligibility Inspection</b> <input checked="" type="checkbox"/> <b>General Items for All Flood Control Works</b> <input checked="" type="checkbox"/> <b>Levee Embankment</b> <input type="checkbox"/> <b>Concrete Floodwalls</b> <input type="checkbox"/> <b>Sheet Pile and Concrete I-walls</b> <input type="checkbox"/> <b>Interior Drainage System</b> <input type="checkbox"/> <b>Pump Stations</b> <input type="checkbox"/> <b>FDR System Channels</b>	<p>Note: In addition to the report contents indicated here, a plan view drawing of the system, with stationing, should be included with this report to reference locations of items rated less than acceptable. Photos of general system condition and any noted deficiencies should also be attached.</p> <p>Note: This inspection rating represents the Corps evaluation of operations and maintenance of the flood damage reduction system and may be used in conjunction with other information for a levee certification determination for National Flood Insurance Program (NFIP) purposes if applicable. An Acceptable Corps inspection rating, alone, does not equate to a certifiable levee for the NFIP. It is recommended for levee systems currently accredited by the Federal Emergency Management Agency (FEMA) for NFIP purposes receiving a Corps Minimally Acceptable or Unacceptable rating, be evaluated by the levee owner to determine the potential impacts to the certification for FEMA.</p>	



**US Army Corps  
of Engineers®**

# Flood Damage Reduction Segment / System Public Sponsor Pre-Inspection Form

The following information is to be provided by the levee district sponsor prior to an inspection. This information will be used to help evaluate the organizational capability of the levee district to manage the levee segment / system maintenance program.

<b>1. Levee segment / system and district: (name of the segment / system and levee district)</b> Napa River, left bank - above Tulocay for CESP
<b>2. Reporting period: (month/day/year to month/day/year)</b>
<b>3. Summary of maintenance required by last inspection report:</b> None
<b>4. Summary of maintenance performed this reporting period:</b> Vegetation maintenance and animal control
<b>5. Summary of maintenance planned next reporting period:</b> Vegetation maintenance and animal control
<b>6. Summary of changes to segment / system since last inspection:</b> None
<b>7. Problems/ issues requiring the assistance of the US Army Corps of Engineers:</b> None



US Army Corps  
of Engineers®

Flood Damage Reduction Segment / System  
Inspection Report  
Napa River, left bank - above Tulocay

Pre-Inspection Form  
Page 1 of 2



# General Instructions for the Inspection of Flood Damage Reduction Segments / Systems

**A. Purpose of USACE Inspections:**

The primary purpose of these inspections is to prevent loss of life and catastrophic damages; preserve the value of Federal investments, and to encourage non-Federal sponsors to bear responsibility for their own protection. Inspections should assure that Flood Damage Reduction structures and facilities are continually maintained and operated as necessary to obtain the maximum benefits. Inspections are also conducted to determine eligibility for Rehabilitation Assistance under authority of PL 84-99 for Federal and non-Federal systems. (ER 1130-2-530, ER 500-1-1)

**B. Types of Inspections:**

The Corps conducts several types of inspections of Flood Damage Reduction systems, as outlined below:

Initial Eligibility Inspections	Continuing Eligibility Inspections	
	Routine Inspections	Periodic Inspections
IEIs are conducted to determine whether a non-Federally constructed Flood Damage Reduction system meets the minimum criteria and standards set forth by the Corps for initial inclusion into the Rehabilitation and Inspection Program.	RIs are intended to verify proper maintenance, owner preparedness, and component operation.	PIs are intended to verify proper maintenance and component operation and to evaluate operational adequacy, structural stability, and safety of the system. Periodic Inspections evaluate the system's original design criteria vs. current design criteria to determine potential performance impacts, evaluate the current conditions, and compare the design loads and design analysis used against current design standards. This is to be done to identify components and features for the sponsor that need to be monitored more closely over time or corrected as needed. (Periodic Inspections are used as the basis of risk assessments.)

**C. Inspection Boundaries:**

Inspections should be conducted so as to rate each Flood Damage Reduction "Segment" of the system. The overall system rating will be the lowest segment rating in the system.

Project	System	Segment
A flood damage reduction project is made up of one or more flood damage reduction systems which were under the same authorization.	A flood damage reduction system is made up of one or more flood damage reduction segments which collectively provide flood damage reduction to a defined area. Failure of one segment within a system constitutes failure of the entire system. Failure of one system does not affect another system.	A flood damage reduction segment is defined as a discrete portion of a flood damage reduction system that is operated and maintained by a single entity. A flood damage reduction segment can be made up of one or more features (levee, floodwall, pump stations, etc).

**D. Land Use Definitions:**

The following three definitions are intended for use in determining minimum required inspection intervals and initial requirements for inclusion into the Rehabilitation and Inspection Program. Inspections should be considered for all systems that would result in significant environmental or economic impact upon failure regardless of specific land use.

Agricultural	Rural	Urban
Protected population in the range of zero to 5 households per square mile protected.	Protected population in the range of 6 to 20 households per square mile protected.	Greater than 20 households per square mile; major industrial areas with significant infrastructure investment. Some protected urban areas have no permanent population but may be industrial areas with high value infrastructure with no overnight population.



**E. Use of the Inspection Report Template:**

The report template is intended for use in all Army Corps of Engineers inspections of levee and floodwall systems and flood damage reduction channels. The section of the template labeled "Initial Eligibility" only needs to be completed during Initial Eligibility Inspections of Non-Federally constructed Flood Damage Reduction Systems. The section labeled "General Items" needs to be completed with every inspection, along with all other sections that correspond to features in the system. The section labeled "Public Sponsor Pre-Inspection Report" is intended for completion before the inspection, if possible.

**F. Individual Item / Component Ratings:**

Assessment of individual components rated during the inspection should be based on the criteria provided in the inspection report template, though inspectors may incorporate additional items into the report based on the characteristics of the system. The assessment of individual components should be based on the following definitions.

Acceptable Item	Minimally Acceptable Item	Unacceptable Item
The inspected item is in satisfactory condition, with no deficiencies, and will function as intended during the next flood event.	The inspected item has one or more minor deficiencies that need to be corrected. The minor deficiency or deficiencies will not seriously impair the functioning of the item as intended during the next flood event.	The inspected item has one or more serious deficiencies that need to be corrected. The serious deficiency or deficiencies will seriously impair the functioning of the item as intended during the next flood event.

**G. Overall Segment / System Ratings:**

Determination of the overall system rating is based on the definitions below. Note that an Unacceptable System Rating may be either based on an engineering determination that concluded that noted deficiencies would prevent the system from functioning as intended during the next flood event, or based on the sponsor's demonstrated lack of commitment or inability to correct serious deficiencies in a timely manner.

Acceptable System	Minimally Acceptable System	Unacceptable System
All items or components are rated as Acceptable.	One or more items are rated as Minimally Acceptable or one or more items are rated as Unacceptable and an engineering determination concludes that the Unacceptable items would not prevent the segment / system from performing as intended during the next flood event.	One or more items are rated as Unacceptable and would prevent the segment / system from performing as intended, or a serious deficiency noted in past inspections (which had previously resulted in a minimally acceptable system rating) has not been corrected within the established timeframe, not to exceed two years.

**H. Eligibility for PL84-99 Rehabilitation Assistance:**

Inspected systems that are not operated and maintained by the Federal government may be Active in the Corps' Rehabilitation and Inspection Program (RIP) and eligible for rehabilitation assistance from the Corps as defined below:

If the Overall System Rating is Acceptable	If the Overall System Rating is Minimally Acceptable	If the Overall System Rating is Unacceptable
The system is active in the RIP and eligible for PL84-99 rehabilitation assistance.	The system is Active in the RIP during the time that it takes to make needed corrections. Active systems are eligible for rehabilitation assistance. However, if the sponsor does not present USACE with proof that serious deficiencies (which had previously resulted in a minimally acceptable system rating) were corrected within the established timeframe, then the system will become Inactive in the RIP.	The system is Inactive in the RIP, and the status will remain Inactive until the sponsor presents USACE with proof that all items rated Unacceptable have been corrected. Inactive systems are ineligible for rehabilitation assistance.

**I. Reporting:**

After the inspection, the Corps is responsible for assembling an inspection report (or a summary report if it was a Periodic Inspection) including the following information:

- a. All sections of the report template used during the inspection, including the cover and pre-inspection materials. (Supplemental data collected, and any sections of the template that weren't used during the inspection do not need to be included with the report.)
- b. Photos of the general system condition and noted deficiencies.
- c. A plan view drawing of the system, with stationing, to reference locations of items rated less than acceptable.
- d. The relative importance of the identified maintenance issues should be specified in the transmittal letter.
- e. If the Overall System Rating is Minimally Acceptable, the report needs to establish a timeframe for correction of serious deficiencies noted (not to exceed two years) and indicate that if these items are not corrected within the required timeframe, the system will be rated as Unacceptable and made Inactive in the Rehabilitation Inspection Program.

**J. Notification:**

Reports are to be disseminated as follows within 30 days of the inspection date.

<b>If the Overall System Rating is Acceptable</b>	<b>If the Overall System Rating is Minimally Acceptable</b>	<b>If the Overall System Rating is Unacceptable</b>
Reports need to be provided to the local sponsor and the county emergency management agency.	Reports need to be provided to the local sponsor, state emergency management agency, county emergency management agency, and to the FEMA region.	Reports need to be provided to the local sponsor, state emergency management agency, county emergency management agency, FEMA region, and to the Congressional delegation within 30 days of the inspection.

# General Items for All Flood Damage Reduction Segments / Systems

For use during all inspections of all Flood Damage Reduction Segments / Systems

Rated Item	Rating	Rating Guidelines		Location/Remarks/Recommendations
1. Operations and Maintenance Manuals	<b>A</b>	<b>A</b>	Levee Owner's Manual, O&M Manuals, and/or manufacturer's operating instructions are present.	Our current Operations and Maintenance Manual is kept in sponsor's office along with a digit copy kept on their server.
		<b>M</b>	Sponsor manuals are lost or missing or out of date; however, sponsor will obtain manuals prior to next scheduled inspection.	
		<b>U</b>	Sponsor has not obtained lost or missing manuals identified during previous inspection.	
2. Emergency Supplies and Equipment (A or M only)	<b>A</b>	<b>A</b>	The sponsor maintains a stockpile of sandbags, shovels, and other flood fight supplies which will adequately supply all needs for the initial days of a flood fight. Sponsor determines required quantity of supplies after consulting with inspector.	The District's Emergency Supplies and Equipment are located at 933 Water St. Supplies consist of sand bags, shovels, sand for the sand bags, chain saws, flash lights, barriers, a grip hoist, and other various flood fighting supplies.
		<b>M</b>	The sponsor does not maintain an adequate supply of flood fighting materials as part of their preparedness activities.	
3. Flood Preparedness and Training (A or M only)	<b>A</b>	<b>A</b>	Sponsor has a written system-specific flood response plan and a solid understanding of how to operate, maintain, and staff the FDR system during a flood. Sponsor maintains a list of emergency contact information for appropriate personnel and other emergency response agencies.	Annual flood fighting training program conducted by the CA Department of Water Resources at the Napa Sheriff's Department each fall.
		<b>M</b>	The sponsor maintains a good working knowledge of flood response activities, but documentation of system-specific emergency procedures and emergency contact personnel is insufficient or out of date.	

Key: A = Acceptable. M = Minimally Acceptable; Maintenance is required. U = Unacceptable. N/A = Not Applicable. FDR = Flood Damage Reduction



# Levee Embankments

For use during Initial and Continuing Eligibility Inspections of levee segments / systems

Rated Item	Rating	Rating Guidelines	Location/Remarks/Recommendations
1. Unwanted Vegetation Growth <sup>1</sup>	<b>A</b>	<b>A</b> The levee has little or no unwanted vegetation (trees, bush, or undesirable weeds), except for vegetation that is properly contained and/or situated on overbuilt sections, such that the mandatory 3-foot root-free zone is preserved around the levee profile. The levee has been recently mowed. The vegetation-free zone extends 15 feet from both the landside and riverside toes of the levee to the centerline of the tree. If the levee access easement doesn't extend to the described limits, then the vegetation-free zone must be maintained to the easement limits. Reference EM 1110-2-301 or Corps policy for regional vegetation variance.	Plantings that were observed on the PI were part of the original construction contract of the levee and have minimal risk the integrity of the levee.
		<b>M</b> Minimal vegetation growth (brush, weeds, or trees 2 inches in diameter or smaller) is present within the zones described above. This vegetation must be removed but does not currently threaten the operation or integrity of the levee.	
		<b>U</b> Significant vegetation growth (brush, weeds, or any trees greater than 2 inches in diameter) is present within the zones described above and must be removed to reestablish or ascertain levee integrity.	
2. Sod Cover	<b>NA</b>	<b>A</b> There is good coverage of sod over the levee.	
		<b>M</b> Approximately 25% of the sod cover is missing or damaged over a significant portion or over significant portions of the levee embankment. This may be the result of over-grazing or feeding on the levee, unauthorized vehicular traffic, chemical or insect problems, or burning during inappropriate seasons.	
		<b>U</b> Over 50% of the sod cover is missing or damaged over a significant portion or portions of the levee embankment.	
		<b>N/A</b> Surface protection is provided by other means.	
3. Encroachments	<b>A</b>	<b>A</b> No trash, debris, unauthorized farming activity, structures, excavations, or other obstructions present within the easement area. Encroachments have been previously reviewed by the Corps, and it was determined that they do not diminish proper functioning of the levee.	NLT1_2020_a_0001: Station_1 NA: Upstream end of levee segment.: No action required at this time. (A)
		<b>M</b> Trash, debris, unauthorized farming activity, structures, excavations, or other obstructions present, or inappropriate activities noted that should be corrected but will not inhibit operations and maintenance or emergency operations. Encroachments have not been reviewed by the Corps.	
		<b>U</b> Unauthorized encroachments or inappropriate activities noted are likely to inhibit operations and maintenance, emergency operations, or negatively impact the integrity of the levee.	
4. Closure Structures (Stop Log, Earthen Closures, Gates, or Sandbag)	<b>NA</b>	<b>A</b> Closure structure in good repair. Placing equipment, stoplogs, and other materials are readily available at all times. Components are clearly marked and installation instructions/ procedures readily available. Trial erections have been accomplished in accordance with the O&M Manual.	

Key: A = Acceptable. M = Minimally Acceptable; Maintenance is required. U = Unacceptable. N/A = Not Applicable. FDR = Flood Damage Reduction



# Levee Embankments

For use during Initial and Continuing Eligibility Inspections of levee segments / systems

Rated Item	Rating	Rating Guidelines		Location/Remarks/Recommendations
Closures) (A or U only)		U	Any of the following issues is cause for this rating: Closure structure in poor condition. Parts missing or corroded. Placing equipment may not be available within the anticipated warning time. The storage vaults cannot be opened during the time of inspection. Components of closure are not clearly marked and installation instructions/ procedures are not readily available. Trial erections have not been accomplished in accordance with the O&M Manual.	
		N/A	There are no closure structures along this component of the FDR segment / system.	
5. Slope Stability	A	A	No slides, sloughs, tension cracking, slope depressions, or bulges are present.	No slides, bulges or cracking observed during the PI.
		M	Minor slope stability problems that do not pose an immediate threat to the levee embankment.	
		U	Major slope stability problems (ex. deep seated sliding) identified that must be repaired to reestablish the integrity of the levee embankment.	
6. Erosion/ Bank Caving	A	A	No erosion or bank caving is observed on the landward or riverward sides of the levee that might endanger its stability.	NLT1_2020_a_0002: Station_1 NA: Station_2 NA: Drop in crown elevation for the last 200 feet.: Monitor. (A)
		M	There are areas where minor erosion is occurring or has occurred on or near the levee embankment, but levee integrity is not threatened.	
		U	Erosion or caving is occurring or has occurred that threatens the stability and integrity of the levee. The erosion or caving has progressed into the levee section or into the extended footprint of the levee foundation and has compromised the levee foundation stability.	
7. Settlement <sup>2</sup>	A	A	No observed depressions in crown. Records exist and indicate no unexplained historical changes.	No settlements were observed during the PI.
		M	Minor irregularities that do not threaten integrity of levee. Records are incomplete or inclusive.	
		U	Obvious variations in elevation over significant reaches. No records exist or records indicate that design elevation is compromised.	
8. Depressions/ Rutting	A	A	There are scattered, shallow ruts, pot holes, or other depressions on the levee that are unrelated to levee settlement. The levee crown, embankments, and access road crowns are well established and drain properly without any ponded water.	No rutting/depressions were observed during PI.
		M	There are some infrequent minor depressions less than 6 inches deep in the levee crown, embankment, or access roads that will pond water.	
		U	There are depressions greater than 6 inches deep that will pond water.	
9. Cracking	A	A	Minor longitudinal, transverse, or desiccation cracks with no vertical movement along the crack. No cracks extend continuously through the levee crest.	No cracking was observed during PI.
		M	Longitudinal and/or transverse cracks up to 6 inches in depth with no vertical movement along the crack. No cracks extend continuously through the levee crest. Longitudinal cracks are no longer than the height of the levee.	

Key: A = Acceptable. M = Minimally Acceptable; Maintenance is required. U = Unacceptable. N/A = Not Applicable. FDR = Flood Damage Reduction



# Levee Embankments

For use during Initial and Continuing Eligibility Inspections of levee segments / systems

Rated Item	Rating	Rating Guidelines	Location/Remarks/Recommendations
		<p><b>U</b> Cracks exceed 6 inches in depth. Longitudinal cracks are longer than the height of the levee and/or exhibit vertical movement along the crack. Transverse cracks extend through the entire levee width.</p>	
10. Animal Control	<b>A</b>	<p><b>A</b> Continuous animal burrow control program in place that includes the elimination of active burrowing and the filling in of existing burrows.</p>	No animal burrows were observed during the PI.
		<p><b>M</b> The existing animal burrow control program needs to be improved. Several burrows are present which may lead to seepage or slope stability problems, and they require immediate attention.</p>	
		<p><b>U</b> Animal burrow control program is not effective or is nonexistent. Significant maintenance is required to fill existing burrows, and the levee will not provide reliable flood protection until this maintenance is complete.</p>	
11. Culverts/ Discharge Pipes <sup>3</sup> (This item includes both concrete and corrugated metal pipes.)	<b>NA</b>	<p><b>A</b> There are no breaks, holes, cracks in the discharge pipes/ culverts that would result in significant water leakage. The pipe shape is still essentially circular. All joints appear to be closed and the soil tight. Corrugated metal pipes, if present, are in good condition with 100% of the original coating still in place (either asphalt or galvanizing) or have been relined with appropriate material, which is still in good condition. Condition of pipes has been verified using television camera video taping or visual inspection methods within the past five years, and the report for every pipe is available for review by the inspector.</p>	
		<p><b>M</b> There are a small number of corrosion pinholes or cracks that could leak water and need to be repaired, but the entire length of pipe is still structurally sound and is not in danger of collapsing. Pipe shape may be ovalized in some locations but does not appear to be approaching a curvature reversal. A limited number of joints may have opened and soil loss may be beginning. Any open joints should be repaired prior to the next inspection. Corrugated metal pipes, if present, may be showing corrosion and pinholes but there are no areas with total section loss. Condition of pipes has been verified using television camera video taping or visual inspection methods within the past five years, and the report for every pipe is available for review by the inspector.</p>	
		<p><b>U</b> Culvert has deterioration and/or has significant leakage; it is in danger of collapsing or as already begun to collapse. Corrugated metal pipes have suffered 100% section loss in the invert. <b>HOWEVER:</b> Even if pipes appear to be in good condition, as judged by an external visual inspection, an Unacceptable Rating will be assigned if the condition of pipes has not been verified using television camera video taping or visual inspection methods within the past five years, and reports for all pipes are not available for review by the inspector.</p>	
		<p><b>N/A</b> There are no discharge pipes/ culverts.</p>	
12. Riprap Revetments &	<b>NA</b>	<p><b>A</b> No riprap displacement or stone degradation that could pose an immediate threat to the integrity of channel bank. Riprap intact with no woody vegetation present.</p>	

Key: A = Acceptable. M = Minimally Acceptable; Maintenance is required. U = Unacceptable. N/A = Not Applicable. FDR = Flood Damage Reduction



# Levee Embankments

For use during Initial and Continuing Eligibility Inspections of levee segments / systems

Rated Item	Rating	Rating Guidelines		Location/Remarks/Recommendations
Bank Protection		<b>M</b>	Minor riprap displacement or stone degradation that could pose an immediate threat to the integrity of the channel bank. Unwanted vegetation must be cleared or sprayed with an appropriate herbicide.	
		<b>U</b>	Significant riprap displacement, exposure of bedding, or stone degradation observed. Scour activity is undercutting banks, eroding embankments, or impairing channel flows by causing turbulence or shoaling. Rock protection is hidden by dense brush, trees, or grasses.	
		<b>N/A</b>	There is no riprap protecting this feature of the segment / system, or riprap is discussed in another section.	
13. Revetments other than Riprap	<b>NA</b>	<b>A</b>	Existing revetment protection is properly maintained, undamaged, and clearly visible.	
		<b>M</b>	Minor revetment displacement or deterioration that does not pose an immediate threat to the integrity of the levee. Unwanted vegetation must be cleared or sprayed with an appropriate herbicide.	
		<b>U</b>	Significant revetment displacement, deterioration, or exposure of bedding observed. Scour activity is undercutting banks, eroding embankments, or impairing channel flows by causing turbulence or shoaling. Revetment protection is hidden by dense brush and trees.	
		<b>N/A</b>	There are no such revetments protecting this feature of the segment / system.	
14. Underseepage Relief Wells/ Toe Drainage Systems	<b>NA</b>	<b>A</b>	Toe drainage systems and pressure relief wells necessary for maintaining FDR segment / system stability during high water functioned properly during the last flood event and no sediment is observed in horizontal system (if applicable). Nothing is observed which would indicate that the drainage systems won't function properly during the next flood, and maintenance records indicate regular cleaning. Wells have been pumped tested within the past 5 years and documentation is provided.	
		<b>M</b>	Toe drainage systems or pressure relief wells are damaged and may become clogged if they are not repaired. Maintenance records are incomplete or indicate irregular cleaning and pump testing.	
		<b>U</b>	Toe drainage systems or pressure relief wells necessary for maintaining FDR segment / system stability during flood events have fallen into disrepair or have become clogged. No maintenance records. No documentation of the required pump testing.	
		<b>N/A</b>	There are no relief wells/ toe drainage systems along this component of the FDR segment / system.	
15. Seepage	<b>A</b>	<b>A</b>	No evidence or history of unrepaired seepage, saturated areas, or boils.	No observations of seepage, boils or saturated areas were observed during the PI.
		<b>M</b>	Evidence or history of minor unrepaired seepage or small saturated areas at or beyond the landside toe but not on the landward slope of levee. No evidence of soil transport.	
		<b>U</b>	Evidence or history of active seepage, extensive saturated areas, or boils.	

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# Levee Embankments

## For use during Initial and Continuing Eligibility Inspections of levee segments / systems

<sup>1</sup> If there is significant growth on the levee that inhibits the inspection of animal burrows or other items, the inspection should be ended until this item is corrected.

<sup>2</sup> Detailed survey elevations are normally required during Periodic Inspections, and whenever there are obvious visual settlements.

<sup>3</sup> The decision on whether or not USACE inspectors should enter a pipe to perform a detailed inspection must be made at the USACE District level. This decision should be made in conjunction with the District Safety Office, as pipes may be considered confined spaces. This decision should consider the age of the pipe, the diameter of the pipe, the apparent condition of the pipe, and the length of the pipe. If a pipe is entered for the purposes of inspection, the inspector should record observations with a video camera in order that the condition of the entire pipe, including all joints, can later be assessed. Additionally, the video record provides a baseline to which future inspections can be compared.

Key: A = Acceptable. M = Minimally Acceptable; Maintenance is required. U = Unacceptable. N/A = Not Applicable. FDR = Flood Damage Reduction



US Army Corps  
of Engineers®

**Flood Damage Reduction Segment / System  
Inspection Report  
Napa River, left bank - above Tulocay**

**Levee Embankments  
Page 5 of 7**

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**Inspect ID:** NLT1\_2020\_a\_0001 **Title:** USACE\_CESPN\_NLT1\_2020\_a\_0001\_1.jpg  
**Rated Item:** 3. Encroachments **Caption:** Rating: Acceptable; Remarks: Upstream end of levee segment.; Action: No action required at this time.



**Inspect ID:** NLT1\_2020\_a\_0002 **Title:** USACE\_CESPN\_NLT1\_2020\_a\_0002\_1.jpg  
**Rated Item:** 6. Erosion/ Bank Caving **Caption:** Rating: Acceptable; Remarks: Drop in crown elevation for the last 200 feet.; Action: Monitor.



# Levee Embankments

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**Inspect ID:** NLT1\_2020\_a\_0002 **Title:** USACE\_CESPN\_NLT1\_2020\_a\_0002\_2.jpg  
**Rated Item:** 6. Erosion/ Bank Caving **Caption:** Rating: Acceptable; Remarks: Drop in crown elevation for the last 200 feet.; Action: Monitor.



122°17'0"W

122°16'40"W

38°17'20"N

38°17'20"N



**2020 Levee Inspection**  
 Napa River above  
 Tulocay Creek, California  
 Pg. 1 of 1  
 Bank: Left

**Legend**

**Point Features**

- Rating:**
- Unacceptable
  - Minimally Acceptable
  - Acceptable
  - N/A

**Line Features**

- Rating:**
- Unacceptable
  - Minimally Acceptable
  - Acceptable
  - Centerline

0 30 60 120 180 240 Feet

**US Army Corps of Engineers**  
 Walla Walla District

CREATED BY: Nathan DeLannoy  
 LAST UPDATED BY: g4ecndid  
 MAP ID: MND\_NLT1\_DDP.mxd  
 DATE: 09/22/20  
 COORDINATE SYSTEM: GCS North American 1983  
 Datum: North American 1983  
**DISCLAIMER**  
 This product was produced from geospatial information by the U.S. Army Corps of Engineers. Geospatial data and products may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised, etc. Using this product for purposes other than those for which it was intended may yield inaccurate or misleading results. The U.S. Army Corps of Engineers assumes no liability for correctness or accuracy, and reserves the right to correct, update, or modify geospatial data and/or products without notification.

122°17'0"W

122°16'40"W

**Appendix C**

**2014 Geotechnical Design Documentation Report**

**DRAFT - Not included due to size**

**Appendix D**

**Napa River H&H Memo For Record**

Draft - Not included due to size

**Appendix E**

**District Quality Control Document**

Napa River, Left bank above Tulocay Creek Periodic Inspection Report No. 1 - District Quality Control

Reviewer Yvonne Palmer, PE  
 Designer Seth Esisele

Cmt No.	Section	Comment	Review Date	Response	Backcheck Date
1	1.1	Use full levee name with caps	11/18/2020	concur	11/20/2020
2	1.2	Use same description as the other projects	11/18/2020	concur	11/20/2020
3	3.1	Elevations on dwgs are in NGVD29	11/18/2020	concur	11/20/2020
4	3.1	Add average height of levee	11/18/2020	concur	11/20/2020
5	3.1	use upstream/downstream instead of north/south	11/18/2020	concur	11/20/2020
6	Cost	Remove contract number	11/18/2020	concur	11/20/2020
7	pg 8	Change map to the new one in other reports	11/18/2020	concur	11/20/2020
8	Pg 9	new levee raise is not pertinent to this report	11/18/2020	concur	11/20/2020
9	Fig 3-2	Remove or clear up the text	11/18/2020	concur	11/20/2020
10	pg 11	Add description for typical levee section	11/18/2020	concur	11/20/2020
11	5.3	Encroachments: This is the downstream end, not upstream	11/18/2020	concur	11/20/2020
12	Table 6-1	Title should be embankments	11/18/2020	concur	11/20/2020

**ITR Review Comments - all concur**

**NAPA RIVER LEFT BANK  
 ABOVE TULOCAY CREEK  
 LEVEE SYSTEM**

NAPA RIVER/NAPA CREEK FLOOD PROTECTION PROJECT  
 NAPA, CALIFORNIA  
 NLD SYSTEM ID NO. 5305000080; SEGMENT ID NO. 5304000080

PERIODIC INSPECTION REPORT NO. 1  
 SEPTEMBER 2020



  
 US Army Corps  
 of Engineers  
 San Francisco District

6 comments

PAGE 9 1

**I3etejmc** Nov 23  
 Highlighted Text

PAGE 16 2

**I3etejmc** Nov 24  
 Add the levee section name like others.

**I3etejmc** Nov 23  
 Highlighted Text

PAGE 18 1

**I3etejmc** Nov 23  
 How high or what was the percentage of the levee that was loaded during the largest flow of December 2005?

PAGE 26 1

**I3etejmc** Nov 24  
 Not Clear. What is the downstream end of levee segment has to do with encroachment?

PAGE 33 1

**I2eddbms** Mar 20  
**RECORD DRAWING:**