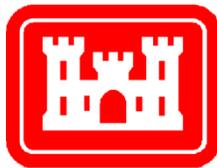


**SUPPLEMENT TO STANDARD
OPERATIONS AND MAINTENANCE MANUAL
SACRAMENTO RIVER FLOOD CONTROL PROJECT
UNIT NO. 125
BACK LEVEE OF RECLAMATION DISTRICT NO. 1000**



**US Army Corps
of Engineers®**

**U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT**

CORPS OF ENGINEERS

U.S. ARMY

SUPPLEMENT TO STANDARD

OPERATION AND MAINTENANCE MANUAL

SACRAMENTO RIVER FLOOD CONTROL PROJECT

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SACRAMENTO DISTRICT

CORPS OF ENGINEERS

U.S. ARMY

JUNE 1959

**SUPPLEMENT TO STANDARD
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LOCATION	ADDITION OR REVISION	DATE
1-04	Add subparagraph d.	Jul 1984
Exhibit B	Added drawing no. 50-4-5596	Jul 1984
Exhibit F	Added transfer letter dated 12 Feb 1984	Jul 1984
Exhibit F	Add copy of letter of transfer dated 13 Dec 1951	22 Dec 2010
Exhibit F	Add copy of letter of acceptance dated 2 Jan 1952	22 Dec 2010
Table of Contents	Updated table of contents reflecting content additions	3 April 2014
1-04	Add subparagraphs e. f. g. h.	3 April 2014
2-04	Add subparagraph c.	3 April 2014
2-02	Subparagraph a. added a note	3 April 2014
Exhibit A	Added Exhibit A-2 and A-3	3 April 2014
Exhibit B	Add As-builts under File No. SA-04-166; SA-04-0167; SA-04-0168; SA-04-0169	3 April 2014
Exhibit F	Add copy of letter of acceptance	3 April 2014
Exhibit H	Add Section 408 Permissions	3 April 2014
Exhibit I	Add Biological Opinions	3 April 2014
Exhibit F	Add copy of letter of transfer dated 29 Nov 2016	29 Dec 2016

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A	Flood Control Regulations (Contained in Standard Manual)	Unattached
A-1	Location Map	1 Sheet
A-2	NCC Levee Improvement Map (Phases 1, 1b, 2, 2b)	1 Sheet
A-3	Levee Mile Map for Natomas Levee Improvement Program	1 Sheet
B	“As Constructed” Drawings	CD attached
C	Plates of Suggested Flood Fighting Methods (Contained in Standard Manual)	Unattached
D	Check List No. 1 – Levee Inspection Report (Contained in Standard Manual)	Unattached
E	Check Lists – Levee, Channels and Structures	Sheets 1-8
F	Letters of Transfer to the State Reclamation Board	Sheets 1-19
G	Suggested Semi-Annual Report Form	Sheets 1-2
H	Section 408 Permission	28 Pages
I	USFWS B.O. #1-1-07-F-0207 & 1-1-07-F-0231	31 Pages
	USFWS B.O. #81420-2008-F-0195-5	87 Pages

SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE MANUAL
UNIT NO. 125
BACK LEVEE OF
RECLAMATION DISTRICT NO. 1000

SECTION I

INTRODUCTION

1-01. Location. The improvement covered by this manual is that part of the Sacramento River Flood Control Project which comprises the levee and channel along the south side (left bank) of the Natomas Cross Canal, the west side of the Pleasant Grove Creek Canal that borders on the north and east sides of the Reclamation District No. 1000. The levee of this unit lies north of the junction of the American and Sacramento Rivers and the City of Sacramento as shown on the location map, Exhibit A-1.

1-02. Protection Provided. The levee of this unit is an essential feature of the Sacramento River Flood Control Project. It provides direct protection to about 52,000 acres of highly developed agricultural land and related buildings and homes, a small part of North Sacramento, the subdivision of Northgate and several county roads. The grade of the adopted floodplain profile along the Natomas East Canal varies from elevation 35.3 at the confluence of the American River and Natomas East Canal to elevation 40.7 at its upper end in the vicinity of Sankey Road. Along the Natomas Cross Canal the grade of the adopted floodplain profile varies from elevation 41.2 at its lower end, the junction with the Sacramento River, to elevation 42.1 at its upper or easterly end. Along the Pleasant Grove Creek Canal the grade of the adopted floodplain profile varies from elevation 42.1 at its junction with the Natomas Cross Canal to elevation 43.4 at its upper end in the vicinity of the Sankey Road crossing. Elevations are referred to U.S. Corps of Engineers datum. The reach of the Natomas East Canal from the American River to Arcade Creek has a project design capacity of 16,000 cubic feet per second, from Arcade Creek to Magpie Creek pumping station 12,900 cubic feet per second, from Magpie to Linda Creek 12,600 cubic feet per second and upstream from Linda Creek the project design capacity is 1,100 cubic feet per second. Along Natomas Cross Canal the project design capacity is 22,000 cubic feet per second and along the Pleasant Grove Creek Canal from the head of the Natomas Cross Canal to the Pleasant Grove Creek the project design capacity is 7,000 cubic feet per second; from Pleasant Grove Creek to Curry Creek 2,700 cubic feet per second; and from Curry Creek to high ground 900 cubic feet per second. The levee provides for a freeboard of at least 3 feet above the grade of the adopted floodplain profile within this unit except along the westerly levee of Natomas East Canal between stations 162+00 to 276+00 as shown on drawings of Exhibit B where the levee provides for a freeboard of at least 2.5 feet above the grade of the adopted floodplain profile.

1-03. Project Works. The flood control improvement covered by this manual is a part of the Sacramento River Flood Control Project authorized by the Flood Control Act of 1917, as modified by the Acts of 1928, 1937, and 1941, and consists of the westerly levees and channels

of Natomas East Canal and Pleasant Grove Creek Canal extending for a distance of about 17.3 miles and the southerly levee and channel of the Natomas Cross Canal which is about 4.4 miles long. The above-described levee was constructed by local interests and for the most part has been enlarged, shaped or raised by the Corps of Engineers to project standards.

1-04. Construction Data and Contractor. Construction required by the Corps of Engineers to bring the levees of this unit to project standards and to perform repair work to locally built levees was accomplished under the following contracts:

a. Emergency levee repairs along Natomas Cross Canal in R.D. 1000, Sutter County was accomplished under Contract No. DA-04-167-CIVENG-57-61 by Lee Stephens, contractor, during the period from 18 October 1956 to 9 May 1957.

b. Levee construction, back levees of R.D. 1000 in Sacramento and Sutter Counties was accomplished under Contract No. DA-04-167-CIVENG-58-14 by Lee Stephens, contractor, during the period from 2 August 1957 to 27 January 1958.

c. Grading and surfacing of the back levee of R.D. 1000 in Sacramento County was accomplished under Contract No. DA-04-167-CIVENG-59-9 by Brighton Sand and Gravel Co. during the period from 7 August 1958 to 7 October 1958.

d. Emergency repairs to project levees on the Natomas Cross Canal left bank levee in Reclamation District 1000 were accomplished under Contract No. DACW05-83-C-0148 by Holman Pettibone. Specification No. 6890 Drawing No. 50-4-5596.

e. 2007 Construction, Natomas Cross Canal (NCC) South Levee, Phase 1. The NCC South Levee Phase 1 Project construction included the installation of 5,300 linear feet of soil-cement-bentonite (SCB) cutoff wall using the Deep Mix Method (DMM), from Levee Mile (LM) 3.36 to LM 4.27 (Unit 4) (as-built station 48+00 to 0+00) on the NCC south levee [and from LM 0.00 (Unit 1) to LM 0.10 (Unit 1) on the Sacramento River east levee, which is incorporated into the Unit 124 O&M manual]. An additional 600 linear feet of SCB cutoff wall, using the conventional, long-reach excavator method, was constructed between LM 3.25 and LM 3.36 (Unit 4) (as-built station 54+00 to 48+00) of the NCC as a demonstration program for post-construction quality control techniques. This section of conventionally-constructed cutoff wall was later replaced with a new soil-bentonite (SB) cutoff wall as noted in section f, below. Construction of the NCC Phase 1 Project began around July 31, 2007 and continued through September 18, 2007. Work was completed by Envirocon, Inc, under Sacramento Area Flood Control Agency (SAFCA) Contract No. 3947, USACE Specification No. 1973, and USACE File No. SA-04-166. USACE granted Section 408 Permission on July 19, 2007, reference Exhibit H. The USFWS Biological Opinion (B.O.) #1-1-07-F-0207 & 1-1-07-F-0231 documents Endangered Species Act (ESA) compliance requirements, reference Exhibit I. Reference Exhibit A-2 for an area map of the NCC work and A-3 for the LM map for the Natomas Levee Improvement Program (NLIP).

f. 2008 Construction, NCC South Levee, Phase 1B. The NCC south levee Phase 1B Project construction continued with the installation of approximately 3,640 linear feet

of cutoff wall between LM 2.43 and LM 3.12 (Unit 4) (as-built station 97+00 to 61+00). For this phase of the work, a SB cutoff wall was installed using the conventional long-reach excavator method. Work occurred between July 14 and September 30, 2008. A change order was issued to the Contractor to construct an additional length of approximately 850 linear feet of cutoff wall between LM 3.21 and LM 3.37 (Unit 4) (as-built station 56+00 to station 47+75), to overlap the conventional method SCB wall constructed in 2007. This work was performed between August 19 and October 3, 2008. Work was completed by Envirocon, Inc, under SAFCA Contract No. 4006, USACE Spec No. 1974, and USACE File No. SA-04-0167. USACE granted Section 408 Permission on July 19, 2007, reference Exhibit H. The USFWS B.O. #1-1-07-F-0207 & 1-1-07-F-0231 documents Endangered Species Act (ESA) compliance requirements, reference Exhibit I. Reference Exhibit A-2 for an area map of the NCC work and A-3 for the LM map for the Natomas Levee Improvement Program (NLIP).

g. 2009 Construction, NCC South Levee, Phase 2. The NCC south levee Phase 2 Project consisted of 15,370 linear feet slurry wall construction and a levee embankment raise. The slurry wall construction was performed using three headings (each using a separate cutoff wall contractor working under a single contract), using the conventional, long-reach excavator method. Heading 1 included constructing a cutoff wall between LM 1.24 and LM 2.44 (Unit 4) (as-built station 160+00 to 96+50) with a gap between LM 1.94 and LM 2.03 (Unit 4). This heading overlaps with the NCC Phase 1B SB cutoff wall by 30 feet, excavating into the existing cutoff wall at a back slope of 4:1. Heading 2 was constructed between LM 0.02 and LM 1.24 (Unit 4) (as-built station 224+25 to 160+00). Heading 3 was constructed between LM 16.44 and LM 16.99 (Unit 3) (as-built station 259+70 to 231+10). All cutoff wall construction headings were completed between June 3, 2009 and August 15, 2009. See as-built drawings for the top of levee finished grade. Work began on July 22, 2009 between LM 2.48 and LM 4.27 (Unit 4) (where cutoff walls had been constructed in previous phases) and continued through August 13, 2009. The remainder of the embankment was constructed following installation and curing of the cutoff wall headings, completing around September 25, 2009. Work was performed by Teichert (Embankment), Envirocon (SB cutoff, heading 1), Magnus Pacific (SB cutoff wall, heading 2), and Inquip (SB cutoff wall, heading 3), under SAFCA Contract No. 3980, USACE spec No. 1980, and USACE File No. SA-04-0168. USACE granted Section 408 Permission on May 22, 2009, reference Exhibit H. The USFWS B.O. # 81420-2008-F-0195-5 documents ESA compliance requirements, reference Exhibit I. Reference Exhibit A-2 for an area map of the NCC work and A-3 for the LM map for the Natomas Levee Improvement Program (NLIP).

h. 2010 Construction, NCC South Levee, Phase 2B. The NCC Phase 2B Project extended the cutoff wall and levee raising improvements constructed as part of NCC Phase 1, 1B, and 2 from the point of termination for NCC Phase 2 to approximately 300 feet north of Howsley Road. The project consisted of levee raising and slope flattening and installation of an SB cutoff wall constructed by the traditional, long-reach excavator method. See as-built drawings for the top of levee finished grade. The NCC Phase 2B work extended approximately 0.5 miles, from LM 16.45 to LM 15.94 (Unit 3) (as-built station 256+00 to station 283+00). Work was completed between May 27, 2010 and November 19, 2010. Work was performed by Nordic Industries (embankment), Magnus Pacific (SB cutoff wall), and Inquip (SB cutoff wall) under SAFCA Contract No. 4046, USACE spec No. 1981, and USACE File No. SA-

04-0169. USACE granted Section 408 Permission on May 22, 2009, reference Exhibit H. The USFWS B.O. # 81420-2008-F-0195-5 documents ESA compliance requirements, reference Exhibit I. Reference Exhibit A-2 for an area map of the NCC work and A-3 for the LM map for the Natomas Levee Improvement Program (NLIP).

1-05. Flood Flows. For purposes of this manual, the term “flood” or “high water period” shall refer to flows when the water surface reaches or exceeds a reading of 35.0 on a staff gage located on the second pile bent at the southeast corner of the El Centro Road Bridge over the Natomas Cross Canal. Also when the water surface reaches or exceeds a reading of 30.0 on a staff gage located on the northwest end of the Silver Eagle Road Bridge over the Natomas East Canal. Both gages are set on U.S. Corps of Engineers datum.

1-06. Assurances Provided by Local Interests. Assurance of cooperation by local interests is provided by State Legislation, as contained in Chapter 3, Part 2, Division 5 of the State Water Code (see paragraph 2-02a of the Standard Manual).

1-07. Transfer to the State Reclamation Board. The levees and channels of this unit were transferred to the State Reclamation Board for maintenance and operation by letters dated 14 February 1958, 24 March 1958 and 22 October 1958.

1-08. Superintendent. The name and address of the Superintendent appointed by local interests to be responsible for the continuous inspection, operation and maintenance of the project works shall be furnished the District Engineer, and in case of any change of Superintendent, the District Engineer shall be so notified.

SECTION II

FEATURES OF THE PROJECT SUBJECT TO FLOOD CONTROL REGULATIONS

2-01. Levees.

a. Description. The levees along the left bank of Natomas Cross Canal, the left bank of Pleasant Grove Greek Canal and the right bank of the Natomas Canal are located as described in paragraphs 1-01 and 1-03 of this manual. A surfaced road traverses the crown of the levee for the full distance of about 21.7 miles. For more complete details of construction of the above-mentioned levee, refer to the “As Constructed” drawings listed in Exhibit B.

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

- (1) Maintenance – paragraph 4-02 of the Standard Manual.
- (2) Check Lists – Exhibit E of this Supplement Manual.
- (3) Operation – paragraph 4-04 of the Standard Manual.
- (4) Special Instructions – paragraph 4-05 of the Standard Manual.

2-02. Drainage and Irrigation Structures.

a. Description. Drainage and irrigation structures which extend through the levee are located and described as follows:

Levee Mileage	Size of Pipe	Gate Location	Other Structure Description	Invert-ft. below crown
<u>Natomas East Canal – American River to Cross Canal</u>				
	6" and			
0.74	12"	-	PG&E Co. gas line crossing	-
2.48	18"	-	Sewer discharge pipe	-
2.48	8"	-	Effluent pipe	4.8
6.27	8"	w.s.	Pump W.S.	3.4
10.5	24"	w.s.	Pump W.S.	8.5
12.12	24"	-	-	-
12.62	24"	w.s.	-	9.4
13.31	48"	w.s.	Gate in riser unit	14.1
14.07	24"	w.s.	Gate in riser unit	15.5
14.92	36"	w.s.	Gate in riser unit	14.3
15.62	8"	w.s.	Pump W.S.	3.2
15.71	24"	w.s.	Gate in riser unit	14.3
15.96	24"	w.s.	Gate in riser unit	16.6
16.00	8"	-	Pump W.S.	2.1

South Levee Natomas Cross Canal - Mile 0.0 to El Centro Road Crossing

0.54	3-28"	-	Pumping Plant W.S.	2.5
2.05	48"	w.s.	Mutual Water Co.	16.4
3.24	42"	w.s.	-	16.4
4.29	18"	w.s.	Pumphouse W.S.	1.9

Note on abbreviations: w.s = waterside; l.s. = landside

*Note: these features were located in the project right of way when it was originally constructed. Since that time some of these structures may have been relocated.

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

- (1) Maintenance – paragraph 5-02 of the Standard Manual.
- (2) Check Lists – Exhibit E of this Supplement Manual.
- (3) Operation – paragraph 5-04 of the Standard Manual.
- (4) Additional Requirements – paragraph 5-05 of the Standard Manual.
- (5) Safety Requirements – paragraph 5-06 of the Standard Manual.

2-03. Channel.

a. Description. The floodway of the Natomas East Canal from Linda Creek to the American River is confined between levees along both banks. From Linda Creek northerly to Sankey Road along the Natomas East Canal and along the Pleasant Grove Creek Canal there is a levee only along the westerly side. In the vicinity of the Sankey Road crossing the direction of flow is southerly along the Natomas East Canal and northerly along the Pleasant Grove Canal. The floodway of the Natomas Cross Canal is confined between levees along both banks for the entire length and the width between levees is about 550 feet. The project design capacity of the channels is as indicated in paragraph 1-02 of this manual.

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

- (1) Maintenance – paragraph 6-02 of the Standard Manual .
- (2) Check Lists – Exhibit E of the Supplement Manual.
- (3) Operation – paragraph 6-04 of the Standard Manual.
- (4) Safety Requirements – paragraph 6-05 of the Standard Manual.

It shall be the duty of the Superintendent to maintain a patrol of the project works during all periods of flood in excess of a reading of 35.0 on the gage at El Centro Road Bridge and a reading of 30.0 on the gage at the Silver Eagle Road Bridge as indicated in paragraph 1-05 of this manual. Gage readings shall be taken in accordance with the following schedule:

Gage Reading

Stage at the Gage

El Centro Road

Silver Eagle Road

Every 12 hours	above 35 feet	above 30 feet
Every 6 hours	above 38 feet	above 33 feet
Every 2 hours	above 42 feet	above 36 feet

The superintendent shall dispatch messages, by the most suitable means, to the State Department of Water Resources whenever the water surface reaches or exceeds the gage readings indicated above and record the time of observations. One copy of the readings shall be forwarded to the District Engineer following the flood, and a second copy transmitted as an enclosure to the semi-annual report in compliance with paragraph 3-05 of the Standard Manual.

2-04. Miscellaneous Facilities.

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

(1) Bridges.

(a) Bridges crossing the East Natomas Canal at the following locations:

- West El Camino Ave. – Station 0+30
- Silver Eagle Road – Station 70+10
- Main Ave. – Station 161+80
- Sorento Road – Station 240+47
- Elkhorn Road – Station 282+57
- Elverta Road – Station 390+18
- Riego Road – Station 530+94

(b) Bridges crossing the Pleasant Grove Creek Canal follow:

- Sankey Road – Station 639+15
- Fifield Road – Station 755+24
- Howsley Road – Station 813+15

(c) Bridges crossing the Natomas Cross Canal follow:

- El Centro Road – Station 873+55
- Garden Highway – Station 1100+44

For the location of stations see the “As Constructed” drawing as listed in Exhibit B.

(2) Utility Relocation. Because of the nature of the construction of the levee by local interests, no records of any utility relocations are available.

(3) Hydrographic Facilities.

(a) A staff gage located at the southeast corner of the El Centro Road Bridge that crosses the Natomas Cross Canal. This gage to be maintained by local interests.

(b) A staff gage located on the northwest end of the Silver Eagle Road Bridge over the Natomas East Canal. This gage to be maintained by local interests.

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

- (1) Maintenance – paragraph 7-02 of the Standard Manual.
- (2) Check Lists – paragraph 7-03 of the Standard Manual.
- (3) Operation – paragraph 7-04 of the Standard Manual.

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

SECTION III

REPAIR OF DAMAGE TO PROJECT WORKS AND METHODS OF COMBATING FLOOD CONDITIONS

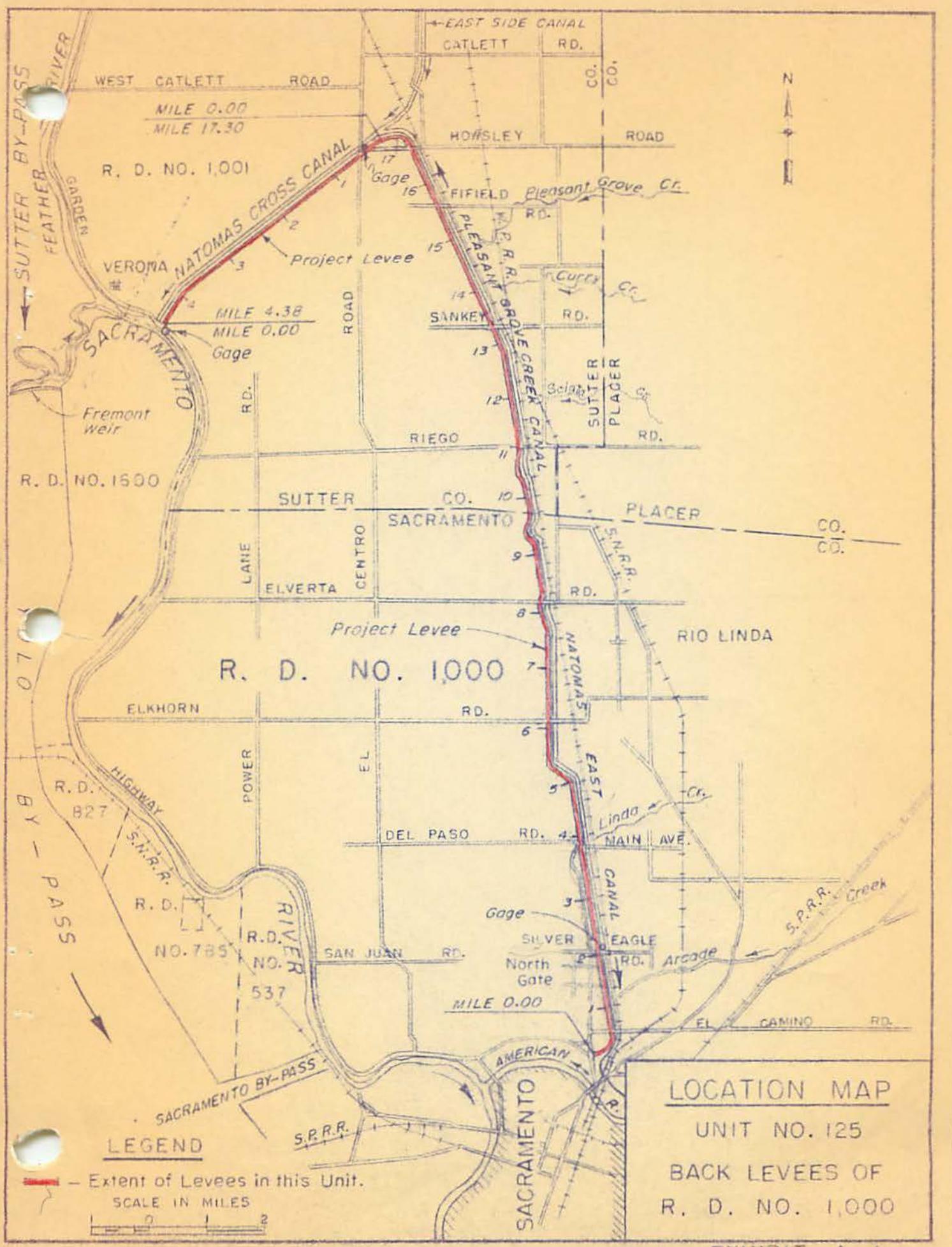
3-01. Repair of Damage. In the event of serious damage to the projects works, whether due to flood conditions or other causes, and which may be beyond the capability of local interests to repair, that Superintendent will contact a representative of the Department of Water Resources, State of California, who coordinates maintenance of project works of the Sacramento River Flood Control Project. The State representative will give assistance or advice, or will determine appropriate action to be taken.

3-02. Applicable Methods of Combating Floods. For applicable methods of combating flood conditions, reference is made to Section VIII of the Standard Operation and Maintenance Manual, revised May 1955, where the subject is fully covered.

EXHIBIT A

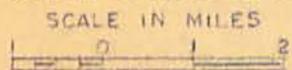
FLOOD CONTROL REGULATIONS

(SEE STANDARD MANUAL)



LEGEND

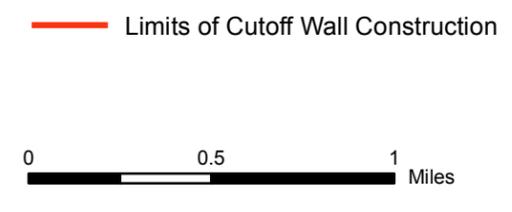
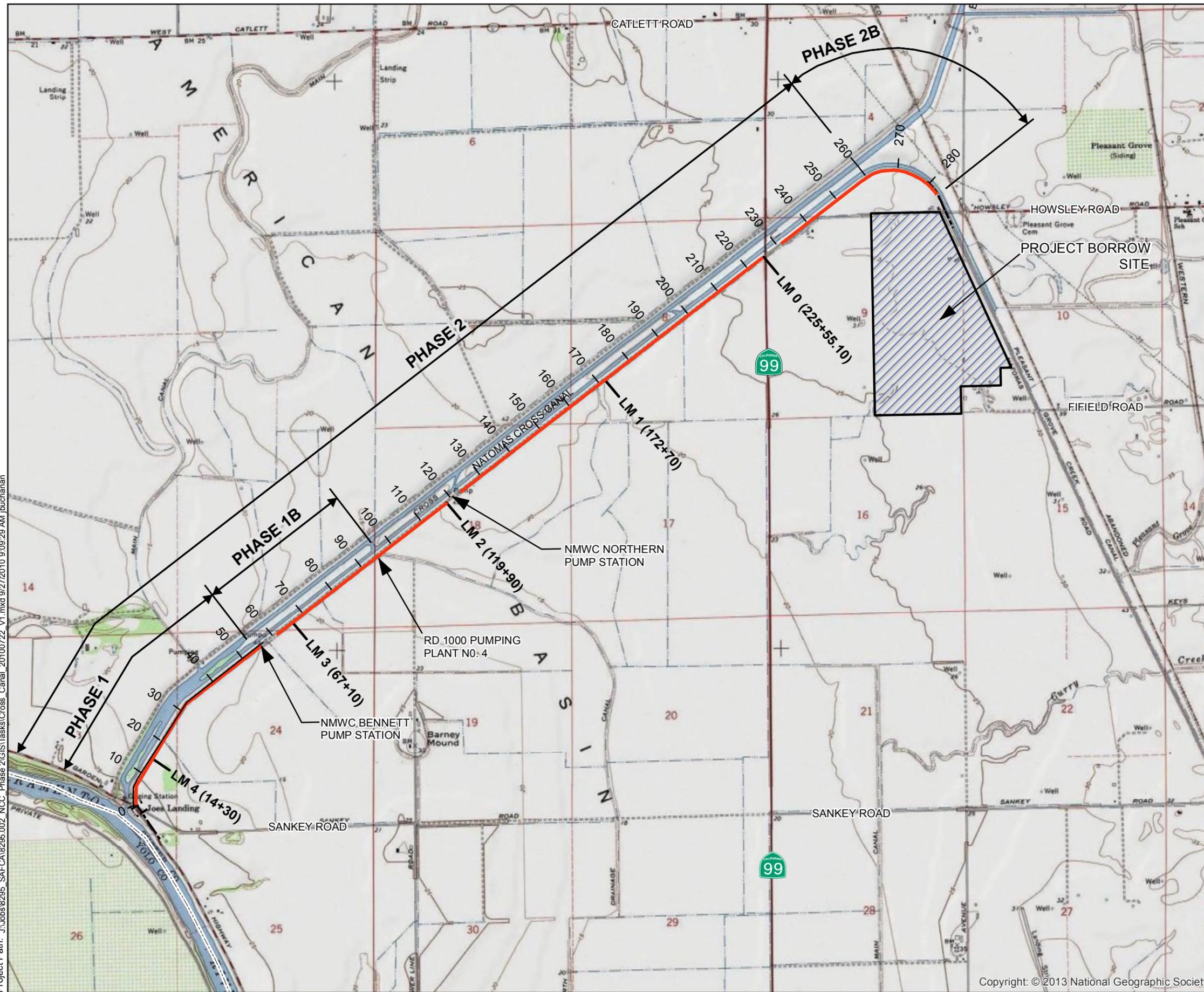
— Extent of Levees in this Unit.



LOCATION MAP
 UNIT NO. 125
 BACK LEVEES OF
 R. D. NO. 1,000

EXHIBIT A-1

Project Path: J:\Jobs\8295_SAFCA\8295.002_NCC_Phase 2\GIS\Tasks\Cross_Canal_20100722_V1.mxd 9/27/2010 9:09:29 AM jbuchanan



**SAFCA
NCC PHASE 1, PHASE 1B, PHASE 2 AND PHASE 2B**

PROJECT FEATURE BY LEVEE STATION



Copyright: © 2013 National Geographic Society

*The Unit 125 O&M Manual consist of Units 3 and 4, along the Natomas Cross Canal, the Natomas Grove Creek Canal, and the North East Main Drain Canal, shown in this figure.



NOTES:

- 1) The purpose of this map is to show the levee miles for the levees included in the Natomas Levee Improvement Program.
- 2) The levee miles shown hereon are based on the NLIP project baselines, the beginning and ending points of Units 1 through 4 being based on the information obtained from Reclamation District No. 1000 Inspection Logs dated February 1991 and February 1992 and are approximate in nature.

**SACRAMENTO AREA FLOOD CONTROL AGENCY
LEVEE MILE MAP FOR NATOMAS LEVEE IMPROVEMENT PROGRAM**

COUNTY OF SACRAMENTO/SUTTER

STATE OF CALIFORNIA

DATE: 01/06/2009 SCALE: 1" = 7000'

DRWN. BY: DJF CHK. BY: BEB SHEET 1 OF 1

Jan. 05, 2009 - 16:21:33 DWG Name: P:\SAFCA\2006.NLIP\survey\dwg\Project Baselines\2008 revision
NLIP-Levee-mile-map.dwg - Layout1 (2) Updated By: dforay

PSOMAS

1075 Creekside Ridge Drive, Suite 200
Roseville, CA 95678
(916) 788-8122 (916) 788-0600 (FAX)

EXHIBIT B

“AS CONSTRUCTED” DRAWINGS

See separate folder for the following drawings

<u>File No.</u>	<u>Title</u>
50-4-3164	Levee Construction, Back Levees of R.D. 1000 and 1001 in Sacramento and Sutter Counties, Sheets 1 to 17, incl.
50-4-3318	Emergency Levee Repairs along Natomas Cross Canal, sheets 5, 6, 7, and 8.
50-4-3316	Back Levee of R.D. 1000 in Sacramento County, 5 sheets.
50-4-5596	Sutter and Yolo Counties, California, Emergency Levee Repairs, Right Bank Yolo Bypass – RD 2035, Left Bank Natomas Cross Canal – RD 1000, PL 84/99, in 2 sheets.
File No. SA-04-166	Natomas Cross Canal, South Levee, Phase 1 (Natomas Levee Improvement Program, Section 408, SAFCA)
File No. SA-04-0167	Natomas Cross Canal, South Levee, Phase 1B (Natomas Levee Improvement Program, Section 408, SAFCA)
File No. SA-04-0168	Natomas Cross Canal, South Levee, Phase 2 (Natomas Levee Improvement Program, Section 408, SAFCA)
File No. SA-04-0169	Natomas Cross Canal, South Levee, Phase 2B (Natomas Levee Improvement Program, Section 408, SAFCA)

For further details, additional drawings are available from the office of the District Engineer.

EXHIBIT C

PLATES OF SUGGESTED FLOOD FIGHTING METHODS

(SEE STANDARD MANUAL)

EXHIBIT D

CHECK LIST NO. 1

LEVEE INSPECTION REPORT

(SEE STANDARD MANUAL)

EXHIBIT E

CHECK LISTS OF LEVEES, CHANNEL AND STRUCTURES

FOR DEFINITION OF “FLOOD” OF “HIGH WATER PERIOD”, SEE PARAGRAPH 1-05 OF
THIS MANUAL

CHECK LIST NO. 2

UNIT NO. 125

BACK LEVEE OF R. D. 1000

Inspector's Report Sheet No. _____ Inspector _____

Date _____ Superintendent _____

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

Instructions for Completing Sheet 2, Exhibit E
(To be printed on back of Sheet 2)

- Item (a) Indicate levee station of observation, obtained by pacing from nearest reference point; indicate right or left bank.
- Item (b) If sufficient settlement of earthwork has taken place to be noticeable by visual observation, indicate amount of settlement in tenths of a foot. If sloughing has caused a change in slope of the embankment sections, determine the new slope. Note areas where erosion or gulying of the section has occurred.
- Item (c) If sufficient erosion or gulying of back face of back toe of levee has taken place to be noticeable by visual inspection, indicate area affected and depth.
- Item (d) Note any natural change in any section of roadway or ramps. Indicate any inadequacy in surface drainage system.
- Item (e) Indicate any evidence of seepage through the embankment section.
- Item (f) Indicate the serviceability of all farm gates across the embankments and roadway, and indicate if repainting is required.
- Item (g) Indicate maintenance measures that have been performed since last inspection and their condition at the time of this inspection.
- Item (h) Record opinion, if any, of contributory causes for conditions observed and also any observations not covered under other columns.

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

CHECK LIST NO. 3

CHANNEL AND RIGHT-OF-WAY

UNIT NO. 125

BACK LEVEE OF R. D. 1000

Inspector's Report Sheet No. _____ Inspector _____

Date _____ Superintendent _____

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

Instructions for Completing Sheet 4, Exhibit E
(To be printed on back of Sheet 4)

- Item (a) Indicate station of observation obtained by pacing from nearest reference point.
- Item (b) Note nature, extent, and size of vegetal growth within the limits of flood flow channel.
- Item (c) Note nature and extent of debris and refuse that might cause clogging of the conduits of the irrigation intake works, fouling of the tainter gates, or the bridges over the channel.
- Item (d) Report any construction along the diversion channel or above the diversion channel or above the diversion works that has come to the attention of the inspector and that might affect the functioning of the project.
- Item (e) Indicate any change in grade or alignment of the channels, either by deposition or sediment or scour, that is noticeable by visual inspection. Estimate amount and extent.
- Item (f) Indicate any change that has taken place in the riprap such as disintegration of the rock, erosion, or movement of the rock. Note the presence of vegetal growth through the riprap.
- Item (g) Note any damage or settlement of the footings of the bridges. Indicate condition of wooden structures and if repainting is required. Indicate condition of bridge approaches, headwalls, and other appurtenances.
- Item (h) Indicate maintenance measures that have been performed since the last inspection and their condition at time of this inspection.
- Item (i) Record opinion, if any, of contributory causes for conditions observed, also any observations not covered under other columns.

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

CHECK LIST NO. 4

DRAINAGE AND IRRIGATION STRUCTURES
UNIT NO. 125

Inspector's Report Sheet No. _____

Inspector _____

Date _____

Superintendent _____

(a) Location by levee miles	(b) Bank	(c) Debris or other obstruction to flow	(d) Damage or settlement of pipe or conduit	(e) Condition of concrete headwall or invert paving	(f) Condition of right-of-way adjacent to structure	(g) Repair Measures Taken since last Inspection	(h) Comments
0.74	Right						
2.48	"						
2.48	"						
6.27	"						
10.50	"						
12.12	"						
12.62	"						
13.31	"						
14.07	"						
14.92	"						
15.62	"						
15.71	"						
15.96	"						
16.00	"						

Natomas East Canal - American River to Cross Canal

CHECK LIST NO. 4

DRAINAGE AND IRRIGATION STRUCTURES
UNIT NO. 125

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

(a) Location by levee miles	(b) Bank	(c) Debris or other obstruction to flow	(d) Damage or settlement of pipe or conduit	(e) Condition of concrete headwall or invert paving	(f) Condition of right-of-way adjacent to structure	(g) Repair measures taken since last inspection	(h) Comments
0.54 2.05 3.24 4.29	left " " " "						South Levee Natomas Cross Canal - Mile 0.0 at El Centro Road Crossing

Instructions for Completing Sheets 6 and 7, Exhibit E
(To be printed on back of Sheets 6 and 7)

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

EXHIBIT F

LETTERS OF TRANSFER TO THE CENTRAL VALLEY FLOOD PROTECTION BOARD
(PREVIOUSLY THE STATE RECLAMATION BOARD)



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

NOV 29 2016

Ms. Leslie M. Gallagher
Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room 151
Sacramento, CA 95821

Dear Ms. Gallagher:

The purpose of this letter is to notify the Central Valley Flood Protection Board of the completion of an effort to update the Operation and Maintenance Manual Supplements for the Sacramento River Flood Control Project and the Lower San Joaquin River Levees and Lower San Joaquin River and Tributaries Project. These updates are a compilation of revisions made to the project over time and where we had record of a transfer letter to the Board. These updated supplements are the most current version and should be utilized as the baseline version for any future project modifications.

This process and the compiled updates have been coordinated with the Central Valley Flood Protection Board and Department of Water Resources staffs for review and comment. All comments have been addressed or incorporated into the manuals.

The Board staff has been provided a copy of the manuals in electronic format. Future updates will include entire unit supplements so updates can be seen in context with the entire unit supplement. The list of completed supplements, by the unit number and title, are attached. If you have any questions regarding this transmittal, please contact Gary Kamei at 916-557-6845.

Sincerely,

A handwritten signature in black ink, appearing to read "D. G. Ray", written over a horizontal line.

David G. Ray, P.E.
Colonel, U.S. Army
District Commander

Enclosures

Standard O&M Manual Sacramento River Flood Control Project	
Unit No.	Project Name
101	RD 341 Sherman Island
102	E. Levee of Sac River, Isleton to Threemile Slough & N. Levee of Threemile Slough from Sac River to SJ River
103	Both Levees of Georgiana Slough & E. Levee of Sac River from Walnut Grove to Isleton
104	Levees around Grand Island
105	Levees Around Reyer Island
106	S. Levee Lindsey Slough & W. Levee of Yolo BP from Lindsey Slough to Watson Hollow and N. Levee of Watson Hollow Drain
107	Levees Around Hastings Tract
108	Levees Around Peters Tract
109	West Levee of Yolo Bypass & E. Levee of Cache Slough
110	Levees Around Sutter Island
111	E. Levee of Sac River from Freeport to Walnut Grove
112	Levees Around Merritt Island
113	E. Levee Yolo Bypass, N. Levee Miner Slough, W. Levees Sutter Slough, Elkhorn Slough & Sac River, All Bordering RD 999
114	W. Levee of Sac River from Northern Boundary of RD 765 to Southern Boundary of RD 307
115	E. Levee of Sac River from Sutterville Rd to Northern Boundary of RD 744
116	W. Levee of Sac River from Sac Weir to Mi 51.2 & S. Levee of Sac Bypass & E. Levee of Yolo Bypass from Sac Bypass to Southern Boundary of RD 900
117	E. Levee Sac River through City of Sac from Tower Bridge to Sutterville Rd
118.1	E. Levee of Sac River from American River to Tower Bridge & S. Levee of American River from Mayhews Downstream to Sac River
118.2	N. Levee American River, E. Levee Natomas Canal, Both Levees Arcade Creek, S. Levee Linda Creek, & Magpie Creek Diversion Channel
118.2 Sup	Vegetation on Mitigation Sites E. Levee of Sac River from American River to Tower Bridge & S. Levee of American River from Mayhews Downstream to Sac River
119	Putah Creek Channel & Levees & W. Levee of Yolo Bypass from Yolo Causeway Downstream 3 mi. Includes O&M manual for the Yolo Basin wetlands, and South Fork Putah Creek Preserve Restoration Section 1135 Authorization.
120	Relocated Willow Slough Channel & Levees & W. Levee Yolo Bypass from mouth of Relocated Willow Slough to Yolo Causeway
121	R. Levee of Yolo Bypass from Willow Slough Bypass to Woodland Rd RD2035
122.1	W. Levee of Sac River from Mi 70.8 to Sac Weir & N. Levee of Sac Bypass & E. Levee of Yolo Bypass from Woodland Hwy to Sac Bypass
123	W. Levee of Sac River from East End of Fremont Weir to Mi 70.8 & E. Levee of Yolo Bypass from East End Fremont Weir to Woodland Hwy RD 1600

124	N. Levee of American River from Natomas E. Canal to Sac River & E. Levee of Sac River from Natomas Cross Canal to American River. Includes supplement, Vegetation on Mitigation Sites.
125	Back Levee of RD 1000
126	Cache Creek Levees & Settling Basin Yolo Bypass to High Ground
127	Knights Landing Ridge Cut & Sac River & Yolo BP Levees of RD's 730 and 819 & S. Levee of Sycamore Slough
128	E. Levee of Sac River from Sutter Bypass to Tisdale Weir all within RD 1500
129	S. Levee of Tisdale By-Pass from E. Levee Sac River to W. Levee Sutter BP & W. Levee of Sutter BP Downstream to E. Levee of Sac River
130	W. Levee Sac River from Sycamore Slough to Wilkins Slough (Mi. 89.9 to Mi. 117.8)
131	W. Levee Sac River from Wilkins Slough to Colusa (Mi. 117.8 to Mi. 143.5)
132	Back Levees of RD 108
133	E. Levee of Sac River from Winship School to Tisdale BP & N. Levee of Tisdale BP & W. Levee of Sutter BP from Long Bridge to Tisdale BP
134	Levees of RD 70, E. Levee of Sac River from Butte Slough Outfall Gates to Winship School & W. Levee of Sutter BP from Butte Slough Outfall Gates to Long Bridge
135	E. Levee of Sutter BP from Sutter Buttes Southerly to Junction with Feather River & E. & W. Levees of Wadsworth Canal & Levee of Intercepting Canals
136	E. Levee of Sac River from Butte Slough Outfall Gates to the Princeton-Afton Rd (Mi. 138.3 to Mi. 164.4)
137	W. Levee of Sac River from North End of Princeton Warehouse to Colusa Bridge
138	E. Levee of Sac River from Parrott-Grant Line to Princeton-Afton Rd
139	W. Levee of Sac River from N. Boundary of LD 2 to North End of Princeton Warehouse
140	W. Levee of Sac River in LD 1 (Mi. 170.5 to Mi. 184.7). Includes mitigation site O&M manual, Yuba County
141.1	E. Levee of Feather River from Bear River to Natomas CC & S. Levee of Bear River & Both Levees of Yankee Slough. Parts 1 and 2
141.2	E. Levee of Feather River from Bear River to Natomas CC & S. Levee of Bear River & Both Levees of Yankee Slough. Parts 1 and 2
142	Back Levee of RD 1001
143	W. Levee of Feather River from North Boundary of RD 823 to E. Levee of Sutter Bypass
144	W. Levee of Feather River from North Boundary of LD 1 to North Boundary of RD 823
145	E. Levee of Feather River, S. Levee of Yuba River, Both Levees of WPRR Intercepting Channel, W. Levee of South Dry Creek & N. Levee of Bear River
146	N. Levee of Bear River & S. Levee of South Dry Creek RD 817 & Vicinity of Wheatland
147	Levee Around the City of Marysville & N. Levee of Yuba River to a Point 1.8 Mi. Upstream from Marysville

148	W. Levee of Feather River from North Boundary of RD 777 to North Boundary of LD 1
149	S. Levee of Yuba River Maintenance Area No. 8
151	E. Levee Feather River from Honcut Creek to Marysville & S. Levee of Honcut Creek & E. Levee of RD 10
152	W. Levee of Feather River from N. Boundary of RD 777 to Western Canal Intake (Levee of Drainage District No. 1)
153	Lower Butte Creek Channel Improvement, Colusa, Glenn & Butte Counties
154	Moulton Weir & Training Levee Sacramento River
155	Colusa Weir & Training Levee Sacramento River
156	Tisdale Weir & Bypass
157	Fremont Weir, Sacramento River
158	Sacramento Weir, Sacramento River
159	Pumping Plants No. 1, 2 & 3, Sutter Bypass
160	Sutter Butte Canal Headgate
161	Butte Slough Outfall Gates
162	Knights Landing Outfall Gates, Sacramento River

Standard O&M Manual San Joaquin River

Unit No.	Project Name
1	Right Bank Levee of the San Joaquin River & French Camp Slough within RD 404
2	Right Bank Levee of the San Joaquin River & French Camp Slough within RD 17
3	North Levee of Stanislaus River & East Levee of the San Joaquin River within RD 2064, 2075, 2094 and 2096
4	East Levee of San Joaquin River within RD 2031
5	East Levee of the San Joaquin River Within RD No. 2092
6	East Levee of the San Joaquin River in RD Nos. 2063 & 2091
7	West Levee of San Joaquin River & North Levee of Old River RD Nos. 524 & 544
8	Right Banks of Old River & Salmon Slough Within RD No. 1 & RD No. 2089
9	Levees Around RD No. 2062 & San Joaquin County Flood Control District Area No.2
10	West Levee of Paradise Cut RD No. 2058 & SJ County Flood Control District, Area No.2
11	West Levee of San Joaquin River from Durham Bridge to Paradise Dam Within RD No. 2085 & 2095
12	West Levee of San Joaquin River From Opposite Mouth of Tuolumne River Downstream to Stanislaus County Line Within RD Nos. 2099, 2100, 2101, & 2102
13	West Levee of the San Joaquin River in RD No. 1602



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
SACRAMENTO ENGINEER DISTRICT
U.S. ARMY CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA, 95814-2922

Executive Office

APR 18 2014

Mr. Jay Punia, Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room 151
Sacramento, California 95821

Dear Mr. Punia,

Pursuant to 33 USC § 408, the Director of Civil Works for the U.S. Army Corps of Engineers (USACE) approved your request to alter the Sacramento River Flood Control Project (SRFCP) on July 18, 2007, as part of the Natomas Cross Canal (NCC) Project, Phase 1 and 1B, and on May 22, 2009, as part of the NCC Project, Phase 2 and 2B. These projects, implemented by the Sacramento Area Flood Control Agency (SAFCA) were the subject of Central Valley Flood Protection Board (CVFPB) encroachment permit number 18159-1 and 18159-2.

While under the direction of the CVFPB, alterations to the Federal flood risk management system at the NCC, south levee were substantially completed in November 2010. Your office subsequently submitted a revised *Supplement to Standard Operation and Maintenance (O&M) Manual Sacramento River Flood Control Project, Unit No. 125, Back Levee of Reclamation District No. 1000*; NCC Phase 1 As-builts, dated August 2009; NCC Phase 1B As-builts, dated March 2009; NCC Phase 2 As-builts, dated March 2011; NCC Phase 2B As-builts, dated March 2011; NCC Phase 1 Project Completion Report, dated February 2012; NCC Phase 1B Completion Report, dated November 2010; NCC Phase 2 and 2B Completion Report, dated December 2011. The Sacramento District has reviewed the above submittals and has determined that the local improvements were constructed in accordance with the final plans and specifications, as approved by the USACE under 33 USC § 408.

This letter informs you that the improvements were accepted as part of the SRFCP. This letter transmits the revised *Supplement to Standard Operation and Maintenance (O&M) Manual Sacramento River Flood Control Project, Unit No. 125, Back Levee of Reclamation District No. 1000* (Encl 1) and the NCC Phase 1, 1B, 2, and 2B as-built drawings (Encl 2). As part of this 408 request, modification and transfer of the work on the Sacramento River East Levee will be transmitted in the future upon receipt of additional project information for the supplemental manual for Unit 124.

In accordance with the assurances you provided on April 13, 2007, and February 4, 2008, you are responsible to operate and maintain this levee as part of the SRFCP. This letter of acceptance into the Federal flood control system should not be construed as an endorsement for inclusion of the alteration described above into the National Flood Insurance Program as outlined in Title 44 of the Code of Federal Regulations Section 65.10 of the National Flood Insurance Regulations (44 CFR Section 65.10). In addition this letter of acceptance shall neither be interpreted as a Federal assurance regarding later approval of any project or credit nor shall it commit the United States to any type of reimbursement if a Federal project is not undertaken.

My point of contact for this action is Mr. Randy Olsen, Chief, Operations and Readiness Branch. He may be reached by telephone at (916) 557-5275 or by email at Randy.P.Olsen@usace.army.mil.

A copy of this letter is being furnished to Mr. Rick Johnson, Executive Director, Sacramento Area Flood Control Agency, 1007 7th Street, 7th Floor, Sacramento, CA 95814 and to Mr. Paul Devereux, General Manager, Reclamation District 1000, 1633 Garden Highway, Sacramento, CA 95633.

Sincerely,


Michael J. Farrell
Colonel, U.S. Army
District Commander

Enclosures



DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
650 CAPITOL MALL
SACRAMENTO, CALIFORNIA 95814

REPLY TO
ATTENTION OF

February 13, 1964

Navigation and Flood Control Unit

The Reclamation Board
State of California
1416 - 9th Street, Room 455
Sacramento, California

Members of the Board:

You are hereby notified that the Corps of Engineers has completed emergency repairs to project levees under authority of Section 5 of the Flood Control Act of August 18, 1941, as amended (Public Law 99, 84th Congress, 1st Session). The work was completed on February 6, 1954 and consisted of repairing the Yolo Bypass right bank levee in Reclamation District 2035 and the Natomas Cross Canal left bank levee in Reclamation District 1090 in accordance with Contract Number DACW05-83-C-0148 and Drawing Number 50-4-5596. This work shall be maintained in accordance with the assurances which your Board provided for the Sacramento River Flood Control Project. This portion of the work will be added by amendment to the Operation and Maintenance Manual, supplement Numbers 121 and 125, Sacramento River Flood Control Project. Copies will be furnished your office at a later date.

Sincerely,

Arthur E. Williams
Colonel, Corps of Engineers
District Engineer

EXHIBIT F

Jan. 2, 1952

The Board accepted the transfer from the Corps of Engineers, in letters as listed below, the following reaches of levees and their contiguous waterway banks, where applicable, for flood control operation and maintenance, as complete and meeting the requirements of the Sacramento River Flood Control Project:

No.	Date of Letter	Levee Location	Remarks	
Unit No. 80A = 199	1	13 Dec. 1951	a. Left Bank Sacramento River Mile 94.0 to 96.6	Completed contract. Spec. No. 1485. Maintained by R. D. No. 1500
Unit No. 81A = 200			b. Left Bank Sacramento River Mile 114.2 to 115.6	Do
Unit No. 82A = 201			c. Left Bank Sacramento River Mile 116.1 to 117.0	Do
Unit No. 86A = 202	2	19 Dec. 1951	Part A, Site 1 - Right Bank Sacramento River, Spec. No. 1515, Grand Island Mile 30.25 to 30.5	Completed contract. Maintained by R. D. No. 3
	3	13 Dec. 1951	a(1) Sherman Island Levee Bridge to Sacramento River	Completed contract. Maintained by R. D. No. 341. 101
		199		
		200	a(2) Sherman Island Levee Bridge East 1300 ft.	Do 101
		203	b. Plug across Seven Mile Slough	Constructed and maintained by R.D. Nos. 1601 and 2067. 102
		204	c. Brannan Island levee of Seven Mile Slough plug and along Three Mile Slough to Sacramento River	Spoil area owned by S. & S.J.D.D. No maintenance required. 103
		218	d(14) East levee Sacramento River Mile 18.5 to 21.5	Completed contract. Maintained by R.D. No. 407. 103
		219	d(15) East levee Sacramento River Mile 21.6 to 26.3	Completed contract. Maintained by R.D. No. 556.
		220	d(16) East levee Sacramento River Mile 26.4 to Georgiana Sl.	Completed contract. Maintained by R. D. No. 556. 103
		221	d(17) East levee Sacramento River Mile 26.5 to 27.55	Completed contract. Maintained by R.D. No. 554. No liability for Delta Cross Channel. 103

Units No. 80A-81A-82A and 86A, and

Items 199 to 295

No.	Date of Letter	Levee Location	Remarks
3	13 Dec. 1951	d(28) East levee Sacramento River Mile 35.38 to 35.74	Completed contract. Maintained by R.D. No. 755. 111
		(248) d(44) East levee Sacramento River Mile 44.5 to 45.3	Constructed by Assessment No. 5. 115 X
		(250) d(46) East levee Sacramento River Mile 56.1 to American River	Constructed and maintained by City of Sacramento. 110.1 X
		(254) d(50) East levee Sacramento River Mile 92.9 to 94.0	Completed contract. Maintained by R.D. No. 1500.
		(256) d(52) East levee Sacramento River Mile 97.5 to 97.7	Completed contract. Maintained by R. D. No. 1500.
		(258) d(54) East levee Sacramento River Mile 99.9 to 102.5	Do
		(261) d(57), (58) East levee Sacramento River Mile 104.2 to 105.65	Do
		(263) d(59) East levee Sacramento River Mile 110.9 to 111.5	Do
		(265) d(61) East bank Sacramento River at Tisdale Weir	Maintained by State under Section 8361 Water Code. 130
		(277) h(3) West levee Sacramento River Mile 133.1 to 133.3	Completed contract. Maintained by Sacramento River West Side Levee District.
		(279) h(5) West levee Sacramento River Mile 134.3 to 140.6	Do
		(281) h(7) West levee Sacramento River Mile 141.3 to 142.0	Do
		(283) h(9) West levee Sacramento River Mile 142.3 to 142.7	Do
		(284) i. East levee Georgiana Slough from S.P.R.R. upstream 22,500 ft.	Completed contract. Maintained by Tyler Island District. 103
		(285) j. North levee American River from Jibboom St. Bridge to El Camino Avenue	Constructed by and maintained by R. D. No. 1000. 125 X

No.	Date of Letter	Levee Location	Remarks
3	13 Dec. 1951	l. Back levee R.D. No. 2068	Completed contract. Maintained by R.D. No. 2068. 109
		m. S. levee North Dry Creek to W.P.R.R. Interceptor	Completed contract.
		n. E. levee W.P.R.R. Interceptor from North Dry Creek to Bear River	Do
		o. N. levee Bear River from W.P.R.R. Interceptor to South Dry Creek	Completed contract. Maintained by R. D. No. 784. 145
		p. N. levee South Dry Creek from Bear River to high ground	Completed contract. Maintained by R. D. No. 817.
		q. South levee Bear River from W.P.R.R. easterly to 5,400 feet east of Carlin Bridge	Completed contract. Maintained by R. D. No. 1001. 141.1
		r. South levee of South Dry Creek from Bear River easterly 1.86 miles	Completed contract. Maintained by R. D. No. 817.
		s. North levee Bear River from South Dry Creek easterly to 4,000 feet easterly from Carlin Bridge	Completed contract. Maintained by R. D. No. 817. 146

31

REGISTERED MAIL
Return Receipt
Requested

Letter No. 13

①

⑬

13 DEC 1951

SPEKA 624.3(Sac. Riv. F.C.P.)

The Reclamation Board
State of California
1100 "G" Street
Sacramento 14, California

Accepted by the Recl. Board:

- Completed by Contract by C. of E.
- Const. by Local Interests 203-248-250-295
- No maint. is required. 204

Not Accepted

No capable of separate maint.

Gentlemen:

Reference is made to your letter of 2 July 1951 acknowledging that certain reaches of the levees of the Sacramento River Flood Control Project and the waterway bank contiguous to said levee reaches meet the requirements of the project as authorized prior to the Flood Control Act of 1944.

The levee reaches in question are located as follows:

a. Sherman Island levee of Three Mile Slough.

- ✓ 199 (1) State Highway Bridge to Sacramento River. 101
- ✓ 200 (2) From the State Highway Bridge, 1500 feet toward the San Joaquin River. 101
- ✓ 201 (5) From a point 5900 feet toward the San Joaquin River from the State Highway Bridge to a point 6900 feet toward the San Joaquin River from the State Highway Bridge. 101
- ✓ 202 (4) From a point 10,500 feet toward the San Joaquin River from the State Highway Bridge to the San Joaquin River. 101

203 b. Plug across Seven Mile Slough near Three Mile Slough. 102

✓ 204 c. Brannan Island levee of Seven Mile Slough and Three Mile Slough from the Plug across Seven Mile Slough southwesterly to Sacramento River. 102

Items 199 to 295

⑬

SPKHA 624.3 (Sac. Riv. F.C.P.)
The Reclamation Board

d. Easterly levee of the Sacramento River.

Reach
19

- 205 (1) From a point 23,650 feet, measured along the Sherman Island levee, downstream from Three Mile Slough to a point 21,950 feet downstream from Three Mile Slough. 101
- 206 (2) From a point 14,850 feet, measured along the Sherman Island levee, downstream from Three Mile Slough to a point 7,700 feet downstream from Three Mile Slough. 101
- 207 (3) From a point 6,300 feet, measured along the Sherman Island levee, downstream from Three Mile Slough to a point 3,450 feet downstream from Three Mile Slough. 101
- 208 (4) From a point 3,500 feet, measured along the Sherman Island levee, downstream from Three Mile Slough to a point 700 feet downstream from Three Mile Slough. 101
- 209 (5) From a point 500 feet, measured along the Sherman Island levee, downstream from Three Mile Slough to Three Mile Slough. 101
- 210 (6) Three Mile Slough to Mile 10.56. 102
- 211 (7) Mile 10.71 to Mile 13.1. 102
- 212 (8) Mile 13.69 to Mile 14.5 (Junction Point). 102
- 213 (9) Mile 14.5 (Junction Point) to Mile 15.0. 102
- 214 (10) Mile 15.1 to Mile 16.9. 102
- 215 (11) Mile 16.96 to Mile 17.5. Brannan 102
- 216 (12) Mile 17.6 to Mile 18.0. Andrus 103
- 217 (13) Mile 18.15 to Mile 18.5. " 103
- 218 (14) Mile 18.5 to Mile 21.5. ✓ o " 103
- 219 (15) Mile 21.6 to Mile 26.3. ✓ o " 103
- 220 (16) Mile 26.4 to Georgiana Slough. ✓ o 103
- 221 (17) Mile 26.5 to Mile 27.55. ✓ o III
- 222 (18) Mile 27.7 to Mile 28.5. III

2. X

Reach
19

SPKKA 824.3(Sac. Riv. F.O.P.)
The Reclamation Board

d. Easterly levee of the Sacramento River. (cont'd)

- ✓ 223 (19) Mile 28.6 to Mile 28.9.
- ✓ 224 (20) Mile 29.1 to Mile 29.9.
- ✓ 225 (21) Mile 30.25 to Mile 30.55.
- ✓ 226 (22) Mile 30.75 to Mile 31.5.
- ✓ 227 (23) Mile 31.8 to Mile 32.2.
- ✓ 228 (24) Mile 32.4 to Mile 33.0.
- ✓ 229 (25) Mile 33.1 to Mile 34.45.
- ✓ 230 (26) Mile 34.65 to Mile 34.95.
- ✓ 231 (27) Mile 35.1 to Mile 35.38.
- ✓ 232 (28) Mile 35.38 to Mile 35.74. ✓
- ✓ 233 (29) Mile 35.85 to Mile 36.35.
- ✓ 234 (30) Mile 36.5 to Mile 36.75.
- ✓ 235 (31) Mile 36.85 to Mile 37.15.
- ✓ 236 (32) Mile 37.3 to Mile 37.85.
- ✓ 237 (33) Mile 38.0 to Mile 38.3.
- ✓ 238 (34) Mile 38.5 to Mile 39.15.
- ✓ 239 (35) Mile 39.75 to Mile 39.9.
- ✓ 240 (36) Mile 40.0 to Mile 40.15.
- ✓ 241 (37) Mile 40.25 to Mile 40.35.
- ✓ 242 (38) Mile 40.5 to Mile 40.8.
- ✓ 243 (39) Mile 41.2 to Mile 41.6.
- ✓ 244 (40) Mile 41.75 to Mile 42.35.
- ✓ 245 (41) Mile 42.5 to Mile 43.05.

Reach 17



SPKKA 324.3 (Sac. Riv. F.C.P.)
The Reclamation Board

d. Easterly levee of the Sacramento River. (cont'd)

Reach 17

- ✓ (246) (42) Mile 43.3 to Mile 45.56. } III
- ✓ (247) (43) Mile 45.56 to Mile 44.2. } III
- ✓ (248) (44) Mile 44.5 to Mile 45.3. xD 115
- ✓ (249) (45) Mile 55.4 to Mile 55.5. 115
- ✓ (250) (46) Mile 56.1 to American River. xD 118.1
- (251) (47) West levee of Sutter Bypass to Mile 87.5. 84.5
- (252) (48) Mile 91.4 to Mile 92.1.
- (253) (49) Mile 92.6 to Mile 92.7.
- (254) (50) Mile 92.9 to Mile 94.0. ✓ 0
- (255) (51) Mile 96.6 to Mile 97.4.
- (256) (52) Mile 97.5 to Mile 97.7. ✓ 0
- (257) (53) Mile 97.7 to Mile 97.8.
- (258) (54) Mile 99.9 to Mile 102.5. ✓ 0
- (259) (55) Mile 103.45 to Mile 103.7.
- (260) (56) Mile 103.8 to Mile 104.2.
- (261) (57) Mile 104.2 to Mile 104.7. ✓ 0
- (262) (58) Mile 104.7 to Mile 105.65.
- (263) (59) Mile 110.9 to Mile 111.5. ✓ 0
- (264) (60) Mile 118.4 to Mile 118.6 (South End Tisdale Weir).
- (265) (61) At Tisdale Weir. ✓ 0 150



Reach 1A

- (266) e. Northerly levee of Miner Slough from a point 1,200 feet easterly from the easterly levee of Yolo Bypass to a point 4,400 feet easterly from the easterly levee of Yolo Bypass.

SPKHA 324.3 (Sac. Riv. F.C.P.)
The Reclamation Board

Letter No. 13

(13)

f. Westerly levee of Sutter Slough. 113

Ranch 36

- ✓ (267) (1) Mile 26.3 to Mile 26.7.
- ✓ (268) (2) Mile 27.05 to Mile 27.2.
- ✓ (269) (3) Mile 27.3 to Elkhorn Slough.

g. Westerly Levee of Elkhorn Slough.

- ✓ (270) (1) Sutter Slough to Station "A" 431+00.
- ✓ (271) (2) Station "A" 429+50 to Station "A" 405+00.
- ✓ (272) (3) Station "A" 403+50 to Station "A" 344+75.
- ✓ (273) (4) Station "A" 340+75 to Station "A" 326+00.
- ✓ (274) (5) Station "A" 70+50 to Station "A" 60+50.

h. Westerly levee of the Sacramento River.

Ranch 3

- ✓ (275) (1) Mile 119.2 to Mile 119.7.
- ✓ (276) (2) Mile 131.4 to Mile 131.8.
- ✓ (277) (3) Mile 133.1 to Mile 133.3. ✓ 0
- ✓ (278) (4) Mile 134.0 (Meridian Bridge) to Mile 134.3.
- ✓ (279) (5) Mile 134.3 to Mile 140.6. ✓ 0
- ✓ (280) (6) Mile 140.6 to Mile 141.3.
- ✓ (281) (7) Mile 141.3 to Mile 142.0. ✓ 0
- ✓ (282) (8) Mile 142.0 to Mile 142.3.
- ✓ (283) (9) Mile 142.3 to Mile 142.7 (Union Oil Co. Wharf). ✓ 0

AX (284) 1. Easterly levee of Georgiana Slough from the S.P.R.R. stream 22,500 feet. ✓ 0 103

XB

(285) j. Northerly levee of the American River and the back levee of Reclamation District No. 1000 from Jibboom Street Bridge to El Camino Avenue. 125 x D

(13)

Letter No. 13

13

SPEKA 524.3(Sac.Riv.F.C.P.)
The Reclamation Board

k. Northerly levee of Natoms Cut.

- 48 ✓ (286) (1) From Sacramento River easterly to a point 1,550 feet easterly from the Garden Highway Bridge. 142
- ✓ (287) (2) From a point 2,550 feet easterly from the Garden Highway Bridge to a point 3,250 feet easterly from the Garden Highway Bridge. 142
- ✓ (288) 1. Back levee of Reclamation District No. 2068 along the S.N.R.R. from the County Road northeasterly 7,200 feet to high ground. 109
- ✓ (289) n. Southerly levee of North Dry Creek near Wheatland from high ground to the W.P.R.R. Interceptor. 145
- ✓ (290) n. Easterly levee of the W. P. R. R. Interceptor from North Dry Creek southerly to Bear River. 145
- ✓ (291) o. Northerly levee of Bear River from the W. P. R. R. Interceptor easterly to South Dry Creek. 145
- ✓ (292) p. Northerly levee of South Dry Creek near Wheatland from Bear River easterly to high ground, including the Singh saddle closure levee. 145
- ✓ (293) q. Southerly levee of Bear River from the W.P.R.R. easterly to a point 5,400 feet easterly from Carlin Bridge. 141.1
- ✓ (294) r. Southerly levee of South Dry Creek near Wheatland from Bear River easterly 1.86 miles. 144
- ✓ (295) s. Northerly levee of Bear River from South Dry Creek easterly to a point 4,000 feet easterly from Carlin Bridge. 144

Reck No. 30

The records of this office show that your Board has accepted the levees and/or works covered by Items d.(14), d.(15), d.(16), d.(29), d.(50), d.(52), d.(54), d.(57), d.(59), d.(61), h.(3), h.(5), h.(7), h.(9), i., m., n., o., p., q., r., and s., above, as complete. Accordingly the waterway bank contiguous to said Items is hereby transferred to the State of California for maintenance and operation.

The levee covered by Items a. to c., inclusive, d.(1) to d.(13), inclusive, d.(17), to d.(27), inclusive, d.(29), to d.(49), inclusive, d.(51), d.(53), d.(55), d.(56), d.(58), d.(60), e., f., g., h.(1), h.(2), h.(4), h.(6), h.(8) and j. to l., inclusive, above, although complete has not been formally transferred as contemplated by the Project documents.

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Letter No. 13

13

SPEKA 624.5(Sac,Riv.F.C.P.)
The Reclamation Board

Accordingly the levee covered by said items, together with the waterway bank contiguous thereto, is hereby transferred to the State of California for maintenance and operation.

The maintenance work required under the provisions of the Sacramento River Flood Control Project shall be performed in accordance with existing Flood Control Regulations which have been prescribed by the Secretary of the Army pursuant to Section 3 of the Act of Congress approved 22 June 1936, as amended and supplemented. As provided under paragraph 208.10(10) of these regulations, a maintenance manual covering these works is in process of preparation and will be furnished your Board upon completion.

A copy of this letter is being transmitted to the State Engineer.

FOR THE DISTRICT ENGINEER:

Sincerely yours,

Copy Furnished:
Office, Chief of Engrs.
So. Pac. Div. Engr.
State Engineer
Engr. Div. (2)
C. de Arrieta

H. R. Reifsnyder
Lt. Colonel, Corps of Engineers
Executive Officer

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SPKKO-P 824.3 (Sac. Riv. F.C.P.)

14 Februray 1958

The Reclamation Board
State of California
1215 O Street
Sacramento, California

Gentlemen:

Reference is made to District Engineer's letter dated 4 September 1957, which referred in part to the completion of emergency levee repairs on the Natomas Cross Canal of the Sacramento River Flood Control Project.

The work consisting of construction of certain levee units referred to above was completed on 9 May 1957 in accordance with Specification No. 2243, Contract No. DA-04-167-CIVENG-57-61 and Drawing No. 50-4-3318. The levee sections referred to above are listed as follows:

<u>Levee Section No.</u>	<u>River Mile Points</u>	<u>Right or Left Bank</u>
618	4.0 to 4.4	Left

The levee sections, Sec. 617 and 618, described above, now meet the requirements of the Sacramento River Flood Project; therefore said levee sections, together with the waterway banks contiguous thereto, are hereby transferred to the State of California for maintenance and operation beginning 29 November 1957, in accordance with the provisions of the "Supplement to the Memorandum of Understanding" executed as of that date.

The maintenance work required under the provisions of the Sacramento River Flood Control Project shall be performed in accordance with existing Flood Control Regulations, inclosed herewith, which have been prescribed by the Secretary of the Army pursuant to Section 3 of the Act of Congress, approved 22 June 1936, as amended and supplemented by the current issue of the Standard Operation and Maintenance Manual for the Sacramento River Flood Control Project. As provided under paragraph 208.10(10) of these

EXHIBIT F
Sheet 1 of 6

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SPKKO-P
The Reclamation Board

regulations, a supplement to the Standard Operation and Maintenance Manual covering these units of work is in process of preparation and will be furnished to you upon completion.

A copy of this letter is being transmitted to the Department of Water Resources.

NOTE: Only portion pertaining to Unit No. 125 included in this copy.

Sincerely yours,

A. E. McCOLLAM
Colonel, CE
District Engineer

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SPKKO-P 824.3 (Sac. Riv. F.C.P.)

24 March 1958

The Reclamation Board
State of California
1215 O Street
Sacramento, California

Gentlemen:

Reference is made to District Engineer's letter dated 5 December 1957, relative to the joint inspection made on 10 December 1957, of certain levee units pertaining to the Sacramento River Flood Control Project for the purpose of transferring them to the jurisdiction of the State of California for operation and maintenance.

The required work consisting of construction of the levee units referred to above was completed on 27 January 1958 in accordance with Specification No. 2271, Contract No. DA-04-167-CIVENG-30-14 and Drawing No. 50-4-3164. Completion of the contract excluded two road ramps at approximately stations 620+00 and 627+00. Work at these two sites will be completed later by purchase order when weather conditions permit.

	<u>Levee Section No.</u>	<u>River Mile Points</u>	<u>Right or Left Bank</u>
<u>Natomas East Canal</u>	619	0.72 to 3.80	Right
	620	9.0 to 16.4	Right
<u>Natomas Cross Canal</u>	621	0.0 to 4.0	Left
	622	4.4 to 5.44	Left
<u>Coon</u>	-	-	-

The levee sections, Nos. 619 to 623, inclusive, described above, now meet the requirements of the Sacramento River Flood Control Project; therefore said levee sections, together with the waterway banks contiguous thereto, are hereby transferred to the State of California.

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SPKKO-P 824.3 (Sac.Riv.F.C.P.)
The Reclamation Board

The maintenance work required under the provisions of the Sacramento River Flood Control Project shall be performed in accordance with existing Flood Control Regulations, inclosed herewith, which have been prescribed by the Secretary of the Army pursuant to Section 5 of the Act of Congress, approved 22 June 1936, as amended and supplemented by the current issue of the Standard Operation and Maintenance Manual for the Sacramento River Flood Control Project. As provided under paragraph 200.10(10) of these regulations, a supplement to the Standard Operation and Maintenance Manual covering these units of work is in process of preparation and will be furnished to you upon completion.

A copy of this letter is being transmitted to the Department of Water Resources.

Sincerely yours,

A. E. McCOLLAM
Colonel, CE
District Engineer

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SPKKO-P 824.3 (Sac Riv FCP)

The Reclamation Board
State of California
1215 O Street
Sacramento, California

Gentlemen:

Reference is made to the joint inspection made on 30 September 1958 of a certain levee unit pertaining to the Sacramento River Flood Control Project for the purpose of transferring it to the jurisdiction of the State of California for operation and maintenance.

The required work consisting of construction of the levee unit referred to above was completed on 7 October 1958 in accordance with Specification No. 2459, Contract No. DA-04-167-CIVENG-59-9 and Drawing No. 50-4-3516.

This levee unit No. 625, referred to above, which extends along the right bank of the Natomas East Canal from Mile 3.80 to Mile 6.00, now meets the requirement of the Sacramento River Flood Control Project; therefore said levee unit, together with the waterway bank contiguous thereto, is hereby transferred to the State of California for operation and maintenance.

In addition to the above, recent surveys indicate that the levee unit adjoining, extending from mile 6.00 to mile 9.00, and designated as unit No. 626 also meets the requirements of the Sacramento River Flood Control Project. Therefore said levee unit No. 626, together with the waterway banks contiguous thereto, is also hereby transferred to the State of California for operation and maintenance.

It is to be noted that the levee units described above combined with other units previously transferred to your jurisdiction now form a continuous levee reach around Reclamation District No. 1000.

EXHIBIT F
Sheet 5 of 6

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SPKKO-P 824.3 (Sac Riv FCP)
The Reclamation Board

The maintenance work required under the provisions of the Sacramento River Flood Control Project shall be performed in accordance with existing Flood Control Regulations, inclosed herewith, which have been prescribed by the Secretary of the Army pursuant to Section 3 of the Act of Congress, approved 22 June 1936, as amended and supplemented by the current issue of the Standard Operation and Maintenance Manual for the Sacramento River Flood Control Project. As provided under paragraph 208.10(10) of these regulations, a supplement to the Standard Operation and Maintenance Manual covering these units of work is in process of preparation and will be furnished to you upon completion.

A copy of this letter is being transmitted to the Department of Water Resources.

Sincerely yours,

/s/ A. E. McCollam
A. E. McCOLLAM
Colonel, CE
District Engineer

EXHIBIT G

SUGGESTED SEMI-ANNUAL REPORT FORM

TO: The District Engineer
Sacramento District
Corps of Engineers
1209 - 8th Street
Sacramento, California

(1 May 19__)
(1 Nov 19__)

Dear Sir:

The semi-annual report for the period (1 May 19__ to 31 October 19__) (1 November 19__ to 30 April 19__) Unit No. 125 of the Sacramento River Flood Control Project (Back Levee of R.D. No. 1000) is as follows:

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

(Superintendent's summary of conditions)

It is our intention to perform the following maintenance work in order to repair or correct the conditions indicated:

(Outline the anticipated maintenance operations for the following 6 months.)

b. During this report period, major high water periods (water level at 35.0 on the gage at El Centro Road and 30.0 on the gage at Silver Eagle Road) occurred on the following dates:

<u>Dates</u>	<u>Maximum Elevation</u>
_____	_____
_____	_____
_____	_____

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

(Superintendent's log of flood observations)

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

(See Maintenance Manual _____).

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

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

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

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

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

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

	<u>Labor</u>	<u>Material</u>	<u>Equipment</u>	<u>Overhead</u>	<u>Total</u>
1. Inspection					
2. Maintenance					
3. Flood fighting operations					
TOTAL					

Respectfully submitted,

Superintendent of Works

EXHIBIT H

SECTION 408 PERMISSIONS



DEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

JUL 19 2007

Executive Office

Mr. Jay Punia
General Manager
California State Reclamation Board
3310 El Camino Ave., Room LL40
Sacramento, CA 95821

Dear Mr. Punia,

The Chief of Engineers, U.S. Army Corps of Engineers, has approved your request to alter the Federal flood damage reduction project, Sacramento River Flood Control Project, Natomas Cross Canal and Sacramento River (encl 1) pursuant to U.S.C. Title 33, Chapter 9, Subchapter 1, Section 408 as described in The Reclamation Board permit # 18159-1 BD. The Chief of Engineers, has granted permission for you to alter the aforementioned public works as it has been determined that such alteration will not be injurious to the public interest and will not impair the usefulness of the project works.

This letter of permission approves your proposed work which consists of constructing a cutoff wall along Sacramento River East Bank Levee between stations 0+00 and 5+00 and along Natomas Cross Canal South Bank Levee between stations 0+00 and 97+00. A gap in the Natomas Cross Canal cutoff wall will be left between stations 58+00 and 59+00, at the location of the Bennett Pump Plant. The degraded portion of the levee will be reconstructed with an impervious cap on the top of the cutoff wall. The reconstructed levee slopes will be 1(V) on 3(H) on both waterside and landside of the levee. The top of levee patrol road section will be restored to the pre-construction conditions, by placing aggregate surfacing to the pre-construction thickness along the Natomas Cross Canal South Bank Levee or by reconstruction of the asphalt concrete pavement section on the Sacramento River East Bank Levee (Garden Highway). The levee slope erosion protection will be restored to the pre-construction conditions.

The term "you" and its derivatives, as used in this approval letter, means the Reclamation Board or any future transferee. The term "this office" refers to the Sacramento District of the Corps of Engineers. Alteration of this project must be in accordance with the following conditions:

Special Conditions:

- a. This Corps letter of permission does not authorize you to take any threatened or endangered species or designated critical habitat. In order to legally take a listed species,

you must have a separate authorization under an Endangered Species Act Section 10 permit, or a Biological Opinion under Endangered Species Act Section 7, with incidental take provisions with which you must comply. The U.S. Fish and Wildlife Service (USFWS) Biological Opinion Number 1-1-07-F-0207 (encl 2), dated June 1, 2007 and Amendment to the USFWS Biological Opinion Number 1-1-07-F-0231(encl 3), dated June 18, 2007, contain mandatory terms and conditions to implement the reasonable and prudent measures that are associated with incidental take that is also specified in the Biological Opinion. Your authorization under this Corps permission is conditional upon your compliance with all of the mandatory terms and conditions associated with the Biological Opinion, which terms and conditions are incorporated herein by reference. Failure to comply with the terms and conditions associated with the incidental take statement in the Biological Opinion, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Corps permission. The USFWS is the appropriate authority to determine compliance with the terms and conditions of its Biological Opinion, and with the Endangered Species Act. The Reclamation Board must comply with all conditions of this Biological Opinion, including those ascribed to the Corps.

- b. You are required to photo record the levee before and after construction to demonstrate that the construction activities have not changed the visual character of the levee.
- c. You are required to submit a revision to the RD 1000 Operations and Maintenance (O&M) Manual for this office's review within 180 days of project completion. As-Built drawings shall be submitted in conjunction with the draft Operations and Maintenance manual. Upon receipt of the draft O&M manual, this office will schedule a transfer inspection with you to verify all construction has been completed in accordance with this approval. Any features found to be deficient during that inspection will require your correction prior to the Corps accepting the alterations as part of the Federal project. You must furnish a certification report that the work has been completed in accordance with the conditions of this approval.
- d. There shall be no disposal, including temporary disposal, of any material in any wetlands or other waters of the United States (US). Best management practices, such as silt fences and mulching, shall be employed to ensure exposed soils do not erode and wash into any waters of the US. Erosion control matting shall not be used to avoid entangling giant garter snakes in it.
- e. Finally, the NCC Phase 1 Improvements Project will be implemented in such a way that there will be no visible trace of the slurry wall after it is constructed, and the levee will be

restored to its current appearance after project construction, maintaining the visual integrity of an element that has been altered and maintained since its original construction.

General Conditions:

- a. You must accept the operation and maintenance responsibility of the completed work.
- b. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places. If human remains are discovered, State law procedures regarding the discovery would be implemented.
- c. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of this approval.

Further Information:

- a. Limits of this permission.
 1. This permission does not obviate the need to obtain other Federal, state or local authorizations, approvals or permissions required by law.
 2. This permission does not grant any property rights or exclusive privileges.
 3. This permission does not authorize any injury to the property or rights of others.
- b. The determination of this office to approve this action as not injurious to the public interest, nor will it impair the usefulness of the project works, was made in reliance on the information you provided.
- c. The Corps may reevaluate its decision on this approval at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to the following:
 1. You fail to comply with the terms and conditions of this approval.
 2. The information provided by you in support of your application proves to have been false, incomplete, or inaccurate.

3. Significant new information surfaces which this office did not consider in reaching the original public interest decision.
- d. This approval should not be construed as an endorsement of certification for the FEMA base flood event.
- e. The Corps acknowledges your commitment to accept the altered project for operation and maintenance and hold and save the United States free from damage due to the construction works.

My point of contact for this action is Ms. Meegan Nagy, Acting Chief, Operations Technical Section. She may be reached at 916-557-7257 or by emailing Meegan.G.Nagy@usace.army.mil.

Sincerely,



Thomas C. Chapman
Colonel, U.S. Army
District Engineer

Enclosures

CF:
Stein Buer, Executive Director, Sacramento Area Flood Control Agency, 1007 7th Street, 7th
Floor, Sacramento, CA 95814



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET NW
WASHINGTON, D.C. 20314-1000

JUL 18 2007

CECW-P

MEMORANDUM FOR Commander, South Pacific Division

SUBJECT: Section 408 Approval of a Flood Control Project Alteration – Sacramento River Flood Control Project, Natomas Cross Canal and Sacramento River, California

1. Reference is made to CESPCK-DE Memorandum dated 29 May 2007, subject as above. A subsequent transmittal of documents to complete the package was received on 5 July 2007.
2. The Section 408 permit application for the subject alteration is approved. Please note the companion application for Section 104 credit consideration was transmitted to the Assistant Secretary of the Army (Civil Works) for action on 21 May 2007. You should caution the local sponsors that formal approval from the ASA(CW) must be obtained prior to the start of construction in order for the work to qualify for any potential Section 104 credit. Also note that contract award is considered the start of construction.
3. We understand that future proposed alterations in this region are likely to involve large footprints with potential far-reaching impacts. For future submissions it is of the utmost importance to provide, per the 23 October 2006 policy guidance, a comprehensive assessment of anticipated local and system-wide impacts as part of the Section 408 approval request documentation.

FOR THE COMMANDER:

A handwritten signature in black ink, appearing to read "S. L. Stockton".

STEVEN L. STOCKTON, P.E.
Deputy Director of Civil Works

Ade
AW**THE RECLAMATION BOARD**

3310 El Camino Ave., Rm. LL40
SACRAMENTO, CA 95821
(916) 574-0609 FAX: (916) 574-0682
PERMITS: (916) 574-0653 FAX: (916) 574-0682

RECEIVED
APR 13 2007



April 11, 2007

Colonel Ronald N. Light, District Engineer
U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, California 95814

Dear Colonel Light:

Based on the "Policy and Procedural Guidance for the Approval of Modification and Alteration of Corps of Engineers Projects" dated October 23, 2006, the California Reclamation Board (Board) is requesting a determination by the U.S. Army Corps of Engineers (Corps) regarding modification of a portion of the Sacramento River Flood Control Project (SRFCP).

The Board has issued a conditional permit (No.18159-1 BD) to the Sacramento Area Flood Control Agency (SAFCA) for construction of a seepage cutoff wall within the south levee of the Natomas Cross Canal, as described in the attached documents provided by SAFCA. The Board has determined that the project is not injurious to the public.

Permit No. 18159-1 BD is subject to a determination from the Corps allowing the modification of the federal project as proposed by SAFCA. If the proposed project, upon completion, is formally incorporated within the federal SRFCP by the Corps, the State of California, acting through the Board, will accept the modified project for operation and maintenance and hold and save the United States free from damage due to the constructed works.

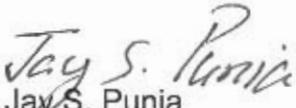
Within 180 days of completion of the project modification, the Board will provide both information to the Corps for the purposes of preparing a revised Operation and Maintenance Manual for this portion of the SRFCP, and as-built Plans and Specifications for the modification.

In order to achieve the flood control benefits of this work for the 2007-2008 flood season, the Board is requesting that the Corps make any necessary determination so that SAFCA may proceed with this modification no later than June 1, 2007.

Colonel Ronald N. Light
April 11, 2007
Page 2

If you have any questions, please call me at (916) 574-0609, or your staff may contact Stephen Bradley, Chief Engineer of the Board, at (916) 574-0608.

Sincerely,


Jay S. Punia
General Manager

Attachments.

cc: Stein Buer, Executive Director
Sacramento Area Flood Control Agency
1007 – 7th Street, 7th Floor
Sacramento, California 95814-3407



**DEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922**

Executive Office

MAY 22 2009

Mr. Jay Punia
Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room LL40
Sacramento, California 95821

Dear Mr. Punia,

The Director of Civil Works for the U.S. Army Corps of Engineers has approved your request to alter the Federal flood damage reduction project, Sacramento River Flood Control Project, pursuant to U.S.C. Title 33, Chapter 9, Subchapter 1, Section 408. These alterations, Sacramento River East Levee (SREL) Phase 1 (Reaches 1 – 4A) included in encroachment permit # 18159-3; SREL Phase 1B (Reach 4B) included in encroachment permit # 18159-3-1 BD; and the Natomas Cross Canal South Levee Phase 2, included in encroachment permit # 18159-2, are included in the Natomas Levee Improvement Program Phase 2 improvements. Permission has been granted for you to alter the aforementioned project works as it has been determined that such alteration will not be injurious to the public interest and will not impair the usefulness of the project works (Encl 1).

This letter of permission supersedes your previous letter of permission dated February 20, 2009, to include SREL Phase 1B, the amended Biological Opinion, dated May 6, 2009, and Department of Army Permit # 2007-211 amended May 11, 2009.

This letter of permission approves your proposed work as summarized below and described in detail in the February 2009 For Bid documents for the Natomas Cross Canal Phase 2 (STA 0+00 to 284+50) and the SREL Phase 1 (STA 0+00 to 190+00), and the March 2009 For Bid documents for SREL Phase 1B (190+00 to 228+00) and associated April 2009 Amendments:

Natomas Cross Canal Phase 2 - The Natomas Cross Canal Phase 2 levee improvements consist of construction of a seepage cut-off wall and raising the levee embankment to a height to provide 200-year level of protection plus 3 feet of additional levee height. The seepage cut-off wall will be constructed of soil/bentonite mix with the traditional open trench method up to 80 feet deep. Vegetation and other encroachments will be removed from the levee landside and waterside slope, and within minimum 15 feet of the levee toe, to conform to the Corps vegetation requirements.

SREL Phase 1- The SREL Phase 1 project consists of construction of an adjacent levee embankment landside of the existing levee. The adjacent levee will be constructed to provide 200-year level of protection plus 3 feet of additional levee height. A seepage cut-off wall will be constructed at the landside toe of the existing levee. A seepage berm 100 feet wide will be constructed on the landside toe of the levee along the downstream 8200 feet of the proposed Phase 1 levee. The berm will be widened to 300-feet on the last 500 feet of this Phase. The berms will be constructed in addition to the seepage cut-off wall to mitigate the underseepage issues on this levee reach. The vegetation within the new adjacent levee footprint and at least 15 feet from the new levee and berm toes will be removed by a previously approved construction contract.

SREL Phase 1 - SREL Phase 1B levee improvement extends to reach 4b along the Sacramento River east bank, between the existing levee stations 190+00 and 228+00. This levee improvement phase consists of construction of an adjacent levee embankment landside of the existing levee raised to a height to provide 200-year level of protection plus 3 feet of freeboard. The underseepage through the levee foundation will be controlled by a deep seepage cut-off wall (to elevation -25 feet NAVD88 for the first 1150 feet that transitions to a shallow depth (elevation +18) to station 214+00. The seepage along the reaches with a shallower cut-off wall will be controlled with an additional 300-foot wide seepage berm. The seepage between station 214+00 and end of the reach (station 228+00) will be controlled by a 500 foot wide seepage berm. The pipes penetrating the levee at Pritchard's Pumping Plant will be temporarily replaced under the foot print of the adjacent levee to allow for settlement of the new adjacent levee. These pipes will later be replaced by permanent pipes in a next construction phase in 2010. Preparation for the foundation (including excavation, removal of the remaining pipe, and backfill) for the new proposed Pump Plant No. 2 is also part of this phase of the project. Elkhorn Irrigation Canal and Giant Garter Snake/Drainage Canal, located currently along the landside levee toe, will be relocated outside the seepage berms, between 500 and 700 feet from the new adjacent levee landside toe.

The term "you" and its derivatives, as used in this approval letter, means the Central Valley Flood Protection Board or any future transferee. The term "this office" refers to the Sacramento District of the U.S. Army Corps of Engineers. Alteration of this project must be in accordance with the following conditions:

Special Conditions:

a. This letter of permission does not authorize you to take any threatened or endangered species or designated critical habitat. In order to legally take a listed species, you must have a separate authorization under an Endangered Species Act Section 10 permit, or a Biological Opinion under Endangered Species Act Section 7, with incidental take provisions with which you must comply. The U.S. Fish and Wildlife Service (USFWS) Biological Opinion Number 81420-2008-F-0195-R001, dated May 6, 2009 contains

mandatory terms and conditions to implement the reasonable and prudent measures that are associated with incidental take that is also specified in the Biological Opinion. Your authorization under this Corps permission is conditional upon your compliance with all of the mandatory terms and conditions associated with the Biological Opinion, which terms and conditions are incorporated herein by reference (Encls 2 and 3). Failure to comply with the terms and conditions associated with the incidental take statement in the Biological Opinion, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Corps permission. The USFWS is the appropriate authority to determine compliance with the terms and conditions of its Biological Opinion, and with the Endangered Species Act. The Central Valley Flood Protection Board must comply with all conditions of this Biological Opinion, including those ascribed to the Corps. The National Marine Fisheries Services (NMFS) letter, dated January 14, 2009, states that the proposed Natomas Levee Improvement project (NLIP) is not likely to adversely affect federally listed endangered Sacramento River winter-run Chinook salmon, threatened Central Valley spring-run Chinook salmon, Central Valley steelhead, Southern Distinct Population Segment (DPS) of North American green sturgeon, or their respective designated and proposed critical habitat (Encl 4).

b. You are required to submit a revision to the RD 1000 Operation and Maintenance (O&M) (33 CFR Section 208.10) Manual for this office's review within 180 days of project completion. As-Built drawings and permanent maintenance easement boundaries shall be submitted in conjunction with the draft Operation and Maintenance manual. Upon receipt of the draft O&M manual, this office will schedule a transfer inspection with you to verify all construction has been completed in accordance with this permission. Any features found to be deficient during that inspection will require your correction prior to the Corps acknowledging that the work was completed in accordance with this letter of permission. Construction data is required to be provided to this office for review by our Engineering Division during construction. Within 180 days of project completion, you must furnish a certification report that the work has been completed in accordance with the conditions of this permission.

c. No work may result in a discharge, including a temporary discharge, of any material into any waters of the United States, including wetlands, unless such discharge is in compliance with your Department of the Army permit dated May 11, 2009. You must employ best management practices, such as silt fences and mulching, to ensure that exposed soils do not erode and wash into any waters of the US. To avoid entanglement of giant garter snakes, you may not use erosion control matting.

d. To ensure your project complies with Section 106 of the National Historic Preservation Act, you must comply with all terms of the *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*, signed May 1, 2008.

e. To ensure there is mitigation for any increased residual flood risk, you are required to develop and submit a Floodplain Management Plan within one year of

issuance of this permission that includes elements for flood information dissemination, public awareness training, flood warning and evacuation plans, emergency flood operations plan with annual exercise, dedicated evacuation resources, post-flood recovery plans. You are required to participate in and comply with applicable Federal floodplain management and flood insurance programs.

f. You will follow and abide by your approved Safety Assurance Review plan dated April 15, 2009 prior to and during construction.

General Conditions:

- a. You must accept the operation and maintenance responsibility of the completed work including all vegetation management requirements specified in your O&M manual.
- b. You are responsible for continued operations and maintenance for this project during construction.
- c. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of your discovery. Unforeseen discoveries will be treated as specified in the Programmatic Agreement.
- d. Construction should be coordinated with this office. Additionally, the proposed work shall not be performed or remain during the flood season of November 1 to April 15, unless otherwise approved in writing by your Board.
- e. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of this approval.
- f. Construction records, documenting field conditions, will be submitted to this office on a weekly basis.

Further Information:

- a. Limits of this permission.
 1. This permission does not obviate the need to obtain other Federal, state or local authorizations, approvals or permissions required by law.
 2. This permission does not grant any property rights or exclusive privileges.
 3. This permission does not authorize any injury to the property or rights of others.
- b. The determination of this office to approve this action as not injurious to the public interest, nor will it impair the usefulness of the project works, was made in reliance on the information you provided.

- c. The Corps may reevaluate its decision on this approval at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to the following:
1. You fail to comply with the terms and conditions of this approval.
 2. The information provided by you in support of your application proves to have been false, incomplete, or inaccurate. Should field conditions or future investigations require a deviation from the final Plans and Specifications referenced above, this deviation must be approved by this office through a request from the Board.
 3. Significant new information surfaces which this office did not consider in reaching the original public interest decision.
- d. This approval should not be construed as an endorsement of certification for the FEMA base flood event.
- e. The Corps acknowledges your commitment to accept the altered project for operation and maintenance and hold and save the United States free from damage due to the construction works.

My point of contact for this action is Ms. Meegan Nagy, Chief, Flood Protection and Navigation Section. She may be reached at 916-557-7257 or by emailing Meegan.G.Nagy@usace.army.mil.

Sincerely,



Thomas C. Chapman
Colonel, U.S. Army
District Engineer

Enclosures

- Encl 1 408 Approval Letter
- Encl 2 Biological Opinion
- Encl 3 Amended Biological Opinion
- Encl 4 NMFS Letter

CF: Stein Buer, Executive Director, Sacramento Area Flood Control Agency, 1007 7th street, 7th Floor, Sacramento, California, 95814

**RECORD OF DECISION
408 PERMISSION AND DEPARTMENT OF THE ARMY 404 PERMIT TO
SACRAMENTO AREA FLOOD CONTROL AGENCY FOR THE NATOMAS LEVEE
IMPROVEMENT PROJECT
SACRAMENTO, CA**

The Natomas Levee Improvement Program (NLIP), Phase 2 Project is a flood damage reduction project proposed for construction by the Sacramento Area Flood Control Authority (SAFCA) as presented by the State of California Central Valley Flood Protection Board (CVFPB). The Secretary of the Army has delegated approval authority to the Chief of Engineers for the U.S. Army Corps of Engineers (USACE or Corps) to issue permission to proceed with the proposed construction pursuant to 33 U.S.C. Section 408 (408 Permission) based on finding that the proposed alteration is not injurious to the public interest and will not impair the usefulness of the Sacramento River Flood Control Project. In accordance with 33 CFR Parts 320 to 332, the Corps is delegated authority to issue Department of Army permits (DA permits) for discharges of dredged or fill material into "waters of the United States", including wetlands, pursuant to Section 404 of the Clean Water Act and for work or structures affecting navigable waters under Section 10 of the Rivers and Harbors Act.

I. Background

SAFCA proposes improvements to the Federal perimeter levee system of the Natomas Basin in Sutter and Sacramento Counties, California, and associated landscape and irrigation/drainage infrastructure modifications. These improvements would be implemented in three phases; Phase 2, initiated in 2008, Phase 3, initiated in 2009, and Phase 4, initiated in 2010. The project is proposed as early implementation of the anticipated outcome of the American River Common Features Project General Reevaluation Report.

The purpose of the proposed program and project is to provide at least 100-year flood protection to segments of the Federal levee system that do not currently meet that standard as quickly as possible. The remaining segments would be improved by the Corps to meet Federal and state standards for 200-year flood protection following authorization of the Common Features Project.

The Final Environmental Impact Statement (FEIS), dated November 2008, for the 33 U.S.C. Section 408 Permission to the CVFPB addressed flood damage reduction and habitat conservation in the Natomas Basin located in Reclamation District 1000 in Sacramento and Sutter Counties, California. The FEIS combined project-level analysis of the 2008 construction phase (i.e. Phase 2) of the NLIP and program-level analysis of the 2009 (i.e. Phase 3) and 2010 (i.e. Phase 4) construction phases. The proposed program and projects focus only on segments that do not currently meet the 100-year design criteria adopted by the Federal Emergency Management Agency (FEMA): approximately 18 miles along the Sacramento River east levee, approximately 5 miles along the Natomas Cross Canal (NCC) south levee, and more than 3 miles along the Pleasant Grove Creek Canal (PGCC) west levee. SAFCA proposes to modify these segments to meet the design criteria by the end of 2010. Phase 2 specifically focuses on improvements to address remaining underseepage and levee height deficiencies along the entire 5.3-mile length of the NCC, as well as underseepage, erosion, encroachment,

and levee height deficiencies along the upper 4.5 project miles of the Sacramento River and NCC east levee.

This Record of Decision (ROD) approves the project at a program level and the specific flood damage reduction features proposed for implementation in Phase 2 as defined below :

- NCC south levee improvements: Raise and realign the NCC south levee to provide additional levee height and more stable waterside and landside slopes. Construct a seepage cutoff wall through the levee crown in Reaches 3-7.
- Sacramento River east levee Reaches 1-4B: Construct an adjacent, raised levee from the NCC to reach 4B with a combination of cutoff walls, seepage berms, and relief wells for seepage remediation where required.
- Irrigation and drainage infrastructure improvements: Relocate the highline Elkhorn Main Irrigation Canal between the North Drainage Canal and Elkhorn Reservoir in reaches 4B – 6A.
- Construct a new canal designed to provide drainage and associated giant garter snake (GGS) habitat between the North Drainage Canal and Elkhorn Reservoir
- Remove a deep culvert at the location of Pumping Plant No. 2.

An application for a DA Permit was originally received in October 2007. An initial public notice describing the proposed project was issued in January 2008. A complete revised application for the DA permit was received in June 2008.

A letter requesting 408 permission was received in February 2008 from the CVFPB. The project requires permission to alter the existing federally authorized levee and construct a new adjacent setback levee that would become part of the federally authorized flood risk reduction project.

II. Alternatives Considered

In addition to “no action”, the following alternatives were considered:

1. Alternative 1: (Preferred and Selected Alternative) Construct an Adjacent Setback Levee along the Sacramento River East Levee. This alternative involves creating an adjacent setback levee along the east bank of the Sacramento River along Reaches 1, 2, 3, 4A and 4B. This alternative would involve relocating the Elkhorn Canal, raising and realigning the NCC south levee, and creating a new GGS Drainage Canal. Repairs and improvements would consist of constructing cutoff walls, seepage berms, and relief wells for seepage removal where required.

2. Alternative 2: Raise in Place with a 1,000-Foot Levee Setback in the Northern 1.5 Miles along the Sacramento River East Levee. This alternative would involve raising the landside slope of the east levee of the Sacramento River to provide additional levee height and more stability. A 1,000 foot setback levee would be constructed along Reaches 1 and 2. This alternative would involve relocating the Elkhorn Canal, raising and realigning the NCC south

levee, and creating a new GGS Drainage Canal. Repairs and improvements would consist of constructing cutoff walls, seepage berms, and relief wells for seepage removal where required.

3. Alternative 3: Construct an Adjacent Levee with a 500-Foot Levee Setback in the Northern 1.5 Miles along the Sacramento River East Levee. This alternative involves creating a 500 foot setback levee adjacent to the existing levee on the east bank of the Sacramento River along Reaches 1 and 2. This alternative would also involve relocating the Elkhorn Canal, raising and realigning the NCC south levee, and creating a new GGS Drainage Canal. Repairs and improvements would consist of constructing cutoff walls, seepage berms, and relief wells for seepage removal where required.

The environmentally preferred and Least Environmentally Damaging Practicable alternative is Alternative 1, construction of adjacent setback levee along Reaches 1-4A of the Sacramento River east levee and raising and installing cutoff walls on the NCC.

III. Responses to FEIS Comments

Two comment letters were received during the FEIS public comment period. These comments were from the United States Environmental Protection Agency (USEPA) and the Garden Highway Association. Their comments and USACE responses, in italics, to those comments are below.

USEPA:

- Requested continued coordination with the regulatory agencies. *The Corps along with SAFCA will continue to coordinate with the regulatory agencies throughout the project.*
- Requested that the Clean Water Act 404(b)(1) Alternative Analysis be included as an appendix. *This has been included as an appendix to the ROD.*
- Recommended implementation of the Natomas Basin flood safety plan. *The 408 permission has a provision that this must be provided within one year of issuance.*
- Recommended the ROD describe how future development would not constrain effective flood protection management nor compromise the flood benefits of this project. *The proposed program and Phase 2 project would substantially lessen the probability of an uncontrolled flood in the Natomas Basin due to levee failure. If no additional flood damage reduction measures are implemented, the result would be a steady rise in expected annual damages that would undermine the accomplishments of the program. As such, SAFCA is implementing a development impact fee program. Based on Sacramento Area Council of Governments growth projections, this fee program would generate approximately \$400 million over the next 30 years. This revenue would be used to finance continued flood risk reduction actions for the Natomas Basin and the Lower American and Sacramento Rivers.*

Garden Highway Association:

- The Garden Highway Association submitted comments on the Draft Environmental Impact Statement (DEIS) and requested further studies be completed by the Corps. *Since then, the Corps has completed engineering reviews of all technical analysis including the hydraulic analysis performed by SAFCA and included the results as an appendix to the 408 Permission.*
- New comments submitted on the FEIS were related to the protection of fish, wildlife and flora. *The Corps consulted with the appropriate resource agencies. The Corps has received a Biological Opinion (BO) and the United States Fish and Wildlife Service (USFWS) and National Marine Fishery Service (NMFS) have determined that the project will not result in significantly adverse impacts on listed species in the project area.*

The Corps previously responded to the remaining comments submitted by the Garden Highway Association in the FEIS.

IV. Other Applicable Laws and Policies

1. National Environmental Policy Act (NEPA) of 1969, as Amended: The proposed action is considered a major Federal action. The Corps determined the proposed action had the potential to significantly affect the quality of the human environment. Scoping for the Environmental Impact Statement (EIS) began on December 17, 2007 when a notice was distributed to a large mailing list to announce a public scoping meeting. The public scoping meeting was held on January 9, 2008. A Notice of Intent to Prepare an EIS was published in the Federal Register on January 31, 2008. A town hall meeting was held on June 11, 2008 at the Natomas Community Center. Representatives from USACE, SAFCA and the FEMA were present to answer questions and provide information about the project to the 70 individuals in attendance. On June 13 2008, the Corps issued a DEIS. On July 16, 2008, during the comment period, a public meeting was held in which written comments were received. The public comment period for the DEIS closed on 28 July 2008. Sixteen comment letters were received. The major areas of controversy associated with the comments were construction related effects on Garden Highway residents and concerns regarding the modeling used to analyze the project's hydraulic impacts. These issues were the subject of a California Environmental Quality Act (CEQA) lawsuit brought against SAFCA by the Garden Highway Community Association which was settled on April 18, 2008. The Corps issued a FEIS in November 2008. A Notice of Availability was published in the Federal Register on November 14, 2008. Two comments were received on the FEIS.

2. Federal Clean Water Act (CWA) of 1972, as Amended: The proposed program and project work required Department of Army (DA) authorization under Section 404 of the CWA. The proposed project is in compliance with the Section 401 of the CWA. The Central Valley Regional Water Quality Board issued a water quality certification under Section 401 of the Clean Water Act for the proposed actions on January 16, 2009. The certification is included as a special condition of the DA permit and the Section 408 permission.

3. Rivers and Harbors Act of 1899, as Amended: The proposed action would require permission under Section 10 (33 USC 403) for the reconstruction of Pump Station No. 2 because drainage and outfall pipes will be extended into the Sacramento River, a navigable

waterway. The proposed action is also subject to Section 408 (33 USC 408) permission. The FEIS will be used to support the Section 10 and 408 decisions for the proposed actions.

4. Fish and Wildlife Coordination Act (FWCA) of 1934, as Amended: The USFWS, NMFS, and the California Department of Fish and Game (CDFG) have provided coordinated input on the project. Consultation with CDFG is ongoing. Appropriate coordination with USFWS will continue throughout the program. The USFWS Coordination Act Report was completed on October 15, 2008. The proposed action is in full compliance with the FWCA.

Endangered Species Act Section 7 consultation with NMFS and USFWS has been completed.

5. Endangered Species Act (ESA) of 1973, as Amended: Following formal consultation under Section 7 of the ESA for the proposed actions, USFWS issued a BO on October 9, 2008 for the valley elderberry longhorn beetle (VELB) and GGS. The BO is incorporated into the DA permit and the Section 408 permission as a special condition. The Corps also consulted with NMFS. On January 14, 2009, NMFS concurred that the proposed action was not likely to adversely affect Central Valley steelhead, Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, their critical habitat and Southern Distinct Population Segment of North American green sturgeon.

6 Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1976 as Amended: In a letter dated January 14, 2009, NMFS determined the proposed action would not adversely affect Essential Fish Habitat for Pacific salmon and had no additional conservation recommendations. The proposed action is in compliance with the MSA.

7. Migratory Bird Treaty Act (MTBA) of 1918: Compliance with the MTBA is being addressed through compliance with the ESA, FWCA, and California Endangered Species Act (CESA). Prior to construction, SAFCA will obtain authorization for take under Section 2081 of the CESA and will comply with the terms of the permit issued for that purpose.

8. Clean Air Act (CAA) of 1963, as Amended: The proposed permit has been analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the CAA. Based on the modeling conducted, it is foreseeable that unmitigated construction generated emissions would result in or substantially conflict with applicable air quality planning efforts. However, with implementation of mitigation identified in the FEIS, emissions would be reduced below the USEPA's general conformity *de minimis* thresholds. Any later indirect emissions are generally not within the Corps continuing program responsibility and generally cannot be practicably controlled by the Corps. For these reasons, a conformity determination is not required for this permit action.

9. National Historic Preservation Act of 1966, as Amended: This project is in compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. USACE has initiated Section 106 consultation with the State Historic Preservation Officer (SHPO). All evaluations of resource identification, determinations of significance, and determinations of project effects and mitigation/treatment measures will meet the requirements of 36 CFR 800 (procedures for implementing Section 106) through a Programmatic Agreement (PA) between USACE, the SHPO, and SAFCA.

10. Executive Order (EO) 11988: Floodplain Management: There are no practicable alternatives to the proposed program and project which would avoid adverse effects and incompatible development in the floodplain. The proposed program will reduce flood risk and provide habitat values.

11. Executive Order 11990: Protection of Wetlands: No proposed action includes all practicable measures to minimize harm and loss to wetlands. Based on the FEIS and proposed compensatory mitigation for project impacts, the proposed action complies with the EO.

12. Executive Order 13175: Consultation with Indian Tribes, Alaska Natives, and Native Hawaiians: The proposed action does not implement any regulations, legislation, policies, or actions that have substantial direct effects on one or more Indian tribes, on the relationship between the Federal Government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes. Native American participation has been incorporated the terms of the Programmatic Agreement entered into under Section 106 of the NHPA and executed on May 8, 2008.

13. Farmland Protection Policy Act (FPPA) (7 USC 4201 et seq.): The proposed action requires converting areas of farmland to flood control facilities, but includes mitigation to acquire agricultural easements at a 1:1 ratio for farmlands removed from agricultural use. The project complies with the FPPA because it provides for compensation for unavoidable direct conversion of agricultural land to non-agricultural uses, will provide infrastructure that will support the continuation of agricultural resources on the west side of the Natomas Basin, and is consistent with state and regional planning efforts that will protect farmland on a regional scale from development.

V. Consideration of Mitigation Measures

Although all practicable means to avoid, minimize, and mitigate adverse effects on environmental resources have been incorporated into the proposed program and project, the preferred alternative would have several unavoidable, significant effects.

The volume of borrow material and associated haul traffic, required for project implementation would result in unavoidable, significant, and temporary increases in traffic on local roadways. Creation and implementation of a traffic routing plan will greatly reduce the increased traffic levels, but it is anticipated that traffic during some periods will still exceed acceptable thresholds. During some time periods, temporary short-term noise and vibrations affecting residents along Garden Highway would also be significant and unavoidable.

Due to the large volume of the haul truck traffic and the operation of a wide range of construction equipment, temporary emissions of ROG, NO_x, and PM₁₀ during construction would result in significant and unavoidable air quality impacts. Implementation of mitigation measures will greatly reduce project generated construction emissions but will not reduce all emissions to below air quality management district standards. To compensate for any emission above these standards, SAFCA has agreed to provide payment into the applicable air quality mitigation fee program.

The expansive footprint of the project would result in the conversion of a significant amount of important farmland to non-agricultural use. Mitigation intended to reduce project effects on

farmland has been included in the mitigation and monitoring program adopted by SAFCA. Mitigation includes the acquisition of agricultural conversion easements at a 1:1 ratio, with the lands on which the permanent easements are acquired are maintained for agricultural use.

Through coordination with the USFWS, the project includes mitigation for impacts to the VELB, the GGS, and their habitats. Proposed compensatory mitigation for project impacts on VELB habitat includes planting of vegetation and protection of habitat that would support the species. Proposed compensatory mitigation for project impacts to GGS includes creation of marsh habitat and the protection of agricultural areas to serve as habitat for GGS. The complete details of the compensation for giant garter snake and VELB are included in the BO from the USFWS dated October 9, 2008.

A Mitigation and Monitoring Plan (MMP) has been prepared and a Long-Term Management Plan (LTMP) is being prepared to guide SAFCA and its partners as they manage the compensatory land in perpetuity. The MMP and LTMP would establish specific success criteria for the habitat components, specify remedial measures to be undertaken if success criteria are not met, and describe short- and long-term management and maintenance of the habitat lands. Monitoring of the mitigation site(s) will occur for at least 8 years.

Through coordination with NMFS, the project includes designs to compensate for the loss of riparian vegetation and other impacts, permanent or temporary, to vegetation on the water side of the Sacramento River East levee slope. Permanent impacts will be compensated through re-vegetation with native species at a 1:1 ratio, in-kind where feasible. A slurry spill contingency plan will be developed and included in the Stormwater Pollution and Prevention Plan (SWPPP) prepared prior to construction by the construction contractor. This SWPPP will include plans to notify NMFS in case of a spill and measures to ensure any spill would be handled properly according to standard protocols.

Coordination with the SHPO in accordance with Section 106 of the NHPA, has led to the determination that at least one potentially, significant cultural resources site could be affected by project activities. This has led to the development of a Programmatic Agreement that stipulates that Historic Property Treatment Plans (HPTP) shall be prepared to mitigate adverse effects to historic properties. The HPTP contains mitigation measures for potential effects on cultural resources that are consistent with those proposed in the FEIS.

The Record of Decision (ROD) complete the National Environmental Policy Act process. The ROD will be publicly available upon request, or can be found on the Sacramento District and SAFCA websites. No action was taken prior to the 30-day review period after posting of the FEIS on November 14, 2008.

VI. 408 Permission

Special Conditions for 408 Permission

In order to assure that the proposed project does not impair the usefulness of the existing Federal project and that it not be injurious to the public interest, the following conditions will be imposed and are as follows:

1. This Section 408 approval does not authorize the take of any threatened or endangered species or designated critical habitat. In order to legally take a listed species, there

must be a separate authorization under an ESA Section 10 permit, or a BO under ESA Section 7, with incidental take provisions with which you must comply. The USFWS BO Number 81420-2008-F-0195-5 dated October 9, 2008 contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with incidental take that is also specified in the BO. Section 408 approval is conditional upon compliance with all of the mandatory terms and conditions associated with the BO, which terms and conditions are incorporated herein by reference. Failure to comply with the terms and conditions associated with the incidental take statement in the BO, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with the Corps' approval to proceed. The USFWS is the appropriate authority to determine compliance with the terms and conditions of its BO and with the ESA. The CVFPB must comply with all conditions of this BO, including those ascribed to the Corps. The NMFS letter, number 2008/05035, dated January 14, 2009, stated that the NLIP Phase 2 project is not likely to adversely affect Central Valley steelhead, Central Valley spring-run Chinook salmon, or North American green sturgeon or their designated critical habitat or the Essential Fish Habitat of Pacific salmon.

2. You are required to submit a revision to the Reclamation District (RD) 1000 Operation and Maintenance (O&M) (33 CFR Section 208.10) Manual for review and approval by the U.S. Army Corps of Engineers, Sacramento District within 180 days of construction completion. As-Built drawings and permanent maintenance easement boundaries shall be submitted in conjunction with the draft O&M manual. Upon receipt of the draft O&M manual, this office will schedule a transfer inspection with you to verify all construction has been completed in accordance with the permission. Any features found to be deficient during that inspection will require your correction prior to the Corps accepting the alterations as part of the Federal project. Construction data is required to be provided to this office for review by our Engineering Division during construction. Within 180 days of construction completion, you must furnish a certification report that the work has been completed in accordance with the conditions of this permission.

3. There shall be no disposal, including temporary disposal, of any material in any wetlands or other waters of the United States (US). Best management practices, such as silt fences and mulching, shall be employed to ensure exposed soils do not erode and wash into any waters of the US. Erosion control matting shall not be used to avoid entangling giant garter snakes in it.

4. To ensure your project complies with Section 106 of the NHPA, you must comply, prior to construction, with all terms of the PA between the USACE, SAFCA and the SHPO signed on May 1, 2008.

5. To ensure there is mitigation for residual flood risk, CVFPB is required to develop a Floodplain Management Plan that includes proactive elements for flood information dissemination, public awareness notification and training, flood warning and evacuation plans, emergency flood operations plan with annual exercise, dedicated evacuation resources and post-flood recovery plans. This plan shall be submitted within one-year of the issuance of the Section 408 letter of permission. You are required to participate in and comply with applicable Federal floodplain management and flood insurance programs.

6. You will cooperate and participate in the Safety Assurance Review plan development and implementation per the USACE guidance of November 17, 2008, forthcoming USACE guidance, and Section 2035 of the Water Resources Development Act of 2007.

VII. Section 408 Findings

408 Permission

Based on my review of the 33 U.S.C. 408 recommendation package, the FEIS, the views of other Federal, State, and local agencies, and input from the public, I find the recommended Natomas Levee Improvement Program Phase 2 project in the document to be technically adequate and not an impairment to the usefulness of existing Federal project; to be in accordance with environmental statutes; to be without significant adverse hydraulic impacts; and to not be injurious to the public interest. Therefore, the request under 33 U.S.C. Section 408, made by the State of California CVFPB on behalf of SAFCA to alter the Sacramento River Flood Control Project by construction of the Natomas Levee Improvement Program Phase 2 Project, is approved.

21 JAN 09
Date


Steven L Stockton
Director of Civil Works

VIII. DA Clean Water Act Section 404 Permit

Compliance with 404(b)(1) Guidelines

1. Are there available, practicable alternatives having less adverse impact on the aquatic ecosystem and without other significant adverse environmental consequences that do not involve discharges into "waters of the U.S." or at other locations within these waters?

Yes ___ No X

2. If the project is in a special aquatic site and is not water dependent, has the applicant clearly demonstrated that there are no practicable alternative sites available?

Yes X No ___

3. Will the discharge:

Violate state water quality standards?

Yes ___ No X

Violate toxic effluent standards under Section 307 of the Clean Water Act?

Yes ___ No X

Jeopardize endangered or threatened species or their critical habitat?

Yes ___ No X

Violate standards set by the Department of Commerce to protect marine sanctuaries?

Yes ___ No X

4. Evaluation of the information in EIS indicates that the proposed discharge material meets testing exclusion criteria for the following reason(s):

(X) based on the available information, the material is not a carrier of contaminants.

() the levels of contaminants are substantially similar at the extraction and disposal sites and the discharge is not likely to result in degradation of the disposal site and pollutants will not be transported to less contaminated areas.

() acceptable constraints are available and will be implemented to reduce contamination to acceptable levels within the disposal site and prevent contaminants from being transported beyond the boundaries of the disposal site.

5. Will the discharge contribute to significant degradation of "waters of the U.S." through adverse impacts to:

Human health or welfare, through pollution of municipal water supplies, fish, shellfish, wildlife and/or special aquatic sites?

Yes ___ No X

Life stages of aquatic life and/or wildlife?

Yes ___ No X

Diversity, productivity, and stability of the aquatic life and other wildlife? Or wildlife habitat or loss of the capacity of wetlands to assimilate nutrients, purify water or reduce wave energy?

Yes ___ No X

Recreational, aesthetic and economic values?

Yes ___ No X

f. Will all appropriate and practicable steps be taken to minimize adverse impacts of the discharge on the aquatic ecosystem? Does the proposal include satisfactory compensatory mitigation for losses of aquatic resources?

Yes X No

Public Interest Review

The decision whether to issue a permit is based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. Evaluating the probable impact which the proposed activity may have on the public interest requires a careful weighing of all those factors which become relevant in each particular case. The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. If the proposed activity complies with the USEPA's 404(b)(1) guidelines, a permit will be granted unless the District Engineer determines that it would be contrary to the public interest.

The EIS analyzed a number of factors relevant to the public interest review. These factors include but are not limited to socioeconomics, aesthetics, wetlands, historic properties, fish and wildlife, flooding and floodplain values, land use, mineral needs, water quality, energy needs, safety, and Prime and unique farmland.

1. The relative extent of the public and private need for the proposed work has been considered: The proposed action is needed to provide flood protection for the Natomas Basin, including existing residents and public facilities. The project will also allow private interests to continue to construct residential and commercial developments in the area.

2. The practicability of using reasonable alternative locations and/or methods to accomplish the objective of the proposed structure or work has been evaluated. Several reasonable alternatives have been reviewed as part of the permit process, including practicable alternatives in the EIS. With mitigation, the proposed action is the least environmentally damageable, practicable alternative.

3. The extent and permanence of the beneficial and/or detrimental effects that the proposed structures or work may have on the public and private uses for which the area is suited has been reviewed: The areas to be impacted are primarily used for private agricultural purposes. The proposed action will result in a permanent change in use in areas where the levee will be widened, in the adjacent levee alignment, and in certain borrow areas. However, some borrow areas will be returned to agricultural use. Moreover, the proposed action is planned to protect existing and future uses in the Basin from potentially catastrophic flooding which could cause significant adverse impacts to natural and man-made resources.

Special Conditions for the DA Permit

1. The document entitled Mitigation and Monitoring Plan, Natomas Levee Improvement Program, Landside Improvement Project dated December 2008, is incorporated by reference as a condition of this authorization except as modified by the following special conditions.

2. In no case shall initiation of the construction of compensatory mitigation, specifically, the GGS canal and Brookfield rice field restoration be delayed beyond September 30, 2009. Construction of compensatory mitigation must be completed no later than September 30, 2010.

3. To ensure that mitigation is completed as required, you must notify the District Engineer of the start date and the completion date of the mitigation areas' construction, in writing and no later than ten calendar days after each date.

4. To provide a permanent record of the completed mitigation work, you shall provide two complete sets of as-builts of the completed mitigation areas (i.e., GGS canal and Brookfield rice field restoration) to the Corps of Engineers. The as-builts must indicate changes made from the original plans in indelible red ink. These as-builts must be provided to this office no later than 60 days after the completion of construction of each of the mitigation areas.

5. To protect the integrity of the preserved areas and avoid unanticipated future impacts, no roads, utility lines, trails, benches, equipment or fuel storage, grading, firebreaks, mowing, grazing, pesticide use, burning, or other structures or activities shall be constructed or occur within the preservation areas without specific, advance written approval from the Corps of Engineers.

6. The Corps permit does not authorize you to take an endangered species, in particular GGS, VELB, or designated critical habitat. In order to legally take a listed species, you must have separate authorization under the ESA (e.g., an ESA Section 10 permit, or a BO under ESA Section 7, with "incidental take" provisions with which you must comply). The USFWS BO (Number 81420-2008-F-0195-5, October 9 2008), contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the BO. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with "incidental take" of the attached BO, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Corps permit. The USFWS is the appropriate authority to determine compliance with the terms and conditions of its BO, and with the ESA. The CVFPB and SAFCA must comply with all conditions of this BO, including those ascribed to the Corps.

7. To further ensure your project complies with the ESA, you must implement all of the mitigating measures identified in the enclosed NMFS letter of concurrence from January 14, 2009 including those ascribed to the Corps therein. If you are unable to implement any of these measures, you must immediately notify this office and the NMFS so we may consult as appropriate, prior to initiating the work, in accordance with Federal law.

8. To ensure your project complies with Section 106 of the NHPA, the CVFPB and SAFCA must comply with all terms of the PA between the USACE, SAFCA, and the SHPO signed on May 1, 2008, and is incorporated by reference as a special condition of the permit.

9. Prior to initiating any activity authorized by this permit, you shall, to insure long-term viability of the GGS canal and Brookfield rice field restoration mitigation areas:

a. Establish a fully-funded endowment(s) to provide for maintenance and monitoring of these areas.

b. Designate an appropriate conservation-oriented third party entity to function as preserve manager and to hold the conservation easements.

c. Record permanent conservation easements and deed restrictions maintaining both areas as wetland preserve and wildlife habitat in perpetuity. Copies of the proposed deed restriction language must be provided to the Corps of Engineers for approval prior to recordation.

10. Provide copies of the recorded documents to the Corps of Engineers no later than 30 days prior to the start of construction of any of the activities authorized by this permit.

11. To ensure completion of compensatory mitigation construction, you must post a performance bond or irrevocable standby letter of credit (Performance Security) for the amount of the construction with a federally approved surety. This Performance Security shall not be released until the Corps of Engineers has received the as-built drawings and approved them in writing. A draft letter for the Performance Security must be submitted to this office for review and approval.

12. You must allow representatives from the Corps to inspect the authorized activity and any mitigation, preservation, or avoidance areas at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

13. You must submit monitoring reports to this office for each year of the eight - year monitoring period, and for each additional year, if remediation is required, by December 31st of each year.

14. All terms and conditions of the Section 401 Water Quality Certification dated January 16, 2009, are expressly incorporated as conditions of this permit.

15. Your responsibility to complete the required compensatory mitigation as set forth in this permit will not be considered fulfilled until you have demonstrated mitigation success and have received written verification from the U.S. Army Corps of Engineers.

IX. DA Clean Water Act Section 404 Permit

1. The evaluation of the proposed action and alternatives was done in accordance with all applicable laws, executive orders, regulations, and agency regulations. The EIS and supporting documents are adequate and contain sufficient information to make a reasoned permit decision.

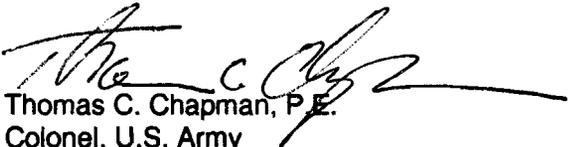
2. The selected alternative is the applicant's Proposed Action, and with appropriate and practicable mitigation measures to minimize environmental harm and potential adverse impacts of the discharges on the aquatic ecosystem and the human environment. The applicant's proposed project, as mitigated by these conditions, is considered the least environmentally damaging, practicable alternative.

3. The discharge complies with the Section 404(b)(1) guidelines, with the inclusion of appropriate and practicable general and special conditions in the permit to minimize pollution or adverse effects to the affected ecosystem.

4. Issuance of a Department of the Army permit, with the inclusion of special conditions on the permit, as prescribed by regulations published in 33 CFR Parts 320 to 332, and 40 CFR Part 320 is not contrary to the public interest.

I have reviewed and evaluated, in light of the overall public interest, the documents and factors concerning the permit application for the proposed action, as well as the stated views of interested agencies and the public. In doing so, I have considered the possible consequences of the proposed action in accordance with regulations published in 33 Code of Federal Regulations (CFR) Parts 320 through 332 and 40 CFR Part 230. Based on these considerations, and pursuant to my delegated authority under Section 404 of the Clean Water Act, I am issuing a DA permit to SAFCA to construct the NLIP Phase 2 subject to special conditions.

21 Jan 09
Date


Thomas C. Chapman, P.E.
Colonel, U.S. Army
Commanding

CENTRAL VALLEY FLOOD PROTECTION BOARD

3310 El Camino Ave., Rm. LL40
SACRAMENTO, CA 95821
(916) 574-0609 FAX: (916) 574-0682
PERMITS: (916) 574-0653 FAX: (916) 574-0682

File



February 4, 2008

Colonel Thomas C. Chapman, District Engineer
U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, California 95814

Dear Colonel Chapman:

The California Central Valley Flood Protection Board (Board) is requesting approval by the U.S. Army Corps of Engineers (Corps) under 33 U.S.C. 408, on behalf of the Sacramento Area Flood Control Agency (SAFCA), to alter a portion of the Sacramento River Flood Control Project. The Board has determined that the proposed alteration is in the best interest of the public and will not have a detrimental effect on the Sacramento River Flood Control Project. Additional documentation provided by SAFCA is attached to describe the proposed alteration.

If the Corps approves the proposed alteration, the Board will proceed with its permitting process. If a permit is granted, the project has been completed, and the alteration has been formally incorporated within the federal project by the Corps, the State of California, acting through the Board, will accept the altered project for operation and maintenance and hold and save the United States free from damage due to the construction works.

Within 90 days of completion of the project alteration, the Board will provide information to the Corps for the purposes of preparing a revised Operation and Maintenance Manual for this portion of the Sacramento River Flood Control Project, along with as-built Plans and Specifications for the alteration.

SAFCA proposes to begin construction during summer 2008 and to complete work prior to the 2009-2010 flood season. To facilitate this schedule, the Board requests that Corps' review be completed no later than May 1, 2008.

If you have any questions or need further information, please contact me at (916) 574-0609.

Sincerely,

Benjamin F. Carter, President
Central Valley Flood Protection Board

Maureen "Lady Bug" Doherty, Secretary
Central Valley Flood Protection Board

cc: Mr. John Bassett
Sacramento Area Flood Control Agency
1007 7th Street, 7th Floor
Sacramento, California 95814-3407



Sacramento
Area Flood
Control
Agency

February 13, 2008

Eric R. Butler
Senior Engineer
Central Valley Flood Protection Board
3310 El Camino Avenue, LL40
Sacramento, CA 95821

Dear Mr. Butler,

Per your request, attached is the information prepared by SAFCA for your use in requesting that the Army Corps of Engineers (USACE) grant permission under 33 U.S.C. 408 (Section 408) to alter portions of the perimeter levee system protecting the Natomas Basin as proposed by SAFCA. As you know, the first phase of this early implementation project, which was permitted by the California Reclamation Board and accepted by the USACE under Section 408, involved in strengthening approximately 5,400 feet of the Natomas Cross Canal (NCC) south levee. This work was completed in 2007. The next phase of the project, which is the focus of the current Section 408 submittal, involves raising the entire 5.3 mile length of the NCC south levee, strengthening the remainder of this levee, and raising and strengthening approximately 4.3 miles of the Sacramento River east levee extending downstream of the NCC. The attached documents provide the information requested the USACE for processing Section 408 requests as set forth in their guidance memorandum dated October 23, 2008.

If you have any questions in this regard, please give me a call.

Sincerely,

A handwritten signature in black ink that reads "Stein M. Buer". The signature is fluid and cursive, with a checkmark-like flourish at the end.

Stein Buer
Executive Director

Office 916-874-7606
FAX 916-874-8289

1007 - 7th Street, 7th Floor
Sacramento, CA 95814-3407

EXHIBIT I

BIOLOGICAL OPINIONS



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In reply refer to:
1-1-07-F-0231

JUN 18 2007

Mr. E. Scott Clark
Chief, Planning Office
Army Corps of Engineers
1325 J Street
Sacramento, California 95814

Subject: Amendment to the Biological Opinion (Service file number 1-1-07-F-0207) for the Natomas Cross Canal South Levee Phase 1 Improvements Project in Sutter County, California

Dear Mr. Clark:

This letter is in response to a request, for further clarification, from the California Department of Fish and Game (CDFG) regarding the proposed conservation measures in the Natomas Cross Canal South Levee Phase 1 Improvements Project biological opinion (1-1-07-F-0207). In order for CDFG to complete a consistency determination under the California Endangered Species Act with our June 1, 2007, biological opinion on the Federal and State listed giant garter snake, CDFG has requested a clarification of the biological opinion to include further detail regarding the restoration of the site after completion of construction. Their request was received in our office via electronic mail on June 15, 2007. The Sacramento Area Flood Control Agency, the project applicant, verbally concurred on June 15, 2007, with the language CDFG proposes to add to the Conservation Measures in the June 1, 2007, biological opinion, detailed below. This amended biological opinion is issued under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Therefore, the June 1, 2007, biological opinion is now amended as follows:

Page 7: Change Bullet Number 10. from:

10. After completion of construction activities, any temporary fill and construction debris will be removed and disturbed areas will be restored to pre-project conditions.

to:

10. After completion of construction activities, any temporary fill and construction debris will be removed, and disturbed areas will be restored to pre-project conditions. All areas disturbed during construction, as described previously, including the upper 1/3 of the waterside levee (6-8 feet), the locations of the slurry batch plant, and the staging/stockpiling areas, shall be fully restored to a higher quality standard than pre-project conditions by re-seeding any of these locations which have bare ground exposed, according to the *Restoration of giant garter snake habitat* standards in item 4.c. of Appendix A (*Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat*) of the *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California*.

In order to ensure that all areas disturbed, as a result of construction activities, have successfully established post-project appropriate vegetation quality, a qualified biologist shall document the species composition and percent cover of an appropriate representative portion of each separate location disturbed during construction, in a vegetation restoration monitoring report. The Service and the CDFG may require remedial actions to restore vegetation on these sites in the event that these areas do not contain 80% cover, as documented no later than June 1, 2008. The monitoring report shall be sent to Ms. Jennifer Hobbs of the Sacramento Fish and Wildlife Office address above, and Mr. Todd Gardner of the CDFG – North Central Region, at 1701 Nimbus Rd., Suite A, Rancho Cordova, CA 95670.

The other portions of the project description, species baseline, effects analysis, conclusion, reasonable and prudent measures, and conservation recommendations in the June 1, 2007, biological opinion remain the same.

This concludes formal consultation with the Corps on the amended Natomas Cross Canal South Levee Phase 1 Improvements Project. As provided in 50 CFR §402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

Please contact Jennifer Hobbs, or Holly Herod, Chief, Sacramento Valley Branch, of my staff at (916) 414-6600, if you have questions regarding this amendment to the biological opinion for the Natomas Cross Canal South Levee Phase 1 Improvements Project.

Sincerely,

Handwritten signature of Peter A. Cross in black ink.

for Kenneth Sanchez
Acting Field Supervisor

cc:

Liz Holland, Sacramento District, Corps of Engineers, Sacramento, California
Todd Gardner, California Department of Fish and Game, Sacramento, California
Anne King, EDAW, Sacramento, California
John Basset, SAFCA, Sacramento, California



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In reply refer to:
1-1-07-F-0207

JUN 1 2007

Mr. E. Scott Clark
Chief, Planning Office
Army Corps of Engineers
1325 J Street
Sacramento, California 95814

Subject: Formal Consultation for the Natomas Cross Canal South Levee Phase 1 Improvements Project in Sutter County, California

Dear Mr. Clark:

This is in response to the U.S. Army Corps of Engineers' (Corps) request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed Natomas Cross Canal (NCC) South Levee Phase 1 Improvements Project in Sutter County, California. Your May 22, 2007, request was received in our office on May 22, 2007. This document represents the Service's biological opinion on the effects of the action on the federally-threatened giant garter snake (*Thamnophis gigas*), in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

The Service has determined that the project is not likely to adversely affect the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) based on the following avoidance measures. One elderberry shrub is located within 100 feet of construction work, but more than 20 feet away. Worker awareness training will be presented to workers prior to beginning construction. Additionally, the shrub shall be fenced 20 feet from the dripline and no insecticides, herbicides, fertilizers, or other chemicals will be used within 100 feet of the elderberry shrub.

The Service has determined that the proposed project is likely to adversely affect the giant garter snake. The proposed project site provides potential giant garter snake habitat. Because of the presence of on-site suitable habitat, and the proximity of recorded observations of the giant garter snake (i.e., 13 California Department of Fish and Game locality records of the giant garter snake are reported within five miles of the proposed project site), the Service believes that the giant garter snake is reasonably certain to occur within the proposed project's action area and, therefore, the proposed project is likely to adversely affect the giant garter snake through

TAKE PRIDE
IN AMERICA 

temporary loss of habitat. Critical habitat has not been proposed for the giant garter snake; therefore, none will be adversely affected.

The findings and recommendations in this consultation are based on: (1) a February 27, 2007, letter from Sacramento Area Flood Control Agency (SAFCA) regarding technical assistance from the Service; (2) your May 22, 2007, letter initiating consultation and accompanying information; (3) e-mails on May 21, and May 22, 2007 from Anne King of EDAW providing an updated description of project acres; and (4) other information available to the Service.

BIOLOGICAL OPINION

Description of the Proposed Action

The project site for the proposed NCC Phase 1 Improvements consists of the westernmost 9,700 feet of the NCC south levee, the 500 feet of the Sacramento River east levee just south of the NCC, and adjacent land in the Sutter County portion of the Natomas basin, northwest of the City of Sacramento. For engineering purposes, the project levee segment included in the NCC Phase 1 Improvements is divided into two reaches.

This phase was identified for the initial phase of construction because a boil was identified along this section of levee during the January through April 2006 elevated river stages. In addition, because of its proximity to the Fremont Weir, a levee failure at this location would allow uncontrolled flooding of the entire Natomas Basin, which is occupied by over 83,000 residents and \$10 billion in damageable property as well as preserves for giant garter snake and Swainson's hawk. This area is presently vulnerable to flooding in a less than 100-year flood event. Uncontrolled flooding of the Natomas Basin in a flood exceeding a 100-year event could result in \$7 billion in damage and effects to listed species and their habitats. The specific project objectives are to address through-seepage and underseepage potential in the westernmost 9,700 feet of the NCC, and initiate the first phase of improvements in 2007, before the start of the next flood season.

The proposed project would involve constructing a cutoff wall through the levee crown in both reaches. The cutoff wall would overlap the Sacramento River east levee by about 500 feet. Potential to construct a waterside cutoff wall was also evaluated, but rejected as infeasible because of increased environmental impacts and cost.

The "project site" for the NCC Phase 1 Improvements project would be limited to an area of temporary ground surface disturbance that includes: the upper 10 feet of the waterside slope of the NCC south levee in Reaches 1 and 2, except for two areas in Reach 2 where excavation would extend farther down the slope (see "Levee Crown Degrading" section below); the levee crown area; the landside levee slope; the maintenance corridor along the landside levee toe; and maintained areas between the toe corridor and adjacent land uses that would be used for construction staging and temporary stockpiling. In Reach 1 and the western end of Reach 2, it would also be necessary to extend approximately 10 feet into the adjacent rice fields to provide the required corridor for equipment passage and construction activities. A berm would be

constructed to allow the remainder of the field to be planted with rice. Along the Sacramento River east levee, the work will occur in the area along and adjacent to the roadway; the landside slope, down to about the level of the existing landside bench; and an area approximately 10 feet wide in the adjacent rice field. Specific construction activities are described below.

Clearing and Grubbing/Stripping

Preparation for degrading the upper 6–8 feet of the levee crown would entail using scrapers (or other suitable equipment depending on the slope) to clear and grub/strip the surface to a depth of 2 inches to remove low-growing vegetation, loose stone and surface soils. This material would be hauled off-site. The top 4 inches of aggregate base from the top-of-levee patrol road would be removed and stockpiled for later reuse. The Garden Highway pavement would be removed and the material disposed of offsite.

Levee Crown Degrading

The upper approximately 1/3 of the levee (6–8 feet) would be degraded by scrapers and a bulldozer. Two areas within Reach 2, with a total length of approximately 600 feet, would be excavated to a lower elevation on the waterside slope of the levee to repair slip failures that occurred in 2006. This over-excavation would not extend into the NCC channel below the ordinary high water mark. Some of the material that is removed may be suitable for later use in reconstructing the levee crown, as described in the next section. The excess material would be temporarily stockpiled along the landslide levee toe and removed during demobilization/cleanup if not used during Phase 1 construction.

Cutoff Wall Construction

The cutoff wall would be constructed to a depth of approximately 70 to 80 feet. Conventional slurry cutoff walls are typically constructed using an excavator with a long-reach boom capable of digging a trench to a maximum depth of approximately 80 feet. Bentonite and water slurry will be placed in the trench during excavation to prevent caving until the soil-cement-bentonite backfill material is mixed and placed in the trench. To make the backfill, select soil is mixed with cement and bentonite clay to achieve the required cutoff wall strength and permeability.

This material is then backfilled into the trench. A portion of the material removed during excavation of the cutoff wall trench may be suitable for this use. Where the excavated material is unsuitable for this use, it will be mixed with select import to meet requirements, or replaced entirely with import material from the borrow site.

Cutoff wall construction requires temporary establishment of an on-site slurry batch plant that would occupy about 1 to 2 acres. The plant would be moved periodically during the construction process due to limitations on the distance that the slurry material can be pumped, but it will always be within the designated staging/stockpiling area. The batch plant site would likely contain tanks for water storage, bulk bag supplies of bentonite, bentonite and cement storage silos, a cyclone mixer, pumps, and two generators that meet air quality requirements. The site would also accommodate slurry tanks to store the blended slurries temporarily until they are pumped to the work sites. Slurry ingredients would be mixed with water at the batch plant and the mixture would be pumped from the tanks through pipes to the cutoff wall construction work

sites. The batch plant would produce two different slurry mixes, one for trench stabilization and one for the soil backfill mix. Therefore, two slurry pipes or hoses, typically 4- or 6-inch high-density polyethylene pipes, would be laid on the ground and would extend to all work sites. An additional pipe may be used to supply water to the work sites.

Levee Crown Reconstruction and Finish Grading

Levee reconstruction would be required to restore the degraded levee to its pre-construction height. Material would be imported from a borrow site (see below for more information) and mixed with degraded levee crown material, as required, to complete the levee reconstruction. Two motor graders would shape the levee to its finished grade as sheepsfoot compactors compact the material. Following levee reconstruction, 2 inches of new road surfacing material would be delivered to the project site and compacted on top of approximately 4 inches of previously salvaged aggregate base material from the levee crown to reconstruct the levee patrol road (located on top of the levee).

Demobilization/Cleanup

Cutoff wall construction would result in the generation of excess trench spoil material, which would require disposal off-site in an authorized landfill or through a concrete recycler. Following the completion of construction activities, all disturbed areas (e.g., batch plant site and staging/stockpiling areas) would be restored to preconstruction conditions, and the levee slopes and any previously vegetated areas disturbed during construction would be seeded with a grass mix. This phase would also entail general cleanup and disposal of unused and waste materials. All construction equipment would be loaded onto trailers and taken off-site.

Borrow Site

The RD 1001 borrow site is generally surrounded by agricultural land, including several active rice fields but consisting primarily of upland agricultural crops and fallow fields. The site is bordered on the west side by the East Side Canal, and Markham Ravine borders the north side of the western portion of the site.

Borrow excavation for the NCC Phase 1 Improvements would be limited to the western portion of the site, west of the railroad tracks. This area has been previously excavated and graded and is primarily covered with ruderal upland vegetation, similar to that described above. Several patches of woodland vegetation (cottonwoods and willows) are present in low-lying areas where borrow material has been previously removed. Borrow extraction for the NCC Phase 1 Improvements would be limited to areas at least 200 feet away from aquatic habitat suitable for giant garter snake (i.e., East Side Canal and Markham Ravine). The eastern portion of the site has been used for rice cultivation, but had been very recently disced, including the field boundaries and berms that formerly separated the individual checks at the time of the most recent field survey (April 2007). No borrow would be excavated from this area.

In the event that the borrow site from RD 1001 is not available for use for the NCC Phase 1 Improvements project, the borrow would come from either the spoil from Natomas Basin Conservancy preserve which is being re-worked or a commercially available borrow source.

Project Schedule

Project construction would begin in late June 2007. The construction contract will contain a milestone date of October 1, 2007, for completion of the wall and restoration of the site to its pre-project condition (including removal of temporary stockpiles and reconstruction of the levee patrol road). Minor remaining demobilization/ cleanup activities and punch list item resolution (unrelated to levee reconstruction) would occur between October 1 and November 30. Core drilling of the cutoff wall, to verify that the contractor met the design parameters, will likely continue through December. The anticipated construction labor force would consist of 45–55 people working on two headings simultaneously, working 10-14 hour shifts, 6 days per week. A smaller crew would perform maintenance activities on Sundays. Given the time constraints for the available work window, the Contractor may choose to work 24 hours per day.

Conservation Measures

The following measures will be implemented to avoid the potential for adverse effects to valley elderberry longhorn beetle and avoid and minimize adverse effects to the giant garter snake potentially resulting from implementation of NCC Phase 1 Improvements. These measures have been incorporated into construction specifications.

Valley Elderberry Longhorn Beetle

1. A worker awareness training program for construction personnel will be conducted by a qualified biologist prior to the commencement of construction activities. The program will inform all construction personnel about the life history and status of the beetle, the need to avoid damaging the elderberry plants, and the possible penalties for not complying with these requirements. Written documentation of the training will be submitted to the Service within 30 days of the completion of training.
2. The elderberry shrub on the project site will be incorporated into a fenced avoidance area, and the fencing will be placed at least 20 feet from the dripline of the shrub.
3. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used within 100 feet of the elderberry shrub. Dirt roadways and disturbed areas within 100 feet of the elderberry shrub will be watered at least twice a day to minimize dust emissions.

Giant Garter Snake

1. A portion of the northern and western ends (approximately 10 feet wide) of the westernmost rice field south of the NCC levee will be dewatered for at least 25 days prior to use of the area for staging/stockpiling during construction.
2. Ground-disturbing activity will not commence prior to May 1, and all project construction will be completed by October 1.

3. A worker awareness training program for construction personnel will be conducted by a qualified biologist before construction activities begin. The program will inform all construction personnel about the life history and status of the giant garter snake, the need to avoid damaging suitable habitat and giant garter snake mortality, and the possible penalties for not complying with these requirements. Written documentation of the training will be submitted to the Service and California Department of Fish and Game (DFG) within 30 days of the completion of training.
4. Before the beginning of construction activities, high-visibility fencing will be erected to protect areas of aquatic habitat from encroachment. These areas will be avoided by all construction personnel. The fencing will be inspected before the start of each work day and will be maintained until all construction activities are completed.
5. Within 24 hours prior to the commencement of ground-disturbing activities, the project site will be surveyed for giant garter snakes by a qualified biologist. The biologist will provide the Service with written documentation of the monitoring efforts with 48 hours after the survey is completed. The project area will be re-inspected by the monitoring biologist whenever a lapse in construction activity of 2 weeks or greater has occurred. A monitoring biologist will be present onsite during initial ground disturbance activities, including clearing and grubbing/stripping. The biologist will be available throughout the construction period and will conduct a monitoring visit at least once per week to ensure avoidance and minimization measures are being properly implemented.
6. The number of access routes, the number and size of staging areas, and the total area of the proposed project activity will be limited to the minimum necessary. Routes and boundaries will be clearly marked. Movement of heavy equipment to and from the project site will be restricted to established roadways and designated staging areas to minimize habitat disturbance. Project-related vehicles will observe a 20-mile-per-hour speed limit within construction areas, except on county roads and on State and Federal highways.
7. All snakes encountered will not be harassed, harmed, or killed and will be allowed to leave the construction area under their own power. If any snake species is observed retreating into an underground burrow within the project limits, no construction will be allowed within a 50-foot radius of the burrow. A 50-foot radius non-disturbance buffer zone will be established and delineated until the monitoring biologist can make a determination that the snake is or is not a giant garter snake.
8. If the monitoring biologist determines that a giant garter snake has retreated into an underground burrow within the project limits, and the area of the burrow cannot be avoided by the project, then under the approval, supervision, and direction of the Service and the monitoring biologist, the burrow will be excavated to allow personnel with appropriate authority and permit to capture and handle the giant garter snake to relocate the giant garter snake outside of the project area.

9. During construction operations, stockpiling of construction materials, portable equipment, vehicles, and supplies will be restricted to the designated construction staging areas. To eliminate attracting predators of the giant garter snake, all food-related trash items, such as wrappers, cans, bottles, and food scraps, will be disposed of in closed containers.
10. After completion of construction activities, any temporary fill and construction debris will be removed and, disturbed areas will be restored to pre-project conditions.

Status of the Species

Giant Garter Snake

Listing. The Service published a proposal to list the giant garter snake as an endangered species on December 27, 1991 (56 FR 67046). The Service reevaluated the status of the giant garter snake before adopting the final rule, which listed as a threatened species on October 20, 1993 (58 FR 54053).

Description. The giant garter snake is one of the largest garter snakes species reaching a total length of approximately 64 inches (162 centimeters). Females tend to be slightly longer and proportionately heavier than males. Generally, the giant garter snakes have a dark dorsal background color with pale dorsal and lateral stripes, although coloration and pattern prominence are geographically and individually variable (Hansen 1980; Rossman *et al.* 1996).

Historical and Current Range. Giant garter snakes formerly occurred throughout the wetlands that were extensive and widely distributed in the Sacramento and San Joaquin Valley floors of California (Fitch 1940; Hansen and Brode 1980; Rossman and Stewart 1987). The historical range of the giant garter snake is thought to have extended from the vicinity of Chico, Butte County, southward to Buena Vista Lake, near Bakersfield, in Kern County (Fitch 1940; Fox 1948; Hansen and Brode 1980; Rossman and Stewart 1987). Early collecting localities of the giant garter snake coincide with the distribution of large flood basins, particularly riparian marsh or slough habitats and associated tributary streams (Hansen and Brode 1980). Loss of habitat due to agricultural activities and flood control have extirpated the giant garter snake from the southern one third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lake beds (Hansen 1980; Hansen and Brode 1980).

Upon Federal listing in 1993, the Service identified 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records (Service 1993). The 13 populations largely coincide with historical flood basins and tributary streams throughout the Central Valley: (1) Butte Basin, (2) Colusa Basin, (3) Sutter Basin, (4) American Basin, (5) Yolo Basin/Willow Slough, (6) Yolo Basin/Liberty Farms, (7) Sacramento Basin, (8) Badger Creek/Willow Creek, (9) Caldoni Marsh/White Slough, (10) East Stockton--Diverting Canal & Duck Creek, (11) North and South Grasslands, (12) Mendota, and (13) Burrell/Lanare.

The known range of the giant garter snake has changed little since the time of listing. In 2005, giant garter snakes were observed at the City of Chico's wastewater treatment facility, approximately ten miles north of what was previously believed to be the northernmost extent of the species' range (D. Kelly pers. comm. 2006; E. Hansen pers. comm. 2006). The southernmost known occurrence is at the Mendota Wildlife Area in Fresno County.

Essential Habitat Components. Endemic to wetlands in the Sacramento and San Joaquin valleys, the giant garter snake inhabits marshes, sloughs, ponds, small lakes, low gradient streams, and other waterways and agricultural wetlands, such as irrigation and drainage canals, rice fields and the adjacent uplands (Service 1999). Essential habitat components consist of: (1) wetlands with adequate water during the giant garter snake's active season (early-spring through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) upland habitat with grassy banks and openings in waterside vegetation for basking; and (4) higher elevation uplands for over-wintering habitat with escape cover (vegetation, burrows) and underground refugia (crevices and small mammal burrows) (G. Hansen 1988). Giant garter snakes are typically absent from larger rivers and other bodies of water that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates (G. Hansen 1988; G. Hansen and Brode 1980; Rossman and Stewart 1987). Riparian woodlands do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations (G. Hansen 1988).

Foraging Ecology. Giant garter snakes are the most aquatic garter snake species and are active foragers, feeding primarily on aquatic prey such as fish and amphibians (Fitch 1941). Because the giant garter snake's historic prey species are either declining, extirpated, or extinct, the predominant food items are now introduced species such as carp (*Cyprinus carpio*), mosquitofish (*Gambusia affinis*), larval and sub-adult bullfrogs (*Rana catesbiana*), and Pacific chorus frogs (*Pseudacris regilla*) (Fitch 1941; G. Hansen 1988; G. Hansen and Brode 1980, 1993; Rossman *et al.* 1996).

Reproductive Ecology. The giant garter snake breeding season extends through March and April, and females give birth to live young from late July through early September (R. Hansen and G. Hansen 1990). Although growth rates are variable, young typically more than double in size by one year of age, and sexual maturity averages three years in males and five years for females (Service 1993).

Movements and Habitat Use. The giant garter snake is highly aquatic but also occupies a terrestrial niche (Service 1999; Wylie *et al.* 2003c). The giant garter snake typically inhabits small mammal burrows and other soil and/or rock crevices during the colder months of winter (*i.e.*, October to April) (G. Hansen and Brode 1993; Wylie *et al.* 1995; Wylie *et al.* 2002), and also uses burrows as refuge from extreme heat during its active period (Wylie *et al.* 1997; Wylie *et al.* 2003b). While individuals usually remain in close proximity to wetland habitats, the Biological Resource Division of the U.S. Geological Survey (BRD) has documented giant garter snakes using burrows as much as 165 feet (50 meters) away from the marsh edge to escape

extreme heat, and as far as 820 feet (250 meters) from the edge of marsh habitat for overwintering habitat (Wylie *et al.* 1997).

In studies of marked giant garter snakes in the Natomas Basin, giant garter snakes moved about 0.25 to 0.5 miles (0.4 to 0.8 kilometers) per day (G. Hansen and Brode 1993). Total activity, however, varies widely between individuals; individual giant garter snakes have been documented to move up to 5 miles (8 kilometers) over a few days in response to dewatering of habitat (Wylie *et al.* 1997) and to use up to more than 8 miles (12.9 kilometers) of linear aquatic habitat over the course of a few months. Home range (area of daily activity) averages about 0.1 mile² (25 hectares) in both the Natomas Basin and the Colusa National Wildlife Refuge (NWR) (Wylie 1998a; Wylie *et al.* 2002), yet can be as large as 14.5 miles² (3744 hectares) (Wylie and Martin 2004).

Rice fields have become important habitat for giant garter snakes, particularly associated canals and their banks for both spring and summer active behavior and winter hibernation (E. Hansen 2004; Wylie 1998a). While within the rice fields, giant garter snakes forage in the shallow water for prey, utilizing rice plants and vegetated berms dividing rice checks for shelter and basking sites (G. Hansen and Brode 1993). In the Natomas Basin, habitat used consisted almost entirely of irrigation ditches and established rice fields (Wylie 1998a; Wylie *et al.* 2004), while in the Colusa NWR, giant garter snakes were regularly found on or near edges of wetlands and ditches with vegetative cover (Wylie *et al.* 2003c). Telemetry studies also indicate that active giant garter snakes use uplands extensively, particularly where vegetative cover exceeds 50 percent in the area (Wylie 1998a).

Predators. Giant garter snakes are killed and/or eaten by a variety of predators, including raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis virginiana*), bull frogs (*Rana catesbeiana*), hawks (*Buteo* sp.), egrets (*Casmerodius albus*, *Egretta thula*), river otters (*Ludra canadensis*), and great blue herons (*Ardea herodias*) (Dickert 2003; Wylie *et al.* 2003a; G. Wylie pers. comm. 2006). Many areas supporting giant garter snakes have been documented to have abundant predators; however, predation does not seem to be a limiting factor in areas that provide abundant cover, high concentrations of prey items, and connectivity to a permanent water source (G. Hansen and Brode 1993; Wylie *et al.* 1995).

Reasons for Decline and Threats to Survival. The current distribution and abundance of the giant garter snake is much reduced from former times (Service 1999). Prior to reclamation activities beginning in the mid- to late-1800s, about 60 percent of the Sacramento Valley was subject to seasonal overflow flooding providing expansive areas of giant garter snake habitat (Hinds 1952). Now, less than 10 percent, or approximately 319,000 acres (129,000 hectares), of the historic 4.5 million acres (1.8 million hectares) of Central Valley wetlands remain (U.S. Department of Interior 1994), of which very little provides habitat suitable for the giant garter snake. Loss of habitat due to agricultural activities and flood control have extirpated the giant garter snake from the southern one-third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lakebeds (R. Hansen 1980; G. Hansen and Brode 1980). Valley flood wetlands are now subject to cumulative effects of upstream watershed modifications, water storage and diversion projects, as well as urban and agricultural

development. The Central Valley Project (CVP), the largest water management system in California, created an ecosystem altered to such an extent that remaining wetlands depend on highly managed water regimes (U.S. Department of Interior 1994). Further, the implementation of CVP has resulted in conversion of native habitats to agriculture, and has facilitated urban development through the Central Valley (Service 1999). For instance, residential and commercial growth within the Central Valley is consuming an estimated 15,000 acres farmland each year (American Farmland Trust 1999), with a projected loss of more than one million acres by the year 2040 (USGS 2003). Environmental impacts associated with urbanization include loss of biodiversity and habitat, alternation of natural fire regimes, fragmentation of habitat from road construction, and degradation due to pollutants. Further, encroaching urbanization can inhibit rice cultivation (J. Roberts pers. comm. 2006). Rapidly expanding cities within the giant garter snake's range include Chico, Yuba City, the Sacramento area, Galt, Stockton, Gustine, and Los Banos.

Ongoing maintenance of aquatic habitats for flood control and agricultural purposes eliminates or prevents the establishment of habitat characteristics required by giant garter snakes (G. Hansen 1988). Such practices can fragment and isolate available habitat, prevent dispersal of giant garter snakes among habitat units, and adversely affect the availability of the giant garter snake's food items (G. Hansen 1988; Brode and G. Hansen 1992). For example, tilling, grading, harvesting and mowing may kill or injure giant garter snakes (Wylie *et al.* 1997). Biocides applied to control aquatic vegetation reduce cover for the giant garter snake and may harm prey species (Wylie *et al.* 1995). Rodent control threatens the giant garter snake's upland aestivation habitat (Wylie *et al.* 1995). Restriction of suitable habitat to water canals bordered by roadways and levee tops renders giant garter snakes vulnerable to vehicular mortality (Wylie *et al.* 1997). Rolled erosion control products, which are frequently used as temporary berms to control and collect soil eroding from constriction sites, can entangle and kill giant garter snakes (Stuart *et al.* 2001; Barton and Kinkead 2005). Livestock grazing along the edges of water sources degrades water quality and can contribute to the elimination and reduction of available quality giant garter snake habitat (G. Hansen 1988; E. Hansen, pers. comm., 2006), and giant garter snakes have been observed to avoid areas that are grazed (E. Hansen 2003). Fluctuation in rice and agricultural production affects stability and availability of habitat (Paquin *et al.* 2006; Wylie and Casazza 2001; Wylie *et al.* 2003b, 2004).

Other land use practices also currently threaten the survival of the giant garter snake. Recreational activities, such as fishing, may disturb giant garter snakes and disrupt thermoregulation and foraging activities (E. Hansen pers. comm., 2006). While large areas of seemingly suitable giant garter snake habitat exist in the form of duck clubs and waterfowl management areas, water management of these areas typically does not provide the summer water needed by the species (Beam and Menges 1997; Dickert 2005; Paquin *et al.* 2006).

Nonnative predators, including introduced predatory game fish, bullfrogs, and domestic cats, can threaten giant garter snake populations (Dickert 2003; G. Hansen 1986; Service 1993; Wylie *et al.* 1995; Wylie *et al.* 2003a). Nonnative competitors, such as the introduced water snake (*Nerodia fasciata*) in the American River and associated tributaries near Folsom, may also threaten the giant garter snake (Stitt *et al.* 2005).

The disappearance of giant garter snakes from much of the west side of the San Joaquin Valley was approximately contemporaneous with the expansion of subsurface drainage systems in this area, providing circumstantial evidence that the resulting contamination of ditches and sloughs with drainwater constituents (principally selenium) may have contributed to the demise of giant garter snake populations. Dietary uptake is the principle route of toxic exposure to selenium in wildlife, including giant garter snakes (Beckon *et al.* 2003). Many open ditches in the northern San Joaquin Valley carry subsurface drainwater with elevated concentrations of selenium, and green sunfish (*Lepomis cyanellus*) have been found to have concentrations of selenium within the range of concentrations associated with adverse affects on predator aquatic reptiles (Hopkins *et al.* 2002; Saiki 1998). Studies on the effects of selenium on giant garter snakes suggest that giant garter snakes with high selenium loads in their internal organs can transfer potentially toxic quantities of selenium to their eggs (Hopkins *et al.* 2004) and also demonstrate higher rates of metabolic activity than uncontaminated giant garter snakes (Hopkins *et al.* 1999).

Status with Respect to Recovery. The draft recovery plan for the giant garter snake subdivides its range into three proposed recovery units (Service 1999): (1) Sacramento Valley Recovery Unit; (2) Mid-Valley Recovery Unit; (3) San Joaquin Valley Recovery Unit; and (4) South Valley Recovery Unit.

The Sacramento Valley Unit at the northern end of the species' range contains sub-populations in the Butte Basin, Colusa Basin, and Sutter Basin (Service 1999; Service 2006). Protected giant garter snake habitat is located on State refuges and refuges of the Sacramento National Wildlife Refuge (NWR) Complex in the Colusa and Sutter Basins. Suitable giant garter snake habitat is also found in low gradient streams and along waterways associated with rice farming. This northernmost recovery unit is known to support relatively large, stable sub-populations of giant garter snakes (Wylie *et al.* 1995; Wylie *et al.* 1997; Wylie *et al.* 2002; Wylie *et al.* 2003c). Habitat corridors connecting subpopulations, however, are either not present or not protected, and are threatened by urban encroachment.

The Mid-Valley Unit includes sub-populations in the American, Yolo, and Delta Basins (Service 1999; Service 2006). The status of Mid-Valley sub-populations is very uncertain; each is small, highly fragmented, and located on isolated patches of limited quality habitat that is increasingly threatened by urbanization (E. Hansen 2002, 2004; Service 1993; Wylie *et al.* 2003b, 2004; G. Wylie pers. comm. 2006). The American Basin sub-population, although threatened by urban development, receives protection from the Metro Air Park and Natomas Basin Habitat Conservation Plans, which share a regional strategy to maintain a viable giant garter snake sub-population in the basin.

The San Joaquin Valley Unit, which includes sub-populations in the San Joaquin Basin, formerly supported large giant garter snake populations, but numbers have severely declined, and recent survey efforts indicate numbers are extremely low compared to Sacramento Valley sub-populations (Dickert 2002, 2003; G. Hansen 1988; Sloan 2004; Williams and Wunderlich 2003; Wylie 1998). Giant garter snakes currently occur in the northern and central San Joaquin Basin within the Grassland Wetlands of Merced County and the Mendota Wildlife Area of Fresno

County; however, these sub-populations remain small, fragmented, and unstable, and are probably decreasing (Dickert 2003, 2005; G. Wylie pers. comm., 2006).

The South Valley Unit included sub-populations in the Tulare Basin, however, agricultural and flood control activities are presumed to have extirpated the giant garter snake from the Tulare Basin (G. Hansen and Brode 1980; R. Hansen 1980; G. Hansen 1988, 1996). Comprehensive surveys for this area are lacking and where habitat remains, the giant garter snake may be present.

Since 1995, BRD has studied giant garter snake sub-populations at the Sacramento, Delevan, and Colusa NWRs and in the Colusa Basin Drain within the Colusa Basin, at Gilsizer Slough within the Sutter Basin, at the Badger Creek area of the Cosumnes River Preserve within the Badger Creek/Willow Creek area of the Delta Basin, and in the Natomas Basin within the American Basin (E. Hansen 2003, 2004; Wylie 1998b, 2003; Wylie *et al.* 1995; Wylie *et al.* 2002, 2003c; Wylie *et al.* 2003b, 2004). These areas contain the largest extant giant garter snake sub-populations. Outside of protected areas, however, giant garter snakes are still subject to all threats identified in the final rule. The other sub-populations are distributed discontinuously in small, isolated patches, and are vulnerable to extirpation by stochastic environmental, demographic, and genetic processes (Goodman 1987).

The draft recovery criteria require multiple, stable sub-populations within each of the three recovery units, with sub-populations well-connected by corridors of suitable habitat. This entails that corridors of suitable habitat between existing giant garter snake sub-populations be maintained or created to enhance sub-population interchange to offset threats to the species (Service 1999). Currently, only the Sacramento Valley Recovery Unit is known to support relatively large, stable giant garter snake populations. Habitat corridors connecting sub-populations, even in the Sacramento Valley Recovery Unit, are either not present or not protected. Overall, the future availability of habitat in the form of canals, ditches, and flooded fields are subject to market-driven crop choices, agricultural practices, and urban development, and are, thus, uncertain and unpredictable.

Environmental Baseline

American Basin. The proposed project is located within the American Basin giant garter snake population, in the Mid Valley Recovery Unit (Service 1999). Seventy-nine CNDDDB (2007) records are known from the American Basin. These records include the Natomas Basin, Gilsizer Slough, the Middle-American Basin just north of the Natomas Cross Canal, Rio Oso and associated tributaries, as well as other locations within the Basin.

Within the greater American Basin, the Natomas Basin is bounded on the west by the Sacramento River levee, on the north by the Natomas Cross Canal (NCC), on the east by the Natomas East Main Drainage Canal (NEMDC), and on the south by the American River levee. The Natomas Basin Habitat Conservation Plan (NBHCP) applies to the 53,537-acre (21,666-hectare) area interior to the toes of the levees surrounding the Natomas Basin, located in the northern portion of Sacramento County and the southern portion of Sutter County. As of June 2003, the Natomas Basin supported approximately 24,567 acres (9,942 hectares) of giant garter

snake habitat. Of that, approximately 96 acres (39 hectares) are ponds and seasonally wet areas, 22,693 acres (9,184 hectares) are rice fields, and 1,778 acres (720 hectares) are canals.

BRD conducted giant garter snake studies in the Natomas Basin, including areas owned and managed by The Natomas Basin Conservancy (TNBC) (Wylie 1998a; Wylie *et al.* 2000; Wylie *et al.* 2003b, 2004). Eric Hansen is now over-seeing these surveys (Jones and Stokes 2005). Surveys have established the presence of giant garter snakes throughout the Basin, including nearly all the TNBC properties with suitable habitat for the giant garter snake. TNBC's marsh and rice land preserves are being managed with the goal to maintain viable sub-populations of the giant garter snake and the NBHCP's other wetland dependent species. Density estimates in the Natomas Basin range from 6 to 64 giant garter snakes per mile (4 to 40 giant garter snakes per kilometer) depending on the trapping location (Wylie *et al.* 2004). Wylie *et al.* (2003b) suggest that TNBC properties have the potential to provide habitat to sustain giant garter snake populations in the Natomas Basin. They propose that development of giant garter snake habitat on TNBC lands should proceed as quickly as practical. In the Sacramento Valley, water is being purchased from rice growers and exported to the south. Fallowing of land appears to reduce or eliminate giant garter snake capture success in adjacent canals (Wylie *et al.* 2004). If land fallowed by water sales increases in the Basin, the habitat managed by TNBC becomes all the more important for protecting giant garter snake sub-populations (Wylie *et al.* 2004). Also, development projects in the southern end of the Natomas Basin will eliminate local giant garter snake sub-populations, particularly when there is no avenue of escape from construction activity (Wylie *et al.* 2003b).

Biologists funded by the Sacramento Area Flood Control Agency are conducting population dynamics studies in the Middle-American Basin, which lies north of the NCC (Hansen 2003, 2004); the Natomas Basin lies to the south of the NCC. Most giant garter snakes in the Middle-American Basin occur near the NCC and Main Canal where more rice and aquatic habitat is available. However, no giant garter snakes have been found to move within or across the NCC itself, suggesting that giant garter snakes are not moving between the middle-American Basin and the Natomas Basin. If the NCC represents a barrier to movement within the greater American Basin, then giant garter snakes may be present in two separate and genetically isolated sub-populations, requiring separate conservation and management. This type of genetic differentiation is known in giant garter snakes as revealed by regional subdivision in mitochondrial DNA haplotypes (Paquin *et al.* 2006).

BRD has conducted studies at Gilsizer Slough, surrounding lands, and associated irrigation canals (Wylie *et al.* 1995; Wylie *et al.* 1997). Giant garter snakes were shown to use canal, marsh, and rice habitat (Wylie *et al.* 1995; Wylie *et al.* 1997). Giant garter snakes were particularly associated with irrigated canals that had thickly vegetated slopes. Fifty-five percent of telemetered giant garter snakes used rice fields at some time (Wylie *et al.* 1997). Because of few recaptures and no clearly defined capture/recapture events, estimation of total numbers of giant garter snakes in the Gilsizer area was not possible; however, BRD speculates that numbers may be in the hundreds. Much of the Gilsizer Slough area is protected by the State. Also, 162 acres (66 hectares) of the Slough is protected as a result of mitigation for the Wild Goose Gas Pipeline and State Route 70-Algodon Road Interchange projects.

According to the CNDDDB (2007), the nearest giant garter snake record to the proposed project site is within 0.6 mile (0.9 kilometer) from the proposed project footprint. Giant garter snakes have been documented to move up to 5 miles (8 kilometers) over a few days in response to dewatering of habitat (Wylie *et al.* 1997) and to use up to more than 8 miles (12.9 kilometers) of linear aquatic habitat over the course of a few months (Wylie and Martin 2004). The action area contains habitat components that can be used by the giant garter snake for feeding, resting, mating, and other essential behaviors, as well as for movement corridors. Because of the biology and ecology of the giant garter snake, the presence of suitable habitat within the proposed project, and observations of the species, the Service has determined that the giant garter snake is reasonably certain to occur within the action area.

Factors Affecting the Giant garter snake within the Action Area

The overall status of the giant garter snake has not improved since its listing. The American Basin is one of the larger and more protected giant garter snake sub-populations. Nonetheless, this sub-population is subject to the effects of a number of projects. Numerous development projects have been constructed in or near giant garter snake habitat in this rapidly urbanizing area. American Basin giant garter snakes are highly vulnerable to secondary effects of urbanization, such as increased predation by house cats, water pollution in the form of urban run-off, and increased vehicular mortality. Most documented localities have been adversely impacted by development, including freeway construction, flood control projects, and development (Wylie *et al.* 2004). Several former localities are known to have been lost and/or depleted to the extent that continued viability is in question (Brode and Hansen 1992). The scarcity of remaining suitable habitat, flooding, stochastic processes, and continued threats of habitat loss pose a severe threat to this sub-population (Goodman 1987).

A number of State, local, private, and unrelated Federal actions have occurred within the action area and adjacent region affecting the environmental baseline of the species. Some of these projects have been subject to prior section 7 consultation. These actions have resulted in both direct and indirect effects to giant garter snake habitat within the region. Projects affecting the environment in and around the action area include bridge replacements over the NEMDC and Steelhead Creek at Main Avenue, the Lower Dry Creek and Robia Creek Levee Improvement project, the Lower Northwest Interceptor project, and the North Natomas Comprehensive Drainage project. In the past eight years, the Service has authorized take resulting in the permanent loss of more than 36 acres (15 hectares) of aquatic and 150 acres (61 hectares) of upland giant garter snake habitat, as well as temporary alteration of over 55 acres (22 hectares) of aquatic and 130 acres (53 hectares) of upland giant garter snake habitat in the greater American Basin.

Several flood control programs are completed within and around the action area, within the Natomas Basin and within the range of the species. Completed projects include the Natomas Area Flood Control project that provided flood protection necessary for development in the Natomas Basin.

In addition to agricultural, flood control, and maintenance activities, other activities have occurred in the Basin that likely affected the giant garter snake and did not receive incidental take authorization. For example, over the last three to four years, approximately 75 acres (30 hectares) of suitable giant garter snake seasonal wetland habitat were altered and/or degraded on lands owned by the Sacramento International Airport. This is a significant percentage of the remaining natural wetlands in the Basin. The Service is working with the Airport to resolve these unauthorized activities.

On-going development within the Natomas Basin also affects the giant garter snake and its habitat. In February of 2002, the Service issued an incidental take permit (ITP) to the Metro Air Park Property Owners Association (MAPPOA) for development activities associated with the implementation of the Metro Air Park Habitat Conservation Plan (MAPHCP). On June 27, 2003, the Service issued ITPs to the City of Sacramento, Sutter County, and TNBC for activities associated with the implementation of the Final NBHCP (City of Sacramento *et al.* 2003). TNBC is the plan operator responsible for acquiring and managing habitat mitigation lands for the MAPHCP and NBHCP. The MAPHCP and NBHCP permits authorized the development of 17,500 acres (7,082 hectares) of land in the Natomas Basin; of this, approximately 8,512 acres (3,445 hectares) is suitable giant garter snake habitat (*e.g.*, ponds, canals, and rice fields) (Service 2003). A key component of the MAPHCP and NBHCP's conservation strategy is the acquisition of 0.5 acre (0.2 hectare) of habitat mitigation lands for every acre of land developed. A total of 75 percent of the mitigation lands will be suitable for the giant garter snake, with 50 percent in rice fields and 25 percent in managed marsh. Once the MAPHCP and NBHCP have been built out, approximately 6,562 acres (2,656 hectares) of habitat will have been acquired for the giant garter snake, including 4,375 acres (1,771 hectares) of rice fields and 2,187.5 acres (521 hectares) of managed marsh. As of January 21, 2004, the City of Sacramento had issued urban development permits for the development of 5,440 acres (2,202 hectares) in the NBHCP permit area; Sutter County had not issued any urban development permits in the NBHCP permit area. In September of 2003, MAPPOA conducted mass grading on 800 acres (324 hectares) of the Metro Air Park site to prepare the site for development. Of the disturbed area, 190.4 acres (77 hectares) will be immediately developed; the remaining area will revert to agricultural use until it is eventually developed. As of January 21, 2004, TNBC had acquired 3,415 acres (1,382 hectares) of lands to mitigate the impacts of these HCPs.

Effects of the Proposed Action

Construction activities associated with the proposed project are likely to adversely affect the giant garter snake. The proposed project would result in the temporary loss of upland and aquatic giant garter snake habitat. About 27.3 acres of giant garter snake upland habitat would be temporarily affected during degradation of the levee, construction of the cutoff wall, and staging/stockpiling and about 0.5 acre of aquatic habitat would be temporarily affected due to using a small portion of an adjacent rice field for staging/stockpiling.

Construction activities that occur within upland habitat for the giant garter snake may harm, harass, injure, or kill giant garter snakes. The Service requests that all construction activities within 200 feet of suitable aquatic habitat for the giant garter snake take place between May 1

and October 1. This is the active period for the giant garter snake and direct mortality is reduced because giant garter snakes are expected to actively move and avoid danger. Construction activities that extend beyond October 1 may adversely affect the giant garter snake by limiting the giant garter snake's ability to find and utilize suitable upland habitat for winter hibernation, and by exposing giant garter snakes to increased risks of injury and mortality from predation, exposure, entombment, vehicular traffic, and construction equipment as the giant garter snakes may be forced to disperse through and/or around the construction site in response to habitat changes and seasonal indicators. Dewatering of rice fields and ditches could directly affect the giant garter snake through the loss of reproductive, basking, and foraging habitat. Furthermore, construction activities, including excavation and movement of large equipment, will remove vegetation cover and basking sites, fill or crush burrows or crevices, and decrease the prey base, and may result in the direct disturbance, displacement, injury, and/or mortality of giant garter snakes. Earthwork activities, earth surface modifications, and the staging of equipment and vehicles will also temporarily disturb upland habitat and/or obstruct giant garter snake movement. Giant garter snakes may be killed or injured by construction equipment or other vehicles accessing the project site.

Restoration and re-vegetation of the 27.3 acres of upland habitat and resumption of rice farming of the 0.5 acre of aquatic habitat temporarily affected would minimize adverse effects resulting from the proposed project. In addition, monitoring biologists, worker awareness training, and construction during a single active season (May 1 to October 1, 2007) will minimize adverse effects to giant garter snakes resulting from construction activities.

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action. Indirect effects to the giant garter snake relative to the proposed project include the temporary displacement and reduction of aquatic prey due to construction activities as well as from increased sedimentation, oils, and other hazardous materials from access roads and staging areas which could wash into drainages. Disturbance from construction activities may also cause giant garter snakes to move into or across areas of unsuitable habitat where they may be prone to higher rates of mortality from vehicles and predation.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act. An undetermined number of future land use conversions and routine agricultural practices are not subject to Federal authorization or funding and may alter the habitat or increase incidental take of the giant garter snake, and are, therefore, cumulative to the proposed project.

As this project has temporary effects to giant garter snakes and their habitat and restoration of the site is being conducted by the Corps and SAFCA it will not impact either the MAPHCP or NBHCP.

The Service is aware of other projects currently under review by the State, county, and local authorities where biological surveys have documented the occurrence of federally-listed species in Sacramento County. These projects include such actions as urban expansion, water transfer projects that may not have a Federal nexus, and continued agricultural development. The cumulative effects of these known actions pose a significant threat to the eventual recovery of the giant garter snake. Additionally, an undetermined number of future land use conversions and routine agricultural practices are not subject to Federal permitting processes and may alter the habitat or increase incidental take of giant garter snakes, and are, therefore, cumulative to the proposed project. These additional cumulative effects include: (1) diversion of water that may degrade habitat; (2) use of burrow fumigants on levees and other potential upland refugia; (3) human intrusion into habitat and/or an increased potential for vandalism; and (4) rip-rapping or lining of canals and stream banks.

Conclusion

After reviewing the current status of the giant garter snake, the environmental baselines for the action area, the effects of the proposed project, proposed conservation measures, and the cumulative effects, the Service has determined that the project, as described in this biological opinion, is not likely to jeopardize the continued existence of the giant garter snake. Critical habitat has not been proposed for the giant garter snake; therefore, none will be adversely modified or destroyed.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), take that is incidental to and not intended as part of the agency action is not considered to be prohibited take under the Act provided that such take is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to

retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

The Service anticipates that incidental take of the giant garter snake will be difficult to detect or quantify for the following reasons: giant garter snakes are cryptically colored, secretive, and known to be sensitive to human activities. Giant garter snakes may avoid detection by retreating to burrows, soil crevices, vegetation, or other cover. Individual giant garter snakes are difficult to detect unless they are observed, undisturbed, at a distance. Most close-range observations represent chance encounters that are difficult to predict. It is not possible to make an accurate estimate of the number of giant garter snakes that will be harassed, harmed, injured, or killed during construction activities. In instances when take is difficult to detect, the Service may estimate take in numbers of individuals per acre of habitat lost or degraded as a result of the action. Therefore, the Service anticipates that all giant garter snakes inhabiting 27.3 acres of upland and 0.5 acre of aquatic habitat may be subject to take in the form of harm or harassment due to the loss and destruction of habitat as a result of the proposed project.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the giant garter snake. Critical habitat has not been proposed for the giant garter snake; therefore, none will be affected.

Reasonable and Prudent Measures

The Service has determined that the following reasonable and prudent measures are necessary and appropriate to minimize the effects of the proposed project on the giant garter snake.

1. Take in the form of harassment and/or harm of the giant garter snake during construction activities and associated with implementing the project shall be minimized.
2. The temporary loss and degradation of giant garter snake habitat shall be confined to the proposed project site, and minimized and restored to the greatest extent practicable.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following terms and conditions implement reasonable and prudent measure number one (1):
 - a. The project proponents shall minimize the potential for harm or harassment of the giant garter snake resulting from project-related activities by implementation of the conservation measures as described on pages 11 and 12 of the Corps' Biological Assessment and appearing in the project description and conservation measures (pages 2 to 7) of this biological opinion.
 - b. The Corps shall include a copy of this biological opinion within its solicitations for design and construction of the proposed project making the primary contractor responsible for implementing all requirements and obligations included within the biological opinion, and to educate and inform all other contractors involved in the project as to the requirements of the biological opinion.
 - c. At least 15 calendar days prior to initiating construction activities, the project proponents shall submit the names and curriculum vitae of the biological monitor(s) for the proposed project.
 - d. Construction activity within giant garter snake habitat shall be conducted between May 1 and October 1. This is the active period for the giant garter snake and direct mortality is lessened, because giant garter snakes are expected to actively move and avoid danger.
 - e. The project proponents shall implement Best Management Practices (BMPs) to prevent sediment from entering areas containing giant garter snake habitat, including, but not limited to, silt fencing, temporary berms, no cleaning of equipment in or near giant garter snake habitat, installation of vegetative strips, and temporary sediment disposal.
 - f. Runoff from dust control and oil and other chemicals used in other construction activities shall be retained in the construction site and prevented from flowing into areas containing giant garter snake habitat. The runoff shall be retained in the construction areas by creating small earthen berms, installing silt fences or hay-bale dikes, or implementing other measures on the construction site to prevent runoff from entering the habitat of the giant garter snake.
 - g. Project-related vehicles shall observe a 20-mile-per-hour speed limit within construction areas, except on County roads and State and Federal highways. This is particularly important during periods when the giant garter snake may be sunning or moving on roadways.
 - h. To avoid attracting giant garter snake predators, all food-related trash items, such as wrappers, cans, bottles, and food scraps, must be disposed of in closed containers and removed at least once a day from the entire project site.

- i. Within 24-hours prior to the commencement of construction activities, the site shall be inspected by a Service-approved biologist. The biologist will provide the Service with a written report that adequately documents the monitoring efforts within 24-hours of commencement of construction activities. The monitoring biologist shall have the authority to stop construction activities if a giant garter snake is encountered during construction until appropriate corrective measures have been completed or until the giant garter snake is determined to be unharmed. Giant garter snakes encountered during construction activities shall be allowed to move away from the area on their own volition. The biologist shall notify the Service immediately if any listed species are found on-site, and will submit a report, including date(s), location(s), habitat description, and any corrective measures taken to protect the species found. The biologist shall be required to report any take to the Service immediately by telephone at (916) 414-6600 and by electronic mail or written letter addressed to the Deputy Assistant Field Supervisor, within one (1) working day of the incident.
- j. The project area shall be re-inspected by the monitoring biologist whenever a lapse in construction activity of two weeks or greater has occurred.
- k. A Worker Environmental Awareness Training Program for construction personnel shall be conducted by the Service-approved biologist for all construction workers prior to the commencement of construction activities. The program shall provide workers with information on their responsibilities with regard to the giant garter snake, an overview of the life-history of the species, information on take prohibitions, protections afforded this animal under the Act, and an explanation of the relevant terms and conditions of this biological opinion. Written documentation of the training must be submitted to the Sacramento Fish and Wildlife Office within 30 days of the completion of training. As needed, training shall be conducted in Spanish for Spanish language speakers.
- l. Should any water remain ponded in the small section of dewatered rice field, the Corps or SAFCA shall remove prey items which may be concentrated in the ponded areas and be an attractant to giant garter snakes.
- m. Erosion control structures will be installed concurrently with road construction and will be constructed so runoff will be directed away from sensitive habitats. Tightly woven fiber netting (mesh size less than 0.25 inch) or similar material shall be used for erosion control or other purposes at the project site to ensure giant garter snakes and other reptiles or amphibians are not trapped by the erosion control material. This limitation will be communicated to the contractor through use of Special Provisions included in the bid solicitation package. Coconut coir matting is an acceptable erosion control material. No plastic mono-filament matting shall be used for erosion control. The edge of the material shall be buried in the ground to prevent giant garter snakes and other reptiles and amphibians from crawling underneath the material. Erosion control measures shall direct

water flow into existing drainages or disperse water across vegetated areas in order to avoid concentrating water.

- n. The Corps shall comply with the *Reporting Requirements* of this biological opinion (see below).

Reporting Requirements

A post-construction compliance report prepared by the monitoring biologists must be submitted to the Deputy Assistant Field Supervisor of the Endangered Species Division at the Sacramento Fish and Wildlife Office within thirty (30) calendar days of the completion of construction activity or within thirty (30) calendar days of any break in construction activity lasting more than thirty (30) calendar days. This report shall detail (i) dates that groundbreaking at the project started and the project was completed; (ii) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the giant garter snake, if any; (v) occurrences of incidental take of the giant garter snake; and (vi) other pertinent information.

The Corps must report to the Service immediately any information about take or suspected take of federally-listed species not authorized in this biological opinion. The Corps must notify the Service within 24 hours of receiving such information. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. In the case of a dead animal, the individual animal should be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen. The Service contact persons are the Deputy Assistant Field Supervisor at (916) 414-6600, and the Resident Agent-in-charge of the Service's Law Enforcement Division at (916) 414-6660.

Any contractor or employee who during routine operations and maintenance activities inadvertently kills or injures a listed wildlife species must immediately report the incident to their representative. This representative must contact the California Department of Fish and Game immediately in the case of a dead or injured listed species. The California Department of Fish and Game contact for immediate assistance is State Dispatch at (916) 445-0045.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

1. The Corps should assist in the implementation of the draft, and when published, the final Recovery Plan for the giant garter snake.

2. The Corps should work with the Service to establish functioning preserves and banking systems in each county to further the conservation of listed species. Such banking systems could incorporate other mitigation (i.e., seasonal wetlands, riparian habitats, raptor foraging, etc.).

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION-CLOSING STATEMENT

This concludes formal consultation on the proposed Natomas Cross Canal South Levee Phase 1 Improvements project. As provided in 50 CFR §402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, as previously described, or the requirements under the incidental take section are not implemented; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; and/or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

Please contact Jennifer Hobbs, Staff Biologist, or Holly Herod, the Sacramento Valley Branch Chief, at (916) 414-6600 if you have questions regarding the proposed Natomas Cross Canal South Levee Phase 1 Improvements project.

Sincerely,



for Kenneth Sanchez
Acting Field Supervisor

cc:

Todd Gardner, California Department of Fish and Game, Sacramento, California
Liz Holland, Sacramento District, Corps of Engineers, Sacramento, California
Anne King, EDAW, Sacramento, California
John Basset, SAFCA, Sacramento, California

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United States Department of the Interior



FISH AND WILDLIFE SERVICE

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In Reply Refer To:
81420-2008-F-0195-5

OCT 9 2008

Mr. Francis C. Piccola
Chief, Planning Division
U.S Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814

Subject: Section 7 Programmatic Formal Consultation on the Natomas Levee Improvement Program, Landside Improvements Project, Sacramento and Sutter Counties, California

Dear Mr. Piccola:

This is in response to the U.S. Army Corps of Engineers (Corps) June 9, 2008, request for consultation with the U.S. Fish and Wildlife Service (Service) on the proposed Natomas Levee Improvement Program, Landside Improvements Project (proposed project) in Sacramento and Sutter Counties, California. Your request was received in our office on June 11, 2008. This document represents the Service's programmatic biological opinion on the effects of the action to two federally-listed threatened species: the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) and the giant garter snake (*Thamnophis gigas*) and project-level biological opinion for Phase 2 work for the same species, in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

This biological opinion is based on information provided in the Corps' letter requesting consultation and their biological assessment. A complete administrative record is on file at the Sacramento Fish and Wildlife Office.

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CONSULTATION HISTORY

September 25, 2006. The Sacramento Area Flood Control Agency (SAFCA) had a meeting with the Service to briefly describe the conceptual Natomas Levee Improvement Project.

May 10, 2007. The SAFCA made a presentation of their Natomas Levee Improvement Program Conceptual Plan to the Natomas Joint Vision, which included staff from the Service, California Department of Fish and Game (CDFG), the City of Sacramento, the Sacramento International Airport (Airport), and the Corps. This presentation included additional details and conceptual project designs.

October 29, 2007. The Service and the CDFG sent a joint comment letter to SAFCA on the Natomas Levee Improvement Project's Draft Environmental Impact Report.

January 11, 2008. The SAFCA, the Corps, the Service, and CDFG began holding coordination meetings on the Natomas Levee Improvement Project to discuss project description and schedule.

January 24, 2008. The SAFCA, the Corps, the Service, and CDFG held a coordination meeting, which included John Roberts from the Natomas Basin Conservancy (TNBC) to discuss project effects.

March 28, 2008. The Service met with SAFCA and Congresswoman Doris Matsui to discuss the project and schedule of the project.

June 17, 2008. The SAFCA and the Corps held a meeting with CDFG and the Service to discuss work proposed for construction in 2009.

June 25, 2008. The Corps, EDAW, CDFG, and Service held a meeting to go over the effects of the project on specific cover-types.

July 2, 2008. The Service met again with Congresswoman Doris Matsui to discuss the schedule of the biological opinion.

July 9, 2008. The Service met with SAFCA, EDAW, CDFG, and the Corps to discuss endowments and easements for the conservation measures. The Service advised SAFCA that any thing other than a conservation easement for protection of compensation areas would take a great deal of time to work through.

July 10, 2008. The Corps, EDAW, SAFCA, CDFG, and Service held a meeting to discuss effects and schedule of the project.

July 15, 2008. The Service and Corps met with SAFCA to resolve schedule differences for the biological opinion. The Service committed to completing the biological opinion by September 24, 2008.

July 17, 2008. The Service provided a request via e-mail for 39 additional acres of managed marsh creation as part of the compensation strategy. This request was sent to EDAW, SAFCA, Corps, and CDFG.

July 21, 2008. The Service, Corps, EDAW, SAFCA, and CDFG met to discuss project effects and compensation strategy.

September 9, 2008. The SAFCA provided an updated compensation strategy based on landuse changes at borrow sites on Sacramento County Airport lands.

September 17, 2008. SAFCA, EDAW, and the Service had a meeting in which SAFCA proposed an idea to develop a compensation bank within the Natomas Basin.

September 19, 2008. The Service responded to the proposal submitted by SAFCA for a compensation bank and suggested that in order to provide a biological opinion to the Corps and SAFCA by September 24, 2008, SAFCA not include compensation banking as part of their project description. The Service also suggested that placing a conservation easement on ½ of the area borrowed at Brookfield would help compensate for effects due to the project.

September 21, 2008. SAFCA's consultant provided an e-mail which agreed to the Service's September 19, 2008, e-mail.

BIOLOGICAL OPINION

Description of Action Area

The proposed project area is located in the Natomas Basin in northern Sacramento and southern Sutter Counties, generally bounded by leveed reaches of the Natomas Cross Canal (NCC) on the north, the Sacramento River on the west, the American River on the south, and the Pleasant Grove Creek Canal (PGCC) and Natomas East Main Drainage Canal (NEMDC)/Steelhead Creek on the east. This project, which is part of the larger Natomas Levee Improvement Program (NLIP) being undertaken by SAFCA, consists of three construction phases, generally occurring between 2008 and 2011. Construction Phase 2 includes the 5.3-mile NCC south levee, the Sacramento River east levee from the NCC south levee to 2,000 feet south of the North Drainage Canal (Reaches 1-4B), the Elkhorn Main Irrigation Canal (Elkhorn Canal) between the North Drainage Canal and the Elkhorn Reservoir settling basin, the site of Reclamation District (RD) 1000 Pumping Plant No. 2, and adjacent land. Construction Phase 3 includes the Sacramento River east levee south of the limits of the Phase 2 improvements to just south of (I-5) (Reaches 5A-9B), the PGCC west levee, the NEMDC west levee between Elkhorn Boulevard and

Northgate Boulevard, the area between Elkhorn Reservoir and the West Drainage Canal where a new canal designed to provide drainage and associated giant garter snake habitat (referred to in this document as the “GGS/Drainage Canal”) would be constructed, the portion of the West Drainage Canal north of Interstate 5 (I-5), the Elkhorn Canal downstream of Elkhorn Reservoir, and RD 1000 Pumping Plant No. 2. Construction Phase 4, which is still undergoing study, includes the Sacramento River east levee south of the limits of the Phase 3 improvements to the junction with the American River north levee (Reaches 10–20), the NEMDC west levee between Sankey Road and Elkhorn Boulevard, the Riverside Main Irrigation Canal (Riverside Canal), and the West Drainage Canal south of I-5 to Fisherman’s Lake. Phase 1 of the project occurred during the summers of 2007 and 2008 and consisted of placing slurry wall along 9,700 linear feet of the Natomas Cross Canal (Service file number 1-1-07-F-0207).

Because the Corps and SAFCA only have a detailed project description for Phase 2 of the entire Natomas Levee Improvement Project, this biological opinion analyzes the landscape effects of the project for all Phases (2, 3, and 4) but will only analyze and provide incidental take coverage for Phase 2. Each subsequent phase will initiate section 7 consultation with the Service under the umbrella of this programmatic biological opinion.

Overview of NLIP Landside Improvements Project

The SAFCA is designing the NLIP in coordination with the Federal and state flood control project sponsors, the Corps, and the State of California Central Valley Flood Protection Board (formerly The Reclamation Board), to address the deficiencies in the Natomas levee system with a focus on achieving a 100-year level of flood protection by 2011. This will require improving the following landside conditions along the NCC south levee, the Sacramento River east levee, and the PGCC and NEMDC west levees:

- ▶ Inadequate freeboard—The NCC south levee and portions of the Sacramento River east levee are not high enough to provide at least 3 feet of freeboard above the 100-year water surface elevation. Additional reaches do not provide 3 feet of freeboard above the 200-year design water surface elevation.
- ▶ Underseepage and through-seepage vulnerability—Most of the levee reaches do not meet recently adopted Federal criteria for safely containing underseepage and through-seepage when the water surface in the adjacent channel reaches the 100-year elevation or, in some cases, the 200-year elevation.

The NLIP Landside Improvements project encompasses addressing freeboard deficiencies through levee raises; addressing seepage potential using a combination of seepage berms, cutoff walls, and relief wells; and acquiring additional right-of-way to construct the improvements and to prevent encroachment into the flood control system. In addition, the project has been designed to include an enlarged levee embankment (adjacent setback levee) along the land side of the existing Sacramento River east levee to minimize the need for substantial removal of vegetation and structural encroachments on the water side of this levee in compliance with Corps guidance. These improvements would include recontouring the levee slopes where necessary to provide a

3:1 horizontal-to-vertical (3H:1V) waterside slope and a 3H:1V (preferred) or 2H:1V (maximum) landside slope.

The specific goal of the NLIP Landside Improvements Project is to provide at least 100-year flood protection as quickly as possible while laying the groundwork to achieve at least urban-standard (200-year) flood protection over time.

Additional project objectives that influenced SAFCA's project design were to:

- (1) use flood control projects in the vicinity of the Sacramento County Airport to facilitate better management of Airport lands to reduce hazards to aviation safety, and
- (2) use flood control projects to enhance habitat quality and values by increasing the extent and connectivity of the lands in the Natomas Basin being managed to provide habitat for the giant garter snake, the Swainson's hawk, and other special-status species.

Recognizing the importance of securing maximum Federal support for the flood control project, SAFCA has explored implementation approaches that also advance the achievement of Federal aviation and wildlife protection objectives where complementary opportunities exist.

Accordingly, the proposed project includes the following elements:

- ▶ The project would include construction of the GGS/Drainage Canal to provide giant garter snake habitat and some drainage infrastructure west of the Airport. Construction of these facilities would allow for dewatering of the ditch running along the western portion of the Airport runway system, which the airport recognizes as a flight safety hazard, by offsetting the effects on drainage and irrigation needs and giant garter snake habitat.
- ▶ The project would combine SAFCA's need for levee embankment and berm material with the Sacramento County Airport System's (SCAS) need to modify the condition and management of Airport bufferlands so as to reduce wildlife hazards affecting Airport operations in a manner that enhances the connectivity of areas managed specifically for their habitat value.

Existing Project Facilities and Potential Borrow Sites

Construction activities for all project phases would take place within the Natomas Basin, except for potential development of a borrow site on RD 1001 land northeast of the basin. The following subsections describe the existing flood control facilities, their general setting, and adjacent irrigation infrastructure and the potential borrow sources for the project as provided by the Corps in their Environmental Impact Statement for the proposed project.

Flood Control and Irrigation Facilities

Natomas Cross Canal South Levee

The NCC is a 5.3-mile-long channel that carries water from several tributary watersheds in western Placer County and eastern Sutter County to the Sacramento River. The NCC begins at the PGCC and East Side Canal and extends southwest to its confluence with the Sacramento River near the Sankey Road/Garden Highway intersection. During periods of flooding, the Sutter Bypass, Sacramento River, and NCC all contribute to raised water elevations that can affect the NCC levees. For engineering purposes, the south levee is divided into seven reaches. Much of the south levee contains an existing stability berm with an internal drainage system. Levee slopes are approximately 3H:1V on the water side and 2H:1V on the land side.

There is an approximately 80- to 100-foot maintenance access area on the landside of the levee through most of the NCC's length. Farms and rural residences are located on both sides of the NCC, with rice the primary crop under cultivation. The Lucich North and Frazer Habitat Preserves, maintained by TNBC, lie south of the NCC south levee from the eastern end of Reach 2 through the western end of Reach 6. A drainage canal, referred to as the Vestal Drain, runs parallel to the NCC south levee through much of Reach 2, approximately 100 feet from the landside levee toe. There is a private irrigation pump and irrigation canal at the landside levee toe in Reach 1. Natomas Central Mutual Water Company's (NMWC) Bennett Pumping Plant and RD 1000's Pumping Plant No. 4 are located in Reach 2, and the NMWC Northern Pumping Plant is located in Reach 3. The NMWC North Main Canal runs parallel to the levee through Reaches 4 and 5, approximately 100 feet from the landside levee toe.

Sacramento River East Levee

An 18-mile-long section of the east levee of the Sacramento River protects the west side of the Natomas Basin between the NCC and the American River. For planning purposes, the levee is divided into 20 reaches. Garden Highway is located on top of the levee crown within all 20 reaches. A drained, 10-foot-wide stability berm is present on the landside slope of the levee between the NCC and Powerline Road (Reaches 1–11). Cutoff walls to address through-levee seepage remediation were previously constructed through the levee in Reaches 12–20. The land uses along the levee vary from north to south. Along the landside, Reaches 1–13 are bordered mainly by private agricultural lands containing a few rural residences, Airport bufferlands, and two farmed TNBC parcels. Teal Bend Golf Club is west of the Airport, adjacent to the levee along Reach 6. The parcels bordering Reaches 14–18 contain more residences, several rural estates, and three TNBC parcels. The landside of Reaches 19 and 20 are bordered by residential subdivisions, a business park, the City of Sacramento's Natomas Oaks Park, undeveloped Costa Park site, and Shorebird Park.

Several irrigation canals, pipelines, wells, and pump stations exist along the Sacramento River east levee. The Elkhorn Canal and the Riverside Canal are key agricultural irrigation canals in the NMWC system. The Elkhorn Canal runs parallel to the Sacramento River east levee from the

North Drainage Canal in Reach 4B through Reach 8 and into the start of Reach 9 (1,250 feet south of Elkhorn Boulevard); this canal is supplied by the Prichard and Elkhorn Pumping Plants on the Sacramento River. The Riverside Canal extends from just north of Reach 13 to the middle of Reach 19 and is supplied by the Riverside Pumping Plant, on the Sacramento River just north of Radio Road. Several lateral canals connect to the Elkhorn and Riverside Canals. The existing Elkhorn and Riverside Canals are highline canals that use gravity flow to deliver water for irrigation by maintaining water levels above the surrounding ground levels. These canals have earthen embankments with side slopes that are nearly vertical, requiring regular maintenance. Approximately 1 mile of the existing Elkhorn Canal is concrete lined and the entire Riverside Canal is concrete lined.

In addition to the NMWC irrigation systems, there are several landowner-operated systems along the levee. These facilities are located primarily in Reaches 1–4A and 9–12, in areas not currently served by the NMWC systems. The areas are serviced by either well pumps on the landside or river pumps, which discharge into buried pipelines, small irrigation ditches, or directly onto fields. The distribution systems run along the landside toe of the levee to supply fields that slope away from the levee. There are approximately nine small pumping plants that provide water from the river and approximately 10 groundwater well pumps.

Several drainage pumping plants are operated by RD 1000 along the Sacramento River east levee. These facilities pump drain water from the main drainage canal system into the river. They include Pumping Plant No. 2, located in Reach 4B; Pumping Plant No. 5, located in Reach 10; Pumping Plant No. 3, located in Reach 13; and Pumping Plant No. 1, located in Reach 20A. Pumping Plant No. 2 was temporarily removed as part of an emergency levee repair in 2006 and would be replaced as an element of the proposed project in the 2009–2010 construction phases. In addition to these RD 1000 pumping stations, the City of Sacramento operates the Willow Creek drainage pumping station, which is located in Reach 19B.

Pleasant Grove Creek Canal West Levee

The PGCC west levee extends southerly from the east end of the NCC south levee to the north end of the NEMDC/Steelhead Creek levee near the Sankey Road crossing. The PGCC west levee protects the Natomas Basin from flood flows from Pleasant Grove Creek and other creeks in western Placer County, as well as from water that backs up in the NCC during high river stages in the Sacramento River. Levee slopes are generally 2H:1V on both the water side and land side of the levee. Natomas Road is located on top of the levee crown. No berms support this levee. A private canal extends parallel to the PGCC west levee for about 1,500 feet at the landside levee toe. Farms and scattered rural residences are located on the landside of the PGCC west levee, and a manufacturing facility and a railroad siding are located within several hundred feet of the levee, just south of Sankey Road.

Natomas East Main Drainage Canal

The 13.3-mile NEMDC/Steelhead Creek west levee extends southerly from the south end of the PGCC west levee near the Sankey Road crossing to Northgate Boulevard. The NEMDC west levee protects the Natomas Basin from flood flows from Arcade and Dry Creeks, as well as from water during high river stages in the American River. Natomas and East Levee Roads are located on top of the levee crown. Private canals extend parallel to portions of the NEMDC west levee landside levee toe. Farms and scattered rural residences are located on the land side of the northern portion of the NEMDC west levee (between Sankey Road and Elkhorn Boulevard), while the southern portion (generally south of Del Paso Road to Northgate Boulevard) is bordered by urban and commercial/industrial development.

The SAFCA NEMDC stormwater pumping station, a facility that is connected to the NEMDC/Steelhead Creek west levee and the Dry Creek north levee, is situated between Del Paso Road and Elkhorn Boulevard. Other pumping stations occur along the NEMDC west levee, including NMWC Pumping Plant Nos. 6 and 8, which pump water out of the Natomas Basin for in-basin drainage and flood control. RD 1000 operates Pumping Plant Nos. 6 and 8 and City of Sacramento operates Pump Station No. 102 on the NEMDC west levee.

Borrow Sites

Borrow sites are areas from which earthen materials would be removed for use in construction. Where borrow sites would be used over more than one construction season, the work would progress in cells that would be incrementally developed as habitat or returned to agricultural use as the borrow activities are completed. Several properties have been identified as likely sources of soil borrow, mainly for use in the improvements to the Sacramento River east levee. The SAFCA has identified the following preferred borrow sources for the construction of the flood control and irrigation infrastructure improvements for construction Phases 2, 3, and 4, and a redundant source that may be pursued if negotiations regarding the preferred sources are unsuccessful or additional quantities are found to be needed during construction:

- Brookfield property (Phases 2, and 3 preferred): Private property west of the PGCC at Fifield Road, which was in rice cultivation in 2008. Material from this property could be used along the NCC south levee and the upper reaches of the Sacramento River east levee in construction Phase 2 and on the PGCC west levee in construction Phases 3. While the overall property may be used as borrow during multiple years, no area of the property would be used for consecutive years. After the removal of borrow material, the land would be returned to rice cultivation in the same season or if too late to plant, then in the following season.
- Airport bufferlands north of the Airport complex (Phases 2 and 3 preferred, Phase 4 potential): Sacramento County property north of Elverta Road and west of Powerline Road. These lands could provide soil for use along the middle reaches of the Sacramento River east levee in construction Phases 2 and 3. They could also provide material for

construction in the lower reaches of the levee in construction Phase 4, if needed. While the overall property may be used as borrow during multiple years, no area of the property would be used for consecutive years. After the removal of borrow material, the borrow areas, which are currently either fallow agricultural lands or ruderal grassland, would be returned to fallow agricultural fields.

- Fisherman's Lake area (Phase 4 preferred): Privately owned parcels between TNBC-managed habitat areas. Several parcels, which are currently planted in rice, orchards, or field crops, may be suitable sources of borrow material for use in the lower reaches of the Sacramento River east levee and are strategically situated for creation of habitat that would link existing TNBC parcels.
- Krumenacher property (Phase 3 preferred): Private parcel at the intersection of East Levee Road and Elkhorn Boulevard. This parcel is a component of the Natomas Panhandle, identified in the Natomas Basin Habitat Conservation Plan (NBHCP) and development of this parcel is already covered by a July 25, 2007, biological opinion (1-1-06-F-0294). This land, which is primarily grassland, could provide a borrow source for the levee widening improvements to the NEMDC.
- Twin Rivers Unified School District (Phase 3 preferred): Material stockpiled on property owned by Twin Rivers Unified School District, immediately south of Krumenacher. This parcel is a component of the Natomas Panhandle, identified in the NBHCP, and development of this parcel is already covered by a July 25, 2007, biological opinion (1-1-06-F-0294). This material could provide a borrow source for the levee widening improvements to the NEMDC.
- Horangic/Private Property Northwest of Garden Highway and Reservoir Road (Phase 3 preferred): Private parcel located in Reach 6A along the Sacramento River east levee. The portion of this site that would not be in the levee footprint could provide borrow material for seepage berms in Reaches 5A–5B. The site would be shallow-graded for borrow material and returned to field crops.
- Binford deYoung/Private Property Southwest of Garden Highway and Elverta Road (Phase 3 preferred): Private parcel located in Reach 5B along the Sacramento River east levee. The portion of this site that would not be in the levee footprint could provide borrow material for seepage berms in Reaches 5A–5B. The site would be shallow-graded for borrow material and returned to field crops.
- Bianchi/Private Property Northwest of Garden Highway and Reservoir Road (Phase 3 potential): Private parcel located in Reach 7 along the Sacramento River east levee. This property could borrow material for levee construction south of the Teal Bend Golf Club. The site would be shallow graded for borrow material and returned to field crops.

- Pacific Terrace (Phase 3 preferred): A 276-acre site located north of I-5 and east of Schoolhouse Road. Approximately 120 acres of this site could be used for levee construction south of the Teal Bend Golf Club. The site would be shallow graded for borrow material and returned to field crops.
- Novak property (Phase 3 preferred, Phase 4 potential): A SAFCA-owned, 94-acre property located south of Del Paso Road and east of Powerline Road in Reach 12A along the Sacramento River east levee. The site could be used for levee construction south of the Teal Bend Golf Course. The site would be shallow graded for borrow material and returned to grassland or field crops.
- RD 1001 (Phase 4 potential): Existing and future borrow sites owned by RD 1001, about 5 miles northeast of the Natomas Basin along Pacific Avenue. Material from the sites could be used in constructing Phase 4.

Overview of the Project Elements

The elements of the proposed project are categorized into five broad, overlapping categories:

- ▶ levee raising and seepage remediation,
- ▶ improvements to major irrigation and drainage infrastructure,
- ▶ acquisition of right-of-way within the footprint of the proposed features, at borrow sites, and to prevent encroachment and provide for maintenance access along the land side of the flood control facilities,
- ▶ habitat development and management for giant garter snakes and Swainson's hawks, and
- ▶ additional actions to meet Federal Emergency Management Agency requirements: encroachment management and bridge crossing modifications.

Levee Raising and Seepage Remediation

General Methods - The following subsections provide an overview of the approaches to addressing freeboard deficiencies and seepage potential that would be used in various combinations on the NCC south levee and Sacramento River east levee, and the PGCC and NEMDC west levees.

Raising, Widening and Flattening Levees (Phases 2, 3 ,4)

The entire NCC south levee, much of the Sacramento River east levee and a portion of the PGCC west levee at Sankey Road lack the required 3 feet of freeboard above the 100-year water surface profile. To meet overall NLIP goals, SAFCA would increase the levee freeboard sufficiently in freeboard-deficient areas to meet the desired minimum of 3 feet of freeboard above the 200-year water surface profile. The levee height increases would be accomplished through raises of the existing NCC south levee or through construction of the raised adjacent setback levee adjacent to the existing Sacramento River east levee:

- Raise of existing levee (NCC south levee). For a minor raise of the levee crown elevation (typically 6 inches or less), the raise may be limited to the levee crown area, provided that there is enough existing crown width to accommodate the raise without narrowing the crown to a width that is less than the minimum requirement. For most of the NIP levee raises, however, a greater crown raise is required and/or the levee slopes must be flattened. The required crown elevation would be met through a full levee raise. Full levee raises consist of an embankment raise from the landside or waterside toe (or both) upward to the increased crown elevation. This requires partially excavating the levee slope to provide a working platform for equipment, typically 10 feet wide, and rebuilding the levee to the appropriate elevation by benching the new embankment material into the existing embankment material.
- Adjacent setback levee (Sacramento River east levee). The proposed adjacent setback levee adjoining the Sacramento River east levee would be constructed with a crown elevation 3 feet above the 200-year water surface profile. In the upper reaches, where the existing levee has freeboard deficiencies of as much as 3 feet, the crown of the adjacent setback levee would be higher than the existing levee and Garden Highway roadway. In the lower reaches, where the existing levee has sufficient freeboard, the adjacent setback levee would be the same height as the existing levee.

The only levee segment that lacks adequate levee height that would be maintained at its current elevation is the PGCC west levee at Sankey Road because the flows through this levee segment into the interior of the Natomas Basin during a Federal Emergency Management Agency (FEMA) 100-year or "200-year" design event are not damaging and are subject to management as part of the basin's interior drainage system. Along the NEMDC west levee between Northgate Boulevard and Elkhorn Boulevard, the levee currently meets FEMA 100-year levee height requirements and also meets the "200-year" plus 3 feet of levee height design for the top of the levee profile.

The final levee configuration must meet the Corps criteria of a 20-foot-wide minimum crown, a 3H:1V waterside slope, and a 3H:1V (preferred) or 2H:1V (maximum) landside slope. Because the levees in most of the project reaches currently have landside slopes of 2H:1V, the proposed project includes flattening these slopes to at least a 3H:1V profile, and preferably 5H:1V. The PGCC west levee would be expanded on the land side to provide a levee width to encompass, at a minimum, a theoretical 3H:1V waterside slope, a crown width of at least 20 feet, and a landside slope of at least 3H:1V. The intent of the landside expansion is to preserve the existing Natomas Road and East Levee Road, which are County/City-maintained roads located on top of the existing PGCC and NEMDC west levees. Levee widening and slope flattening would also occur along the NEMDC west levee between Elkhorn Boulevard and the NEMDC stormwater pumping station.

Seepage Remediation

Underseepage problems can occur where levees are constructed on low-permeability foundation soil (silt and clay) underlain by a layer of higher permeability (sand and gravel). Excessive

underseepage makes the levee susceptible to failure during periods of high river stage. Under these conditions, seepage travels horizontally under the levee and then is forced vertically upward through the low-permeability foundation layer, often referred to as a “blanket.” Failure of the blanket can occur either by uplift, a condition in which the blanket does not have enough weight to resist the confined pressure acting on the bottom of the blanket, or by piping (internal erosion) caused by water flowing under high vertical gradients through the erodible blanket and carrying fine soil particles out of the foundation materials. Through-seepage is seepage through a levee embankment that can occur during periods of high river stage. Depending on the duration of high water and the permeability of embankment soil, seepage may exit the landside face of the levee. Seepage can also pass directly through pervious layers in the levee if such layers are present. Under these conditions, the stability of the landside levee slope may be reduced.

During Phases 2–4, along the Sacramento River east levee, cutoff walls would be constructed through the adjacent levee in some reaches, and 100-foot-wide earthen seepage berms would be constructed in others for seepage remediation. Although portions of this reach of the Natomas perimeter levee system are considered susceptible to seismically induced ground shaking, such a condition would likely not cause deformation of the soil-bentonite (SB) walls in the adjacent levee because of its malleability and location farther away from the river channel, where levee failure is more likely to occur in association with seismically induced collapse of the river bank. Additionally, because an SB seepage cutoff wall is constructed lower in the levee section, it is not likely to be significantly affected by failure of the levee itself if the levee were to collapse. Relief wells cause the least amount of construction disturbance but require routine maintenance of the wells themselves and the drainage and pumping facilities necessary to support them. Seepage berms are feasible where there is sufficient room for construction.

Phase 2 includes the construction of a seepage cutoff wall through the levee crown of the NCC within Reaches 3–7. Phase 3 includes the construction of SB cutoff walls within the PGCC west levee where required to provide seepage remediation. Along the NEMDC west levee between the NEMDC stormwater pumping station and Northgate Boulevard, an SB or soil-cement-bentonite cutoff wall would likely be constructed.

Major Irrigation and Drainage Infrastructure Modifications

There are two major canal systems in the Natomas Basin: an irrigation system owned and operated by NMWC and a drainage system owned and operated by RD 1000. The NMWC pumps water into the basin to provide irrigation water to its shareholders for agricultural use within the basin. During winter (October–April), drainage is primarily rainfall runoff; during summer (May–September), drainage water from agricultural fields is typically recirculated for irrigation. Because the basin is surrounded by levees, all excess drainage within the basin must be pumped out. In general, irrigation water is pumped into the basin from the Sacramento River and NCC and returned to the perimeter rivers and canals via RD 1000's drainage system. In the southern part of the Natomas Basin, the City of Sacramento also operates several drainage pump stations that serve residential areas.

As a result of the planned levee improvements in the Natomas Basin, the irrigation canals currently at the toe of the Sacramento River east levee (the Elkhorn Canal and the Riverside Canal) would be replaced by new irrigation canals set back from the existing levee farther to the east. Where constraints exist, certain portions of the canals would be piped. The existing and proposed irrigation canals are highline canals, which means that the bottom of the canal is roughly equal to the surrounding ground elevation. Irrigation canals would be constructed high enough to raise water levels above the levels of the adjacent fields to allow for gravity flow into the fields.

A new drainage canal would be constructed to improve the connectivity of giant garter snake habitat between the North Drainage Canal and West Drainage Canal. The proposed GGS/Drainage Canal would be constructed with the top of bank roughly at existing ground level to facilitate drainage. Material excavated to construct the GGS/Drainage Canal would generally be used to construct the embankments of the adjacent highline irrigation canals. Some import and export of soil materials for levee construction would be required to accommodate the phasing of the activities. The following subsections provide an overview of these irrigation and drainage infrastructure modifications.

Relocation of the Elkhorn and Riverside Canals

General Construction Plan for Relocated Canals - The Elkhorn and Riverside Canals would be constructed with sufficient height to raise water levels above the levels of adjacent fields. Design water levels would be based on existing levels at service points along the alignments and the tops of embankments would provide for 1 foot of freeboard. To provide for stable banks, side slopes of 3H:1V would be used. The invert of canals would be lined with concrete to control vegetation and to allow for maintenance with minimal disturbance of aquatic habitat along the water's edge.

To avoid interruptions in service along the existing irrigation canals, the relocated canals would be constructed and operational before construction of planned levee improvements that would conflict with the existing irrigation canals. Thus, in any particular reach, the new canal would be constructed before the levee improvements in that same reach. Approximately half of the new Elkhorn Canal (North Drainage Canal to Elkhorn Reservoir) is planned for construction in Phase 2. The GGS/Drainage Canal from the North Drainage Canal to Elkhorn Reservoir also would be constructed in Phase 2, because this section would run parallel to and within the same right-of-way as the proposed Elkhorn Canal in this area. Concurrent construction of these new irrigation and drainage facilities would facilitate the use of excavated material from the GGS/Drainage Canal excavation for use as embankment material along the Elkhorn Canal. The remainder of the Elkhorn Canal and GGS/Drainage Canal would be constructed in Phase 3, and the new Riverside Canal would be constructed during the Phase 4.

Elkhorn Canal - Approximately 22,300 feet of the Elkhorn Canal would be relocated to accommodate the levee construction. This facility is a main irrigation canal that services NMWC Central and Elkhorn systems from the Prichard and Elkhorn Pumping Plants on the Sacramento River. Approximately 1 mile of the existing Elkhorn Canal is concrete lined, including segments

between Elverta Road and the Elkhorn Pumping Plant and also just north and south of Elkhorn Road; the remainder is earth lined.

The proposed alignment of the new Elkhorn Canal is based primarily on the extent of the planned levee improvements. The canal was sited as close as possible to the projected toe of the new levee (with allowance made for a 5H:1V landside levee slope). After this initial alignment was determined, a number of site-specific factors were considered and used to refine the alignment. The resulting alignment minimizes conflicts with known cultural resources sites and existing trees and is roughly parallel to the projected levee toe.

North of Elkhorn Reservoir, the maximum bottom width of the new canal would be 12 feet. The canal embankments would be approximately 7 feet tall with 15-foot-wide patrol roads along the top of the embankments with a two percent grade sloped down towards the canal. The vegetated side slopes would be 3H:1V to provide for stable banks. Overall, the width of the canal would be approximately 140 feet, with additional width required for a buffer and maintenance area for the canal construction north of Elkhorn Reservoir.

To minimize project impacts on the existing Teal Bend Golf Club, the alignment of the Elkhorn Canal through the golf course would be piped (approximately 3,200 feet). Two 36-inch pipes would be aligned parallel to the levee toe land side of the flood control facility corridor. This alignment would avoid existing golf course infrastructure to the extent possible.

South of Teal Bend, the Elkhorn Canal would return to an open channel parallel to the toe of the new levee. The majority of this reach of earthen canal has a design bottom width of 5 feet, with a minimum of 1 foot of levee height and 3H:1V side slopes. A 15-foot-wide patrol road would be located on the top of the field side of the canal; the other embankment would be 8 feet wide on the crown. The only portion of the new canal that would have a concrete-lined invert would be the 4,100-foot section where the existing canal is lined. The remaining 2,900 feet of new canal would be earthen-lined. To avoid impacts on existing residences, a second section (approximately 950 feet through the Mortensen and Breese properties) of the Elkhorn Canal may be piped using a single 36-inch pipe. The materials to construct the Elkhorn Canal would come primarily from the construction of the GGS/Drainage canal north of I-5. However, a small amount of import from the Airport north borrow sites is expected to be used to support construction of a portion of Phase 2 improvements.

Riverside Canal - Approximately 18,600 feet of the Riverside Canal would be relocated to accommodate the levee construction. This facility is a main irrigation canal that services NMWC Riverside system. The supply for this canal is the Riverside Pumping Plant. The canal flows south along the landside toe of the levee to approximately Bryte Bend Road. The canal south of Bryte Bend Road has not been used in recent years. The canal north of the Riverside Pumping Plant is supplied by relifted water at RD 1000's Pumping Plant No. 3. From Pumping Plant No. 3, the canal flows north approximately 950 feet and turns away from the levee. The entire existing Riverside Canal is concrete lined, although much of the concrete lining is broken and in poor condition.

Like the Elkhorn Canal alignment, the alignment of the Riverside Canal would be based primarily on the extent of the planned levee improvements. The canal would be sited as close as possible to the projected toe of the new levee (allowing for a 5H:1V landside levee slope). After this initial alignment is determined, a number of other factors would be considered and used to refine the alignment. One-half to three-quarters of a mile south of San Juan Road southward to I-80, there are a number of residences along the landside toe of the levee. To avoid bisecting these private properties, it is likely that the Riverside Canal alignment would follow the eastern property line of these parcels. The final alignment would also aim to minimize conflicts with existing trees and other site-specific constraints that are identified during design. Based on these site-specific factors and the variation of the proposed seepage remediation methods in different reaches, the alignment would be only roughly parallel to the projected levee toe. The proposed bottom width of the relocated Riverside Canal would be determined during final design to meet existing capacity needs.

Construction of the New GGS/Drainage Canal - The new GGS/Drainage Canal would enhance habitat functionality by permanently linking known giant garter snake population centers and TNBC properties in the northern and southern reserve areas that are managed for GGS habitat, thus, improving habitat connectivity between the North Drainage Canal and West Drainage Canal and augmenting movement opportunities for this species within the Natomas Basin. This would link emerging blocks of managed giant garter snake habitat in the vicinity of Prichard Lake north of the Airport and around Fisherman's Lake south of the Airport. In addition to providing giant garter snake habitat, the GGS/Drainage Canal would intercept flows from non-Airport property sources. Irrigation and drainage water currently flowing into the Airport West Ditch from non-Airport property would be incorporated into the GGS/Drainage Canal.

The GGS/Drainage Canal would generally extend parallel to the Sacramento River east levee, extending from the North Drainage Canal at the RD 1000 Pumping Plant No. 2 in the north to the West Drainage Canal in the south, approximately 1,000 feet south of Elkhorn Boulevard. The GGS/Drainage Canal construction would include reconstruction of the West Drainage Canal from I-5 to Fisherman's Lake. The length of the entire GGS/Drainage Canal, including the reconstruction, would be approximately 43,800 linear feet. The GGS/Drainage Canal would have a series of check structures along its length to maintain consistent water levels in the low-flow channel of the canal during the snake's active season (April–October). Supplemental water would be provided from NMWC irrigation system. The low-flow channel would have a top width of approximately 50 feet and an average depth of approximately 6 feet. Vegetation would be managed within the canal excavation and on the banks by mowing.

The portion of the GGS/Drainage Canal that would be constructed in Phase 2 is north of Elkhorn Reservoir would be parallel and approximately 30 feet west of the edge of the Elkhorn Canal. Thus, the alignment was based on the same factors as discussed above for the Elkhorn Canal. North of Reservoir Road the canal would be set back a minimum of 200 feet from the projected levee toe to minimize concerns of excessive seepage exit gradients in the bottom of the canal.

The canal in this location would have a 10-foot bottom width and vegetated 3H:1V side slopes. The canal would be approximately five feet deep with two percent grade sloped down towards the canal from the edge of the Elkhorn Canal embankment and the adjacent ground for a distance of 12 feet to allow for a patrol road. The depth would be sufficient to provide a minimum water depth of 4.5 feet with allowance for 1 foot of water level variance and a minimum of 1 foot of freeboard. The footprint of the GGS/Drainage Canal is approximately 50 feet wide. A 30-foot right-of-way would separate the proposed GGS/Drainage Canal from the proposed relocated Elkhorn Canal.

South of Elkhorn Reservoir, the new canal would be constructed with roughly the same proportions as the segment north of Elkhorn Reservoir, with one notable exception. Between the sedimentation basin and Walnut Road, for a total of 2,200 feet, a 15-foot-wide managed tule (*Scirpus acutus*) bench would be constructed alongside the main channel. This bench would typically be seasonally inundated with water, similar to a managed marsh, and which would drain into the main channel. The 5,900-foot segment of the canal between the southeastern corner of Teal Bend Golf Club and the West Drainage Canal would have a 50-foot-wide managed tule bench.

The GGS/Drainage Canal north of Teal Bend Golf Club would be managed primarily as a linear high-quality giant garter snake habitat and movement corridor, with stormwater drainage a secondary function during major storm events, which typically occur in the snake's inactive season. South of Teal Bend Golf Club, the canal would also serve as a primary giant garter snake habitat area and movement corridor, but the volume of stormwater drainage would increase in a southerly direction as the canal collects additional runoff as a result of the natural slope of the basin. Winter storm-related runoff exceeding the capacity of the West Drainage Canal south of I-5 would be pumped into the Sacramento River using RD 1000's Pumping Plant No. 3, consistent with existing stormwater management practice.

The shoreline and lower bank of the GGS/Drainage Canal (including the improved West Drainage Canal) would be planted or managed to promote tule/cattail (*Typha latifolia*) vegetation as suitable cover and foraging habitat for giant garter snake. However, management of the canal would also require removal of noxious aquatic weeds that obstruct the flow of water. A secure water supply would ensure that water of a suitable quality is present and flowing at low velocity in the canal during the active season of the giant garter snake, and that the water surface would be managed within a range of approximately 1 foot to provide consistent cover from predators along the tule fringe of canal banks. Input of supplemental canal water would begin at a diversion point on the North Drainage Canal at the north end of the new GGS/Drainage Canal. Other points of inflow may occur at downstream locations.

Removal of Airport West Ditch

To take advantage of common construction practices and to maximize the use of common facilities, the rearrangement of irrigation and drainage facilities required to provide for rerouting of flows that contribute to the Airport West Ditch would be undertaken in conjunction with these

proposed NLIP improvements in construction Phase 3. This work would include modifications and extension of existing irrigation infrastructure and modification of some local drainage conveyance facilities.

Removal of Culvert and Reconstruction at Pumping Plant No. 2

The project would include the removal of a deep culvert beneath the levee section at the RD 1000 Pumping Plant No. 2 location and the replacement of a relocated RD 1000 Pumping Plant No. 2, which was removed from the western end of the North Drainage Canal in response to underseepage observed during extended winter storms in January 2006.

Land Acquisition

Several of the measures described above would increase the footprint of the flood control system: levees would be widened on the land side as a result of raising, constructing an adjacent setback levee, and flattening the waterside and/or landside slopes. In addition, a 50- to 100-foot-wide access and maintenance corridor would be established at the landside toes of the levees. The proposed improvements also include woodland corridors and groves to replace trees that are removed from within the levee footprint and maintenance access areas, and canal construction east of the flood control features. The SAFCA also would acquire adjacent land for relocation of infrastructure from the flood control corridor and planned improvements outside the flood control corridor (e.g., the GGS/Drainage Canal), with appropriate easements provided to utility owners upon completion of the work. To meet its project footprint needs, SAFCA would acquire private lands in fee and would acquire an easement interest where the project features would be on Airport land (owned by Sacramento County). Where the project footprint would overlie land owned and managed by TNBC, SAFCA may either purchase the land in fee or obtain easements.

Additional Actions to Meet FEMA Requirements

Encroachment Management (Phases 3 and 4)

Corps levee guidance requires the removal of vegetation greater than 2 inches in diameter on the levee slopes and within 15 feet of the waterside and landside levee toes. The Corps levee guidance also requires an assessment of encroachments on the levee slopes, including utilities, fences, structures, retaining walls, driveways, and other features that penetrate the levee prism. Substantial encroachments are present on the Sacramento River east levee. One of the objectives of constructing an adjacent setback levee along the Sacramento River east levee is to facilitate acceptable management of existing vegetation and structural encroachments along the water side of this levee. By moving the hypothetical waterside slope of the levee (the "levee template") landward, the adjacent levee would significantly reduce most of the conflicts between these encroachments and applicable Corps levee operation and maintenance requirements. Should any of these existing encroachments be determined to reduce the integrity of the levee, increase flood risk unacceptably, or impede visibility or access to the waterside levee slope, the encroachments would need to be removed. Removal of some waterside slope encroachments may be required by

the end of 2011 to ensure that the levee system meets Federal criteria for the 100-year level of protection. Along the land side of the proposed adjacent setback levee, encroachment removal would typically be accomplished as part of the landside levee improvements. This activity would include the relocation of utility poles that are on the existing landside slope of the levee.

Bridge Crossings (Phase 4)

Under applicable Federal requirements, the plane of the northbound and southbound bridge crossings of SR 99/70 over the NCC must be 4 feet above the 100-year water surface elevation in the NCC. The 100-year water surface elevation is 44.4 NAVD 88. The soffit (underside) elevation of the northbound crossing is 44.9 NAVD 88, and the soffit elevation of the southbound crossing is 42.9 NAVD 88. Accordingly, during construction of Phase 4 the following options must be considered for implementation in conjunction with the California Department of Transportation:

- (1) Raise both bridge crossings as necessary to meet minimum FEMA clearance requirements.
- (2) Provide for installation of a closure structure across the southbound crossing in the event of a 100-year or greater flood.
- (3) Replace the bridge rail structures on the east and west sides of the bridge crossings and modify the levees connecting to these structures to provide at least 4 feet of levee height above the 100-year water surface elevation. Under any of these options, at least the northbound crossing could remain open for use during a 100-year flood event.

Investigations to Aid Project Planning and Design

Geo-technical Investigations

Additional exploration of geotechnical conditions is anticipated to be required in Phases 2–4 along the NCC south levee, Sacramento River east levee, PGCC west levee, NEMDC/Steelhead Creek west levee, and American River north levee to facilitate refinement of design for flood facility improvements. Exploration of subsurface conditions would primarily be conducted by drilling borings. Borings along the levees would generally be drilled to depths of 60–120 feet below the ground surface using either a rubber-tire truck-mounted drill rig or an all-terrain drill rig equipped with an 8-inch-diameter hollow-stem auger and a 4-inch-diameter rotary wash drill bit. Hollow-stem augers would generally be used to drill through the levee fill and would be left in place to act as temporary casing and protection against hydraulic fracturing of the levee. Rotary wash drilling methods would be used below the augers. Borings located at and landward of the levee toe would be drilled using rotary wash drilling methods. Exploration of potential borrow sites will also be required to assess suitability of the material. Such exploration could include boring methods similar to those described above, but to shallower depths (10–12 feet below grade). Test pit excavation would be conducted using a tire-mounted backhoe to depths of 10–12 feet below grade. The test pits would likely be 1–3 feet wide along dirt roadways and 3–6 feet wide in agricultural fields by about 10 feet long. Samples

would be obtained by hand with shovels from the excavated materials. When the bottom depth has been reached, the test pits would be loosely backfilled with the spoils with minor compaction effort. In the dirt roadways, the backfilled materials would be compacted with more effort to maintain drivability and safety.

Cultural Resources Investigations

Archeological surveys within potential flood control facility improvement footprints and potential borrow sites are required to facilitate project planning in Phases 2–4 and satisfy requirements under Section 106 of the National Historic Preservation Act. The surveys would include up to three stages of work. All excavation work in Stages 1 and 2 would be conducted with hand tools, such as shovels and trowels. Stage 1 entails digging shovel test pits 15 inches in diameter and up to 3 feet deep to evaluate the characteristics of subsurface material; these test pits would be backfilled immediately. Depending on archeological evidence found within the shovel test pits, Stage 2 work may be initiated to allow for a more thorough site investigation. This Phase would include excavation of 1-meter-square and 5-foot-deep test units. These test units may need to remain open for several days until examination can be completed. Any sites requiring deeper excavation to further investigate subsurface features identified in the first two stages would be included in Stage 3. This stage would require the use of machinery, such as a backhoe.

Conservation Strategy Overview

According to SAFCA, the project conservation strategy will support and significantly contribute towards the emergence of an urban habitat refuge in the Natomas Basin. The refuge is projected to occupy approximately 15,000 acres once the NBHCP objectives and other proposed conservation programs are completed. Through habitat creation, restoration, and preservation, SAFCA will increase the amount of protected habitat available for NBHCP-covered species. Further, SAFCA's proposed plan will consolidate large areas of habitat, assisting in the expansion of TNBC reserve blocks in the northwestern and southwestern regions of the Basin. Finally, the construction of new canals and the establishment of woodland corridors will greatly improve the connectivity between core habitat reserves that are distributed throughout the Basin, and substantially increase acreage and patch size of these critical habitats.

Overall, the proposed project is an opportunity to employ a landscape-scale vision, helping to advance the goals and objectives of the NBHCP and assist the Federal Aviation Administration (FAA), Corps, and the local Reclamation Districts in achieving their goals. The SAFCA's Natomas Landside Improvements Project presents a unique, one-time opportunity to reconfigure habitat and connective corridors in the Basin at a landscape scale.

Rather than a piecemeal approach to habitat protection, SAFCA's proposed project secures and expands the amount of habitat protected in the Basin, establishes the components that tie the preserves and disparate mitigation sites together in perpetuity under public ownership, and increases the quality and viability of this emerging urban reserve. Refer to the June 18, 2008, *Conceptual Mitigation, Management, and Monitoring Plan* document (prepared by EDAW for

SAFCA) for a more complete summary of the conceptual strategy for creating/enhancing/preserving, protecting, and managing habitats in the Natomas Basin in perpetuity. The following subsections provide an overview of the primary goals and landscape-level benefits of this habitat conservation strategy.

Increase Amount of Protected Habitat

While the project will result in loss and reconfiguration of landside habitats adjacent to the widened levees in the Natomas Basin, the proposed project has been specifically designed to minimize impacts to these landside habitats, and to avoid impacts to riparian habitats along the Sacramento River and NCC. The construction of an adjacent setback levee and installation of seepage cutoff walls enable SAFCA to retain the mature riparian tree corridor and numerous Swainson's hawk nests that are located along the waterside of the Natomas Basin levees. The project's conservation strategy includes the preservation, enhancement, and creation of over 1,300 acres of compensatory habitats in the Natomas Basin, including:

- ▶ 72.98 acres of created, managed marsh,
- ▶ 616.15 acres of created, managed grasslands,
- ▶ 154.37 acres of canals (16 canal miles) and associated uplands,
- ▶ 140.85 acres of landside valley oak woodlands and savannah (125 acres created and 15.85 acres preserved),
- ▶ 175 acres of preserved rice fields, and
- ▶ 150 acres or more of agricultural field crops.

The project will result in the creation of a larger contiguous area protected and managed for the giant garter snakes and Swainson's hawks than currently exists.

Expansion and Consolidation of Protected Habitat in the Natomas Basin

The project will consolidate large areas of habitat, assisting in the expansion and infill of TNBC reserve blocks in the northwestern and southwestern regions of the Basin. The SAFCA will acquire several properties to provide compensatory habitat, either in the form of preserved rice and agricultural crop fields or created managed marsh, managed grasslands, or landside woodlands. Many of these properties are contiguous with existing TNBC reserves or other completed or planned mitigation habitats. Protecting habitat adjacent to existing TNBC reserves and other mitigation sites creates a larger contiguous area managed for giant garter snake and Swainson's hawk than currently exists. This increases the habitat value, sustainability, and functions that these individual properties would otherwise provide in isolation, contributing to giant garter snake and Swainson's hawk recovery in the Basin.

Strengthen Connectivity between TNBC Reserves

The proposed enhancements of existing Basin landscapes are important to the successful implementation of the NBHCP, along with the acquisition and permanent protection of mitigation land. The connective canal and woodland corridors that SAFCA proposes to establish

and/or improve are enhancements that will aid in NBHCP implementation, providing TNBC with an opportunity to improve its overall performance towards the goals of the NBHCP. Canal corridors will provide enhanced habitat functionality by permanently linking TNBC properties in the north and Fisherman's Lake reserve areas that are managed for the giant garter snake and other covered species.

Mitigation, Management, and Monitoring Plan

A *Mitigation and Monitoring Plan* (MMP) and a *Long-Term Management Plan* (LTMP) for the compensatory habitat components are being prepared to guide SAFCA and its partners as they manage the compensatory land components in perpetuity. The MMP would address the habitat creation and preservation components of the NLIP Landside Improvements project. The MMP and LTMP would establish specific success criteria for the habitat components, specify remedial measures to be undertaken if success criteria are not met (e.g., adaptive management, physical adjustments, additional monitoring), and describe short- and long-term management and maintenance of the habitat lands. The MMP and LTMP would also describe the strategies for the long-term protection of these habitats and funding for the management as provided through appropriate mechanisms, which would be determined by SAFCA, the regulatory agencies, and other entities cooperating in the implementation of the project.

Plan Goal

The goal of the MMP and LTMP is to ensure that the conservation values of the preserved, restored, and created habitats are maintained in good condition in perpetuity. The MMP and LTMP would discuss specific management strategies designed to maintain the conservation values for each of the habitat mitigation components and identifies performance criteria used to determine the success of the mitigation habitats. The biological goals include: (1) the preservation of the abundance and diversity of native species, and particularly special-status species, in the mitigation habitats; (2) the protection of the habitat features from the effects of indiscriminate land uses that may adversely impact mitigation habitats; and (3) the restoration of any adverse condition within the mitigation habitat areas that may affect or potentially affect these areas.

Implementing Mechanisms for Long-Term Protection and Management

The MMP and LTMP would describe the framework for the protection and management of the mitigation habitat components of the NLIP Landside Improvements project. The actual implementation of this framework would be enacted through easements, stakeholder-specific management agreements or memoranda of understandings, and contractual agreements. These contractual agreements would focus on the management obligations specific to each management entity, and describe the demonstrated financial and legal assurances necessary to implement the MMP and LTMP to protect and manage the habitat mitigation components in perpetuity. These contractual agreements would be subject to review and approval by USFWS, Corps, and CDFG, and enforced by SAFCA, in perpetuity, and by Corps through permit issuance.

Management Entities for Project Features

Agencies and organizations anticipated to have management responsibility for proposed project features are SAFCA, RD 1000, NMWC, the Airport, and TNBC.

Sacramento Area Flood Control Agency

SAFCA would be responsible for the design and construction of all levee improvements, maintenance access and inspection roads and rights-of-way, replacement canals and associated drainage and irrigation structures, and habitat creation sites. In addition, SAFCA would be responsible for all necessary land acquisitions and easements to construct the project features and achieve the project objectives. However, once these project features are completed, most of the land or land management responsibility would be conferred by SAFCA to the other management entities described below. Memoranda of agreement, land ownership transfers, or management endowments and contracts would be used by SAFCA to transfer land management responsibility to the appropriate public agency or nonprofit land management organization. At the end of the project construction period, all project lands would be in public ownership and/or would be under the permanent control of a natural resource conservation entity.

Reclamation District 1000

The mission and purpose of RD 1000 is to operate and maintain the flood protection levees surrounding the Natomas Basin and to operate and maintain the internal drainage system to evacuate agricultural and urban stormwater and incidental runoff. The RD 1000 would be responsible for the management of the proposed levee improvements, reconstructed Pumping Plant No. 2, and drainage features. Typical maintenance activities include mowing grassland along levee slopes, berms, and rights-of-way, removing sediment and noxious aquatic weeds from the canals, and managing bank vegetation.

Natomas Central Mutual Water Company

The NMWC is a nonprofit mutual water company with the primary focus of keeping the water conveyance functioning to serve the company shareholders. Intensive maintenance to maximize agricultural irrigation services throughout the basin is generally conducted in a given year on only 10 percent of the approximately 100 miles in the Natomas Basin canal system operated by NMWC. The NMWC would be responsible for maintaining and managing the relocated Elkhorn and Riverside Canals and existing irrigation canals. The relocated canals would be maintained in the same manner as the existing canals. Typical maintenance activities include operating and repairing water control structures and barrier gates, periodically removing sediment and noxious aquatic weeds from the canals, repairing canal roads, managing bank vegetation, and mowing grassland along canal and road rights-of-way. However, the relocated Elkhorn and Riverside Canals would have improved levees, better water control structures, and wider roads and rights-of-way than the existing canals. These improvements are expected to ease annual canal management efforts, allowing for a proportionately greater focus on maintenance and operations and less need for system repair and dredging.

Sacramento County Airport System

The SCAS manages the Sacramento County–owned bufferlands outside the Airport Operations Area. All project components on land under SCAS management would remain in public ownership but project land must be protected in perpetuity for the benefit of the giant garter snake.

The Natomas Basin Conservancy

The TNBC acquires and manages land for the purpose of meeting the objectives of the NBHCP. To meet the mitigation goals of the NBHCP, developers of projects pay a mitigation fee to TNBC when they apply for building permits. The TNBC then uses the mitigation fees to acquire, restore, and manage mitigation lands to provide habitat for protected species and maintain agriculture in the Natomas Basin. The TNBC owns approximately 30 mitigation properties totaling more than 4,500 acres. Private land acquired by SAFCA and converted to managed marsh, preserved in rice, or used for woodland establishment would be conveyed to TNBC after creation of permanent habitats as marsh, woodlands, and habitat buffer zones. The SAFCA may also contract with TNBC for management elements of some habitat features (e.g., the GGS/Drainage Canal).

Stakeholder-Specific Management Agreements

The MMP will describe the framework for the design and management of the mitigation habitat components of the proposed project. The actual implementation of this framework will be enacted through Stakeholder-Specific Management Agreements. These contractual agreements will focus on the management obligations specific to each entity, and describe the demonstrated financial and legal assurances necessary to implement the MMP and protect and manage the habitat mitigation components in perpetuity. These contractual agreements will be subject to review and approval by the Service, Corps, and CDFG, and enforced by SAFCA, in perpetuity, and by Corps through permit issuance.

Funding Mechanism

Funding for implementation of the MMP and LTMP has been incorporated into the overall budget for implementation of the NLIP Landside Improvements project. SAFCA anticipates funding for project construction, monitoring, and long-term management will be provided through the Consolidated Capital Assessment District and existing Operations and Management District. The Consolidated Capital Assessment District was created to provide local cost share for flood control project within the Sacramento Urban Area. It was adopted on April 26, 2007, after voters who would be within the assessment district voted to approve the assessment. A portion of the District Assessment Fee would be encumbered to specifically implement the MMP and LTMP. This District funding source will sunset in 2037, at which point, the funding would transition into a non-wasting endowment. The endowment would be built over time through a 2-year advance of the fee into the account.

Project Phasing

The proposed project is comprised of three phases of construction, spanning approximately 3 years. Phase 2 of the NLIP Landside Improvements project, for which SAFCA is currently requesting a permit, is described and analyzed in detail in this permit application, while Phases 3 and 4, for which subsequent requests for permits will be submitted, are described and analyzed at a more general, program level of detail in this document.

Phase 2 Work

Table 1 summarizes the major elements of Phase 2 of the Landside Improvements project (proposed project) and the general timeframes in which the elements are expected to be implemented. Note that although seepage berms are depicted as the primary means of providing underseepage remediation along the Sacramento River east levee, the use of cutoff walls continues to be evaluated, and cutoff walls will likely be implemented instead of berms in several locations. Each of the main project elements are described in more detail below.

Levee Raising and Seepage Remediation

Natomas Cross Canal South Levee

The proposed project would include raising the entire NCC south levee (Station 0+00 to Station 287+50, Reaches 1 to 7) and would continue the construction of a seepage cutoff wall from the eastern terminus of the NCC South Levee Phase 1 Improvements (NCC Phase 1 Improvements) initiated in 2007 (Station 0+00 to Station 61+00, beginning of Reach 1 to approximately middle of Reach 2) to the eastern end of the NCC south levee (approximately Station 56+00 to Station 287+50, approximately the middle of Reach 2 to end of Reach 7). NCC Reaches correspond roughly to the following Stations: Reach 1 (Station 0 to Station 3); Reach 2 (Station 4 to Station 103), Reach 3 (Station 103 to Station 123), Reach 4 (Station 123 to Station 170), Reach 5 (Station 171 to Station 195), Reach 6 (Station 195 to Station 277), and Reach 7 (Station 278 to Station 287). Phase 2 would include the construction of the NCC south levee component, which is anticipated to occur over one construction seasons, beginning in May 2009 and ending in October 2009. The primary construction activities are described below.

Preparation for construction of the cutoff wall would begin with using scrapers (or other suitable equipment, depending on the slope) to clear and grub/strip the surface to a depth of 2 inches to remove low-growing vegetation, loose stone, and surface soils. The aggregate base from the operating road also would be removed and stockpiled for later reuse. Waste material would be hauled to an off-site location.

Table 1	
Summary of the Major Elements of Phase 2 of the Proposed Project	
Project Element	Proposed Activity and Timing
Levee raising and seepage remediation: NCC south levee	Raise and realign the NCC south levee to provide additional freeboard and more stable waterside and landside slopes and to reduce the need for removal of waterside vegetation. (May–October 2009) Construct a seepage cutoff wall through the levee crown in Reaches 3–7. (May–October 2009)
Levee raising and seepage remediation: Sacramento River east levee (adjacent setback levee)	Construct a raised adjacent setback levee from the NCC to just south of the North Drainage Canal (Reaches 1–4B) with a 100-foot seepage berm in Reach 4A and a 300-foot seepage berm in Reach 4B. (May–October 2009) Relocate utility poles. (November–December 2008)
Improvements to major irrigation and drainage infrastructure	Construct a new canal designed to provide drainage and associated giant garter snake habitat (the GGS/Drainage Canal) between the North Drainage Canal and Elkhorn Reservoir. (May–October 2009) Relocate the Elkhorn Canal (highline irrigation canal) between the North Drainage Canal and Elkhorn Reservoir in anticipation of the filling of the existing Elkhorn Canal at the toe of the Sacramento River east levee. (May–October 2009) Remove a deep culvert at the location of Pumping Plant No. 2. (May–October 2009)
Habitat enhancement, creation and management	Establish vegetative habitat features in the new GGS/Drainage Canal. (Fall 2009) Recontour and create habitat on lands used as borrow sources. (Fall 2009) Establish grassland on the adjacent setback levee slopes and seepage berms. (Fall 2009) Install woodland plantings to offset the loss of portions of tree groves in the landside levee footprint. (Fall 2008–Fall 2009)
Right-of-way acquisition	Acquire right-of-way through fee title or easement interest within the footprint of the project features, at the borrow sites and along the flood control system. (Before construction)
Notes: Elkhorn Canal = Elkhorn Main Irrigation Canal; GGS = Giant Garter Snake; NCC = Natomas Cross Canal	

Construction of the cutoff wall would include degrading the existing levee to a depth equal to one-half its total height (approximately 9 feet). A 70-foot-deep cutoff wall would be constructed for a total length of 23,150 linear feet (2 million square feet), with the method of installation at the contractor's discretion. Given anticipated schedule constraints, a three-heading, double-shift

work schedule is anticipated. Material degraded to support cutoff wall construction would be compacted at the landside toe of the levee to support the levee raising operation described below. Unsuitable material generated from cutoff wall construction would be disposed of off-site.

Raising of the Natomas Cross Canal South Levee

Levee raising would occur throughout the entire length of the NCC to provide three feet of freeboard over the design water surface profile (this requires raising the levee approximately three feet). Throughout most of the NCC, this would be accomplished by setting the levee back towards the landside, such that there is a theoretical 3H:1V waterside slope extending from the existing waterside toe to the new waterside top. Following degrading of the levee for cutoff wall construction, the new levee crown would be constructed such that the actual waterside slope extends to meet the point of degrade on the waterside slope. This actual slope would be 3H:1V or flatter. The new levee crown would have a width of twenty feet and the new landside slope would be 3H:1V. Where an existing stability berm is present, it would be stripped and incorporated into the new levee prism. Any portion of the berm outside of the limits of new fill would be trimmed back to conform to the new landside 3H:1V slope. Where the berm is fully incorporated, it would be stripped and trimmed as necessary to accommodate placement of new fill material around it. Existing drain pipes exiting the berm would be extended to daylight landward of the new levee landside toe.

Throughout Reaches 6 and 7, Sutter County infrastructure (Howsley Road and related features) and private residences are close to the NCC south levee. To avoid the infrastructure and residences, between Station 215+00 and 245+00 (central portion of Reach 6, from just west of State Route (SR) 70/99 to just east of SR 70/99), the levee would be raised waterward, encroaching on the NCC channel approximately 30 feet. Between Stations 245+00 and 279+50 (remaining portion of Reach 6), the levee would be raised on the landside, similar to Stations 54+00 through 215+00 (approximately the middle of Reach 2 to initial portion of Reach 6). Smooth transition distances of up to 200–500 feet would link the waterward and landward raises.

Vegetation would be removed from the waterside slope in all locations above the elevation corresponding with the projection of the landside levee toe on the waterside slope. Between Station 0+00 and 54+00 (Reach 1 through first half of Reach 2), where there is significant vegetation on the waterside slope above this elevation, the levee would be set back an additional fifteen feet to provide a “root-free” zone on the levee slope, and the vegetation would remain.

Removal of Structures

Relocation of Howsley Road, the Morrison Canal, a roadway drainage pump station, and three residences and outbuildings would be required by landward levee raises in Reaches 6 and 7. If hydraulic modeling indicates that unacceptable hydraulic impacts would not result from waterside levee raising in Reaches 6 and 7, only two structures in Reach 7 (a residence and a semimobile trailer) would require relocation as a result of the proposed levee improvements.

Utility Modifications and Miscellaneous Work

Pipelines penetrate the NCC south levee at four locations: Odysseus Farms (Bolen Ranch); NMWC waterside Bennett Pumping Plant; NMWC Northern Pumping Plant; and RD 1000's landside Pumping Plant No. 4. None of these penetrations comply with current Corps regulations; therefore, the pipelines would be raised to have their inverts above the 200-year water surface elevation and would be equipped with waterside shutoff valves. If pipes are corroded, they may have to be replaced down the waterside slope of the levee.

As part of raising the pump station discharge pipelines that cross the NCC south levee, canals south of the levee would need to be relocated farther from the levee toe in the following locations: the RD 1000 Vestal Drain and NMWC Bennett Canal between Station 55+50 and Station 61+50 (middle of Reach 2) and the NMWC North Main Canal between Station 120+00 and Station 123+50 (end of Reach 3 to beginning of Reach 4) and between Station 216+00 and 218+00 (Reach 6, just west of SR 70/99). The ditch segments would be moved about 100 feet farther away from the levee toe. Some of this work may be accomplished by NMWC as part of its American Basin Fish Screen Project, but the timing of this NMWC project is uncertain. If the work is not accomplished by NMWC, SAFCA would relocate the canals at the time that the pipelines are raised.

Between Station 0+00 and Station 19+00 (beginning of Reach 1 through first eighth of Reach 2) of the NCC south levee, SAFCA intends to obtain a landside levee maintenance access area to match the 80- to 100-foot wide maintenance access area already established for the levee. This area is currently in active rice fields. Once the maintenance access area is established, this area would be filled to be above the agricultural field grade to prevent encroachment by farming operations into the maintenance access area and to provide an operating road at the levee toe. Between Station 99+00 and Station 124+00 (end of Reach 2 through Reach 3), a low-lying area between the levee's landside toe and an operating road for the Lucich North Habitat Preserve would be filled to raise the grade of the operating road at the landside toe.

In 1996, as part of SAFCA's NCC and PGCC Levee Project, 200 feet of floodwall was installed to raise the NCC levee around the State Route (SR) 99/70 bridges over the NCC. The top of wall for this floodwall is at elevation 44.80 feet (National Geodetic Vertical Datum 29). To conform to current levee criteria, the floodwall would need to be raised to elevation 49.3 feet.

Construction Staging Areas and Postconstruction Site Condition

Construction staging would take place in areas adjacent to the NCC south levee, within the maintenance access areas between Stations 0+00 and 56+00, 61+00 and 96+50, 99+00 and 216+00, and 251+00 and 281+00. Cutoff wall construction would require temporary establishment of three on-site slurry batch plants that would occupy about 1-2 acres each. Each batch plant site would likely contain tanks for water storage, a pug mill mixer, bulk bag supplies of bentonite, bentonite and cement storage silos, cyclone mixers, pumps, and generators. The sites would also include slurry tanks to store the blended slurries temporarily until they are

pumped to the work sites. Slurry constituents would be mixed with water at the batch plant and the mixture would be pumped from the tanks through pipes to the cutoff wall construction work sites.

After construction, the levee slopes and any previously vegetated areas disturbed during construction, including staging areas, would be seeded with a grass mix.

Sacramento River East Levee Reaches 1–4B

Phase 2 of construction would begin in 2009 for the Sacramento River east levee, which includes an adjacent levee extending from the northern end of Reach 1 at the NCC south levee through Reach 4B (approximately Station 0+00 to Station 226+00). Also included in Phase 2 is: installation of cutoff wall in Reach 2 of the adjacent levee; construction of a 100-foot seepage berm in Reach 4A and 300-foot berm in Reach 4B; planting of woodlands in a corridor and fallow fields extending from the lower end of Reach 1 through portions of Reach 4A; and reconstruction of the intersections of Sankey Road and Riego Road with Garden Highway.

An adjacent setback levee is proposed in lieu of in-place modification of the existing Sacramento River east levee, which has substantial structural and vegetation encroachments along its water side. The adjacent-levee raise would involve the construction of a new embankment adjacent to the existing levee. A minimum 5-foot-wide shoulder would extend from the landside edge of the crown of the existing levee to the water side of the new adjacent setback levee embankment. A 3H:1V slope would extend up to the crown of the adjacent setback levee. The crown would be at least 20 feet wide and would be topped with an aggregate base access road for inspection and maintenance. The adjacent setback levee would have a 5H:1V landside slope, except for approximately 5,000 feet in Reaches 2 and 3, which would be 3H:1V. It would be constructed of compacted random fill material from borrow sources and from the excavation of the existing landside stability berm.

It is assumed that a main construction staging area for this phase would be located on approximately 5 acres near Riego Road. The area would be fenced and would be used for the contractor's and engineer's construction trailers, parking for personnel, machine maintenance tools and parts, possibly water trucks, and the storage of fuels and other materials to be used for construction. The project right-of-way along the construction area also would be used for staging of construction materials and equipment. Personnel, equipment, and imported materials would reach the project site via SR 99/70, Sankey Road, Riego Road, and Elverta Road. The primary corridors where construction activity would take place are the adjacent levee alignment and existing dirt roads used for access to the work areas; soil borrow areas; and paved roads, including Powerline, Sankey, and Riego Roads.

Improvements to Reaches 1–4B are anticipated to occur over one construction season, beginning in May 2009 and ending in October 2009. The primary construction activities are described below.

Site Preparation (Tree Removal, Clearing, Grubbing, and Stripping)- Site preparation would entail removing trees and other large vegetation from the construction area and stripping the top 6 inches of material from the landside slope of the existing levee, the footprint of the adjacent setback levee, the seepage berm areas, and the 50-foot-wide permanent maintenance access corridor. Large roots and deleterious material would then be grubbed from the working area. To the extent feasible, trees that must be removed from within the footprint of the adjacent setback levee or berms would be relocated outside of the footprint to new woodland planting areas, where a substantial number of new trees would also be planted. Excess earth materials (organic soils, roots, and grass from borrow areas and the adjacent levee foundation and excavated material that does not meet levee embankment criteria) would be used in the reclamation of borrow areas or hauled off-site to landfills. Cleared vegetation (i.e., trees, brush) would be hauled off-site to landfills.

Relocation of Irrigation Ditch - Odysseus Farms, located at the junction of the NCC south levee and Sacramento River east levee, maintains a private irrigation ditch that is situated within the proposed footprint of the adjacent setback levee. This private irrigation ditch is situated along the top of an existing berm in Reach 1 within the proposed footprint of the adjacent setback levee. Before filling of the existing ditch, a new ditch would be constructed in Reach 1 to serve irrigation needs for agricultural uses of the land along this reach. The new ditch would be constructed from Station 0+00 to Station 25+00 and would be elevated, similar to the existing canal, to allow for gravity flow southward from the NCC. The relocated ditch would cross under Sankey Road through a culvert and meet the existing canal lateral at Station 25+00. The existing ditch would be drained and any unsuitable material from the ditch bottom would be excavated and hauled off-site. To maintain irrigation system continuity, this relocation work would need to be implemented prior to May 1, 2009, as facilities begin operations prior to May and are continually in operation through the end of summer, thus presenting limited opportunities for relocation during the levee construction work window.

Removal of Landside Structures and Other Facilities - Residences and other farm structures that are within the proposed footprint of the adjacent setback levee embankment, berms, and maintenance areas at Station 35+00 in Reach 1 (house, barn, and shed) would have to be removed or relocated farther from the flood control facilities before the start of levee construction. Irrigation facility collection/distribution boxes, wells, and standpipes within the footprint of the flood control features would be demolished and replaced as needed. Debris from structure demolition, power poles, utility lines, piping, and other materials requiring disposal would be hauled off-site to a suitable landfill. As feasible, demolished concrete could be sent to a concrete recycling facility. Wells and septic systems would be abandoned in accordance with the applicable state and county requirements. Some utility poles would be relocated after October 1, 2008, after permit issuance; the removal of other landside structures and facilities would not occur until May of 2009.

Excavation of Stability Berm and Inspection Trench

The existing stability berm along the levee would be excavated and the soil and drain rock would be stockpiled for use in the construction of the adjacent setback levee. The geotextile fabric from the drain layer would be discarded. A 3-foot-deep inspection trench would also be excavated along the foundation of the adjacent levee raise area after stripping has occurred. The purpose of this trench is to expose or intercept any undesirable underground features such as old drain tile, water or sewer lines, other debris, animal burrows, buried logs, or pockets of unsuitable material (e.g., sand lenses). After inspection, the trench would be backfilled and compacted as part of the embankment construction.

Construction of Adjacent Levee Raise and Cutoff Walls

Borrow material would be excavated from several locations in the project area and would be delivered to the levee construction sites by scrapers or haul trucks where it would be spread by motor graders and compacted by sheepsfoot rollers to build the adjacent levee up to a height equal to about two-thirds of the height of the existing levee. This would create a working platform for cutoff wall installation using an excavator with a long-stick boom capable of digging a trench to a maximum depth of approximately 80 feet. Bentonite slurry would be pumped into the trench during excavation to prevent caving. The soil excavated from the trench would be mixed with bentonite and backfilled into the trench to create the cutoff wall.

Reconstruction of Garden Highway at Intersections - The Garden Highway intersections at Sankey and Riego Roads would require reconstruction to accommodate the raised adjacent setback levee. It is anticipated that Garden Highway would be extended up and onto the widened adjacent levee at these locations to meet with the secondary roads. Approach embankments at the intersections would be enlarged and the entire intersections would be repaved. Intersecting roads would be raised at a slope of 15H:1V, extending the approach embankment approximately 350 feet outward from the levee. The side slopes of the raised embankments would be at a 3H:1V slope.

Installation of Surface Drainage Outlets across Garden Highway - Between the adjacent setback levee and the Garden Highway pavement, new storm drain facilities would be constructed to convey surface water beneath Garden Highway and toward the Sacramento River. A drainage swale collection system would convey runoff water to drop inlets located approximately 1,000 feet apart along an approximately 22,800-foot-long section of the improved levee, and new 12-inch diameter pipe laterals would convey the water beneath Garden Highway to the waterside slope berm. Excavation of a trench across Garden Highway and down the waterside levee slope would be required; those segments of Garden Highway where excavation occurs would have to be reconstructed. Single-lane traffic controls and through-traffic detours would be required during construction Phase 2. Drainage outlets would be located on the waterside levee berm, above the two-year ordinary high water mark. The construction of the drainage outlets entail the excavation of a 100 square foot area, of which the lower eighteen to twenty-four inches would be filled with a gravel/cobble mix, and the upper six to twelve inches would be an open depression. Water exiting the drainage outlets would settle in the depression, and then flow overland to the Sacramento River.

Site Restoration and Demobilization - Following construction, the levee slopes, seepage berms, maintenance access right-of-way, and any previously vegetated areas disturbed during construction would be seeded with a grass mix. Any construction debris would be hauled to an appropriate waste facility. Equipment and materials would be removed from the site, and staging areas and any temporary access roads would be restored to preproject conditions. Demobilization would likely occur in various locations as construction proceeds along the project alignment.

Major Irrigation and Drainage Infrastructure Modifications

Elkhorn Canal - The Phase 2 construction plan would include the new Elkhorn Canal from the North Drainage Canal to Elkhorn Reservoir, between Reach 4B and Reach 6B. On the north end, the new canal would be connected with the existing Prichard Pumping Plant outfall and an outlet to the North Drainage Canal would be constructed. An outfall to provide for connection to RD 1000 Pumping Plant No. 2, during its construction in Phase 3, would be incorporated into the Phase 2 canal construction to minimize the need for future canal disturbance. The discharge pipes from the Prichard Pumping Plant would be extended to the relocated canal. The outlet to the North Drainage Canal would be combined with the GGS/Drainage Canal outfall with a gated control structure in the irrigation canal and a piped outlet to the North Drainage Canal.

At the southern end, the relocated Elkhorn Canal would connect into an earthen-lined sediment basin. The sedimentation basin would consist of a number of watered, earthen-bottomed chambers separated by weirs, which may be concrete or rock covered. The basins would have 3H:1V embankments that are 15-foot-wide at the top to provide maintenance equipment access. The total area of basins including the embankments is approximately 9.6 acres, with nearly 3.3 acres of water surface. The proposed sediment basin would be connected to Elkhorn Reservoir with a temporary pipe and outfall structure. During construction Phase 3 (see below), Elkhorn Reservoir would be dewatered and piping from the Elkhorn Pumping Plant would be extended to the new sediment basin, at which time the Elkhorn Reservoir sediment basin would be abandoned and filled.

The GGS/Drainage Canal would be constructed parallel to and within the same right-of-way as the Elkhorn Canal. These features would be constructed concurrently to facilitate the use of excavated material from the GGS/Drainage Canal for use as embankment material along the Elkhorn Canal.

The primary construction stages for Elkhorn Canal are described in the subsections below.

Clearing and Grubbing/Stripping

Preparation for canal construction would entail using bulldozers/scrapers to clear and grub/strip the surface to a depth of 4–6 inches and remove low-growing vegetation and loose surface soils. Suitable materials removed during this stage could be stockpiled. Unsuitable material would be wasted and hauled off-site. The right-of-way for the canal that would need to be cleared (including the GGS/Drainage Canal right-of-way) is approximately 225 feet wide.

Bulldozers/scrapers and front-end loaders would be used to excavate and move material. Water trucks would be used to control dust and dump trucks would be used to haul unsuitable materials away.

This phase of construction would commence immediately after mobilization and would most likely occur in multiple sections of the Elkhorn Canal and GGS/Drainage Canal alignments simultaneously.

Pump Discharge Pipe Extension

Because the Elkhorn Canal would be relocated farther from NMWC pumping plants than the existing canal, additional pipe would need to be installed to maintain the connections between the pumping plants and the irrigation canals. In particular, discharge pipes would need to be extended at Prichard Pumping Plant and Elkhorn Pumping Plant. Pipes would be transported to the site on flatbed trucks. Excavators and backhoes would be used to dig the pipe trenches and lay the sections of welded steel pipe and backfill the trench. The trench would be deep enough to provide for a minimum of 12 inches of cover. A small compactor would be used to compact the soil over the pipe. The construction of pipelines at the existing Prichard Pumping Plant would occur during Phase 2 of construction, and at the Elkhorn Pumping Plant pipeline construction would occur during Phase 3 of construction.

Prichard Pumping Plant Connection

A new concrete transition structure would be constructed at the north end of the existing Elkhorn Canal to connect the existing Prichard outfall box culvert to the new Elkhorn Canal. Three reinforced concrete discharge pipes, two 36-inch and one 30-inch, approximately 600 feet in length, would be constructed in parallel from the new transition structure to the proposed distribution box located approximately 250 feet south of the western end of the North Drainage Canal. These pipes would connect the Prichard Pumping Plant outfall to the distribution box. From the distribution box, two 54-inch reinforced concrete discharge pipes, approximately 30 feet long, would connect the box to the new Elkhorn Canal.

The concrete distribution box footprint would be approximately 25 foot by 30 foot. A 60-inch discharge pipe stub and 48-inch intake pipe stub would be constructed on the north side of the distribution box. These stubs will provide for future connections of the distribution box to the North Drainage Canal and Pumping Plant No. 2.

Water Control Facility Construction

New facilities that would be constructed include distribution boxes, gate valves, cast-in-place concrete headwalls and control structures, culverts, and a proposed earthen-lined sediment basin adjacent to Elkhorn Reservoir. Backhoes and excavators would be used to excavate material for the new facilities. Precast distribution boxes, pipes, and other appurtenances would be transported to the site on flatbed trucks. Other concrete facilities would be poured in place and concrete would be transported to the site in ready-mix and boom concrete pumper trucks. Small compactors would be used to compact fill material around the facilities.

Embankment and Access Road Construction

The existing Elkhorn Canal is a highline canal, and construction of its replacement would require little or no excavation but a large amount of borrow material. The bottom of the new Elkhorn Canal channel would be approximately at existing ground level. During construction, borrow material would be required to build up the embankments of the new canal, which would be approximately 4 feet above the channel bottom with 3H:1V side slopes. Bulldozers and graders would be used to move and shape the embankment material, sheepsfoot and smooth drum rollers would be used to compact the embankment material, and water trucks would be used on-site for dust control and moisture conditioning.

Canal Lining

The bottom 6 to 12 inches of the Elkhorn Canal channel would be lined with concrete to provide for maintenance between seasons while minimizing impacts on the adjacent canal banks. Ready-mix and concrete pumper trucks would be required to apply the concrete to the bottom of the channel. It is anticipated that approximately 3,000 cubic yards of concrete would be required in construction Phase 2 for the proposed Elkhorn Canal lining.

Irrigation Interconnections

This phase includes work required to interconnect the relocated Elkhorn Canal with the existing irrigation canals within the Natomas Basin. Excavators and backhoes would be used to trench any connectors and motor graders would be used to shape the embankments. A water truck would be used to control dust and provide moisture conditioning during the excavation and construction of the interconnection facilities. Canal interconnections would be performed before the abandonment of the existing Elkhorn Canal.

Central Main Flume Connection

A second concrete distribution box would be constructed to connect the Elkhorn Canal to the Central Main Flume. The box will be located at the intersection of the Elkhorn Canal with the Central Main Flume with a footprint that is approximately 19 feet by 49 feet and will be tied into the existing concrete flume. Three 48-inch slide gates would be constructed on both the north and south ends of the box to connect the box to the Elkhorn Canal both north and south of the flume. A 6 foot by 6 foot reinforced concrete box culvert on the east end of the distribution box would connect to an outfall structure and the end of the flume.

Erosion Control

Erosion control measures would be installed before the start of construction and would be maintained throughout the construction period to prevent sedimentation of adjacent waterways. A hydroseeding truck would be used at the end of construction to seed any disturbed area. Water trucks would be used throughout the construction period to control dust in any disturbed areas.

Irrigation Canal Abandonment

As the newly constructed canal is completed and operable, the existing Elkhorn Canal would be abandoned. Irrigation flows would be rerouted to the new canal and the existing canal would be dewatered and abandoned. The filling of the abandoned Elkhorn Canal in Reach 4B would take

place as part of Phase 2 of levee construction and in Reaches 5A to 6B would take place as part of the Phases 3 and 4 of levee construction. Portions of farm canals and other irrigation canals would be abandoned because of the relocation of the Elkhorn Canal. Such segments that are outside the footprint of the proposed levee improvements would be filled after the relocation of the Elkhorn Canal is completed. Dump trucks would be used to haul fill material to those canals, rollers would be used to compact the fill, and water trucks would be used for dust control.

Demobilization/Cleanup

This phase includes dismantling any temporary facilities, hauling away any leftover construction materials, and cleaning up the site. All disturbed areas would be reseeded and graded to drain. A front-end loader and dump trucks would be used to move materials. This phase of construction would also entail general cleanup and hauling away unused and waste materials. All construction equipment would be removed.

Scheduling for Phase 2 Construction of the Elkhorn Canal

The segment of the Elkhorn Canal from the Prichard Pumping Plant to the Elkhorn sedimentation basin would be constructed between May and October 2009. The segment of the Elkhorn Canal from the Central Main Flume to the Elkhorn sedimentation basin would be constructed between May and October 2009.

Phase 2 Construction on New GGS/Drainage Canal - The Phase 2 construction plan would include the construction of the GGS/Drainage Canal from the North Drainage Canal to the slough east of Elkhorn Reservoir, between Reach 4B and Reach 6B. The GGS/Drainage Canal and Elkhorn Canal would be parallel and separated by a 20-foot right-of-way access. The GGS/Drainage Canal would tie into the North Drainage Canal east of the proposed location of replacement RD 1000 Pumping Plant No. 2. Crossing of the Elkhorn Canal and tie-in to the North Drainage Canal are anticipated to be made via open, arching culverts (e.g., "Con-Arch" culverts) that allow the GGS/Drainage Canal to pass under the Elkhorn Canal and the access road on the south side of the North Drainage Canal without being confined to pipes.

Because portions of the GGS/Drainage Canal and the Elkhorn Canal would be constructed parallel within the same right-of way, they would be constructed concurrently during Phase 2 construction. This approach would facilitate the use of material from the GGS/Drainage Canal excavation for use as embankment material along the Elkhorn Canal. Construction of the GGS/Drainage Canal would include the same construction phases as described above for the Elkhorn Canal, with a few exceptions. Unlike the Elkhorn Canal, the GGS/Drainage Canal would not be concrete lined. The top of bank for the GGS/Drainage Canal would be approximately at existing ground level. During construction, a trench at least 6 feet deep and an average width of 55 feet would need to be excavated for the construction of the GGS/Drainage Canal. Reclamation would include planting tules on the sloped banks. Backhoes would be used to prepare the planting areas and a water truck would be used to control dust.

Removal of Culvert at Pumping Plant No. 2 Site - SAFCA would undertake a second phase of the levee repairs and facility removal adjacent to the RD 1000 Pumping Plant No. 2 site at the

west end of the North Drainage Canal as part of the proposed project. This phase of work would include: (1) excavating and removing approximately 400 feet of the existing levee section adjacent to the Pumping Plant No. 2 site to expose a deep culvert and possible voids under the levee, (2) removing the deep culvert, (3) reconstructing the levee adjacent to the pumping plant sump with levee embankment fill, and (4) demolishing, removing, and relocating the pumping plant remnants within the project footprint. The last activity, reconstruction of the pumping plant, would be conducted in the 2009 construction phase and is described in the next subsection.

The project-related work would be confined to an area of approximately 2.3 acres. A stockpile and staging area of approximately 4.5 acres would be established near the work area.

Excavation limits would be extended to reconstruct the levee section adjacent to the sump and to reach areas where anomalies were identified during a geophysical investigation of the site. An area on the water side of the sheet pile wall would be excavated to lower the ground surface so as to reduce the loading on the sheet pile and excavation shoring system as the excavation takes place on the land side of the sheet piles. Excavated material would be stored on the site along the dewatered section of the North Drainage Canal, east of the abandoned sump, and in an adjacent agricultural field along the canal.

During excavation, the remnants of the pumping plant would be demolished and removed. This work includes relocation of a 36-inch irrigation supply pipe that is within the excavation limits. A temporary plastic fabric-lined ditch at the outfall of this pipe would also be relocated to provide for sufficient staging and stockpile areas. A short irrigation system 'outage' would be required to allow for relocation of the pipe and ditch.

Heavy equipment required for construction includes semi flatbed and/or box trucks to deliver equipment and materials; a crane to drive sheet pilings for additional shoring needs; dump trucks to haul debris, stockpile excavated levee material, and import select soil materials for levee reconstruction; two hydraulic excavators; two dozers for stripping and stockpiling material, a grader, water truck, and front-end loader for maintenance of haul roads and stockpiles; and a roller compactor for levee construction.

Habitat Enhancement, Development, and Management

Habitat enhancements and developments planned for Phase 2 of project construction include: the northern segments of the relocated Elkhorn Canal and the newly constructed GGS/Drainage Canal between the North Drainage Canal and Elkhorn Reservoir; the preservation and establishment of landside woodlands along the Sacramento River east levee; the creation of managed grasslands on the newly constructed levee slopes, seepage berms, access rights-of-ways, and canal embankments; and the preservation of rice land. Please refer to the June 18, 2008, *Conceptual Mitigation, Management, and Monitoring Plan* document (prepared by EDAW for SAI/CA) for a more complete summary of the conceptual strategy for creating/enhancing/preserving, protecting, and managing habitats in the Natomas Basin in perpetuity.

The proposed project would offset temporary and permanent effects to habitat of listed species through the creation, enhancement, and preservation of habitat in the basin. The construction of the Elkhorn Canal and GGS/Drainage Canal, including their management elements, are described above in more detail. Design and management elements for the managed grasslands, landside woodlands, and rice fields are summarized below.

Managed Grasslands

Levee Slopes and Seepage Berms - Levee improvements would result in landside slopes that are less steep than the existing slopes, and several reaches of the Sacramento River east levee would have adjoining 80- to 300-foot-wide earthen seepage berms with a nearly flat slope (50H:1V or less). Parallel to the landside toe of enlarged levees and seepage berms would be maintenance access roads and seepage relief wells in some locations. Additional setback buffer lands would flank some of these features, and property acquisition for the proposed project may leave SAFCA with remnant portions of acquired parcels that are nonessential to flood control uses. With the exception of the crown of the levee, these areas would be managed as grassland. Most grassland would be mowed or grazed throughout the growing season, with an emphasis on mowing procedures and stubble height to optimize these areas for Swainson's hawk foraging habitat. However, the primary purpose and management priority of levees and seepage berms would continue to be flood risk reduction, for which RD 1000 has principal management and maintenance responsibility, and they would be maintained in accordance with Corps and Central Valley Flood Protection Board operations and maintenance requirements.

Canal Embankments - The side slopes of the new GGS/Drainage Canal and relocated Elkhorn and Riverside Canals would be flatter than typical canal slopes in the Natomas Basin and consistent (3H:1V), resulting in greatly reduced erosion and sedimentation. Vegetation on the banks could easily be mowed to a specified stubble height using cutter blades instead of the existing, high-disturbance practice of flail mowing or scraping vegetation from the banks and canal with a drag bucket. These improved canal maintenance practices would substantially reduce disturbance and incidental mortality of giant garter snakes that use bank and shoreline vegetation as cover and feeding habitat.

Landside Woodlands

Woodlands consisting of native riparian species would be planted east of the maintenance corridor along the Sacramento River east levee improvements. In Phase 2, tree and shrub species, including elderberry shrubs (*Sambucus mexicana*), would be planted on approximately 30 acres of existing cropland or fallow or currently unused sites. Groves would generally be at least 50-100 feet wide and several hundred feet long. Wide woodland corridors would promote successful nesting by a variety of native birds deeper within the grove canopy, where nest parasitism by crows, cowbirds, and starlings is less of a factor in breeding success. At maturity, stand structure would vary from closed canopy woodland to grassland savanna vegetation types.

Planting sites would require suitable soil conditions, water supply during a 3- to 5-year establishment phase, reduced risk of wildfire, and minimal depth to seasonally high groundwater or other natural water sources to sustain trees once irrigation ceases. A mixture of native riparian

species would be planted, but predominant species would be Valley oak (*Quercus kelloggii*), the primary tree species that would be affected by the proposed improvements to the Sacramento River east levee, and cottonwood (*Populus fremontii*), which is a preferred nest tree for Swainson's hawks in the basin and is faster growing than Valley oak. Establishment of woody vegetation would likely require more than one technique, including seeding in winter, flood irrigation, drip or agricultural-scale spray heads, cuttings, and acorn planting.

Where trees would be removed from existing groves to make way for the proposed flood control system features, they would be transplanted in new locations, including newly planted groves, to the extent feasible. The woodland planting areas would provide locations for transplanting any elderberry shrubs that would need to be moved from the proposed footprint of flood risk reduction improvements.

Rice Fields

Brookfield - The Brookfield property is a 353-acre private property that is located between Howsley Road and Fifield Road, west of the PGCC west levee. As of the summer of 2008, the property is currently in rice cultivation.

Up to 160 acres of the site may be utilized for borrow operations in Phase 2. After the completion of borrow excavation, the 160 acres would be returned to rice and at least ½ of the 353-acre site would be preserved in perpetuity. The removal of borrow material would entail excavating the site to a depth of up to approximately 6 feet, with an approximate net yield of approximately 3.6 million cubic yards of soil from the site. One foot of topsoil would be removed and stockpiled for reuse during reclamation of the site. This borrow material would be used for levee improvements along the NCC south levee (construction Phase 2), PGCC west levee (construction Phase 3), and possibly the NEMDC west levee (construction Phase 4); however, no area of the property would be used in consecutive years. Following the removal of borrow material for the levee construction, the site would be graded and returned to rice cultivation.

Currently, the site is irrigated from on-site wells. To provide irrigation to the site following the excavation of borrow material, the irrigation canal along the south side of the site would be deepened and reconfigured from the Brookfield site westward to the culvert under SR 99/70. Additionally, a field irrigation ditch would be constructed within the Brookfield site to provide irrigation water from the adjacent highline canal to the fields. Grading of the site would be performed at a slope that would allow the water to flow back to the drainage canals running along the west and south side of the property. The water from the eastern fields would be drained into a canal along the west side of the pasture land and into the southern drainage canal. The drainage channel along the west and south side of the property would be modified to allow the site to drain following borrow excavation.

Modifications include widening all canals to an 8-foot bottom width with 3H:1V side slopes. Specific canal improvements could include modification of approximately 4,480 feet of the

RD 1000 canal that borders the south end of the site, modification of 3,670 feet of the private north-south drainage ditch along the west edge of the property, creation of a 900-foot long drainage ditch along the west edge of the pasture lands, and modification of a 6,350 foot long section of the drainage canal along SR 99/70 from the RD 1000 canal south. Improvements of the drainage canal along SR 99/70 may require land acquisition of up to 25 acres to account for the additional width of the channel and flatter side slopes.

Reclamation of Other Borrow Sites

Borrow sites would provide material for Phase 2 flood control and irrigation infrastructure modifications. Following excavation of the borrow material, these sites would be reclaimed for postconstruction uses.

Airport North Borrow Sites - The Airport's north bufferlands have been historically farmed as rice fields and field crops. However, based on FAA requirements to reduce hazardous wildlife attractants near runways, the Airport has opted to not renew rice leases on its bufferlands. Thus, these lands are currently either fallow agricultural fields or ruderal grassland. After borrow activities, these sites would be returned to their current condition.

Cut depths for all the borrow sites would be approximately 4–6 feet. Following the excavation of the borrow sites, disturbed areas would be finish graded to standard irrigation slopes so that the sites would drain and not have any standing water in less than 10-year storm events. Excavated soils not used for borrow material, such as the organic surface layer or soils considered unsuitable for levee construction, would be stockpiled and respread on-site following excavation. Any unsuitable borrow material would be stockpiled on-site and graded back into the restoration of the site. Revegetation activities would include erosion control on excavated slopes (i.e., hydroseeding) and application of fertilizer.

Overview of Construction Phases 3 and 4

Table 2 summarizes the major elements of Phases 3 and 4 of the proposed project and the anticipated general timeframes in which the elements are expected to be implemented. Note that although seepage berms are depicted as the primary means of providing underseepage remediation along the Sacramento River east levee, the use of cutoff walls continues to be evaluated, and cutoff walls will likely be implemented instead of berms in several locations.

Levee Raising and Seepage Remediation

Sacramento River East Levee Reaches 5A–20A

Improvements to the Sacramento River east levee would continue in construction Phases 3 and 4, and would extend from Reach 5A (below Station 226+00) through Reach 20A (Station 925+50). It is anticipated that construction of improvements to the Sacramento River east levee would encompass Reaches 5A-9B in construction Phase 3 and Reaches 10-20A in construction Phase 4.

The construction season is assumed to be mid-April – November for both construction phases. The following descriptions of design and construction of the improvements to the Sacramento

Table 2	
Summary of the Major Elements of Phase 3 and 4	
Project Element	Proposed Activity and Timing
Levee raising and seepage remediation: Sacramento River east levee (adjacent setback levee)	Construct an adjacent setback levee along Stations 55+00 to 68+00 in Reach 2 and from just south of the North Drainage Canal to the American River north levee (Reaches 5A-20B), raised where needed to provide adequate freeboard, with seepage berms, relief wells, and cutoff walls for seepage remediation as required (specific seepage remediation measures are still under study). (May 1, 2009–November 1, 2010)
Levee widening and flattening and seepage remediation: PGCC west levee	Widen the levee between Howsley Road and Sankey Road to allow for seepage remediation and flatten the levee on the water side to meet Corps criteria. Construct cutoff walls or seepage berms where required. (April–November 2009)
Levee widening and flattening and seepage remediation: NEMDC west levee	Widen levee and flatten slope between Elkhorn Blvd and NEMDC stormwater pumping station. (April–November 2009) Construct a seepage cutoff wall from NEMDC stormwater pumping station to Northgate Blvd where required. (April–November 2009)
Improvements to major irrigation and drainage infrastructure	Construct the new GGS/Drainage Canal between Elkhorn Reservoir and the West Drainage Canal, and improve the West Drainage Canal to provide enhanced giant garter snake habitat. (May 1–November 1, 2009) Implement Airport West Ditch improvements in connection with construction of the GGS/Drainage Canal to allow the Airport to decommission the agricultural irrigation function of this facility and eliminate the hazards currently associated with it. The Airport stormwater detention function provided by this ditch would continue. The ditch would therefore be recontoured as a gently sloping swale to facilitate periodic maintenance such as mowing. (May 1–November 1, 2009) Relocate the Riverside Canal and the Elkhorn Canal downstream of Elkhorn Reservoir (specific alignments to be determined) and fill the existing canals. (May 1–November 1, 2009, and May 1–November 1, 2010) Construct RD 1000 Pumping Plant No. 2. (April 1, 2009–September 1, 2010)
Habitat enhancement, creation and management	Establish habitat enhancements in the new GGS/Drainage Canal and improved West Drainage Canal. (Fall 2009) Recontour and create marsh and managed grassland on lands used as borrow sources. (Fall or spring after borrow excavation in 2009 and 2010) Establish grassland on the adjacent setback levee slopes and seepage berms. (Fall after construction in 2009 and 2010) Install woodland plantings to offset the loss of portions of tree groves in the landside levee footprint (locations to be determined). (Fall 2009 and 2010)
Additional actions to meet FEMA requirements: encroachment management on the Sacramento River east levee, and bridge crossing modifications at the NCC	Remove encroachments from a portion of the water side and land side of the Sacramento River east levee as needed to ensure that the levee can be certified as meeting the minimum requirements of the NFIP and Corps design criteria (specific criteria still under discussion). (Timing to be determined) Modify the SR 99/70 crossing of the NCC as needed to meet FEMA requirements. (Timing to be determined)
Right-of-way acquisition	Acquire right-of-way through fee title or easement interest within the footprint of the project features, at the borrow sites and along the flood control system. (Before construction)
Notes: Airport = Sacramento International Airport; Elkhorn Canal = Elkhorn Main Irrigation Canal; FEMA = Federal Emergency Management Agency; GGS = Giant Garter Snake; NCC = Natomas Cross Canal; NFIP = National Flood Insurance Program; PGCC = Pleasant Grove Creek Canal; RD = Reclamation District; Riverside Canal = Riverside Main Irrigation Canal; SR = State Route; Corps = U.S. Army Corps of Engineers	

River east levee proposed for construction Phases 3 and 4 are described in less detail than construction Phase 2 (improvements to the NCC south levee and Sacramento River east levee Reaches 1–4B) because they are not as far along in the project design process.

Required Freeboard Increases and Proposed Underseepage Remediation - Levee crown raises are required to provide adequate freeboard above the 100-year design water surface elevation in Reaches 5A–10 and above the 200-year design water surface elevation in Reaches 11A and 11B. Downstream of Reach 11B (Powerline Road), there is adequate freeboard above the 200-year design water surface elevation, and levee crown raises are not required. Substantial structural encroachments and large amounts of woody vegetation are present on the waterside slope of the existing levee, and the adjacent setback levee is proposed to extend through Reaches 5A–19A to avoid the need for extensive removal of the existing vegetation and encroachments on the waterside slope to meet Corps criteria. The existing levee in Reaches 19B–20B already has a wide crown, and extensive residential development is located along the landside levee toe; therefore, construction of the adjacent setback levee is not proposed for these reaches. The adjacent setback levee would extend outward at least 11 feet from the landside edge of the existing levee crown and would have a 3H:1V landside slope.

Underseepage remediation is required in many of the reaches from 5A through 20A. Reach 20B has sufficient freeboard for the 200-year water surface elevation and a cutoff wall (constructed by Corps in 2000) that meets current design criteria. Because this wall was constructed to an adequate depth, this reach does not need additional seepage remediation. Based on the results of geotechnical investigations, engineering and cost considerations, and land use constraints, cutoff walls are proposed for Reaches 5A–20A.

Removal of Landside Structures and Vegetation - Removal of some residences, other structures, and woodland vegetation, including mature trees, would be required to create ample space for the adjacent setback levee, berms, and maintenance access corridor. It is anticipated that residences would be removed at Station 62+00 in Reach 2, Station 245+00 in Reach 5A, Station 368+00 in Reach 8, Station 436+50 in Reach 9A, Station 468+00 in Reach 10, and at several locations along Reaches 15 through 18.

Miscellaneous Construction Elements and Postconstruction Site Condition - Modifications of roadway intersections with Garden Highway, utility relocations, removal of pumps and wells, and relocation of private canals would be similar to these activities as described for the improvements to Sacramento River east levee Reaches 1–4B. As described for Reaches 1–4B, after construction, the levee slopes, seepage berms, maintenance access right-of-way, and any previously vegetated areas disturbed during construction would be seeded with a grass mix.

Pleasant Grove Creek Canal West Levee

The PGCC west levee is vulnerable to seepage and has stability concerns. The proposed project includes improvements to 17,400 feet of the PGCC west levee, beginning at the east end of the NCC improvements at Howsley Road and extending southerly to Sankey Road. Construction is

anticipated to proceed in Phases 3 and 4 on this component of the NLIP. Details of the proposed improvements will be developed based on additional geotechnical studies and cost analysis. The improvements are expected to consist of the following:

- ▶ widening of the levee to provide a minimum top width of 20 feet to accommodate safe lane widths for Natomas Road;
- ▶ flattening the water side of the levee to a 3H:1V slope;
- ▶ reconstructing the landside levee slope with new, select material to create a 3H:1V slope (the existing slope ranges from 2:1 to 2.5:1);
- ▶ from its intersection with Howsley Road and continuing one quarter mile south, raising the widened levee one to two-tenths of a foot to provide 3 feet of levee height on the 100-year design water surface profile; and
- ▶ constructing a SB cutoff wall through three separate reaches, totaling approximately 5,000 lineal feet, to coincide with areas where streams historically flowed east to west through the current PGCC alignment.

Irrigation and drainage canals at the landside toe of the existing levee would need to be relocated to the west to accommodate the berm construction. Several structures associated with the industrial facility near the southern end of the PGCC would need to be relocated.

The postproject site condition (grass-covered levee slopes and berms) and long-term maintenance practices would be as described above for the NCC south levee and Sacramento River east levee.

Natomas East Main Drainage Canal West Levee

The NEMDC west levee is vulnerable to seepage and has stability concerns. The proposed project includes improvements to the NEMDC west levee, beginning from Sankey Road south to Northgate Boulevard. Construction is anticipated to proceed in Phases 3 and 4 on this component of the NLIP. Details of the proposed improvements will be developed based on additional geotechnical studies and cost analysis. The improvements are expected to consist of the following:

- From the NEMDC pump station (between Elkhorn Boulevard and Del Paso Road) south to Northgate Boulevard, approximately 25,000 linear feet of cutoff wall is to be constructed to a depth of up to 80 feet from the levee crown. The existing maintenance easement on this stretch of the NEMDC will not accommodate levee reshaping or levee degrading beyond what is necessary to provide a minimum working platform for cutoff wall installation. Additionally, structures in close proximity of the landside levee toe make additional maintenance easement acquisition impractical. Where asphalt-concrete surfacing is present at the levee crown, it would be removed and disposed of off site. Following completion of the cutoff wall, the levee crown would be reconstructed and the operating road surface restored.
- North of the NEMDC pump station, to Elkhorn Boulevard, levee widening and slope flattening will occur similar to what is described for the PGCC west levee. These project components include:
 - widening of the levee to provide a minimum top width at least 20 feet to accommodate safe lane widths for Natomas and East Levee Roads;

- flattening the water side of the levee to a 3H:1V slope; and
- reconstructing the landside levee slope with new, select material to create a 3H:1V slope.

The postproject site condition and long-term maintenance practices would be as described above for the NCC south levee and Sacramento River east levee.

Major Irrigation and Drainage Infrastructure Modifications

Elkhorn and Riverside Canals

Construction Phases 3 and 4 would include the relocation of the remainder of the Elkhorn Canal (south of Elkhorn Reservoir) and the relocation of the Riverside Canal and would include the same construction phases as described for Phase 2. Timing of the new canal construction would be critical to avoid interruptions in irrigation service. The remainder of the relocated Elkhorn Canal, from Elkhorn Reservoir south, and the relocated Riverside Canal would be constructed before existing canals are filled in as part of the levee improvements in Reaches 6B–9A scheduled for construction Phase 3 and 12–20B scheduled for construction in Phase 4.

In addition to the general canal construction activities described for construction Phase 2, Elkhorn Reservoir would be dewatered and piping from the Elkhorn Pumping Plant would be extended to the new settling basin, at which time Elkhorn Reservoir would be abandoned and filled. The pipelines from the Elkhorn and Riverside Pumping Plants to the relocated irrigation canals would be constructed.

Phase 3 Construction of the New GGS/Drainage Canal

Phase 3 construction phase would include the construction of the GGS/Drainage Canal from north of Teal Bend Golf Course to the West Drainage Canal and improvements to the West Drainage Canal to enhance habitat value for giant garter snake. Because the GGS/Drainage Canal would be approximately 3.5–5.5 feet lower in elevation than the Elkhorn Canal, it would cross underneath the Elkhorn Canal, approximately 350 feet north of Elkhorn Reservoir, likely through a structure similar to that described above for the northern crossing. Reclamation would include planting tules on the sloped banks. In the portion of the canal below I-5, tules would be planted above the canal bench. Backhoes would be used to prepare the planting areas and a water truck would be used to control dust. A 2,200-foot-long section of the GGS/Drainage Canal between the sedimentation basin and Walnut Road as well as the 2,850-foot-long section of the existing West Drainage Canal would include a 15-foot-wide managed tule bench, which would typically be inundated with water and drain into the main channel. The 5,900-foot-long section between the southeastern corner of Teal Bend Golf Course and the West Drainage Canal would have a 50-foot-wide managed tule bench.

Removal of Airport West Ditch

As part of a safety survey conducted by the FAA for the Airport, the FAA expressed concern that the Airport West Ditch provides habitat for wildlife that potentially create a hazard to aircraft. The FAA recommended relocation of the ditch to alleviate the hazard. Additionally, a longstanding problem has existed with leakage from a 24-inch pipeline, resulting in marshy

conditions along its route, approximately 11,000 feet between the intake structure and delivery point at the Airport pumps. During the past year the Airport began receiving all of its domestic (drinking) water supply from the City of Sacramento via a pipeline and storage tank project. Two of the on-Airport water wells previously used to provide domestic water were connected to the Airport's landscape irrigation piping system, and the water supply to the "leaky underground pipe" was deactivated. All of the Airport's landscape irrigation needs are now provided on-site, and there is no need for the leaky pipe to remain in place. Irrigation water provided by NMWC still flows south through the Airport West Ditch, however, whereupon it is pumped to privately owned farms west of the Airport. The proposed project would include the construction of canal improvements to allow for decommissioning of the agricultural irrigation function of the ditch.

During storms, the Airport West Ditch receives stormwater runoff from a portion of the impervious surfaces on the west side of the Airport. Depending on the water volume, some of the stormwater is retained in the ditch until it can drain off-site to the Sacramento River. Therefore, the stormwater detention function of the Airport West Ditch must continue. In addition to the habitat-related safety issues, the ditch presents a physical obstruction hazard to planes that may leave the runway during adverse takeoff or landing situations. Therefore, the final stage of this project component would consist of regrading the Airport West Ditch to a gently sloping swale that can be easily maintained through mowing or other means. The more gradual gradient would also pose a lower threat to aircraft that may unexpectedly exit the runway.

To take advantage of common construction practices and to maximize the use of common facilities, the rearrangement of irrigation and drainage facilities required to provide for rerouting of flows that contribute to the Airport West Ditch would be accomplished along with the proposed NLIP improvements. The proposed GGS/ Drainage Canal would intercept many of the Airport West Ditch's off-site irrigation and drainage sources and reroute flows outside of the Airport Operations Area. The intent is to reroute year-round flows through the GGS/Drainage Canal. Additional irrigation infrastructure improvements required to reroute these flows would be implemented along with the GGS/Drainage Canal construction. Equipment that would be utilized in this reconfiguration includes excavators, loaders, compactors, dump trucks, water trucks, hydroseeding trucks, and generators.

Pumping Plant No. 2 Reconstruction and Relocation

Pumping Plant No. 2 would be reconstructed and relocated as part of the proposed project at the western end of the North Drainage Canal, approximately 900 feet east of the centerline of the levee in the vicinity of the intersection with the P6 Drain. Long discharge pipes would extend over the levee to the Sacramento River. The work is expected to take place in construction Phase 3. Two 42-inch steel discharge pipes, approximately 850 feet long, would connect the two 300-horsepower pumps from the pump station to a new concrete outfall structure in the Sacramento River. The new outfall structure would be constructed close to the location of the original Pumping Plant No. 2 outfall structure. Equipment required for construction of Pumping Plant No. 2 include an excavator, dozer, loader, crane, boom truck, pile driver, concrete pump, generator, and water truck.

Habitat Enhancement, Development, and Management

Habitat enhancements and developments planned for Phases 3 and 4 of project construction include: the southern segments of the relocated Elkhorn Canal and the newly constructed GGS/Drainage Canal between the Elkhorn Reservoir and the West Drainage Canal and the relocated Riverside Canal; additional establishment of landside woodlands along the Sacramento River east levee; continued creation of managed grasslands on the newly constructed levee slopes, seepage berms, access rights-of-ways, and canal embankments; the creation of managed marsh in the southern areas of the basin; and preservation of additional rice and agricultural upland cropland. Please refer to the June 18, 2008, *Conceptual Mitigation, Management, and Monitoring Plan* document (prepared by EDAW for SAFCA) for a more complete summary of the conceptual strategy for creating, enhancing, preserving, protecting, and managing habitats in the Natomas Basin in perpetuity. Similar to Phase 2, temporary and permanent effects to habitats of listed species that result from the implementation of Phases 3 and 4 would be offset through the creation, enhancement, and preservation of habitat in the basin.

Programmatic Biological Opinion Implementing Procedure

Because the Corps and SAFCA only have a detailed project description for Phase 2 of the entire Natomas Levee Improvement Project, this biological opinion analyzes the landscape effects of the project for all Phases (2, 3, and 4) but will only analyze and provide incidental take coverage for Phase 2. For each subsequent phase, the Corps will initiate section 7 consultation with the Service under the umbrella of this programmatic biological opinion. The following process will be used when implementing projects under this programmatic biological opinion:

1. The Corps will submit a letter requesting that the proposed phase be tiered to this programmatic biological opinion and provide the Service the following:
 - a. Project maps, which includes reaches under construction, cover types within the construction/maintenance boundary.
 - b. Project schedule.
 - c. An inventory of any elderberry stems >1 inch diameter that are within 100 feet of project actions and the number of shrubs and stems that would be transplanted and when and where they would be transplanted.
 - d. A description of how compensation measures from the preceding phase are being implemented and the schedule for completion of those measures.
2. The Service will review new information that may reveal effects not considered previously and review the information provided to determine whether the activities described under future Phases were programmatically analyzed in this document.
3. The Corps and SAFCA should involve the Service on Phase 3 and Phase 4 early in the process to allow the Service an opportunity to comment on project descriptions and expedite the completion of biological opinions for those phases.

Giant Garter Snake

Status of the Species

Listing. The Service published a proposal to list the giant garter snake as an endangered species on December 27, 1991 (56 FR 67046). The Service reevaluated the status of the snake before adopting the final rule, which listed as a threatened species on October 20, 1993 (58 FR 54053). Critical habitat has not been designated for the giant garter snake.

Description. The giant garter snake is one of the largest garter snakes species reaching a total length of approximately 64 inches (162 centimeters). Females tend to be slightly longer and proportionately heavier than males. Generally, the snakes have a dark dorsal background color with pale dorsal and lateral stripes, although coloration and pattern prominence are geographically and individually variable (Hansen 1980; Rossman *et al.* 1996).

Historical and Current Range. Giant garter snakes formerly occurred throughout the wetlands that were extensive and widely distributed in the Sacramento and San Joaquin Valley floors of California (Fitch 1940; Hansen and Brode 1980; Rossman and Stewart 1987). The historical range of the snake is thought to have extended from the vicinity of Chico, Butte County, southward to Buena Vista Lake, near Bakersfield, in Kern County (Fitch 1940; Fox 1948; Hansen and Brode 1980; Rossman and Stewart 1987). Early collecting localities of the giant garter snake coincide with the distribution of large flood basins, particularly riparian marsh or slough habitats and associated tributary streams (Hansen and Brode 1980). Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lake beds (Hansen 1980; Hansen and Brode 1980).

Upon Federal listing in 1993, the Service identified 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records (Service 1993). The 13 populations largely coincide with historical flood basins and tributary streams throughout the Central Valley: (1) Butte Basin, (2) Colusa Basin, (3) Sutter Basin, (4) American Basin, (5) Yolo Basin/Willow Slough, (6) Yolo Basin/Liberty Farms, (7) Sacramento Basin, (8) Badger Creek/Willow Creek, (9) Caldoni Marsh/White Slough, (10) East Stockton--Diverting Canal & Duck Creek, (11) North and South Grasslands, (12) Mendota, and (13) Burrell/Lanare.

The known range of the giant garter snake has changed little since the time of listing. In 2005, giant garter snakes were observed at the City of Chico's wastewater treatment facility, approximately ten miles north of what was previously believed to be the northernmost extent of the species' range (D. Kelly pers. comm. 2006; E. Hansen pers. comm. 2006). The southernmost known occurrence is at the Mendota Wildlife Area in Fresno County. No sightings of giant garter snakes south of Mendota Wildlife Area within the historic range of the species have been made since the time of listing (Hansen 2002).

Essential Habitat Components. Endemic to wetlands in the Sacramento and San Joaquin valleys, the giant garter snake inhabits marshes, sloughs, ponds, small lakes, low gradient streams, and other waterways and agricultural wetlands, such as irrigation and drainage canals, rice fields and the adjacent uplands (Service 1999a). Essential habitat components consist of: (1) wetlands with adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) upland habitat with grassy banks and openings in waterside vegetation for basking; and (4) higher elevation uplands for over-wintering habitat with escape cover (vegetation, burrows) and underground refugia (crevices and small mammal burrows) (Hansen 1988). Snakes are typically absent from larger rivers and other bodies of water that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates (Hansen 1988; Hansen and Brode 1980; Rossman and Stewart 1987). Riparian woodlands do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations (Hansen 1988).

Foraging Ecology. Giant garter snakes are the most aquatic garter snake species and are active foragers, feeding primarily on aquatic prey such as fish and amphibians (Fitch 1941). Because the giant garter snake's historic prey species are either declining, extirpated, or extinct, the predominant food items are now introduced species such as carp (*Cyprinus carpio*), mosquito-fish (*Gambusia affinis*), larval and sub-adult bullfrogs (*Rana catesbiana*), and Pacific chorus frogs (*Pseudacris regilla*) (Fitch 1941; Hansen 1988; Hansen and Brode 1980, 1993; Rossman *et al.* 1996).

Reproductive Ecology. The giant garter snake breeding season extends through March and April, and females give birth to live young from late July through early September (Hansen and Hansen 1990). Although growth rates are variable, young typically more than double in size by one year of age, and sexual maturity averages three years in males and five years for females (Service 1993b).

Movements and Habitat Use. The giant garter snake is highly aquatic but also occupies a terrestrial niche (Service 1999a; Wylie *et al.* 2004a). The snake typically inhabits small mammal burrows and other soil and/or rock crevices during the colder months of winter (*i.e.*, October to April) (Hansen and Brode 1993; Wylie *et al.* 1995; Wylie *et al.* 2003a), and also uses burrows as refuge from extreme heat during its active period (Wylie *et al.* 1997; Wylie *et al.* 2004a). While individuals usually remain in close proximity to wetland habitats, the Biological Resource Division of the U.S. Geological Survey (BRD) has documented snakes using burrows as much as 165 feet (50 meters) away from the marsh edge to escape extreme heat, and as far as 820 feet (250 meters) from the edge of marsh habitat for over-wintering habitat (Wylie *et al.* 1997). Giant garter snakes have been observed tens to hundreds of meters distant from any water body in various types of habitat. Upland habitat is essential for snakes because it provides overwintering hibernacula and areas for which snakes to thermoregulate (regulate their body temperature), and small mammal burrows which are used by snakes for ecdysis (shedding of the skin). Upland habitat may be particularly important for neonates (newly born) giant garter snakes, which may

use the uplands more frequently than adults, possibly seeking terrestrial prey, such as earthworms or other insects.

In studies of marked snakes in the Natomas Basin, snakes moved about 0.25 to 0.5 miles (0.4 to 0.8 kilometers) per day (Hansen and Brode 1993). Total activity, however, varies widely between individuals; individual snakes have been documented to move up to 5 miles (8 kilometers) over a few days in response to dewatering of habitat (Wylie *et al.* 1997) and to use up to more than 8 miles (12.9 kilometers) of linear aquatic habitat over the course of a few months. Home range (area of daily activity) averages about 0.1 mile² (25 hectares) in both the Natomas Basin and the Colusa National Wildlife Refuge (NWR) (Wylie 1998a; Wylie *et al.* 2002), yet can be as large as 14.5 miles² (3744 hectares) (Wylie and Martin 2004).

Rice fields have become important habitat for giant garter snakes, particularly associated canals and their banks for both spring and summer active behavior and winter hibernation (Hansen 2004; Wylie 1998b). While within the rice fields, snakes forage in the shallow water for prey, utilizing rice plants and vegetated berms dividing rice checks for shelter and basking sites (Hansen and Brode 1993). In the Natomas Basin, habitat used consisted almost entirely of irrigation ditches and established rice fields (Wylie 1998a; Wylie *et al.* 2004b), while in the Colusa NWR, snakes were regularly found on or near edges of wetlands and ditches with vegetative cover (Wylie *et al.* 2003a). Telemetry studies also indicate that active snakes use uplands extensively, particularly where vegetative cover exceeds 50 percent in the area (Wylie 1998b).

Predators. Giant garter snakes are killed and/or eaten by a variety of predators, including raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis virginiana*), bull frogs (*Rana catesbeiana*), hawks (*Buteo* sp.), egrets (*Casmerodius albus*, *Egretta thula*), river otters (*Lutra canadensis*), and great blue herons (*Ardea herodias*) (Dickert 2003; Wylie *et al.* 2003c; G. Wylie pers. comm. 2006). Many areas supporting snakes have been documented to have abundant predators; however, predation does not seem to be a limiting factor in areas that provide abundant cover, high concentrations of prey items, and connectivity to a permanent water source (Hansen and Brode 1993; Wylie *et al.* 1995).

Reasons for Decline and Threats to Survival. The current distribution and abundance of the giant garter snake is much reduced from former times (Service 1999a). Prior to reclamation activities beginning in the mid- to late-1800s, about 60 percent of the Sacramento Valley was subject to seasonal overflow flooding providing expansive areas of snake habitat (Hinds 1952). Now, less than 10 percent, or approximately 319,000 acres (129,000 hectares), of the historic 4.5 million acres (1.8 million hectares) of Central Valley wetlands remain (U.S. Department of Interior 1994), of which very little provides habitat suitable for the giant garter snake. Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one-third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lakebeds (Hansen 1980; Hansen and Brode 1980).

Valley flood wetlands are now subject to cumulative effects of upstream watershed modifications, water storage and diversion projects, as well as urban and agricultural development. The Central Valley Project (CVP), the largest water management system in California, created an ecosystem altered to such an extent that remaining wetlands depend on highly managed water regimes (U.S. Department of Interior 1994). Further, the implementation of CVP has resulted in conversion of native habitats to agriculture, and has facilitated urban development through the Central Valley (Service 1999a). For instance, residential and commercial growth with the Central Valley is consuming an estimated 15,000 acres of Central Valley farmland each year (American Farmland Trust 1999), with a project loss of more than one million acres by the year 2040 (USGS 2003). Environmental impacts associated with urbanization include loss of biodiversity and habitat, alternation of natural fire regimes, fragmentation of habitat from road construction, and degradation due to pollutants. Further, encroaching urbanization can inhibit rice cultivation (J. Roberts pers. comm. 2006). Rapidly expanding cities within the snake's range include Chico, Yuba City, the Sacramento area, Galt, Stockton, Gustine, and Los Banos.

Ongoing maintenance of aquatic habitats for flood control and agricultural purposes eliminates or prevents the establishment of habitat characteristics required by snakes (Hansen 1988). Such practices can fragment and isolate available habitat, prevent dispersal of snakes among habitat units, and adversely affect the availability of the snake's food items (Hansen 1988; Brode and Hansen 1992). For example, tilling, grading, harvesting and mowing may kill or injure giant garter snakes (Wylie *et al.* 1997). Biocides applied to control aquatic vegetation reduce cover for the snake and may harm prey species (Wylie *et al.* 1995). Rodent control threatens the snake's upland estivation habitat (Wylie *et al.* 1995; Wylie *et al.* 2004a). Restriction of suitable habitat to water canals bordered by roadways and levee tops renders snakes vulnerable to vehicular mortality (Wylie *et al.* 1997). Rolled erosion control products, which are frequently used as temporary berms to control and collect soil eroding from construction sites, can entangle and kill snakes (Stuart *et al.* 2001; Barton and Kinkead 2005). Livestock grazing along the edges of water sources degrades water quality and can contribute to the elimination and reduction of available quality snake habitat (Hansen 1988; E. Hansen, pers. comm. 2006), and giant garter snakes have been observed to avoid areas that are grazed (Hansen 2003). Fluctuation in rice and agricultural production affects stability and availability of habitat (Paquine *et al.* 2006; Wylie and Casazza 2001; Wylie *et al.* 2003b, 2004b).

Other land use practices also currently threaten the survival of the snake. Recreational activities, such as fishing, may disturb snakes and disrupt thermoregulation and foraging activities (E. Hansen pers. comm. 2006). While large areas of seemingly suitable snake habitat exist in the form of duck clubs and waterfowl management areas, water management of these areas typically does not provide the summer water needed by the species (Beam and Menges 1997; Dickert 2005; Paquin *et al.* 2006).

Nonnative predators, including introduced predatory game fish, bullfrogs, and domestic cats, can threaten snake populations (Dickert 2003; Hansen 1986; Service 1993; Wylie *et al.* 1995; Wylie *et al.* 2003c). Nonnative competitors, such as the introduced water snake (*Nerodia fasciata*) in

the American River and associated tributaries near Folsom, may also threaten the giant garter snake (Stitt *et al.* 2005).

The disappearance of giant garter snakes from much of the west side of the San Joaquin Valley was approximately contemporaneous with the expansion of subsurface drainage systems in this area, providing circumstantial evidence that the resulting contamination of ditches and sloughs with drainwater constituents (principally selenium) may have contributed to the demise of giant garter snake populations. Dietary uptake is the principle route of toxic exposure to selenium in wildlife, including giant garter snakes (Beckon *et al.* 2003). Many open ditches in the northern San Joaquin Valley carry subsurface drainwater with elevated concentrations of selenium, and green sunfish (*Lepomis cyanellus*) have been found to have concentrations of selenium within the range of concentrations associated with adverse effects on predator aquatic reptiles (Hopkins *et al.* 2002; Saiki 1998). Studies on the effects of selenium on snakes suggest that snakes with high selenium loads in their internal organs can transfer potentially toxic quantities of selenium to their eggs (Hopkins *et al.* 2004) and also demonstrate higher rates of metabolic activity than uncontaminated snakes (Hopkins *et al.* 1999).

Status with Respect to Recovery. The draft recovery plan for the giant garter snake subdivides its range into four proposed recovery units (Service 1999a): (1) Sacramento Valley Recovery Unit; (2) Mid-Valley Recovery Unit; (3) San Joaquin Valley Recovery Unit; and (4) South Valley Recovery Unit.

The Sacramento Valley Unit at the northern end of the species' range contains sub-populations in the Butte Basin, Colusa Basin, and Sutter Basin (Service 1999a; Service 2006). Protected snake habitat is located on State refuges and refuges of the Sacramento National Wildlife Refuge (NWR) Complex in the Colusa and Sutter Basins. Suitable snake habitat is also found in low gradient streams and along waterways associated with rice farming. This northernmost recovery unit is known to support relatively large, stable sub-populations of giant garter snakes (Wylie *et al.* 1995; Wylie *et al.* 1997; Wylie *et al.* 2002; Wylie *et al.* 2003a; Wylie *et al.* 2004a). Habitat corridors connecting subpopulations, however, are either not present or not protected, and are threatened by urban encroachment.

The Mid-Valley Unit includes sub-populations in the American, Yolo, and Delta Basins (Service 1999a; Service 2006). The status of Mid-Valley sub-populations is very uncertain; each is small, highly fragmented, and located on isolated patches of limited quality habitat that is increasingly threatened by urbanization (E. Hansen 2002, 2004; Service 1993; Wylie 2003; Wylie and Martin 2004; Wylie *et al.* 2004b; Wylie *et al.* 2005; G. Wylie pers. comm. 2006). The American Basin sub-population, although threatened by urban development, receives protection from the Metro Air Park and Natomas Basin Habitat Conservation Plans, which share a regional strategy to maintain a viable snake sub-population in the Natomas Basin.

The San Joaquin Valley Unit, which includes sub-populations in the San Joaquin Basin, formerly supported large snake populations, but numbers have severely declined, and recent survey efforts indicate numbers are extremely low compared to Sacramento Valley sub-populations (Dickert

2002, 2003; Hansen 1988; Williams and Wunderlich 2003; Wylie 1998a). Giant garter snakes currently occur in the northern and central San Joaquin Basin within the Grassland Wetlands of Merced County and the Mendota Wildlife Area of Fresno County; however, these sub-populations remain small, fragmented, and unstable, and are probably decreasing (Dickert 2003, 2005; G. Wylie pers. comm., 2006).

The South Valley Unit included sub-populations in the Tulare Basin, however, agricultural and flood control activities are presumed to have extirpated the snake from the Tulare Basin (Hansen 1995). Comprehensive surveys for this area are lacking and where habitat remains, the giant garter snake may be present.

Since 1995, BRD has studied snake sub-populations at the Sacramento, Delevan, and Colusa NWRs and in the Colusa Basin Drain within the Colusa Basin, at Gilsizer Slough within the Sutter Basin, at the Badger Creek area of the Cosumnes River Preserve within the Badger Creek/Willow Creek area of the Delta Basin, and in the Natomas Basin within the American Basin (Hansen 2003, 2004; Wylie 1998a, 1998b, 2003; Wylie *et al.* 1995; Wylie *et al.* 2002; Wylie *et al.* 2003a, 2004a; Wylie *et al.* 2003b, 2004b). These areas contain the largest extant giant garter snake sub-populations. Outside of protected areas, however, snakes are still subject to all threats identified in the final rule. The other sub-populations are distributed discontinuously in small, isolated patches, and are vulnerable to extirpation by stochastic environmental, demographic, and genetic processes (Goodman 1987).

The draft recovery criteria require multiple, stable sub-populations within each of the four recovery units, with sub-populations well-connected by corridors of suitable habitat. This entails that corridors of suitable habitat between existing snake sub-populations be maintained or created to enhance sub-population interchange to offset threats to the species (Service 1999a). Currently, only the Sacramento Valley Recovery Unit is known to support relatively large, stable giant garter snake populations. Habitat corridors connecting sub-populations, even in the Sacramento Valley Recovery Unit, are either not present or not protected. Overall, the future availability of habitat in the form of canals, ditches, and flooded fields are subject to market-driven crop choices, agricultural practices, and urban development, and are, thus, uncertain and unpredictable.

Environmental Baseline

American Basin. The proposed project is located within the American Basin snake population, in the Mid Valley Recovery Unit (Service 1999a). Seventy-nine CNDDDB (2007) records are known from the American Basin. These records include the Natomas Basin, the Middle-American Basin just north of the Natomas Cross Canal, Rio Oso and associated tributaries, as well as other locations within the Basin.

Within the greater American Basin, the Natomas Basin is bounded on the west by the Sacramento River levee, on the north by the Natomas Cross Canal (NCC), on the east by the Natomas East Main Drainage Canal (NEMDC), and on the south by the American River levee.

The NBHCP applies to the 53,537-acre (21,666-hectare) area interior to the toes of the levees surrounding the Natomas Basin, located in the northern portion of Sacramento County and the southern portion of Sutter County. The baseline analysis done for the NBHCP found that, as of 2001, the Natomas Basin supported approximately 24,567 acres (9,942 hectares) of aquatic giant garter snake habitat. Of that, approximately 96 acres (39 hectares) are ponds and seasonally wet areas, 22,693 acres (9,184 hectares) are rice fields, and 1,778 acres (720 hectares) are canals (CH2M Hill 2002).

The BRD conducted giant garter snake studies in the Natomas Basin, including areas owned and managed by The Natomas Basin Conservancy (TNBC) (Wylie 1998a; Wylie *et al.* 2000; Wylie *et al.* 2003b, 2004b). Eric Hansen is now over-seeing these surveys (Jones and Stokes 2005). Surveys have established the presence of giant garter snakes throughout the Basin, including nearly all the TNBC properties with suitable habitat for the snake. The TNBC's marsh and rice land preserves are being managed with the goal to maintain viable sub-populations of the giant garter snake and the NBHCP's other wetland dependent species. Density estimates in the Natomas Basin range from 6 to 64 snakes per mile (4 to 40 snakes per kilometer) depending on the trapping location (Wylie *et al.* 2004b). Wylie *et al.* (2003b) suggest that TNBC properties have the potential to provide habitat to sustain snake populations in the Natomas Basin. They propose that development of giant garter snake habitat on TNBC lands should proceed as quickly as practical. In the Sacramento Valley, water is being purchased from rice growers and exported to the south. Fallowing of land appears to reduce or eliminate snake capture success in adjacent canals (Wylie *et al.* 2004b). If land fallowed by water sales increases in the Basin, the habitat managed by TNBC becomes all the more important for protecting snake sub-populations (Wylie *et al.* 2004b). Also, development projects in the southern end of the Natomas Basin will eliminate local snake sub-populations, particularly when there is no avenue of escape from construction activity (Wylie *et al.* 2003b).

Biologists funded by the Sacramento Area Flood Control Agency are conducting population dynamics studies in the Middle-American Basin, which lies north of the NCC (Hansen 2003, 2004); the Natomas Basin lies to the south of the NCC. Most giant garter snakes in the Middle-American Basin occur near the NCC and Main Canal where more rice and aquatic habitat is available. However, no snakes have been found to move within or across the NCC itself, suggesting that snakes are not moving between the middle-American Basin and the Natomas Basin. If the NCC represents a barrier to movement within the greater American Basin, then giant garter snakes may be present in two separate and genetically isolated sub-populations, requiring separate conservation and management. This type of genetic differentiation is known in giant garter snakes as revealed by regional subdivision in mitochondrial DNA haplotypes (Paquin *et al.* 2006).

The BRD has conducted studies at Gilsizer Slough, surrounding lands, and associated irrigation canals (Wylie *et al.* 1995; Wylie *et al.* 1997). Giant garter snakes were shown to use canal, marsh, and rice habitat (Wylie *et al.* 1995; Wylie *et al.* 1997). Snakes were particularly associated with irrigated canals that had thickly vegetated slopes. Fifty-five percent of telemetered snakes used rice fields at some time (Wylie *et al.* 1997). Because of few recaptures

and no clearly defined capture/recapture events, estimation of total numbers of giant garter snakes in the Gilsizer area was not possible; however, BRD speculates that numbers may be in the hundreds. Much of the Gilsizer Slough area is protected by the State. Also, 162 acres (66 hectares) of the Slough is protected as a result of mitigation for the Wild Goose Gas Pipeline and State Route 70-Algodon Road Interchange projects.

Factors Affecting the Snake within the Action Area - A number of State, local, private, and unrelated Federal actions have occurred within the action area (Natomas Basin) and adjacent region affecting the environmental baseline of the species. Some of these projects have been subject to prior section 7 consultation. These actions have resulted in both direct and indirect effects to giant garter snake habitat within the region. Projects affecting the environment in and around the action area include bridge replacements over the NEMDC and Steelhead Creek at Main Avenue, the Lower Dry Creek and Robia Creek Levee Improvement project, the Lower Northwest Interceptor project, and the North Natomas Comprehensive Drainage project.

The Sacramento International Airport has recently changed landuse of lands they own north of the west runway. Until recently, this land had been leased to local farmers and has been actively farmed in rice. The Airport has not proposed any compensation nor have they initiated consultation with the Service in order to examine the effects the loss of this rice would have on giant garter snakes within the Natomas Basin. There is a loss of at least 617 acres of active rice that served as aquatic habitat for the giant garter snake on Airport property. The Airport has decided to not renew rice leases on this land based on a November 17, 2005, letter from the FAA which listed corrective actions they required the Sacramento County Airport to complete in order to avoid legal actions from the FAA. As of December 31, 2007, all of the leases for rice on SCAS lands were terminated. At the date of this biological opinion, the FAA has not initiated section 7 consultation with the Service on the effects to giant garter snakes of their Federal action to have the Sacramento County Airport terminate the rice leases.

On-going development within the Natomas Basin also affects the snake and its habitat. In February of 2002, the Service issued an incidental take permit (ITP) to the Metro Air Park Property Owners Association (MAPPOA) for development activities associated with the implementation of the Metro Air Park Habitat Conservation Plan (MAPHCP). On June 27, 2003, the Service issued ITPs to the City of Sacramento, Sutter County, and TNBC for activities associated with the implementation of the Final NBHCP (City of Sacramento *et al.* 2003). The TNBC is the plan operator responsible for acquiring and managing habitat mitigation lands for the MAPHCP and NBIICP. The MAPHCP and NBHCP permits authorized incidental take of the giant garter snake and several other species resulting from the development of 17,500 acres (7,082 hectares) of land in the Natomas Basin; of this, approximately 8,512 acres (3,445 hectares) is suitable giant garter snake habitat (*e.g.*, ponds, canals, and rice fields) (Service 2003). A key component of the MAPHCP and NBHCP's Operating Conservation Strategy (OCS) is the acquisition of 0.5 acre (0.2 hectare) of habitat mitigation lands for every acre of land developed within the permit areas. A total of 75 percent of the mitigation lands protected under the plans will be suitable for the giant garter snake, with 50 percent in rice fields and 25 percent restored to managed marsh. Once the MAPHCP and NBHCP permit areas have been built out,

approximately 6,562 acres (2,656 hectares) of habitat will have been acquired/restored and will be actively managed for the giant garter snake, including 4,375 acres (1,771 hectares) of rice fields and 2,187.5 acres (521 hectares) of managed marsh.

As of December 31, 2006, the City of Sacramento had authorized grading on 6,785 acres (2,746 hectares) in the NBHCP permit area; Sutter County had not issued any urban development permits in the NBHCP permit area. In September of 2003, MAPPOA graded 800 acres (324 hectares) of the Metro Air Park site to prepare the site for development. Of the disturbed area, 190.4 acres (77 hectares) will be immediately developed; the remaining area will revert to agricultural use until it is eventually developed. As of December 31, 2007, no additional land has been graded at Metro Air Park. As of December 31, 2007, TNBC had acquired 4,092 acres (1,656 hectares) of lands to mitigate the impacts of these two HCPs.

The Service and CDFG consider the entire Natomas Basin as potential habitat for the snake because the lands are of generally uniform character and capable of restoration. To survive in the Basin, giant garter snakes require large blocks of wetland and adjacent upland habitat distributed throughout three population centers and connected to each other through a system of canals and other aquatic features. Brode and Hansen (1992) stated that the Basin provides the most important habitat remaining for the snake and observed that snake habitat within the Basin occurs in three large areas that are separated by major highways. Area 1 is defined as lands north of I-5 and west of State Route 99/70 (SR 99/70). Important habitat areas include Prichard Lake, the North Drain Canal, and its associated rice fields. Area 2 is defined as the lands south and west of I-5, and its most important habitat area is Fisherman's Lake. Area 3 is defined as the lands east of I-5 and SR 99/70. The most important component of Area 3 is "Snake Alley", an area comprised of the North Main Canal and its associated rice fields and irrigation ditches on the east side of SR 99/70. The authors hypothesized that snakes could move between the three areas through large box culverts under the major highways. Brode and Hansen (1992) attributed the snake's continued success in the Basin to the numerous irrigation ditches, rice fields, and especially the extensive network of irrigation canals, feeder canals, and drains. The authors concluded by presenting a conceptual conservation plan for the snake in the Basin. This plan was based upon a minimum of one core habitat in each of the geographic areas with connecting canals to ensure snakes could move between each of the three areas. The Corps and SAFCA's proposed project is located in portions of all three areas. Much of the borrow and construction would occur within Area 1 along the Sacramento River east levee and near the North Main Canal and Area 2 adjacent to Fisherman's Lake and along the West Drainage Canal.

The continuing practice of fallowing rice fields on and around Airport property due to FAA corrective actions letter, and throughout the Natomas Basin, threatens the viability of giant garter snake populations and the effectiveness of the NBHCP OCS. Irrigated rice is important as foraging, shelter, and basking habitat for the snake. Rice may serve a particularly important role for snakes in the Natomas Basin as compared to its role as habitat in other parts of the species range. Rice, and other wetlands, adjacent to the ditches and canals may serve as vital nursery habitat for young giant garter snakes and as "way stations" for snakes as they make their way through the extensive ditch and canal system in the Natomas Basin. In particular, rice may be an

important resource for juvenile giant garter snakes by providing large amounts of cover and small prey for the juveniles to feed on late in the summer.

According to the CNDDDB (2008), there are 40 records of giant garter snakes within the Natomas Basin and all of them are within 5 miles of the proposed project. Giant garter snakes have been documented on and directly adjacent to portions of the project area and within canals and ditches in the general area that are hydrologically connected with the aquatic features on the proposed project site. As described in the *Movements and Habitat Use* section of this biological opinion, snakes can travel considerable distances over the course of days and years in both aquatic and uplands habitats.

The proposed project area contains habitat components suitable for giant garter snake feeding, resting, mating, and other essential behaviors, as well as for movement corridors. Because of the biology and ecology of the giant garter snake, the presence of suitable habitat within the proposed project, and observations of the species, the Service has determined that the giant garter snake is reasonably certain to occur within the action area and be affected by the proposed project.

Valley Elderberry Longhorn Beetle

Status of the Species

Listing. The beetle was listed as a threatened species under the Act on August 8, 1980 (45 FR 52803). Critical habitat for the species was designated and published in 50 CFR §17.95. Two areas along the American River in the Sacramento metropolitan area have been designated as critical habitat for the beetle. The first area designated as critical habitat for this species is along the lower American River at River Bend (formerly Goethe) and Ancil Hoffman parks (American River Parkway Zone) and the second area is at the Sacramento Zone, an area about a half mile from the American River downstream from the American River Parkway Zone. In addition, an area along Putah Creek, Solano County, and the area west of Nimbus Dam along the American River Parkway, Sacramento County, are considered essential habitat, according to *The Valley Elderberry Longhorn Beetle Recovery Plan* (USFWS 1984). These critical habitat areas and essential habitat areas within the American River parkway and Putah Creek support large numbers of mature elderberry shrubs with extensive evidence of use by the beetle.

Life History. The elderberry shrub (*Sambucus* sp.) is the sole host plant for the valley elderberry longhorn beetle. Elderberries are locally common components of the remaining riparian forest and savannah landscapes, and to a lesser extent the mixed chaparral-foothill woodlands, of the Central Valley. The occupancy rates of the beetle are reduced in non-riparian habitats (e.g., Talley *et al.* in press), indicating that riparian elderberry habitat an important habitat type for the beetle.

Use of elderberry shrubs by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the shrub's use by the beetle is an exit hole created by the larva emerging just prior to the pupal stage. Observations of elderberry shrubs along the Cosumnes River and in the

Folsom Lake area indicate that larval beetles can be found in elderberry stems with no apparent exit holes; the larvae either succumb prior to constructing an exit hole or not developed sufficiently to construct one. Larvae appear to be distributed in stems which are 1.0 inch or greater in diameter at ground level and can occur living stems. *The Valley Elderberry Longhorn Beetle Recovery Plan* (USFWS 1984) and Barr (1991) further describe the beetle's life history.

Population Structure. The beetle is a specialist on elderberry plants, and tends to have small population sizes and occurs in low densities (Barr 1991; Collinge *et al.* 2001). It has been observed feeding upon both blue and red elderberry (USFWS 1984, Barr 1991) with stems greater than or equal to one inch in diameter (Barr 1991). Sightings of the beetle are rare and in most circumstances, evidence of the beetle is derived from the observation of the exit holes left when adults emerge from elderberry stems. The beetle tends to occur in areas with higher elderberry densities, but has lower exit hole densities than a closely related species, the California elderberry longhorn beetle (Collinge *et al.* 2001).

Distribution and Range. When the beetle was listed in 1980, the species was known from less than ten localities along the American River, the Merced River, and Putah Creek. By the time the *Valley Elderberry Longhorn Beetle Recovery Plan* was prepared in 1984, additional occupied localities had been found along the American River and Putah Creek. As of 2005, the California Range wide distribution extends from the Sacramento River in Shasta County, southward to an area along Caliente Creek in Kern County (CNDDB 2005). The CNDDB contained 190 occurrences for this species in 44 drainages throughout the Central Valley. However, the number of records should be viewed with caution as a record does not necessarily indicate a unique population. In many cases, there are multiple records within close proximity to one another within the same watershed or river. For example, 24 records are known within two miles of the American River (CNDDB 2006).

The beetle is considered a poor disperser based on the spatial distribution of occupied shrubs (Barr 1991; Collinge *et al.* 2001). Huxel and Hastings (1999) used computer simulations of colonization and extinction patterns based on differing dispersal distances, and found that the short dispersal simulations best matched the 1997 census data in terms of site occupancy. This suggests that dispersal and colonization are limited to nearby sites. At spatial scales greater than 6.2 miles, such as across drainages, beetle occupancy appears to be strongly influenced by regional extinction and colonization processes, and colonization is constrained by limited dispersal (Collinge *et al.* 2001; Huxel and Hastings 1999). Except for one occasion, drainages examined by Barr that were occupied in 1991, remained occupied in 1997 (Collinge *et al.* 2001; Huxel and Hastings 1999). The one exception was Stoney Creek, which was occupied in 1991, but not in 1997. All drainages found by Barr (1991) to be unoccupied in 1991, were also unoccupied in 1997. Collinge *et al.* (2001) further found that while the proportions of occupancy were similar, the number of sites examined containing elderberry and the density of elderberry at sites had decreased since Barr (1991), resulting in fewer occupied sites and groups. Studies suggest that the beetle is unable to re-colonize drainages where the species has been extirpated, because of its limited dispersal ability (Barr 1991; Collinge *et al.* 2001). This data suggests that drainages unoccupied by the beetle remain unoccupied.

Reasons for Decline and Threats to Survival. The beetle continues to be threatened by habitat loss and fragmentation, predation by the non-native Argentine ants (*Linepithema humile*) (Holway 1998; Huxel 2000; Huxel and Hastings 1999; Huxel *et al.* 2001; Ward 1987), and possibly other factors such as pesticide drift, non-native plant invasion, improper burning regimes, off-road vehicle use, rip-rap bank protection projects, wood cutting, and over-grazing by livestock.

Habitat Loss - Habitat destruction is one of the most significant threats to the beetle. Riparian forests, the primary habitat for the beetle, have been severely depleted throughout the Central Valley over the last two centuries as a result of expansive agricultural and urban development (Huxel *et al.* 2001; Katibah 1984; Roberts *et al.* 1977; Thompson 1961). As of 1849, the rivers and larger streams of the Central Valley were largely undisturbed. They supported continuous bands of riparian woodland four to five miles in width along some major drainages, such as the lower Sacramento River, and generally about two miles wide along the lesser streams (Thompson 1961). Most of the riverine floodplains supported riparian vegetation to about the 100-year flood line (Katibah 1984).

A large human population influx occurred after 1849, however, and much of the Central Valley riparian habitat was rapidly converted to agriculture and used as a source of wood for fuel and construction to serve a wide area (Thompson 1961). The clearing of riparian forests for fuel and construction made this land available for agriculture (Thompson 1961). Natural levees bordering the rivers, once supporting vast tracts of riparian habitat, became prime agricultural land (Thompson 1961). As agriculture expanded in the Central Valley, needs for increased water supply and flood protection spurred water development and reclamation projects. Artificial levees, river channelization, dam building, water diversion, and heavy groundwater pumping further reduced riparian habitat to small, isolated fragments (Katibah 1984). In recent decades, these riparian areas have continued to decline as a result of ongoing agricultural conversion as well as urban development and stream channelization. As of 1989, there were over 100 dams within the Central Valley drainage basin, as well as thousands of miles of water delivery canals and streambank flood control projects for irrigation, municipal and industrial water supplies, hydroelectric power, flood control, navigation, and recreation (Fraye *et al.* 1989). Riparian forests in the Central Valley have dwindled to discontinuous strips of widths currently measurable in yards rather than miles.

Some accounts state that the Sacramento Valley supported approximately 775,000 to 800,000 acres of riparian forest as of approximately 1848, just prior to statehood (Smith 1977; Katibah 1984). No comparable estimates are available for the San Joaquin Valley. Based on early soil maps, however, more than 921,000 acres of riparian habitat are believed to have been present throughout the Central Valley under pre-settlement conditions (Huxel *et al.* 2001; Katibah 1984). Another source estimates that of approximately 5,000,000 acres of wetlands in the Central Valley in the 1850s, approximately 1,600,000 acres were riparian wetlands (Warner and Hendrix 1985; Frayer *et al.* 1989).

Based on a California Department of Fish and Game riparian vegetation distribution map, by 1979, there were approximately 102,000 acres of riparian vegetation remaining in the Central Valley. This represents a decline in acreage of approximately 89 percent as of 1979 (Katibah 1984). More extreme figures were given by Frayer *et al.* (1989), who reported that woody riparian forests in the Central Valley had declined to 34,600 acres by the mid-1980s (from 65,400 acres in 1939).

An even more recent analysis, completed by The Central Valley Historic Mapping Project, observed similar decreases in the amount of riparian habitat (Geographic Information Center 2003). Loss of riparian habitat between 1900 and 1990 in the Central Valley was about 96% in the southern portion of the Valley (Kern County to Fresno County) (16,000 acres remaining), 84% in the middle Valley (Merced County to San Joaquin County) (21,000 acres remaining) and 80% in the northern Valley (Sacramento and Solano counties to Shasta County) (96,000 acres remaining). Although these studies have differing findings in terms of the number of acres lost (most likely explained by differing methodologies), they attest to a dramatic historic loss of riparian habitat in the Central Valley.

Habitat Fragmentation - Destruction of riparian habitat in central California has resulted not only in a significant acreage loss, but also has resulted in beetle habitat fragmentation. Fahrig (1997) states that habitat fragmentation is only important for habitats that have suffered greater than 80 percent loss. Riparian habitat in the Central Valley, which has experienced greater than 90 percent loss by most estimates, would meet this criterion as habitat vulnerable to effects of fragmentation. Existing data suggests that beetle populations, specifically, are affected by habitat fragmentation. Barr (1991) found that small, isolated habitat remnants were less likely to be occupied by beetles than larger patches, indicating that beetle subpopulations are extirpated from small habitat fragments. Barr (1991) and Collinge *et al.* (2001) consistently found beetle exit holes occurring in clumps of elderberry bushes rather than isolated bushes, suggesting that isolated shrubs do not typically provide long-term viable habitat for this species.

Habitat fragmentation can be an important factor contributing to species declines because: (1) it divides a large population into two or more small populations that become more vulnerable to direct loss, inbreeding depression, genetic drift, and other problems associated with small populations; (2) it limits a species' potential for dispersal and colonization; and (3) it makes habitat more vulnerable to outside influences by increasing the edge:interior ratio (Primack 1998).

Small, isolated subpopulations are susceptible to extirpation from random demographic, environmental, and/or genetic events (Shaffer 1981; Lande 1988; Primack 1998). While a large area may support a single large population, the smaller subpopulations that result from habitat fragmentation may not be large enough to persist over a long time period. As a population becomes smaller, it tends to lose genetic variability through genetic drift, leading to inbreeding depression and a lack of adaptive flexibility. Smaller populations also become more vulnerable to random fluctuations in reproductive and mortality rates, and are more likely to be extirpated by random environmental factors. When a sub-population becomes extinct, habitat fragmentation

reduces the chance of recolonization from any remaining populations. The effect of habitat fragmentation likely is exacerbated by the poor dispersal abilities of the beetle (Collinge *et al* 2001; Talley 2005).

Habitat fragmentation not only isolates small populations, but also increases the interface between habitat and urban or agricultural land, increasing negative edge effects such as the invasion of non-native species (Huxel *et al.* 2001; Huxel 2000) and pesticide contamination (Barr 1991). Several edge effect-related factors may be related to the decline of the beetle.

Predation - The invasive Argentine ant (*Linepithema humile*) is a potential threat to the beetle (Huxel 2000). This ant is both an aggressive competitor and predator on native fauna that is spreading throughout riparian habitats in California and displacing assemblages of native arthropods (Ward 1987; Human and Gordon 1997; Holway 1998). The Argentine ant requires moisture and it may thrive in riparian or irrigated areas. A negative association between the presence of the ant and beetle exit holes was observed along Putah Creek in 1997 (Huxel 2000). This aggressive ant could interfere with adult mating or feeding behavior, or prey on eggs and larvae (e.g., Way *et al.* 1992). Surveys along Putah Creek found beetle presence where Argentine ants were not present or had recently colonized, but the beetle was absent from otherwise suitable sites where Argentine ants had become well-established (Huxel, in prep.). Between 1998 and 2002, the number of sites infested by the Argentine ant increased by 3 along Putah Creek and the American River (30 sites total were examined) (Huxel 2000; Holyoak and Talley 2001). The Argentine ant has been expanding its range throughout California since its introduction around 1907, especially in riparian woodlands associated with perennial streams (Holway 1998; Ward 1987). Huxel (in prep.) concluded that, given the potential for Argentine ants to spread with the aid of human activities such as movement of plant nursery stock and agricultural products, this species may come to infest most drainages in the Central Valley along the valley floor, where the beetle is found.

The beetle is also likely preyed upon by insectivorous birds, lizards, and European earwigs (*Forficularia auricularia*) (Klasson *et al.* 2005). These three predators move freely up and down elderberry stems searching for food. The European earwig is a scavenger and omnivore that was often found feeding on tethered mealworm (*Tenebrio monitor*) larvae. The earwig may be common in riparian areas and it may lay its eggs in dead elderberry shrubs. The earwig, like the Argentine ant, requires moisture and is often found in large numbers in riparian and urban areas. Earwig presence and densities tended to be highest in mitigation sites likely because of the irrigation, although this needs to be statistically tested (Klasson *et al.* 2005).

Pesticide Drift - Direct spraying with pesticides and related pesticide drift is a potentially harmful factor for the beetle. A wide range of such spraying is done to control mosquitoes, crop diseases, and undesirable plants and insects. Although there have been no studies specifically focusing on the direct and indirect effects of pesticides on the beetle, evidence suggests that the species may be adversely affected by some pesticide applications. Commonly used pesticides within the range of the beetle include insecticides, most of which are broad-spectrum and likely toxic to the beetle; herbicides, which may harm or kill its host elderberry plants; and broad-spectrum

pesticides toxic to many forms of life. The greatest pesticide use occurs in the San Joaquin Valley. Four counties in this region had the highest use: Fresno, Kern, Tulare, and San Joaquin (CDPR 2006). The peak timing of application depends on the chemical agent and other factors including the activity period of the targeted pest insects; the use of the agents may coincide with the most vulnerable period of beetle adult activity, egg-laying and initial larval exposure on the outside of elderberry stems (Talley *et al.* 2006). The California Department of Pesticide Regulation (CDPR) in 1997 listed 239 pesticide active ingredients applied in proximity to locations of beetle (same square mile per Marovich and Kishaba 1997 cited in Talley *et al.* 2006). Pesticide active ingredients sold in California have averaged on the order of 600 million pounds per year since about 1998 (CDPR 2006).

Pesticide use reported to the CDPR is only a fraction of the pesticides sold in California each year. About two-thirds of the active ingredients sold in a given year are not subject to use reporting, including home-use pesticide products. Recent studies of major rivers and streams documented that 96 percent of all fish, 100 percent of all surface water samples and 33 percent of major aquifers contained one or more pesticides at detectable levels (Gilliom 1999). Pesticides were identified as one of the 15 leading causes of impairment for streams included on the Clean Water Act section 303(d) lists of impaired waters. Because the beetle occurs primarily in riparian habitat, the contamination of rivers and streams likely has affects on this species and its habitat. Given the amount and scope of pesticide use, along with unreported household and other uses, and the proximity of agriculture to riparian vegetation in the Central Valley, it appears likely that pesticides are affecting the beetle and its elderberry habitat.

Invasive Plant Species - Invasive exotic plant species may significantly alter the habitat of the beetle. Without adequate eradication and control measures these non-native species may eliminate elderberry shrubs and other native plants. Pest plants of major importance in Central Valley riparian systems include black locust (*Robinia pseudoacacia*), giant reed (*Arundo donax*), red sesbania (*Sesbania punicea*), Himalayan blackberry (*Rubus armeniacus*), tree of heaven (*Ailanthus altissima*), Spanish broom (*Spartium junceum*), Russian olive (*Eleagnus angustifolia*), edible fig (*Ficus carica*), and Chinese tallowtree (*Sapium sebiferum*). Non-woody invasives such as ripgut brome (*Bromus diandrus*), foxtail barley (*Hordeum murinum*), *Lolium multiflorum*, and starthistle/knapweed (*Centaurea* spp.) also may impair elderberry germination or establishment, or elevate the risk of fire. Invasive plant control efforts often are limited by funding, labor, coordination with landowners, and the resilience and spread of their target plants. No rangewide assessment has been completed on the overall degree of impact of invasive plants on the beetle and its habitat. However, there are a number of local efforts to control invasive riparian plant species. For example, the American River Parkway has invasive species removal efforts by Sacramento Weed Warriors (a community stewardship project associated with the California Native Plant Society) and others, and the Cosumnes River Preserve has a group of volunteers who regularly remove exotics and restore native habitats (Talley *et al.* 2006).

Other Threats - Several other factors may threaten the beetle including fire, flooding, and overgrazing by livestock. The condition of elderberry shrubs can be adversely affected by fire, which is often common at the urban-wildland interface. Brush fires initially have a negative effect on

shrub condition and, therefore, beetle larvae through direct burning and stem die-off. A year after fire, however, surviving elderberry resprout and display rapid stem growth (Crane 1989). Fires often scarify the hard elderberry seed coat leading to germination of seedlings the following season (Crane 1989). Frequent or repeated fire, however, may kill remaining shoots, root crowns and seeds, causing elderberry to be eliminated from an area for many years since recruitment by seeds is patchy and generally slow (Crane 1989). Elderberry shrubs appeared suitable for the beetle two to six years after burning, but were often uninhabited, with the presence of old, burned exit holes suggesting pre-burn occupancy and post-burn vacancy (Talley *et al.* 2006.). The post-fire lag in occupancy is likely the result of the limited movements of the beetle. Beetle occupancy occurred six to seven years post burn and, as in the alluvial plain of the American River Parkway, is about the same within the post-burn compared with unburned areas (Talley *et al.* in press). No quantitative studies of the net effects of fire on the ν beetle have been undertaken (e.g., examining beetle and elderberry through time after burns or in areas with varying burn frequencies and magnitude).

The beetle can tolerate flooding of its riparian habitat. The animal has higher occupancy rates in riparian than non-riparian habitats, and associations between the beetle and proximity to rivers were either not observed or there was a weak positive correlation with nearness to the river (Halstead and Oldham 1990; Talley 2005; Talley *et al.* in press). These findings illustrate that the beetle is not likely harmed by flooding and that higher habitat quality may be associated with rivers. In addition, if elderberry, a facultative riparian shrub, can withstand flooding, then the beetle likely will survive these events. Most floods occur during winter or early spring when the beetle is in its early life history stages, so that the effects of floods are even less likely to affect the beetle. If the shrub is exposed to prolong flooding (i.e. anoxia) and becomes severely stressed, then the beetle may be affected. The duration and magnitude of flooding at which elderberry stresses is uncertain and the levels of stress that affect the beetle is also unknown. Elderberry shrubs have adaptations that plants use to persist with flooding such as lenticels and aerenchyma, demonstrating that it is probably at least somewhat flood tolerant. Finally, if an area is flooded too frequently so that elderberry cannot survive then no beetles would be able to inhabit the area (Talley 2005).

Another potential factor in the beetle's decline is the effects of inappropriate levels of livestock grazing, which can result in destruction of entire elderberry plants and inhibition of elderberry regeneration. Cattle, sheep and goats readily forage on new elderberry growth, and goats will consume even decadent growth. Well-manicured stands of elderberries, such as occurs due to livestock grazing, have generally been shown to have a relative absence of beetles (USFWS 1984). The effects on the beetle of both grazing and exotic plant invasions are likely significantly exacerbated by the problem of habitat fragmentation of elderberries. Such fragmentation increases the edge:interior ratio of habitat patches, thereby facilitating the adverse effects of these outside influences.

Environmental Baseline

The beetle currently inhabits the Central Valley from southern Shasta County south to Kern County in the San Joaquin Valley (Barr 1991; Talley *et al.* 2006). Within this range, there are approximately 190 records of the animal, largely based on exit holes, (CNDDB 2006; Talley *et al.* 2006).

The beetle was listed as a threatened species due to the loss of its riparian habitat (USFWS 1980). Quantifying the loss of elderberry shrubs as a result of the agricultural and urban development over the past 200 years is near impossible. However, recent studies have identified plant communities that are associated with elderberry (Vaghti *et al.* submitted) and estimating loss of these communities offers insight into the loss of the beetle and its habitat. Lang *et al.* (1989) observed fewer numbers of elderberry shrubs in the lower reach (i.e., between Sacramento and Colusa) of the Sacramento River than the northern reach (i.e., Chico to Red Bluff). They attributed this difference to the loss of elderberry shrubs and riparian habitat in the southern reach of the Sacramento River as a result of extensive flood control activities such as the construction and maintenance of levees. The Central Valley Historic Mapping Project (Geographic Information Center 2003) observed similar decreases in the amount of riparian habitat. Loss of riparian habitat between 1900 and 1990 in the Central Valley was about 96% in the southern portion of the Valley (Kern County to Fresno County) (16,000 acres remaining), 84% in the middle Valley (Merced County to San Joaquin County) (21,000 acres remaining) and 80% in the northern Valley (Sacramento and Solano counties to Shasta County) (96,000 acres remaining).

In addition to the riparian habitat loss described by Lang *et al.* (1989), both the number of sites with elderberry shrubs and the density of elderberry within sites decreased between studies of the same areas in 1991 and 1997 which resulted in a lower number of occupied sites and shrub groups (Barr 1991; Collinge *et al.* 2001). Holyoak and Talley (2001) investigated natural recruitment and mortality rates of elderberry at seven sites along Putah Creek and the American River that had been previously sampled by Collinge *et al.* (2001). They observed that mortality and recruitment rates were similar between the two areas, illustrating that elderberry shrubs likely replace themselves in these relatively undisturbed areas.

In the northern portion of the beetle's range along the Sacramento River and 13 of its tributaries (including lands in Butte, Placer, Sacramento, Shasta, Sutter, Tehama, Yolo and Yuba counties), the beetle occurs in drainages that function as distinct, relatively isolated metapopulations (Collinge *et al.* 2001). Half of the 14 drainages in the Sacramento Valley surveyed by Barr (1991) in 1991 and again by Collinge *et al.* (2001) in 1997 remained unoccupied in both studies. The beetle experienced extirpation in two drainages and neither were recolonized. Collinge *et al.* (2001) concluded that because of dispersal limitations, unoccupied drainages were likely to remain unoccupied and those where the resident beetle population became extirpated were not likely to be recolonized. One of the implications of their results for conservation was that there is little chance that natural populations would recover following declines (Collinge *et al.* 2001).

The increase in the amount of riparian habitat through restoration and compensation efforts is valuable, but remains small in comparison to estimated historic losses of the habitat. Approximately 50,000 acres of existing riparian habitat has been protected in the Sacramento and San Joaquin Valley since 1980. In addition, approximately 5,000 acres of habitat has been restored for the benefit of the beetle (including planting of elderberries) and another 1,600 acres of riparian habitat has been restored however, no elderberry plantings were included (Talley *et al.* 2006). An undetermined amount of additional habitat has been restored as a result of compensation for section 7 projects. Despite the efforts of a number of agencies and organizations, the 5,000 acres of restoration activities is less than 1 percent of the estimated 890,000 acres of the historic riparian habitat lost in the Central Valley. Loss of the beetle and its habitat continues, including conversion of agricultural lands, urban development and other activities that are often unreported. The ability of restoration and enhancement of conservation sites to fully compensate for adverse effects to the animal and its lost remnant natural habitat, is uncertain (Holyoak *et al.* in press).

Evidence of the beetle, in the form of exit holes, have been found within some of the elderberry shrubs which would be transplanted as part of work under Phase 2. Additionally, evidence of valley elderberry longhorn beetles was documented in the California Natural Diversity Database 2008, along the Sacramento River in the southern portion of the Natomas Basin. The action area contains components that can be used by the listed animal for feeding, resting, mating, and other essential behaviors. Therefore, the Service believes that the valley elderberry longhorn beetle is reasonably certain to occur within the action area because of the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the action area, as well as recent observations of this listed species.

Effects of the Proposed Action

Giant garter snake

Direct Effects

Overall Project

Land use changes due to SAFCA's project include the permanent loss of up to 299.65 acres of row and field crop, 78.48 acres of fallow agricultural fields (some of which was previously active rice), 45.03 acres of orchard, 127.98 acres of rice, and 30.37 acres of open water and other non-canal wetlands. The project includes a gain of 89.11 acres of woodland, 356.12 acres of grassland, 72.98 acres of managed marsh, and 65.88 acres of canals.

Depending on how the grasslands are managed, the conversion of row crop and fallow agricultural fields to grassland could be beneficial to giant garter snakes. Agricultural areas typically have high levels of disturbance due to crop maintenance and harvesting activities. Mortality of snakes by farm equipment would be highly likely. Fallow agricultural fields may lack adequate cover for snakes and increase the risk of predation. Some of the grassland would

be created on the slopes of the new levees and berms. While these grasslands would be subject to greater human disturbance than non-levee grasslands, due to maintenance requirements from the Corps, they would still suffer less disturbance than an active agricultural field. Flood control structures need to allow easy visual inspection from the top of the levee during the spring and fall. While RDs have varying ways of complying with this requirement, SAFCA is proposing to have RD 1000 mow levee slopes to a height which would allow for visual inspection but also be high enough to reduce the chance of coming into contact with a snake. The Corps also requires that the levee slopes receive rodent control measures to keep ground burrowing mammals from burrowing into the sides of the levee. This could include grouting ground squirrel holes closed, which would remove potential hibernacula for giant garter snakes in the winter months to using a rodenticide which would lessen the number of ground squirrels in the area.

Giant garter snakes are not typically found in orchards because of the high amount of overstory cover, therefore there would be a benefit to giant garter snake due to the loss of 45.03 acres of orchard habitat. However, SAFCA proposes to create an additional 89.11 acres of woodland to compensate for effects to Swainson's hawk nesting trees. It is not expected that giant garter snakes will use dense woodland areas. Therefore, this represents a net loss of 44.08 acres of habitat that is not expected to be used by giant garter snakes.

Because of the project, 72.98 acres of rice would be permanently converted to an upland habitat type. The SAFCA has proposed to compensate for the loss of rice by creating 70 acres of managed marsh on 55 acres of existing rice fields and 15 acres of annual grassland near Fisherman's Lake. Overall there would be a loss of 127.98 acres of rice from the Natomas Basin. Additionally, there will be a temporary loss of rice within the Natomas Basin due to borrow excavation from the Brookfield site. A total of 353 acres of rice would be unavailable for giant garter snakes in the Natomas Basin for one year due to borrow activities. The loss of rice reduces the amount and availability of habitat, including summer water, for the snake. Due to the large amount of rice that has been fallowed in the Natomas Basin (37 percent loss of active rice between 2004 and 2007), any additional loss of rice, even for 1 season, has a direct effect on giant garter snakes. Flooded rice fields act as seasonal marshes and produce high numbers of tadpoles, frogs and mosquitofish. Effects associated with reduced available summer water in the form of rice field habitat also include displacement of individual giant garter snakes from familiar habitat areas and result in giant garter snakes foraging over a wider area. Giant garter snakes may move to other areas of suitable habitat, but will encounter increased mortality from vehicles, exposure to temperature extremes, predation, and human disturbance while migrating to new areas. Migrating snakes or snakes using a larger foraging area may displace resident snakes or compete for food and shelter resources with resident snakes, resulting in reduced survivorship and fecundity of both resident and immigrant snakes.

Adverse effects from the reduction of rice fields may be greatest for gravid females, juveniles, and neonate snakes. Gravid females spend significant time basking in mid to late summer while incubating young, and thus may have reduced survivorship or fecundity if displaced from familiar retreats and basking sites (giant garter snakes are live bearers and contribute significant resources to brooding offspring). Abundant food resources are also essential for females to both

recover body mass after giving birth and to survive the overwintering period when the snakes do not forage. Abundant food resources are also essential to the survival of juveniles and neonates. Giant garter snakes typically double their weight in the first year, with rapid growth likely necessary to reach a size class no longer susceptible to predation by non-native predatory fish and bullfrogs. The reduced availability of rice fields will result in less small prey for young snakes, which would inhibit growth, result in delayed sexual maturation and decreased births and recruitment of individuals into the population. This could potentially skew the age structure of the population to older giant garter snakes. Juveniles and neonates also rely on developing sufficient body mass prior to overwintering in order to survive long periods without foraging. Temporary or permanent loss of rice fields will not only remove habitat, but will also have adverse effects on reproduction, recruitment, and survival of the snake that will continue to affect giant garter snake populations well beyond the project time frame.

To offset the effects of the permanent loss of 127.98 acres of rice and the temporary effects to 356 acres of rice in the basin, SAFCA proposes to create 72.98 acres of managed marsh and permanently protect 175 acres of rice. Managed marsh has the capability to provide higher quality habitat for giant garter snakes because the habitat is available for the snake year round, will be subject to less human disturbance from farming activities, protected in perpetuity with a Conservation Easement, and will hold water for longer periods of time than a rice field typically does. Providing protection in perpetuity in the form of a Conservation Easement on 175 acres of rice fields would also benefit the snake because the rice farming at this site would be managed by TNBC and would assure more "snake-friendly" rice habitat than a typical rice field.

SAFCA proposes to affect 14 acres of irrigation and drainage canals that are vitally important for giant garter snakes both for foraging and movement within the basin. The loss of a canal within the basin even for a single season could have a large detrimental effect to giant garter snakes and their ability to access areas within the Natomas Basin for foraging and cover. To minimize any temporal effects of filling irrigation and drainage ditches, SAFCA has proposed to construct the replacement irrigation canals and GGS/Drainage Canal before most of the fill of existing ditches and canals occurs, providing some time for habitat development before the loss. In some cases these canals would be created a full year in advance of filling existing canals. Additionally, SAFCA has proposed to create better aquatic canal habitat for giant garter snakes by assuring that the new GGS/Drainage Canal would have a minimum water depth of 4.5 feet between April and October, which is the active season for the giant garter snake. This reliable water supply will provide a corridor between TNBC reserves in the Fisherman's Lake area and reserves along the North Drainage Canal in the northwestern portion of the Natomas Basin. About 31.24 acres of giant garter snake canal and 38.43 acres of irrigation canal would be created with this project. An integral part of the GGS/Drainage Canal is 10.21 acres of the benches that would be created intermittently along the canal. These benches would be inundated in the summer months and allow for the growth of vegetation which would provide both cover and a food source for giant garter snakes. While the canal itself provides connectivity between two core areas for giant garter snakes, the benches along the canal would provide the food source, cover, and potential nursery grounds for snakes as they travel between the two areas.

SAFCA proposes to purchase long-term water contracts from NCMWC to provide water for both the managed marsh and GGS/Drainage Canal. While the Service expects the GGS/Drainage Canal to provide benefits to giant garter snakes in the Natomas Basin by providing connectivity and offsetting the effects of their project, there is some concern regarding the long term protection of the canal because the project description does not provide a Conservation Easement on this feature. The SAFCA has assured the Service that it can provide the necessary protection through another type of easement for the giant garter snake and the Service is willing to work with SAFCA to create the language for the easement that satisfies all of the interested parties. However, it is the Service's preference that a Conservation Easement be placed on this feature and if agreement cannot be reached on the language of the easement, than the Service will have to reanalyze their effects and the GGS/Drainage Canal would be viewed as a minimization measure for their effects not a compensation measure.

Phase 2 Construction

Phase 2 construction includes work along the NCC and reaches 1-4B along the Sacramento River east levee. The Corps and SAFCA have proposed to complete the majority of the work during the active season of the giant garter snake (May 1 to October 1). Construction during this time would occur in 61.1 acres of developed land, 139.6 acres of annual grassland, 645.5 acres of row and field crop and fallow agriculture, 1.5 acres of orchard, 185 acres of rice (25 would be a permanent effect, 160 acres would be a temporary effect), 2 acres of canals and ditches, 22 acres of open water and other non-canal wetlands, and 10.3 acres of woodland. At the end of the construction season the proposed land cover types will be 53.5 acres of developed land, 30 acres of created woodland, 15.85 acres of preserved woodland, 168 acres of levee slope grassland, 123 acres of grassland on seepage berms and canal embankments, 19 acres of irrigation canal, 13.5 acres of GGS/Drainage Canal, and 175 acres of preserved rice. The newly created cover-types with the project would protected from future development through either a flood control easement, conservation easement, or drainage easement.

Phase 2 construction would primarily occur between May 1 and October 1. The only components of Phase 2 work which would occur outside of the giant garter snake's active season would be relocation of power poles, relocation of private irrigation pipelines, canals, and wells, and the removal, transplantation, and/or planting of trees and elderberry shrubs that are located in the Phase 2 footprint. To reduce the likelihood of disturbing or killing a giant garter snake that may be overwintering in uplands that would be affected this winter, SAFCA has proposed to erect exclusionary fencing around the areas where they would be working prior to October 1. This fence would be monitored daily prior to and during construction to insure that there are no breaches that a snake could get through. This should remove the chance that project construction would kill giant garter snakes when they are working in the winter months.

The remainder of the project would be constructed during the active period (May 1 – October 1) for the snake, resulting in a decreased risk of direct mortality of snakes. However, given the number of acres of aquatic and upland giant garter snake habitat affected within Phase 2, it is highly likely effects to snakes would include removal of cover and basking sites, filling or crushing of burrows or crevices, obstructing snake movement, and decreasing the prey base, and

may result in the direct disturbance, displacement, injury, and/or mortality of snakes. Snakes may disperse across or may bask on existing roads, and thus may be killed or injured by construction equipment or other vehicles accessing the project site.

Compensation for the loss of rice in Phase 2 would occur during Phase 4 with the creation of 72.98 acres of managed marsh along the western boundary of Fisherman's Lake. The creation of managed marsh at this location would connect to existing TNBC Preserve lands which currently are in managed marsh which would enlarge a core area for giant garter snakes in the Natomas Basin. While the Service recognizes the benefit of enlarging managed marsh within the Fisherman's Lake area, there would be a temporal loss of aquatic habitat for giant garter snake between when rice is converted to upland in Phase 2 and when marsh is created in Phase 4. If for some reason the Corps and SAFCA either do not complete all the project phases or do not provide the 72.98 acres of managed marsh in 2011, then they would have to reinitiate consultation with the Service as outlined on page 79 of this biological opinion.

Within the construction of Phase 2, SAFCA has proposed to create canal habitat in advance of canal that would be filled in Phase 3. This helps to offset effects due to the filling of canal which would be a loss of aquatic habitat for snakes, by allowing the new canals to become established in advance and also allow vegetation to begin to grow along the banks, which would provide cover from predation for the giant garter snake.

Valley Elderberry Longhorn Beetle

Effects to the valley elderberry longhorn beetle may occur with the transplantation of elderberry shrubs outside of the footprint of the levee enlargement. Loss of an elderberry shrub or even a stem can result in direct mortality of valley elderberry longhorn beetles or affect valley elderberry longhorn breeding and feeding because adult beetles rely solely on elderberry flowers for food and must lay their eggs on elderberry stems to successfully reproduce.

All three phases of the project have potential to affect about 40 elderberry shrubs through transplantation. This action will adversely affect the valley elderberry longhorn beetle. Any beetle larvae occupying these plants are likely to be killed when the plants are removed. An additional number of elderberry shrubs would remain where they currently are however, construction work would occur within 100 feet but no closer than 20 feet from the dripline of an elderberry shrub.

Temporal loss of habitat will occur. Although mitigation for impacts on the beetle involve creation or restoration of habitat, it generally takes five or more years for elderberry plants to become large enough to support beetles, and it generally takes 25 years or longer for riparian habitats to reach their full value (USFWS 1994). Temporal loss of habitat will temporarily reduce the amount of habitat available to beetles and may cause fragmentation of habitat and isolation of subpopulations. In cases where the proposed project will reduce the canopy closure of riparian forests, an edge effect is created that could result in reduced habitat quality for the

beetles. Beetles disperse poorly and the systematic removal of elderberry shrubs from a relatively connected river corridor has adverse effects well outside of the project's footprint.

Proposed avoidance and minimization measures should minimize adverse effects resulting from elderberry stem trimming or elderberry transplantation.

Effects of Phase 2 Construction to Valley Elderberry Longhorn Beetle

Table 3 lists the elderberry shrub stem counts and sizes which would be transplanted as part of the Phase 2 construction. Effects to the valley elderberry longhorn beetle due to transplantation of these shrubs are described above. Elderberry shrubs would be transplanted and elderberry seedlings and associated natives would be planted at one of the following properties: Rio Ramaza, Cummings, or Lasuevic.

Table 3. Elderberry Stem Sizes and Compensation

Location	Stems (maximum diameter at ground level)	Exit Hole on Shrub (Yes or No)	Elderberry Seedling Ratio	Associated Native Plant Ratio	Number of Stems Observed	Required Elderberry Plantings	Required Associated Native Plant Plantings
Riparian	stems $\geq 1''$ & $\leq 3''$	No	2:1	1:1	33	66	66
		Yes	4:1	2:1	57	228	456
Riparian	stems $> 3''$ & $< 5''$	No	3:1	1:1	16	48	48
		Yes	6:1	2:1	13	78	156
Riparian	stems $> 5''$	No	4:1	1:1	16	64	64
		Yes	8:1	2:1	16	128	256
Non-riparian	stems $\geq 1''$ & $\leq 3''$	No	1:1	1:1	23	23	23
		Yes	2:1	2:1	5	10	20
Non-riparian	stems $> 3''$ & $< 5''$	No	2:1	1:1	8	16	16
		Yes	4:1	2:1	2	8	16
Non-riparian	stems $> 5''$	No	3:1	1:1	2	6	6
		Yes	6:1	2:1	1	6	12
Total replacement plantings						681	1,139
Total Elderberry shrubs to be transplanted						23	
1,820 / 10 = 182 valley elderberry longhorn beetle credits or 7.52 acres							

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions affecting listed species that are reasonably certain to occur in the area considered in this biological opinion. Future Federal actions not related to this proposed action are not considered in determining the cumulative effects, but are subject to separate consultation requirements pursuant to section 7 of the Act.

The effectiveness of the NBHCP's Operating Conservation Strategy (OCS) relies on the City of Sacramento and Sutter County limiting development to a combined total of 15,517 acres within their respective permit areas. The proposed project site is located outside the permitted development area, and SAFCA is not a permittee under the NBHCP; however, the plan assumes no significant new development in the basin outside of the City of Sacramento and Sutter County permit areas. The NBHCP outlines a carefully constructed OCS that balances reasonable development in the Basin with conservation of snake habitat in order to maintain a viable population of giant garter snakes in the basin and avoid jeopardy to this threatened species. The NBHCP and MAPIICP allow for urban development of certain areas (totaling up to 17,500 acres) in the Basin in return for the preservation of, and in some cases, restoration and management of 8,725 acres, in an interconnected preserve system, which when added to the baseline of agricultural and undeveloped lands in the basin, will conserve the Natomas Basin snake population. While the proposed project does not increase the number of developed acres beyond the 17,500 contemplated under the NBHCP and MAPHCP, it does change (in some cases, permanently) habitat types from one type to another. Loss of habitat which the 22 covered species of the NBHCPs may use include 299.65 acres of row and field crop, 78 acres of fallow fields, 45.03 acres of orchard, and 30.37 acres of open water and other non-canal wetlands. Increases in the following habitat types would occur with the project: 89.11 acres of woodland, 356.12 acres of grassland, 72.98 acres of managed marsh, and 65.88 acres of canal. While there would be a change in habitat types within the basin, the NBHCP covered species would still be able to use the habitats that SAFCA's project would be creating and development would be precluded from these areas through conservation easements, flood control easements, and drainage easements.

While SAFCA is not a signatory to the NBHCP, the plan sets forth a regional conservation strategy that covers the entire basin. The NBHCP's efficacy in maintaining a viable population of giant garter snake in the Basin depends, in significant part, on the retention of a sufficient amount of undeveloped acreage throughout the Basin, to support giant garter snake.¹ The NBHCP operates under the assumption that agricultural land in the Basin would continuously rotate between crop types, and therefore all land provides habitat for all 22 of the NBHCP covered species, including the giant garter snake.

¹ In *NWF v. Norton*, 2005 U.S. Dist LEXIS 33768, Judge Levi upheld the NBHCP and its strategy to protect the GGS in the Natomas Basin. However, in footnote 13 of the opinion, he cautioned that, "the Service and those seeking an ITP in the future will face an uphill battle if they attempt to argue that additional development in the basin beyond the 17,500 acres will not result in jeopardy" to the snake.

SAFCA's proposed project will directly affect existing land that has been preserved as mitigation for either the NBHCP or MAPHCP. During Phase 2 of the project, 1.63 acres of fallow row and grain crop would be affected at the Atkinson Preserve and 4.09 acres of alfalfa and 5.72 acres of wheat would be affected at the Huffman West Preserve. During Phase 4 of the project, 1.98 acres of alfalfa, 0.05 acre of developed, 0.83 acre of ruderal, and 0.48 acre of valley oak woodland would be affected at the Alleghany 50 Preserve and 0.044 acre of valley oak woodland and 0.00034 acre of riparian scrub would be affected at the Cummings Preserve. These areas would be replaced with levee slope covered in grassland. As provided for in the NBHCP (IV.C.2.c.(1)) SAFCA shall "pay for the value of replacing every acre of reserve land impacted." To accomplish this SAFCA has proposed to acquire existing TNBC land not currently dedicated to mitigation to offset acre-per-acre losses. This existing TNBC land would consist of rice, not the upland habitat types affected. The SAFCA will fund the perpetual maintenance, monitoring, and enhancement of these preserves for the benefit of the covered species. Because this land is currently and will be maintained in rice, this will benefit the giant garter snake.

The proposed project would positively affect the biological connectivity between and within two of the Basin's three major geographical areas and TNBC's preserve lands. The GGS/Drainage Canal that SAFCA proposes to construct would provide connectivity between the population of snakes and the TNBC preserves around Fisherman's Lake with the population of snakes and TNBC preserves in the northwest portion of the Natomas Basin near the North Drainage Canal. The SAFCA would provide guaranteed water in the canal between April and October, which would create aquatic connectivity. In an effort to increase the habitat quality of the corridor, SAFCA will create benches along the canal, which would be shallowly inundated in the summer months to provide a prey base support emergent marsh vegetation which would provide cover for the giant garter snake. The SAFCA proposes to manage this canal in perpetuity for the giant garter snake, and proposes to encumber the canal with an easement in which the conservation values prevail over drainage values. The SAFCA's plan to construct this canal would benefit connectivity and strengthen the success of the NBHCP.

In December 2008, FEMA will issue a new flood map for the Natomas Basin. This would place all of Natomas into the AE zone, which would require that builders place the bottom floor of new construction up to 20 feet above ground level to keep it out of the floodplain. This would effectively stop new construction in Natomas. While not directly growth-facilitating, the proposed project would serve planned and reasonably foreseeable growth by providing flood protection to the Natomas Basin which is currently an impediment to future growth (planned or otherwise) in the Natomas Basin. It is likely that some of the growth (commercial, municipal, and residential) in the Natomas Basin will not require section 7 consultation with the Service for compliance with the Act, and will not obtain take coverage pursuant to section 10 of the Act. Currently, the NBHCP and the East Contra Costa HCP are the only two permitted regional HCPs in the Sacramento area, although Placer, Yolo, South Sacramento, Yuba, and Sutter are all developing regional HCPs. Until these regional HCPs are finalized, there is no mechanism to provide "take" coverage for projects with no Federal nexus besides these projects pursuing their own individual HCPs. Some "take" of listed species is likely to occur for which no

minimization, avoidance, and compensation/mitigation measures for federally-listed species are implemented.

SAFCA, the Corps, the city of Sacramento, Sacramento County, and Sutter County should understand that future development within the Natomas Basin could negatively affect the NBHCP and MAPHCP and potentially jeopardize the giant garter snake in the Natomas Basin. Any additional "take" of listed species outside what has been analyzed in this biological opinion or the NBHCP and MAPHCP cannot occur without appropriate permits or consultations with the Service and CDFG.

The cumulative effects of reasonable foreseeable projects in the Natomas Basin may pose a significant threat to the eventual recovery of the giant garter snake. The following proposed projects could significantly affect the sustainability of giant garter snakes in the Natomas Basin when considered cumulatively with the proposed Natomas Levee Improvement Project:

- The proposed Greenbriar residential development is located on an approximately 577-acre site south of Elkhorn Boulevard and west of State Highway 99. Development on this site could result in the loss of giant garter snake habitat adjacent to Lone Tree Canal, depending on the configuration of houses and infrastructure.
- Natomas Joint Vision, as currently proposed by the City of Sacramento and Sacramento County, is to develop approximately 6,000 acres in the area of the County outside of the City's permitted area under the NBHCP.
- Sacramento International Airport's Master Plan would enlarge the airport on land currently owned by the airport and would occur through 2020. Much of the land slated for airport expansion is currently in agricultural production.

Other projects which are reasonably foreseeable and should be considered cumulative with the proposed project, but for which the Service has little to no information about the extent of their effects to giant garter snakes, include:

- Camino Norte
- Downtown Natomas Airport Light Rail
- Pacific Gas & Electric Line 406/407 Pipeline
- Sacramento Municipal Utility District Powerline – Elkhorn Substation
- Sutter Pointe Specific Plan

Conclusion

After reviewing the current status of the giant garter snake and valley elderberry longhorn beetle, the environmental baseline for the species, the effects of the proposed project, and the cumulative effects on this species, it is the Service's biological opinion that the proposed Natomas Landside Improvements Project, as described herein, is not likely to jeopardize the continued existence of

the giant garter snake or valley elderberry longhorn beetle. The project will not result in a net destruction or adverse modification of valley elderberry longhorn critical habitat.

The Corps and SAFCA have proposed to improve flood protection for the Natomas Basin above what currently exists. Two HCPs currently exist within the Natomas Basin and are based on future development occurring within the permit area of the MAPHCP and NBHCP. The baselines and assumptions for which these HCPs were developed were based on no additional development occurring within the basin outside of these permit areas and no change in landuse practices. Sacramento County and the City of Sacramento are already proposing additional development outside of the existing permit areas. Additionally, the Natomas Basin has experienced a large amount of rice fallowing both in land held by private farmers and leases terminated on Sacramento County Airport property. While the Service has concluded that SAFCA's project would not jeopardize the giant garter snake or valley elderberry longhorn beetle, it does facilitate growth within the Natomas Basin, which would require additional analysis to determine if this growth could jeopardize any of the 22 species covered by the MAPHCP and NBHCP. If growth outside of the permit areas were to occur within the Natomas Basin, these future projects must have a higher conservation outcome than currently exists in the HCPs and must be closely coordinated with the Service.

INCIDENTAL TAKE STATEMENT FOR PHASE 2 CONSTRUCTION

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act, provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are nondiscretionary for listed species in Phase 2 of this opinion and must be implemented by the Corps in order for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity that is covered by this incidental take statement. If the Federal agency (1) fails to adhere to the terms and conditions of the incidental take statement, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

Giant Garter Snake

The Service anticipates that incidental take of the snake will be difficult to detect or quantify for the following reasons: giant garter snakes are cryptically colored, secretive, and known to be sensitive to human activities. Snakes may avoid detection by retreating to burrows, soil crevices, vegetation, or other cover. Individual snakes are difficult to detect unless they are observed, undisturbed, at a distance. Most close-range observations represent chance encounters that are difficult to predict. It is not possible to make an accurate estimate of the number of snakes that will be harassed, harmed or killed during Phase 2 construction activities (staging areas, work on canal banks, soil borrow areas, and vehicle traffic to and from borrow areas). In instances when take is difficult to detect, the Service may estimate take in numbers of species per acre of habitat lost or affected as a result of the action. Therefore, the Service anticipates that all giant garter snakes inhabiting 187 acres of aquatic and 818.9 acres of upland habitat may be harassed, harmed, or 2 giant garter snakes killed by loss and destruction of habitat, as a result of the project.

Valley Elderberry Longhorn Beetle

The Service expects that incidental take of the valley elderberry longhorn beetle will be difficult to detect or quantify. The cryptic nature of these species and their relatively small body size make the finding of an injured or dead specimen unlikely. The species occurs in habitats that make them difficult to detect. Due to the difficulty in quantifying the number of beetles that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of elderberry stems one inch or greater in diameter at ground level (beetle habitat) that will become unsuitable for beetles due to direct or indirect effects as a result of Phase 2 construction. Therefore, the Service estimates that all beetles inhabiting 23 elderberry plants containing stems 1 inch or greater at ground level (118 stems between 1-3 inches, 39 stems between 3 and 5 inches and 35 stems ≥ 5 inches; see Table 3 in the text) will become unsuitable as a result of the proposed action.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the giant garter snake, or valley elderberry longhorn beetle, and will not result in the destruction or adverse modification of designated critical habitat because in the case of the giant garter snake critical habitat has not been designated and it is outside of the critical habitat for valley elderberry longhorn beetle.

Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize the effect of the proposed project on the giant garter snake and valley elderberry longhorn beetle.

1. The Corps and SAFCA shall implement the project as proposed in the biological assessment and this biological opinion.

2. Effects of harassment of individual giant garter snakes within the proposed project, and of the loss or degradation of the species' habitat shall be minimized.
3. Effects of harassment of individual valley elderberry longhorn beetle, and of the loss and degradation of the species' habitat shall be minimized.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following terms and conditions implement reasonable and prudent measure one (1):
 - a. The Corps and SAFCA shall minimize the potential for incidental take of the giant garter snake and valley elderberry longhorn beetle resulting from the project related activities by implementation of the project description as described in the biological assessment and the project description of this biological opinion.
 - b. If requested, before, during, or upon completion of ground-breaking and construction activities, the project proponents shall allow access by Service and/or California Department of Fish and Game personnel to the project site to inspect project effects to the snake and valley elderberry longhorn beetle.
 - c. A Service approved Worker Environmental Awareness Training Program for construction personnel shall be conducted by a Service-approved biologist for all construction workers prior to the commencement of construction activities. The program shall provide workers with information on their responsibilities with regard to the giant garter snake and valley elderberry longhorn beetle, an overview of the life-history of the species, information on take prohibitions, and protections afforded the species under the Act. Written documentation of the training must be submitted to the Sacramento Fish and Wildlife Office within 30 days of the completion of training. As needed, training shall be conducted in Spanish for Spanish language speakers and other languages as needed or necessary.
 - d. The applicants shall include a copy of this biological opinion within its solicitations for design and construction of the proposed project making the primary contractor responsible for implementing all requirements and obligations included within the biological opinion, and to educate and inform all other contractors involved in the project as to the requirements of the biological opinion.

2. The following terms and conditions implement reasonable and prudent measure two (2):
 - a. The project proponents shall minimize the potential for harm or harassment of the snake resulting from project-related activities by implementation of the conservation measures as described in the Corps' Biological Assessment and appearing in the project description (pages 3-44) of this biological opinion.
 - b. At least 30 calendar days prior to initiating construction activities, the project proponents shall submit the names and curriculum vitae of the biological monitor(s) for the proposed project. Monitors shall have the ability to differentiate giant garter snakes from other snakes and the authority to stop construction activities if a snake is encountered during construction until appropriate corrective measures have been completed or until the snake is determined to be unharmed.
 - c. For Phase 2 work which would occur outside of the giant garter snake active window (power pole relocations and private irrigation canal relocation) exclusion fencing would be placed around upland areas that giant garter snakes could use to overwinter. The exclusionary fencing would be monitored everyday prior to and during construction to ensure that openings do not develop that would allow the entry of a giant garter snake into the construction area.
 - d. Construction activity shall be conducted between May 1 and October 1. This is the active period for the snake and direct mortality is lessened, because snakes are expected to actively move and avoid danger. If it appears that construction activity may go beyond October 1, the project proponents shall contact the Service as soon as possible, but not later than July 15 of the year in question, to determine if additional measures are necessary to minimize take.
 - e. The project proponents shall implement Best Management Practices (BMPs) to prevent sediment from entering areas containing snake habitat, including, but not limited to, silt fencing, temporary berms, no cleaning of equipment in or near snake habitat, installation of vegetative strips, and temporary sediment disposal.
 - f. Runoff from dust control and oil and other chemicals used in other construction activities shall be retained in the construction site and prevented from flowing into areas containing snake habitat. The runoff shall be retained in the construction areas by creating small earthen berms, installing silt fences or hay-bale dikes, or implementing other measures on the construction site to prevent runoff from entering the habitat of the snake.
 - g. Project-related vehicles shall observe a 20-mile-per-hour speed limit within construction areas, except on County roads and State and Federal highways. This

is particularly important during periods when the snake may be sunning or moving on roadways.

- h. To avoid attracting snake predators, all trash items, such as wrappers, cans, bottles, and food scraps, must be disposed of in closed containers and removed at least once a day from the entire project site.
- i. Within 24-hours prior to the commencement of construction activities, the site shall be inspected by a Service-approved biologist. The biologist will provide the Service with a written report that adequately documents the monitoring efforts within 24-hours of commencement of construction activities. Snakes encountered during construction activities shall be allowed to move away from the area on their own volition. The biologist shall notify the Service immediately if any listed species are found on-site, and will submit a report, including date(s), location(s), habitat description, and any corrective measures taken to protect the species found. The biologist shall be required to report any take to the Service immediately by telephone at (916) 414-6600 and by electronic mail or written letter addressed to the Deputy Assistant Field Supervisor, within one (1) working day of the incident. The project area shall be re-inspected by the monitoring biologist whenever a lapse in construction activity of two weeks or greater has occurred.
- j. Erosion control structures will be installed concurrently with construction. Erosion control structures will be constructed so runoff will be directed away from sensitive habitats. Tightly woven fiber netting (mesh size less than 0.25 inch) or similar material shall be used for erosion control or other purposes at the project site to ensure giant garter snakes and other reptiles or amphibians are not trapped by the erosion control material. This limitation will be communicated to the contractor through use of Special Provisions included in the bid solicitation package. Coconut coir matting is an acceptable erosion control material. No plastic mono-filament matting shall be used for erosion control. The edge of the material shall be buried in the ground to prevent giant garter snakes and other reptiles and amphibians from crawling underneath the material. Erosion control measures shall direct water flow into existing drainages or disperse water across vegetated areas in order to avoid concentrating water.
- k. Movement of heavy equipment to and from the project site shall be restricted to established roadways to minimize habitat disturbance. Stockpiling of construction materials, including portable equipment, vehicles, and supplies, shall be restricted to the designated construction staging area and exclusive of aquatic habitat avoidance areas. Aquatic snake habitat adjacent to the project area shall be flagged and avoided by all construction personnel.

- l. To the extent feasible, the project proponents shall confine clearing of vegetation and scraping, or digging, of soil to the minimal area necessary to facilitate construction activities.
 - m. High visibility fencing shall be placed to prevent encroachment of construction personnel and equipment into areas containing snake habitat. The fencing shall be inspected before the start of each work day and maintained by the project proponents until completion of the project. The fencing may be removed only when the construction of the project is completed.
 - n. After completion of construction activities, any temporary fill and construction debris shall be removed. As described in the biological assessment and the project description of this biological opinion, the project proponents will restore all snake habitat subject to temporary ground disturbances, including storage and staging areas and temporary roads. These areas shall be re-contoured, if appropriate, and re-vegetated with appropriate locally-collected native plant species to promote restoration of the area to pre-project conditions. All temporary fill and construction debris shall be removed. An area subject to "temporary" disturbance includes any area that is disturbed during the project, but that, after project completion, will not be subject to further disturbance and has the potential to be re-vegetated. Appropriate methods and plant species used to re-vegetate such areas will be determined on a site-specific basis in consultation with the Service and the CDFG. Restoration work may include replanting emergent vegetation. Refer to the Service's *Guidelines for the Restoration and/or Replacement of Giant Garter Snake Habitat*. A written report shall be submitted to the Service within ten (10) working days of the completion of construction at the project site.
 - o. The Corps and SAFCA shall ensure compliance with the reporting requirements.
 - p. Prior to construction on May 1, 2009, the Corps and SAFCA will have the following documents completed and approved by the Service:
 - drainage easement language for the GGS/Drainage Canal;
 - Mitigation and Monitoring Plan and Long-Term Management Plan;
 - encumbrances on a portion of the District Assessment Fee; and
 - contract with NCMWC to provide reliable water for the GGS/Drainage Canal and managed marsh.
3. The following terms and conditions implement reasonable and prudent measure three (3):
- a. The procedures outlined in the Service's *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* dated July 9, 1999, shall be followed for all actions

related to the proposed project.

- b. Elderberry shrubs will be fenced with high visibility construction fencing. In areas where the typical 20-foot buffer from the dripline of the elderberry shrub is encroached on, the fencing will be placed as far from the elderberry shrub's dripline as construction activities will allow.
- c. A biological monitor will be present on site when work will encroach on the 20-foot elderberry buffer. The monitor will have the authority to stop construction within 20 feet of the shrub if unauthorized take of the beetle occurs. The monitor shall contact the Service immediately to determine what corrective measures need to be taken.
- d. Compensation plantings shall occur within the same year as the transplantation of the elderberry shrubs. The selection of the final compensation site for elderberry shrubs shall be coordinated with the Service. A Service reviewed plan for the longterm maintenance and monitoring of the elderberry compensation site shall be completed prior to transplantation.

Reporting Requirements

A post-construction compliance report prepared by the monitoring biologists must be submitted to the Chief of the Endangered Species Division (Central Valley) at the Sacramento Fish and Wildlife Office within thirty (30) calendar days of the completion of construction activity or within thirty (30) calendar days of any break in construction activity lasting more than thirty (30) calendar days. This report shall detail: (i) dates that groundbreaking at the project started and the project was completed; (ii) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the giant garter snake, if any; (v) occurrences of incidental take of any these species; and (vi) other pertinent information.

The Corps must require SAFCA to report to the Service immediately any information about take or suspected take of federally-listed species not authorized in this biological opinion. The SAFCA must notify the Service within 24 hours of receiving such information. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. In the case of a dead animal, the individual animal should be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen. The Service contact persons is, Chief of the Endangered Species Division (Central Valley) at (916) 414-6600, and the Resident Agent-in-charge of the Service's Law Enforcement Division at (916) 414-6660.

Any contractor or employee who during routine operations and maintenance activities inadvertently kills or injures a listed wildlife species must immediately report the incident to their

representative. This representative must contact the CDFG immediately in the case of a dead or injured listed species. The CDFG contact for immediate assistance is State Dispatch at (916) 445-0045.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

1. The Corps and SAFCA should assist in the implementation of the draft, and when published, the final Recovery Plan for the giant garter snake.
2. The Corps and SAFCA should provide funding to researchers studying topics identified by the Service in the draft, and when published, the final Recovery Plan for the giant garter snake.
3. The Corps should use environmental restoration authorities to acquire and restore garter snake habitat from willing sellers.

To be kept informed of actions minimizing or avoiding adverse effects or benefiting listed and proposed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation with the Corps on the Natomas Levee Improvement Project. As provided in 50 CFR 402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the proposed action may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this opinion; or (4) a new species or critical habitat is designated that may be affected by the proposed action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

If you have any questions regarding this biological opinion on the Natomas Landside Improvements Project, please contact Jennifer Hobbs at (916) 414-6541 or Jana Milliken, Sacramento Valley Branch Chief.

Sincerely,

A handwritten signature in black ink that reads "Ken Sanchez". The signature is written in a cursive, flowing style.

Ken Sanchez
Acting Field Supervisor

cc:

Elizabeth Holland, Corps, Sacramento, CA
Todd Gardner, CDFG, Sacramento, CA
Peter Buck, SAFCA, Sacramento, CA
Kelly Fitzgerald, EDAW, Sacramento, CA

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