APPENDIX A

Hydraulic Impact Analysis

SACRAMENTO AREA FLOOD CONTROL AGENCY

NATOMAS LEVEE IMPROVEMENT PROGRAM

SUMMARY REPORT ON HYDRAULIC IMPACT ANALYSES

Prepared for

Sacramento Area Flood Control Agency

Prepared by

MBK ENGINEERS
2450 Alhambra Blvd., 2nd Floor
Sacramento, CA 95817
916/456-4400 (phone) • 916/456-0253 (fax)

April 22, 2008

REGISTERED PROFESSIONAL ENGINEER
Michael C. Archer
No. C 040485
Exp. 03/31/09
Civil
STATE OF CALIFORNIA

TABLE OF CONTENTS

1. **Overview** 1
2. **SRFCP System Background** 2
3. **Approach to Modeling Analysis** 4
4. **Results of Modeling Analysis** 7
5. **Support of Impact Analysis Methodology** 14
6. **NLIP Coordination with Regional Improvements** 16
7. **Conclusion** 16

LIST OF TABLES

1. **Definition of Model Assumptions for Various Conditions**
2. **Levee Failure Summary**
3. **100-year Maximum Water Surface Elevation Summary, Levees Fail When Water Reaches Top of Levee**
4. **200-year Maximum Water Surface Elevation Summary, Levees Fail When Water Reaches Top of Levee**
5. **500-year Maximum Water Surface Elevation Summary, Levees Fail When Water Reaches Top of Levee**
6. **100-year Maximum Water Surface Elevation Summary, No Levee Failures**
7. **200-year Maximum Water Surface Elevation Summary, No Levee Failures**
8. **500-year Maximum Water Surface Elevation Summary, No Levee Failures**
9. **Extent of Levee Overtopping, 500-year Flood Event, No Failures**

LIST OF FIGURES

1. **Sacramento River Flood Control System Map**
2. **Sacramento River UNET Model Extents**
3. **Natomas Levee Improvement Program Study Area**
4. **Water Surface Profile – Model Calibration vs. 1997 Flood Event High Water Marks**
5. **Water Surface Profile – USACE SRFCP 1957 Design Profile, Sacramento River Natomas Reach**
6. **Water Surface Profile – USACE SRFCP 1957 Design Profile, Natomas Cross Canal**
7. **Water Surface Profile – 100-year, Sacramento River Natomas Reach**
8. **Water Surface Profile – 100-year, Natomas Cross Canal**
9. **Water Surface Profile – 200-year, Sacramento River Natomas Reach**
10. **Water Surface Profile – 200-year, Natomas Cross Canal**
11. **Water Surface Profile – 500-year, Sacramento River Natomas Reach**
12. **Water Surface Profile – 500-year, Natomas Cross Canal**

1. OVERVIEW

The Sacramento Area Flood Control Agency (SAFCA) is proposing to raise and strengthen portions of the federal project levee system protecting the Natomas Basin in Sacramento and Sutter Counties in order to provide urban development in the basin with at least a 100-year level of flood protection as quickly as possible while laying the groundwork for providing at least a 200-year level of flood protection over time. This effort is referred to as the Natomas Levee Improvement Program (or "NLIP"). It is part of a larger program of improvements, including modifications to Folsom Dam that would provide the Sacramento area as a whole with at least a 200-year level of flood protection.

Under applicable federal law, no federal project levee or related flood control facility may be altered unless: Congress has authorized the alteration; or, pursuant to 33 U.S.C. 408, the Secretary of the Army acting through the Chief of Engineers of the U.S. Army Corps of Engineers ("USACE") has granted permission for the alteration based on a determination that the proposed work will not be injurious to the public interest and will not otherwise impair the usefulness of the affected facility. Under Title 23 of the California Water Code, such alterations must also be: authorized by the State Legislature; or permitted by the California Central Valley Flood Protection Board ("Board"), formerly the Reclamation Board. In order to coordinate these federal and state decision-making processes, the Board's recent practice has been to issue a letter to the USACE requesting permission for proposed alterations after the Board has made its own determination that the work will not have a detrimental impact on the affected flood control system.

At the heart of both processes is an analysis of the hydraulic effects of the proposed alteration. SAFCA has historically conducted this analysis by evaluating the potential effects of its levee improvement projects on water surface elevations in the stream and river channels in the project area and in the larger watershed within which the project is situated. This approach was used to evaluate the flood related impacts of the NLIP for purposes of meeting the requirements of the California Environmental Quality Act (CEQA). Specifically, SAFCA's engineering consultant, MBK Engineers ("MBK"), has used a UNET hydraulic computer model of the Sacramento River Flood Control Project ("SRFCP"), which was approved in 2006 by the USACE Sacramento District, to compare existing conditions in the waterways surrounding the Natomas Basin and in the larger SRFCP with and without the NLIP improvements and the other improvements comprising the 200-year flood protection program for the Sacramento area. MBK's initial routings assumed that the levees outside the project area would fail when overtopped. However, in order to test the sensitivity of this assumption, a later set of routings was performed assuming that none of these levees would fail even if overtopped (as several were overtopped in the 200-year model runs).

The results of the initial routings were presented in the program-level Environmental Impact Report ("EIR") on Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area, which was certified by the SAFCA Board of Directors in February 2007. Using the same methodology, the analysis was performed again and presented in the Draft EIR for the NLIP Landside Improvements Project in September 2007. The 'no levee failure' routings were performed thereafter and presented in the Landside Improvements Final EIR

which was certified by the SAFCA Board in November 2007. The modeling showed that the proposed NLIP improvements by themselves would not alter any of the identified water surface elevations in the river channels comprising the SRFCP. Moreover, when the NLIP improvements are analyzed as part of the larger 200-year flood protection program for the Sacramento area, including modifications to Folsom Dam, the result is a lowering of water surface elevations for the 100-year and 200-year floods along the lower Sacramento River for most of the reach adjacent to the Natomas Basin. On this basis, SAFCA has concluded that the NLIP improvements would not cause any significant hydraulic impacts.

This report is a summary of the previous hydraulic impact analyses conducted for the NLIP. The report also presents new information requested by the USACE as part of their National Environmental Policy Act (NEPA) compliance for review of the proposed levee alterations.

2. SRFCP SYSTEM BACKGROUND

The perimeter levee system around the Natomas Basin is part of a larger integrated system of levees, dams, and bypass channels comprising the SRFCP (Figure 1). This system encompasses five historic flood basins in the Sacramento Valley (Colusa, Sutter, Feather, Yolo and American Flood Basins) and the sub-basins contained therein. Planning, design, and construction of the SRFCP has been ongoing since the early 1900s under the leadership of the USACE and the State of California (State), with local levee and reclamation districts playing the principal role in operating and maintaining the system.

The SRFCP levees were set close to the river channel in order to improve navigation by having the rivers scour hydraulic mining sediments. The design of the system assumed no levee failures but included five engineered diversions and one natural overflow diversion. The natural diversion is to Butte Basin, which is upstream from the SRFCP levees. This diversion did not include flowage easements because the Butte Basin is a historic flood basin. The five engineered diversions include two additional diversions to Butte Basin (Moulton and Colusa Weirs), one diversion to the Sutter Bypass (Tisdale Weir), and two diversions to the Yolo Bypass (Fremont and Sacramento Weirs). All of the engineered diversions included the acquisition of property rights to support the diversions. The deliberate planning, construction, and maintenance of the diversions assured that they would function during flood conditions and serve as reliable features of the flood project.

Initially, the river channel and bypass levees in each segment of the system were constructed based on a standard geometry. The levees were designed with a predetermined freeboard allowance tied to specified flows and associated water surface elevations generally matched to observed conditions during the 1907 and 1909 floods. Over time, the standard levee section was increased because of numerous levee failures. The minimum standard levee changed from a levee with a top width of 10 feet to one with a top width of 20 feet. In addition, the design flows were modified substantially on the Feather and American Rivers. This was the result of floods that occurred after 1909, which demonstrated these rivers could produce substantially greater flows than occurred during the 1907 and 1909 floods. Because numerous levee failures occurred along the Feather River levees between 1920 and 1934, these levees were set back and enlarged

to accommodate greater flows. These changes were summarized in memorandums issued by the USACE which define the minimum freeboard requirements for each segment of the SRFCP, collectively referred to as the "USACE 1957 Profile." Over the years, the system capacity of the SRFCP was also greatly expanded by the construction of five major multiple-purpose reservoirs (Shasta, Black Butte, Oroville, New Bullards Bar, and Folsom Reservoirs) containing 2.7 million acre-feet of dedicated flood control storage space.

The record floods of 1986 and 1997 triggered additional system modifications. Although these floods were significantly larger than the 1907 and 1909 floods, the availability of reservoir storage largely prevented flows in the system from exceeding the design of the SRFCP. Nevertheless, numerous project levees experienced unexpectedly severe stress and some failed. This experience caused the USACE, the State, and their local partners to perform a series of geotechnical evaluations on the SRFCP's levees and to adopt new, more rigorous levee design standards for urban areas, including updated standards for seepage through and under project levees. To meet these standards, USACE, the State, and local flood control agencies have made substantial investments in addressing identified deficiencies in levees throughout the SRFCP and in improving the level of flood protection provided by the levees, particularly in urban areas. Federal, State and local support for these levee improvements has been secured under several federally authorized projects, including the Sacramento Urban Levee Reconstruction Project, the American River Watershed Investigation, the West Sacramento Levee Improvement Project, the Sutter Basin Project and the Yuba River Basin Project. In the aftermath of the flooding of New Orleans, these authorized projects are being expanded to support an even broader scope of urban levee improvement activity.

The evolution of these urban levee improvements is occurring within a SRFCP management framework that has historically allowed necessary adaptations to the system without undermining its basic operational principles. These principles may be summarized as follows. First, the SRFCP is not intended to provide a uniform level of flood protection (statistical probability of flooding) to the various sub-basins within the protected area. Rather, each sub-basin is protected by levees that are required to at least meet the SRFCP's minimum geometrical standards, including freeboard reflecting the water surface profile prescribed for that segment of the system. Second, each sub-basin's flood protection is dependent on the fitness of its own levees and not on the condition (or failure) of any other sub-basin's levees. Accordingly, each sub-basin has the right to keep its levees in the fittest possible condition to ensure that these levees will perform as reliably as possible in a flood. This right ensures the orderly operation and maintenance of the system since even the most modest levee work has the potential to trigger a "transfer of risk" from one sub-basin to another, at least in theory, and there are no data or modeling tools available to quantify such transfers of risk, assess their significance, or determine how they might be mitigated. Third, for this reason, the administration of the SRFCP has historically relied on "change in design water surface elevation" as the guideline for evaluating the effects of any proposed levee work.

The strictest scrutiny is given to levee work involving physical changes in the geometry of the river channel since these changes have the most potential to alter water surface elevations prescribed by the "USACE 1957" water surface profiles. This work includes placement of fill or construction of structures in the floodway, construction of new levees, relocation of existing

levees, excavation within the floodway, construction of large berms for protecting riverbanks, raising an existing levee (waterside raise), construction of a new bypass, and planting of vegetation within the floodway. Landside levee work of the type proposed as part of the NLIP, such as placing a cutoff wall in a levee, adding a seepage berm to a levee, placing a field of seepage relief wells along a levee, raising a levee (landside raise), widening a levee (increased top width), and relocating a seepage ditch, is also strictly scrutinized but is not likely to cause impacts.

The standard procedure for this evaluation is to use hydrologic and hydraulic computer modeling tools such as, HEC-1, HEC-2, UNET, HEC-RAS, RMA2, FESWMS, etc. The analysis consists of calibrating the hydraulic model to historic flood events using high-water marks and stream gage data. The calibration activity is normally conducted on a system-wide basis instead of a site-specific basis. However, data available for computer model calibration can be sparse or nonexistent. In addition, assumptions must be made regarding reservoir operations. Because all of the reservoirs that contribute to the operation of the SRFCP (Shasta, Black Butte, Oroville, New Bullards Bar and Folsom) are governed by water control manuals issued by USACE, current reservoir operations are assumed to continue except where it is reasonably foreseeable that the current operation would change. Examples of such changes are at the Folsom Dam and Reservoir: where Congress has directed USACE to formalize the variable space storage operation that has been in effect by agreement between SAFCA and the U.S. Bureau of Reclamation since 1995; and where water control structures are being modified as part of the Folsom Dam Joint Federal Project.

3. APPROACH TO MODELING ANALYSIS

As discussed above, in order to evaluate the hydraulic impacts of the levee alterations proposed as part of the NLIP, MBK used a UNET hydraulic computer model calibrated to historic flood events using high-water marks and stream gage data gathered in connection with the 1997 Flood. Figure 2 displays the geographical extent of the UNET model. Figure 3 provides the UNET model river mile stationing around the Natomas Basin. The results of the calibration model output compared to the high water mark and stream gage data are shown on Figure 4.

The hydraulic impacts of the levee alterations proposed as part of the NLIP were evaluated based on the potential of the proposed levee alterations to increase one or more of the SRFCP's recognized design water surface elevations: (1) the "USACE 1957" water surface profiles that serve as the minimum design standard for the SRFCP; (2) the 100-year flood elevations that govern management of SRFCP protected floodplains under the National Flood Insurance Program (33 CFR. 65.10); and (3) the 200-year water surface elevations that are likely to govern implementation of floodplain management standards recently adopted by the State Legislature (Statutes of 2008, Chapter 364 [adding Water Code Section 9602(i)]). In addition, SAFCA has provided information on the project impacts to the 500-year flood elevation. This flood represents the extreme limit of the flows that could reach the NLIP project area.

The modeling runs compare the "Existing", "Without Project" and "With Project" conditions under each of the above flood scenarios. The Existing Condition analysis provides an evaluation

of the levee and reservoir system as it exists in April 2008. The Without Project condition assumes implementation of federally authorized improvements to Folsom Dam and anticipated improvements to the levees protecting existing urban areas outside the Natomas Basin (American River Basin, West Sacramento, Yuba Basin and Sutter Basin) so as to provide these areas with 200-year flood protection. The With Project condition adds the improvements proposed as part of the NLIP to the Without Project condition.

In order to compare these conditions, assumptions about the performance of SRFCP levees under flow conditions that exceed the design of the levee system are necessary for the 100-year, 200-year and 500-year floods. As noted above, the design of the SRFCP was not historically based on assumed levee failures. For floods exceeding the design of the SRFCP, it is improbable to assume that no levees will fail even in extreme floods that would cause vast lengths of levee overtopping throughout the system. Therefore, these floods have been modeled assuming that failure will occur when the water reaches the top of the levee. However, in order to test the sensitivity of this approach, and in order to model a scenario that resembles the SRFCP's "no basin relies on another basin's failure for protection" tenet, a secondary "no levee failure" scenario has also been modeled. Under this scenario it is assumed that SRFCP levees that do not currently meet the minimum freeboard requirements of the SRFCP are raised to meet the minimum levee standard and that levees, which are overtopped under any of the targeted flood conditions will not fail. The assumptions supporting these modeling scenarios are summarized in Table 1.

Table 1. Definition of model assumptions for various conditions

Condition	Top of Levee Assumption	Levee Failure Assumption	Reservoir Ops Assumption
Existing	Existing top of levee grade April 2008	Levees fail when water reaches the top of the levee	Existing reservoirs and current (2008) operation criteria
Without Project	Same as Existing with the following changes. Federally authorized improvements to Folsom Dam are implemented and urban area levees outside the Natomas Basin are assumed to have levees at 200-year water surface + 3 feet of freeboard. NLIP levees same as Existing Condition.	Levees fail when water reaches the top of levee.	Same as Existing except Folsom Dam will be operated in accordance with the Joint Federal Project currently under construction
With Project	Same as Without Project except NLIP levees raised to design level	Same as Without Project	Same as Without Project
Without Project Sensitivity Analysis	Same as Without Project except that SRFCP levees with top elevations below SRFCP design standard are assumed to be raised to meet this standard	No levee failures	Same as Without Project
With Project Sensitivity Analysis	Same as With Project except that SRFCP levees with top elevations below SRFCP design standard are assumed to be raised to meet this standard	No levee failures	Same as Without Project

As noted above, the Without Project condition assumes that urban areas (outside the Natomas Basin) will be provided with 200-year protection. This is the most likely near term future condition of the levee system based on the information currently available. This condition is reasonable based on California voters November 2006 approval of a bond measure that would provide over $3 billion for urban levee improvements in the Central Valley. Additionally, in September 2007 the State Legislature enacted the Central Valley Flood Protection Act of 2008 (Act), Water Code Section 9600 et seq., which was signed into law by the governor in October 2007. The Act is based on the following findings:

- The Central Valley of California is experiencing unprecedented development, resulting in the conversion of historically agricultural lands and communities to densely populated residential and urban centers.

- The legislature recognizes that by their nature, levees, which are earthen embankments typically founded on fluvial deposits, cannot offer complete protection from flooding, but can decrease its frequency.

- The legislature recognizes that the level of flood protection afforded rural and agricultural lands by the original flood control system would not be adequate to protect those lands if they are developed for urban uses, and that a dichotomous system of flood protection for urban and rural lands has developed through many years of practice.

- The legislature further recognizes that levees built to reclaim and protect agricultural land may be inadequate to protect urban development unless those levees are significantly improved.

- Cities and counties rely upon federal floodplain information when approving developments, but the information available is often out of date and the flood risk may be greater than that indicated using available federal information.

- The legislature recognizes that the current federal flood standard is not sufficient to protect urban and urbanizing areas within flood prone areas throughout the Central Valley.

  (Statutes of 2007, Chapter 364, Section 9.)

Based on these findings, the Act embraces a new flood protection standard for urban areas (defined as “developed areas in which there are 10,000 residents or more”) located in levee protected floodplains in the Central Valley. This new “urban level of flood protection” is defined as “the level of protection that is necessary to withstand flooding that has a 1-in-200 chance of occurring in any given year using criteria consistent with, or developed by, the Department of Water Resources.” (Statutes of 2007, Chapter 364 [adding Water Code Section 9602(i)]).

4. RESULTS OF MODELING ANALYSIS

The flood routings described herein indicate that under the Existing condition, all SRFCP levees would contain the USACE 1957 design flood profile. The 100-year flood would overtop some non-urban levees but this flood would be contained by all urban levees under the Existing condition. The 200-year flood would generate multiple levee overtopping locations in several non-urban areas under both the Existing and Without Project conditions and along the Lower American River under the Existing condition. However, this flood would be effectively contained under both the Existing and Without Project conditions by all existing urban levees outside the American River basin, including the levees around the Natomas Basin. The 500-year flood would cause massive levee overtopping affecting all segments of the system under the Existing and Without Project conditions. Only West Sacramento and the Natomas Basin would avoid overtopping under these conditions with upstream levee failures. Table 2 provides a summary of these conditions.

Table 2. Levee Failure Summary (Number of Levee Failures)

Condition	Design Flood			
	USACE 1957 Design	100-year	200-year	500-year
Existing	0	3	36	65
Without Project	0	3	18	75
With Project	0	3	16	74

Tables 3, 4 and 5 summarize the maximum water surface elevations at several locations in and around the project area for the Existing, Without Project, and With Project conditions for the 100-year, 200-year and 500-year flood events, respectively.

Table 3. 100-year Maximum Water Surface Elevation Summary, Levees Fail When Water Reaches Top of Levee

Location (Comp Study River Mile)	Maximum Water Surface Elevation (ft NGVD29)			Change (ft)	
	Existing	Without Project	With Project	Existing to Without Project	Without Project to With Project
Sacramento River					
at Knight's Landing (90.22)	41.46	41.46	41.46	0	0
at Fremont Weir, west end (84.75)	40.16	40.17	40.17	+0.01	0
At Natomas Cross Canal (79.21)	40.20	40.19	40.19	-0.01	0
at I-5 (71.00)	35.79	35.72	35.72	-0.07	0
at Sacramento Bypass (63.82)	31.68	30.80	30.80	-0.88	0
at NEMDC (61.0)	32.15	31.29	31.29	-0.86	0
at I St. (59.695)	31.88	31.02	31.02	-0.86	0
at Freeport Bridge (46.432)	25.64	24.90	24.90	-0.74	0
Natomas Cross Canal					
u/s Hwy 99/70 (4.82)	40.44	40.37	40.37	-0.07	0
Pleasant Grove Creek Canal					
at Sankey Rd. (3.65)	40.38	40.36	40.36	-0.02	0
at Fifield Rd. (1.49)	40.48	40.44	40.45	-0.04	+0.01
Feather River					
at Nicolaus Gage (8.00)	48.53	48.53	48.53	0	0
Yolo Bypass					
at Woodland Gage (51.10)	32.65	32.59	32.59	-0.06	0
American River					
at H St. (6.471)	43.05	40.70	40.70	-2.35	0

Table 4. 200-year Maximum Water Surface Elevation Summary, Levees Fail When Water Reaches Top of Levee

Location (Comp Study River Mile)	Maximum Water Surface Elevation (ft NGVD29)			Change (ft)	
	Existing	Without Project	With Project	Existing to Without Project	Without Project to With Project
Sacramento River					
at Knight's Landing (90.22)	41.68	41.70	41.70	+0.02	0
at Fremont Weir, west end (84.75)	40.93	40.97	40.97	+0.04	0
At Natomas Cross Canal (79.21)	41.03	41.04	41.04	+0.01	0
at I-5 (71.00)	37.37	36.63	36.63	-0.74	0
at Sacramento Bypass (63.82)	35.33	32.59	32.59	-2.74	0
at NEMDC (61.0)	36.35	33.10	33.10	-3.25	0
at I St. (59.695)	36.02	32.82	32.82	-3.2	0
at Freeport Bridge (46.432)	28.49	26.48	26.48	-2.01	0
Natomas Cross Canal					
u/s Hwy 99/70 (4.82)	41.01	41.06	41.06	+0.05	0
Pleasant Grove Creek Canal					
at Sankey Rd. (3.65)	41.00	41.01	41.03	+0.01	+0.02
at Fifield Rd. (1.49)	41.07	41.09	41.10	+0.02	+0.01
Feather River					
at Nicolaus Gage (8.00)	50.15	50.16	50.16	+0.01	0
Yolo Bypass					
at Woodland Gage (51.10)	33.68	33.60	33.60	-0.08	0
American River					
at H St. (6.471)	46.49	44.23	44.23	-2.26	0

Table 5. 500-year Maximum Water Surface Elevation Summary, Levees Fail When Water Reaches Top of Levee

Location (Comp Study River Mile)	Maximum Water Surface Elevation (ft NGVD29)			Change (ft)	
	Existing	Without Project	With Project	Existing to Without Project	Without Project to With Project
Sacramento River					
at Knight's Landing (90.22)	41.63	41.68	41.68	+0.05	0
at Fremont Weir, west end (84.75)	40.86	40.92	40.93	+0.06	+0.01
At Natomas Cross Canal (79.21)	41.01	40.99	40.99	-0.02	0
at I-5 (71.00)	37.68	37.58	37.58	-0.10	0
at Sacramento Bypass (63.82)	35.63	35.36	35.37	-0.27	+0.01
at NEMDC (61.0)	36.66	36.34	36.34	-0.32	0
at I St. (59.695)	36.33	36.02	36.02	-0.31	0
at Freeport Bridge (46.432)	28.69	28.56	28.56	-0.13	0
Natomas Cross Canal					
u/s Hwy 99/70 (4.82)	41.33	41.30	41.31	-0.03	+0.01
Pleasant Grove Creek Canal					
at Sankey Rd. (3.65)	41.71	41.73	41.75	+0.02	+0.02
at Fifield Rd. (1.49)	41.73	41.77	41.78	+0.04	+0.01
Feather River					
at Nicolaus Gage (8.00)	50.12	50.10	50.10	-0.02	0
Yolo Bypass					
at Woodland Gage (51.10)	33.75	33.63	33.63	-0.12	0
American River					
at H St. (6.471)	46.54	47.90	47.90	+1.36	0

Tables 6, 7 and 8 present the same information as Tables 4, 5 and 6 but for the Sensitivity analyses.

Table 6. 100-year Maximum Water Surface Elevation Summary, No Levee Failures (Sensitivity Analysis)

Location (Comp Study River Mile)	Maximum Water Surface Elevation (ft NGVD29)		Change (ft.)
	Without Project	With Project	Without Project to With Project
Sacramento River			
at Knight's Landing (90.22)	42.10	42.10	0
at Fremont Weir, west end (84.75)	40.90	40.90	0
At Natomas Cross Canal (79.21)	41.45	41.45	0
at I-5 (71.00)	36.90	36.90	0
at Sacramento Bypass (63.82)	31.45	31.45	0
at NEMDC (61.0)	32.02	32.02	0
at I St. (59.695)	31.74	31.74	0
at Freeport Bridge (46.432)	25.54	25.54	0
Natomas Cross Canal			
u/s Hwy 99/70 (4.82)	41.50	41.50	0
Pleasant Grove Creek Canal			
at Sankey Rd. (3.65)	41.37	41.37	0
at Fifield Rd. (1.49)	41.50	41.50	0
Feather River			
at Nicolaus Gage (8.00)	48.90	48.90	0
Yolo Bypass			
at Woodland Gage (51.10)	33.21	33.21	0
American River			
at H St. (6.471)	40.81	40.81	0

Table 7. 200-year Maximum Water Surface Elevation Summary, No Levee Failures (Sensitivity Analysis)

Location (Comp Study River Mile)	Maximum Water Surface Elevation (ft NGVD29)		Change (ft.)
	Without Project	With Project	Without Project to With Project
Sacramento River			
at Knight's Landing (90.22)	43.39	43.39	0
at Fremont Weir, west end (84.75)	42.47	42.48	+0.01
At Natomas Cross Canal (79.21)	42.90	42.92	+0.02
at I-5 (71.00)	38.24	38.24	0
at Sacramento Bypass (63.82)	33.48	33.48	0
at NEMDC (61.0)	34.06	34.07	+0.01
at I St. (59.695)	33.78	33.78	0
at Freeport Bridge (46.432)	27.40	27.41	+0.01
Natomas Cross Canal			
u/s Hwy 99/70 (4.82)	42.92	42.94	+0.02
Pleasant Grove Creek Canal			
at Sankey Rd. (3.65)	42.65	42.67	+0.02
at Fifield Rd. (1.49)	42.90	42.91	+0.01
Feather River			
at Nicolaus Gage (8.00)	51.19	51.20	+0.01
Yolo Bypass			
at Woodland Gage (51.10)	34.56	34.57	+0.01
American River			
at H St. (6.471)	44.40	44.40	0

Table 8. 500-year Maximum Water Surface Elevation Summary, No Levee Failures (Sensitivity Analysis)

Location (Comp Study River Mile)	Maximum Water Surface Elevation (ft NGVD29)		Change (ft.)
	Without Project	With Project	Without Project to With Project
Sacramento River			
at Knight's Landing (90.22)	44.27	44.31	+0.04
at Fremont Weir, west end (84.75)	43.79	43.85	+0.06
At Natomas Cross Canal (79.21)	43.68	43.85	+0.17
at I-5 (71.00)	39.76	39.85	+0.09
at Sacramento Bypass (63.82)	37.97	38.00	+0.03
at NEMDC (61.0)	37.97	38.00	+0.03
at I St. (59.695)	37.67	37.69	+0.02
at Freeport Bridge (46.432)	30.28	30.30	+0.02
Natomas Cross Canal			
u/s Hwy 99/70 (4.82)	43.45	43.71	+0.26
Pleasant Grove Creek Canal			
at Sankey Rd. (3.65)	43.25	43.40	+0.15
at Fifield Rd. (1.49)	43.50	43.71	+0.21
Feather River			
at Nicolaus Gage (8.00)	53.45	53.47	+0.02
Yolo Bypass			
at Woodland Gage (51.10)	35.96	36.01	+0.05
American River			
at H St. (6.471)	49.16	49.17	+0.01

Computed water surface elevation profiles for each of the key flow conditions in the project area (Sacramento River channel downstream of the Fremont Weir) are shown in Figures 5 through 12. Figures 5 and 6 show the relationship between the 1957 design and the height of the levees on both sides of the Sacramento River and Natomas Cross Canal, respectively. Figure 6 also indicates the locations in which the non-urban Sacramento River west levee would be raised to meet the minimum freeboard requirements of the USACE 1957 design standard under the Sensitivity analysis. Figures 7 and 8 indicate the profile of the current 100-year flood. Figures 9 and 10 indicate the profile of the 200-year (no levee failure) design flood. Figures 9 and 10 also show the likely 200-year water surface profile assuming upstream levee failures in non-urban areas. Figure 9 shows that the current height of the Sacramento River east levee along the Natomas Basin is essentially at the same elevation as the 200-year (no levee failure) design water surface profile and considerably higher than the likely water surface profile assuming upstream levee failures. It also shows the extent to which the Sacramento River west levee across from Natomas would be overtopped in a 200-year flood. Because the levees protecting the Natomas Basin are already nearly high enough to contain the 200-year (no levee failure) design flood, the NLIP does not increase water surface elevations for the 200-year flood under the likely levee

failure scenario and produces a maximum water surface increase of only 0.02 feet with the unlikely no levee failure scenario. Figures 11 and 12 show the profiles for the 500-year flood with upstream levee failures. The 500-year (with levee failures) water surface elevation in the Sacramento River channel is lower throughout the most critical portion of this reach than the 200-year (no levee failure) design water surface elevation. As reflected in Figures 11 and 12, under the likely assumption that upstream levees will fail when water reaches the top of the levee, the water surface elevations around Natomas would be dramatically lower than the 200-year (no levee failure) profile that was used for design of NLIP. This 200-year levee design condition thus represents a worst-case scenario for the Sacramento River and the Natomas Cross Canal and underscores the high degree of protection against Natomas Basin levee overtopping that would be provided by the design of the NLIP improvements.

Under the sensitivity analysis of the 500-year (no levee failure) flood, the maximum water surface elevation change on the Sacramento River between the Without Project and With Project conditions, as shown in Table 8, is 0.17 feet. The maximum water surface change in the NCC is 0.26. However, even these relatively minor impacts are considered extremely implausible given that over 80 miles of upstream and adjacent levees could be overtopped (see Table 9) by this flood without any levee failures occurring.

Table 9. Extent of Levee Overtopping, 500-year Flood Event, No Failures

River	Total Leveed Length	Left Bank		Right Bank	
		Length of Overtopped Levee	Approx. Maximum Depth of Overtopping	Length of Overtopped Levee	Approx. Maximum Depth of Overtopping
American River	~13 miles	~7 miles	~4 ft	~12 miles	~3 ft
Feather River	~50 miles	~14 miles	~3 ft	~13 miles	~3 ft
Natomas Cross Canal	~5 miles	~4 miles	~1 ft	~3.5 miles	~2.5 ft
Sacramento Bypass	~1.7 miles	~0.5 miles	~0.5 ft	~0.2 miles	~0.5 ft
Sacramento River upstream of Natomas Cross Canal	~90 miles	~13 miles	~4 ft	~7 miles	~3 ft
Sacramento River Adjacent to Natomas	~18 miles	~8 miles	~1 ft	~6 miles	~3 ft
Sacramento River downstream of American River	~60 miles	~2 miles	~2 ft	~2 miles	~2 ft
Sutter Bypass	~30 miles	~4 miles	~4 ft	~7 miles	~4 ft
Tisdale Bypass	~4 miles	~0.5 miles	~0.5 ft	~0.5 miles	~1 ft
Wadsworth Canal	~4 miles	~4 miles	~1 ft	~4 miles	~2 ft
Yolo Bypass	~37 miles	~5 miles	~2.5 ft	~2 miles	~2 ft

5. SUPPORT OF IMPACT ANALYSIS METHODOLOGY

California Legislature

Consistent with its approval of a new more rigorous standard for urban flood protection, the State Legislature also approved “the project features necessary to provide a 200-year level of flood protection along the American and Sacramento Rivers and within the Natomas Basin as described in the final engineer’s report dated April 19, 2007, adopted by the Sacramento Area Flood Control Agency.” (Statutes of 2007, Chapter 641 [amending Water Code Section

12670.14(b)]). Moreover, in connection with this approval, the legislature adopted the following findings and declarations (Statutes of 2007, Chapter 641, Section 1[k]):

As evidenced by the environmental impact reports certified in connection with these projects, including the hydrology and hydraulics impact analysis set forth in the environmental impact report prepared by the Sacramento Area Flood Control Agency with regard to local funding mechanisms for comprehensive flood control improvements for the Sacramento area dated February 2007, the increase in flood protection associated with improving the American and Sacramento River levees and modifying Folsom Dam will be accomplished without altering or otherwise impairing the design flows and water surface elevations prescribed as part of the Sacramento River Flood Control Project. Accordingly, these improvements will not result in significant adverse hydraulic impacts to the lands protected by the Sacramento River Flood Control Project. Thus, it is not necessary or appropriate to require these projects to include hydraulic mitigation.

The projects authorized in Section 12670.14 of the Water Code will increase the ability of the existing flood control system in the lower Sacramento Valley to protect heavily urbanized areas within the City of Sacramento and the Counties of Sacramento and Sutter against very rare floods without altering the design flows and water surface elevations prescribed as part of the Sacramento River Flood Control Project or impairing the capacity of other segments of the Sacramento River Flood Control Project to contain these design flows and to maintain water surface elevations. Accordingly, the projects authorized in that section will not result in significant adverse hydraulic impacts to the lands protected by the Sacramento River Flood Control Project and neither the Reclamation Board nor any other state agency shall require the authorized projects to include hydraulic mitigation for these protected lands.

Although these findings are not legally binding, they indicate the legislature's concurrence with SAFCA's approach to analyzing hydraulic impacts. Congressional authorization for raising and strengthening a twelve-mile reach of the Sacramento River east levee in the 1996 Water Resources Development Act ("WRDA") and for raising and strengthening all five-plus miles of the NCC south levee in the 1999 WRDA without in either case requiring hydraulic mitigation offers additional indirect legislative support for SAFCA's approach.

<u>USACE HQ</u>

USACE has been using a risk-based analysis for economic evaluation for some time and has been moving to a risk-based analysis for system performance, largely for certification of levees for FEMA. However, in his memo dated *August 2, 2007, Subject: Section 408 Approval of a Flood Control Project Alteration - Sacramento River Flood Control Project, Feather and Yuba Rivers, California* (copy enclosed), Deputy Director of Civil Works Steven L. Stockton indicated that the discussion of flood protection in terms such as 100-year or 200-year level of protection is acceptable to comply with NEPA and other environmental statues. However, a risk-based analysis as required by ER 1105-2-100 and ER 1105-2-101 will be needed to determine the terms of any eventual Section 104 reimbursement.

6. NLIP COORDINATION WITH REGIONAL IMPROVEMENTS

SAFCA's approach to providing an urban standard of flood protection to the Natomas Basin is being replicated in the other urbanizing sub-basins in the lower Sacramento Valley (West Sacramento, Marysville extending south to Reclamation District 784, and Yuba City). However, these improvements are intended to complement rather than substitute for pursuing improvements on a regional scale that would improve the flow of water through the Yolo and Sacramento Bypass systems and lower water surface elevations throughout the lower Sacramento Valley. In 2002 through 2003, SAFCA made substantial investments in hydraulic studies and analyses of the improvements that would be required to move more flood water into and through the Yolo Bypass during large flood events in the Sacramento-Feather River watershed to reduce flows and water surface elevations in the Sacramento River channel downstream of the Fremont weir. The Lower Sacramento River Regional Project Initial Report (SAFCA 2003) indicated that this could be accomplished by widening the Fremont weir, setting back the levees on the east side of the Yolo Bypass, discharging flood flows into the Sacramento Deep Water Ship Channel and eliminating low, restricted elevation levees at the lower end of the Yolo Bypass. However, these improvements would be extremely costly and time consuming to implement; they would occur entirely outside SAFCA's jurisdiction, and would require extraordinary cooperation among affected federal, state, and local interests; and they would not resolve the seepage problems affecting the Sacramento River east levee and the Natomas Cross Canal south levee adjacent to the Natomas Basin. For these reasons, SAFCA concluded that this alternative would not achieve the objectives of the NLIP and, therefore, it was not carried forward for further analysis.

On a long-term basis, however, regionally oriented improvements to the Yolo and Sacramento Bypass systems would help to address potential changes in hydrology due to climate change and would reduce the risk of uncontrolled flooding on a system-wide basis. Although this flooding is most likely to occur in lightly populated agricultural areas, reducing its frequency by increasing the conveyance capacity of the SRFCP would avoid the cost of repairing and reconstructing damaged levees and other public infrastructure and would increase public support for the "dichotomous system of flood protection for urban and rural lands" that exists in the Sacramento Valley. Early implementation of the NLIP, as well as early implementation of proposed improvements to SRFCP levees protecting other urban areas, would not preclude any of the alternatives contemplated for the update of the Central Valley Flood Protection Plan.

7. CONCLUSION

Raising and strengthening portions the federal project levee system protecting the Natomas Basin in Sacramento and Sutter Counties as proposed by SAFCA would not result in any significant, adverse hydraulic impacts to other sub-basins protected as part of the SRFCP. Furthermore, these improvements would be consistent with the principles that have guided the management of the SRFCP over the past century and with the policies adopted by the State Legislature calling for an immediate and comprehensive effort to increase the level of flood protection provided to Sacramento and the other urban areas within the SRFCP. The NLIP improvements would also be consistent with the direction given by Congress when it approved raising and strengthening 12 miles of the Sacramento River east levee (WRDA 1996) and 5.3 miles of the Natomas Cross Canal south levee (WRDA 1999).

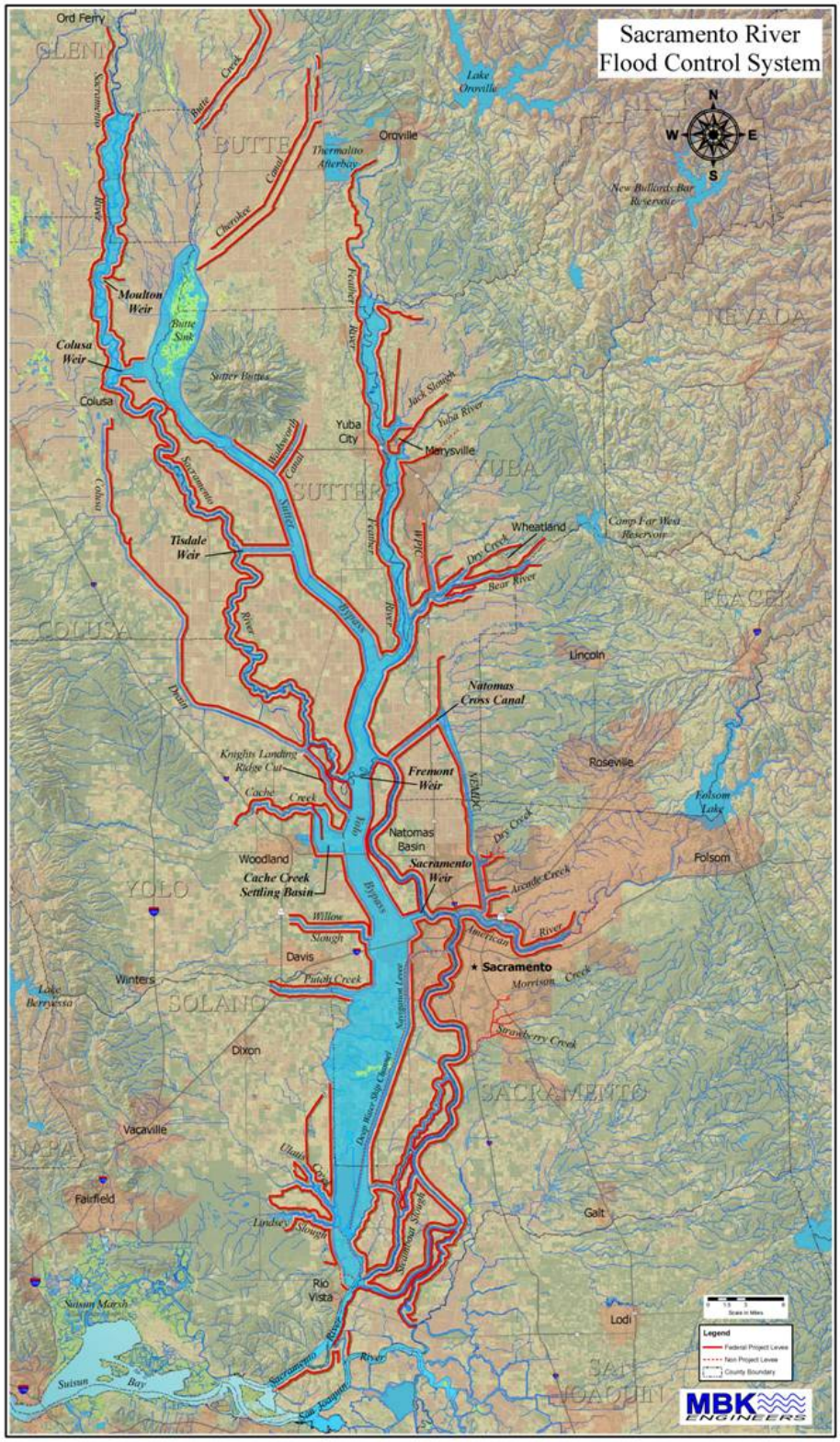

Figure 1. Sacramento River Flood Control System Map

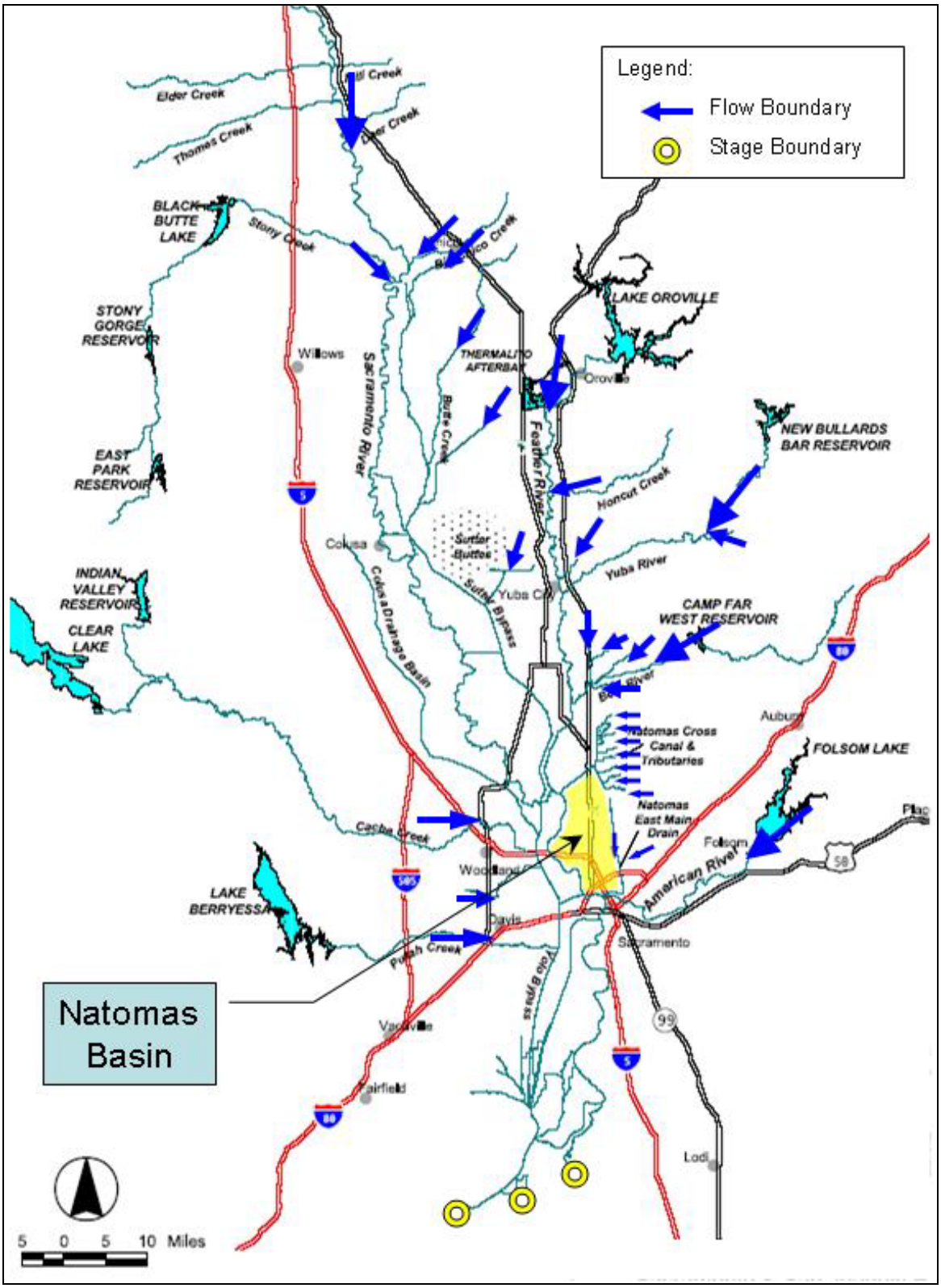

Figure 2. Sacramento River UNET Model Extents

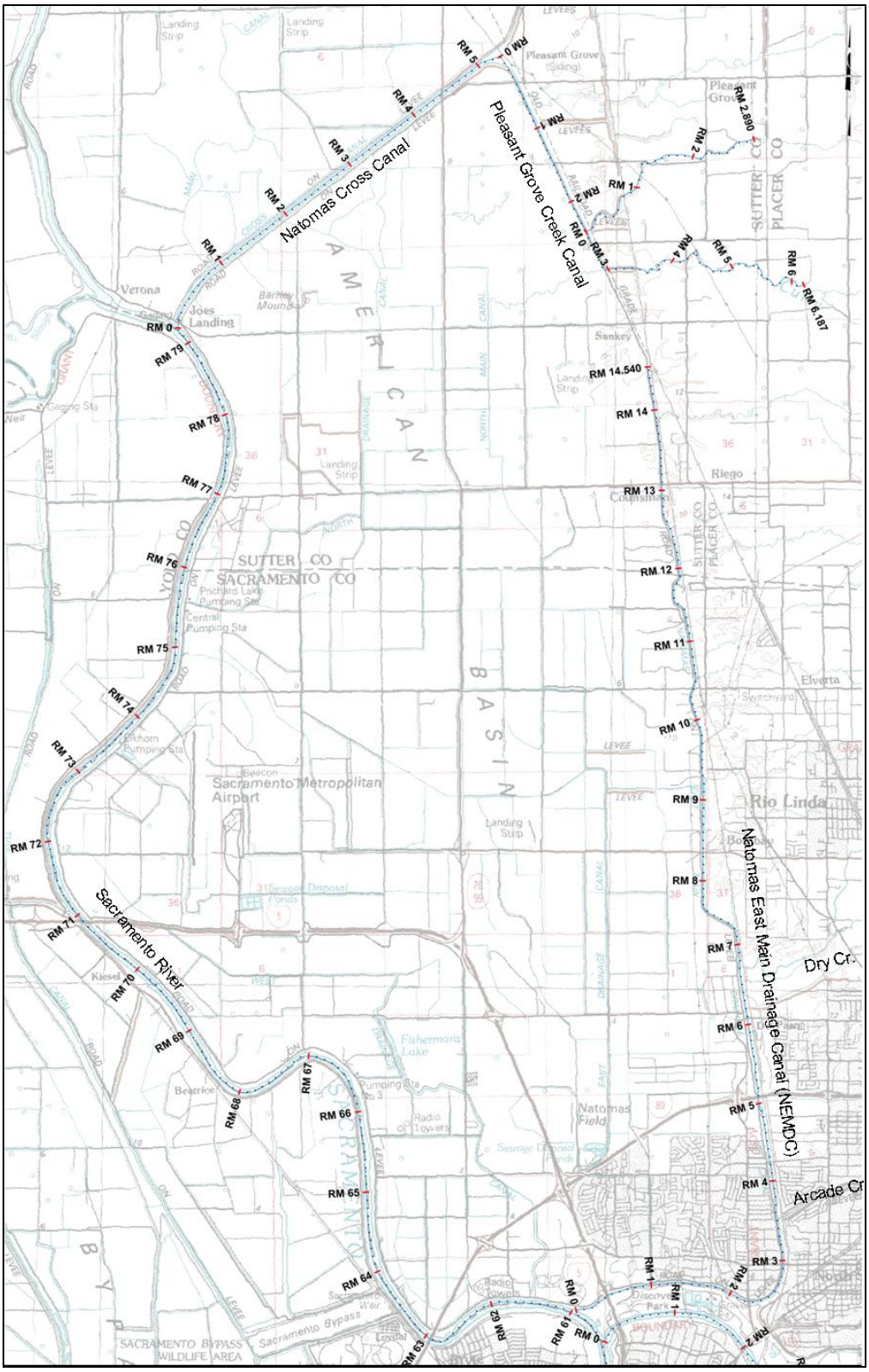

Figure 3. Natomas Levee Improvement Program Study Area

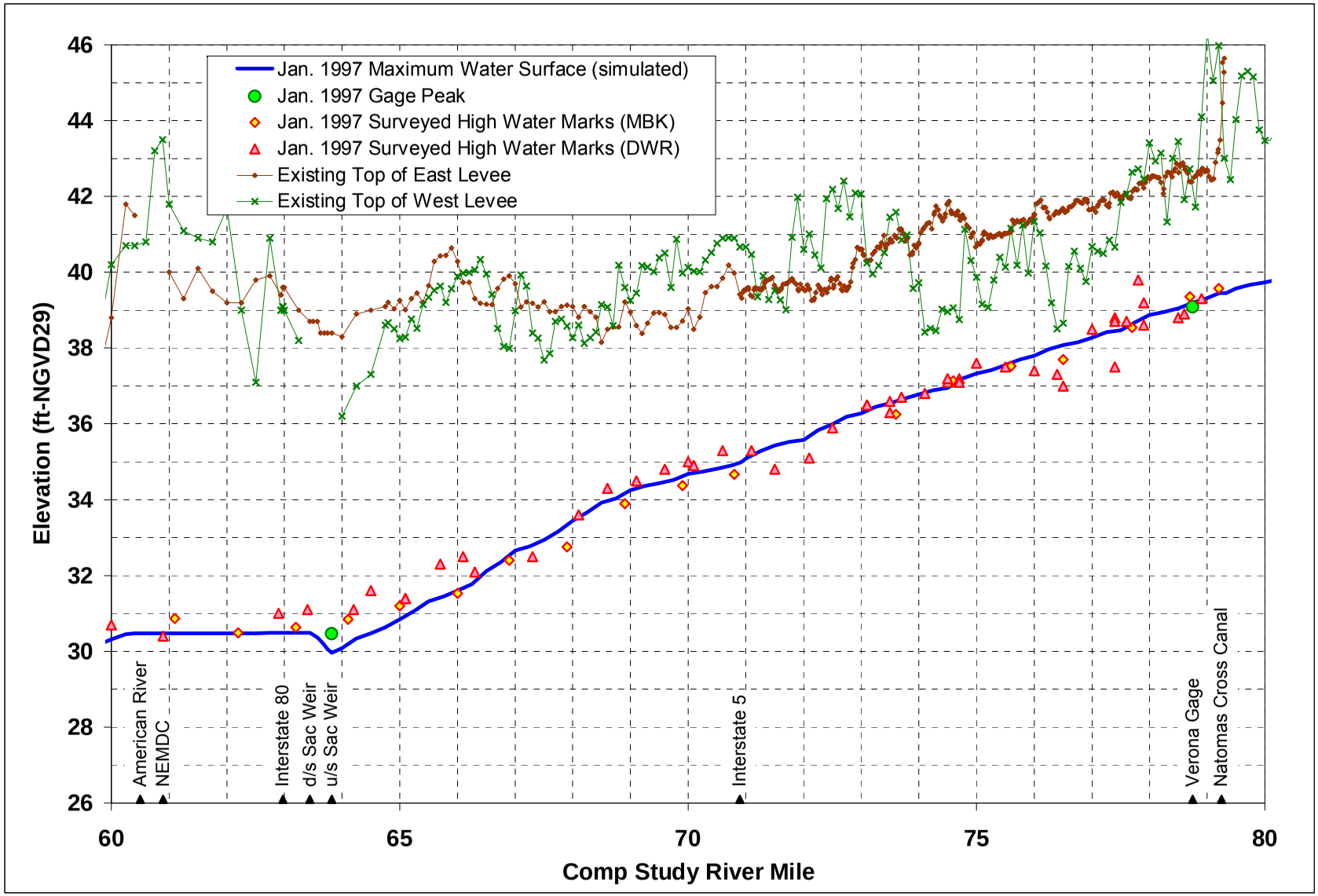

Figure 4. Water Surface Profile – Model Calibration vs. 1997 Flood Event High Water Marks

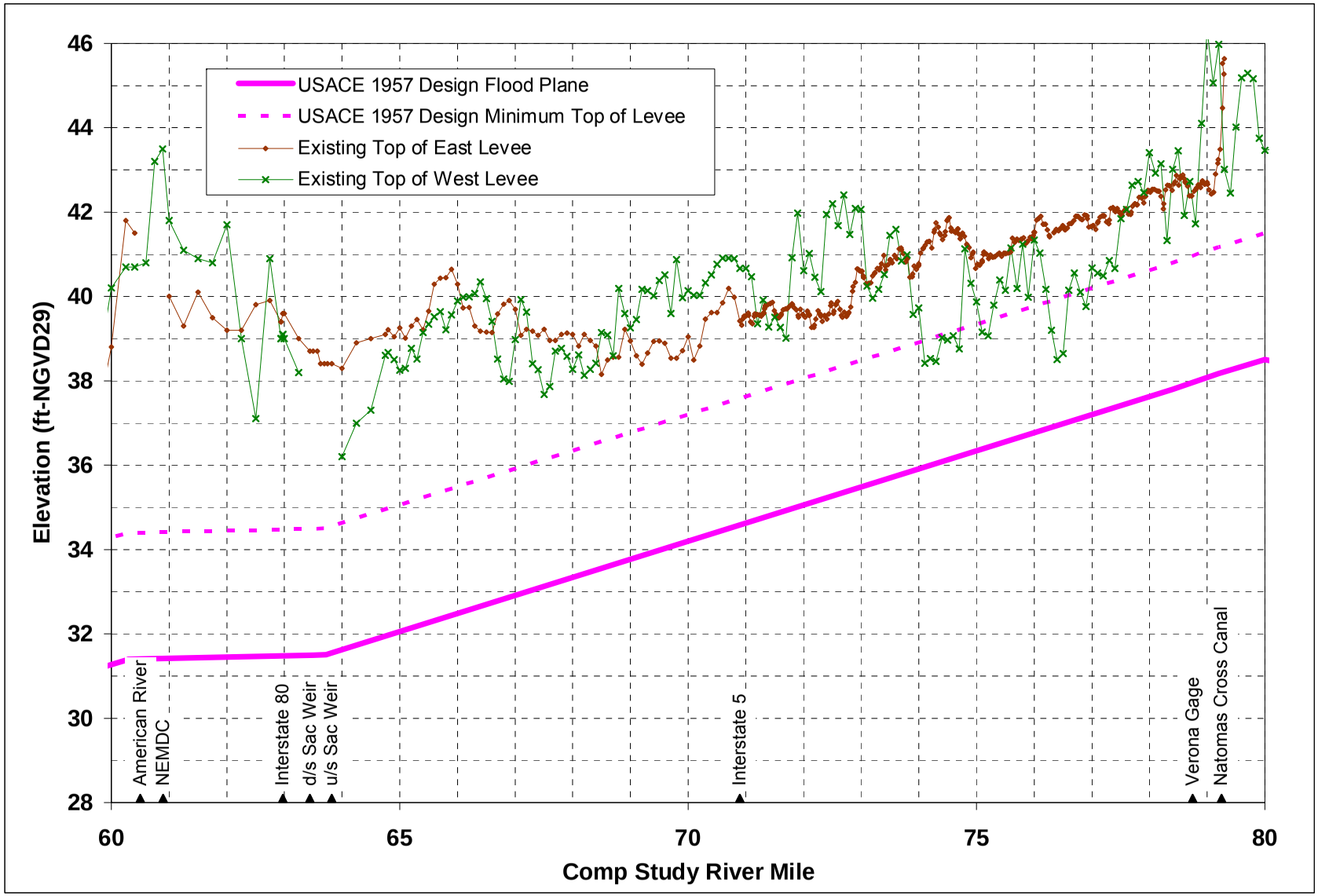

Figure 5. Water Surface Profile – USACE SRFCP 1957 Design Profile, Sacramento River Natomas Reach

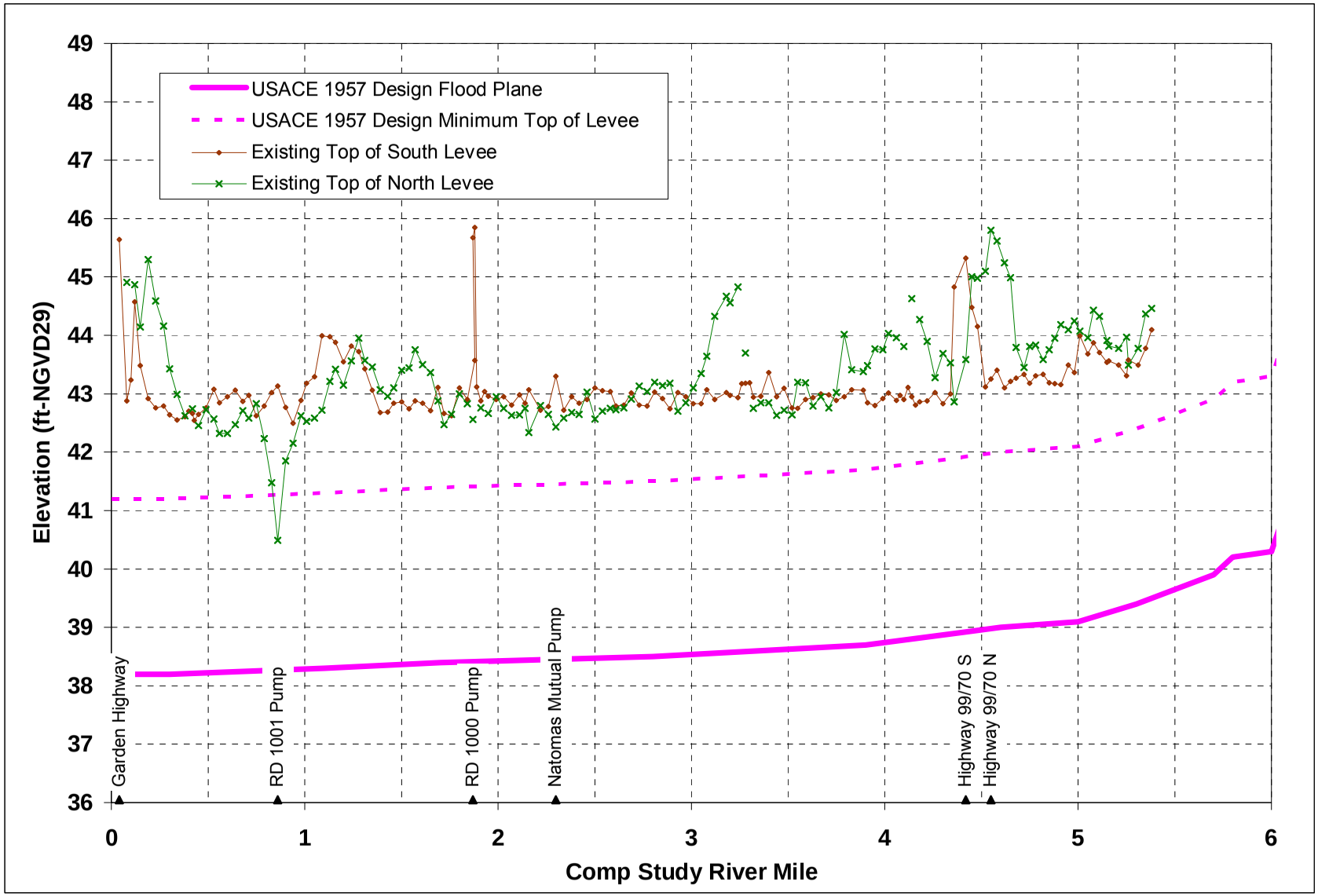

Figure 6. Water Surface Profile – USACE 1957 Design Profile, Natomas Cross Canal

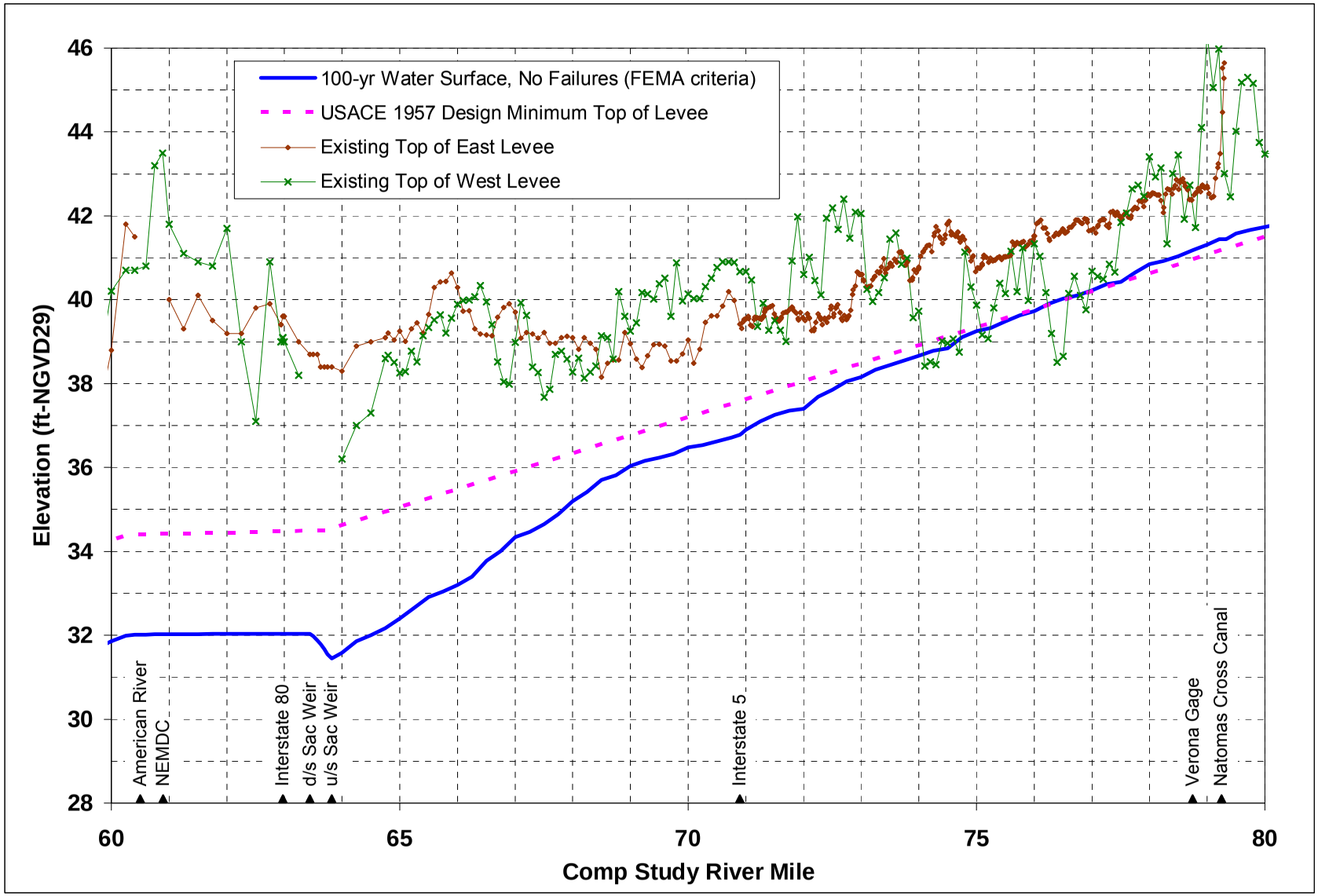

Figure 7. Water Surface Profile – 100-year, Sacramento River Natomas Reach

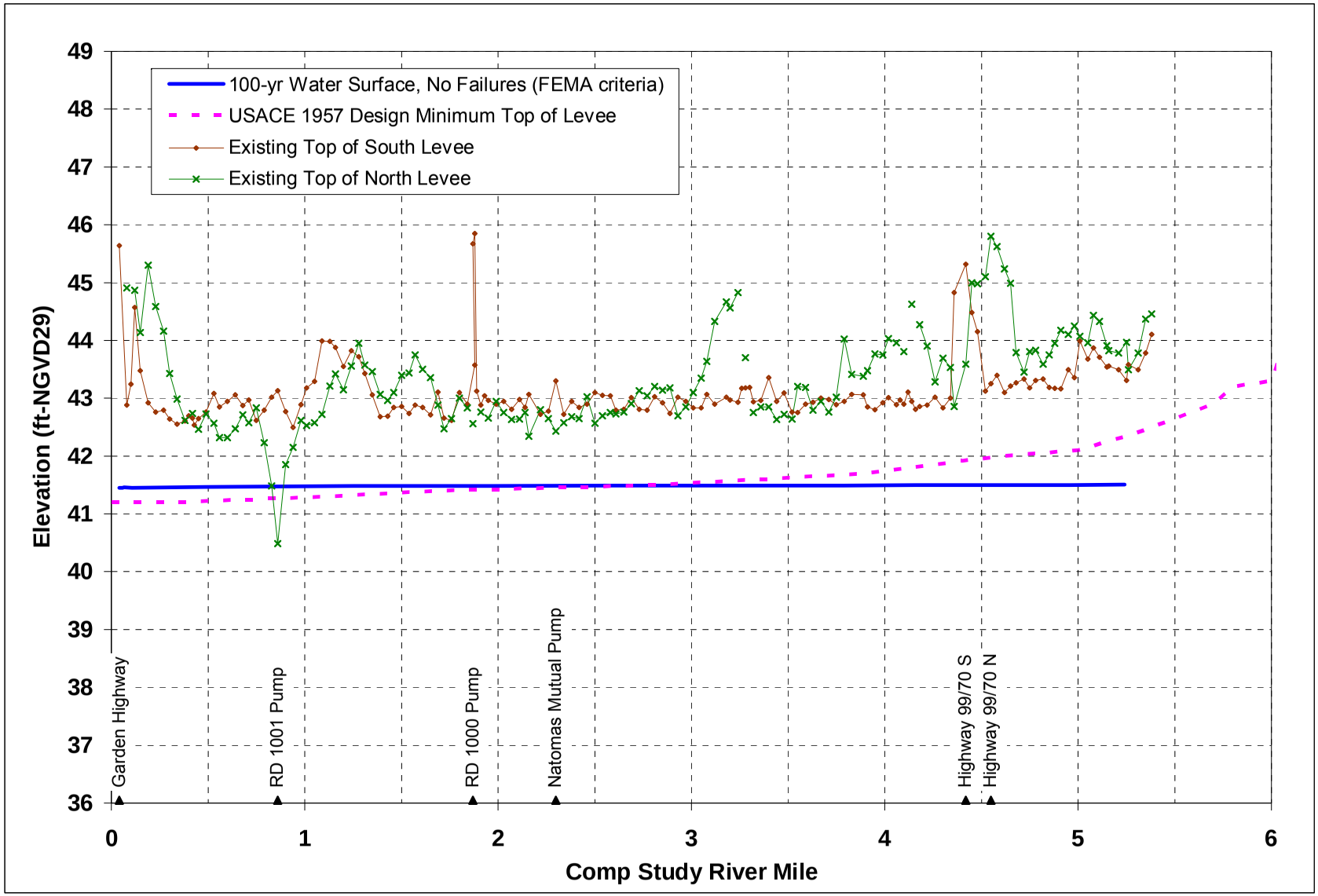

Figure 8. Water Surface Profile – 100-year, Natomas Cross Canal

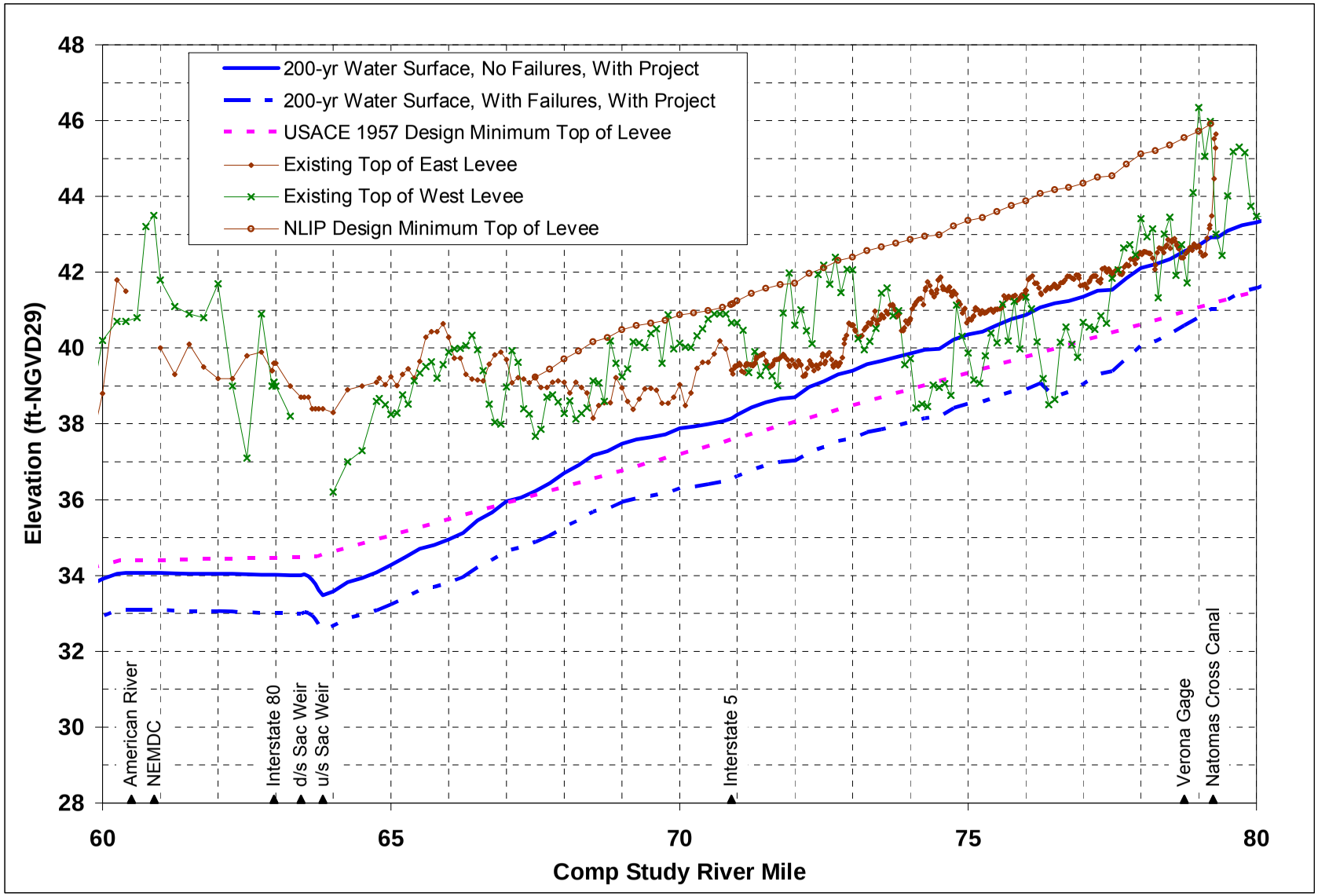

Figure 9. Water Surface Profile – 200-year, Sacramento River Natomas Reach

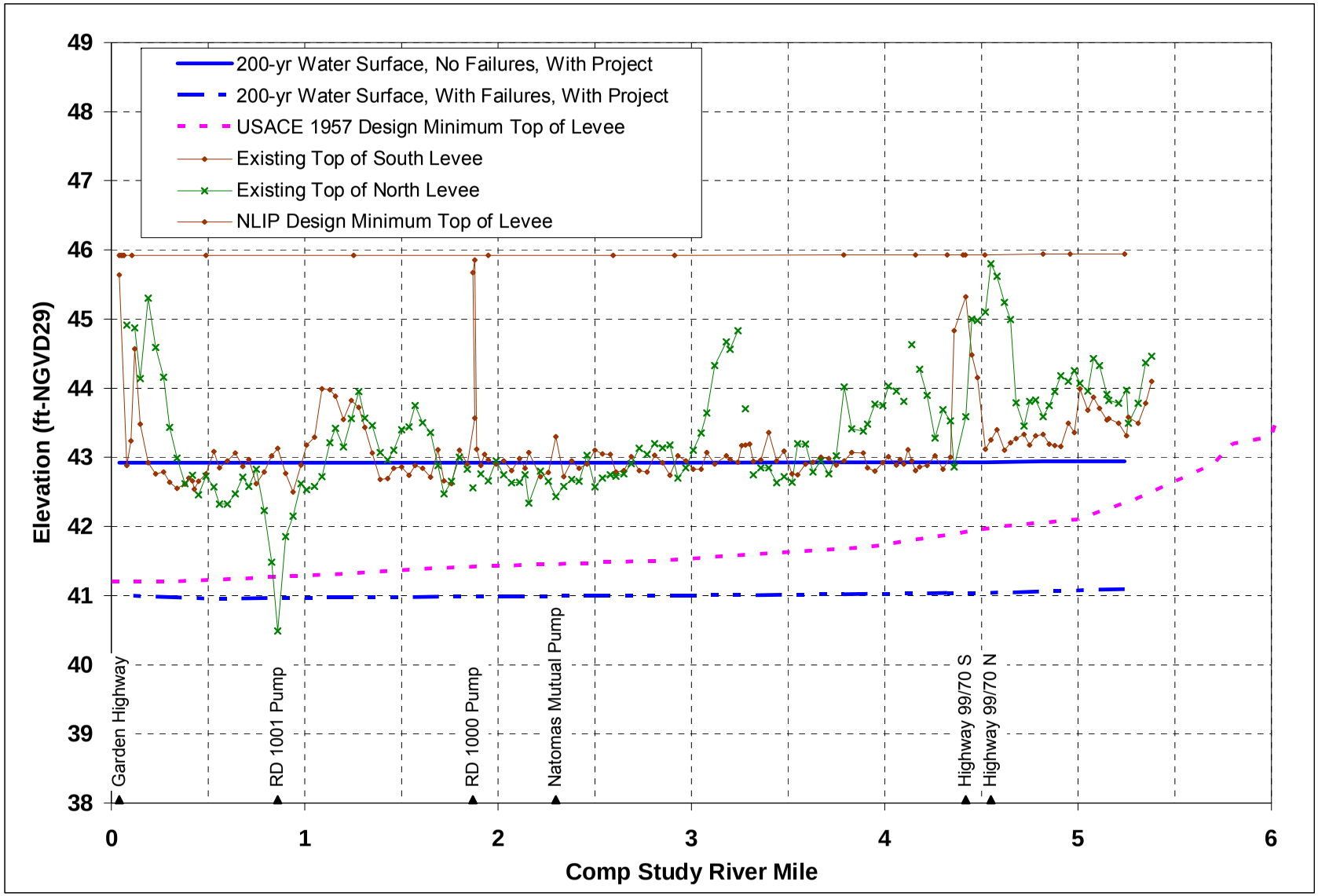

Figure 10. Water Surface Profile – 200-year, Natomas Cross Canal

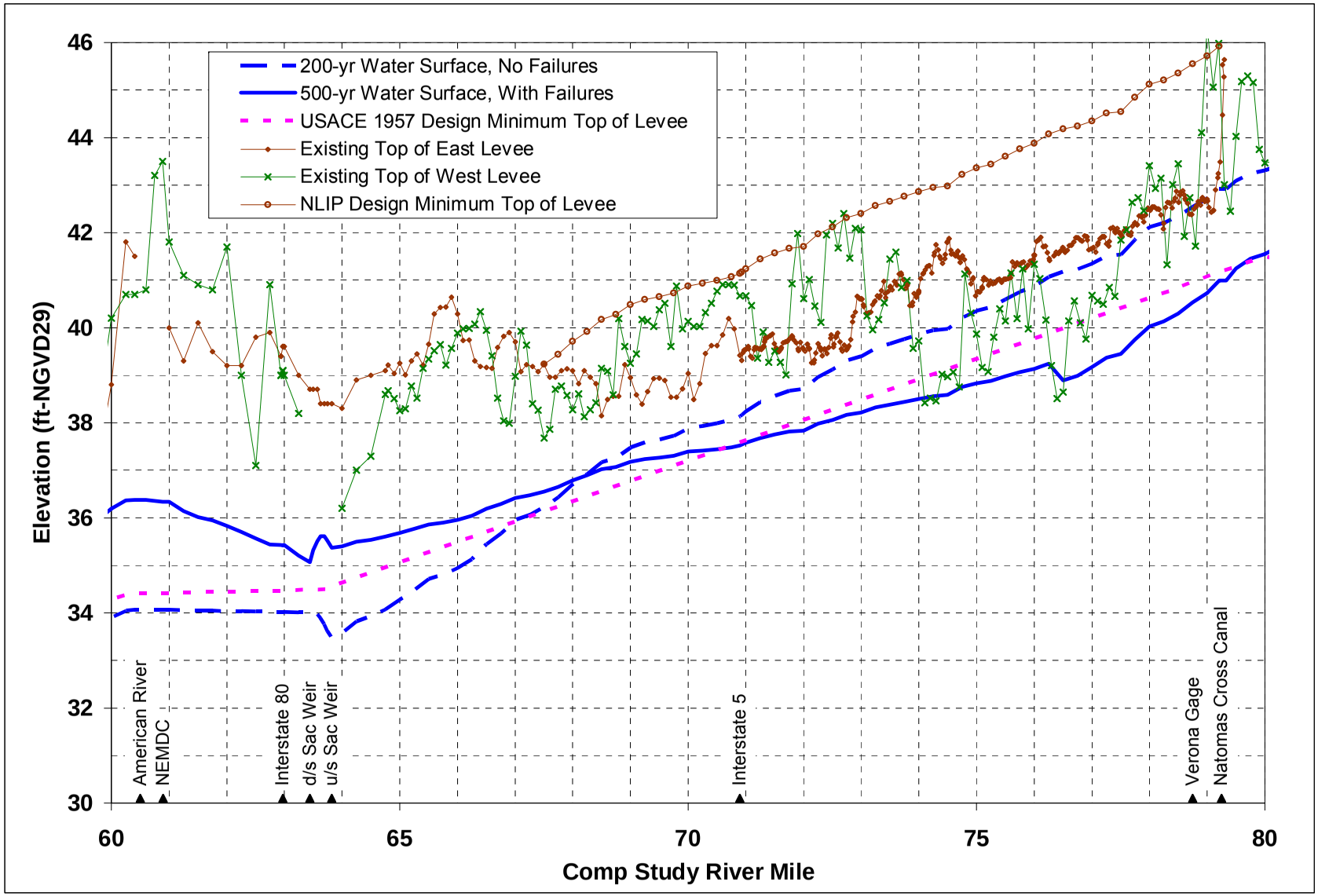

Figure 11. Water Surface Profile – 500-year, Sacramento River Natomas Reach

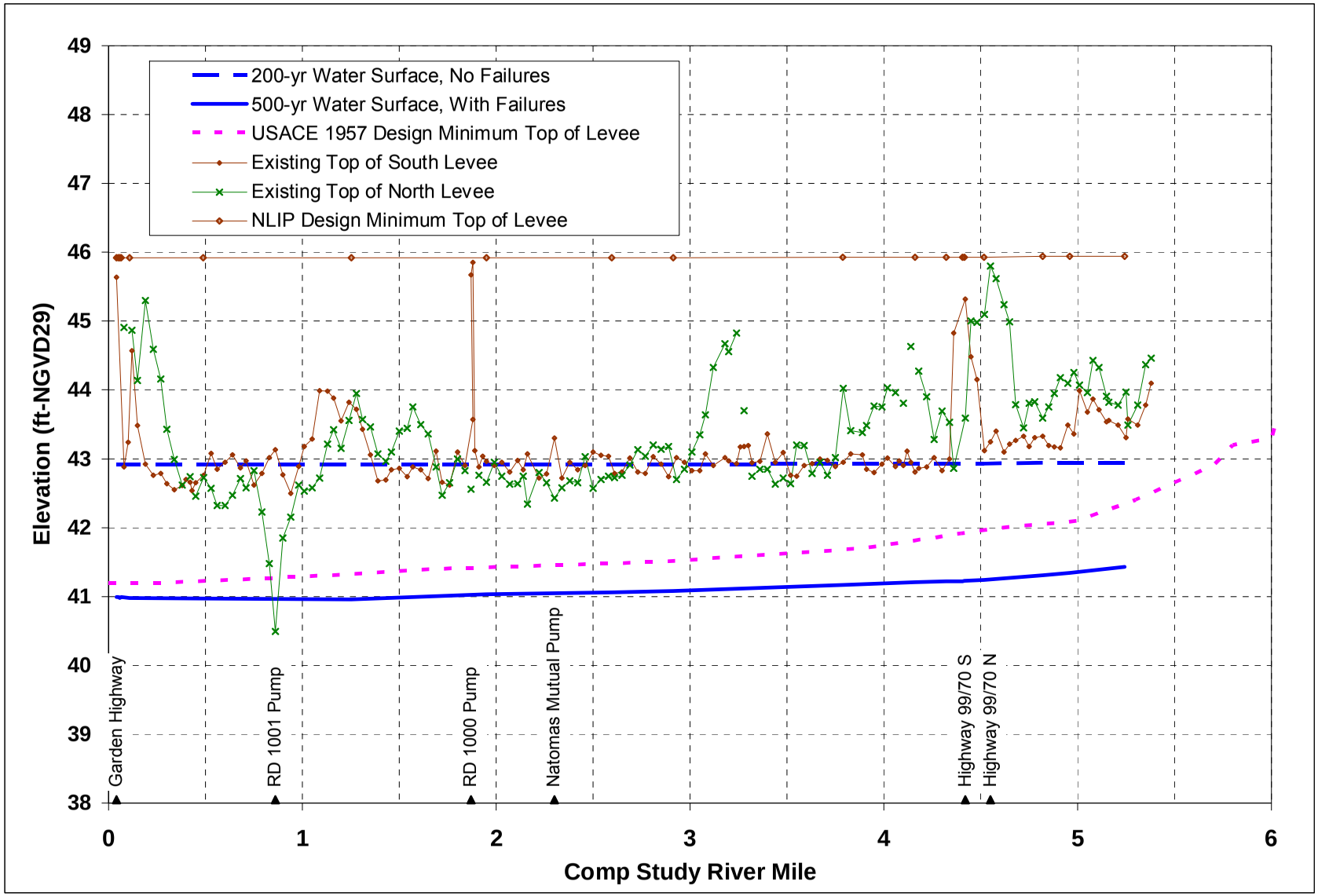

Figure 12. Water Surface Profile – 500-year, Natomas Cross Canal

APPENDIX B

Air Quality Modeling Results

GGS/Elkhorn Canal Relocation *Work to occur during 2008 calendar year would be compressed into 3 month time frame; work to occur during 2009 calendar year is assumed to be phased over 6 months

***assumes all activity to occur in Sacramento County**

	ROG	NOX	PM10	Unit	Quantity	Unit	ROG	NOX	PM10	Unit	Distance (miles/round-trip)	# of Haul Loads	Total Miles Traveled	Total Miles Traveled/Day	Time frame	Conversion Factor	
Clearing, Grubbing, Stripping, Grading					4000.0	yd3 (export)					10.0	285.7	2857.1	190.5	15.0	days	
Mobile Sources					*(assumes 10 miles to material disposal site)							*(assumes haul load = 14 yd3)					
Bulldozer(s)	3.63	21.55	1.12	lb/day	4.0		217.7	1293.0	66.9	lb/yr						0.00220462	lb/gram
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		108.1	419.3	21.6	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		55.3	420.6	22.8	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	20.0	employees	5.6	14.6	1.1	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	4.0	trucks			806.8	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Truck Loading at Canal	-	-	0.04	lb/ton					202.9	lb/yr	1.25	333.33					
Truck Unloading at Off-site Disposal	-	-	0.005	lb/ton			-	-	26.3	lb/yr	1.25	333.33					
Total							**386.6**	**2147.4**	**1148.3**	**lb/yr**						2000	lb/ton
Total							**25.8**	**143.2**	**76.6**	**lb/day**							
Utility Relocations					0.0	yd3					0.0	0.0	0.0	0.0	30.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Bulldozer(s)	3.63	21.55	1.12	lb/day	2.0		217.7	1293.0	66.9	lb/yr							
Excavator(s)	1.84	6.47	0.34	lb/day	2.0		110.4	388.1	20.5	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	1.0		31.2	141.4	7.8	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	20.0	employees	11.1	29.1	2.1	lb/yr				40.0	per employee	0.00220462	lb/gram
Total							**370.4**	**1851.5**	**97.4**	**lb/yr**						2000	lb/ton
Total							**12.3**	**61.7**	**3.2**	**lb/day**							
Water Control Facility Construction					0.0	yd3					0.0	0.0	0.0	20.0	45.0	days	
Mobile Sources												*assumes haul load = 14 yd3					
Backhoe(s)	1.84	6.47	0.34	lb/day	2.0		165.6	582.1	30.8	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	4.0		1029.9	4665.5	257.5	lb/yr							
Flatbed Truck(s)	0.70	8.63	0.27	g/mile	2.0		2.8	34.2	1.1	lb/yr	*assumes flat-bed trucks travel 20 miles/day on paved roads					0.00220462	lb/gram
Employee Trips	0.21	0.55	0.04	g/mile	20.0	employees	16.7	43.7	3.2	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	2.0	trucks			254.1	lb/yr							
Total							**1215.0**	**5325.4**	**546.6**	**lb/yr**						2000	lb/ton
Total							**27.0**	**118.3**	**12.1**	**lb/day**							
Embankment/Access Road Construction					15000.0	yd3					10.0	1071.4	10714.3	1071.4	55.0	days	
Mobile Sources					(borrow)							*assumes haul load = 14 yd3	*10 days to complete hauling				
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		396.2	1537.4	79.2	lb/yr							
Bulldozer(s)	3.63	21.55	1.12	lb/day	2.0		399.1	2370.4	122.7	lb/yr							
Roller(s)	0.59	4.47	0.24	lb/day	4.0		129.1	982.8	53.2	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	2.0		131.9	1070.3	58.2	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	10.0		16.5	203.8	6.4	lb/yr						0.00220462	lb/gram
Employee Trips	0.21	0.55	0.04	g/mile	20.0	employees	20.4	53.4	3.9	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	10.0	trucks			3,025.5	lb/yr	*assumes borrow area is 10 miles round trip, on paved roads						
Total							**1093.2**	**6218.1**	**3349.0**	**lb/yr**						2000	lb/ton
Total							**19.9**	**113.1**	**60.9**	**lb/day**							
Canal Lining					2600.0	yd3					20.0	185.7	3714.3	168.8	22.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Off-Highway Trucks	3.60	13.98	0.72	lb/day	3.0		237.7	922.4	47.5	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	10.0		5.7	70.7	2.2	lb/yr	*assumes concrete delivered from an offsite source 20 miles away					0.00220462	lb/gram
Employee Trips	0.29	0.61	0.04	g/mile	20.0	employees	11.1	23.6	1.5	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	10.0	trucks			1,048.8	lb/yr							
Total							**254.6**	**1016.7**	**1100.1**	**lb/yr**						2000	lb/ton
Total							**11.6**	**46.2**	**50.0**	**lb/day**							
Irrigation Interconnections					0.0	yd3					0.0	0.0	0.0	0.0	12.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		43.2	167.7	8.6	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	1.0		14.4	116.8	6.3	lb/yr							
Excavator(s)	1.84	6.47	0.34	lb/day	2.0		44.2	155.2	8.2	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	20.0	employees	4.4	11.6	0.8	lb/yr				40.0	per employee	0.00220462	lb/gram
Total							**106.2**	**451.3**	**24.0**	**lb/yr**						2000	lb/ton
Total							**8.9**	**37.6**	**2.0**	**lb/day**							
Pump Discharge Pipe Extension					0.0	yd3					0.0	0.0	0.0	0.0	22.0	days	
Mobile Sources												*assumes haul load = 14 yd3					
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		79.2	307.5	15.8	lb/yr							
Excavator(s)	1.84	6.47	0.34	lb/day	2.0		81.0	284.6	15.0	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	2.0		40.5	308.5	16.7	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	3.0		137.3	622.1	34.3	lb/yr							
Crane(s)	1.44	6.16	0.34	lb/day	1.0		31.7	135.5	7.4	lb/yr						0.00220462	lb/gram
Employee Trips	0.21	0.55	0.04	g/mile	20.0	employees	8.1	21.3	1.6	lb/yr				40.0	per employee	0.00220462	lb/gram
Total							**378.0**	**1679.4**	**90.9**	**lb/yr**						2000	lb/ton
Total							**17.2**	**76.3**	**4.1**	**lb/day**							
Site Restoration/ Irrigation Canal Abandonment/ Demobilization					7000.0	yd3					20.0	500.0	10000.0	5000.0	22.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Other Equipment	2.08	9.43	0.52	lb/day	2.0		33.3	150.8	8.3	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	2.0		14.7	112.2	6.1	lb/yr							
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	3.0		237.7	922.4	47.5	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	2.0		15.4	190.3	6.0	lb/yr	*assumes seeding material delivered from an offsite source 20 miles away					0.00220462	lb/gram
Employee Trips	1.20	9.73	0.53	g/mile	20.0	employees	46.5	377.5	20.5	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	2.0	trucks			2,823.8	lb/yr							
Total							**347.7**	**1753.2**	**2912.2**	**lb/yr**						2000	lb/ton
Total							**15.8**	**79.7**	**132.4**	**lb/day**							
2008 calendar year																	
Total from canal work							**2**	**10**	**5**	**TPY**	to occur during **2008** calendar year						
Total from canal work							**54**	**237**	**265**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently			(approximately the same level of activity as would occur during 6 months in 2009 would occur in a compressed period during 3 months in 2008)			
2009 calendar year																	
Total from canal work							**1**	**6**	**4**	**TPY**	to occur during **2009** calendar year						
Total from canal work							**27**	**118**	**180**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						

*These calculations represent worst-case emissions from construction activities associated with the Elkhorn Canal Relocation

Sacramento East Levee Improvements Alt 1, 1-20a

***84% of reaches 1-4b occurs in Sutter County, 16% of 1-4b and 100% of 5a-20a occurs in Sacramento County**

	ROG	NOX	PM10	Unit	Quantity	Unit	ROG	NOX	PM10	Unit	Distance (miles/round-trip)	# of Haul Loads	Total Miles Traveled	Total Miles Traveled/Day	Time frame	Conversion Factor	
[1]Clearing, Grubbing, Stripping, Grading (concurrent with [2,3])					0.0	yd3					0.0	0.0	4.3	4.3	27.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive length of levee each day			
Haul Truck(s)	0.70	8.63	0.27	g/mile	5.0		0.0	0.4	0.0	lb/yr						0.00220462	lb/gram
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		97.3	377.4	19.5	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	2.0		196.7	862.1	45.9	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		99.5	757.2	41.0	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	2.0		64.7	525.4	28.6	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	30.0	78.6	5.7	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	5.0	trucks			6.1	lb/yr							
Total							**488.2**	**2601.0**	**146.7**	**lb/yr**						2000	lb/ton
Total							**18.1**	**96.3**	**5.4**	**lb/day**							
[2]Relocate Canal and Tree Removal (concurrent with [1,3])					0.0	yd3					0.0	0.0	4.3	4.3	48.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive length of levee each day			
Excavator(s)	1.84	6.47	0.34	lb/day	2.0		176.7	620.9	32.8	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	2.0		0.0	0.2	0.0	lb/yr						0.00220462	lb/gram
Loader(s)	0.92	7.01	0.38	lb/day	1.0		44.2	336.5	18.2	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	53.3	139.7	10.2	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	4.0	trucks			4.9	lb/yr							
Total							**274.2**	**1097.3**	**598.3**	**lb/yr**						2000	lb/ton
Total							**5.7**	**22.9**	**12.5**	**lb/day**							
[3]Excavate Stability Berm/Inspection Trech (concurrent with [1,2])				Reusable Onsite Fill	285500.0	yd3					0.1	20392.9	2039.3	72.8	28.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Excavator(s)	1.84	6.47	0.34	lb/day	4.0		206.1	724.4	38.3	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	20.0		2039.6	8940.2	475.9	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	4.0		3.1	38.8	1.2	lb/yr						0.00220462	lb/gram
Bulldozers	3.63	21.55	1.12	lb/day	3.0		304.8	1810.1	93.7	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	3.0		100.7	817.3	44.4	lb/yr							
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		201.7	782.7	40.3	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	31.1	81.5	5.9	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			575.8	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Aggregate Storage Piles	-	-	0.002	lb/ton					570.5	lb/yr	1.25	12745.54					
							-	-									
Total							**2887.1**	**13195.0**	**1846.1**	**lb/yr**						2000	lb/ton
Total							**103.1**	**471.2**	**65.9**	**lb/day**							
[4]Borrow Excavation, Haul and Place Adjacent Levee Raise, Cutoff Wall, & Seepage Berms (concurrent with [5,6])				Brookfield Fill	3958500.0	yd3					5.0	282750.0	1413750.0	13090.3	108.0	days	
				Commercial Fill	60333.3	yd3					30.0	4309.5	129285.7	1197.1	108.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Water Truck(s)	3.60	13.98	0.72	lb/day	5.0		1945.2	7547.3	389.0	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	15.0		5900.2	25862.7	1376.7	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		398.0	3028.7	163.9	lb/yr							
Bulldozers	3.63	21.55	1.12	lb/day	4.0		1567.3	9309.3	481.9	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	6.0		1348.2	6107.5	337.1	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	6.0		776.7	6305.1	342.7	lb/yr							
Excavator(s)	1.84	6.47	0.34	lb/day	4.0		795.1	2794.0	147.7	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	90.0		2381.3	29357.6	918.5	lb/yr						0.00220462	lb/gram
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	120.0	314.3	22.9	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	90.0	trucks	-	-	1,385,202.8	lb/yr	*assumes that all material hauling is along unpaved haul routes						
Travel on paved roads			0.28	lb/VMT	0.0	trucks			-	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Material loading at borrow			0.04	lb/ton					203,905.1	lb/yr	1.25	46514.27					
Material unloading at levee			0.005	lb/ton					26,373.6	lb/yr	1.25	46514.27					
Bulldozing	-	-	0.41	lb/hr	12.0	hrs/day			532.28	lb/yr							
Total							**15231.9**	**90626.5**	**1620194.0**	**lb/yr**						2000	lb/ton
Total							**141.0**	**839.1**	**15001.8**	**lb/day**							
[5]Reconstruct Garden Hwy/Install Surface Drainage (concurrent with [4,6])					0.0	yd3					10.0	0.0	10.0	10.0	27.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive 10 miles each day			
Backhoe(s)	0.67	4.54	0.38	lb/day	2.0		36.3	245.4	20.5	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	2.0		112.4	509.0	28.1	lb/yr							
Roller(s)	0.59	4.47	0.24	lb/day	2.0		31.7	241.2	13.1	lb/yr							
Paver(s)	0.93	7.08	0.38	lb/day	2.0		50.2	382.2	20.7	lb/yr							
Concrete Truck(s)	3.60	13.98	0.72	lb/day	3.0		291.8	1132.1	58.4	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	8.0		0.1	1.5	0.0	lb/yr						0.00220462	lb/gram
Employee Trips	0.29	0.61	0.04	g/mile	60.0	employees	40.9	86.9	5.4	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			22.6	lb/yr							
Total							**563.3**	**2598.2**	**110.4**	**lb/yr**						2000	lb/ton
Total							**20.9**	**96.2**	**4.1**	**lb/day**							
[6]Construct Relief Wells/Berm/Drainage Canal (concurrent with [4,5])					0.0	yd3					0.0	0.0	0.0	0.0	30.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	5.0		540.3	2096.5	108.1	lb/yr							
Drill Rig(s)	2.87	5.75	0.43	lb/day	3.0		258.6	517.3	38.8	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	33.3	87.3	6.3	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	5.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**832.3**	**2701.0**	**153.2**	**lb/yr**						2000	lb/ton
Total							**27.7**	**90.0**	**5.1**	**lb/day**							
[7]Site Restoration/Demobilization					0.0	yd3					0.1	0.0	0.0	0.0	34.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	6.0		734.8	2851.2	147.0	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	3.0		0.0	0.0	0.0	lb/yr						0.00220462	lb/gram
Employee Trips	1.20	9.73	0.53	g/mile	60.0	employees	215.6	1750.4	95.1	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**950.5**	**4601.6**	**242.1**	**lb/yr**						2000	lb/ton
Total							**28.0**	**135.3**	**7.1**	**lb/day**							
2009 calendar year																	
Total from East Levee Project						**100%**	**10.6**	**58.7**	**811.6**	**TPY**	to occur during 2009 calendar year						
Total from East Levee Project						**100%**	**189.6**	**1025.4**	**15011.0**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sutter County						**39%**	**4.1**	**22.8**	**315.7**	**TPY**	to occur during 2009 calendar year						
Emissions to occur in Sacramento County						**61%**	**6.5**	**35.8**	**495.1**	**TPY**	to occur during 2009 calendar year						
Emissions to occur in Sutter County						**39%**	**74.0**	**399.9**	**5854.3**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sacramento County						**61%**	**115.7**	**625.5**	**9156.7**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						

*These calculations represent worst-case emissions from construction activities associated with Sacramento East Levee work

Sacramento East Levee Improvements Alt 1, 1-4b

***84% of reaches 1-4b occurs in Sutter County, 16% of 1-4b**

	ROG	NOX	PM10	Unit	Quantity	Unit	ROG	NOX	PM10	Unit	Distance (miles/round-trip)	# of Haul Loads	Total Miles Traveled	Total Miles Traveled/Day	Time frame	Conversion Factor	
[1]Clearing, Grubbing, Stripping, Grading (concurrent with [2,3])					0.0	yd3					0.0	0.0	4.3	4.3	27.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive length of levee each day			
Haul Truck(s)	0.70	8.63	0.27	g/mile	5.0		0.0	0.4	0.0	lb/yr						0.00220462	lb/gram
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		97.3	377.4	19.5	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	2.0		196.7	862.1	45.9	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		99.5	757.2	41.0	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	2.0		64.7	525.4	28.6	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	30.0	78.6	5.7	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	5.0	trucks			6.1	lb/yr							
Total							**488.2**	**2601.0**	**146.7**	**lb/yr**						2000	lb/ton
Total							**18.1**	**96.3**	**5.4**	**lb/day**							
[2]Relocate Canal and Tree Removal (concurrent with [1,3])					0.0	yd3					0.0	0.0	4.3	4.3	48.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive length of levee each day			
Excavator(s)	1.84	6.47	0.34	lb/day	2.0		176.7	620.9	32.8	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	2.0		0.0	0.2	0.0	lb/yr						0.00220462	lb/gram
Loader(s)	0.92	7.01	0.38	lb/day	1.0		44.2	336.5	18.2	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	53.3	139.7	10.2	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	4.0	trucks			4.9	lb/yr							
Total							**274.2**	**1097.3**	**598.3**	**lb/yr**						2000	lb/ton
Total							**5.7**	**22.9**	**12.5**	**lb/day**							
[3]Excavate Stability Berm/Inspection Trech (concurrent with [1,2])				Reusable Onsite Fill	111000.0	yd3					0.1	7928.6	792.9	28.3	28.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Excavator(s)	1.84	6.47	0.34	lb/day	4.0		206.1	724.4	38.3	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	20.0		2039.6	8940.2	475.9	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	4.0		1.2	15.1	0.5	lb/yr						0.00220462	lb/gram
Bulldozers	3.63	21.55	1.12	lb/day	3.0		304.8	1810.1	93.7	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	3.0		100.7	817.3	44.4	lb/yr							
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		201.7	782.7	40.3	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	31.1	81.5	5.9	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			223.9	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Aggregate Storage Piles	-	-	0.002	lb/ton					221.8	lb/yr	1.25	4955.36					
							-	-									
Total							**2885.2**	**13171.3**	**1144.7**	**lb/yr**						2000	lb/ton
Total							**103.0**	**470.4**	**40.9**	**lb/day**							
[4]Borrow Excavation, Haul and Place Adjacent Levee Raise, Cutoff Wall, & Seepage Berms (concurrent with [5,6])				Brookfield Fill	1922000.0	yd3					5.0	137285.7	686428.6	6355.8	108.0	days	
				Commercial Fill	38333.3	yd3					30.0	2738.1	82142.9	760.6	108.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Water Truck(s)	3.60	13.98	0.72	lb/day	5.0		1945.2	7547.3	389.0	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	15.0		5900.2	25862.7	1376.7	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		398.0	3028.7	163.9	lb/yr							
Bulldozers	3.63	21.55	1.12	lb/day	4.0		1567.3	9309.3	481.9	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	6.0		1348.2	6107.5	337.1	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	6.0		776.7	6305.1	342.7	lb/yr							
Excavator(s)	1.84	6.47	0.34	lb/day	4.0		795.1	2794.0	147.7	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	90.0		1186.1	14622.8	457.5	lb/yr						0.00220462	lb/gram
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	120.0	314.3	22.9	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	90.0	trucks	-	-	689,956.4	lb/yr	*assumes that all material hauling is along unpaved haul routes						
Travel on paved roads			0.28	lb/VMT	0.0	trucks			-	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Material loading at borrow			0.04	lb/ton					99,462.2	lb/yr	1.25	22689.04					
Material unloading at levee			0.005	lb/ton					12,864.7	lb/yr	1.25	22689.04					
Bulldozing	-	-	0.41	lb/hr	12.0	hrs/day			532.28	lb/yr							
Total							**14036.8**	**75891.6**	**806534.7**	**lb/yr**						2000	lb/ton
Total							**130.0**	**702.7**	**7467.9**	**lb/day**							
[5]Reconstruct Garden Hwy/Install Surface Drainage (concurrent with [4,6])					0.0	yd3					10.0	0.0	10.0	10.0	27.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive 10 miles each day			
Backhoe(s)	0.67	4.54	0.38	lb/day	2.0		36.3	245.4	20.5	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	2.0		112.4	509.0	28.1	lb/yr							
Roller(s)	0.59	4.47	0.24	lb/day	2.0		31.7	241.2	13.1	lb/yr							
Paver(s)	0.93	7.08	0.38	lb/day	2.0		50.2	382.2	20.7	lb/yr							
Concrete Truck(s)	3.60	13.98	0.72	lb/day	3.0		291.8	1132.1	58.4	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	8.0		0.1	1.5	0.0	lb/yr						0.00220462	lb/gram
Employee Trips	0.29	0.61	0.04	g/mile	60.0	employees	40.9	86.9	5.4	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			22.6	lb/yr							
Total							**563.3**	**2598.2**	**110.4**	**lb/yr**						2000	lb/ton
Total							**20.9**	**96.2**	**4.1**	**lb/day**							
[6]Construct Relief Wells/Berm/Drainage Canal (concurrent with [4,5])					0.0	yd3					0.0	0.0	0.0	0.0	30.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	5.0		540.3	2096.5	108.1	lb/yr							
Drill Rig(s)	2.87	5.75	0.43	lb/day	3.0		258.6	517.3	38.8	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	33.3	87.3	6.3	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	5.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**832.3**	**2701.0**	**153.2**	**lb/yr**						2000	lb/ton
Total							**27.7**	**90.0**	**5.1**	**lb/day**							
[7]Site Restoration/Demobilization					0.0	yd3					0.1	0.0	0.0	0.0	34.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	6.0		734.8	2851.2	147.0	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	3.0		0.0	0.0	0.0	lb/yr						0.00220462	lb/gram
Employee Trips	1.20	9.73	0.53	g/mile	60.0	employees	215.6	1750.4	95.1	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**950.5**	**4601.6**	**242.1**	**lb/yr**						2000	lb/ton
Total							**28.0**	**135.3**	**7.1**	**lb/day**							
2009 calendar year																	
Total from East Levee Project						**100%**	**10.0**	**51.3**	**404.5**	**TPY**	to occur during 2009 calendar year						
Total from East Levee Project						**100%**	**178.6**	**889.0**	**7477.1**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sutter County						**84%**	**8.4**	**43.1**	**339.8**	**TPY**	to occur during 2009 calendar year						
Emissions to occur in Sacramento County						**16%**	**1.6**	**8.2**	**64.7**	**TPY**	to occur during 2009 calendar year						
Emissions to occur in Sutter County						**84%**	**150.0**	**746.7**	**6280.8**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sacramento County						**16%**	**28.6**	**142.2**	**1196.3**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						

*These calculations represent worst-case emissions from construction activities associated with Sacramento East Levee work

Sacramento East Levee Improvements Alt 2, 1-20a

***84% of reaches 1-4b occurs in Sutter County, 16% of 1-4b and 100% of 5a-20a occurs in Sacramento County**

	ROG	NOX	PM10	Unit	Quantity	Unit	ROG	NOX	PM10	Unit	Distance (miles/round-trip)	# of Haul Loads	Total Miles Traveled	Total Miles Traveled/Day	Time frame	Conversion Factor	
[1]Clearing, Grubbing, Stripping, Grading (concurrent with [2,3])					0.0	yd3					0.0	0.0	4.3	4.3	27.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive length of levee each day			
Haul Truck(s)	0.70	8.63	0.27	g/mile	5.0		0.0	0.4	0.0	lb/yr						0.00220462	lb/gram
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		97.3	377.4	19.5	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	2.0		196.7	862.1	45.9	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		99.5	757.2	41.0	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	2.0		64.7	525.4	28.6	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	30.0	78.6	5.7	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	5.0	trucks			6.1	lb/yr							
Total							**488.2**	**2601.0**	**146.7**	**lb/yr**						2000	lb/ton
Total							**18.1**	**96.3**	**5.4**	**lb/day**							
[2]Relocate Canal and Tree Removal (concurrent with [1,3])					0.0	yd3					0.0	0.0	4.3	4.3	48.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive length of levee each day			
Excavator(s)	1.84	6.47	0.34	lb/day	2.0		176.7	620.9	32.8	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	2.0		0.0	0.2	0.0	lb/yr						0.00220462	lb/gram
Loader(s)	0.92	7.01	0.38	lb/day	1.0		44.2	336.5	18.2	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	53.3	139.7	10.2	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	4.0	trucks			4.9	lb/yr							
Total							**274.2**	**1097.3**	**598.3**	**lb/yr**						2000	lb/ton
Total							**5.7**	**22.9**	**12.5**	**lb/day**							
[3]Excavate Stability Berm/Inspection Trech (concurrent with [1,2])				Reusable Onsite Fill	264000.0	yd3					0.1	18857.1	1885.7	67.3	28.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Excavator(s)	1.84	6.47	0.34	lb/day	4.0		206.1	724.4	38.3	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	20.0		2039.6	8940.2	475.9	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	4.0		2.9	35.9	1.1	lb/yr						0.00220462	lb/gram
Bulldozers	3.63	21.55	1.12	lb/day	3.0		304.8	1810.1	93.7	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	3.0		100.7	817.3	44.4	lb/yr							
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		201.7	782.7	40.3	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	31.1	81.5	5.9	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			532.5	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Aggregate Storage Piles	-	-	0.002	lb/ton					527.5	lb/yr	1.25	11785.71					
							-	-									
Total							**2886.9**	**13192.1**	**1759.7**	**lb/yr**						2000	lb/ton
Total							**103.1**	**471.1**	**62.8**	**lb/day**							
[4]Borrow Excavation, Haul and Place Adjacent Levee Raise, Cutoff Wall, & Seepage Berms (concurrent with [5,6])				Brookfield Fill	2762000.0	yd3					5.0	197285.7	986428.6	9133.6	108.0	days	
				Commercial Fill	176043.8	yd3					30.0	12574.6	377236.7	3492.9	108.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Water Truck(s)	3.60	13.98	0.72	lb/day	5.0		1945.2	7547.3	389.0	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	15.0		5900.2	25862.7	1376.7	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		398.0	3028.7	163.9	lb/yr							
Bulldozers	3.63	21.55	1.12	lb/day	4.0		1567.3	9309.3	481.9	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	6.0		1348.2	6107.5	337.1	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	6.0		776.7	6305.1	342.7	lb/yr							
Excavator(s)	1.84	6.47	0.34	lb/day	4.0		795.1	2794.0	147.7	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	90.0		2104.5	25945.0	811.7	lb/yr						0.00220462	lb/gram
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	120.0	314.3	22.9	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	90.0	trucks	-	-	1,224,179.7	lb/yr	*assumes that all material hauling is along unpaved haul routes						
Travel on paved roads			0.28	lb/VMT	0.0	trucks			-	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Material loading at borrow			0.04	lb/ton					149,068.7	lb/yr	1.25	34005.14					
Material unloading at levee			0.005	lb/ton					19,280.9	lb/yr	1.25	34005.14					
Bulldozing	-	-	0.41	lb/hr	12.0	hrs/day			532.28	lb/yr							
Total							**14955.1**	**87213.8**	**1397135.0**	**lb/yr**						2000	lb/ton
Total							**138.5**	**807.5**	**12936.4**	**lb/day**							
[5]Reconstruct Garden Hwy/Install Surface Drainage (concurrent with [4,6])					0.0	yd3					10.0	0.0	10.0	10.0	27.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive 10 miles each day			
Backhoe(s)	0.67	4.54	0.38	lb/day	2.0		36.3	245.4	20.5	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	2.0		112.4	509.0	28.1	lb/yr							
Roller(s)	0.59	4.47	0.24	lb/day	2.0		31.7	241.2	13.1	lb/yr							
Paver(s)	0.93	7.08	0.38	lb/day	2.0		50.2	382.2	20.7	lb/yr							
Concrete Truck(s)	3.60	13.98	0.72	lb/day	3.0		291.8	1132.1	58.4	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	8.0		0.1	1.5	0.0	lb/yr						0.00220462	lb/gram
Employee Trips	0.29	0.61	0.04	g/mile	60.0	employees	40.9	86.9	5.4	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			22.6	lb/yr							
Total							**563.3**	**2598.2**	**110.4**	**lb/yr**						2000	lb/ton
Total							**20.9**	**96.2**	**4.1**	**lb/day**							
[6]Construct Relief Wells/Berm/Drainage Canal (concurrent with [4,5])					0.0	yd3					0.0	0.0	0.0	0.0	30.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	5.0		540.3	2096.5	108.1	lb/yr							
Drill Rig(s)	2.87	5.75	0.43	lb/day	3.0		258.6	517.3	38.8	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	33.3	87.3	6.3	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	5.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**832.3**	**2701.0**	**153.2**	**lb/yr**						2000	lb/ton
Total							**27.7**	**90.0**	**5.1**	**lb/day**							
[7]Site Restoration/Demobilization					0.0	yd3					0.1	0.0	0.0	0.0	34.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	6.0		734.8	2851.2	147.0	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	3.0		0.0	0.0	0.0	lb/yr						0.00220462	lb/gram
Employee Trips	1.20	9.73	0.53	g/mile	60.0	employees	215.6	1750.4	95.1	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**950.5**	**4601.6**	**242.1**	**lb/yr**						2000	lb/ton
Total							**28.0**	**135.3**	**7.1**	**lb/day**							
2009 calendar year																	
Total from East Levee Project						**100%**	**10.5**	**57.0**	**700.1**	**TPY**	to occur during 2009 calendar year						
Total from East Levee Project						**100%**	**187.1**	**993.8**	**12945.6**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sutter County						**58%**	**6.1**	**33.2**	**407.4**	**TPY**	to occur during 2009 calendar year						
Emissions to occur in Sacramento County						**42%**	**4.4**	**23.9**	**294.0**	**TPY**	to occur during 2009 calendar year						
Emissions to occur in Sutter County						**58%**	**108.5**	**576.4**	**7508.5**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sacramento County						**42%**	**78.6**	**417.4**	**5437.2**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						

*These calculations represent worst-case emissions from construction activities associated with Sacramento East Levee work

Sacramento East Levee Improvements Alt 2, 1-4b

***84% of reaches 1-4b occurs in Sutter County, 16% of 1-4b**

	ROG	NOX	PM10	Unit	Quantity	Unit	ROG	NOX	PM10	Unit	Distance (miles/round-trip)	# of Haul Loads	Total Miles Traveled	Total Miles Traveled/Day	Time frame	Conversion Factor	
[1]Clearing, Grubbing, Stripping, Grading (concurrent with [2,3])					0.0	yd3					0.0	0.0	4.3	4.3	27.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive length of levee each day			
Haul Truck(s)	0.70	8.63	0.27	g/mile	5.0		0.0	0.4	0.0	lb/yr						0.00220462	lb/gram
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		97.3	377.4	19.5	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	2.0		196.7	862.1	45.9	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		99.5	757.2	41.0	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	2.0		64.7	525.4	28.6	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	30.0	78.6	5.7	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	5.0	trucks			6.1	lb/yr							
Total							**488.2**	**2601.0**	**146.7**	**lb/yr**						2000	lb/ton
Total							**18.1**	**96.3**	**5.4**	**lb/day**							
[2]Relocate Canal and Tree Removal (concurrent with [1,3])					0.0	yd3					0.0	0.0	4.3	4.3	48.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive length of levee each day			
Excavator(s)	1.84	6.47	0.34	lb/day	2.0		176.7	620.9	32.8	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	2.0		0.0	0.2	0.0	lb/yr						0.00220462	lb/gram
Loader(s)	0.92	7.01	0.38	lb/day	1.0		44.2	336.5	18.2	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	53.3	139.7	10.2	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	4.0	trucks			4.9	lb/yr							
Total							**274.2**	**1097.3**	**598.3**	**lb/yr**						2000	lb/ton
Total							**5.7**	**22.9**	**12.5**	**lb/day**							
[3]Excavate Stability Berm/Inspection Trech (concurrent with [1,2])				Reusable Onsite Fill	264000.0	yd3					0.1	18857.1	1885.7	67.3	28.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Excavator(s)	1.84	6.47	0.34	lb/day	4.0		206.1	724.4	38.3	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	20.0		2039.6	8940.2	475.9	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	4.0		2.9	35.9	1.1	lb/yr						0.00220462	lb/gram
Bulldozers	3.63	21.55	1.12	lb/day	3.0		304.8	1810.1	93.7	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	3.0		100.7	817.3	44.4	lb/yr							
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		201.7	782.7	40.3	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	31.1	81.5	5.9	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			532.5	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Aggregate Storage Piles	-	-	0.002	lb/ton					527.5	lb/yr	1.25	11785.71					
							-	-									
Total							**2886.9**	**13192.1**	**1759.7**	**lb/yr**						2000	lb/ton
Total							**103.1**	**471.1**	**62.8**	**lb/day**							
[4]Borrow Excavation, Haul and Place Adjacent Levee Raise, Cutoff Wall, & Seepage Berms (concurrent with [5,6])				Brookfield Fill	1889000.0	yd3					5.0	134928.6	674642.9	6246.7	108.0	days	
				Commercial Fill	64902.4	yd3					30.0	4635.9	139076.5	1287.7	108.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Water Truck(s)	3.60	13.98	0.72	lb/day	5.0		1945.2	7547.3	389.0	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	15.0		5900.2	25862.7	1376.7	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		398.0	3028.7	163.9	lb/yr							
Bulldozers	3.63	21.55	1.12	lb/day	4.0		1567.3	9309.3	481.9	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	6.0		1348.2	6107.5	337.1	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	6.0		776.7	6305.1	342.7	lb/yr							
Excavator(s)	1.84	6.47	0.34	lb/day	4.0		795.1	2794.0	147.7	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	90.0		1255.8	15481.7	484.4	lb/yr						0.00220462	lb/gram
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	120.0	314.3	22.9	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	90.0	trucks	-	-	730,486.2	lb/yr	*assumes that all material hauling is along unpaved haul routes						
Travel on paved roads			0.28	lb/VMT	0.0	trucks			-	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Material loading at borrow			0.04	lb/ton					99,135.9	lb/yr	1.25	22614.61					
Material unloading at levee			0.005	lb/ton					12,822.5	lb/yr	1.25	22614.61					
Bulldozing	-	-	0.41	lb/hr	12.0	hrs/day			532.28	lb/yr							
Total							**14106.4**	**76750.6**	**846723.0**	**lb/yr**						2000	lb/ton
Total							**130.6**	**710.7**	**7840.0**	**lb/day**							
[5]Reconstruct Garden Hwy/Install Surface Drainage (concurrent with [4,6])					0.0	yd3					10.0	0.0	10.0	10.0	27.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive 10 miles each day			
Backhoe(s)	0.67	4.54	0.38	lb/day	2.0		36.3	245.4	20.5	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	2.0		112.4	509.0	28.1	lb/yr							
Roller(s)	0.59	4.47	0.24	lb/day	2.0		31.7	241.2	13.1	lb/yr							
Paver(s)	0.93	7.08	0.38	lb/day	2.0		50.2	382.2	20.7	lb/yr							
Concrete Truck(s)	3.60	13.98	0.72	lb/day	3.0		291.8	1132.1	58.4	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	8.0		0.1	1.5	0.0	lb/yr						0.00220462	lb/gram
Employee Trips	0.29	0.61	0.04	g/mile	60.0	employees	40.9	86.9	5.4	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			22.6	lb/yr							
Total							**563.3**	**2598.2**	**110.4**	**lb/yr**						2000	lb/ton
Total							**20.9**	**96.2**	**4.1**	**lb/day**							
[6]Construct Relief Wells/Berm/Drainage Canal (concurrent with [4,5])					0.0	yd3					0.0	0.0	0.0	0.0	30.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	5.0		540.3	2096.5	108.1	lb/yr							
Drill Rig(s)	2.87	5.75	0.43	lb/day	3.0		258.6	517.3	38.8	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	33.3	87.3	6.3	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	5.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**832.3**	**2701.0**	**153.2**	**lb/yr**						2000	lb/ton
Total							**27.7**	**90.0**	**5.1**	**lb/day**							
[7]Site Restoration/Demobilization					0.0	yd3					0.1	0.0	0.0	0.0	34.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	6.0		734.8	2851.2	147.0	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	3.0		0.0	0.0	0.0	lb/yr						0.00220462	lb/gram
Employee Trips	1.20	9.73	0.53	g/mile	60.0	employees	215.6	1750.4	95.1	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**950.5**	**4601.6**	**242.1**	**lb/yr**						2000	lb/ton
Total							**28.0**	**135.3**	**7.1**	**lb/day**							
2009 calendar year																	
Total from East Levee Project						**100%**	**10.1**	**51.8**	**424.9**	**TPY**	to occur during 2009 calendar year						
Total from East Levee Project						**100%**	**179.2**	**896.9**	**7849.2**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sutter County						**84%**	**8.4**	**43.5**	**356.9**	**TPY**	to occur during 2009 calendar year						
Emissions to occur in Sacramento County						**16%**	**1.6**	**8.3**	**68.0**	**TPY**	to occur during 2009 calendar year						
Emissions to occur in Sutter County						**84%**	**150.5**	**753.4**	**6593.3**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sacramento County						**16%**	**28.7**	**143.5**	**1255.9**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						

*These calculations represent worst-case emissions from construction activities associated with Sacramento East Levee work

Sacramento East Levee Improvements Alt 3, 1-20a

***84% of reaches 1-4b occurs in Sutter County, 16% of 1-4b and 100% of 5a-20a occurs in Sacramento County**

	ROG	NOX	PM10	Unit	Quantity	Unit	ROG	NOX	PM10	Unit	Distance (miles/round-trip)	# of Haul Loads	Total Miles Traveled	Total Miles Traveled/Day	Time frame	Conversion Factor	
[1]Clearing, Grubbing, Stripping, Grading (concurrent with [2,3])					0.0	yd3					0.0	0.0	4.3	4.3	27.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive length of levee each day			
Haul Truck(s)	0.70	8.63	0.27	g/mile	5.0		0.0	0.4	0.0	lb/yr						0.00220462	lb/gram
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		97.3	377.4	19.5	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	2.0		196.7	862.1	45.9	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		99.5	757.2	41.0	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	2.0		64.7	525.4	28.6	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	30.0	78.6	5.7	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	5.0	trucks			6.1	lb/yr							
Total							**488.2**	**2601.0**	**146.7**	**lb/yr**						2000	lb/ton
Total							**18.1**	**96.3**	**5.4**	**lb/day**							
[2]Relocate Canal and Tree Removal (concurrent with [1,3])					0.0	yd3					0.0	0.0	4.3	4.3	48.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive length of levee each day			
Excavator(s)	1.84	6.47	0.34	lb/day	2.0		176.7	620.9	32.8	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	2.0		0.0	0.2	0.0	lb/yr						0.00220462	lb/gram
Loader(s)	0.92	7.01	0.38	lb/day	1.0		44.2	336.5	18.2	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	53.3	139.7	10.2	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	4.0	trucks			4.9	lb/yr							
Total							**274.2**	**1097.3**	**598.3**	**lb/yr**						2000	lb/ton
Total							**5.7**	**22.9**	**12.5**	**lb/day**							
[3]Excavate Stability Berm/Inspection Trech (concurrent with [1,2])				Reusable Onsite Fill	496500.0	yd3					0.1	35464.3	3546.4	126.7	28.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Excavator(s)	1.84	6.47	0.34	lb/day	4.0		206.1	724.4	38.3	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	20.0		2039.6	8940.2	475.9	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	4.0		5.5	67.5	2.1	lb/yr						0.00220462	lb/gram
Bulldozers	3.63	21.55	1.12	lb/day	3.0		304.8	1810.1	93.7	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	3.0		100.7	817.3	44.4	lb/yr							
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		201.7	782.7	40.3	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	31.1	81.5	5.9	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			1,001.4	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Aggregate Storage Piles	-	-	0.002	lb/ton					992.1	lb/yr	1.25	22165.18					
							-	-									
Total							**2889.5**	**13223.7**	**2694.2**	**lb/yr**						2000	lb/ton
Total							**103.2**	**472.3**	**96.2**	**lb/day**							
[4]Borrow Excavation, Haul and Place Adjacent Levee Raise, Cutoff Wall, & Seepage Berms (concurrent with [5,6])				Brookfield Fill	4144500.0	yd3					5.0	296035.7	1480178.6	13705.4	108.0	days	
				Commercial Fill	48909.1	yd3					30.0	3493.5	104805.2	970.4	108.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Water Truck(s)	3.60	13.98	0.72	lb/day	5.0		1945.2	7547.3	389.0	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	15.0		5900.2	25862.7	1376.7	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		398.0	3028.7	163.9	lb/yr							
Bulldozers	3.63	21.55	1.12	lb/day	4.0		1567.3	9309.3	481.9	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	6.0		1348.2	6107.5	337.1	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	6.0		776.7	6305.1	342.7	lb/yr							
Excavator(s)	1.84	6.47	0.34	lb/day	4.0		795.1	2794.0	147.7	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	90.0		2446.0	30155.7	943.5	lb/yr						0.00220462	lb/gram
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	120.0	314.3	22.9	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	90.0	trucks	-	-	1,422,860.1	lb/yr	*assumes that all material hauling is along unpaved haul routes						
Travel on paved roads			0.28	lb/VMT	0.0	trucks			-	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Material loading at borrow			0.04	lb/ton					212,762.6	lb/yr	1.25	48534.83					
Material unloading at levee			0.005	lb/ton					27,519.2	lb/yr	1.25	48534.83					
Bulldozing	-	-	0.41	lb/hr	12.0	hrs/day			532.28	lb/yr							
Total							**15296.7**	**91424.6**	**1667879.5**	**lb/yr**						2000	lb/ton
Total							**141.6**	**846.5**	**15443.3**	**lb/day**							
[5]Reconstruct Garden Hwy/Install Surface Drainage (concurrent with [4,6])					0.0	yd3					10.0	0.0	10.0	10.0	27.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive 10 miles each day			
Backhoe(s)	0.67	4.54	0.38	lb/day	2.0		36.3	245.4	20.5	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	2.0		112.4	509.0	28.1	lb/yr							
Roller(s)	0.59	4.47	0.24	lb/day	2.0		31.7	241.2	13.1	lb/yr							
Paver(s)	0.93	7.08	0.38	lb/day	2.0		50.2	382.2	20.7	lb/yr							
Concrete Truck(s)	3.60	13.98	0.72	lb/day	3.0		291.8	1132.1	58.4	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	8.0		0.1	1.5	0.0	lb/yr						0.00220462	lb/gram
Employee Trips	0.29	0.61	0.04	g/mile	60.0	employees	40.9	86.9	5.4	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			22.6	lb/yr							
Total							**563.3**	**2598.2**	**110.4**	**lb/yr**						2000	lb/ton
Total							**20.9**	**96.2**	**4.1**	**lb/day**							
[6]Construct Relief Wells/Berm/Drainage Canal (concurrent with [4,5])					0.0	yd3					0.0	0.0	0.0	0.0	30.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	5.0		540.3	2096.5	108.1	lb/yr							
Drill Rig(s)	2.87	5.75	0.43	lb/day	3.0		258.6	517.3	38.8	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	33.3	87.3	6.3	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	5.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**832.3**	**2701.0**	**153.2**	**lb/yr**						2000	lb/ton
Total							**27.7**	**90.0**	**5.1**	**lb/day**							
[7]Site Restoration/Demobilization					0.0	yd3					0.1	0.0	0.0	0.0	34.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	6.0		734.8	2851.2	147.0	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	3.0		0.0	0.0	0.0	lb/yr						0.00220462	lb/gram
Employee Trips	1.20	9.73	0.53	g/mile	60.0	employees	215.6	1750.4	95.1	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**950.5**	**4601.6**	**242.1**	**lb/yr**						2000	lb/ton
Total							**28.0**	**135.3**	**7.1**	**lb/day**							
2009 calendar year																	
Total from East Levee Project						**100%**	**10.6**	**59.1**	**835.9**	**TPY**	to occur during 2009 calendar year						
Total from East Levee Project						**100%**	**190.2**	**1032.8**	**15452.5**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sutter County						**42%**	**4.5**	**24.8**	**351.1**	**TPY**	to occur during 2009 calendar year						
Emissions to occur in Sacramento County						**58%**	**6.2**	**34.3**	**484.8**	**TPY**	to occur during 2009 calendar year						
Emissions to occur in Sutter County						**42%**	**79.9**	**433.8**	**6490.1**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sacramento County						**58%**	**110.3**	**599.0**	**8962.5**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						

*These calculations represent worst-case emissions from construction activities associated with Sacramento East Levee work

Sacramento East Levee Improvements Alt 3, 1-4b

***84% of reaches 1-4b occurs in Sutter County, 16% of 1-4b occurs in Sacramento County**

	ROG	NOX	PM10	Unit	Quantity	Unit	ROG	NOX	PM10	Unit	Distance (miles/round-trip)	# of Haul Loads	Total Miles Traveled	Total Miles Traveled/Day	Time frame	Conversion Factor	
[1]Clearing, Grubbing, Stripping, Grading (concurrent with [2,3])					0.0	yd3					0.0	0.0	4.3	4.3	27.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive length of levee each day			
Haul Truck(s)	0.70	8.63	0.27	g/mile	5.0		0.0	0.4	0.0	lb/yr						0.00220462	lb/gram
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		97.3	377.4	19.5	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	2.0		196.7	862.1	45.9	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		99.5	757.2	41.0	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	2.0		64.7	525.4	28.6	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	30.0	78.6	5.7	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	5.0	trucks			6.1	lb/yr							
Total							**488.2**	**2601.0**	**146.7**	**lb/yr**						2000	lb/ton
Total							**18.1**	**96.3**	**5.4**	**lb/day**							
[2]Relocate Canal and Tree Removal (concurrent with [1,3])					0.0	yd3					0.0	0.0	4.3	4.3	48.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive length of levee each day			
Excavator(s)	1.84	6.47	0.34	lb/day	2.0		176.7	620.9	32.8	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	2.0		0.0	0.2	0.0	lb/yr						0.00220462	lb/gram
Loader(s)	0.92	7.01	0.38	lb/day	1.0		44.2	336.5	18.2	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	53.3	139.7	10.2	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	4.0	trucks			4.9	lb/yr							
Total							**274.2**	**1097.3**	**598.3**	**lb/yr**						2000	lb/ton
Total							**5.7**	**22.9**	**12.5**	**lb/day**							
[3]Excavate Stability Berm/Inspection Trech (concurrent with [1,2])				Reusable Onsite Fill	322000.0	yd3					0.1	23000.0	2300.0	82.1	28.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Excavator(s)	1.84	6.47	0.34	lb/day	4.0		206.1	724.4	38.3	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	20.0		2039.6	8940.2	475.9	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	4.0		3.5	43.8	1.4	lb/yr						0.00220462	lb/gram
Bulldozers	3.63	21.55	1.12	lb/day	3.0		304.8	1810.1	93.7	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	3.0		100.7	817.3	44.4	lb/yr							
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		201.7	782.7	40.3	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	31.1	81.5	5.9	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			649.5	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Aggregate Storage Piles	-	-	0.002	lb/ton					643.4	lb/yr	1.25	14375.00					
							-	-									
Total							**2887.5**	**13200.0**	**1992.8**	**lb/yr**						2000	lb/ton
Total							**103.1**	**471.4**	**71.2**	**lb/day**							
[4]Borrow Excavation, Haul and Place Adjacent Levee Raise, Cutoff Wall, & Seepage Berms (concurrent with [5,6])				Brookfield Fill	1983000.0	yd3					5.0	141642.9	708214.3	6557.5	108.0	days	
				Commercial Fill	26909.1	yd3					30.0	1922.1	57662.3	533.9	108.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Water Truck(s)	3.60	13.98	0.72	lb/day	5.0		1945.2	7547.3	389.0	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	15.0		5900.2	25862.7	1376.7	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		398.0	3028.7	163.9	lb/yr							
Bulldozers	3.63	21.55	1.12	lb/day	4.0		1567.3	9309.3	481.9	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	6.0		1348.2	6107.5	337.1	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	6.0		776.7	6305.1	342.7	lb/yr							
Excavator(s)	1.84	6.47	0.34	lb/day	4.0		795.1	2794.0	147.7	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	90.0		1181.9	14571.5	455.9	lb/yr						0.00220462	lb/gram
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	120.0	314.3	22.9	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	90.0	trucks	-	-	687,537.2	lb/yr	*assumes that all material hauling is along unpaved haul routes						
Travel on paved roads			0.28	lb/VMT	0.0	trucks			-	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Material loading at borrow			0.04	lb/ton					101,977.5	lb/yr	1.25	23262.84					
Material unloading at levee			0.005	lb/ton					13,190.0	lb/yr	1.25	23262.84					
Bulldozing	-	-	0.41	lb/hr	12.0	hrs/day			532.28	lb/yr							
Total							**14032.6**	**75840.3**	**806954.7**	**lb/yr**						2000	lb/ton
Total							**129.9**	**702.2**	**7471.8**	**lb/day**							
[5]Reconstruct Garden Hwy/Install Surface Drainage (concurrent with [4,6])					0.0	yd3					10.0	0.0	10.0	10.0	27.0	days	
Mobile Sources												*assumes haul load = 14 yd3		*assumes haul trucks drive 10 miles each day			
Backhoe(s)	0.67	4.54	0.38	lb/day	2.0		36.3	245.4	20.5	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	2.0		112.4	509.0	28.1	lb/yr							
Roller(s)	0.59	4.47	0.24	lb/day	2.0		31.7	241.2	13.1	lb/yr							
Paver(s)	0.93	7.08	0.38	lb/day	2.0		50.2	382.2	20.7	lb/yr							
Concrete Truck(s)	3.60	13.98	0.72	lb/day	3.0		291.8	1132.1	58.4	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	8.0		0.1	1.5	0.0	lb/yr						0.00220462	lb/gram
Employee Trips	0.29	0.61	0.04	g/mile	60.0	employees	40.9	86.9	5.4	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			22.6	lb/yr							
Total							**563.3**	**2598.2**	**110.4**	**lb/yr**						2000	lb/ton
Total							**20.9**	**96.2**	**4.1**	**lb/day**							
[6]Construct Relief Wells/Berm/Drainage Canal (concurrent with [4,5])					0.0	yd3					0.0	0.0	0.0	0.0	30.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	5.0		540.3	2096.5	108.1	lb/yr							
Drill Rig(s)	2.87	5.75	0.43	lb/day	3.0		258.6	517.3	38.8	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	60.0	employees	33.3	87.3	6.3	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	5.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**832.3**	**2701.0**	**153.2**	**lb/yr**						2000	lb/ton
Total							**27.7**	**90.0**	**5.1**	**lb/day**							
[7]Site Restoration/Demobilization					0.0	yd3					0.1	0.0	0.0	0.0	34.0	days	
Mobile Sources												*(assumes haul load = 14 yd3)					
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	6.0		734.8	2851.2	147.0	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	3.0		0.0	0.0	0.0	lb/yr						0.00220462	lb/gram
Employee Trips	1.20	9.73	0.53	g/mile	60.0	employees	215.6	1750.4	95.1	lb/yr				40.0	per employee	0.00220462	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**950.5**	**4601.6**	**242.1**	**lb/yr**						2000	lb/ton
Total							**28.0**	**135.3**	**7.1**	**lb/day**							
2009 calendar year																	
Total from East Levee Project						**100%**	**10.0**	**51.3**	**405.1**	**TPY**	to occur during 2009 calendar year						
Total from East Levee Project						**100%**	**178.5**	**888.5**	**7481.0**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sutter County						**84%**	**8.4**	**43.1**	**340.3**	**TPY**	to occur during 2009 calendar year						
Emissions to occur in Sacramento County						**16%**	**1.6**	**8.2**	**64.8**	**TPY**	to occur during 2009 calendar year						
Emissions to occur in Sutter County						**84%**	**150.0**	**746.3**	**6284.0**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sacramento County						**16%**	**28.6**	**142.2**	**1197.0**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						

*These calculations represent worst-case emissions from construction activities associated with Sacramento East Levee work

NCC South Levee Phase 2 Improvements - Cutoff Wall and Levee Raise							*all work would occur in 2009.													
*All work would occur in Sutter County																				
	ROG	NOX	PM10	Unit	Quantity	Unit	ROG	NOX	PM10	Unit	Distance (miles/round-trip)	# of Haul Loads	Total Miles Traveled	Total Miles Traveled/Day	Time frame	Conversion Factor				
[1]Clearing, Grubbing, Stripping					13500.0	yd3 (export)					10.0	964.3	9642.9	482.1	20.0	days				
Mobile Sources					*(assumes 10 miles to material disposal site)							*(assumes haul load = 14 yd3)								
Haul Truck(s)	0.70	8.63	0.27	g/mile	12.0		178.6	2201.6	68.9	lb/yr						0.00220462	lb/gram			
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		72.0	279.5	14.4	lb/yr										
Scraper(s)	3.64	15.96	0.85	lb/day	3.0		218.5	957.9	51.0	lb/yr										
Loader(s)	0.92	7.01	0.38	lb/day	1.0		18.4	140.2	7.6	lb/yr										
Employee Trips	0.21	0.55	0.04	g/mile	50.0	employees	18.5	48.5	3.5	lb/yr				40.0	per employee	0.00220462	lb/gram			
Fugitive Sources																				
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr										
Travel on paved roads			0.28	lb/VMT	12.0	trucks			2,722.9	lb/yr										
Material Handling											Tons/yd3 (gravel/sand)	Tons/day								
Truck Loading at Levee	-	-	0.04	lb/ton					685.0	lb/yr	1.25	843.75								
Truck Unloading at Off-site Disposa	-	-	0.005	lb/ton			-	-	88.6	lb/yr	1.25	843.75								
Total							**506.1**	**3627.7**	**3641.8**	**lb/yr**						2000	lb/ton			
Total							**25.3**	**181.4**	**182.1**	**lb/day**										
[2,4]Levee Degrading & Compaction (lags [1] by 14 days)					0.0	yd3					0.0	0.0	0.0	0.0	135.0	days				
Mobile Sources																				
Bulldozer(s)	3.63	21.55	1.12	lb/day	4.0		1959.1	11636.6	602.3	lb/yr										
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		972.6	3773.6	194.5	lb/yr										
Scraper(s)	3.64	15.96	0.85	lb/day	4.0		1966.7	8620.9	458.9	lb/yr										
Roller(s)	0.59	4.47	0.24	lb/day	2.0		158.5	1206.1	65.3	lb/yr										
Loader(s)	0.92	7.01	0.38	lb/day	3.0		373.1	2839.4	153.6	lb/yr										
Employee Trips	0.21	0.55	0.04	g/mile	50.0	employees	125.0	327.4	23.8	lb/yr				40.0	per employee	0.00220462	lb/gram			
Fugitive Sources																				
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr										
Travel on paved roads			0.28	lb/VMT	0.0	trucks			-	lb/yr										
Material Handling																				
Bulldozing	-	-	0.41	lb/hr	10.0	hrs/day			554.45	lb/yr										
Total							**5555.0**	**28404.0**	**2052.9**	**lb/yr**						2000	lb/ton			
Total							**41.1**	**210.4**	**15.2**	**lb/day**										
[3,5]Cutoff Wall Construction & Borrow Site Excavation (lags [2] by 14 days)					195000.0	yd3 (borrow)					10.0	13928.6	139285.7	928.6	150.0	days				
Mobile Sources					*(assumes Brookfield borrow site; also assumes exported material is transported on return trip to borrow site)							*(assumes haul load = 14 yd3)								
Excavator(s)	1.84	6.47	0.34	lb/day	3.0		828.2	2910.5	153.8	lb/yr										
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		540.3	2096.5	108.1	lb/yr										
Other Equipment	2.08	9.43	0.52	lb/day	6.0		1872.6	8482.7	468.1	lb/yr										
Loader(s)	0.92	7.01	0.38	lb/day	3.0		414.6	3154.9	170.7	lb/yr										
Haul Truck(s)	0.70	8.63	0.27	g/mile	4.0		215.0	2650.0	82.9	lb/yr						0.00220462	lb/gram			
Pick-up Truck(s)	0.21	0.55	0.04	g/mile	10.0		0.7	1.8	0.1	lb/yr						0.00220462	lb/gram			
Employee Trips	0.21	0.55	0.04	g/mile	50.0	employees	138.9	363.8	26.5	lb/yr				40.0	per employee	0.00220462	lb/gram			
Fugitive Sources																				
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr										
Travel on paved roads			0.28	lb/VMT	4.0	trucks			39,330.9	lb/yr										
Material Handling											Tons/yd3 (gravel/sand)	Tons/day								
Truck Loading at Borrow	-	-	0.04	lb/ton					9893.8	lb/yr	1.25	1625.00								
Truck Unloading at Levee	-	-	0.005	lb/ton			-	-	1279.7	lb/yr	1.25	1625.00								
Total							**4010.1**	**19660.1**	**51514.6**	**lb/yr**						2000	lb/ton			
Total							**26.7**	**131.1**	**343.4**	**lb/day**										
[6]Demobilization/Cleanup					0.0	yd3					0.0	0.0	0.0	0.0	14.0	days				
Mobile Sources																				
Water Truck(s)	3.60	13.98	0.72	lb/day	3.0		151.3	587.0	30.3	lb/yr										
Haul Truck(s)	0.70	8.63	0.27	g/mile	2.0		0.2	2.7	0.1	lb/yr	*(assumes haul truck drives 5.1 miles/day)					0.00220462	lb/gram			
Employee Trips	0.21	0.55	0.04	g/mile	50.0	employees	13.0	34.0	2.5	lb/yr				40.0	per employee	0.00220462	lb/gram			
Fugitive Sources																				
Travel on unpaved roads	-	-	0.90	lb/VMT	2.0	trucks	-	-	128.2	lb/yr	*(assumes haul truck drives 5.1 miles/day)									
Travel on paved roads			0.28	lb/VMT	0.0	trucks			-	lb/yr										
Total							**164.5**	**623.7**	**161.0**	**lb/yr**						2000	lb/ton			
Total							**11.7**	**44.5**	**11.5**	**lb/day**										
Levee Raise & Borrow Site Excavation					685000.0	yd3					10.0	48928.6	489285.7	3261.9	150.0	days				
Mobile Sources												*(assumes haul load = 14 yd3)								
Water Truck(s)	3.60	13.98	0.72	lb/day	3.0		1621.0	6289.4	324.2	lb/yr										
Bulldozer(s)	3.63	21.55	1.12	lb/day	2.0		1088.4	6464.8	334.6	lb/yr										
Roller(s)	0.59	4.47	0.24	lb/day	4.0		352.2	2680.3	145.0	lb/yr										
Excavator(s)	1.84	6.47	0.34	lb/day	5.0		1380.3	4850.8	256.3	lb/yr										
Haul Truck(s)	0.70	8.63	0.27	g/mile	30.0		755.1	9309.1	291.2	lb/yr						0.00220462	lb/gram			
Employee Trips	0.29	0.61	0.04	g/mile	65.0	employees	245.9	522.8	32.7	lb/yr				40.0	per employee	0.00220462	lb/gram			
Fugitive Sources																				
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr										
Travel on paved roads			0.28	lb/VMT	30.0	trucks			138,162.3	lb/yr										
Material Handling											Tons/yd3 (gravel/sand)	Tons/day								
Truck Loading at Borrow	-	-	0.04	lb/ton					34755.1	lb/yr	1.25	5708.33								
Truck Unloading at Levee	-	-	0.005	lb/ton			-	-	4495.3	lb/yr	1.25	5708.33								
Total							**5442.9**	**30117.1**	**178796.9**	**lb/yr**						2000	lb/ton			
Total							**36.3**	**200.8**	**1192.0**	**lb/day**										
Finishing Grading					0.0	yd3					0.0	0.0	0.0	0.0	10.0	days				
Mobile Sources																				
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		72.0	279.5	14.4	lb/yr										
Grader(s)	1.20	9.73	0.53	lb/day	3.0		36.0	291.9	15.9	lb/yr										
Employee Trips	0.21	0.55	0.04	g/mile	55.0	employees	10.2	26.7	1.9	lb/yr				40.0	per employee	0.00220462	lb/gram			
Fugitive Sources																				
Travel on unpaved roads	-	-	0.90	lb/VMT	2.0	trucks	-	-	-	lb/yr										
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr										
Total							**118.2**	**598.1**	**32.2**	**lb/yr**						2000	lb/ton			
Total							**11.8**	**59.8**	**3.2**	**lb/day**										
Operating Road Construction					5000.0	yd3					0.1	357.1	35.7	3.6	10.0	days				
Mobile Sources					(*assumes 2,500 cy salvaged, and 2,500 cy imported)							*(assumes haul load = 14 yd3)								
Roller(s)	0.59	4.47	0.24	lb/day	2.0		11.7	89.3	4.8	lb/yr										
Grader(s)	0.67	4.54	0.38	lb/day	2.0		6.7	45.4	3.8	lb/yr	(*assumes that graders are used for 5 days)									
Haul Truck(s)	0.70	8.63	0.27	g/mile	10.0		0.1	0.7	0.0	lb/yr						0.00220462	lb/gram			
Employee Trips	1.20	9.73	0.53	g/mile	55.0	employees	58.1	471.9	25.6	lb/yr				40.0	per employee	0.00220462	lb/gram			
Fugitive Sources																				
Travel on unpaved roads	-	-	0.90	lb/VMT	2.0	trucks	-	-	32.1	lb/yr										
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			10.1	lb/yr										
Material Handling											Tons/yd3 (gravel/sand)	Tons/day								
Truck Loading of salvage materia	-	-	0.04	lb/ton					253.7	lb/yr	1.25	625.00								
Truck Unloading at road installation	-	-	0.005	lb/ton			-	-	32.8	lb/yr	1.25	625.00								
Total							**76.7**	**607.4**	**362.9**	**lb/yr**						2000	lb/ton			
Total							**7.7**	**60.7**	**36.3**	**lb/day**										
Total for "2008 phase" 2009 calendar																				
Total from NCC Project							**8**	**42**	**118**	**TPY**	to occur during "2008 phase" 2009 calendar year									
Total from NCC Project							**68**	**392**	**197**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently									
*These calculations represent worst-case emissions from construction activities associated with the NCC																				

PGCC West Levee Phase Improvements - Levee Widening and Flatening							*all work would occur in 2009.													
*All work would occur in Sutter County																				
	ROG	NOX	PM10	Unit	Quantity	Unit	ROG	NOX	PM10	Unit	Distance (miles/round-trip)	# of Haul Loads	Total Miles Traveled	Total Miles Traveled/Day	Time frame	Conversion Factor				
[1]Clearing, Grubbing, Stripping					0.0	yd3 (export)					0.0	0.0	0.0	0.0	20.0	days				
Mobile Sources					*(assumes 10 miles to material disposal site)							*(assumes haul load = 14 yd3)								
Haul Truck(s)	0.70	8.63	0.27	g/mile	6.0		0.0	0.0	0.0	lb/yr						0.00220462	lb/gram			
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		72.0	279.5	14.4	lb/yr										
Scraper(s)	3.64	15.96	0.85	lb/day	2.0		145.7	638.6	34.0	lb/yr										
Loader(s)	0.92	7.01	0.38	lb/day	1.0		18.4	140.2	7.6	lb/yr										
Employee Trips	0.21	0.55	0.04	g/mile	30.0	employees	11.1	29.1	2.1	lb/yr				40.0	per employee	0.00220462	lb/gram			
Fugitive Sources																				
Travel on unpaved roads	-	-	0.90	lb/VMT	6.0	trucks	-	-	-	lb/yr										
Travel on paved roads			0.28	lb/VMT	0.0	trucks			-	lb/yr										
Material Handling											Tons/yd3 (gravel/sand)	Tons/day								
Truck Loading at Levee	-	-	0.04	lb/ton					0.0	lb/yr	1.25	0.00								
Truck Unloading at Off-site Disposa	-	-	0.005	lb/ton			-	-	0.0	lb/yr	1.25	0.00								
Total							**247.3**	**1087.4**	**58.1**	**lb/yr**						2000	lb/ton			
Total							**12.4**	**54.4**	**2.9**	**lb/day**										
[2]Levee Widening & Compaction					330000.0	yd3					1.0	23571.4	23571.4	174.6	135.0	days				
Mobile Sources																				
Bulldozer(s)	3.63	21.55	1.12	lb/day	2.0		979.6	5818.3	301.2	lb/yr										
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		486.3	1886.8	97.3	lb/yr										
Scraper(s)	3.64	15.96	0.85	lb/day	2.0		983.4	4310.4	229.5	lb/yr										
Roller(s)	0.59	4.47	0.24	lb/day	1.0		79.2	603.1	32.6	lb/yr										
Loader(s)	0.92	7.01	0.38	lb/day	2.0		248.7	1892.9	102.4	lb/yr										
Employee Trips	0.21	0.55	0.04	g/mile	30.0	employees	75.0	196.4	14.3	lb/yr				40.0	per employee	0.00220462	lb/gram			
Fugitive Sources																				
Travel on unpaved roads	-	-	0.90	lb/VMT	4.0	trucks	-	-	84,641.5	lb/yr										
Travel on paved roads			0.28	lb/VMT	0.0	trucks			-	lb/yr										
Material Handling																				
Bulldozing	-	-	0.41	lb/hr	10.0	hrs/day			554.45	lb/yr										
Total							**2852.2**	**14708.0**	**85973.2**	**lb/yr**						2000	lb/ton			
Total							**21.1**	**108.9**	**636.8**	**lb/day**										
[3]Reconstructing Landside Levee Slope & Borrow Site Excavation					85000.0	yd3 (borrow)					1.0	6071.4	6071.4	36.1	168.0	days				
Mobile Sources					*(assumes Brookfield borrow site; also assumes exported material is transported on return trip to borrow site)							*(assumes haul load = 14 yd3)								
Excavator(s)	1.84	6.47	0.34	lb/day	2.0		618.4	2173.1	114.8	lb/yr										
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		605.2	2348.0	121.0	lb/yr										
Other Equipment	2.08	9.43	0.52	lb/day	3.0		1048.6	4750.3	262.2	lb/yr										
Loader(s)	0.92	7.01	0.38	lb/day	2.0		309.5	2355.6	127.5	lb/yr										
Haul Truck(s)	0.70	8.63	0.27	g/mile	2.0		9.4	115.5	3.6	lb/yr						0.00220462	lb/gram			
Pick-up Truck(s)	0.21	0.55	0.04	g/mile	5.0		0.4	1.0	0.1	lb/yr						0.00220462	lb/gram			
Employee Trips	0.21	0.55	0.04	g/mile	30.0	employees	93.3	244.4	17.8	lb/yr				40.0	per employee	0.00220462	lb/gram			
Fugitive Sources																				
Travel on unpaved roads	-	-	0.90	lb/VMT	4.0	trucks	-	-	21,801.6	lb/yr										
Travel on paved roads			0.28	lb/VMT	0.0	trucks			1,714.4	lb/yr										
Material Handling											Tons/yd3 (gravel/sand)	Tons/day								
Truck Loading at Borrow	-	-	0.04	lb/ton					4312.7	lb/yr	1.25	632.44								
Truck Unloading at Levee	-	-	0.005	lb/ton			-	-	557.8	lb/yr	1.25	632.44								
Total							**2684.8**	**11988.1**	**29033.5**	**lb/yr**						2000	lb/ton			
Total							**16.0**	**71.4**	**172.8**	**lb/day**										
[4]Demobilization/Cleanup					0.0	yd3					0.0	0.0	0.0	0.0	14.0	days				
Mobile Sources																				
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		100.9	391.3	20.2	lb/yr										
Haul Truck(s)	0.70	8.63	0.27	g/mile	2.0		0.2	2.7	0.1	lb/yr	*(assumes haul truck drives 5.1 miles/day)					0.00220462	lb/gram			
Employee Trips	0.21	0.55	0.04	g/mile	30.0	employees	7.8	20.4	1.5	lb/yr				40.0	per employee	0.00220462	lb/gram			
Fugitive Sources																				
Travel on unpaved roads	-	-	0.90	lb/VMT	2.0	trucks	-	-	128.2	lb/yr	*(assumes haul truck drives 5.1 miles/day)									
Travel on paved roads			0.28	lb/VMT	0.0	trucks			-	lb/yr										
Total							**108.9**	**414.4**	**149.9**	**lb/yr**						2000	lb/ton			
Total							**7.8**	**29.6**	**10.7**	**lb/day**										
[5]Constructing Seepage and Stability Berm & Borrow Site					42000.0	yd3					30.0	3000.0	90000.0	600.0	150.0	days				
Mobile Sources												*(assumes haul load = 14 yd3)								
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		1080.7	4192.9	216.1	lb/yr										
Bulldozer(s)	3.63	21.55	1.12	lb/day	2.0		1088.4	6464.8	334.6	lb/yr										
Roller(s)	0.59	4.47	0.24	lb/day	2.0		176.1	1340.1	72.5	lb/yr										
Excavator(s)	1.84	6.47	0.34	lb/day	2.0		552.1	1940.3	102.5	lb/yr										
Haul Truck(s)	0.70	8.63	0.27	g/mile	15.0		138.9	1712.3	53.6	lb/yr						0.00220462	lb/gram			
Employee Trips	0.29	0.61	0.04	g/mile	35.0	employees	132.4	281.5	17.6	lb/yr				40.0	per employee	0.00220462	lb/gram			
Fugitive Sources																				
Travel on unpaved roads	-	-	0.90	lb/VMT	15.0	trucks	-	-	60,595.6	lb/yr										
Travel on paved roads			0.28	lb/VMT	0.0	trucks			25,413.8	lb/yr										
Material Handling											Tons/yd3 (gravel/sand)	Tons/day								
Truck Loading at Borrow	-	-	0.04	lb/ton					2131.0	lb/yr	1.25	350.00								
Truck Unloading at Levee	-	-	0.005	lb/ton			-	-	275.6	lb/yr	1.25	350.00								
Total							**3168.6**	**15932.0**	**89213.0**	**lb/yr**						2000	lb/ton			
Total							**21.1**	**106.2**	**594.8**	**lb/day**										
Finishing Grading					0.0	yd3					0.0	0.0	0.0	0.0	10.0	days				
Mobile Sources																				
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		36.0	139.8	7.2	lb/yr										
Grader(s)	1.20	9.73	0.53	lb/day	2.0		24.0	194.6	10.6	lb/yr										
Employee Trips	0.21	0.55	0.04	g/mile	35.0	employees	6.5	17.0	1.2	lb/yr				40.0	per employee	0.00220462	lb/gram			
Fugitive Sources																				
Travel on unpaved roads	-	-	0.90	lb/VMT	2.0	trucks	-	-	-	lb/yr										
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr										
Total							**66.5**	**351.3**	**19.0**	**lb/yr**						2000	lb/ton			
Total							**6.6**	**35.1**	**1.9**	**lb/day**										
Total for 2009																				
Total from PGCC Project							**5**	**22**	**102**	**TPY**	to occur during "2008 phase" 2009 calendar year									
Total from PGCC Project							**37**	**163**	**640**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently									
*These calculations represent worst-case emissions from construction activities associated with the PGCC																				

*PM10 emissions would likely result in or substantially contribute to a violation of the CAAQS (50 ug/m3)

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
Elkhorn Canal	27	118	180	1	6	4
East Levee	116	625	9157	6	36	495
TOTAL	143	744	9337	8	42	499

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
Elkhorn Canal	54	237	265	2	10	5
TOTAL	54.0	236.7	264.7	2.1	10.2	4.6

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
% Reduction	5%	20%	85%	5%	20%	85%
TOTAL	136	595	1401	7	34	75
	-	85	-	25	25	100
	-	Y	Y	N	Y	Y

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
% Reduction	5%	20%	85%	5%	20%	85%
TOTAL	51.3	189.3	39.7	2.0	8.2	0.7
	-	85	-	25	25	100
	-	Y	Y	N	N	N

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
Elkhorn Canal	27	118	180	1	6	4
East Levee	79	417	5437	4	24	294
TOTAL	106	536	5617	6	30	298

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
% Reduction	5%	20%	85%	5%	20%	85%
TOTAL	100	429	843	5	24	45
	-	85	-	25	25	100
	-	Y	Y	N	N	N

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
Elkhorn Canal	27	118	180	1	6	4
East Levee	110	599	8962	6	34	485
TOTAL	137	717	9143	7	40	489

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
% Reduction	5%	20%	85%	5%	20%	85%
TOTAL	130	574	1371	7	32	73
	-	85	-	25	25	100
	-	Y	Y	N	Y	Y

*PM10 emissions would likely result in or substantially contribute to a violation of the CAAQS (50 ug/m3)

Alternative 1

Unmitigated 2009 Emissions

Sutter County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
NCC	68	392	197	8	42	118
East Levee	150	747	6281	8	43	340
PGCC						
TOTAL	218	1139	6478	16	85	458

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
Elkhorn Canal	27	118	180	1	6	4
East Levee	29	142	1196	2	8	65
TOTAL	56	261	1376	3	14	69

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
Elkhorn Canal	54	237	265	2	10	5
TOTAL	54.0	236.7	264.7	2.1	10.2	4.6

Mitigated 2009 Emissions

Sutter County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
% Reduction	5%	20%	75%	5%	20%	75%
TOTAL	207	911	1620	16	68	115
Threshold	25	25	80	25	25	-
Significant?	Y	Y	Y	N	Y	-

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
% Reduction	5%	20%	85%	5%	20%	85%
TOTAL	53	208	206	3	11	10
Threshold	-	85	-	25	25	100
Significant?	-	Y	Y	N	Y	Y

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
% Reduction	5%	20%	85%	5%	20%	85%
TOTAL	51.3	189.3	39.7	2.0	8.2	0.7
Threshold	-	85	-	25	25	100
Significant?	-	Y	Y	N	N	N

Alternative 2

Unmitigated 2009 Emissions

Sutter County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
NCC	68	392	197	8	42	118
East Levee	151	753	6593	8	43	357
PGCC						
TOTAL	218	1145	6791	16	85	475

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
Elkhorn Canal	27	118	180	1	6	4
East Levee	29	144	1256	2	8	68
TOTAL	56	262	1436	3	14	72

Mitigated 2009 Emissions

Sutter County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
% Reduction	5%	20%	75%	5%	20%	75%
TOTAL	208	916	1698	16	68	119
Threshold	25	25	80	25	25	-
Significant?	Y	Y	Y	N	Y	-

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
% Reduction	5%	20%	85%	5%	20%	85%
TOTAL	53	209	215	3	12	11
Threshold	-	85	-	25	25	100
Significant?	-	Y	Y	N	N	N

Alternative 3

Unmitigated 2009 Emissions

Sutter County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
NCC	68	392	197	8	42	118
East Levee	150	746	6284	8	43	340
PGCC						
TOTAL	218	1138	6481	16	85	459

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
Elkhorn Canal	27	118	180	1	6	4
East Levee	29	142	1197	2	8	65
TOTAL	56	261	1377	3	14	69

Mitigated 2009 Emissions

Sutter County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
% Reduction	5%	20%	75%	5%	20%	75%
TOTAL	207	910	1620	16	68	115
Threshold	25	25	80	25	25	-
Significant?	Y	Y	Y	N	Y	-

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
% Reduction	5%	20%	85%	5%	20%	85%
TOTAL	53	208	207	3	11	10
Threshold	-	85	-	25	25	100
Significant?	-	Y	Y	N	Y	Y

TIPS FOR USE:

1. For both residential and non-residential acreage entries EXCLUDE ONLY undisturbed (not graded) Open Space.
2. Append this calculation sheet to the environmental document.
3. Unmitigated NOx (lbs/day) and duration (days) should be consistent with URBEMIS results.

Construction Emissons Mitigation Fee Calculation

PART 1: PROJECT INFORMATION

Project Name:	SAFCA - "2008 Phase" NLIP Emissions within SMAQMD's Jurisdiction		
Control/Application #:			
Single Family Dwelling Units:		*Note: Enter information only in blue bordered cells*	
Multi Family Dwelling Units:		Total Residential Acreage:	
Non-residential Square Feet:		Total Non-residential Acreage:	

PART 2: EMISSIONS INFORMATION

Year	Activity Phase	NOx (lbs/day) unmitigated	NOx (lbs/day) mitigated*	NOx over threshold (lbs/day)	duration (days)	Total significant NOx (lbs)
2009	East Levee/Elkhorn Canal	743.84	595.07	510.07	108	55087.49
	Total project Nox over threshold (lbs)		*55087.49*			
	Total project Nox over threshold (tons)		*27.54*			

PART 3: MITIGATION FEE RESULTS

TOTAL MITIGATION FEE ($14,300/TON)**	***$393,876***
Administrative Fee (5%)	***$19,694***
TOTAL MITIGATION FEE	***$413,569***

>>> *Fee is to be paid to the SMAQMD prior to any ground disturbance either in total or on a by acre basis.*

Mitigation Fee ($/acre)	**#DIV/0!**

* Assumes a construction mitigation plan which achieves a 20% reduction in NOx from on-site, off-road equipment.

** Or the $/ton of NOx cost-effectiveness value in effect at the time the fee is collected.

TIPS FOR USE:

1. For both residential and non-residential acreage entries EXCLUDE ONLY undisturbed (not graded) Open Space.
2. Append this calculation sheet to the environmental document.
3. Unmitigated NOx (lbs/day) and duration (days) should be consistent with URBEMIS results.

Construction Emissons Mitigation Fee Calculation

PART 1: PROJECT INFORMATION

Project Name:	SAFCA - "2008 Phase" NLIP Emissions within SMAQMD's Jurisdiction		
Control/Application #:			
Single Family Dwelling Units:		*Note: Enter information only in blue bordered cells*	
Multi Family Dwelling Units:		Total Residential Acreage:	
Non-residential Square Feet:		Total Non-residential Acreage:	

PART 2: EMISSIONS INFORMATION

Year	Activity Phase	NOx (lbs/day) unmitigated	NOx (lbs/day) mitigated*	NOx over threshold (lbs/day)	duration (days)	Total significant NOx (lbs)
2009	East Levee/Elkhorn Canal	535.74	428.59	343.59	108	37107.88
	Total project Nox over threshold (lbs)		*37107.88*			
	Total project Nox over threshold (tons)		*18.55*			

PART 3: MITIGATION FEE RESULTS

TOTAL MITIGATION FEE ($14,300/TON)**	***$265,321***
Administrative Fee (5%)	***$13,266***
TOTAL MITIGATION FEE	***$278,587***

>>> *Fee is to be paid to the SMAQMD prior to any ground disturbance either in total or on a by acre basis.*

Mitigation Fee ($/acre)	**#DIV/0!**

* Assumes a construction mitigation plan which achieves a 20% reduction in NOx from on-site, off-road equipment.

** Or the $/ton of NOx cost-effectiveness value in effect at the time the fee is collected.

TIPS FOR USE:

1. For both residential and non-residential acreage entries EXCLUDE ONLY undisturbed (not graded) Open Space.
2. Append this calculation sheet to the environmental document.
3. Unmitigated NOx (lbs/day) and duration (days) should be consistent with URBEMIS results.

Construction Emissons Mitigation Fee Calculation

PART 1: PROJECT INFORMATION

Project Name:	SAFCA - "2008 Phase" NLIP Emissions within SMAQMD's Jurisdiction		
Control/Application #:			
Single Family Dwelling Units:		*Note: Enter information only in blue bordered cells*	
Multi Family Dwelling Units:		Total Residential Acreage:	
Non-residential Square Feet:		Total Non-residential Acreage:	

PART 2: EMISSIONS INFORMATION

Year	Activity Phase	NOx (lbs/day) unmitigated	NOx (lbs/day) mitigated*	NOx over threshold (lbs/day)	duration (days)	Total significant NOx (lbs)
2009	East Levee/Elkhorn Canal	717.36	573.89	488.89	108	52799.97
	Total project Nox over threshold (lbs)		*52799.97*			
	Total project Nox over threshold (tons)		*26.40*			

PART 3: MITIGATION FEE RESULTS

TOTAL MITIGATION FEE ($14,300/TON)**	***$377,520***
Administrative Fee (5%)	***$18,876***
TOTAL MITIGATION FEE	***$396,396***

>>> *Fee is to be paid to the SMAQMD prior to any ground disturbance either in total or on a by acre basis.*

Mitigation Fee ($/acre)	**#DIV/0!**

* Assumes a construction mitigation plan which achieves a 20% reduction in NOx from on-site, off-road equipment.

** Or the $/ton of NOx cost-effectiveness value in effect at the time the fee is collected.

Equipment Type	Emission Rates for Year 2008			
	ROG	NOX	PM10	Unit
Employee Light-Duty Trucks	0.21	0.55	0.04	g/mile
Haul Trucks	0.70	8.63	0.27	g/mile
Backhoes	0.67	4.54	0.38	lb/day
Bore/Drill Rigs	2.87	5.75	0.43	lb/day
Concrete/Industrial Saws	1.11	7.51	0.63	lb/day
Cranes	1.44	6.16	0.34	lb/day
Crawler Tractors	1.09	10.22	0.54	lb/day
Crushing/Proc. Equipment	1.59	14.91	0.79	lb/day
Dozer	3.63	21.55	1.12	lb/day
Excavator	1.84	6.47	0.34	lb/day
Forklifts, Rough Terrain	0.78	4.59	0.35	lb/day
Grader	1.20	9.73	0.53	lb/day
Loaders, Rubber Tired	0.92	7.01	0.38	lb/day
Off-Highway Trucks	3.60	13.98	0.72	lb/day
Other Construction Equip.	2.08	9.43	0.52	lb/day
Pavers	0.93	7.08	0.38	lb/day
Paving Equipment	0.78	7.28	0.39	lb/day
Rollers	0.59	4.47	0.24	lb/day
Scrapper	3.64	15.96	0.85	lb/day
Signal Boards	0.65	2.37	0.22	lb/day
Skid Steer Loaders	0.56	2.91	0.17	lb/day
Surfacing Equipment	3.74	22.19	1.15	lb/day
Tractors	0.67	4.54	0.38	lb/day
Trenchers	0.99	5.69	0.41	lb/day
Water Trucks	0.65	7.23	0.24	g/mile
Fugitive Dust			10	lb/acre/day

Assumptions: Emission factors from the Road Construction Emissions Model, Version 5.2 (SMAQMD 2006) for 2008 which assume equipment operates 8hrs/day

Travel on Unpaved Haul Roads (Heavy Duty Trucks):		
E(lbs/VMT)=(k)(s/12)^a (W/3)^b	*AP-42 12/03, 13.2.2-4 eq 1a	
Where:	**PM10**	
k=Particle Size Multiplier:	1.5	*AP-42 12/03 Table 13.2.2-2; PM10 emissions; industrial roads
s=Silt Content:	4.3	*AP-42 12/03 Table 13.2.2-1, service road
empirical constants		
a	0.9	*AP-42 12/03 Table 13.2.2-2; PM10 emissions; industrial roads
b	0.45	*AP-42 12/03 Table 13.2.2-2; PM10 emissions; industrial roads
W=Vehicle Weight:	11.375	((2+1.25 T/cy*15 cy truck capacity) + 2)/2 (average weight of loaded and unloaded haul truck; assumed empty truck weighs 2 tons)
	1.08	lbs/VMT
E(ext)= E[(365-P)/365]	*AP-42 12/03 12.2.2-4 eq 2	
Where:		
P=# days/yr with >=0.01 in. precip	63	*AP-42 12/03 Figure 13.2.2-1 for Sacramento Co/NOAA Technical Memorandum NWS WR-272; CLIMATE OF SACRAMENTO, CALIFORNIA (June 2005)
	0.90	lbs/VMT
Travel on Paved Haul Roads (Heavy Duty Trucks):		
E(lbs/VMT)=(k) (sL/2)^.65 (W/3)^1.5 - C	*AP-42 12/03, 13.2.1-4 eq 1	
Where:	**PM10**	
k=Particle Size Multiplier (lb/VMT)	0.016	*AP-42 12/03 Table 13.2.1-1; PM10 emissions; industrial roads
sL=road surface silt loading (g/m2)	8.2	*AP-42 12/03 Table 13.2.1-4; quarry roads
W=Vehicle Weight:	11.375	((2+1.25 T/cy*15 cy truck capacity) + 2)/2 (average weight of loaded and unloaded haul truck; assumed empty truck weighs 2 tons)
C=exhaust, break, tire wear (lb/VMT)	0.00047	*AP-42 12/03 Table 13.2.1-2; PM10 emissions
	0.30	lbs/VMT
E(ext)= E[1-(P/4N)]	*AP-42 12/03 13.2.1 eq 2	
Where:		
P=# days/yr with >=0.01 in. precip	63	*AP-42 12/03 Figure 13.2.2-1 for Sacramento Co/NOAA Technical Memorandum NWS WR-272; CLIMATE OF SACRAMENTO, CALIFORNIA (June 2005)
N=number of days in averaging period	365	
	0.28	lbs/VMT

Fugitive Dust Source Emissions

	(lb/acre/day)		
Disturbance Area	60.71		
Assumptions: SMAQMD emission factor of 60.71 lbs/acre/day (SMAQMD 1994).			
Aggregate Storage Piles			
Emissions result from several distinct processes within the stockpiling cycle: 1. loading in of materials through batch or drop operations, 2. equipment traffic in storage area, 3. wind erosion of piles, 4. loadout of material through batch or drop operations (AP-42 12/03, chapt. 13.2.4).			
E(lb/ton)=(k)(0.0032)(U/5)^1.3 /(M/2)^1.4	*AP-42 12/03, 13.2.4-3 eq 1		
Where:	**PM10**		
k=Particle Size Multiplier:	0.35	*AP-42 12/03 13.2.4-3; PM10 emissions	
U=mean wind speed (mph)	8	*NOAA Western Regional Climate Center, Sacramento International Airport ASOS station, CA RAWS data from 1996-2006 (http://www.wrcc.dri.edu/htmlfiles/westwind.final.html#CALIFORNIA)	
M=moisture content (%):	2.4	*AP-42 7/98 Table 11.9-3, haul truck	
	0.002	lbs/ton	
Batch Loading at Borrow Area			
E(TSP<15 um)=(.119/(M^0.9))	*AP-42 7/98, Table 11.9-1		
Where:	**PM10**		
M=moisture content (%):	2.4	*AP-42 7/98 Table 11.9-3, haul truck	
	0.05	lb/ton	
*E(TSP<10um)=(E(TSP<15 um)*S)*	*AP-42 7/98, Table 11.9-1		
S=scaling factor	0.75	*AP-42 7/98 Table 11.9-3, haul truck	
	0.04	lb/ton	
Truck Unloading			
E(TSP<15 um)	**PM10**		
Where:	**0.007**	lb/ton	*AP-42 7/98 Table 11.9-4, end dump truck unloading (batch drop)
*E(TSP<10um)=(E(TSP<15 um)*S)*	*AP-42 7/98, Table 11.9-1		
S=scaling factor	0.75	*AP-42 7/98 Table 11.9-1, haul truck	
	0.005	lb/ton	
Bulldozing	**PM10**		
E(TSP<15 um)=(18.6(s)^1.5)/(M^1.4)	*AP-42 7/98, Table 11.9-1		
Where:			
M=moisture content (%):	7.9	*AP-42 7/98 Table 11.9-3, bulldozer	
s=silt content (%)	6.9	*AP-42 7/98 Table 11.9-3, bulldozer	
	18.67	lb/hr	
*E(TSP<10um)=(E(TSP<15 um)*S)*	*AP-42 7/98, Table 11.9-1		
S=scaling factor	0.75	*AP-42 7/98 Table 11.9-1, bulldozer	
	14.00	lb/hr	
Scraper Unloading	**PM10**		
E(TSP<15 um)	**0.04**	lb/ton	*AP-42 7/98 Table 11.9-4, scraper unloading
*E(TSP<10um)=(E(TSP<15 um)*S)*	*AP-42 7/98, Table 11.9-1		
S=scaling factor	0.75	*AP-42 7/98 Table 11.9-1, bulldozer/haul truck	
	0.03	lb/ton	

Conformity: Regionally Significant Thresholds Calculations

2006 Estimated Annual Average Emissions

SACRAMENTO COUNTY

ROG	CO	NOX	PM10	
64.4	**365.95**	**81.78**	**44.43**	ton/day
23506.00	133571.8	29849.70	16216.95	tpy
2350.60	13357.18	2984.97	1621.70	10% of total

SUTTER COUNTY

ROG	CO	NOX	PM10	
10.34	**43.06**	**20.27**	**14.45**	ton/day
3774.10	15716.90	7398.55	5274.25	tpy
377.41	1571.69	739.86	527.43	10% of total

APPENDIX C

Noise Modeling Results

Appendix C
SAFCA Levee Improvement Project
Clearing and Grubbing/Strippng
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	63.6	79.3
	200	57.6	73.3
	300	54.0	69.7
	400	51.5	67.2
	500	49.6	65.3
	600	48.0	63.7
	700	46.7	62.4
	800	45.5	61.2
	900	44.5	60.2
	1000	43.6	59.3
	1100	42.8	58.5
	1200	42.0	57.7
	1300	41.3	57.0
	1400	40.7	56.4
	1500	40.1	55.8
	1600	39.5	55.2
	1700	39.0	54.7
	1800	38.5	54.2
Threshold*	900	44.5	60.2

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Scraper	80	88	0.4
Loader	75	79	0.4
Water Truck	75	91	0.4

H_{eff} = 10	
G = 0.57	

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Scraper	68.3	76.3
Loader	63.3	67.3
Water Truck	63.3	79.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	63.6	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Construction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Levee Improvement Project
Levee Degrading
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	63.8	79.3
	200	57.7	73.3
	300	54.2	69.7
	400	51.7	67.2
	500	49.8	65.3
	600	48.2	63.7
	700	46.9	62.4
	800	45.7	61.2
	900	44.7	60.2
	1000	43.8	59.3
	1100	42.9	58.5
	1200	42.2	57.7
	1300	41.5	57.0
	1400	40.8	56.4
	1500	40.2	55.8
	1600	39.7	55.2
	1700	39.2	54.7
	1800	38.7	54.2
Threshold*	2600	35.5	51.0

Assumptions:	**Reference Noise Levels (L_{max}) @50 feet**		
	Mitigated	Unmitigated	Usage Factor
Scraper	80	88	0.4
Loader	75	79	0.4
Water Truck	75	91	0.4
Dozer	75	80	0.4
			H_{eff} = 10
			G = 0.57

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Scraper	68.3	76.3
Loader	63.3	67.3
Water Truck	63.3	79.3
Dozer	63.3	68.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	63.8	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Levee Improvement Project
Demolish Canal and Tree Removal
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	72.3	79.3
	200	66.3	73.3
	300	62.7	69.7
	400	60.2	67.2
	500	58.3	65.3
	600	56.7	63.7
	700	55.4	62.4
	800	54.2	61.2
	900	53.2	60.2
	1000	52.3	59.3
	1100	51.5	58.5
	1200	50.7	57.7
	1300	50.0	57.0
	1400	49.4	56.4
	1500	48.8	55.8
	1600	48.2	55.2
	1700	47.7	54.7
	1800	47.2	54.2
Threshold*	2300	45.0	52.0

Assumptions:			
	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Excavator	80	85	0.4
Loader	75	79	0.4
Haul Truck	84	91	0.4
			H_{eff} = 10
			G = 0.57

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Excavator	68.3	73.3
Loader	63.3	67.3
Haul Truck	72.3	79.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	72.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Levee Improvement Project
Cutoff Wall Construction
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	72.3	79.3
	200	66.3	73.3
	300	62.7	69.7
	400	60.2	67.2
	500	58.3	65.3
	600	56.7	63.7
	700	55.4	62.4
	800	54.2	61.2
	900	53.2	60.2
	1000	52.3	59.3
	1100	51.5	58.5
	1200	50.7	57.7
	1300	50.0	57.0
	1400	49.4	56.4
	1500	48.8	55.8
	1600	48.2	55.2
	1700	47.7	54.7
	1800	47.2	54.2
Threshold*	2300	45.0	52.0

Assumptions:			
	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Generator	75	78	1
Loader	75	79	0.4
Haul Truck	84	91	0.4
Slurry Pump	75	76	0.5
Excavators	80	85	0.4
			Heff = 10
			G = 0.57

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Generator	67.3	70.3
Loader	63.3	67.3
Haul Truck	72.3	79.3
Slurry Pump	64.3	65.3
Excavators	68.3	73.3
Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	72.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Levee Improvement Project
Borrow Site Excavation
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	72.3	79.3
	200	66.3	73.3
	300	62.7	69.7
	400	60.2	67.2
	500	58.3	65.3
	600	56.7	63.7
	700	55.4	62.4
	800	54.2	61.2
	900	53.2	60.2
	1000	52.3	59.3
	1100	51.5	58.5
	1200	50.7	57.7
	1300	50.0	57.0
	1400	49.4	56.4
	1500	48.8	55.8
	1600	48.2	55.2
	1700	47.7	54.7
	1800	47.2	54.2
Threshold*	2300	45.0	52.0

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Excavators	80	85	0.4
Loader	75	79	0.4
Haul Truck	84	91	0.4

Heff = 10	
G = 0.57	

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Excavators	68.3	73.3
Loader	63.3	67.3
Haul Truck	72.3	79.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	72.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Levee Improvement Project
Levee Raising
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	63.8	79.6
	200	57.7	73.6
	300	54.2	70.0
	400	51.7	67.5
	500	49.8	65.6
	600	48.2	64.0
	700	46.9	62.7
	800	45.7	61.5
	900	44.7	60.5
	1000	43.8	59.6
	1100	42.9	58.8
	1200	42.2	58.0
	1300	41.5	57.3
	1400	40.8	56.7
	1500	40.2	56.1
	1600	39.7	55.5
	1700	39.2	55.0
	1800	38.7	54.5
Threshold*	2600	35.5	51.3

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Roller	74	80	0.5
Haul Truck	75	91	0.4
Water Truck	75	91	0.4
Dozer	75	80	0.4

H_{eff} = 10
G = 0.57

Calculations:	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
Roller	63.3	69.3
Haul Truck	63.3	79.3
Water Truck	63.3	79.3
Dozer	63.3	68.3

Cumulative:	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
	63.8	79.6

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Levee Improvement Project
Surface Drainage Outlets
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	73.3	79.4
	200	67.3	73.3
	300	63.8	69.8
	400	61.3	67.3
	500	59.3	65.4
	600	57.8	63.8
	700	56.4	62.5
	800	55.3	61.3
	900	54.2	60.3
	1000	53.3	59.4
	1100	52.5	58.5
	1200	51.7	57.8
	1300	51.0	57.1
	1400	50.4	56.4
	1500	49.8	55.8
	1600	49.2	55.3
	1700	48.7	54.8
	1800	48.2	54.3
Threshold*	2600	45.0	51.1

Assumptions:			
	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Backhoe	75	85	0.4
Paver	80	89	0.5
Haul Truck	84	91	0.4
Compactor	80	85	0.2
Concrete Truck	85	90	0.4
			H_{eff} = 10
			G = 0.57

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Backhoe	63.3	73.3
Paver	69.3	78.3
Haul Truck	72.3	79.3
Compactor	65.3	70.3
Concrete Truck	73.3	78.3
Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	73.3	79.4

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Levee Improvement Project
Construct Relief Wells and Drainage Canals
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	73.3	78.3
	200	67.3	72.3
	300	63.7	68.7
	400	61.2	66.2
	500	59.3	64.3
	600	57.7	62.7
	700	56.4	61.4
	800	55.2	60.2
	900	54.2	59.2
	1000	53.3	58.3
	1100	52.5	57.5
	1200	51.7	56.7
	1300	51.0	56.0
	1400	50.4	55.4
	1500	49.8	54.8
	1600	49.2	54.2
	1700	48.7	53.7
	1800	48.2	53.2
Threshold*	2600	45.0	50.0

Assumptions:			
	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Drill Rig	80	98	0.4
Roller	74	80	0.5
Support Truck	55	65	0.4
Excavator	85	90	0.2
Concrete Truck	85	90	0.4
			Heff = 10
			G = 0.57

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Drill Rig	68.3	86.3
Roller	63.3	69.3
Support Truck	43.3	53.3
Excavator	70.3	75.3
Concrete Truck	73.3	78.3
Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	73.3	78.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Levee Improvement Project
Site Restoration and Demobilization
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	68.3	79.3
	200	62.3	73.3
	300	58.7	69.7
	400	56.2	67.2
	500	54.3	65.3
	600	52.7	63.7
	700	51.4	62.4
	800	50.2	61.2
	900	49.2	60.2
	1000	48.3	59.3
	1100	47.5	58.5
	1200	46.7	57.7
	1300	46.0	57.0
	1400	45.4	56.4
	1500	44.8	55.8
	1600	44.2	55.2
	1700	43.7	54.7
	1800	43.2	54.2
Threshold*	1050	47.9	58.9

Assumptions:			
	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Water Truck	75	84	0.4
Haul Truck	75	91	0.4
Hydroseed Truck	80	88	0.4

Heff = 10	
G = 0.57	

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Water Truck	63.3	72.3
Haul Truck	63.3	79.3
Hydroseed Truck	68.3	76.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	68.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

SAFCA Levee Improvement Project
NLIP
Summary of Predicted Action Noise Levels

	Action	Mitigated	Unmitigated	Distance to Noise Contours in feet 50 dBA Contour	45 dBA Contour
1	Clearing and Grubbing/Strippng	63.6	79.3	477.8	849.7
2	Levee Degrading	63.8	79.3	487.6	867.1
3	Demolish Canal and Tree Removal	72.3	79.3	1300.8	2313.2
4	Cutoff Wall Construction	72.3	79.3	1300.8	2313.2
5	Borrow Site Excavation	72.3	79.3	1300.8	2313.2
6	Levee Raising	63.8	79.6	487.6	867.1
7	Surface Drainage Outlets	73.3	79.4	1466.5	2607.8
8	Construct Relief Wells and Drainage Canals	73.3	78.3	1459.6	2595.5
9	Site Restoration and Demobilization	68.3	79.3	820.7	1459.5

Appendix C
SAFCA Canal Improvement Project
Clearing and Grubbing/Strippng
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	63.6	79.3
	200	57.6	73.3
	300	54.0	69.7
	400	51.5	67.2
	500	49.6	65.3
	600	48.0	63.7
	700	46.7	62.4
	800	45.5	61.2
	900	44.5	60.2
	1000	43.6	59.3
	1100	42.8	58.5
	1200	42.0	57.7
	1300	41.3	57.0
	1400	40.7	56.4
	1500	40.1	55.8
	1600	39.5	55.2
	1700	39.0	54.7
	1800	38.5	54.2
Threshold*	900	44.5	60.2

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Dozer	75	85	0.4
Loader	75	79	0.4
Water Truck	75	91	0.4

H_{eff} = 10	
G = 0.57	

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Dozer	63.3	73.3
Loader	63.3	67.3
Water Truck	63.3	79.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	63.6	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Canal Improvement Project
Dewatering
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	73.3	79.3
	200	67.3	73.3
	300	63.7	69.7
	400	61.2	67.2
	500	59.3	65.3
	600	57.7	63.7
	700	56.4	62.4
	800	55.2	61.2
	900	54.2	60.2
	1000	53.3	59.3
	1100	52.5	58.5
	1200	51.7	57.7
	1300	51.0	57.0
	1400	50.4	56.4
	1500	49.8	55.8
	1600	49.2	55.2
	1700	48.7	54.7
	1800	48.2	54.2
Threshold*	2600	45.0	51.0

Assumptions:			
	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Crane	75	83	0.16
Loader	75	79	0.4
Pile Driver	95	101	0.04
Generator	75	78	1
			H_{eff} = 10
			G = 0.57

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Crane	59.3	67.3
Loader	63.3	67.3
Pile Driver	73.3	79.3
Generator	67.3	70.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	73.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Canal Improvement Project
Excavation
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	63.3	67.3
	200	57.3	61.3
	300	53.7	57.7
	400	51.2	55.2
	500	49.3	53.3
	600	47.7	51.7
	700	46.4	50.4
	800	45.2	49.2
	900	44.2	48.2
	1000	43.3	47.3
	1100	42.5	46.5
	1200	41.7	45.7
	1300	41.0	45.0
	1400	40.4	44.4
	1500	39.8	43.8
	1600	39.2	43.2
	1700	38.7	42.7
	1800	38.2	42.2
Threshold*	2300	36.0	40.0

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Excavator	80	85	0.4
Loader	75	79	0.4

H_{eff} = 10	
G = 0.57	

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Excavator	68.3	73.3
Loader	63.3	67.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	63.3	67.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Canal Improvement Project
Foundation Construction
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	73.3	79.3
	200	67.3	73.3
	300	63.7	69.7
	400	61.2	67.2
	500	59.3	65.3
	600	57.7	63.7
	700	56.4	62.4
	800	55.2	61.2
	900	54.2	60.2
	1000	53.3	59.3
	1100	52.5	58.5
	1200	51.7	57.7
	1300	51.0	57.0
	1400	50.4	56.4
	1500	49.8	55.8
	1600	49.2	55.2
	1700	48.7	54.7
	1800	48.2	54.2
Threshold*	2600	45.0	51.0

Assumptions:			
	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Generator	78	75	1
Loader	75	79	0.4
Pile Driver	95	101	0.04
Crane	75	83	0.16
			H_{eff} = 10
			G = 0.57

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Generator	70.3	67.3
Loader	63.3	67.3
Pile Driver	73.3	79.3
Crane	59.3	67.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	73.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Canal Improvement Project
Concrete Construction
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	67.3	70.6
	200	61.2	64.6
	300	57.7	61.0
	400	55.2	58.5
	500	53.3	56.6
	600	51.7	55.0
	700	50.4	53.7
	800	49.2	52.5
	900	48.2	51.5
	1000	47.3	50.6
	1100	46.4	49.7
	1200	45.7	49.0
	1300	45.0	48.3
	1400	44.3	47.7
	1500	43.7	47.1
	1600	43.2	46.5
	1700	42.7	46.0
	1800	42.2	45.5
Threshold*	2300	40.0	43.3

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet Mitigated	Unmitigated	Usage Factor
Boom Truck	80	85	0.4
Generator	75	78	1
Concrete Pump	75	82	0.4

Heff = 10
G = 0.57

Calculations:

	L_{eq} dBA @ 100 feet Mitigated	Unmitigated
Boom Truck	68.3	73.3
Generator	67.3	70.3
Concrete Pump	63.3	70.3

Cumulative:

L_{eq} dBA @ 100 feet Mitigated	Unmitigated
67.3	70.6

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Canal Improvement Project
Pipeline Construction
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	65.3	79.3
	200	59.3	73.3
	300	55.7	69.7
	400	53.2	67.2
	500	51.3	65.3
	600	49.7	63.7
	700	48.4	62.4
	800	47.2	61.2
	900	46.2	60.2
	1000	45.3	59.3
	1100	44.5	58.5
	1200	43.7	57.7
	1300	43.0	57.0
	1400	42.4	56.4
	1500	41.8	55.8
	1600	41.2	55.2
	1700	40.7	54.7
	1800	40.2	54.2
Threshold*	2300	38.0	52.0

Assumptions:			
	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Excavator	75	85	0.4
Welder	73	75	0.4
Water Truck	75	91	0.4
Compactor	80	85	0.2
Crane	75	83	0.16
Loader	75	79	0.4
			Heff = 10
Calculations:	**L_{eq} dBA @ 100 feet**		**G** = 0.57
	Mitigated	Unmitigated	
Excavator	63.3	73.3	
Welder	61.3	63.3	
Water Truck	63.3	79.3	
Compactor	65.3	70.3	
Crane	59.3	67.3	
Loader	63.3	67.3	
Cumulative:	**L_{eq} dBA @ 100 feet**		
	Mitigated	Unmitigated	
	65.3	79.3	

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Canal Improvement Project
Backfill and Finish Grading
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	65.3	79.3
	200	59.3	73.3
	300	55.7	69.7
	400	53.2	67.2
	500	51.3	65.3
	600	49.7	63.7
	700	48.4	62.4
	800	47.2	61.2
	900	46.2	60.2
	1000	45.3	59.3
	1100	44.5	58.5
	1200	43.7	57.7
	1300	43.0	57.0
	1400	42.4	56.4
	1500	41.8	55.8
	1600	41.2	55.2
	1700	40.7	54.7
	1800	40.2	54.2
Threshold*	1050	44.9	58.9

Assumptions:			
	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Loader	75	85	0.4
Dozer	74	80	0.4
Water Truck	75	91	0.4
Compactor	80	85	0.2
Grader	75	85	0.08
			H_{eff} = 10
			G = 0.57

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Loader	63.3	73.3
Dozer	62.3	68.3
Water Truck	63.3	79.3
Compactor	65.3	70.3
Grader	56.3	66.3
Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	65.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Canal Improvement Project
Electrical and Mechanical Equipment Installation
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	59.3	67.3
	200	53.3	61.3
	300	49.8	57.8
	400	47.3	55.3
	500	45.3	53.3
	600	43.7	51.7
	700	42.4	50.4
	800	41.2	49.2
	900	40.2	48.2
	1000	39.3	47.3
	1100	38.5	46.5
	1200	37.7	45.7
	1300	37.0	45.0
	1400	36.4	44.4
	1500	35.8	43.8
	1600	35.2	43.2
	1700	34.7	42.7
	1800	34.2	42.2
Threshold*	1050	38.9	46.9

Assumptions:			
	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Crane	75	83	0.16
			Heff = 10
			G = 0.57

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Crane	59.3	67.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	59.3	67.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Canal Improvement Project
Erosion Control
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	63.3	72.3
	200	57.3	66.3
	300	53.7	62.7
	400	51.2	60.2
	500	49.3	58.3
	600	47.7	56.7
	700	46.4	55.4
	800	45.2	54.2
	900	44.2	53.2
	1000	43.3	52.3
	1100	42.5	51.5
	1200	41.7	50.7
	1300	41.0	50.0
	1400	40.4	49.4
	1500	39.8	48.8
	1600	39.2	48.2
	1700	38.7	47.7
	1800	38.2	47.2
Threshold*	2300	36.0	45.0

Assumptions:			
	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Hydroseed Truck	80	88	0.4
Water Truck	75	84	0.4
			Heff = 10
			G = 0.57

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Hydroseed Truck	68.3	76.3
Water Truck	63.3	72.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	63.3	72.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix C
SAFCA Canal Improvement Project
Demobilization and Clean Up
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	63.3	67.3
	200	57.3	61.3
	300	53.7	57.7
	400	51.2	55.2
	500	49.3	53.3
	600	47.7	51.7
	700	46.4	50.4
	800	45.2	49.2
	900	44.2	48.2
	1000	43.3	47.3
	1100	42.5	46.5
	1200	41.7	45.7
	1300	41.0	45.0
	1400	40.4	44.4
	1500	39.8	43.8
	1600	39.2	43.2
	1700	38.7	42.7
	1800	38.2	42.2
Threshold*	2300	36.0	40.0

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Trucks	75	91	0.4
Loader	75	79	0.4

H_{eff} = 10	
G = 0.57	

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Trucks	63.3	79.3
Loader	63.3	67.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	63.3	67.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

SAFCA Canal Improvement Project
NLIP
Summary of Predicted Action Noise Levels

				Distance to Noise Contours in feet	
	Action	**Mitigated**	**Unmitigated**	**50 dBA Contour**	**45 dBA Contour**
1	Clearing and Grubbing/Strippng	63.6	79.3	477.8	849.7
2	Dewatering	73.3	79.3	1459.5	2595.4
3	Excavation	63.3	67.3	461.5	820.7
4	Foundation Construction	73.3	79.3	1459.5	2595.4
5	Concrete Construction	67.3	70.6	729.8	1297.7
6	Pipeline Construction	65.3	79.3	580.9	1033.1
7	Backfill and Finish Grading	65.3	79.3	580.7	1032.6
8	Electrical and Mechanical Equipment Installation	59.3	67.3	291.9	519.1
9	Erosion Control	63.3	72.3	461.5	820.7
10	Demobilization and Clean Up	63.3	67.3	461.5	820.7

Appendix C

Traffic Noise Prediction Model, (FWHA RD-77-108)

Model Input Sheet

Project Name : SAFCA
Project Number :
Modeling Condition : 2008 construction volumes
Ground Type : Soft
Metric (L_{eq}, L_{dn}, CNEL) : Leq

K Factor : 10
Traffic Desc. (Peak or ADT) : Peak

Segment	Construction Site	Segment	Traffic Vol.	Speed (Mph)	Distance to CL	% Autos	%MT	% HT	Day %	Eve %	Night %	Offset (dB)
1	Natomas Cross Canal	South Levee	50	35	50	0		100	100		0	
2	Sacramento River	East Levee	120	35	50	0		100	100		0	
3	Sacramento River	East Levee - Alt.	145	35	50	0		100	100		0	

Appendix C

Traffic Noise Prediction Model, (FWHA RD-77-108)

Predicted Noise Levels

Project Name : SAFCA
Project Number :
Modeling Condition : 2008 construction volumes
Metric (Leq, Ldn, CNEL) : Leq

		Segment	Noise Levels, dB Leq				Distance to Traffic Noise Contours, Feet				
Segment	Construction Site		Auto	MT	HT	Total	70 dB	65 dB	60 dB	55 dB	50 dB
1	Natomas Cross Canal	South Levee	0.0	0.0	65.0	65.0	23	50	107	230	496
2	Sacramento River	East Levee	0.0	0.0	68.8	68.8	41	89	192	413	890
3	Sacramento River	East Levee - Alt.	0.0	0.0	69.6	69.6	47	101	217	468	1009

APPENDIX D

Cultural Resources Programmatic Agreement

PROGRAMMATIC AGREEMENT
AMONG THE U.S. ARMY CORPS OF ENGINEERS,
THE SACRAMENTO AREA FLOOD CONTROL AGENCY, AND
THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER

REGARDING THE ISSUANCE OF PERMISSION UNDER THE AUTHORITY OF SECTION 408 OF THE RIVERS AND HARBORS ACT OF 1899 AND SECTION 404 OF THE CLEAN WATER ACT FOR THE NATOMAS LEVEE IMPROVEMENT PROGRAM, LANDSIDE IMPROVEMENTS PROJECT

WHEREAS, the U.S. Army Corps of Engineers, Sacramento District (Corps) proposes to review an application that seeks permission for alteration of flood control structures under the authority of Section 408 of the Rivers and Harbors Act and to issue one or more permits to discharge fill to the waters of the United States under the authority of Section 404 of the Clean Water Act to the Sacramento Area Flood Control Agency (SAFCA) for the Natomas Levee Improvement Program Landside Improvements Project (Project); and

WHEREAS, The Corps has determined that the issuance of these permissions and permits constitute an undertaking per 36 CFR 800.16(y), which require compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 as amended (16 U.S.C. 470f); and

WHEREAS the Project includes improvements to an extensive levee system surrounding the Natomas Basin and landscape and irrigation/drainage infrastructure modifications that will be implemented in three construction phases, currently scheduled for 2008, 2009, and 2010; and

WHEREAS, the Corps has determined that this undertaking will have an adverse effect on at least one Historic Property that has been determined eligible for inclusion in the National Register of Historic Places (NRHP), CA-SAC-485/H; and

WHEREAS, because of the complex and phased nature of the improvements, the Corps has not yet determined the exact area of potential effects (APE), nor has SAFCA acquired all of the rights-of-entry, easements and ownership interests that would allow a complete inventory and determination of effects on Historic Properties; and

WHEREAS, the Natomas Basin is sensitive for buried archaeological resources that cannot be accurately located prior to construction; and such buried sites may also be Historic Properties, and therefore SAFCA and the Corps need to document a framework for managing post-review discoveries per 36 CFR Section 800.13, including evaluation of those resources, assessment of effects, and resolution of potential adverse effects; and

WHEREAS, at such time as any unevaluated cultural resource may be discovered, it may require archaeological data recovery and/or other historic preservation activities, in compliance with Section 106 of the National Historic Preservation Act, concurrent with *active* construction; and

WHEREAS, the urgency of flood control improvements require a management framework for Historic Properties that will be implemented after the execution of this agreement in an expedited manner that thus departs from the process normally used under 36 CFR Section 800 et seq., yet still fulfills the requirements of Section 106 of the NHPA; and

WHEREAS, SAFCA has been invited to participate as a signatory to this Programmatic Agreement (PA) by the Corps and the California State Historic Preservation Officer (SHPO; and

WHEREAS, the Corps has consulted The Ione Band of Miwok Indians, the Shingle Springs Band of Miwok Indians and the United Auburn Indian Community, and they have been invited to concur in this PA; and

WHEREAS, the Corps shall make the terms and conditions of this PA as part of the conditions of any permissions and permits issued by the Corps for this project; and

WHEREAS, SAFCA has agreed to undertake responsibility for compliance with the NHPA on its own behalf, and on behalf of the Central Valley Flood Protection Board; and

WHEREAS, the Corps has consulted with the SHPO and the Advisory Council on Historic Preservation in accordance with regulations implementing Section 106 of the NHPA;

WHEREAS, the Council has been consulted and declined to participate in this agreement;

NOW, THEREFORE, the Corps, the SHPO, and SAFCA agree that the Project shall be implemented in accordance with the following stipulations in order to take into account the effects of the undertaking on Historic Properties.

The Corps shall ensure that the following stipulations of this PA are carried out.

STIPULATIONS

I. DEFINITIONS

The terms used in this Programmatic Agreement shall be as defined in regulations implementing Section 106 of the NHPA, and as follows:

"APE (Area of Potential Effect)" means any location at which any Project development activity will be constructed; and locations of any Project-related construction staging areas, borrow areas, and materials stockpile areas; and the locations of any other Project development activities. The APE shall be defined so as to include the maximum spatial dimensions of all Project-related construction and operations rights-of-way, easements, areas which potentially may be affected by Project activities, and other properties to which SAFCA has access, whether on a temporary or permanent basis, or ownership for Project development.

"Concurring parties" means their concurrence indicates that they are in agreement with the terms of the PA.

"Consulting parties" means the Corps, the SHPO, and SAFCA who are signatories to this PA. Only signatories have the authority to amend or terminate this PA.

"Cultural resources" means any property or location that was created, modified, or used by people at least 50 years in the past. Cultural resources include but are not limited to Historic Properties and traditional cultural properties/places (i.e., NRHP listed or eligible properties as defined at 36 CFR Part 60).

"Historic Property" means a cultural resource that has been determined eligible for or is listed on the NRHP (i.e., NRHP listed or eligible properties as defined at 36 CFR Part 60), either by formal nomination

and listing or by concurrence between federal agencies and the SHPO.

"Historic preservation" means any activity conducted in accordance with the NHPA and its implementing regulations to, among other things, inventory, evaluate, manage, or treat cultural resources such as buildings, structures, sites, districts, and objects eligible for, or that may be determined eligible for, listing in the NRHP according to eligibility criteria at 36 CFR Part 60.

"Project development activities" means any physical action related to the Project that has the potential to damage or otherwise alter those characteristics of Historic Properties that would make them eligible for listing in the NRHP.

II. STANDARDS

(A.) Professional Qualifications. All technical work required for historic preservation activities implemented pursuant to this Programmatic Agreement shall be carried out by or under the direct supervision of a person or persons meeting at a minimum the *Secretary of Interior's Professional Qualifications Standards* for archaeology or history, as appropriate (48 FR 44739). "Technical work" here means all efforts to inventory, evaluate, and perform subsequent treatment such as data recovery excavation or recordation that is required under this Programmatic Agreement. This stipulation shall not be construed to limit peer review, guidance, or editing of documents by SAFCA or SAFCA's consultants.

(B.) Historic Preservation Standards. Historic preservation activities carried out pursuant to this Programmatic Agreement shall meet the *Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation* (48 FR 44716-44740) as well as standards and guidelines for historic preservation activities established by the SHPO. The Corps shall ensure that all reports prepared pursuant to this Programmatic Agreement will be provided to the consulting parties and shall ensure that all such reports meet published standards of the California Office of Historic Preservation, specifically, *Preservation Planning Bulletin* Number 4(a), "Archaeological Resources Management Reports (ARMR): Recommended Contents and Format" (December 1989).

III. PROJECT DESCRIPTION

(A) PROJECT Description. A description of the Project is found in the Final Environmental Impact Report (November 2007). A summary of the Project's description in the environmental impact report is provided as **Attachment A** and is made a part of this Programmatic Agreement.

(B) Existing Conditions. An archival search and archaeological survey have been completed for all areas of the APE as currently defined to which SAFCA currently has access, and which currently are not covered by paving, built environment features, or agricultural crops. A report of the results of archival research and archaeological survey, "Cultural Resources Inventory Reports, Part 1 – Natomas Levee Improvement Program Landside Improvements Project, Sacramento and Sutter Counties, California" (October 2007) is made **Attachment B** to this Programmatic Agreement.

A number of prehistoric sites are known to be present along the banks of the Sacramento River. However, archaeological survey of the area is of limited value because the alluvial depositional environment may obscure and bury sites, leaving no surface manifestation of those archaeological resources. For most of the length of the Project, levees have been built on the riverbanks. These levees are one focus of the Project's activity, and occupy a substantial portion of the Project's APE. Furthermore, it has not been established

whether certain known sites in proximity to the Project's development activities extend under the existing levees. The existing levees both obscure ground surfaces and prevent subsurface archaeological testing within their footprints. Because of these conditions, a full assessment of archaeological sites that may be present in the APE cannot be made in advance of construction. There is no definitive information, even for sites known to be in Project's proximity, of site boundaries relative to the APE, or of the significance or integrity of any portions of such sites that may be within the APE. For these reasons, even though archaeological deposits may extend into the APE, and even though some of these deposits may qualify as Historic Properties, it is impossible to develop meaningful site-specific Historic Properties Treatment Plans (HPTP) prior to all construction, or to carry out all necessary data recovery in advance of the Corps' approvals, permitting and construction.

For these reasons, unforeseen discoveries shall be treated pursuant to the provisions of 36 CFR 800.13 (Post-review discoveries).

(C) Project Phasing and Potential Changes to the APE: Because the improvements will occur in three phases (anticipated to be 2008, 2009, and 2010), it will be necessary to define the APE for each phase. The APE for each phase shall be submitted with the cultural resources inventory reports, and shall be consulted upon as part of that document, pursuant to **Stipulation IV**, below.

After the initial concurrence, changes to the APE may be necessary as SAFCA refines its phased Project plans. In particular, the ability of SAFCA to obtain access permissions of private landowners, determination of borrow sites and ongoing negotiations with resource agencies regarding species mitigation requirements may affect final Project's design, and may expand the current APE in some areas. Any changes to the APE shall be made in accordance with subsections D and E (below) of this Stipulation III. The SHPO, Corps, and SAFCA shall consult and reach concurrence in any changes to the APE. The final APE shall account for all Project development activities for the as-built Project. SAFCA shall notify the Corps of any change in the APE and the Corps shall determine the potential for Project development activities in a revised APE to affect cultural resources, through cultural resources inventory and testing as needed.

(1) If there is the potential that cultural resources exist in the revised APE, SAFCA shall submit to the Corps:
   (a) a map of the revised APE; and
   (b) a description of Project development activities to take place in the revised APE; and
   (c) a description of the inventory, nature, location, and known or potential significance of cultural resources in the revised APE; and
   (d) a description of any archaeologically sensitive areas in the revised APE that require monitoring by an archaeologist, and Native American monitor as appropriate; and
   (e) a plan for managing cultural resources in a manner that either avoids Project-related effects to cultural resources, or which mitigates any adverse effects, and which provides for the management of unforeseen cultural resources discoveries.

(2) If no cultural resources are identified within a revised APE, SAFCA shall document such a determination, provide documentation to the Corps and keep such documentation on file at its principal offices.

After the Corps and SAFCA agree to a revised APE and if such a change has the potential to have an effect on cultural resources, the Corps shall submit the documentation to the SHPO for their review. The SHPO

shall have 30 calendar days from the date of receipt of the notice of a revision to the APE to review and to provide in writing either concurrence with or objection to the definition of the revised APE, and any proposed historic preservation activities. Should the SHPO not respond in writing within 30 calendar days, the Corps and SAFCA shall proceed as though the SHPO has concurred in the revised APE, and the proposed historic preservation activities, if any.

Should the SHPO object to the definition of the revised APE or proposed historic preservation activities, the Corps, SAFCA, and the SHPO shall consult for a period not to exceed 15 calendar days following the date of the receipt of the SHPO's written objection in an effort to come to agreement on the issues to which the SHPO has objected. Should the SHPO, the Corps, and SAFCA be unable to agree on the issues to which the SHPO has objected, the consulting parties to this Programmatic Agreement shall proceed in accordance with **Stipulation VIII (Resolving Objections)**, below.

(D) Scope of Identification Efforts in the APE: Inventories of Historic Properties within the established or revised APE shall be completed in accordance with **Stipulation IV (Inventory of Historic Properties)** of this Programmatic Agreement. Treatment of any adverse effects to Historic Properties within the established or revised APE shall be completed in accordance with **Stipulation V (Treatment of Effects)** of this Programmatic Agreement.

(E) Scope of the APE: For purposes of this Programmatic Agreement, a revised APE shall be defined to meet, at a minimum, the following criteria:

(1) The APE for any segment of the Natomas levees that are being improved as part of the Project and shall include the levee segment and a corridor extending not less than 75 feet from the land side toe of the levee segment. The APE also shall include:

- The extent of all Project construction and excavation activity required to construct flood control facilities and to modify irrigation and drainage infrastructure,
- The additional right-of-way/easements obtained by SAFCA as part of the Project's features,
- All areas used for excavation of borrow material and habitat creation, and
- All construction staging areas.

(2) The APE for Project activities shall include the direct footprint of the activity and a reasonable buffer determined by consultation between SAFCA and the Corps, according to the nature of the activity, SAFCA's ownership interest or easement, and the probability that ground-disturbing work may extend beyond the footprint of planned improvements and activities.

(3) The APE for any other type of Project development activities shall be defined by the Corps in consultation with the consulting parties.

IV. INVENTORY OF HISTORIC PROPERTIES

(A) Identification Efforts to Date and Further Work Required: An inventory of Historic Properties within the APE has been initiated consistent with the *Secretary of Interior's Standards and Guidelines for Archeology and Historic Preservation* (48 FR 44716–44740). The SAFCA shall submit a completed inventory and evaluation for each phase of Project work (2008, 2009, 2010) to the Corps. Such inventory shall be deemed complete by the Corps when the SHPO concurs in the NRHP eligibility recommendation for all cultural resources within the APE for that phase.

Areas of Archaeological Sensitivity: Areas of archaeological sensitivity will be monitored in accordance with HPTPs.

(C) Changes in the APE: If areas are added to the Project development activities subsequent to the SHPO concurrence on the map of the APE for a specific phase, SAFCA shall complete an inventory of Historic Properties within the expanded APE. Such inventory shall be undertaken and completed consistent with the *Secretary of Interior's Standards and Guidelines for Archeology and Historic Preservation* (48 FR 44716–44740). Such inventory shall be deemed completed by the Corps at such time as the SHPO concurs in the NRHP eligibility of all cultural resources within the established and revised APE for the Project, pursuant to this Stipulation IV.

V. TREATMENT OF EFFECTS

(A) Historic Property Treatment Plans: If Historic Properties are identified in cultural resources inventories that would be adversely affected by the Project, SAFCA shall prepare a Historic Properties Treatment Plan (HPTP) for review and written approval by the Corps and the SHPO for those specific properties. An HPTP applicable to every Historic Property that may sustain adverse effects by the Project shall be prepared, including for those Historic Properties found during construction. An HPTP may address individual or multiple Historic Properties. An HPTP shall stipulate those actions SAFCA shall take to resolve the adverse effects of the Project on Historic Properties. SAFCA shall ensure that all provisions of an HPTP are carried out in a timely manner. Any changes to an HPTP shall be reviewed and approved by the Corps. Copies of all reports pertaining to the treatment of Historic Properties shall be submitted to the consulting parties to this Programmatic Agreement. Reports and other data pertaining to the inventory of, and treatment of effects on, Historic Properties may be distributed to concurring parties to this Programmatic Agreement and to other members of the public consistent with **Stipulation VII (Confidentiality)** of this Programmatic Agreement. Individual HPTPs may be submitted simultaneously with the cultural resources inventory report for specific Project phases. If HPTPs are submitted simultaneously with an inventory report for a Project phase or with an addendum to such report for an expanded APE or Project description, the Corps and SHPO review period for such HPTP shall run concurrently with the review period for the inventory report.

Review Schedule: The SHPO and the Corps shall have 30 calendar days to review and comment upon in writing any HPTP submitted by SAFCA. The SHPO and the Corps shall indicate in their review that they find the HPTP either acceptable or not. In the event that comments are not made by the SHPO within 30 calendar days, the Corps shall assume the SHPO has accepted the HPTP as submitted. In the event the Corps and/or the SHPO provide written comment within the 30-day period, either SAFCA shall accept the comments and revise the HPTP accordingly, or SAFCA and the Corps may object to some or all comments. Comments from the Corps or the SHPO that are not acceptable to SAFCA shall be resolved by consultation among the Corps, the SHPO, and SAFCA for a period of not more than 15 calendar days. Should the Corps, the SHPO, and SAFCA be unable to resolve any dispute regarding the Corps or the SHPO comments, the consulting parties shall proceed in accordance with **Stipulation VIII (Resolving Objections)** of this Programmatic Agreement.

The Corps shall submit to the SHPO for review and comment any amendment, addendum, revision or other change to an HPTP. SAFCA shall proceed to make changes to an HPTP as per the procedure and schedule for the review and approval of an original HPTP. If a Historic Property is discovered within an expanded APE subsequent to an initial inventory effort for a phase, and the Corps and SAFCA agree that

the Project may adversely affect the property, SAFCA shall submit an addendum to the HPTP or a new HPTP. The review schedule for this submittal follows the provisions of Stipulation V.

(B) Commencement of Construction and Project Work: Project development activities may commence within the APE after a Historic Properties inventory has been completed (per **Stipulations III and IV**, above), and prior to treatment of adverse effects on Historic Properties within the APE provided that:

(1) A plan to respond to inadvertent archaeological discoveries is prepared by SAFCA and approved by the Corps prior to the commencement of Project activities anywhere in the APE for that phase of the Project; and

(2) Project development activities do not encroach within 30 meters (100 ft) of the known boundaries of any Historic Property as determined from archaeological site record forms, other documentation, or as otherwise defined in consultation with the SHPO; and

(3) An archaeological monitor is present during any Project activities that are anticipated to extend either vertically or horizontally into any areas designated to be archaeologically sensitive by SAFCA in consultation with the Corps.

(C) Final Report Documenting Implementation of the Historic Properties Treatment Plan(s): Within one year after the completion of all work performed as part of the Project SAFCA shall submit to the Corps and SHPO a final report documenting the results of all work prepared under the HPTPs. This report shall be submitted to the Corps and SHPO for review and comments, which SAFCA shall incorporate.

VI. NATIVE AMERICAN AND OTHER PUBLIC CONSULTATION AND PUBLIC NOTICE

Members of the interested public shall be invited to consult regarding this Programmatic Agreement. Within 30 calendar days of the signing date of this Programmatic Agreement, the Corps, the SHPO, and SAFCA shall consult to compile a list of members of the interested public who shall be provided notice of this Programmatic Agreement. The opinions of local Native Americans with cultural ties to the APE and the opinions of other members of the public shall be taken into account by the consulting parties for historic preservation actions taken in accordance with this Programmatic Agreement. Native Americans and other members of the public may be invited to concur in this Programmatic Agreement. Native American monitor(s) shall be invited to assist SAFCA in the treatment of any Native American human remains and items associated with Native American burials discovered during the Project in accordance with California Public Resources Code Section 5097.98 and California Health and Safety Code Section 7050.5(b) and 7050.5(c).

VII. CONFIDENTIALITY

Confidentiality regarding the nature and location of the archaeological sites and any other cultural resources discussed in this Programmatic Agreement shall be maintained on a "need-to know" basis limited to appropriate personnel and agents of SAFCA, the Corps, and the SHPO involved in planning, reviewing and implementing this Programmatic Agreement consistent with Section 304 of the NHPA.

VIII. RESOLVING OBJECTIONS

(A.) Should any party to this Programmatic Agreement object to any action proposed or carried out

pursuant to this Programmatic Agreement, the Corps shall consult with the objecting party(ies) for a period of time not to exceed *30 calendar days* to resolve the objection. If the Corps determines that the objection cannot be resolved, the Corps shall forward all documentation relevant to the dispute to the Council. Within 30 calendar days after receipt of all pertinent documentation, the Council shall either:

(1) Provide the Corps with recommendations, which the Corps shall take into account in reaching a final decision regarding the objection; or

(2) Notify the Corps that the Council will comment in accordance with the requirements of Section 106 of the NHPA, and proceed to comment. Any Council comment provided in response shall be taken into account by the Corps, pursuant to the requirements of Section 106 of the NHPA.

(3) Should the Council not exercise one of the above options within 30 days after receipt of all pertinent documentation, the Corps may assume the Council's concurrence in its proposed response to the objection.

(4) The Corps shall take into account any Council recommendation or comment provided in accordance with this stipulation with reference only to the subject of the objection; the Corps' responsibility to carry out all actions under this Programmatic Agreement that are not the subjects of the objection shall remain unchanged.

(B.) At any time during implementation of the measures stipulated in this Programmatic Agreement should an objection pertaining to the Programmatic Agreement be raised by a member of the public, the Corps or SAFCA shall notify the consulting parties to the Programmatic Agreement and take the objection into account, consulting with the objector and, should the objector so request, with any of the consulting parties to this Programmatic Agreement to address the objection.

IX. AMENDMENTS

Any consulting party to this Programmatic Agreement may propose that the Programmatic Agreement be amended, whereupon the Corps shall consult with the other consulting parties to this Programmatic Agreement to consider such amendment. Any amendment shall be executed by the consulting parties in the same manner as the original Programmatic Agreement.

If the Project has not been completed within five years of the date of the execution of this Programmatic Agreement, the consulting parties shall consult on a date not less than 90 days prior to the fifth anniversary of this Programmatic Agreement to either amend this Programmatic Agreement and acknowledge its continued applicability for the undertaking for a designated period of time, or terminate this Programmatic Agreement and proceed to again consult regarding the undertaking in accordance with regulations implementing Section 106 of the NHPA.

All attachments to this Programmatic Agreement, and other instruments prepared pursuant to this agreement such as, but not limited to, the Project's description, initial cultural resource inventory report and maps of the APE, HPTPs, and monitoring and discovery plans may be amended without requiring amendment of this Programmatic Agreement. Such amendments will be consulted on by the concurring parties and shall be final when agreement is reached by the parties.

X. FAILURE TO CARRY OUT THE TERMS OF THE AGREEMENT

Should the Corps fail to ensure that the terms of this Programmatic Agreement are carried out, the Corps shall notify the parties to this Programmatic Agreement and again consult with the SHPO and the Council in accordance with regulations implementing Section 106 of the NHPA. The Corps shall not take any action or make any irreversible decision that would affect an Historic Property, preclude historic preservation alternatives, or foreclose any opportunities for the Council to comment on the undertaking prior to completion of the process for considering and resolving effects on Historic Properties provided in this document.

XI. SCOPE OF THE PROGRAMMATIC AGREEMENT

Execution of this Programmatic Agreement by the Corps, the SHPO, and SAFCA, and implementation of its terms, evidence that Corps has afforded the Council an opportunity to comment on the undertaking for SAFCA Natomas Levee Improvement Program Landside Improvements Project, pursuant to 16 U.S.C. 470f, and that the Corps has taken into account the effects of the undertaking on Historic Properties. This Programmatic Agreement is limited in scope to the undertaking defined herein and is entered into solely for that purpose.

CONSULTING PARTIES:

U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT

By: _____ Date: 10 Apr 08

Title: COL Thomas Chapman, District Engineer, Sacramento District, U.S. Army Corps of Engineers

SACRAMENTO AREA FLOOD CONTROL AGENCY

By: _____ Date: 4/11/08

Title: Stein M. Buer, Executive Director, Sacramento Area Flood Control Agency

CALIFORNIA STATE HISTORIC PRESERVATION OFFICER

By: _____ Date: 5/1/08

Title: Milford Wayne Donaldson, F.A.I.A., California State Historic Preservation Officer

CONCUR:

CENTRAL VALLEY FLOOD PROTECTION BOARD

By: Jay S. Punia Date: 6/23/08

Title: Jay S. Punia, Executive Officer, Central Valley Flood Protection Board

By: JAY S. PUNIA Date: 6/23/08

Title: Executive Officer, CVFPB

Attachment A: Project Description Summary

Attachment B: "Cultural Resources Inventory Reports, Part 1 – Natomas Levee Improvement Program Landside Improvements Project, Sacramento and Sutter Counties, California" (report).