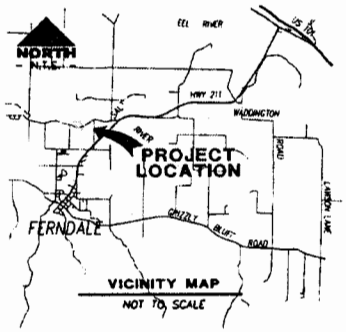
PRELIMINARY
NOT FOR CONSTRUCTION

BAR IS ONE INCH ON ORIGINAL DRAWING	ROAD NAME: PORT KENYON ROAD		PUBLIC WORKS DESIGN SECTION
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	ROAD NO: 2H010	MILE POST: PM 0.37 TO PM 0.69	
	PROJECT NO.:		DESIGNED BY: CJW
	CONTRACT NO.: 211303		DRAWN BY: JMB
	L:\PROJECTS\211301 FRANCIS CRK\DWG\		REVIEWED BY:
	PLOT DATE: 1/7/2011		APPROVED BY:

COUNTY OF HUMBOLDT
DEPARTMENT OF PUBLIC WORKS
FRANCIS CREEK CULVERT REPLACEMENT
COVER SHEET, LOCATION MAP, AND VICINITY MAP

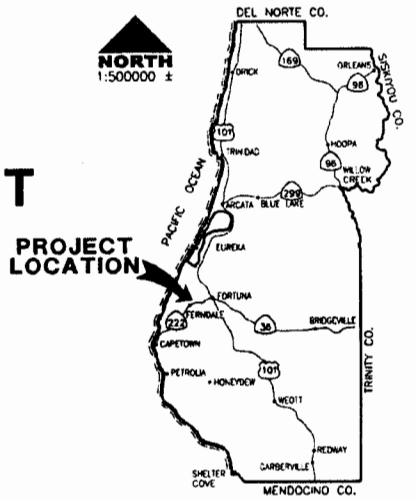
SHEET 1 OF 8



COUNTY OF HUMBOLDT
DEPARTMENT OF PUBLIC WORKS

PROJECT PLANS FOR CONSTRUCTION OF

FRANCIS CREEK CULVERT REPLACEMENT
PORT KENYON ROAD (2H010) PM 0.5
AGREEMENT NO. PXXXXXXXX
CONTRACT NO. 211303



LOCATION MAP
SCALE: 1:500000 ±

INDEX OF SHEETS

APPLICABLE STANDARD PLANS

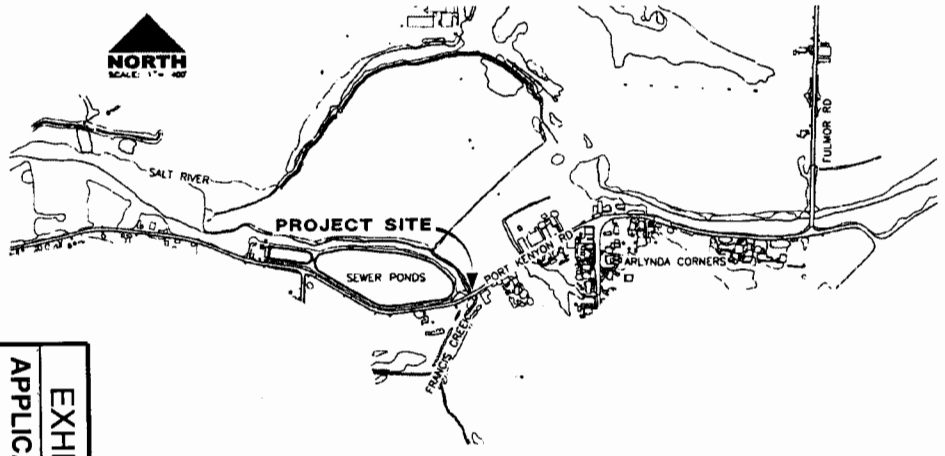
JULY 2006 CALTRANS STANDARD PLANS

A10A	ABBREVIATIONS
A10B	SYMBOLS
A62A	EXCAVATION AND BACKFILL MISCELLANEOUS DETAILS
A73C	DELINEATORS, CHANNELIZERS AND BARRICADES.
A77	METAL BEAM GUARDRAIL
D88A	STRUT DETAILS FOR STRUCTURAL STEEL PIPE
T3	TEMPORARY RAILING (TYPE K)
T13	TRAFFIC CONTROL
T51	TEMPORARY SILT FENCE
T56	TEMPORARY FIBER ROLL
T59	TEMPORARY CONCRETE WASHOUT

FUNDING SOURCE

THIS PROJECT IS FUNDED BY THE CALIFORNIA DEPARTMENT OF FISH AND GAME

RESOURCES AGENCY
CALIFORNIA
DEPARTMENT
FISH & GAME



VICINITY MAP
SCALE: 1"=400'

APPROVED

CHRISTOPHER J. WHITWORTH
RCE 51931, EXP. 6/30/2011

DATE

REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER J. WHITWORTH
NO. 51931
EXP. 06/30/08
CIVIL
STATE OF CALIFORNIA

ORIGINAL LOW BID PRICE	CONSTRUCTED BY	RESIDENT ENGINEER
	PROJECT COMPLETED / /	CONSTRUCTION COST $

EXHIBIT NO. 11
APPLICATION NO. 1-10-032 - HUMBOLDT COUNTY RESOURCE CONSERVATION DISTRICT
FRANCIS CREEK CULVERT REPLACEMENT PLANS (1 of 8)

PRELIMINARY
NOT FOR CONSTRUCTION

BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	ROAD NAME: PORT KENYON ROAD ROAD NO. 2H010 MILE POST: PM 0.37 TO PM 0.69 PROJECT NO.: CONTRACT NO: 211303 L:\PROJECTS\211301 FRANCIS CRK\DWG\ CDSHEET.DWG PLOT DATE: 1/7/2011	PUBLIC WORKS DESIGN SECTION DESIGNED BY: CJW DRAWN BY: JAB REVIEWED BY: APPROVED BY:	COUNTY OF HUMBOLDT DEPARTMENT OF PUBLIC WORKS FRANCIS CREEK CULVERT REPLACEMENT CONSTRUCTION AREA SIGNS, QUANTITIES, SURVEY CONTROL AND DETAILS	SHEET 2 OF 8

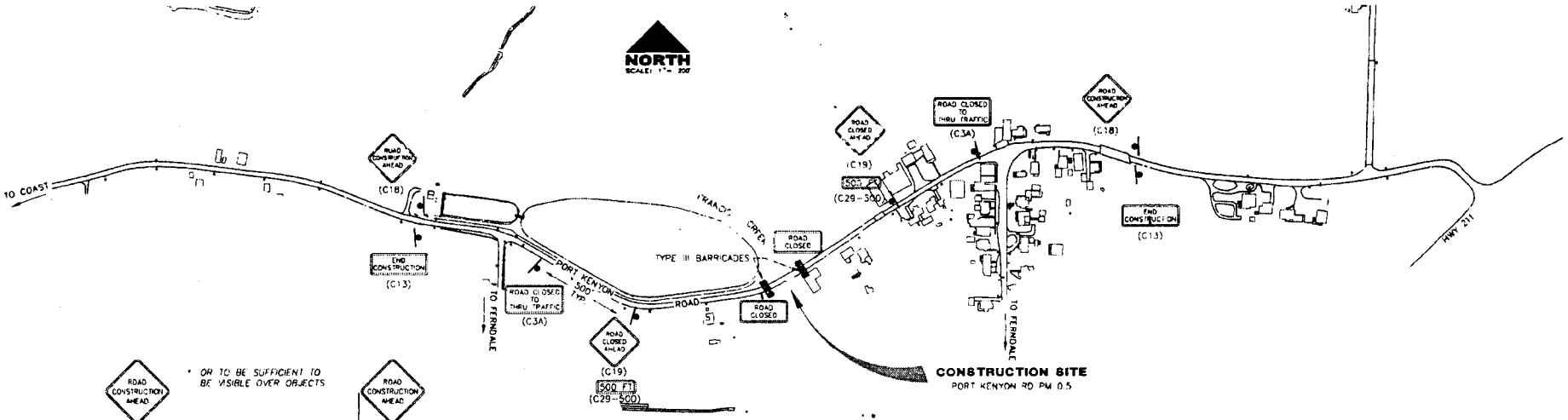
QUANTITIES

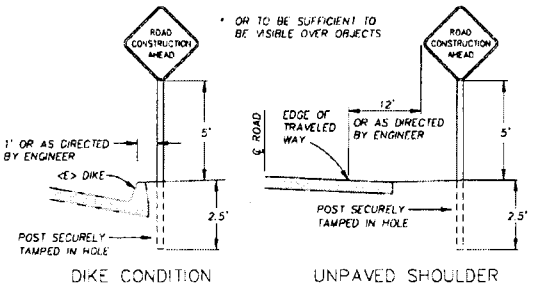
ITEM NO.	ITEM CODE		ITEM DESCRIPTION	UNIT	BID QUANTITY
1	74016		Construction Site Management	LS	1
2	74017		Prepare water Pollution Control Plan	LS	1
3	74028		Temporary Fiber Roll (Type 1)	LF	100
4	74032		Temporary Concrete Washout Facility	EA	1
5	120090		Construction Area Signs	EA	10
6	150805		Remove Culvert	EA	1
7	160101		Clearing and Grubbing	LS	1
8	170101		Develop Water Supply (Diversion)	LS	1
9	190151	F	Channel Excavation (Francis Creek)	CY	1,670
10	192025	F	Structure Excavation (ConSpan Footing)	CY	580
11	193004	F	Structure Backfill (Conspan)	CY	610
12	197010		Place and Compact Embankment (Import)	CY	630
13	197020		Earth Retaining Structure	SF	2,080
14	203016	S	Erosion Control (Type D)	LS	1
15	260301		Class 3 Aggregate Base	CY	220
16	390102		Asphalt Concrete (Type A)	Ton	210
17	510103	S-F	Class A Concrete (ConSpan Footing)	CY	50
18	520101	S-F	Bar Reinforcing Steel	Lbs	5,000
19	874060x	S	42'x34'x12' ConSpan Structure	LS	1
20	832001	S	Metal Beam Guard Rail	LF	532
21	839585	S	Alternative Flared Terminal System	EA	4
22	999990		Mobilization	LS	1

SURVEY CONTROL COORDINATES

PNT #	NORTHING	EASTING	ELEV.	DESCRIPTION
9	2107382.71	5934255.93	20.89	CP 9
11	2107491.15	5934611.20	21.81	CP 11
12	2107783.65	5934591.09	19.37	CP 12
14	2107374.60	5934087.45	20.35	CP 14
109	2107385.94	5934184.98	20.89	FD N&S
115	2107379.11	5934013.60	20.76	n&s

SPENCER CHANNEL TOPO SURVEY CONTROL POINTS





RURAL CONSTRUCTION AREA SIGN
– NOT TO SCALE –

NOTES

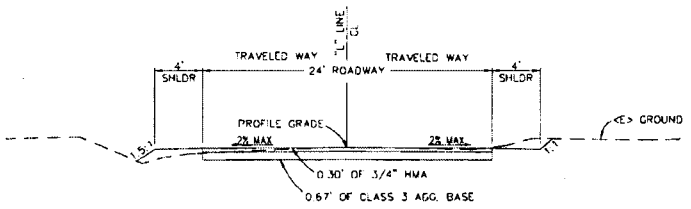
1) SIGNS SHALL BE PLACED AS SHOWN ON PLAN OR AS DIRECTED BY THE RESIDENT ENGINEER.
2) FINAL PLACEMENT OF SIGNS SHALL BE APPROVED BY RESIDENT ENGINEER.
3) ADDITIONAL PORTABLE SIGNS SHALL BE USED AS REQUIRED FOR OTHER ROADSIDE WORK.
4) SEE STANDARD PLAN T13 FOR TRAFFIC CONTROL SYSTEM.
5) IN ADDITION TO CONSTRUCTION AREA SIGNS AND WHEN DIRECTED BY THE RESIDENT ENGINEER, THE CONTRACTOR SHALL UTILIZE FLAGMEN AS NECESSARY TO DIRECT TRAFFIC.
6) DISTANCE TO C18/C23 AND C13/C14 MAY BE EXTENDED TO ENCOMPASS SITES WITHIN ONE MILE OF EACH OTHER.

CONSTRUCTION AREA SIGN SUMMARY

SIGN TYPE	QTY	DESCRIPTION	SIZE	REMARKS	POST SIZE	NUMBER
C18	2	ROAD CONSTRUCTION AHEAD	48" x 48"	VISIBLE AT ALL TIMES	4" x 4"	1
C3A	2	ROAD CLOSED TO THRU TRAFFIC	60" x 30"	VISIBLE AT ALL TIMES	4" x 4"	1
C19 & C29-500	2	ROAD CLOSED AHEAD 500 FT	48" x 48" 29" x 9"	VISIBLE AT ALL TIMES	4" x 4"	1
C2	2	ROAD CLOSED	48" x 30"	VISIBLE AT ALL TIMES	4" x 4"	1
C13	2	END CONSTRUCTION	60" x 24"	VISIBLE AT ALL TIMES	4" x 4"	2

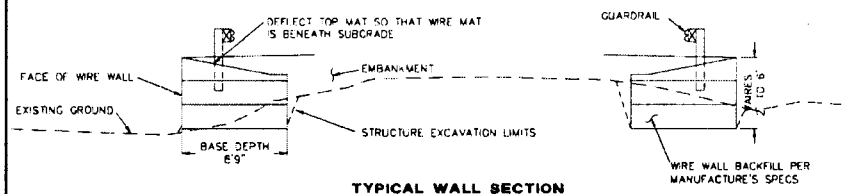
PRELIMINARY
NOT FOR CONSTRUCTION

BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	ROAD NAME: PORT KENYON ROAD ROAD NO: 74010 MILE POST: PM 0.37 TO PM 0.59 PROJECT NO.: CONTRACT NO.: 211305 L:\PROJECTS\211301 FRANCIS CRK\DWG\ CDSHOS3.DWG PLOT DATE: 1/7/2011	PUBLIC WORKS DESIGN SECTION DESIGNED BY: CJW DRAWN BY: JAB REVIEWED BY: APPROVED BY:	COUNTY OF HUMBOLDT DEPARTMENT OF PUBLIC WORKS FRANCIS CREEK CULVERT REPLACEMENT TYPICAL SECTIONS AND DETAILS	SHEET 3 OF 8



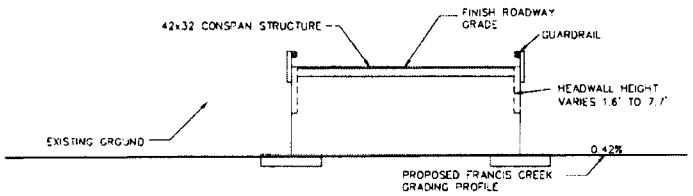
TYPICAL ROAD SECTION

NTS



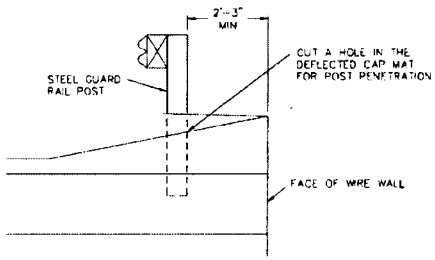
TYPICAL WALL SECTION

SCALE 1"=5'



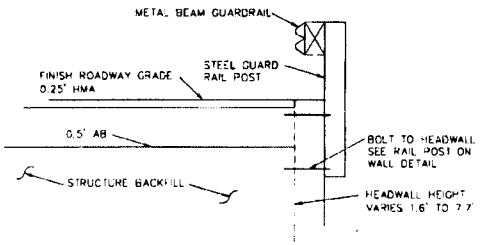
CONSPAN TYPICAL SECTION

SCALE: 1"=10'



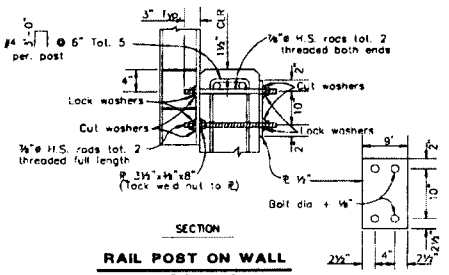
GUARDRAIL ON WIRE WALL DETAIL

SCALE 1"=2'



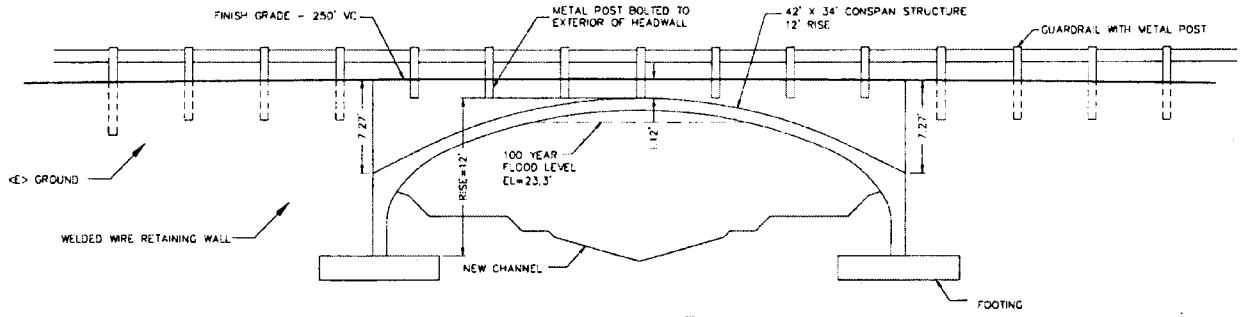
GUARDRAIL ON HEADWALL DETAIL

SCALE 1"=2'



RAIL POST ON WALL

NOT TO SCALE



CONSPAN ELEVATION

SCALE: 1"=5'

PRELIMINARY
NOT FOR CONSTRUCTION

BAR IS ONE INCH ON ORIGINAL DRAWING	ROAD NAME: PORT KENYON ROAD	PUBLIC WORKS DESIGN SECTION	COUNTY OF HUMBOLDT DEPARTMENT OF PUBLIC WORKS
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	ROAD NO: 3H310 MILE POST: PM 0.37 TO PM 0.65		FRANCIS CREEK CULVERT REPLACEMENT
	PROJECT NO.:	DESIGNED BY: CJN	
	CONTRACT NO.: 211383	DRAWN BY: JMD	"T-LINE" PLAN, PROFILE, AND DETAILS
	L:\PROJECTS\211383 FRANCIS CRK\ENG\ CDSH04.DNG	REVIEWED BY:	
	PLOT DATE: 1/3/2011	APPROVED BY:	

SHEET 4 OF 8

NORTH
SCALE: 1" = 20'

EAST SIDE DRAINAGE (PROPOSED ALIGNMENT)

235+00

236+00

234+00

PCC = 234+19.38

PORT KENYON RD

<E> BARN

PROPOSED 42'x32' CONSPAN STRUCTURE

PCC = 236+56.81

PT = 236+97.69

90°±Rt

PCC = 236+83.69

PCC = 237+57.32

PCC = 237+85.13

FRANCIS CREEK (PROPOSED ALIGNMENT)

90°±Rt

PCC = 238+19.52

PCC = 238+34.70

<E> SEWER TREATMENT POND

PLAN VIEW
SCALE 1"=20'

24.00

PROFILE
SCALE: 1"=20' H & V

PM STA = 234+44.83
PM ELEV = 10.99

PM STA = 235+18.54
PM ELEV = 11.30

42x32 CONSPAN STRUCTURE

FINISH ROADWAY GRADE

EXISTING GROUND

PROPOSED FRANCIS CREEK GRADING PROFILE

0.42%

PM STA = 239+19
PM ELEV = 12.96

PM STA = 238+44.98
PM ELEV = 13.09

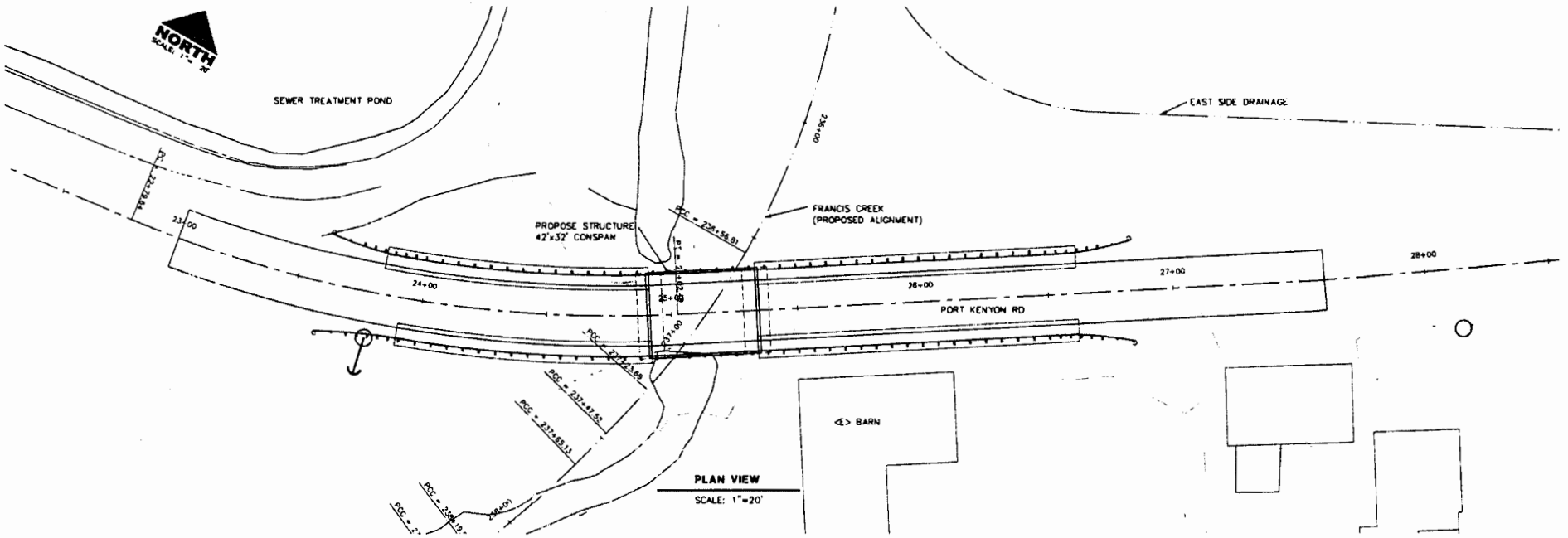
40
20
0
-20

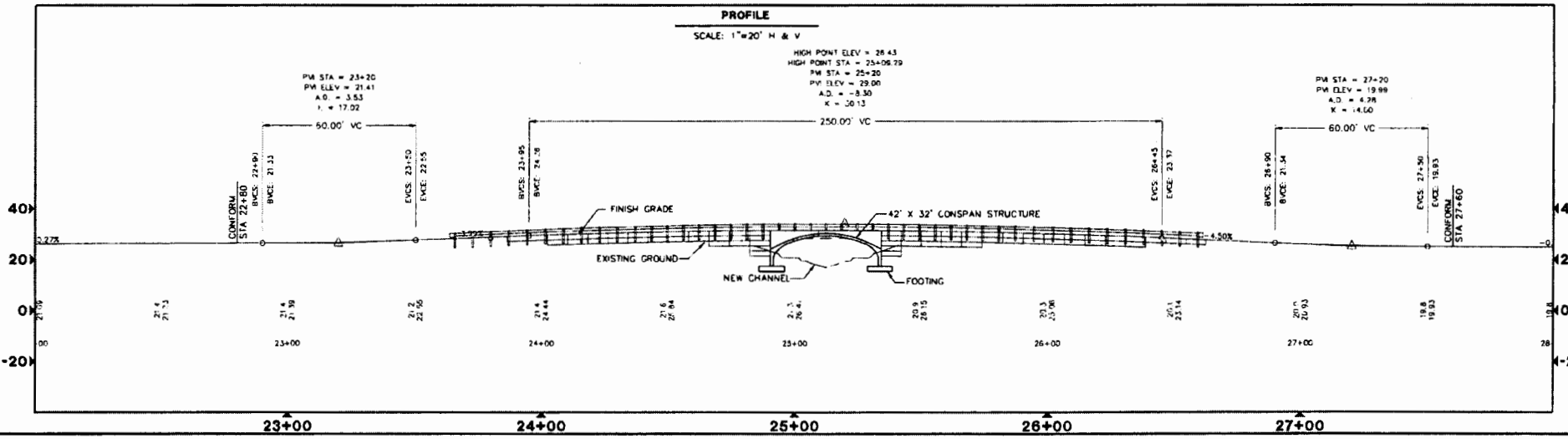
30.2 10.80 | 20.8 11.01 | 21.7 11.24 | 21.8 11.43 | 21.1 11.64 | 21.0 11.85 | 21.3 12.06 | 22.0 12.27 | 19.4 12.46 | 21.7 12.69 | 20.5 12.90 | 19.8 13.18

234+00 235+00 236+00 237+00 238+00 239+00

PRELIMINARY
NOT FOR CONSTRUCTION

BAR IS ONE INCH ON ORIGINAL DRAWING	ROAD NAME: PORT KENYON ROAD	PUBLIC WORKS DESIGN SECTION	COUNTY OF HUMBOLDT DEPARTMENT OF PUBLIC WORKS
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	ROAD NO: 2H010 MILE POST: PM 0.37 TO PM 0.98		FRANCIS CREEK CULVERT REPLACEMENT
	PROJECT NO.:	DESIGNED BY: CJH	
	CONTRACT NO.: 211303	DRAWN BY: JAB	"L-LINE" PLAN, PROFILE, AND DETAILS
	I:\PROJECTS\211301 FRANCIS CRK\ENG\ CDSH05.DWG	REVIEWED BY:	
	PLOT DATE: 1/7/2011	APPROVED BY:	SHEET 5 OF 8





PRELIMINARY
NOT FOR CONSTRUCTION

BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

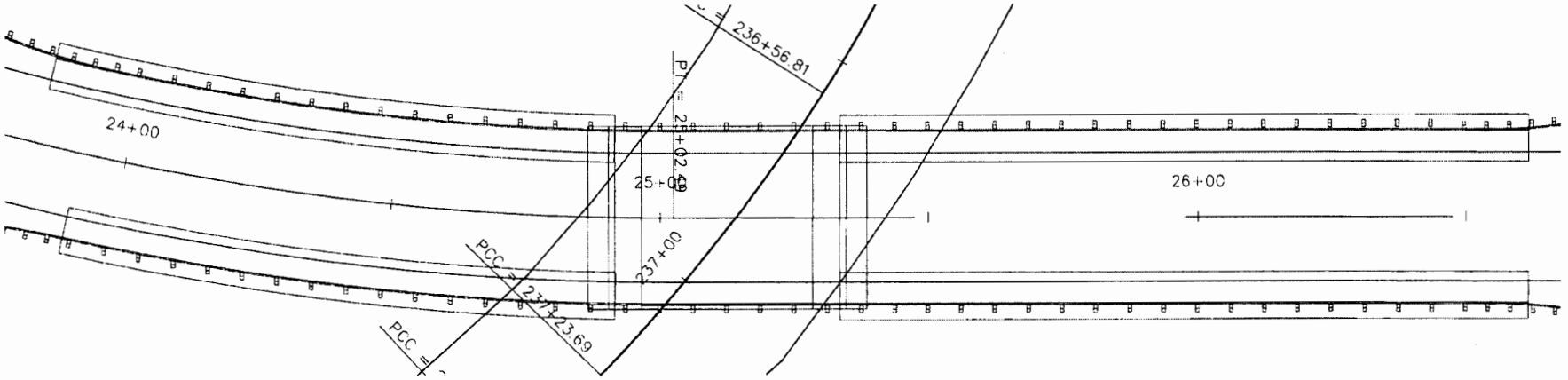
ROAD NAME: PORT KENYON ROAD		PUBLIC WORKS DESIGN SECTION
ROAD NO: 2H010	MILE POST: PM 0.37 TO PM 0.69	
PROJECT NO:		DESIGNED BY: CJR
CONTRACT NO.: 211303		DRAWN BY: JAS
L:\PROJECTS\211301 FRANCIS CRK\DWG\ CDSHOS.DWG		REVIEWED BY:
PLOT DATE: 1/7/2011		APPROVED BY:

COUNTY OF HUMBOLDT
DEPARTMENT OF PUBLIC WORKS
FRANCIS CREEK CULVERT REPLACEMENT
WELDED WIRE WALL ELEVATION, SECTIONS, AND DETAILS

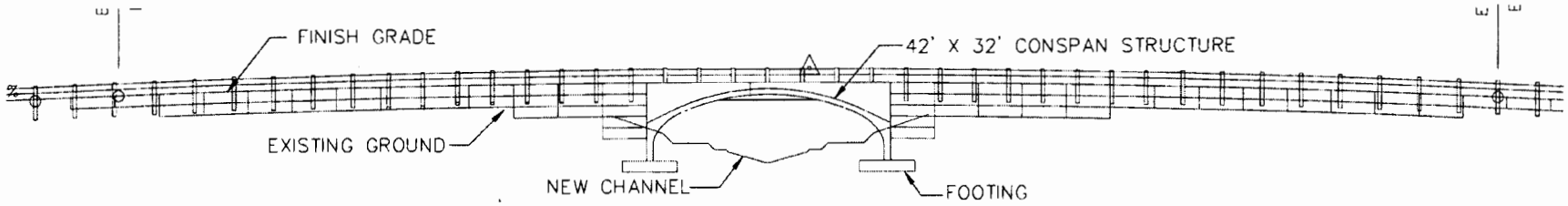
SHEET 6 OF 8

6 & 7

PLAN VIEW OF WWW
SCALE 1"=2'



PLAN VIEW OF WWW
SCALE 1"=2'



ELEVATION VIEW OF WWW
SCALE 1"=2'

PRELIMINARY
NOT FOR CONSTRUCTION

BAR IS ONE INCH ON ORIGINAL DRAWING	ROAD NAME: PORT KENYON ROAD	PUBLIC WORKS DESIGN SECTION	COUNTY OF HUMBOLDT DEPARTMENT OF PUBLIC WORKS
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	ROAD NO: 3H010 MILE POST: PM 0.37 TO PM 0.58	DESIGNED BY: CJW	FRANCIS CREEK CULVERT REPLACEMENT
	PROJECT NO.:	DRAWN BY: JAB	
	CONTRACT NO.: 21383	REVIEWED BY:	T - LINE CROSS SECTIONS
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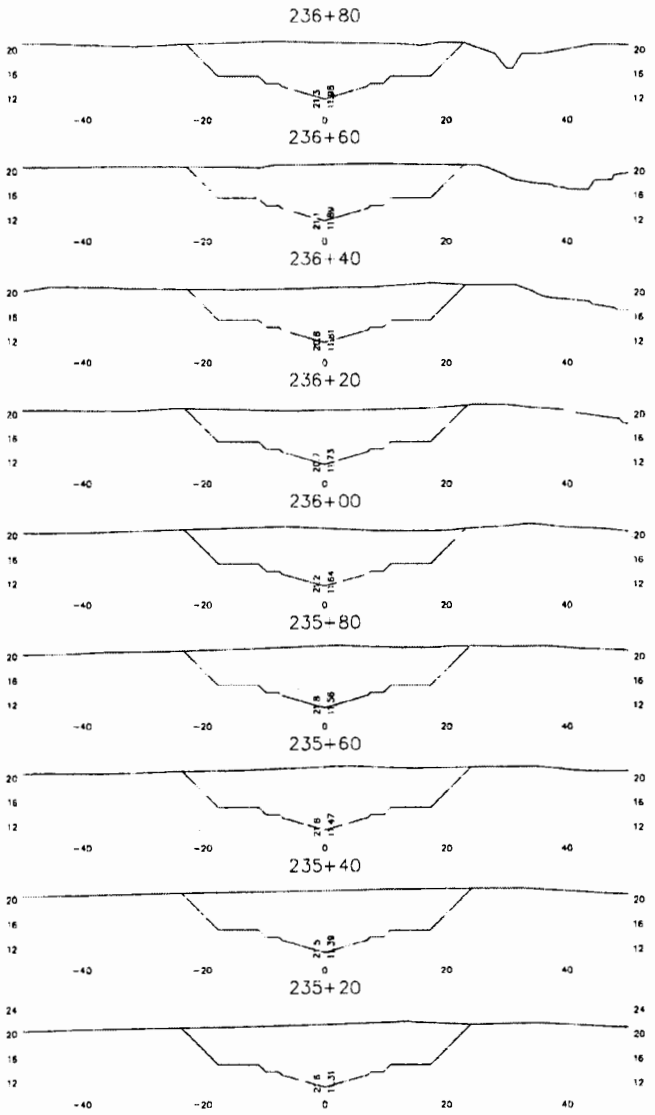
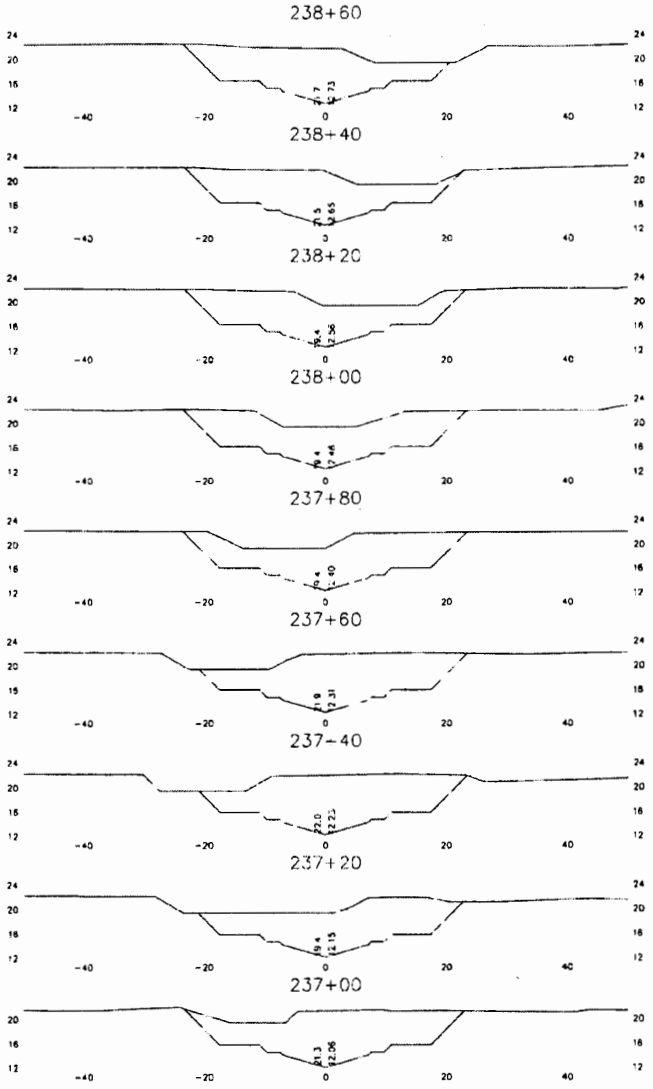
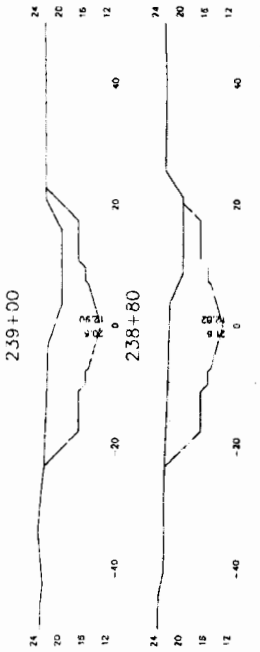
	PLOT DATE: 1/3/2011		

SHEET 7 OF 8







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	ROAD NO: 2H010	MILE POST: PM 0.37 TO PM 0.66	DESIGNED BY: CJW	FRANCIS CREEK CULVERT REPLACEMENT
	PROJECT NO.:		DRAWN BY: JAB	L LINE CROSS SECTIONS
	CONTRACT NO.: 211303		REVIEWED BY:	
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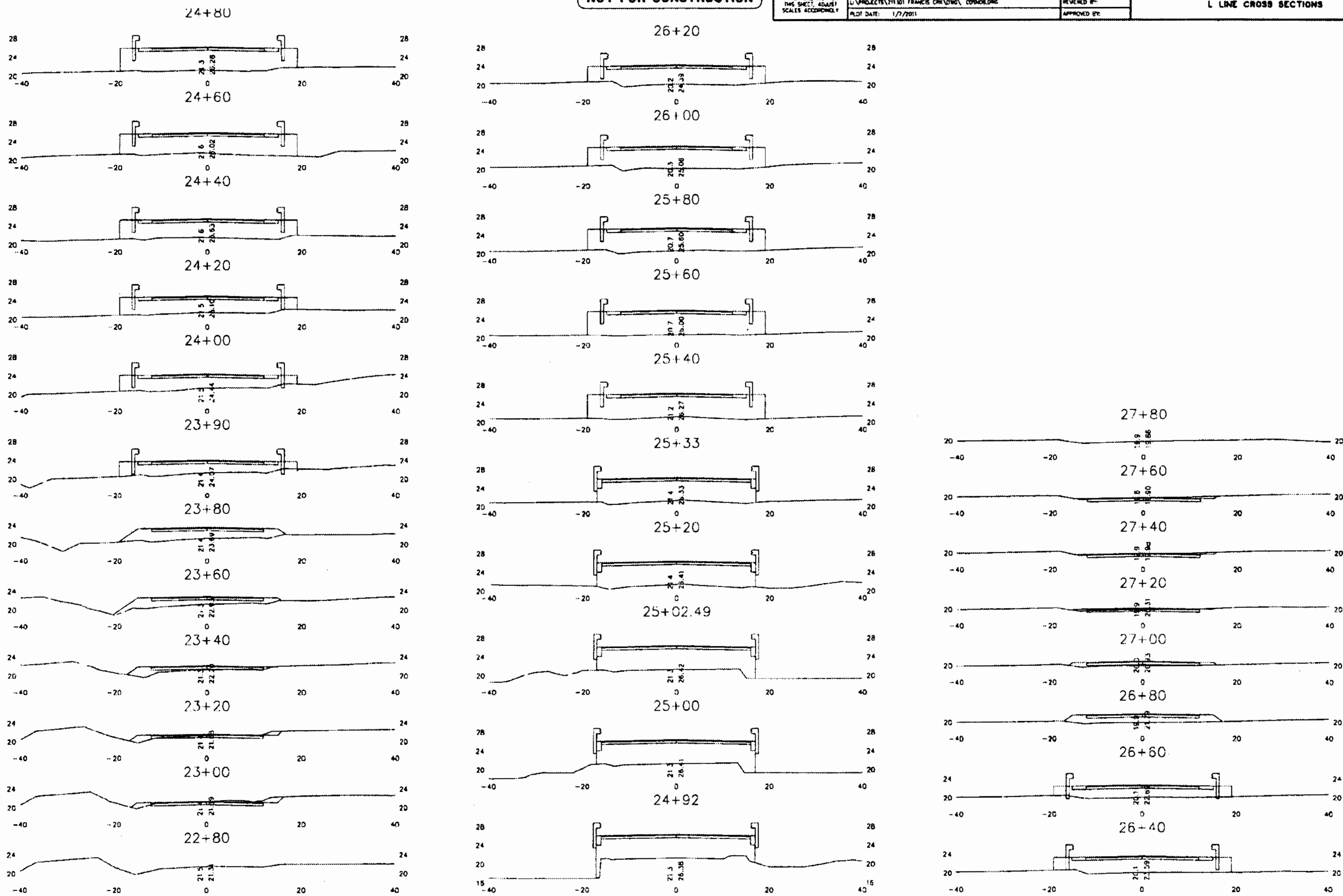
	PLOT DATE: 1/7/2011			

SHEET 8 OF 8



8 of 8

None of the work completed under Commission Emergency Permit No. 1-10-035-G shown in this figure is proposed to be made permanent under CDP No. 1-10-032 (Salt River Ecosystem Restoration Project). Instead, all areas are proposed to be restored per the proposed plans, and Eastside Drainage is proposed to be realigned north of Port Kenyon Road to flow into Francis Creek. In addition, the riparian vegetation removed along Francis Creek is proposed to be restored, and additional riparian vegetation is proposed to be planted along the proposed lower Francis Creek realignment.

EXHIBIT NO. **12**

APPLICATION NO.

1-10-032 - HUMBOLDT COUNTY RESOURCE CONSERVATION DISTRICT

WORK PERMITTED UNDER COMMISSION EMERGENCY PERMIT NO. 1-10-035-G

Emergency work performed by Humboldt County under Commission Emergency Permit No. 1-10-035-G approved on October 7, 2010

Imagery: USDA NAIP (2009)

Date prepared: October 6, 2010

Humboldt County Department of Public Works

1 inch = 350 feet

0 175 350 700 Feet

Salt River Ecosystem Restoration Project

SEDIMENT REUSE OPTIONS

Revised: 9-13-2011

Sediment Reuse Sites							
Owner ID	**Map ID**	**Sediment Application Description and Area (AC)**		**Upland Sediment Application Volume (CY)***	**Upland Delineation Reference (see below)**	**Sediment Application Buffers** (see below)**	**APN**
Alexandre	12	Pasture	40.1	16,160	1	A, B, C, E	10601124
Alexandre	East	Pasture	105.4	42,530	2, 4	A, B, C, E	10603101, 10601120
Alexandre	1	Pasture	59.2	23,880	1	A, B, C, D	10010210
Alexandre	13	Pasture	32.4	13,090	1, 4	A, B, C, D	10602113
Alexandre	South, C	Pasture	40.6	16,400	2, 4	A, B, C, E	10602111
Alexandre (Halley)	10	Pasture	52.7	21,250	1, 4	A, B, C, D	10601103
Alexandre (Trutalli)	14	Pasture	120.2	48,470	1, 4	A, B, C, D	10602150, 10602161, 10602112, 10602178
Rocha/Walker	20	Pasture	96.4	38,880	3, 4	A, B, E	10602102, 10602103, 10602107, 10602162
Cahill	11	Pasture	106.9	43,140	1, 4	A, B, C, D	10601104
McCanless	16	Pasture	74.2	29,930	1, 4	A, B, C, D	10602139
Mendes (Becker)	19	Existing Cattle Lane/Facility	1.8	2,940	NA	NA	10011102
Ferndale Fairgrounds	NA	Existing Stalls	NA	500	NA	NA	3007101
Schoenhofer	7	Pasture	54.8	22,120	1, 4	A, B, C, D	10011207
Boynton (Rocha)	3	Pasture	49.0	19,790	1, 4	A, B, C, D	10010216
Ladonna Head	8	Pasture	33.1	13,360	1, 4	A, B, C, D	10011211, 10602101
Nelson	15 (East Only)	Pasture	42.9	17,320	1, 4	A, B, C, D	10602137
Alexandre (Manzi)	A, 9	Pasture	86.0	34,710	NA, 4	F	10601101
Alexandre	B	Pasture	20.0	8,060	NA, 4	F	10601102
Alexandre	D	Pasture	40.7	16,430	NA	F	10602156
Alexandre	D2	Pasture	20.3	8,210	NA	F	10602132, 10602130
Alexandre (Town)	E	Pasture	23.1	9,320	NA	F	03021108, 03117117, 03117122
Cahill	2	Pasture	8.6	3,460	NA, 4	NA	10010214
Boynton	4	Existing Cattle Lane/Facility	0.2	250	NA, 4	NA	10011109
M. Boynton	4/5	Existing Cattle Lane	1.1	1,790	NA, 4	NA	10011114, 10011113
Vevoda	18	Pasture	30.3	12,230	1	A, B, C, D	10001214, 10602176, 10302177
Sousa	NA	Pasture	14.2	5,750	NA	NA	10016215, 10016228, 10023102
		TOTAL AVAILABLE SEDIMENT APPLICATION/REUSE (CY):		**469,970** (FILL)			
		TOTAL PHASE II EXCAVATION (CY):		**426,700** (CUT)***			
		EXCESS AVAILABLE APPLICATION/REUSE (CY):		**43,270** (NET)			

* Volume calculated based on 3" application depth on existing pastures and 12" application depth on existing cattle lanes

***An estimated 100,000 CY of total Phase II cut volume is assumed to consist of woody and organic deleterious material not suitable for Agricultural Reuse and will be reused for onsite mulch or off-hauled to reuse/disposal outside of the Coastal Zone.

Upland Delineation Reference

1 - Uplands Delineation for Various Agricultural Fields, Salt River Sediment Reuse Plan, Ferndale, California. ACOE, HCRCD, Winzler & Kelly, November 2010.

2 - Revised Wetland Delineation for Alexandre Sediment Reuse Plan, Ferndale, California. ACOE, HCRCD, Winzler & Kelly, April 2011

3 - Revised Wetland Delineation and Supplemental Data for Rocha Sediment Reuse Plan, Ferndale, California. Winzler & Kelly, August 2010

4- Survyed to confirmed presence/absence of ponding water area during Winter 2011

NA - Upland delineation not completed for parcel and pending

Sediment Application Buffers

** Prior to sediment application, all wetlands previously delineated shall be flagged, avoided, and the following application buffers shall be applied:

A - 10 FT buffer from fence lines unless C or D or E exist on adjoining parcel (whichever buffer is greater)

B - 0 FT buffer from uplands on adjoining parcels, existing roads, cattle lanes and agricultural structures and facilities

C - 25 FT buffer from 2011 mapped ponded water areas

D - 100 FT buffer from wetlands delineated in Reference 1

E - 25 FT buffer from wetlands delineated in References 2 and 3

F - Upland Delineation not completed for parcel. Assumed sediment application over entire parcel.

EXHIBIT NO. 13

APPLICATION NO.
1-10-032 - HUMBOLDT COUNTY RESOURCE CONSERVATION DISTRICT
PROPERTIES PROPOSED FOR EXCAVATED SEDIMENT REUSE

Salt River Ecosystem Restoration Project
Sediment Reuse Plan Template
August 2011

Summary of Supporting Wetland Delineations on Parcel

The subject site (APN 234-56-789) is located within the Ferndale Bottoms approximately 1.25 miles northeast of the City of Ferndale, Humboldt County, and is on the USGS 7.5 minute Ferndale and Fortuna Quadrangles. A U.S. Corps of Engineers (COE) upland determination was completed for this site on 8-14-09. A wetland delineation was conducted by Winzler & Kelly and the COE on December 4, 9 and 11, 2008, pursuant to the COE Wetland Delineation Manual, the Regional Supplement to the Manual, and the California Coastal Commission guidance for wetland delineations. The delineated wetlands are shown on the attached map.

Summary of Ponded Water Surveys on Parcel

Ponded water surveys were completed by the Humboldt County Resource Conservation District (HCRCD) on 2-15-11. These surveys were completed in accordance to the ponded water protocol developed specifically for this task. GPS coordinates were taken around the perimeter of ponded water areas and are shown on the attached map.

Sediment Application and Reuse

The excavated sediments will be delivered by belly dumps and/or end dump trucks and windrowed within the agricultural upland areas during the months of June through October. The windrows will be approximately 5-feet high and 10-feet wide and per cross-section detail below. The material will be applied to the fields within 18-months of delivery.

Sediments will be used as a top-dressing for permanent pastures or as an amendment to pastures used in crop rotations. When used as a top-dressing, the application method will consist of applying sediments up to 4-inches and incorporating into the surface with equipment and/or irrigation methods. When used in pastures scheduled for crop rotations, the application method will consist of applying sediments up to 12-inches and incorporating into the surface with equipment prior to planting. Setback buffer distances following **CRITERIA A** established in the Wetland Buffer Assessment for Sediment Reuse Areas on Agricultural Lands Report (Winzler & Kelly 2011) and listed below shall be implemented during the windrowing and application of the sediments.

EXHIBIT NO. 14
APPLICATION NO.
1-10-032 - HUMBOLDT COUNTY RESOURCE CONSERVATION DISTRICT
EXAMPLE SEDIMENT RESUE PLAN (DRAFT TEMPLATE)
(1 of 4)

Setback Buffer Distance (feet) From Applied Sediment			
Description		Criteria A	Criteria B
1	Delineated Wetlands, Ponded Water Areas	30	100
2	Road, Cattle Lane, Agricultural Heavy Use Area, Agricultural Structure	0	0
3	Fence Line with Delineated Uplands on Adjoining Parcel	0	0
4	Fence Line with Delineated Wetlands/Ponded Water Areas on Adjoining Parcel	30	100
Criteria A: Established for parcels where upland delineations were conducted at a **high** resolution. Criteria B: Established for parcels where upland delineations were conducted at a **low** resolution.			

Sediment Reuse Notes

1. The contractor shall be responsible for delivering and windrowing the excavated sediment on the agricultural uplands shown on the construction plans. The contractor shall notify the construction manager a minimum of 14-days in advance of sediment delivery to each parcel.

2. Designated ingress/egress locations and wetland avoidance areas will be flagged by the construction manager and it shall be the responsibility of the contractor to ensure all delivery and windrowing activities are conducted within the designated agricultural upland areas.

3. Sediment delivered and windrowed by the contractor shall be spread/applied on agricultural uplands within 18-months by the landowner. It shall be the responsibility of the landowner and HCRCD to ensure the spreading/application is within the designated agricultural upland areas. Spreading/application techniques will be per the landowner's grazing and crop rotation and monitored by the HCRCD.

4. Placement of excavated sediment on agricultural uplands (zoning designation: AE – Agriculture Exclusive) is consistent with the definition of General Agriculture (Humboldt County Zoning Regulations: 314-170.1 – General Agriculture). General Agriculture is a principally permitted use within the Agriculture Exclusive zoning designation. The County of Humboldt has recognized that placement of the excavated sediment on nearby pastures to amend agriculture upland soil is consistent with the principally permitted use of agriculturally zoned parcels, and therefore the conditional use permit issued by the County of Humboldt for this project does not cover those parcels that are receiving excavated materials only.

5. Per section ii,c,1,b of the State Water Resources Control Board NPDES General Permit for Storm Water discharges (Order No. 2009-0009 DWQ, NPDES No. CAS000002), activities associated with disturbance to land surfaces solely related to agricultural operations such as disking, harrowing, terracing and leveling, and soil preparation are not covered under the general permit and therefore the Stormwater Pollution Prevention Plan (SWPPP) will not be required for the sediment application activities on agricultural uplands. Standard erosion control BMPs will be implemented during the hauling, windrowing and placement of the excavated sediment on the agricultural uplands to minimize wind and rain induced erosion.

Sediment Reuse Best Management Practices

Best management practices (BMPS) to prevent wind and rain induced erosion shall be implemented during the windrowing and application of sediment on agricultural uplands. These shall include but not be limited to:

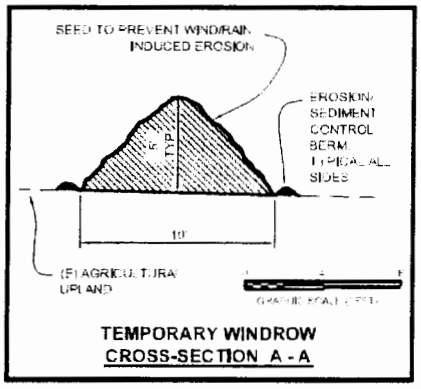
1. Sediment reuse areas shall be managed to allow uniform sheet/overland flow discouraging shallow concentrated flow conditions

2. The buffer filter strip will be maintained with high quality vegetation (ie, established pasture) during the reestablishment of vegetation after sediment application on the sediment reuse area

3. Depth of overland flow moving through the filter will not be greater than the height of the vegetation in the filter

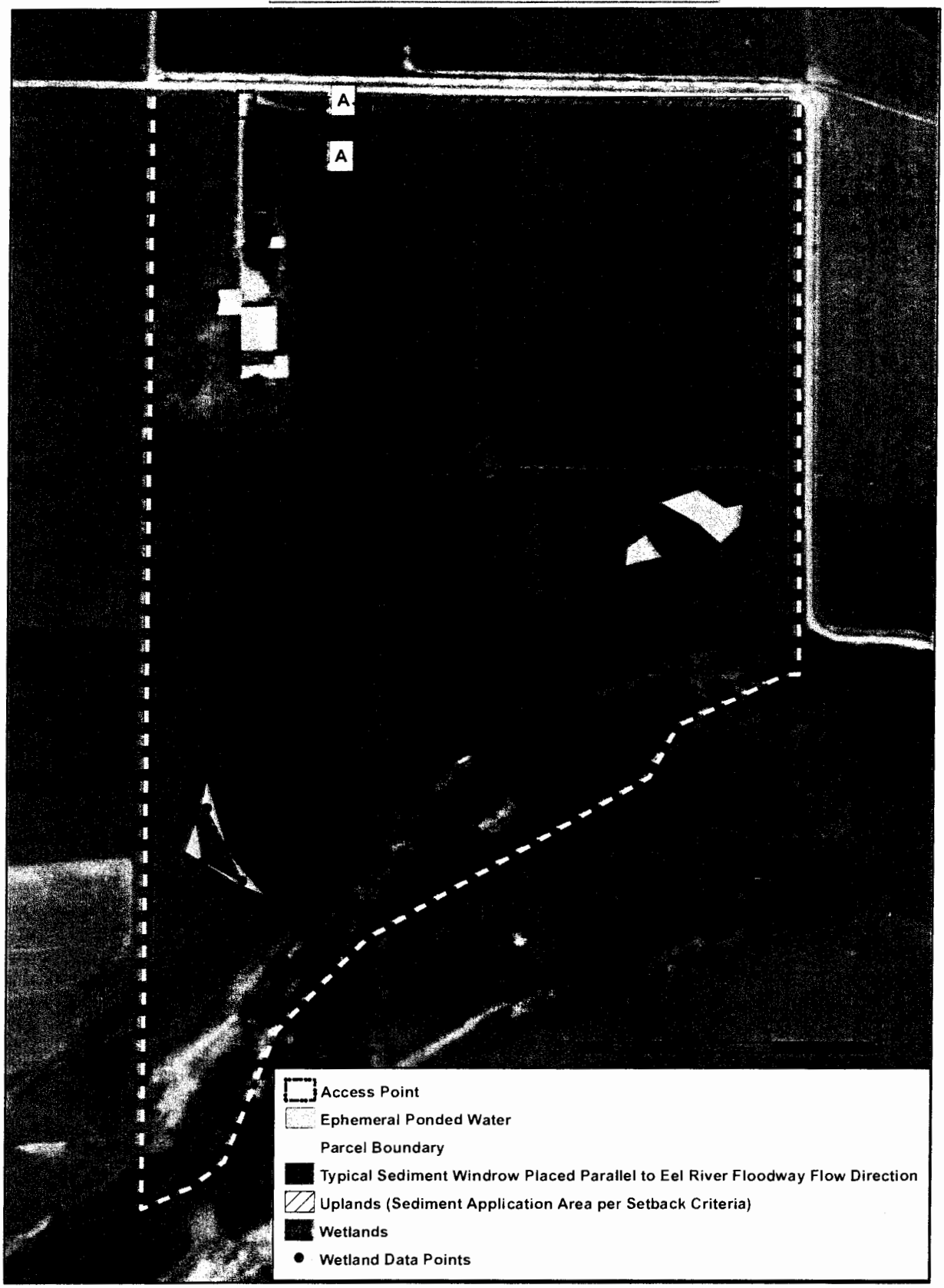
4. The filter strip is not anticipated to be overwhelmed by sediment since it will only be required to temporally function until the upland area is revegetated

5. Sediment that will remain windrowed during the winter months (see cross-section below) shall be seeded and appropriate BMPS shall be implemented by the landowner to protect water quality and monitored by the HCRCD until spreading/application has occurred



TEMPORARY WINDROW
CROSS-SECTION A - A

Salt River Ecosystem Restoration Project
Sediment Reuse Plan
Map Template



Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
3.1 Hydrology and Water Quality			
Mitigation 3.1.1-2.1: Prepare and implement SWPPP Prior to construction of the Salt River Ecosystem Restoration Project, the Humboldt County Resource Conservation District shall obtain authorization from the North Coast RWQCB. As part of this application process, the applicant shall develop a SWPPP and identify Best Management Practices (BMPs) for controlling soil erosion and the discharge of construction-related contaminants. BMPs shall be monitored as specified in the SWPPP for successful implementation. This mitigation measure shall apply to all portions of the Salt River Ecosystem Restoration Project and related projects that involve construction activities. The SWPPP shall be prepared prior to any construction on any portion of the project, and implemented during construction. Individual SWPPPs may be prepared for various construction components or phases (e.g., demolition of existing site structures, grading of one parcel, dredging channels, etc.). The SWPPP would also specifically address: ▪ Erosion control and maintenance of material stockpiles that remain during the duration of project construction as well as sediment reuse (possibly lasting multiple years). ▪ Erosion and sediment control measures to eliminate or minimize input to surface waters and generation of fugitive dust. ▪ Specify silt fencing or fiber rolls to trap sediments and erosion control blankets on graded slopes and channel banks. ▪ Avoid operating equipment in flowing water by using temporary cofferdams, sheet-piles and/or turbidity curtain and/or other suitable structures to divert flow around the channel and bank construction. The SWPPP(s) shall be prepared according to requirements of the State's construction Activities Storm Water Permit (Construction Permit; State Board Order No. 99-08-DWQ, NPDES Permit CAS000002), following guidance contained in Section A of that permit, and it shall include all appropriate best management practices for minimizing stormwater runoff and the potential pollution it may cause. The SWPPP should also address protecting stockpiles left over winter wet seasons from erosion associated with rainfall and/or flooding. Coverage shall be obtained under the Construction Permit by filing a Notice of Intent and fee prior to construction of any project component.	Construction Contractor	HCRCD Project Manager	Prior to initiation of Construc-tion

EXHIBIT NO. 15
APPLICATION NO.
1-10-032 - HUMBOLDT COUNTY RESOURCE CONSERVATION DISTRICT
PROPOSED CEQA MITIGATION MEASURES
(1 of 15)

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
Mitigation 3.1.1-2.2: Implement dewatering restrictions Ponded storm or groundwater in construction areas shall not be dewatered by project contractors directly into adjacent surface waters or to areas where they may flow to surface waters unless authorized by a permit from the North Coast RWQCB. In the absence of a discharge permit, ponded water (or other water removed for construction purposes), shall be pumped into baker tanks or other receptacles, characterized by water quality analysis, and remediated (e.g., filtered) and/or disposed of appropriately based on results of analysis. If determined to be of suitable quality, some of this water may be used on-site for dust control purposes.	Construction contractor will conduct monitoring.	HCRCD Project Manager	Ongoing from stat of constructio n until completion of constructio n
Mitigation 3.1.1-2.3: Implement contractor training for protection of water quality All contractors that would be performing demolition, construction, grading, or other work that could cause increased water pollution conditions at the site (e.g., dispersal of soils) shall receive training regarding the environmental sensitivity of the site and need to minimize impacts. Contractors also shall be trained in implementation of stormwater BMPs for protection of water quality.	Construction contractor will conduct training.	HCRCD Project Manager	Prior to start of constructio n
Mitigation 3.1.1-2.4: Minimize potential pollution caused by inundation Sites shall not be inundated (connected to tidal water or upstream freshwater sources) until surface soil conditions have been stabilized, all construction debris removed, and all surface soils have been removed from the site.	Construction contractor	HCRCD Project Manager	Prior to inundation of any sites

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
Mitigation 3.1.1-2.5: In-stream erosion and water quality control measures during channel dredging In instances where excavation and/or dredging occurs in an effort to widen/deepen the existing Salt River Channel, in-stream erosion and turbidity control measures shall be implemented. These measures include installation and maintenance of in-stream turbidity curtains and silt-fence along channel banks as specified in project designs, specifications and erosion control plans.	Construction contractor	HCRCD Project Manager	Prior to any excavation
Mitigation 3.1.1-3: Implement water quality monitoring and maintenance plan The long-term monitoring plan shall routinely screen project water quality and source areas leading to degraded water quality. Maintenance and adaptive management strategies shall be designed and implemented under the plan to modify the morphology of poor water quality source areas.	HCRCD Project Manager	HCRCD Project Manager	Ongoing as specified in Water Quality Monitoring Plan
Mitigation 3.1.1-7: Implement erosion monitoring and maintenance plan To ensure no long-term adverse impacts, the project includes a long-term monitoring and maintenance plan that would monitor for excessive erosion and sediment accumulation and prescribe remedies in the form of channel adjustments and sediment excavation on an "as-needed" basis. Monitoring shall be conducted pursuant to the long-term monitoring and maintenance plan. Specific criteria will be developed and stipulated in the plan that will trigger the need for adaptive management and/or maintenance activities. If erosion is so great that it causes water quality impairments, improvements such as channel armoring shall be implemented to manage and reduce erosion.	HCRCD Project Manager	HCRCD Project Manager	Ongoing and post-construc-tion as specified in Water Quality Monitoring Plan
Mitigation 3.1.1-9.1: Armor berms and wetland fringe Restoration design shall account for wind-wave erosion control measures in project design that shall include bioengineering and/or hard-bank stabilization measures. Bioengineering methods may include the planting of specific vegetation species that thrive in anticipated environments (accounting for inundation depth-duration-frequency) such as tules or willows and/or installation of large-wood structures such as bank revetments. Hard-bank stabilization measures pertain to the placement of rock and or rip-rap (or other suitable materials) to effectively protect shoreline banks from erosion.	Project design engineers	HCRCD Project Manager	Prior to approval of final design

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
Mitigation 3.1.1-9.2: Implement erosion monitoring and maintenance plan The Monitoring and Mitigation Plan shall include measures to identify and evaluate erosion problems that evolve in response to wind-waves. Similar to the other erosion monitoring and mitigation components, the Plan shall include wind-wave erosion criteria and thresholds that, if exceeded, will trigger maintenance and/or adaptive management measures to repair and eliminate erosional problems.	Project construction contractor and HCRCD Project Manager	HCRCD Project Manager	Ongoing during construct-ion and post-construc-tion
3.3 Biological Resources: Terrestrial/Upland/ Riparian			
Mitigation Measure 3.3.1-2: Preconstruction surveys and possible installation of nest boxes Before riparian areas are cleared, a count of mature trees with available cavities shall be taken to roughly estimate the number of cavities being lost. If the survey and an analysis by a qualified individual demonstrates that the project would result in inadequate habitat remaining for cavity nesters, nest boxes shall be erected to match, as closely as possible, the lost value. Should the findings of the surveys result in the conclusion that nest boxes are not necessary, this mitigation measure would not be required.	Qualified biologist	HCRCD Project Manager	Prior to clearing of any riparian areas
Mitigation Measure 3.3.1-3: Minimizing construction-related disturbance to sensitive habitats ▪ The locations of any sensitive habitats to be avoided shall be clearly identified in the contract documents (plans and specifications). ▪ Before clearing and grubbing commences; construction and staging areas shall be flagged to clearly define the limits of the work area. These areas shall be clearly identified on the contract documents (plans and specifications). ▪ Contractors awarded contract packages shall sign a document stating that they have read, agree to, and understand the required resource avoidance measures, and shall have construction crews participate in a training session on sensitive area resources. ▪ A qualified biologist shall be on-site to observe construction activities as appropriate when construction in or adjacent to sensitive habitat such as wetlands or special status species locations occurs. ▪ Site disturbance shall be minimized to the greatest extent possible by using existing disturbed areas for access roads and staging areas, and concentrating the area of disturbance associated with restoration actions to the minimum necessary to complete the project. Where feasible, temporary measures for access or construction, such as the use of temporary tracks or pads, shall be used to minimize impacts.	Contracting officer or Construction Manager and qualified biologist, as specified in the mitigation measures	HCRCD Project Manager	Contract specifica-tion shall be developed prior to signing of contract; biological monitoring as specified in the measure (prior to clearing and during construct-ion)

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
▪ Restoration activities to restore ecological function and integrity to disturbed habitats, such as revegetation, shall take place as rapidly as possible following habitat disturbance.			
Mitigation Measure 3.3.1-5.1: Pre-construction removal of dense-flowered cordgrass In order to reduce the likelihood of dense-flowered cordgrass colonizing restored tidal marsh at Riverside Ranch, existing populations in and adjacent to the project area shall be controlled prior to construction using manual, mechanical, and/or approved chemical methods.	HCRCD Project Manager and designees	HCRCD Project Manager	Prior to start of construc-tion
Mitigation Measure 3.3.1-5.2: Monitoring and removal of noxious weeds in restored habitats in the project area Levels of noxious weeds in restored riparian and tidal marsh habitats shall be monitored after project implementation. Noxious weed removal shall be conducted as part of project maintenance over the lifetime of the project. Noxious weed removal techniques shall be described in the management plans for the Salt River and Riverside Ranch, which shall be prepared in consultation with DFG, FWS, and NMFS.	Project biologist	HCRCD Project Manager	Ongoing post-construc-tion as specified in manage-ment plans
Mitigation 3.3.1-6: Minimize, avoid, and compensate for impacts to sensitive plants Mitigation for special status plant species is addressed collectively for all species, with modifications noted for individual species. Significant impacts to special-status plant species present or likely to be present onsite shall be minimized, avoided, and contingently compensated by complying with the following: ▪ Pre-construction surveys: Potential habitat for special-status plant species shall be surveyed in appropriate seasons for optimal species-specific detection prior to project excavation/dredging, fill, drainage, or flooding activities associated with project construction. Survey methods shall comply with CNPS/CDFG rare plant survey protocols, and shall be performed by qualified field botanists. Surveys shall be modified to include detection of juvenile (pre-flowering) colonies of perennial species when necessary. Any populations of special status plant species that are detected shall be mapped. Populations shall be flagged if avoidance is feasible and population is located adjacent to construction areas. Special Status plant surveys were conducted between May and August 2010 in the project area for channel restoration and Riverside Ranch restoration. These surveys documented populations of Lyngbye's sedge and Humboldt Bay owl's clover described above. Special status	Qualified biologist to conduct surveys; HCRCD contracting officer or Construction Manager to incorporate avoidance information and language into construction contracts	HCRCD Project Manager	Surveys and contract language prior to contracting; avoidance to be implemen-ted throughout construct-ion

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
plant surveys would be conducted in the project area for upslope sediment reduction components of the project where work would be conducted in suitable habitat. For example, maple-leaved checkerbloom (Sidalcea malachroides) may occur in broadleafed upland forest or North Coast coniferous forest, often in disturbed areas, and Howell's montia (Montia howellii) has been documented on roadsides in North Coast coniferous forest in the Wildcat Mountains and may occur in upslope sediment reduction areas. Surveys for these and other special status plant surveys with potential to occur in the upslope sediment reduction areas listed in Table 3.3-3 shall be conducted prior to upslope sediment reduction project implementation. ▪ The locations of any special status plant populations to be avoided shall be clearly identified in the contract documents (plans and specifications). ▪ If special-status plant populations are detected where construction would have unavoidable impacts, a compensatory mitigation plan shall be prepared and implemented in coordination with USFWS or DFG. Such plans may include salvage, propagation, on-site reintroduction in restored habitats, and monitoring. Plans have been developed for Lyngbye's sedge, Humboldt Bay owl's clover, and eelgrass. These plans are available from the HCRCD, and will be further revised in consultation with regulatory agencies. The plans include the following measures: ▫ Impacts to these species shall be avoided or minimized to the extent feasible. If feasible, impacts to these species will be minimized by restricting channel excavation in the portions of the lower Salt River where they are found to a single bank of the channel (e.g. only the east bank). It should be noted that populations of owl's clover can fluctuate dramatically between years (Pickart 2001), making the number of individuals impacted difficult to predict. ▫ Humboldt Bay owl's clover: A qualified botanist shall collect and conserve seed from local populations of Humboldt Bay owl's clover. These seeds shall be used to replant a population of this species to mitigate for the population lost to construction impacts. The project area shall be monitored for five years and compared with a reference population to determine whether replanting and natural recruitment have resulted in population numbers equal to or greater than those present before project implementation. If the population does not appear to have reestablished during the five year period, seed shall be collected from elsewhere and additional attempts shall be made to reestablish the population. ▫ Lyngbye's sedge: Seed shall be collected from Lyngbye's sedge in the project area to be used for replanting in the event that natural recruitment does not result in a post-project population size equal to or greater than the pre-project population size. Monitoring and adaptive management will be conducted for a ten year period to determine whether the area and approximate number of Lyngbye's sedge in the project area is similar to the area of sedge before the project. Additional planting efforts (from seed or from rootstock of mature plants) shall be undertaken if the population size is declining below pre-project size during the monitoring period. ▫ Eelgrass: The extent and density of eelgrass cover within areas of project impact shall be mapped prior to construction. Natural recruitment shall be monitored for 3 years to determine whether eelgrass is naturally recruiting in newly created channels adequately to replace the area of eelgrass lost due to project impacts. If eelgrass does not establish in an area equal to or greater than that lost due to project impacts in the first 3 years, eelgrass shall be actively planted using the most current scientific methods.			

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
▪ If USFWS or DFG require propagation or transplantation, scientifically sound genetic management guidelines and protocols for rare plants shall be applied to propagation and transplant plans, possibly including the following: ▫ maintain some reserve clonal stock of perennial special-status plant populations during the monitoring period to offset the risk of failure in establishing populations in the wild, ▫ set aside surplus reserve seed of annual special-status plants from impacted populations ▫ conduct long-term monitoring to determine the fate of managed special-status plant populations. No special-status plant species shall be introduced to the site beyond their known historic geographic range unless such introduction is recommended in a final recovery plan or conservation plan prepared and adopted by the USFWS or the CDFG, in formal consultation with the USFWS.			
Mitigation 3.3.1-7: Minimize and avoid impact to nesting special status or migratory birds Construction activities would occur during the breeding and nesting season (March 1-August 15) only following pre-construction site-specific surveys by a qualified biologist. Nesting surveys shall be conducted no more than one week prior to the initiation of site preparation. If surveys identify active nests belonging to common migratory bird species, a 100-foot exclusion zone shall be established around each nest to minimize disturbance-related impacts on nesting birds. If surveys identify active nests belonging to special status birds, an interim no-activity zone of 300 feet shall be established around the nest. If surveys identify active nests belonging to raptors, an interim no-activity zone of 500 feet shall be established around the nest. The radius of the no-activity zone may be modified after consultation with DFG, and the duration of the exclusion shall be determined in consultation with DFG. In order to avoid take of willow flycatchers and western yellow-billed cuckoos during Project activities, in areas where the vegetation is dense and unfeasible to adequately survey, riparian vegetation removal will occur between August 15 and November 30 to avoid the nesting season for these species. For areas with less dense riparian vegetation that can be adequately surveyed, which will be determined in consultation with CDFG, riparian vegetation removal may occur between 1 July and 15 August after surveys for nesting willow flycatchers and presence/absence surveys for other nesting birds are conducted by a qualified biologist prior to the start of vegetation removal. Surveys for willow flycatchers would occur in June and presence/absence surveys for other birds and would occur no more than one week prior to the initiation of site preparation. If active nests belonging to willow flycatchers or western yellow-billed cuckoos are detected during surveys, a 300-foot exclusion zone will be established around each nest in which no construction activities will occur until nesting is completed. The duration of the no-activity exclusion area(s) will be determined in consultation with CDFG.	Project biologist in consultation with CDFG	HCRCD Project Manager	Surveys to be conducted No more than one week prior to initiation of site preparation Develop-ment of exclusion zones prior to site disturbance
Mitigation Measure 3.3.1-12: Limit construction access routes and equipment staging areas and	Project construction	HCRCD Project Manager	Ongoing during

7 of 15

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
minimize excavation in existing aquatic habitat when eggs and tadpoles are expected to be present and conduct preconstruction surveys for RLF in all suitable habitat that would be disturbed by construction. Construction access routes and equipment staging areas shall be limited within the study area to the extent feasible. Excavation in existing aquatic habitat shall only occur when egg masses and tadpoles are not expected (August 15–October 31) for further protection of frogs. If disturbance in aquatic habitats is necessary prior to August 15, the area shall be cleared of and any tadpoles relocated to suitable habitat.	contractor under direction of project biologist		construc-tion
3.4 Biological Resources: Aquatic			
Mitigation 3.4.1-1.2: Limit initial construction to an extended dry weather season (April – November) Initial project construction activities involving earth moving on any of the sites in an area where material may enter or be transferred to a slough shall be limited to the April 1-November 30 dry season. This would reduce the amount of sediment and contaminants washed into the Salt River and Eel Estuary from the Salt River Ecosystem Restoration Project and related project site by rains. Maintenance activities involving earth moving on any of the sites in an area where material may enter or be transferred to a slough shall be limited to the April 15 1-November 1 dry season. This would reduce the amount of sediment and contaminants washed into the Salt River and Eel Estuary from Salt River Ecosystem Restoration Project maintenance activities.	HCRCD to include as contract provision; contractor to implement	HCRCD Project Manager	Upon initiation of project construc-tion
Mitigation 3.4.1-1.3: Adhere to site-specific construction plans Conduct construction work in accordance with site-specific construction plans that minimize the potential for increased delivery of sediment to surface waters.	Construction contractor	HCRCD Project Manager	Ongoing during project construc-tion
Mitigation 3.4.1-1.5: Minimize removal of and damage to native vegetation During excavation of the main channel, a significant amount of native vegetation must be removed. Where possible, the contractor will use heavy equipment to excavate plants and shrubs with root-wads, and replant these at areas designated by the re-vegetation plan. Native vegetation that is removed or damaged at access ways and within the construction areas shall be replaced under the re-vegetation plan at a 3:1 ratio.	Construction contractor	HCRCD Project Manager	During excavation of main Salt River channel

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
Mitigation 3.4.1-1.6: Install temporary construction fencing to identify work areas The project contractors shall install temporary construction fencing to identify areas that require clearing, grading, revegetation, or recontouring, and minimize the extent of areas of areas to be cleared, graded, recontoured, or otherwise disturbed.	Construction contractor	HCRCD Project Manager	Prior to start of grading or clearing
Mitigation 3.4.1-1.9: Fish relocation Before any potential de-watering activities begin in any creeks or channels within the project area, the RCD shall ensure that native aquatic vertebrates and larger invertebrates are relocated out of the construction area into a flowing channel segment by a qualified fisheries biologist. In deeper or larger areas, water levels shall first be lowered to manageable levels using methods to ensure no impacts to fisheries and other special status aquatic species. A qualified fisheries biologist or aquatic ecologist shall then perform appropriate seining or other trapping procedures to a point at which the biologist is assured that almost all individuals within the construction area have been caught. These individuals shall be kept in buckets with aerators to ensure survival. They shall then be relocated to an appropriate flowing channel segment or other appropriate habitat as identified by the RCD in consultation with the NMFS and the DFG. Construction activities shall be prohibited from unnecessarily disturbing aquatic habitat. Federally threatened or endangered aquatic species that occur within the project area either as residents or non-residents are Coho salmon, steelhead, Chinook salmon, green sturgeon, and tidewater goby. Introduced species, particularly Sacramento pikeminnow shall be documented and euthanized, as discussed under Mitigation 3.4.1-4, below.	Project biologist	HCRCD Project Manager	Prior to any dewatering activities
Mitigation 3.4.1-1.10: Tidewater Goby Measures Specific measures designed to avoid or mitigate for impacts to tidewater goby include the following stepwise approach, described in detail in the Draft Biological Assessment for Tidewater Goby under preparation for submittal to the United States Fish and Wildlife Service for consultation. These measures are: 1. Prior to commencement of construction, tidewater goby surveys shall be conducted in May at all previously identified tidewater goby survey sites. Tissue samples will be collected for genetic analysis; 2. Construction plans shall ensure avoidance of disturbance to existing tidewater goby habitat at "Site #6" (see Biological Assessment) a possible relocation site for tidewater gobies found prior to dewatering of the Salt River channel;	Project biologist	HCRCD Project Manager	

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
3. Immediately prior to construction season, a tidewater goby survey shall be conducted in May at all sites and Connick to collect tissue samples for genetic analysis; 4. For any necessary relocation of tidewater goby, or other aquatic species, seining shall be conducted prior to dewatering of the Salt River channel; 5. Captured goby, or other listed species, shall be appropriately relocated as follows: a. Relocation of tidewater goby to Connick Ranch, providing genetic analysis so directs; b. Relocation of tidewater goby to "Site #6" (as identified in the Draft Biological Assessment) providing genetic analysis so directs and landowner permission is provided; c. Retention of existing Riverside Ranch habitat at two suitable sites (see Biological Assessment) and relocate tidewater goby to those sites 6. Most importantly, many acres of habitat suitable for tidewater goby shall be restored at Riverside Ranch as part of the project description;			
Mitigation 3.4.1-2: Biological monitoring program and adaptive management The RCD shall conduct reviews of the Riverside Ranch property on three occasions to determine the functionality of the newly constructed breach points and tidal habitat. These reviews shall take place at the time of breaching, three months following breaching, and one year following breaching. If at any time entrainment of fish is occurring, the RCD shall retain a hydrologist to review the performance of the project, and to recommend corrective measures.	Project biologist	HCRCD Project Manager	At the time of breaching, three months following breaching, and one year following breaching.
3.5 Air Quality			
Mitigation Measure 3.5.1-1.1: Utilize Best Management Practices to minimize fugitive dust generation and assure compliance with North Coast Air Quality Management District rules for particulates	Construction contractor	HCRCD Project Manager	Ongoing during-construc-tion

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
In order to minimize the generation of fugitive dust, the following best management practices shall be implemented during project construction. ▪ All active construction areas shall be watered at a rate sufficient to keep soil moist and prevent formation of wind-blown dust. ▪ All trucks hauling soil, sand, and other loose materials shall be covered, or all trucks shall be required to maintain at least 2 feet of freeboard. ▪ All unpaved access roads, parking areas, and construction staging areas shall be paved, watered daily, or treated with non-toxic soil stabilizers during construction. ▪ All paved access roads, parking areas, and construction staging areas shall be cleaned daily with water sweepers during construction. ▪ If visible soil is carried out onto adjacent streets, the area shall be washed with water or by a water sweeper truck. ▪ Hydroseeding or non-toxic soil stabilizers shall be applied to inactive construction areas (previously graded areas inactive for ten days or more). ▪ Exposed stockpiles of dirt, sand, and similar material shall be enclosed, covered, watered daily, or treated with non-toxic soil binders. ▪ Traffic speeds on unpaved roads shall be limited to 10 miles per hour. ▪ Sandbags, hay bales, or other erosion control measures shall be installed to prevent silt runoff to public roadways. ▪ Vegetation in disturbed areas shall be replanted as quickly as possible. ▪ Outdoor dust-producing activities shall be suspended when high winds (>15 mph) create visible dust plumes in spite of control measures. ▪ Reasonable precautions shall be taken to prevent the entry of unauthorized vehicles onto the site during non-work hours. Construction activities associated with the Project shall comply with AQMD Rule 420 (Particulate Matter) and Rule 430 (Fugitive Dust Emissions), or succeeding AQMD rules that carry out the AQMD's management program for particulate matter. Many of the Best Management Practices listed above are also cited in Rule 430.			
Mitigation Measure 3.5.1-1.2: Minimize construction machinery emissions Contractors shall be required to: 1) minimize idling time to 5 minutes for all trucks; and 2) maintain properly tuned equipment.	Construction contractor to implement; HCRCD to include in contract specifications	HCRCD Project Manager	Ongoing during construc-tion
3.6 Noise			
Mitigation 3.6.1-1: Noise from earthmoving and hauling of soils a) Hours of construction for outdoor activities exceeding 50 dBA shall be limited to Monday through Friday 7:00 a.m.	Construction contractor to implement; HCRCD to	HCRCD Project Manager	During construct-ion

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
to 7:00 p.m. and weekends and holidays from 9:00 a.m. to 6:00 p.m. Movement and hauling of material, and associated activities such as re-fueling or maintenance, shall be limited to normal working hours for the area, as specified above. b) All equipment shall operate with factory-equipped mufflers, and staging areas shall be located as far from residential uses as is practical. These conditions shall be incorporated into project contract specifications. c) To the degree feasible, haul trucks shall use haul routes along the existing channel excavation path, or along roadways distant from sensitive receptors. The contractor shall determine the feasibility of developing haul roads along the channel excavation path. Design considerations shall include a minimum of three separate work sites (to minimize travel on County roads). Haul road construction shall be designed to minimize impacts; haul road designs shall include, but not be limited to the placement of geotextile fabric under the haul road for facilitated re-excavation and removal of bedload materials following project completion. d) A haul-truck route plan shall be developed. Hauling shall minimize passing any substantial collection of noise-sensitive land uses (i.e. occupied houses, schools, hospitals), and shall be limited to less than 200 loads per day on any given road. e) Larger capacity belly and end-dump trucks as well as double-trailers shall be utilized whenever feasible.	include in contract specifications		
3.11 Cultural Resources			
Mitigation Measure 3.11.1-1: Cease work and conduct assessment Inadvertent Discovery of Cultural Resources If cultural resources, such as chipped or ground stone, historic debris, building foundations, or bone are discovered during ground-disturbance activities, work shall be stopped within 20 meters (66 feet) of the discovery, per the requirements of CEQA (January 1999 Revised Guidelines, Title 14 CCR 15064.5 (f)) and 36 CFR § 800.13 (a-b). Work near the archaeological finds shall not resume until a professional archaeologist, who meets the Secretary of the Interior's Standards and Guidelines, has evaluated the materials and offered recommendations for further action. Prehistoric materials that could be encountered include: obsidian and chert flakes or chipped stone tools, grinding implements, (e.g., pestles, handstones, mortars, slabs), bedrock outcrops and boulders with mortar cups, locally darkened midden, deposits of shell, dietary bone, and human burials. Historic materials that could be encountered include: ceramics/pottery, glass, metal, can and bottle dumps, cut bone, barbed wire fences, building pads, structures, trails/roads, railroad rails and ties, trestles, etc. Inadvertent Discovery of Human Remains If human remains are discovered during project construction, work will stop at the discovery location, within 20 meters (66 feet), and any nearby area reasonably suspected to overlie adjacent to human remains (Public Resources Code, Section 7050.5). The Humboldt County coroner will be contacted to determine if the cause of death must be investigated. If the coroner determines that the remains are of Native American origin, it is necessary to comply with	Construction contractor to report finds; HCRCD construction supervisor to contact archaeologist; qualified archaeologist to conduct evaluations/ recommenda-tions	HCRCD Project Manager	Ongoing During construc-tion

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
state laws relating to the disposition of Native American burials, which fall within the jurisdiction of the NAHC (Public Resources Code, Section 5097). The coroner will contact the NAHC. The descendants or most likely descendants of the deceased will be contacted, and work will not resume until they have made a recommendation to the landowner or the person responsible for the excavation work for means of treatment and disposition, with appropriate dignity, of the human remains and any associated grave goods, as provided in Public Resources Code, Section 5097.98. Work may resume if NAHC is unable to identify a descendant or the descendant failed to make a recommendation. The following text details procedures for treatment of an inadvertent discovery of Human Remains: ▪ Immediately following discovery of known or potential human remains all ground-disturbing activities at the point of discovery shall be halted, ▪ No material remains shall be removed from the discovery site, a reasonable exclusion zone shall be cordoned off, ▪ The Project Manager shall be notified and the Project Manager shall contact the county coroner. ▪ It is highly recommended the services of a professional archaeologist be retained to immediately examine the find and assist the process. ▪ All ground-disturbing construction activities in the discovery site exclusion area shall be suspended. ▪ The discovery site shall be secured to protect the remains from desecration or disturbance, with 24-hour surveillance, if prudent. ▪ Discovery of Native American remains is a very sensitive issue, and all project personnel shall hold any information about such a discovery in confidence and divulge it only on a need-to-know basis. ▪ The Coroner has two working days to examine the remains after being notified. If the remains are Native American, the Coroner has 24 hours to notify the Native American Heritage Council (NAHC) in Sacramento (telephone (916) 653-4082). The NAHC is responsible for identifying and immediately notifying the Most Likely Descendant (MLD) of the deceased Native American. ▪ Within 24 hours of their notification by the NAHC, the MLD shall be granted permission by the landowner's authorized representative to inspect the discovery site, if they so choose. ▪ Within 24 hours of their notification by the NAHC, the MLD shall recommend to the landowner and Project Manager means for treating or disposing, with appropriate dignity, the human remains and any associated grave goods. The Recommendation may include the scientific removal and nondestructive or destructive analysis of human remains and items associated with Native American burials. ▪ Whenever the NAHC is unable to identify a MLD, or the MLD identified fails to make a recommendation, or the landowner or his/her authorized representative rejects the recommendation of the MLD and mediation between the parties by the NAHC fails to provide measures acceptable to the landowner, the landowner or his/her authorized representatives shall re-inter the human remains and associated grave offerings with appropriate dignity on the property in a location not subject to further subsurface disturbance. ▪ Following final treatment measures, the Project Manager or professional archaeologist shall ensure that a report is prepared that describes the circumstances, nature and location of the discovery, its treatment, including results of analysis (if permitted), and final disposition, including a confidential map showing the reburial location. Appended to the report shall be a formal record about the discovery site prepared to current California standards on DPR 523 form(s). Report copies will be distributed to the NCIC, NAHC and MLD.			

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
Port Kenyon Culturally Sensitive Area It is recommended that pre-project archeological testing be conducted at this location to determine presence or absence of cultural materials within the proposed area of potential effects for this project. It appears that this location contains substantial overburden of flood soils, capping the historic ground surface. Deep auger boring or backhoe trenching is recommended to determine presence or absence of cultural materials within this sensitive area prior to any project related excavations.			
3.12 Transportation			
Mitigation 3.12.1.1: Traffic Control Plan As part of the final construction documents, the contractor shall be required to submit a Traffic Control Plan corresponding to a Work Sequencing Schedule for review and approval by the construction manager prior to commencement of work. The Traffic Control Plan shall provide a narrative supported with figures depicting the haul routes anticipated to be utilized throughout the construction period and shall be developed in accordance to the California Manual on Uniform Traffic Control Devices (MUTCD) and applicable County of Humboldt encroachment permit conditions. The Traffic Control Plan shall detail the desired haul routes, public notification, required signage/flagging, potential lane/road closers, detour routes, provisions for providing temporary pedestrian access (if applicable) and provisions for maintaining access to all parcels. The use of Port Kenyon Road would be important for the transport of material and therefore the crossing replacement shall be scheduled for a time period when haul trucks would be using that portion of the road less frequently. The Traffic Control Plan shall be periodically updated throughout the course of the project.	Construction contractor	HCRCD Project Manager / Construction Manager	To be included in final construc-tion documents
3.14 Hazards and Hazardous Materials			
Mitigation 3.14.1-2.1: Adapt and apply regional best management practices for managed marshes BMPs are habitat-based strategies that can be implemented when needed for mosquito control in managed wetlands. These strategies represent a range of practices that wetland managers can incorporate into existing habitat management plans or in the design of new wetland restoration or enhancement projects. Ideally, BMPs can be used to decrease the production of mosquitoes and reduce the need for chemical treatment without significantly disrupting the ecological character, habitat function, or wildlife use in managed wetlands. Not all BMPs would be appropriate for a given wetland location or set of circumstances. Timing of Managed Marsh Flooding and Drawdown (Nontidal Managed Open Water Options) Timing of flooding and drawdown shall be coordinated with County Department of Public Health, adapted to current-	Project engineers to develop BMP's; construction contractor to implement.	HCRCD Project Manager	During design and constructio n phases, and post-construct-ion

Mitigation	Implementing Responsibility	Monitoring Responsibility	Mitigation Timing
year temperature, rainfall patterns, and mosquito vector risks, to minimize mosquito production and vector risks. Rapid Flooding and Drawdown of Managed Marsh Marshes shall be flooded and drawn down (emerged bed) as quickly as operational controls allow. Water Control Once wetlands have been flooded, water surface elevations shall minimally fluctuate prior to drawdown, except during winter periods of low mosquito production. Minimal fluctuation is based on the need to circulate water (maximize turnover). In managed wetland areas, marsh submergence depths shall be managed to maximize areas with minimal initial flooding depths of two feet. Wetland Design Features to Reduce Mosquito Production Managed wetland edges shall be constructed to enable efficient access by vector control field crews for monitoring and treatment. Edge slopes of managed nontidal marsh areas shall be steeper than to 4:1 (horizontal to vertical). Open water areas with sufficient fetch and wind-wave turbulence to minimize mosquito production shall be interspersed within managed marsh, at least 20 percent of total area. Floating aquatic vegetation shall be actively suppressed in open water areas within managed marsh.			

BIOLOGICAL ASSESSMENT FOR THE SALT RIVER ECOSYSTEM RESTORATION PROJECT

Covering the Tidewater Goby

Prepared by:

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With
Winzler & Kelly

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EXHIBIT NO. 16
APPLICATION NO.
1-10-032 - HUMBOLDT COUNTY RESOURCE CONSERVATION DISTRICT
PROPOSED MITIGATION MEASURES FOR LISTED SPECIES (1 of 20)

25 May 2011

Project No. 3117-05

4.0 CONSERVATION MEASURES INCORPORATED INTO THE PROJECT

4.1 Tidewater Goby Avoidance and Minimization Measures

The following conservation measures will be implemented to avoid and minimize effects on tidewater gobies:

- All in-stream construction and maintenance activities, including channel excavation, will be conducted between 15 June and 15 October, with extension to 31 October if rainless.
    - Prior to in-stream construction activities in 2012, temporary cofferdams (described above) will be placed upstream of the active work zone to control stream flow from the Salt River tributaries (including Coffee, Williams, Francis, Reas, and Smith creeks). A combination of pumped and/or gravity diversion pipes will be used to route flow around the active work areas. Fish screens (maximum 1/16-in opening mesh screen) will be installed immediately upstream from the cofferdams to prevent aquatic organisms from being exposed to pumps.
    - 1-2 days prior to installation of the cofferdams, and again after installation of cofferdams but prior to dewatering the channel, fish will be captured and removed by seining or dip netting (using USFWS approved methods) in known tidewater goby habitats (USFWS goby sites 2, 3, 5, and 6, see Figure 3) by biologists qualified to handle tidewater gobies under a scientific recovery permit pursuant to section 10(a)(1)(A) of the Act (likely CDFG). Gobies from sites 2 or 3 may be relocated (see below).
    - Appropriate dewatering techniques that minimize the potential for fish entrainment will be employed, including a maximum 1/16-inch opening mesh screen will be used around pump inlets to prevent the potential entrainment of fish species during dewatering.
    - Qualified biologists will also be on location during dewatering to capture and relocate any stranded fish. Dewatering will concentrate fish into smaller areas allowing for their capture and relocation. The qualified biologist will identify, record, and report to appropriate fisheries agencies (CDFG or USFWS) all fish captured and relocated, or the occurrence of any mortality. Electrofishing by CDFG may be used in internal sloughs where salinity is low and where gobies have not been found. Any tidewater gobies that are captured will be placed in a 5-gallon bucket in water from the habitat where they were captured and then they will be relocated within 30 minutes of capture. Specific sites for relocation will be determined based on results of genetic analysis, landowner consensus, and feasibility, and will be decided in coordination with USFWS. There are three potential relocations sites for tidewater gobies:
        1. **Relocate to Connick Ranch**: Gobies may be relocated to suitable habitat on Connick Ranch where tidewater gobies have previously been detected, only with

the consent of the USFWS (Figure 4). The decision to relocate to this location will depend on results of genetic analysis and an agreement with the Wildlands Conservancy (landowner).

2. **Relocated to Site 6**: Gobies may be relocated to Site 6 upon approval of the landowner, which at this time has not occurred.
3. **Returned to the site of capture**: Gobies may be re-released to sites 2 or 3 if design modifications allow for these sites to remain watered and hydrologic conditions supporting gobies to be maintained over the 30 to 60 days required for instream work to be conducted in the Salt River.

- At sites 2, 3, 5, and 6, where tidewater gobies were detected during surveys conducted by USFWS on 4 May 2010 (USFWS 2010; Figure 3), the following modifications and/or construction activities will occur:
  - **Sites 2 and 3:** The culverts, tide gates, scour holes, downstream tidal channels and adjacent levees at these sites will not be modified or disturbed during construction activities. However, these sites will be temporarily impacted during dewatering and excavation of the Salt River channel, which will temporarily eliminate tidal exchange via the small connector channels between the scour holes and mainstem Salt River.
  - **Sites 5 and 6:** Both sites are scour holes formed on the out-board side of culverts equipped with tide gates. These culverts drain winter flood waters out of the adjacent pastures to the mainstem Salt River. At both sites, the levees and culverts will either be retained, plugged and retained, or removed and the levee repaired with compatible fill material. The tidal channels and associated structures connecting these sites to the mainstem Salt River will not be disturbed or altered. A new 48-inch diameter culvert with tidegate will be installed through the new setback berm between the outboard drainage ditch and existing outboard tidal channel(s) connected to Salt River. It is unknown if the culverts at sites 5 and 6 will continue to function similar to existing conditions after installation of the new culvert (i.e., seasonally draining lands to the north of winter storm waters and maintaining the existing scour holes); however, if tidewater goby habitat at sites 5 and 6 is reduced or lost, it will be more than compensated for throughout the project site.
- A qualified biologist will provide environmental awareness training to all construction personnel before construction begins. The training will include descriptions of sensitive species, and discussion of all required protection measures.
- In accordance with federal and state endangered species acts, all observations of sensitive species will be reported to the appropriate agency (CDFG and USFWS).
- A Stormwater Pollution Prevention Plan (SWPPP) has not yet been developed but will be prepared and implemented by the contractor to ensure that water quality in the Salt River and tributaries is not degraded during construction activities and until the disturbed areas are stabilized and erosion potential is minimized. The SWPPP will detail erosion and

sediment BMPs that will be implemented to prevent entry of storm water runoff into the excavation site, entrainment of excavated contaminated materials leaving the site, and entry of polluted storm water runoff into coastal waters during transportation and storage of excavated materials. BMPs that will be implemented as part of the SWPPP will include:

- Coffer dams or other temporary fish barriers/water control structures will be placed in the channel during low tide, and will only be removed during low tide (if possible), after work is completed.
- Because coffer dams will be installed and the channel will be dewatered prior to excavation, equipment will not be operated directly within tidal waters or stream channels of flowing streams, after fish removal efforts have been completed.
- Silt fences and or silt curtains will be deployed in the vicinity of the coffer dams and at excavation of sloughs at culvert installation and removal areas to prevent any sediment from flowing into the creek or wetted channels. If the silt fences are not adequately containing sediment, construction activity will cease until remedial measures are implemented that prevents sediment from entering the waters below.
- Sediment sources will be controlled using fiber rolls, sediment basins, and/or check dams that will be installed prior to or during grading activities and removed once the site has stabilized.
- Erosion control may include seeding, mulching, erosion control blankets, plastic coverings, and geotextiles that will be implemented after completion of construction activities.
- Excess water will be pumped into the surrounding fields to prevent sediment-laden water from entering the stream channel. When internal sloughs are connected to the mainstem Salt River, excavation will occur during a rising tide so that water flows into the marsh and sediment has a chance to settle out, allowing impacts of turbid water generated from excavations necessary for connection of the sloughs to the mainstem to be minimized by settlement and dilution.
- Appropriate energy dissipation devises will be utilized to reduce or prevent erosion at discharge end of dewatering activity.
- Turbidity and pH monitoring will be conducted in the Salt River throughout the site stabilization period to ensure that water quality is not being degraded. Turbid water will be contained and prevented from being transported in amounts that are deleterious to fish, or in amounts that could violate state pollution laws. Silt fences or water diversion structures will be used to contain sediment. If sediment is not being contained adequately, as determined by visual observation, the activity will cease.
- Exposed surfaces above high marsh, down to 7-8 ft elevation (NAVD88), will be mulched and seeded with appropriate seed after the work has been completed.

- Construction materials, debris, and waste will not be placed or stored where it can enter into or be washed by rainfall into waters of the U.S./State.
- Upland areas will be used for equipment refueling. If equipment must be washed, washing will occur where wash water cannot flow into wetlands or waters of the U.S./State.
- Operators of heavy equipment, vehicles, and construction work will be instructed to avoid sensitive habitat areas. To ensure construction occurs in the designated areas and does not impact environmentally sensitive areas, the boundaries of the work area will be fenced or marked with flagging.
- Equipment when not in use will be stored outside of the slough channel and above high tide elevations.
- All construction equipment will be maintained to prevent leaks of fuels, lubricants or other fluids into the slough. Service and refueling procedures will be not conducted where there is potential for fuel spills to seep or wash into the slough.
- Extreme caution will be used when handling and/or storing chemicals and hazardous wastes (e.g., fuel and hydraulic fluid) near waterways, and any and all applicable laws and regulations will be followed. Appropriate materials will be on site to prevent and manage spills.
- All trash and waste items generated by construction or crew activities will be properly contained and remove from the project area
- After work is completed, project staff will be on site to ensure that the area is recontoured as per approved specifications. If necessary, restoration work (including revegetation and soil stabilization) will be performed in conformance with the Revegetation and SWWP plans.

- An Adaptive Management Plan (AMP) has been prepared and will be implemented. It includes long-term monitoring of erosion, sediment control, water quality, habitat development, vegetation maintenance, and BMPs for management actions. Monitoring and management actions that affect tidewater gobies include:
  - Tidewater goby will be surveyed every year for 5 years using USFWS 2005 Recovery Plan survey protocol (Appendix F.) for gobies on Riverside Ranch and in habitats specifically created to support gobies. If gobies occur each year for 5 years, then monitoring will be discontinued. As described in the USFWS protocol, surveys will be conducted in two sampling periods between July 1 and October 31, due to this period being the time of highest abundance for the species in general, and therefore, the period of highest detection. The two sampling periods will be separated by at least 30 days to accommodate changes in water level, seasonal movements, or other functions that result in movement of gobies within the survey area. All surveys will be recorded and reported, including surveys that do not detect tidewater gobies..

- Dissolved oxygen, temperature, and salinity will be monitored for a minimum of 5 years in the Salt River channel and Riverside Ranch to ensure that water quality is adequate to support tidewater gobies. If water quality is degraded and not adequate to support tidewater gobies, management actions will be taken to improve water quality.
- Tidal exchange will be monitored for a minimum of 5 years in the Salt River channel and Riverside Ranch to determine if the project has established the desired tidal exchange, functional tidal prism, and salinity structure. Management actions will be taken if the desired tidal exchange is not achieved.

5.0 FEDERALLY THREATENED AND ENDANGERED SPECIES

5.1 Tidewater Goby

Tidewater goby was federally listed as endangered in 1994 (59 FR 5494). Critical habitat was designated in 2000 (65 FR 69693), and this designation was revised in 2008 (73 FR 5920). The Salt River, including the action area, is not within tidewater goby critical habitat; however, critical habitat occurs in the adjacent Eel River estuary less than 4 km from the action area.

The tidewater goby is a small, annual fish that inhabits coastal brackish water within California ranging from the Smith River to northern San Diego County. A recovery plan was completed in 2005 (USFWS 2005), and a five-year status review was completed in 2007 (USFWS 2007). Threats to the species include loss and modification of coastal wetlands, water diversions, predation and competition by introduced species, channelization of rivers, and degraded water quality from agricultural and sewage effluents, increased sedimentation from cattle grazing, and increased water temperatures from riparian vegetation removal (USFWS 2005).

Tidewater gobies occur in coastal lagoons and brackish marshes and estuaries that are seasonally disconnected from tidal action when sand bars form at the ocean (Moyle 2002). They rarely occur in freshwater habitats but occasionally enter marine environments when flushed out of lagoons, estuaries, and river mouths by normal breaching of sandbars following storm events. These events can disperse tidewater gobies along the coast and have been known to result in recolonization of extirpated localities within several kilometers of extant populations (Lafferty et al. 1999a, 1999b). Population sizes can have large variations throughout the year, plummeting directly after flood and breaching events, and then quickly recovering in summer (Moyle 2002). Physical habitat characteristics associated with tidewater gobies include sand and mud substrate, and habitats ranging from areas void of vegetation to areas thick with emergent vegetation (Chamberlain 2006). Open water is used for reproduction and vegetated areas are critical for juvenile rearing and overwintering, as they provide refuge from high flows (Moyle 2002). Eggs in burrows and the planktonic larvae are susceptible to entrainment during flood and breaching events; therefore, survival is greater where there is infrequent breaching and exposure to tidal influence and/or availability of off-channel sloughs to serve as a refuge from high-velocity

BIOLOGICAL ASSESSMENT

for the

SALT RIVER ECOSYSTEM RESTORATION PROJECT

Humboldt County, California

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the tree and shrub habitat develops, cuckoos may colonize the area from nearby Cock Robin Island in the Eel River.

11.0 SPECIES PROTECTION MEASURES

Conservation measures are intended to avoid, minimize, or compensate for environmental impacts to listed species or critical habitat. Various divisions and departments of the state and federal government may agree upon additional conservation measures. These agreements are not contractually binding, but may be made a condition of the resulting Letter of Concurrence or Biological Opinion. A series of conservation measures will be implemented to reduce or minimize adverse effects to listed species.

11.1.1 *Avoidance Measures*

Pre-construction surveys, construction timing, and construction limitations will avoid potential impacts to both upland and aquatic listed species. These include:

1. In-channel construction and maintenance activities will be limited to the June 15-November 30 dry season. This would reduce the amount of sediment and contaminants eroding into the Salt River and Eel Estuary as a result of project activities. In addition, few salmonids or other fish species would be expected to be present in the Salt River during this time period, as it is outside the time that winter salmonid spawning runs occur in the Salt River and during the time when the sediment-filled Salt River acts as a fish passage barrier for coho, Chinook and steelhead.

2. Removal of riparian vegetation during initial project construction or vegetation maintenance will be conducted between September 1 - March 1, outside the nesting season for western yellow-billed cuckoos and other nesting birds. Nesting surveys would be conducted by a qualified biologist and would occur no more than one week prior to the initiation of site preparation. If surveys identify active nests belonging to western yellow-billed cuckoos, a 300-foot exclusion zone will be established around each nest in which no construction activities will occur until nesting is completed. This is further described in the Take Avoidance Measures for State-Listed Species Document (H.T. Harvey & Associates 2011e).

3. Grading limits will be clearly defined and identified on the construction plans. Project work areas currently vegetated with native plants will be protected unless they are in areas slated for excavation, fill, access roads or other essential items of work that involve ground disturbance. All native vegetation to be protected should be fenced with orange construction fencing to clearly demarcate all work areas from protected areas during construction. The contractor must install the fencing prior to construction and the fence locations will be inspected/approved by the site inspector prior to any ground disturbance or vegetation removal in the project area.

11.2 Minimization Measures

11.2.1 *Storm Water Pollution Prevention Plan (SWPPP)*

Sediment reduction and erosion control is one of the four primary components of the proposed project description; erosion control measures will also be applied during project construction and post-construction. Upslope sediment reduction activities are described above. The benefits of future upslope sediment reduction activities include decreasing aggradation of the Salt River channel, which will then better support desired aquatic and riparian species. Applicable erosion control BMPs include: seeding; mulching; erosion control blankets; plastic coverings; and geotextiles.

The primary pollutant and sources that are associated with this project are sediment/turbidity from excavated areas or from materials reuse areas. Fertilizers and pesticides are not proposed as chemicals to be used in the re-vegetation actions of the Project. Other less likely pollutants and sources include oil and grease from heavy equipment; construction BMPs addressing oil and grease will be followed and will be described in the SWPPP.

Earthwork activities are phased to occur outside of the wet season (October 15 – April 15). Construction activities during the wet season will require the use of BMPs to reduce erosion and control sediment. The earthwork activities will be conducted per the construction documents and subject to project permits including a SWPPP administered by the State General Permit for Storm Water Discharges associated with Construction and Land Disturbance Activities (Order No. 2009-0009 DWQ, NPDES No. CAS000002). The SWPPP shall be developed by a Qualified SWPPP Developer and implemented by a Qualified SWPPP Practitioner to ensure that receiving waterbodies are not impacted as a result of erosion and sedimentation during construction activities, until the disturbed areas are stabilized and sheet and rill erosion potential are minimized, and until a Notice of Termination of the general permit has been filed with the Regional Board. Because of the proximity of the proposed grading activities to the Eel River, which is a 303(d) listed waterbody impaired by sediment and has beneficial uses related to Cold Freshwater Habitat specifically for spawning, reproduction, early development, and migration of aquatic organisms such as salmonids, the project will be subject to turbidity and pH monitoring through site stabilization.

The SWPPP will detail the location and type of erosion and sediment control BMPs. Sediment source control BMPs applicable for this project include: silt fencing; fiber rolls; temporary sediment basins; and check dams. These will be implemented prior to or during grading activities and removed once the site has stabilized. Applicable erosion control BMPs include: seeding; mulching; erosion control blankets; plastic coverings; and geotextiles. Erosion control BMPs including seeding and mulching will be implemented upon completion of the grading activities. The SWPPP will detail erosion and sediment BMPs that will be implemented to prevent entry of storm water runoff into the excavation site, entrainment of excavated contaminated materials leaving the site, and

entry of polluted storm water runoff into coastal waters during transportation and storage of excavated materials. BMPs that will be implemented as part of the SWPPP include:

- Coffer dams or other temporary fish barriers/water control structures will be placed in the channel during low tide, and will only be removed during low tide (if possible), after work is completed.

- Because coffer dams will be installed and the channel will be dewatered prior to excavation, equipment will not be operated directly within tidal waters or stream channels of flowing streams, after fish removal efforts have been completed.

- Silt fences and or silt curtains will be deployed in the vicinity of the coffer dams and at excavation of sloughs at culvert installation and removal areas to prevent any sediment from flowing into the creek or wetted channels. If the silt fences are not adequately containing sediment, construction activity will cease until remedial measures are implemented that prevents sediment from entering the waters below.

- Sediment sources will be controlled using fiber rolls, sediment basins, and/or check dams that will be installed prior to or during grading activities and removed once the site has stabilized.

- Erosion control may include seeding, mulching, erosion control blankets, plastic coverings, and geotextiles that will be implemented after completion of construction activities.

- Excess water will be pumped into the surrounding fields to prevent sediment-laden water from entering the stream channel. When internal sloughs are connected to the mainstem Salt River, excavation will occur during a rising tide so that water flows into the marsh and sediment has a chance to settle out, allowing impacts of turbid water generated from excavations necessary for connection of the sloughs to the mainstem to be minimized by settlement and dilution.

- Appropriate energy dissipation devises will be utilized to reduce or prevent erosion at discharge end of dewatering activity.

- Exposed surfaces above high marsh and down to 7-8 ft elevation (NAVD88), will be mulched and seeded with appropriate seed after the work has been completed.

- Construction materials, debris, and waste will not be placed or stored where it can enter into or be washed by rainfall into waters of the U.S./State.

- Upland areas will be used for equipment refueling. If equipment must be washed, washing will occur where wash water cannot flow into wetlands or waters of the U.S./State.

- Operators of heavy equipment, vehicles, and construction work will be instructed to avoid sensitive habitat areas. To ensure construction occurs in the designated areas and does not impact environmentally sensitive areas, the boundaries of the work area will be fenced or marked with flagging.

- Equipment when not in use will be stored outside of the slough channel and above high tide elevations.

- All construction equipment will be maintained to prevent leaks of fuels, lubricants or other fluids into the slough. Service and refueling procedures will be not conducted where there is potential for fuel spills to seep or wash into the slough.

- Extreme caution will be used when handling and/or storing chemicals and hazardous wastes (e.g., fuel and hydraulic fluid) near waterways, and any and all applicable laws and regulations will be followed. Appropriate materials will be on site to prevent and manage spills.

- All trash and waste items generated by construction or crew activities will be properly contained and remove from the project area.

- After work is completed, project staff will be on site to ensure that the area is recontoured as per approved specifications. If necessary, restoration work (including revegetation and soil stabilization) will be performed in conformance with the Revegetation and SWPPP plans.

11.2.1.1 *Implement dewatering restrictions*

Ponded storm or groundwater in construction areas will not be dewatered by project contractors directly into adjacent surface waters or to areas where they may flow to surface waters unless authorized by a permit from the North Coast RWQCB. In the absence of a discharge permit, ponded water (or other water removed for construction purposes), will be pumped into baker tanks or other receptacles, characterized by water quality analysis, and remediated (e.g., filtered) and/or disposed of appropriately based on results of analysis. If determined to be of suitable quality, some of this water may be used on-site for dust control purposes. The contractor will be required to submit to the Construction Manager and Environmental Monitor for review and approval a dewater and creek diversion plan.

11.2.1.2 Implement contractor training for protection of water quality

All contractors that would be performing demolition, construction, grading, or other work that could cause increased water pollution conditions at the site (e.g., dispersal of soils) will receive training regarding the environmental sensitivity of the site and need to

minimize impacts. Contractors also will be trained in implementation of stormwater BMPs for protection of water quality.

11.2.1.3 Minimize potential pollution caused by inundation

Sites will not be inundated (connected to tidal water or upstream freshwater sources) until surface soil conditions have been stabilized, all construction debris removed, and all surface soils have been removed from the site.

11.2.1.4 Instream erosion and water quality control measures during channel excavation

In instances where excavation and/or dredging occurs in an effort to widen/deepen the existing Salt River channel, in-stream erosion and turbidity control measures will be implemented. These measures include installation and maintenance of in-stream turbidity curtains and silt-fence along channel banks as specified in project designs, specifications and erosion control plans.

11.2.1.5 Minimize removal of and damage to native vegetation

During excavation of the main channel, a significant amount of native vegetation will be removed. Where possible, the contractor will use heavy equipment to excavate plants and shrubs with root wads, and replant these at areas designated by the re-vegetation plan.

11.2.1.6 Fish Relocation

Before any de-watering activities begin in any creeks or channels within the project area, coffer dams will be erected, and all native aquatic vertebrates and larger invertebrates will be relocated out of the construction area into a flowing channel segment by a qualified fisheries biologist holding appropriate permits. In deeper or larger areas, water levels shall first be lowered to manageable levels using methods to ensure no impacts to fish and other special status aquatic species. A qualified fisheries biologist or aquatic ecologist will then perform appropriate seining, dip netting, electrofishing, or other trapping procedures to a point at which the biologist is assured that almost all individuals within the construction area have been caught. These individuals will be kept in insulated coolers equipped with battery operated aerators to ensure survival, and will be relocated to an appropriate flowing channel segment or other appropriate habitat as identified by the HCRCD in consultation with the NOAA Fisheries, CDFG, and USFWS. If fish mortalities occur, individuals will be collected and frozen for delivery to NMFS (for salmonids) or USFWS (for tidewater goby). A combination of pumped and/or gravity diversion pipes will be used to route flow around the active work areas. Fish screens (maximum 1/16 inch opening mesh screen) will be installed immediately upstream from the cofferdams to prevent aquatic organisms from being transported into the bypass pipe. Construction activities shall be prohibited from unnecessarily disturbing aquatic habitat. Introduced species, particularly Sacramento pikeminnow shall be documented and

euthanized. Coffer dams will not be removed until significant freshwater flows in the fall occur, which will minimize water quality degradation from suspended sediment and turbidity in the estuary.

11.2.2 *Measures to Compensate for Impacts*

11.2.2.1 Creation of Habitat

The Project will increase the amount of tidal marsh, aquatic, ruderal and freshwater marsh habitats and decrease in the amount of agricultural grassland, seasonal wetlands, developed lands and scrub-shrub in the Project area (Table 3). This includes a reduction of 273 acres of agricultural grassland and increase of 264 acres of tidal marsh in the Riverside Ranch restoration area suitable for longfin smelt, coho salmon, Chinook salmon, steelhead trout, cutthroat trout, and other brackish-dependent species. The creation of 264 acres of tidal marsh will greatly increase the amount and quality of overwintering and rearing habitat for juvenile coho salmon and other juvenile salmonids in the Salt River estuary, which grow larger in estuaries than farther upstream (Wallace and Allen 2009). The project will also increase of freshwater channel habitat along the main Salt River Channel, above the reach of tidal influence. This will provide additional overwintering and rearing habitat for salmonids and improve hydraulic connectivity with tributary streams, which could improve adult salmonid migration and spawning runs to upstream tributaries. Within the restored tidal marsh, the proposed internal slough channels will create approximately 8.7 acres suitable for eel grass beds.

The Phase 2 corridor design includes salmonid refugia and re-connection of the mainstem with tributaries. The freshwater reach will improve/reconnect access to approximately 15 miles of salmonid spawning and rearing habitat in Reas, Francis and Williams Creeks. Backwater alcoves and active bench depressions will provide northern red-legged frog habitat and winter refuge habitat for juvenile salmonids.

Restoration of the tidal freshwater marsh is expected to provide important overwintering habitat for juvenile coho and Chinook salmon, steelhead, and cutthroat trout, as has been observed in restored freshwater tidal ecotones of Humboldt Bay (Wallace and Allen 2009) and in other restored estuaries of the Pacific Northwest (Miller and Simenstad 1997, Simensted and Cordell 2000, Koski 2009). Juvenile coho salmon in particular have been found using low gradient freshwater tidal habitats to overwinter after high winter flows. Freshwater species also likely to occur include prickly sculpin, stickleback, Sacramento sucker (*Catostomus occidentalis*), California roach (*Lavinia symmetricus*), and Sacramento pikeminnow (Downie and Gleason 2007).

Habitat features targeting specific species such as tidewater goby and salmonids have been designed and incorporated into the design drawings. These features include juvenile salmonid refugia in the form of off-channel habitat alcoves, in-stream wood structures and tidal marsh panes. These features have been discussed with multiple agencies and designed to meet the requirement of the individual species' recovery plans adopted by the USFWS and NMFS. For Phase 1, these features have not been depicted on the Riverside

Ranch 75% Design Plans, however the supporting memo presented in Appendix A presents the features that will be incorporated into the final plans. For Phase 2, these features have been presented developed and presented in the 50% Design Plans. Additionally, a Tidewater Goby Specific BA (H. T. Harvey & Associates 2011b) was developed and submitted to the US Fish and Wildlife Service (USFWS) and National Oceanic & Atmospheric Administration (NOAA) and discusses these features in detail specific to Phase 1.

11.2.2.2 Pikeminnow Control

One biological goal of the Salt River Ecosystem Restoration Project is to expand tidal, freshwater and wetland habitat favorable to native fishes, particularly estuarine dependent species such as Pacific salmon, tidewater goby, and green sturgeon. While the project would restore such habitat, and benefit those species, there is also a chance that the habitats created could favor undesirable non-native species that prey on native species, thus causing a further decline of some special status species. Of particular concern is the Sacramento pikeminnow (Ptychocheilus grandis), a large piscivorous (fish-eating) cyprinid, native to the Sacramento-San Joaquin river drainages and several smaller coastal drainages in California (HCRCD 2011).

In about 1979, the Sacramento pikeminnow species was introduced into the Eel River drainage of northwestern California, where it has become widespread (Brown and Moyle 1997). Juvenile pikeminnow are abundant in the Salt River (DFG 2005). The life history and ecological interactions of the Sacramento pikeminnow in the Eel River are of considerable interest because the Eel River contains depleted populations of salmonid species that once provided the basis for large commercial fisheries. Sacramento pikeminnow may compete with or prey on salmonids under some conditions (Brown and Moyle 1981).

The extent to which juvenile pikeminnow in the Salt River area compete with native species is not fully understood. A recent study indicates that pikeminnow are more common in the turbid, tidal freshwater habitats of the Sacramento Delta than was previously recognized, and stream flows may play an important role in moving juvenile Sacramento pikeminnow into the Sacramento Delta from upstream areas (Nobriga 2006). This same scenario appears to be true of the Eel River estuary, since there is little evidence of local recruitment.

Pikeminnow are highly mobile. Highly mobile, Adult pikeminnow at the upstream limit of their range in one Eel River tributary moved downstream up to 14.5 miles during the winter, possibly as a result of high flows, but tended to return to their original position the following spring, where they remained through the summer, congregating in deep pools during the summer months (Harvey 1999). This suggests that piscivory by pikeminnow may be concentrated in the deep pools where they are congregating, rather than in the Eel estuary.

Incidence of piscivory rises significantly as individual size increases, but two separate studies failed to detect salmonids in foregut contents (Nobriga 2006, Dugas, unpb.).

Similarly, DFG surveys of the project area found few Pikeminnow exceeding 6" in size, and their stomach contents contained a "green goo." No evidence of fish was found in their foregut (Cannata, pers. comm.). In any event, pikeminnow are piscivorous and highly mobile, both daily and seasonally. Furthermore, Sacramento pikeminnow are successful predators in high turbidity environments, though they emphasize benthic (bottom-dwelling) prey under turbid conditions (Harvey pers. comm.). However, Most importantly, pikeminnow have a low tolerance to saline conditions, and do not thrive in estuarine conditions, such as those expected to be restored in much of the proposed project area.

Restoring historic conditions to the Eel estuary is the single-most important step possible for enhancing conditions for native species. The project would include levee breaches, enhancements of tidal exchange, channel excavation, and other measures to promote habitat favorable to native, estuarine dependent species, and less favorable to the pikeminnow.

In addition, as part of the project, The RCD would conduct annual monitoring for at least five years to assess pikeminnow population levels, habitat preferences, dietary preferences, movement patterns, and other factors. Pikeminnow would be euthanized with non-toxic methods such as pithing, and stomach contents would be examined to assess piscivory. Standard population monitoring methods would be used for both assessment and control to ensure the avoidance of take of listed species, and the protection of water quality during the sampling period.

The goal of this effort is to determine if adult pikeminnow capable of piscivory are present and/or dominant in the project area, if their presence is harmful to native species, and if so whether practicable measures can be taken to control their numbers while native species are recolonizing newly created habitat. Documentation of both pikeminnow and native species would help characterize population dynamics within the project area. Presence and abundance of both pikeminnow and native species would be documented and reported in order to help assess trends and population response to the project. Monitoring would follow standard protocol to avoid take of state or federally listed species.

In the event that adult, picivorous pikeminnow (adults greater than 10" with evidence of piscivory, such as stomach contents) become dominant in the project area, to the exclusion of native species, the RCD would conduct a three-year, pilot, pikeminnow-control-program subsequent to the five year monitoring program. The anticipated approach would be annual seining or netting of the main channel with a suitable mesh size in order to trap, document and euthanize pikeminnow. Native species would be documented and returned unharmed to the channel.

The program would be conducted in coordination with the DFG and the Redwood Sciences Lab over a three-year period, culminating in a survey report of the Salt River fish assemblage no later than twelve years after project implementation. The reports would be posted online at Calfish.org, and made available to the DFG and the Redwood

Sciences Lab for interpretation. Eradication of the introduced Sacramento pikeminnow is considered infeasible, so no extension of the pilot program is proposed. However, the pilot program would serve as an intermediate measure to promote the occupation of newly created habitat by native species. Moreover, the information generated in the pilot program would help resource managers determine the effectiveness of the proposed pikeminnow control approach for future projects (HCRCD 2011).

11.3 Monitoring

11.3.1 *Adaptive Management thru Long-Term Monitoring*

Given the watershed-level scale of the Project, the variety of habitats and hydrologic conditions, the high initial disturbance to the ecosystem, interactions with agricultural land uses, and typical level of uncertainty associated with the evolution of ecosystem restoration projects, an Adaptive Management Plan (AMP) has been developed. Adaptive management employs a structured approach, yet it is also a flexible tool that can adjust to a dynamic environment and an evolving project. Adaptive management can thereby keep a project 'on track' toward meeting its goals and objectives, despite the variability inherent in dynamic, natural systems over spatial and temporal scales. The AMP has been designed to provide a strong long-term adaptive management program while still providing flexibility within both the organizational structure and the monitoring program to ensure that the project can work toward meeting the long-term Project goals and objectives. The AMP is based on the four following categories with the monitoring methods, frequency, management triggers and actions specified in the AMP (H.T. Harvey & Associates 2011c).

1. Erosion, Sediment Deposition, and Geomorphic Condition for the Salt River Corridor
2. Erosion, Sediment Deposition, and Geomorphic Condition for Riverside Ranch
3. Water Quality Monitoring for Salt River and Riverside Ranch
4. Habitat Development/Vegetation Maintenance/Invasive Species Control

11.3.2 *Habitat Mitigation and Monitoring*

The Habitat Mitigation and Monitoring Plan (HMMP) includes multiple habitat restoration, conservation, and management elements as compensatory mitigation for potential project impacts. This plan serves as a companion document to the CEQA document and permit applications. The HMMP contains a detailed description of the project impacts to vegetation and a conceptual plan to mitigate for those impacts, including planting plans for revegetating the project area. The HMMP also includes a description of the project's long-term mitigation site monitoring and maintenance requirements, and provides recommendations for ongoing maintenance during the mitigation monitoring period (H.T. Harvey & Associates 2011d).

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TAKE AVOIDANCE MEASURES FOR STATE-LISTED SPECIES SALT RIVER ECOSYSTEM RESTORATION PROJECT HUMBOLDT COUNTY, CALIFORNIA

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May 4, 2011

Project No. 3117-04

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2002). Abundance in estuaries and juvenile survival is strongly correlated with the previous year's winter and spring outflow because it results in faster transport of larval smelt into rearing habitat and decreases salinity in the estuaries (Moyle 2002).

As long as the July 1st start date for channel activities is adhered to, the potential for Project activities to result in harm to, or mortality of longfin smelt is minimized. The Project is also expected to increase the amount of tidal/estuarine habitat for juvenile and adult longfin smelt and improve freshwater connectivity for transport of larval smelt into rearing habitat, both of which could increase their ability to survive and reproduce in the Project area.

7.3.2. Adverse Impacts of Taking On Ability to Survive and Reproduce in Light of:

(A) Known Population Trends. Longfin smelt occurs in Pacific coast bays and estuaries from San Francisco Bay to Alaska (CDFG 2009a). It was once one of the most abundant species in Humboldt Bay and in the San Francisco Bay-Delta Estuary (Moyle 2002). In 2003-2005, abundance in the San Francisco Bay-Delta Estuary was less than 1% of the 1967-1986 average (BI, CBD, and NRCD 2007), and populations have also become very small in the Eel River estuary and in Humboldt Bay (Moyle 2002). The species was listed as threatened by the State of California in 2009. USFWS rejected a petition to list the species under the Endangered Species Act in 2009 (USFWS 2009).

(B) Known Threats. Longfin smelt are threatened by water diversions leading to reduced freshwater inflow, entrainment of fish at diversions, direct and indirect impacts of nonnative species on food supply and habitat, and lethal and sub-lethal effects of pesticides and toxic chemicals (CDFG 2009a).

(C) Reasonably Foreseeable Impacts on the Species from Other Related Projects and Activities. To our knowledge, no other related projects and activities that would result in incidental take of longfin smelt in the Salt River are currently proposed.

7.3.3. Threat to Continued Existence of the Species

Implementation of the avoidance measures (see Section 8.2, below) incorporated into the Project description will avoid the potential for incidental take. With these avoidance measures, the Project will not result in take of longfin smelt, and hence will not affect the continued existence of the species. It is anticipated that the project will ultimately benefit longfin smelt by increasing estuarine habitat in the lower Salt River.

8.0 MEASURES TO MINIMIZE AND FULLY MITIGATE IMPACTS (CCR § 783.2(a)(7))

8.1 WILLOW FLYCATCHER AND WESTERN YELLOW-BILLED CUCKOO

No mitigation measures are proposed for willow flycatcher and yellow-billed cuckoo because incidental take will be avoided. In order to avoid take of willow flycatchers and western yellow-

billed cuckoos during Project activities, in areas where the vegetation is dense and unfeasible to adequately survey, riparian vegetation removal will occur between 15 August and 30 November to avoid the nesting season for these species. For areas with less dense riparian vegetation that can be adequately surveyed, which will be determined in consultation with CDFG, riparian vegetation removal may occur between 1 July and 15 August after surveys for nesting willow flycatchers and presence/absence surveys for other nesting birds are conducted by a qualified biologist prior to the start of vegetation removal. Surveys for willow flycatchers would occur in June and presence/absence surveys for other birds and would occur no more than one week prior to the initiation of site preparation. If active nests belonging to willow flycatchers or western yellow-billed cuckoos are detected during surveys, a 300-foot exclusion zone will be established around each nest in which no construction activities will occur until nesting is completed. The duration of the no-activity exclusion area(s) will be determined in consultation with CDFG.

8.2 LONGFIN SMELT

No mitigation measures are proposed for longfin smelt because incidental take will be avoided. In order to avoid take of longfin smelt, all in-stream construction and maintenance activities, including channel excavation, will be conducted between 1 July and 15 October, with extension to 31 October if rainless. Alternatively, in-stream activities could occur starting 15 June only if beach seine and larval tow net, dip net, light trapping, or drift net surveys are conducted by CDFG prior to any channel activities each year of construction to determine if smelt adults or larvae are present. Beach seining would be conducted in approximately the same locations as Puckett used in 1973-1974 (Puckett stations 2-3, 2-4, and 2-5; see Puckett 1977) plus three upstream sites spread throughout the Phase II project area, using a 100 ft x 6 ft beach seine with a 0.5 inch mesh. Sampling for longfin smelt larvae/juveniles would also occur using appropriate gear (tow, dip, or drift net) with 0.5 mm (500 micron) mesh. Weekly surveys would be conducted beginning the first week in April, as discharge allows, through the first week of June. If no adult, juvenile, or larval longfin smelt are found during surveys, in-stream construction and maintenance activities may occur between 15 June and 15 October, with extension to 31 October if rainless. If longfin smelt are found at any time in the surveys, in-stream construction and maintenance activities will not be initiated until 1 July. This time period corresponds to the beginning of the normal dry season, which will reduce the potential for increased sediment and turbidity in the Salt River.

Prior to channel excavation, a cofferdam will be erected on the Salt River, and any longfin smelt found in the area to be dewatered will be captured by CDFG and released in the Eel River estuary. The cofferdam will not be removed until significant freshwater flows in the fall occur, which will minimize water quality degradation from suspended sediment and turbidity in the estuary.

9.0 MONITORING PLAN (CCR § 783.2(a)(9))

9.1 WILLOW FLYCATCHER AND WESTERN YELLOW-BILLED CUCKOO

It is expected that take of willow flycatchers and western yellow-billed cuckoos will be avoided by following the avoidance measures detailed in Section 8.1. The results of pre-construction surveys for willow flycatchers or western yellow-billed cuckoos, and any decisions to establish exclusion zones will be reported to DFG within three days of the surveys. The duration of the no-activity exclusion area(s) will also be determined in consultation with CDFG.

9.2 LONGFIN SMELT

It is expected that take of longfin smelt will be avoided by following the avoidance measures detailed in Section 8.2. If any longfin smelt are captured and released during dewatering for the cofferdam, the number of fish, their number, estimated size, life stage (juvenile or adult), and condition will be reported to DFG within 3 days.

10.0 FUNDING (CCR § 783.2(a)(10))

The HCRCD received grant funds to implement the Salt River Ecosystem Restoration Project from two State programs: the Consolidated Grants Program and North Coast Integrated Regional Water Management Plan. Planning funds were provided by the California State Coastal Conservancy (SCC) to develop a project to restore the natural functions of the Salt River ecosystem. Funding for land acquisition of portions of the project area were provided by the State of California Wildlife Conservation Board (WCB), the SCC, and the USFWS. SCC enhancement guidelines emphasize the restoration of saltmarsh habitat, alleviation of flooding and restoration of natural hydrologic functions. WCB grant funding requirements include wildlife habitat preservation, restoration and management, wildlife-oriented education and research, and allow for compatible public uses as may be consistent with wildlife habitat preservation. Funding of the avoidance measures will be included as part of the Salt River Ecosystem Restoration Project.

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SALT RIVER ECOSYSTEM RESTORATION PROJECT HABITAT MITIGATION AND MONITORING PLAN

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EXHIBIT NO. 17
APPLICATION NO.
1-10-032 - HUMBOLDT COUNTY RESOURCE CONSERVATION DISTRICT
PROPOSED HABITAT MITIGATION & MONITORING PLAN (EXCERPT) (1 of 49)

4 May 2011

Project No. 3117-05

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Table 1. Land Use and Habitat Projections (all units in acres)[1]

	RIVERSIDE RANCH[2]				SALT RIVER[2]				OVERALL PROJECT			
HABITAT TYPE	**Existing**	**Removed**	**Replanted or Created**	**Projected or Created**	**Existing**	**Removed**	**Replanted or Created**	**Projected or Created**	**Total Existing**	**Total Projected**	**Projected Change**	**Creation Ratio[7]**
Tidal Salt & Brackish Marsh	36	14	300	322	-	-	4	4	36	326	+290	9:1
High Marsh Ecotone Wetland	-	-	12	12	-	-	-	-	0	12	+12	12:1
Aquatic / Mudflat[5]	8	4	17	21	3	-	-	14	11	35	+24	3:1
Riparian Forest/Scrub	31	13	25	43	66	32	51	85	97	128[8]	+31	1.3:1
Freshwater Wetland Habitats:												
a) Freshwater Marsh/Freshwater Channel Wetlands	<1	-	-	<1	1	<1	22	22	1	22	+22	22:1
b) Seasonal Wetlands	3	3	-	<1	21	11	-	10	24	10	-14	-
Agricultural/ Grassland/ Levees	358	303[9]	18[4]	73	240	52	-	188	598	262	-337	-
Scrub-Shrub	8	8	-	-	1	1	-	-	9	0	-9	-
Ruderal	20	20	-	-	3	3	-	-	23	0	-23	-
Developed	8	8	-	<1	1	<1	-	<1	9	<1	-8	-
Sediment Management Areas[6]	-	-	-	-	-	-	-	13[3]	0	13	+13	13:1
Permanent Access Road or Improved Bridge Crossing	-	-	-	-	-	-	-	<1	0	<1	+<1	-
Approximate Total	**472**			**472**	**336**			**336**	**808**	**808**		

[1] Totals are approximate due to rounding of individual acreage amounts.

[2] The confluence of Reas Creek divides the restoration areas of Riverside Ranch (Phase 1) and Salt River (Phase 2).

[3] 13 acres have been depicted on the projected vegetation maps. However, an additional 7 ac are tentatively proposed within the project area on existing agricultural grasslands.

[4] New berm will be seeded with native and erosion control grass species, above 9 ft (NAVD 88) on tidal marsh side and entire side slope on opposing side.

[5] Existing habitat type includes impacted areas to existing Eel grass beds (1.2 ac). Projected habitat area includes an estimated 8.7 acres of Eel grass beds created. Reference: Salt River Ecosystem Restoration Project Rare Plant Mitigation and Monitoring Plan (H.T. Harvey & Associates and Winzler & Kelly, January 27, 2011).

[6] The location of proposed Sediment Management Areas currently comprise approximately 85% Agricultural Grasslands and 15% Riparian Forest and have been accounted for in the respective Removed columns.

[7] Creation Ratio defined as total acres **Projected** (Created) to total acres **Existing**.

[8] Area does not include anticipated future natural recruitment of riparian habitat on the active bench. 20+ acres of projected freshwater and seasonal wetland habitats on the active bench could convert to riparian forest per Adaptive Management Plan.

[9] Area includes grassland habitat on existing levees some of which are not currently used for agricultural production.

Table 2. ACOE and CA Coastal Commission Jurisdictional Wetlands[1] Permanently Impacted and/or Created (all units in acres)

RIVERSIDE RANCH[2]				SALT RIVER[3]				OVERALL PROJECT		
Existing	Filled	Created	Projected	Existing	Filled	Created	Projected	Total Existing	Total Projected	Projected Change
462.9	13.7[4]	13.7[5]	462.9	293	0.3[6]	1.6[7]	294.3	755.9	757.2	+1.3

[1] Upland Delineation for the Salt River Restoration Project Mapping and Report, Prepared by the ACOE, HCRCD and Winzler &Kelly, December 2010. Amended April 2011

[2] Total Riverside Ranch Tidal Marsh Restoration (Phase I) Area: 472 AC

[3] Total Salt River Channel and Riparian Corridor Restoration (Phase II) Area: 336 AC

[4] Native fill from the channel excavation will be placed on approximately 81.2 acres of wetlands of which **13.7 acres will be permanently convert from wetlands to uplands.** The permanently impacted area is associated with the new berm and calculated as the area above 9.0ft (NAVD 88) on the tidal side of the berm and above the existing ground elevation on the opposing side of berm and per the Riverside Ranch Wetland Conversion Assessment Report (Winzler & Kelly, H.T. Harvey & Associates and Kamman Hydrology & Engineering, August 2011). The remaining 67.5 acres of fill will be placed in the tidal marsh below 9.0ft (NAVD 88) to diversify marsh plain elevations and create high marsh ecotone wetlands.

[5] **Creation of 13.7 acres of wetlands through lowering of site levees and mapped uplands.**

[6] Accounts for replaced Port Kenyon Road bridge crossing over Francis Creek, replaced agricultural bridge crossing over Francis Creek approximately 500-ft upstream from Port Kenyon Rd., new culvert crossing over Eastside Drainage, roughened rock channels to connect Reas and Williams Creeks, and permanent corridor access roads for Francis Creek SMA and SMA immediately upstream from Dillon Road bridge.

[7] Current upland areas that will be excavated and converted to freshwater channel wetland.

Table 3. Type of Permanent and Temporary Impacts to ACOE and CA Coastal Commission Jurisdictional Wetlands or Waters of the U.S./State[3]

PERMANENT[1] FILL AND/OR DREDGE				TEMPORARY[2] FILL AND/OR DREDGE		
Description	**Cubic Yards (CY)**	**Acres (AC)**	**Linear Feet (LF)**	**Cubic Yards (CY)**	**Acres (AC)**	**Linear Feet (LF)**
Riverside Ranch Tidal Marsh Restoration (Phase 1)						
Salt River Channel (Dredge Native)	183,4000	22.2	12,900	Approximate 1,600 CY of gravel/rock/sheet-pile/soil[8,9]	<1	ND[5]
Internal Sloughs (Dredge Native)	47,000	8.7	19,700			
Lower Marsh Plain (Dredge Native)	60,600	50 (approx.)	NA			
Raise Marsh Plain (Fill Native)	121,300	35 (approx.)	NA			
Berm Outboard Ditch (Dredge Native)	31,400	13	10,500			
Berm (Fill Native)	185,000	13.7	11,360			
Fill Existing Ag Ditches (Fill Native)	30,250	3 (approx.)	5,000			
Lower Existing Levees (Dredge Native)	14,150	5 (approx.)	7,000			
Salt River Channel and Riparian Corridor Restoration (Phase 2)						
Salt River Channel (Dredge Native)	387,700	70[7]	27,750	Approximate 1,500 CY gravel[4,10]	<1	ND[5]
Francis Creek Channel (Dredge Native)	36,000	3	2,900			
Eastside Drainage (Dredge Native)	1,000	0.3	1,000			
Francis Creek Channel (Fill – Bridge Replacement)	50 (Concrete Footing)	0.3[6]	NA			
Sediment Management Area Access Road (Fill)	350 (Gravel)					
Boulder Weirs at Reas, Francis and Williams Creek Confluence (Fill)	500 (Rock)					

[1] Permanent impact areas are defined as areas that will experience permanent dredge/fill.

[2] Temporary impact areas are areas where temporary construction disturbance could occur and are within the project area. These areas will be utilized for haul roads, staging areas and stockpiling areas and will be restored back to pre-construction conditions. These areas exclude soil amendment areas on agriculture lands.

[3] Upland Delineation for the Salt River Restoration Project Mapping and Report, Prepared by the ACOE, HCRCD and Winzler & Kelly, December 2010. Amended April 2011.

[4] Assumed 50CY of temporarily placed gravel base for each proposed construction entrance and temporary placement of coffer dams.
[5] Not Definable due to variable haul routes and coffer dam placement determined by the contractor and construction manager within the project limits of disturbance.
[6] Accounts for replaced Port Kenyon Road bridge crossing over Francis Creek, replaced agricultural bridge crossing over Francis Creek approximately 500-ft upstream from Port Kenyon Rd., new culvert crossing over Eastside Drainage, roughened rock channels to connect Reas and Williams Creeks, and permanent corridor access roads for Francis Creek SMA and SMA immediately upstream from Dillon Road bridge.
[7] Channel excavation area within the Salt River Channel and Riparian Corridor Restoration, Phase II area (336 AC) that is currently mapped as Jurisdictional Wetlands/Waters.
[8] Does not include area bound by Salt River channel and proposed berm (approximately 320 AC) that will be temporarily disturbed for construction access and material hauling. This area will be de-compacted and restored back to pre-construction conditions.
[9] Temporary fill for construction access and coffer dam placement in Salt River Channel.
[10] Does not include area within project limits and outside of permanent disturbance area (approximately 135 AC) that will be temporarily disturbed for construction access and material hauling. This area will be de-compacted and restored back to pre-construction conditions.

Future or ongoing disturbance from maintenance along the channel corridor will be minimized to the extent possible, and is addressed in the Adaptive Management Plan (H. T. Harvey & Associates 2011a). Ongoing maintenance activities may include vegetation removal, riparian planting, or periodic sediment removal within Sediment Management Areas (SMAs). These areas will be monitored per the AMP, and if any maintenance activities result in the activation of adaptive management triggers, potential remedial measures will be evaluated and implemented. In addition, future channel maintenance activities will be planned to avoid impacts to salmonids and actively nesting birds, unless these areas have been cleared by pre-construction surveys.

Functions and Values of Impacted Habitats

Existing habitats include tidal salt marsh, willow riparian scrub forest, aquatic/mudflat, agricultural grassland, seasonal wetlands, freshwater marsh, ruderal and developed habitats (Figure 3). A discussion of the functions and values of these habitats is discussed within each habitat type.

Tidal Salt/Brackish Marsh

Vegetation. Some tidal influence occurs in the lower reach of the Salt River resulting in brackish to saline conditions. The tidal salt marsh habitat is dominated by non-native dense-flowered cordgrass (*Spartina densiflora*), pickleweed (*Sarcocornia pacifica*), saltgrass (*Distichlis spicata*), slender arrowgrass (*Triglochin concinna*), Lyngbye's sedge (*Carex lyngbyei*), silver weed (*Potentilla anserina*) fat hen (*Atriplex patula*), and sand spurry (*Spergularia macrotheca*).

Wildlife. Vegetated tidal salt marsh provides habitat for a number of avian species, including species found in other habitats in the project area (i.e., the song sparrow [*Melospiza melodia*]) and species that occur primarily in tidal marsh vegetation (i.e., the marsh wren, *Cistothorus palustris*). This habitat supports few mammals in the Humboldt Bay region. These species include the California vole (*Microtus californicus*) and deer mouse (*Peromyscus maniculatus*), both native species, as well as Old World introduced murids (rats and house mouse). Vegetated tidal marsh supports a number of bird species. However, the tidal marsh currently associated with the site is relatively narrow and linear, which reduces the number of birds it can support, especially during the breeding season. For example, herons and rails may forage in these belts of vegetation, but it is not extensive enough to support breeding for most of these larger species. Passerines, such as marsh wrens and song sparrows, may find this habitat extensive enough for nesting. A number of other species would occur as transient foragers or roosters in this habitat. These species include blackbirds, migrant warblers such as yellow and yellow-rumped (*Dendroica coronata*), and nonbreeding sparrows including Lincoln's (*Melospiza lincolnii*), white-crowned (*Zonotrichia leucophrys*) and golden-crowned (*Zonotrichia atricapilla*).

The aquatic habitats associated with the vegetated tidal salt/brackish marsh support estuarine dependent fish communities (described below). Tidal marshes provide refuge habitat during high flows (habitat complexity), and provide/export nutrients and prey items important in the food chain for fish species including juvenile salmonids (*Oncorhynchus* spp), tidewater goby (*Eucyclogobius newberryi*), and longfin smelt (*Spirinchus thaleichthys*) (Simenstad and

Cordell 2000). Tidewater goby are completely estuarine dependent: the habitat currently provided in the lower Salt River and Riverside Ranch may be a sink for gobies, which may only be able to use those habitats during portions of the year.

The tidal salt and brackish marshes of the project site under the current conditions can be considered of moderate value to wildlife species and provide a number of valuable ecological functions relating especially to water quality, sediment retention, nutrient cycling, primary productivity, and wildlife breeding/foraging/refugial habitat. Most of the wildlife associated with tidal marsh comprises avian species. There are few terrestrial animals in salt marsh. The vegetation is not relatively nutritious and most of the animals associated with salt marsh feed on seeds or aquatic animals (Schoenherr 1992).

Riparian Forest/ Scrub-Shrub

The riparian zone is a 50-200 ft corridor along the Salt River and adjacent levees that comprises willows, alders, forbs and grasses (Alice Berg & Associates 2005; H. T. Harvey & Associates 2010; Grassetti 2011; Winzler & Kelly 2010e). Scrub-shrub habitat is also located along several smaller historic drainages within the agricultural fields, as well as along man-made ditches and fencelines. These habitat types are described in concert due to their frequent affiliation within the Project Area.

Vegetation. Dominant willow species include arroyo willow (*Salix lasiolepis*), sandbar willow (*Salix exigua*), Pacific willow (*Salix lasiandra*), and Sitka willow (*Salix sitchensis*). In addition to willows, riparian species include red alder (*Alnus rubra*) and sparse, isolated stands of black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) (Ericsson et al. 2008). Large remnant willow riparian stands are also present along drainage features on the northeast site boundary. Scrub-shrub habitat forms distinct row cover along drainage areas and fence lines within the project area and in areas along the Salt River channel. Scrub-shrub habitat typically consists of California rose (*Rosa californica*) Himalayan and California blackberry (*Rubus discolor* and *R. ursinus*), coyote brush (*Baccharis pilularis*), and poison oak (*Toxicodendron diversilobium*).

Wildlife. The willow riparian scrub/forest habitat on this site is relatively extensive and well developed. As such, it provides the necessary vegetation attributes associated with a functional riparian system at a coastal location. This habitat supports relatively high avian species diversity throughout the year (although species composition changes seasonally). Of conservation interest is the importance of riparian habitat to Neotropical migrants, including some that likely breed on the site (e.g., Bullock's oriole, *Icterus bullockii*), some that would occur primarily during migration (MacGillivray's warbler, *Oporonis tolmiei*), and some that occur during the winter months (golden-crowned sparrow). Finally, other species are resident in willow riparian in this area and breed in this habitat (e.g., black-capped chickadee, *Parus atricapillus*). During a visit in May 2008, a number of birds characteristic of willow habitat were singing in the willow riparian habitat on the site. These species included Swainson's thrush (*Catharus ustulatus*), Wilson's warbler (*Wilsonia pusilla*), yellow warbler (*Dendroica petechia*), and Bullock's oriole. Other bird species that that can be found in this habitat type include the wrentit (*Chamaea fasciata*), orange-crowned warbler (*Vermivora celata*),

Wilson's warbler, song (*Melospiza melodia*) and white-crowned (*Zonotrichia leucophrys*) sparrows, house finch (*Carpodacus mexicanus*), and American goldfinch (*Carduelis tristis*).

This habitat type could be appropriate breeding habitat for willow flycatchers (*Empidonax traillii*), a species listed by the state of California as endangered (the federally listed *E. t. extimus* does not occur in northwestern California). This species is a rare and very local breeder in northwestern California. Willow flycatchers have been detected in the project area, most likely as relatively scarce migrants. There are no documented breeding records for the species at the project site or in the Salt River drainage (Alice Berg and Associates 2005, Hunter et al. 2005, Winzler & Kelly 2010b). However, during protocol-level surveys for willow flycatchers in suitable habitat in the Project area in 2010, a single male willow flycatcher singing on territory was observed (Winzler & Kelly 2010b).

In addition to birds, riparian areas provide important habitat for other wildlife taxa. A limited number of reptiles and amphibians occur in riparian habitat in the region including northern alligator lizard (*Elgaria coerulea*), western terrestrial garter snake (*Thamnophis elegans*), common garter snake (*Thamnophis sirtalis*), northern red-legged frog (*Rana aurora*), pacific chorus frog (*Pseudacris regilla*) and California slender salamander (*Batrachoseps attenuatus*) A number of mammals and other species are found in these habitats as well, including black-tailed deer (*Odocoileus hemionus*).

The density and diversity of species in riparian communities are greater than any other community in California (Schoenherr 1993). Riparian communities are highly productive and provide an abundance of food resources, vegetation structural complexity, and represent an ecotone between aquatic and upland habitats, which further enhances diversity. Overall, riparian habitats such as this provide valuable ecological functions, particularly relating to wildlife breeding and foraging.

Aquatic/Mudflat

The Salt River and its tributaries support aquatic/mudflat habitats. At low tides, a small amount of mudflat habitat is exposed along the river adjacent to the project site, especially in areas closer to the confluence with the Eel River, where the Salt River is wider. At high tides, these mudflat areas convert to shallow open water or aquatic habitat. Additional areas of aquatic habitat occur as small drainage channels, primarily located behind water control structures or in constructed drainage ditches.

However, freshwater inputs (and therefore a true open-water aquatic channel) to the mainstem of the Salt River have become dramatically impaired due to excess sedimentation. The result is a diversion of flows and ensuing flooding, including Williams Creek that no longer flows into the Salt River and therefore is not available to salmonids. (Downie and Lucey 2005).

Vegetation. Aquatic/mudflat vegetation consists of eelgrass (*Zostera marina*) which occurs in low density from the confluence of Cut-Off Slough to the confluence of Smith Creek, algae (*Gracilaria* sp. and *Ulva* sp.), and widgeon grass (*Ruppia maritima*).

Wildlife. Birds forage in aquatic/mudflat habitat, especially during retreating and low tides when water is relatively shallow. Such conditions facilitate detection and capture of fish and invertebrates (herons etc.), and mudflat is exposed enabling shorebirds to probe the moist substrate for invertebrates. Other species, for example waterfowl and kingfishers, are more likely to use this habitat during incoming or high tides. Example birds observed and expected in this habitat include: great blue (*Ardea herodias*) and black-crowned night (*Nycticorax nycticorax*) herons, great (*Camerodius albus*) and snowy (*Egretta thula*) egrets, green-winged teal (*Anas crecca*), mallard (*Anas platyrhynchos*) lesser scaup (*Aythya affnis*), northern harrier (*Circus cyaneus*), greater (*Tringa melanoleuca*) and lesser (*T. flavipes*), yellowlegs and black-bellied plover (*Pluvialis squatarola*).

The estuarine aquatic habitat of the Salt River currently provides marginal habitat for estuarine dependent species (e.g., tidewater goby), potentially important but constrained migration/rearing habitat for species such as salmonids, and spawning/nursery habitat for many species that utilize the ocean as adults. Many of these species will forage at high tides over the mudflats. Tidal channels provide small fish a refuge from larger fish and avian predators. In the estuarine portion of the Salt River, juvenile federally threatened Chinook salmon (*O. tshawytscha*) as well as coho salmon, steelhead, cutthroat trout, Sacramento pikeminnow (*Ptychocheilus grandis*) and threespine stickleback are known to occur. As is the case in similar settings, juvenile salmonids would likely rear in freshwater tidal portions of the estuary before migrating out to sea as smolts, and likely use the brackish portions to transition physiologically from freshwater to marine habitats. Other estuarine fish species that are likely to occur include longfin smelt, Pacific herring (*Clupea harengus*), Pacific sardine (*Sardinops sagax*), surf smelt (*Hypomesus pretiosus*), topsmelt (*Atherinops affinis*), bay pipefish (*Sygnathus leptorhynchus*), redtail surfperch (*Amphistichus rhodoterus*), shiner surfperch (*Cymatogaster aggregata*), prickly scuplin (*Cottus asper*), coastrange sculpin (*Cottus aleuticus*), Pacific staghorn sculpin (*Leptocottus armatus*), English sole (*Parophrys vetulis*), starry flounder (*Platichthys stellatus*), and anchovy (*Engraulis mordax*) (Downey and Lucey 2005). Special-status fish are discussed later in this document under *Summary of Threatened/Endangered Species Impacts*.

Estuarine systems function on both plankton-based and detrital-based food webs. Vegetation composition varies with salinity and depth, which in turn influences the distribution of animal species throughout the system. Many of these species forage in these habitats in an opportunistic fashion, taking advantage of temporary fluctuations in food availability created by the tidal cycle. The aquatic and mudflat habitats of the project area are valuable habitats for the species described above, and provide foraging habitat for most fish species when inundated by tides, and provide spawning habitat for species such as Pacific herring.

Agricultural Grassland

The dominant land cover type in the Salt River Delta is agricultural grassland. This is a regionally abundant habitat type that provides low-to-moderate ecological value to the species described below.

Vegetation. Vegetation in the low-lying agricultural pastureland of the Salt River Delta is dominated by grassland species such as Kentucky bluegrass (*Poa pratensis*), perennial

ryegrass (*Lolium perenne*), saltgrass, common velvet grass (*Holcus lanatus*), creeping bentgrass (*Agrostis stonolifera*), reed canarygrass (*Phalaris arundinacea*), and common oat (*Avena sativa*). Ruderal species within the pastureland include poison hemlock (*Conium maculatum*), bull thistle (*Cirsium vulgare*), filaree (*Erodium cicutarium*), dandelion (*Taraxacum officinale*), common vetch (*Vicia sativa*), bindweed (*Convolvulus arvensis*), fennel (*Foeniculum vulgare*), wild radish (*Raphanus sativus*), dock (*Rumex* spp.), common ragwort (*Senecio vulgaris*), soft chess (*Bromus hordaceous*), creeping buttercup (*Ranunculus repens*), white clover (*Trifolium repens*), red clover (*Trifolium pratense*), bird's-foot trefoil (*Lotus corniculatus*) and English plantain (*Plantago lanceolata*) (Francis 2005) (Ericsson et al. 2008; H. T. Harvey & Associates 2008).

Wildlife. Agricultural pastureland provides habitat for a suite of wildlife species that include the species identified as occurring in ruderal grasslands on the site. Black-tailed deer are common here. Mammals that typically use such fields, perhaps more frequently than is the case with ruderal grassland, include the California vole, Pacific shrew (*Sorex pacificus*), and coast mole (*Scapanus orarius*). A number of swallows were observed foraging for aerial insects over the pastureland during a site visit in May 2008. These species included tree (*Tachycineta bicolor*), cliff (*Petrochelidon pyrrhonota*) and barn swallows (*Hirundo rustica*). Other species observed in this habitat on the site included Eurasian collared-dove (*Streptopelia decaocto*), Savannah sparrow (*Passerculus sandwichensis*), and red-winged (*Agelaius phoeniceus*) and Brewer's blackbirds (*Euphagus cyanocephalus*). Shorebirds that occur in pasturelands in coastal Humboldt County include the long-billed curlew (*Numenius americanus*), and killdeer (*Charadrius vociferous*). These fields also provide foraging habitat for a number of raptor species including the northern harrier, peregrine falcon (*Falco peregrinus*), red-tailed hawk (*Buteo jamaciensis*), barn owl (*Tyto alba*), and the turkey vulture (*Cathartes aura*).

Seasonal Wetlands

Seasonal wetlands occur primarily in low-lying areas within the agricultural pasturelands. These pasturelands are generally subject to seasonal disturbance by grazing, which reduces the vegetation complexity and associated ecological functions and values of these areas, although they support some valuable amphibian breeding niches. Seasonal wetlands are predominantly freshwater, but include some brackish areas in the lower reaches of the Salt River channel, particularly within the Riverside Ranch segment of the project.

Vegetation. Seasonal wetlands are vegetated by spikerush (*Eleocharis macrostachya*), small field bulrush (*Scirpus microcarpus*), common rush (*Juncus effusus*), spreading rush, (*Juncus patens*), field horsetail (*Equisetum arvense*), Pacific silverweed (*Potentilla anserina*), blackberry, creeping buttercup, white clover, red clover, bird's-foot trefoil, and brass buttons (*Cotula coronopifolia*).

Wildlife. Seasonal wetlands provide habitat for a variety of wildlife. The composition of species using seasonal wetlands varies considerably depending on the extent of the wetlands, the duration and period of inundation as well as the extent and species composition of vegetation associated with the wetlands. More species will be associated with the seasonal wetlands than with the flooded pasture on this site. A major factor responsible for the higher

diversity of wildlife using the seasonal wetlands is the wetland vegetation associated with those wetlands relative to the grasses in the pasture. Many of the species that use flooded pasture also use seasonal wetlands when they hold water. However a number of additional species use the vegetation associated with the seasonal wetlands that are absent from the flooded pasture. Amphibians such as Pacific treefrogs (*Pseudacris regilla*) use these ponded areas and will breed in them if the duration of ponding is sufficient and various species of garter snakes (*Thamnophis* spp.) may visit seasonal wetlands on the site. Northern red-legged frogs (*Rana aurora*) occur on the site and breed in some of these wetlands. Small mammals such as rodents and insectivores inhabit vegetated portions of the seasonal wetlands and these species, in turn, provide prey for predatory birds and mammals. Examples of birds found in this habitat that are not likely to use flooded pasture include the green heron (*Butorides virescens*), common yellowthroat (*Geothlypis trichas*), and marsh wren. A seasonal (summer/fall) herd of deer also utilizes this area. Seasonally connected wetland habitats (connected by channels that allow for fish to pass to the estuary/river during high flows or high tides) in Riverside Ranch may also provide rearing habitat for fish species including salmonids and tidewater goby.

Freshwater Channel Wetlands

Freshwater channel wetland habitat occurs on less than one acre of the project area, primarily along edges of streams and sloughs. Water levels in the project area recede in the summer, exposing mud and creating habitat for wetland species. This is a valuable habitat type for the species described below, especially salmonids.

Vegetation. Freshwater wetlands in the project area is characterized by emergent vegetation include sturdy bulrush (*Schoenoplectus robustus*, also known as *Scirpus robustus*), creeping spike rush, and common rush.

Wildlife. Freshwater wetlands attract many bird species including the American bittern (*Botaurus lentiginosus*), red-winged blackbird, marsh wren, pied-billed grebe (*Podilymbus podiceps*), American coot (*Fulica americana*), great-blue heron, great egret, snowy egret and cinnamon teal (*Anas cyanoptera*). Various mammals, such as river otters (*Lutra canadensis)* and reptiles and amphibians, including red-legged frogs and garter snakes also use this habitat in the region. Freshwater channels provide rearing habitat for juvenile salmonids, and also provides habitat for introduced predatory Sacramento pikeminnow. Tidal freshwater habitat provides a particularly important rearing habitat for juvenile coho salmon; growth and survival of juveniles is often greater in these habitats than in stream habitats farther upstream (Koski 2009, Wallace and Allen 2009).

Existing conditions in the Salt River provide some juvenile rearing habitat for salmonids but the quality and quantity of tidal freshwater habitat critical for rearing of juvenile coho salmon and other salmonids is limited. Currently, connectivity of freshwater habitat in the Salt River is poor; adult access to spawning habitat is limited in some years in Francis Creek and most years in other tributaries.

Ruderal

Ruderal habitat occurs primarily along and near developed areas, levees (both natural and man-made) and drainages around and within the Salt River Delta. Generally this habitat type is of relatively low ecological value.

Vegetation. Ruderal habitat is dominated by mostly invasive non-native species such as wild radish, velvet grass, bull thistle, poison hemlock, bird's foot trefoil, and English plantain.

Wildlife. As is typical of ruderal areas, this habitat on site supports primarily widespread, common wildlife species tolerant of disturbed habitats. Examples of mammals that are found in this habitat in the Humboldt Bay region include house mice (*Mus musculus*), black rats (*Rattus rattus*), deer mice (*Peromyscus maniculatus*), striped skunks (*Mephitis mephitis*), raccoons (*Procyon lotor*), opossums (*Didelphis virginiana*), and feral cats (*Felis catus*). Avian species characteristic of ruderal grasslands in this region include the house finch, American goldfinch, red-winged (*Agelaius phoeniceus*) and Brewer's blackbirds (*Euphagus cyanocephalus*) and various sparrows, including savannah sparrows (*Passerculus sandwichensis*) that likely breed in portions of this habitat (as well as agricultural grassland habitat) that support relatively dense stands of grass. Reptiles and amphibians are relatively sparse in ruderal habitats in the region, but Pacific tree frogs, garter snakes, and western fence lizards (*Sceloporus occidentalis*) forage in these areas. Other wildlife that may utilize this ruderal habitat includes blacktailed deer (*Odocoileus* sp.) and porcupine (*Erethizon dorsatum*).

Developed

Developed areas include areas such as barns and houses, roads, and other agricultural infrastructure, such as holding pens. Developed areas do not include substantial areas of vegetation cover.

Wildlife. Several species of birds and mammals likely use these structures for shelter and foraging, as well as possibly for nesting. Such species include barn owls, barn and cliff swallows, Norway rats (*Rattus norvegicus*), house mice, and feral cats (*Felis catus*). Structures also provide foraging perches for raptors, such as red-tailed hawks (*Buteo jamaicensis*) and American kestrels (*Falco sparverius*).

Summary of Threatened/Endangered Species Impacts

Prior to 2010 sensitive species surveys, information concerning the known distribution of threatened, endangered, or other special-status and significant plant and animal species that may occur in the area was collected from several sources and reviewed by H. T. Harvey & Associates biologists. The sources included the CDFG's Natural Diversity Data Base (CNDDB 2008), and miscellaneous information available through the U.S. Fish and Wildlife Service (USFWS), CDFG, and technical publications. Contacts with local biologists were also made (e.g., Andrea Pickart [Humboldt Bay National Wildlife Refuge] and Annie Eicher [UC Sea Grant Extension]).

RESTORATION DESIGN

LOCATION

All of the project's restoration areas are located within the project construction footprint and immediately adjacent lands of willing landowners.

OWNERSHIP STATUS

Land ownership in the Project area is primarily private property and includes Riverside Ranch, the Salt River channel, and some adjacent pasturelands. Riverside Ranch, which was private land primarily in agricultural uses, was acquired in 2007 by the Western Rivers Conservancy, and it is expected that ownership will be transferred to the California Department of Fish & Game. Along the periphery of the Salt River channel land uses are primarily agricultural and contain a few residences, agricultural outbuildings and the wastewater treatment plant for the City of Ferndale (Grassetti Environmental Consulting 2010).

HISTORIC AND CURRENT USES

The Project area was historically a tidal slough before construction of levees, tide gates, dikes, berms, and water diversions in the late 1800s allowed conversion of much of the tidal slough to pasture (Grassetti Environmental Consulting 2010). Since then, the Project area has been used primarily for seasonal livestock grazing (dairy cows), and crops (corn and hay), with the exception of historically forested upland areas (Grassetti Environmental Consulting 2010).

BASIS FOR DESIGN

The project's goals and objectives are described previously under Summary of Overall Project Goals and Objectives. Those goals and objectives, most of which directly address the restoration of functional native habitats, form the strategic basis for the design. The habitat restoration design addresses those goals and objectives and is integrated closely with the physical design for the site.

The Salt River Channel and Riparian Corridor and Tidal Marsh restoration designs (Kamman Hydrology & Engineering 2011, Winzler & Kelly 2011a) are driven primarily by the site's hydrologic setting and goals, and the resulting dynamic landform defines the basis for the restoration design. The proposed mosaic of restored habitats has been developed to match plant species' tolerances and/or affinity for post-construction salinity, soil, hydrologic, and sedimentary conditions (e.g., static, aggrading or scouring sediments). Plant species have been selected and placed to assist hydrologic functionality (streambank stabilization, focusing flows to induce sediment transport, etc.), compete with undesirable invasive plant species (primarily via shading), provide shading of the active channel to improve fish habitat, and restore historic plant associations. A diversity of plant species is also proposed to maximize the potential for restoration success and to establish habitats that support a broad suite of wildlife species. The design team has also minimized impacts to sensitive and regulated habitats, and maximized the restoration acreage of high priority sensitive habitats such as wetlands and riparian habitats, and habitats for sensitive wildlife species. Riparian and wetland habitats comprise two of the most

valuable habitat types for birds and other wildlife in North America, and riparian habitats have been identified as the most important habitats to landbird species in California (RHJV 2004.).

Due to the large scale alteration of site hydrology and elevations necessary to achieve the project goals, and the inherently limited land available for ecosystem restoration within the project footprint, it is infeasible to avoid conversion of some habitat types or to replace all impacted habitats using standard mitigation ratios. Thus, there are complex tradeoffs to be considered, but there is also an overall net ecosystem benefit. Some of the tangible benefits are:

1) *Restoration of historic habitats* including tidal marsh, tidal slough, freshwater channel, Sitka spruce riparian forest, and rare plant habitat
2) Proposed restoration will significantly *increase the habitat diversity*, and support a wider assemblage of wildlife species than the current condition
3) *Significant increase in tidal marsh*, one of the richest ecosystems present on the coast, including the establishment of substantial new high marsh ecotone
4) The project design is being developed to *minimize/avoid the need for future intrusive channel maintenance* that would impact the aquatic/riparian ecosystem
5) Provide improved *fish passage and significant levels of restored and currently unavailable instream habitat*
6) Project will *control invasive plants* such as non-native *Spartina* and reed canarygrass

HABITAT RESTORATION CONCEPTUAL DESIGN

Salt River Fluvial Reach

The fluvial reach of the Salt River channel between Perry Slough and Reas Creek has been designed to connect a proposed river channel corridor to passive and active sediment management areas as well as the floodplain. The proposed channel capacity ranges between the 1- and 1.5-year return period flow, with capacity depending on topographic relief of the adjoining floodplain. Within the channel, there are two principal geomorphic features: the active channel and the active bench.

Figures 5, 7, 9, and 12 show the proposed channel alignment and restoration areas in plan view and Figures 6, 8, 10, 11, and 13 show cross-sections of the channel, existing habitats and proposed habitats. Plant species palettes for the different habitats are shown on each cross-section.

Geomorphic Elements of Restoration Areas

Active Channel

The active channel is intended to function as a higher energy channel that will transport sediment and water over a wide range of flows. The active channel will be confined by woody vegetation (both planted and naturally recruited on the adjoining banks) to provide bank stability, promote

sediment deposition and natural levee formation adjacent to the active channel, and provide vegetation cover and shading once established. This bioengineering approach provides quick vegetation establishment benefiting bank stability, desirable roughness characteristics and riparian habitat. The active channel will contain summer base flows and high flow capacity that will be exceeded approximately 60 to 70 days/year, limiting woody vegetation to those species that can tolerate frequent inundation. Unvegetated segments along the banks of the active channel are proposed to allow hydraulic connectivity to the active bench. Flow will be allowed to exit onto the active bench as well as reenter the active channel encouraging deposition and the formation of side channels and topographic diversity on the active bench. Sustained flow velocities in the active channel are intended to impede colonization of woody vegetation that could promote aggradation. However, some natural recruitment of woody vegetation is anticipated to occur in the active channel and shall be monitored, and removed if necessary. The monitoring and adaptive management of the channel are described in the project's Adaptive Management Plan (AMP) (H. T. Harvey & Associates 2011a). Although there is considerable uncertainty regarding the persistence of the constructed active channel, removal of sediment from the active channel is not anticipated to be necessary.

Active Bench

Flows exceeding the active channel capacity will occupy the active bench, providing an area for sediment deposition, morphological diversity outside of the active channel and the establishment of vegetation and wildlife habitat. The active bench is anticipated to be a highly dynamic interface between the active channel and the floodplain. Topographic diversity will be graded into the active bench to both create slower water areas for deposition as well as low-flow constrictions that promote scour of side channels and allow return of flow back into the active channel. Vegetation throughout the active bench will be managed in and around sediment management areas to ensure the desired channel morphology and hydraulics, to establish and maintain function, and to avoid disruptions to flow conveyance within the active sediment management areas. Outside of active sediment management areas, natural recruitment of woody vegetation is anticipated on the active bench and will be maintained and managed pursuant to the channel design intent per the AMP. Vegetation within the active channel will be managed per the AMP to ensure that significant vegetation establishment does not limit the hydraulic and geomorphic function.

Multi-function Active Bench Habitat Elements

Multi-function habitat elements (elevated vegetated berms, engineered log jams (ELJs), high flow pathways, backwater slough alcoves, areas of seasonal ponding and in-stream wood structures) are integrated into the channel corridor design with the intent to provide habitat and morphologic benefit consistent with the project goals and objectives. These elements will be situated at the interface between the active channel and the active bench, providing opportunities to diversify aquatic habitat, increase morphological complexity and either promote or discourage sedimentation on the active bench. Such elements will also be used to force flow into passive and active sediment management areas and backwater slough alcoves. Depending on their placement and intended purpose, these elements will create aquatic habitat by creating pools, cover, and areas suitable for macro-invertebrates and refugia for fish and amphibians.

Sediment Management Areas

Over time it is expected that sediment inputs to the mainstem Salt River will be reduced through implementation of erosion control and sediment trapping activities in the upper watershed. Nevertheless, the sediment load is high, and necessitates active management for the foreseeable future. Therefore, there are three active sediment management areas in the upper reaches of the project area. Sediment will periodically be removed from these areas in the summer when disturbance of the aquatic habitat can be minimized and access is facilitated. These areas will provide interim habitat values in between sediment removal activities; such as temporary salmonid refugia in the winter, and in the summer the grasslands will provide foraging for avian species such as white-tailed kite and northern harrier.

Riverside Ranch Tidal Marsh

The Riverside Ranch restoration will re-establish intertidal wetland habitat to the Eel/Salt River Estuary. The increase in tidal exchange associated with a restored marsh will also help sustain a restored Salt River channel. Restoring tidal prism to the lower Salt River, (i.e., increasing the volume of water exchanged on each tidal cycle) increases channel scour and helps maintain and equilibrate the width and depth of the channel. Figure 12 shows a plan view and Figure 13 shows a cross-section of the restoration areas.

Habitat Restoration Design by Reach

Within the project footprint all available and suitable areas have been utilized to maximize the acreage of wetland and riparian habitat that can be created. Existing infrastructure such as roads, bridges, and agricultural facilities limit corridor alignment variable width options. Where feasible, the corridor alignment avoids contiguous stands of adjoining mature riparian forests to minimize temporal impacts while maximizing riparian widths within the constrained landscape. The sub-sections below summarize the revegetation approach, organized on a reach basis.

Cottonwood/Spruce Riparian Forest with Freshwater Wetland (Figures 5 and 6)

This upper reach of the project area has no tidal influence and therefore all proposed plant species are freshwater species. The land available for restoration is fairly narrow compared with downstream reaches. Riparian forest will be established on the upper parts of the slopes that rise up from the active bench; species would include black cottonwood, Sitka spruce, redwood, grand fir, red alder, and big leaf maple (see cross-section for percent composition of each species). As the larger stature evergreen Sitka spruce and redwood develop they will shade out naturally recruiting willow, which will limit the development of undesirable willow thickets onto the active bench where they could limit flow conveyance. Native shrubs and ferns will be installed to provide understory cover (see cross-section for proposed species). Native species expected to naturally recruit on the upper slope include pacific willow, Sitka willow, sandbar willow, arroyo willow, California blackberry, wild rose, and common horsetail.

The active bench is designed to support low growing native freshwater wetland plants such as slough sedge and spike rush. It is expected that willow will recruit on this bench but these will be periodically managed on an as-needed basis per the AMP.

A strip of active channel edge riparian will also be established to promote a succession of woody riparian species. This vegetation will provide shading of the aquatic habitat, help shade out invasive reed canarygrass, protect the banks from erosion during flood events, and promote scour of the active channel. The approach incorporates the reuse of onsite native plant material and woody vegetation for the use in various bioengineering techniques such as sod mat and brush bundles applied to the toe of the active channel. These treatments provide immediate bank stability upon installation and for several years post construction. Live willow stakes from onsite stock will be incorporated into the bioengineered bank thru the higher shear zones providing additional bank stability and early succession canopy over the active channel. The active channel edge zone will also include planting of alders and spruce on the adjoining active channel berms to provide late successional canopy designed to suppress willow growth in the long-term while maintaining a defined active channel.

Spruce/Cottonwood Riparian Forest with Freshwater Marsh (Figures 7 and 8)

This reach of the project is predominantly influenced by freshwater, but the lower section within 500 ft upstream of Dillon Road is subject to tidal inundation in the active channel, but not onto the active bench. The land available for restoration becomes considerably wider in this reach, ranging as high as 500+ ft in width for riparian forest and channel areas. The plant species proposed for the riparian forest in this reach are identical to those cited above under Cottonwood Spruce Riparian Forest with Freshwater Wetland, but the percent composition of the species is shifted to establish Sitka spruce as the dominant tree species. The shrubs and fern palette is very similar with minor adjustments (see cross-section for full plant palette).

The active bench will be vegetated in isolated areas with freshwater marsh species such as slough sedge and spike rush and where scour and deposition are anticipated to be minimal. Naturally recruiting woody vegetation on the active bench will be maintained per the AMP.

An ecologically valuable active channel edge riparian habitat element has been added to the design and referred to as the active berm. Shown in the cross-section, this is where riparian strips will be established immediately adjacent to the active channel to provide channel shading, stabilize the channel banks and induce sediment accumulation on natural levees along each side of the channel. These natural levees or active berms will vary in elevation, with the higher elevations receiving inundation approximately 5-10 days per year; this modest level of inundation allows for the planting of Sitka spruce, alder, and cottonwood intermixed with the willow plantings. As these natural levees aggrade over time and the inundation period decreases even further, additional plantings of Sitka spruce and other compatible species can be installed to gradually establish a dense evergreen riparian corridor that will limit willow establishment and also shade out reed canarygrass.

Spruce/Cottonwood Riparian Forest with Tidal Freshwater Marsh (Figures 9 and 10)

In this reach there is tidal influence on the active bench beginning approximately 1800 ft downstream of the Dillon Road Bridge. Figure 2.14A is a cross-section placed just below the bridge in the area where the bench is still above tidal influence, thus freshwater marsh will occupy the bench. The channel will be fresh in the winter and brackish in the summer. The

inundation regime for the channel and bench are largely influenced by tidal elevations and backwater effects from the Eel River. The plant species to be installed and expected to recruit remain the same as in the reach upstream for this portion of the reach.

Spruce Dominated Riparian Forest with Brackish Marsh (Figures 9 and 11)

The cross-section for this reach has several notable changes from upstream areas. First, a substantial width and acreage of existing riparian will be preserved on both sides of the channel, providing an average riparian corridor width of approximately 280 feet (ft). The outer slopes will be planted with Sitka spruce, red alder and Sitka willow and a mix of native shrubs and ferns. A small fringe of brackish marsh will be established along the lower outer slope, and a mudflat will occupy the active bench. The channel and active bench will be tidally influenced and inundated 60-70 days per year.

Riverside Ranch Tidal Salt Marsh/Riparian Forest (Figures 12 and 13)

The restored tidal salt marsh reach of the Salt River (from below Reas Creek to Cutoff Slough) is intended to accommodate optimal tidal exchange to restore wetlands in Riverside Ranch as well as provide flood flow conveyance. The channel will be sized for unrestricted tidal exchange of the restored wetland tidal prism, having a characteristic tidal channel shape with relatively steep (1.5:1; H:V) side slopes. Channel dimensions (width, depth and area) decrease in an upstream direction in response to reduced tidal prism volumes. The channel is designed to maximize tidal amplitudes through the reach to the Riverside Ranch inlet channels. This reach is also designed to maintain naturally high flow velocities during both neap and spring tides to maintain channel equilibrium morphology. The channel will experience increased tidal influence, and the regular wetting and drying cycles, associated scour velocities and increased salinity will promote the establishment of salt and brackish marsh vegetation further upstream in the Salt River. The channel has also been designed to maintain a range of water depths which are anticipated to be suitable for eelgrass colonization.

The channel will be excavated into the existing Salt River alignment, maintaining the historic channel sinuosity and adjacent marsh habitat. Tides at and above MHHW will overtop the central tidal channel, flowing onto the adjacent marshplain. Natural recruitment of tidal marsh vegetation is anticipated on the adjacent marshplain after construction. The Salt River tidal salt marsh reach was designed as an equilibrium channel and is not intended to erode or aggrade substantially after construction, therefore on-going removal of sediment from this reach is not anticipated.

The Riverside Ranch component will restore tidal marsh habitat to create extensive habitat improvements and ecological benefits to numerous fish, wildlife and wetland plant species. This effort entails restoring tidal exchange from the Salt River tidal salt marsh reach into Riverside Ranch through removal of levees and excavation of connector and internal slough channels. Restoring tidal wetlands to the Ranch will significantly increase the volume of water exchanged on each tidal cycle (tidal prism) between the restored wetland and the Eel River estuary. This will result in higher flow velocity and increased tidal scour that will maintain the newly restored morphology of the Salt River. Thus, the two main connections between restored marsh and the Salt River channel are strategically located to maximize the length of Salt River tidal channel

exposed to increased tidal prism. Restoration efforts also include significant grading of internal Ranch areas to eliminate existing drainage ditches, create more natural sinuous channel networks, and increase micro-topography for distinct marsh habitat zones. The project also involves constructing a new setback berm to project adjacent properties from tidal inundation with an outboard drainage ditch to maintain the current level of drainage from surrounding properties. Before the setback berm is constructed, the top 6 inches of the berm footprint and any nearby graded areas will be excavated from the surface and stockpiled to provide a source of seed and organic rich topsoil. After grading is complete, the stockpiled soil will be re-spread and disked over the surface of the berm (and any higher elevation filled areas) in order to provide a source of native seed and organic matter, and to augment the seeding in these areas. Any agricultural areas and/or potentially erosional areas not adequately covered with the stockpiled topsoil may still receive a treatment with an erosion control seed mix.

Because the existing elevations within Riverside Ranch are relatively high (majority of the site is between mean tide level and mean higher high water), it is anticipated that low- to high-marsh habitats (occupying elevations ranging from mean tide level (MTL) through and above mean higher high tide level (MHHW)) will establish rapidly after restoration is complete. The only subtidal (below MTL) habitat inside Riverside Ranch will be restricted to the internal slough channels. Elevations to accommodate upland ecotone habitat will be maintained and created at selected locations around the perimeter of the restored marsh. The main connector channels to the Salt River along with internal slough channels are sized to optimize tidal exchange and maintain adequate flow velocity and scour to flush sediments out of the marsh through tidal action if deposited within the marsh channels during storms.

Based on monitoring and modeling data, it is anticipated that these reaches will experience very low salinity through the rainy season, transitioning through brackish conditions and into high/marine salinities by early summer through late fall period, mirroring the salinity signature and seasonal cycle of the Eel River estuary (H. T. Harvey & Associates 2009). It is anticipated that a mix of salt and brackish marsh vegetation will naturally recruit and colonize Riverside Ranch based on seasonal inundation and salinity patterns. Features will be designed to create tidewater goby habitat that mute tides and retain water at all tides, yet are hydraulically connected: these habitat features include confluence pools, natural topographic features (terminal ponds, pannes), and earthen sills within main channels that provide slack water. The majority of the internal slough channels are also designed to provide adequate water depths and conditions for eelgrass recruitment.

The setback berms will be offset from the property boundary to allow for continued grazing access to approximately 75 ac of contiguous agricultural land along the southeast portion of the property, and aligned to avoid impacting existing willow habitat. The creation of upland transition habitat is balanced with the ability to take full advantage of the restored tidal prism and promote salt marsh development.

Two areas on Riverside Ranch in the vicinity of the new breaches will be graded to elevations at or below MHW to provide additional drainage from the property and to enhance the tidal prism in the upstream portions of the adjacent Salt River. Additional habitat features include the retention of a grassland area with seasonal wetland characteristics in the northeast corner

adjacent to a significant thicket of mature willows. This area will be grazed and managed for Aleutian cackling geese.

Projected habitats include the riparian habitat planting areas (Sitka spruce, shore pine, alder, and redwood) to restore historic Salt River Delta forested habitat on the Riverside Ranch property. Preservation of existing willow habitat on-site will also maintain habitat values for avian species.

The HCRCD and CDFG have an MOU in place for administering leases on CDFG lands. The project will retain land specifically for agricultural use to enhance short grass habitat. This area is located outside of the tidally restored areas, on the outboard side of the setback berm. This area provides a contiguous area of approximated 75 ac that can be used for grazing and provides a habitat enhancement opportunity for Aleutian cackling goose.

The plan view for Riverside Ranch is shown in Figure 12 and the cross-section is depicted in Figure 13. The cross-section is adjacent to Riverside Ranch and depicts the trapezoidal shaped channel, and the marsh plain that extends to a new setback berm. This interior area of Riverside Ranch is presently dominated by pastures with a salt marsh fringe on the outboard side of the berm. Once a tidal connection is re-established, the newly vegetated portions of the restored ranch will be dominated by naturally recruiting tidal salt marsh species including slough sedge, pickleweed, salt grass, slender arrowgrass, fat hen, jaumea, gumplant and sand spurry. Other naturally recruiting species that may occur include Lyngbye's sedge, common rush and common spike rush. The higher elevation salt marsh will be monitored to determine whether it is developing the diversity representative of native high marshes in Humboldt County estuaries. If necessary, planting may occur in this area to augment natural recruitment and to increase the diversity of salt marsh species. Plantings could include salt marsh species such as gumplant, saltgrass, jaumea, seaside arrowgrass, and sea lavender.

Dense-flowered cordgrass is also likely to colonize this area and ongoing maintenance will be necessary to control the spread of any existing cordgrass plants and to limit the establishment of this species after construction activities are completed. Dense-flowered cordgrass management is described in the Maintenance Plan of this MMP and in the AMP (H. T. Harvey & Associates 2011a).

Fish and Wildlife Use

Cottonwood/Spruce Riparian Forest with Freshwater Marsh or Freshwater Wetland

Bird and terrestrial wildlife species that are expected to occur in the cottonwood/spruce riparian forest are similar to those that are expected to occur in the spruce dominated riparian forest (see below). However, the addition of cottonwood to the association enhances the habitat value for some riparian associates such as the yellow warbler and Bullock's oriole and will support long-term nesting habitats for raptors. Raptor nesting habitat is a limiting factor in the Eel River Valley.

The low-gradient freshwater marsh is expected to provide rearing habitat for juvenile salmonids and other freshwater species as described above. Riparian vegetation along the floodplain should slow velocities and provide overwintering refuge for juvenile salmonids during high flows. The

freshwater reach will improve/reconnect access to approximately 15 miles of salmonid spawning and rearing habitat in Reas, Francis and Williams Creeks (Downie and Lucey 2005). Backwater alcoves and active bench depressions will provide northern red-legged frog habitat and winter refuge habitat for juvenile salmonids.

Spruce/Cottonwood Riparian Forest with Tidal Freshwater Marsh

Bird and terrestrial wildlife species that are expected to occur in the spruce/cottonwood riparian forest are similar to those that are expected to occur in the spruce dominated riparian forest.

The tidal freshwater marsh is expected to provide important overwintering habitat for juvenile coho and Chinook salmon, steelhead, and cutthroat trout, as has been observed in restored freshwater tidal ecotones of Humboldt Bay (Wallace and Allen 2009) and in other restored estuaries of the Pacific Northwest (Miller and Simenstad 1997, Simensted and Cordell 2000, Koski 2009). Juvenile coho salmon in particular have been found using low gradient freshwater tidal habitats to overwinter after high winter flows. Freshwater species also likely to occur include prickly sculpin, stickleback, Sacramento sucker (*Catostomus occidentalis*), California roach (*Lavinia symmetricus*), and Sacramento pikeminnow (Downie and Gleason 2007).

Spruce Dominated Riparian Forest with Brackish Marsh

The spruce dominated riparian forest is expected to provide habitat for bird species such as the golden-crowned kinglet (*Regulus satrapa*), brown creeper (*Certhia americana*), gray jay (*Perisoreus canadensis*) and hermit warbler (*Dendroica occidentalis*). Neotropical migrants may also occur in the spruce dominated riparian forest, including some that likely breed on the site (e.g., Bullock's oriole), some that would occur primarily during migration (MacGillivray's warbler), and some that would occur during the winter months (golden-crowned sparrow). Bird species expected to occur as residents in this habitat type include the black-capped chickadee, and summer breeding residents such as Swainson's thrush, Wilson's warbler, yellow warbler, and Bullock's oriole. The willow flycatcher, listed by the State of California as endangered, may occur as a summer resident or breeder, although occurrences have been very rare in the project area (Harris 2006, Hunter et al. 2005, Winzler & Kelly 2010b). In addition to birds, the riparian forest could provide habitat for reptile species such as the northern alligator lizard, western terrestrial garter snake, and common garter snake, amphibian species such as the Pacific treefrog, northern red-legged frog, and California slender salamander and mammal species, such as black-tailed deer (*Odocoileus hemionus*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), and a variety of shrews, moles, voles (*Microtus* sp.), and mice (*Peromyscus* sp.).

The brackish marsh is expected to provide overwintering habitat for juvenile salmon rearing and important transition habitat for outmigrating juvenile Chinook and coho salmon as they move from freshwater to the ocean (Bottom et al. 2005; Miller and Sadro 2003). In the lower Eel River Estuary this zone typically is brackish but slightly stratified, with saltier water at the bottom and fresher water at the surface (H. T. Harvey & Associates 2009); in the winter it tends to be fresher and in the summer more saline with decreasing freshwater flows. These habitats tend to be used more seasonally, preferred by freshwater species in the winter and marine assemblages in the summer (Downie and Gleason 2007).

Federally endangered tidewater gobies have been observed in small quiet pools (i.e., 4-5 m diameter) downstream of tide gates adjacent to the Salt River channel in Riverside Ranch (USFWS 2010). Thus, tidewater gobies could occur in the brackish marsh if it contains features such as seasonally disconnected, low-velocity, off-channel, or tidally muted slough channels and swales (Chamberlain 2006).

Riverside Ranch Tidal Salt Marsh/Riparian Forest

Tidal salt marsh is expected to provide habitat for shorebirds, herons, rails, waterfowl, raptors, and gulls, and could support breeding for some of these species. Tidal salt marsh is also expected to provide year-round habitat, and possibly breeding habitat, for passerine bird species such as the song sparrow and marsh wren. A number of other passerine birds will likely occur as seasonal transients in the tidal salt marsh and adjacent riparian forest, including red-winged blackbird, yellow warbler, yellow-rumped warbler, Lincoln's sparrow, white-crowned sparrow, and golden-crowned sparrow. Special-status species that could use the tidal salt marsh as habitat include the northern harrier and short-eared owl. Mammals that could occur in the tidal salt marsh include the California vole and white-footed mouse, both native species, as well as Old World introduced murids (rats and house mouse). The grassland area with seasonal wetland characteristics that will be retained in the northeast corner of Riverside Ranch is expected to provide foraging habitat for Aleutian cackling geese.

Tidal salt marsh may also provide habitat for estuarine and marine fish species, and transition habitat for outmigrating or over-wintering juvenile salmonids. Based on the species assemblages that occur in the lower Eel River Estuary (Downie and Gleason 2007), fish species that could occur in the restored tidal salt marsh include the longfin smelt, listed as threatened by the State of California, as well as a host of marine fish species including herring, sardine, anchovy, top smelt, staghorn sculpin, surfperches, English sole, and starry flounder. Juvenile Dungeness crab are also likely to use restored tidal salt marsh habitat as a nursery area.

Federally endangered tidewater gobies and juvenile coho salmon have been observed in small quiet pools (i.e., 4-5 m diameter) downstream of tide gates adjacent to the Salt River channel in Riverside Ranch (USFWS 2010). Thus, tidewater gobies could occur in the restored tidal salt marsh if it contains created features such as seasonally disconnected, low-velocity, off-channel, or tidally muted slough channels and swales (Chamberlain 2006; Winzler & Kelly 2010d). Some habitat types specifically created for gobies and juvenile salmonids are likely to provide short-term value, however, these habitats will adjust over time as the marsh evolves and responds to natural processes such as scour, deposition and sea level rise. It is anticipated that as the marsh evolves, some created habitat may lose value but other habitats will persist and provide long term benefits for these species. Ultimately, the restoration of Riverside Ranch and increased hydrologic connectivity throughout this reach of the Salt River will improve the functions and values of the habitat to these and other important fish species.

RESTORATION TIMELINE

It is anticipated that hydrologic and aquatic functions in the Salt River will be fully restored in 15-25 years; the new channel should function hydrologically as soon as construction is

completed (e.g., it will convey the design flow within the channel). However, full aquatic habitat functionality will not be supported until forested streamside vegetation approaches maturity, which is anticipated to take 15-25 years. Estuarine habitat at Riverside Ranch is likely to be functioning hydrologically as soon as tidal circulation is restored, but full restoration of aquatic habitat functions is expected to gradually establish over 5-10 years.

RESTORED HABITATS

The Salt River Ecosystem Restoration project is projected to result in increases of 264 ac of new tidal wetland habitat, 35 ac of high marsh ecotone, 23 ac of additional aquatic channels and mudflats, 32 ac of riparian habitat, and eight ac of freshwater wetlands (Table 1). The project will also establish 13 ac of Sediment Management Areas that will provide wetland functions and values while the site is developing as well as long-term sustained geomorphic function of the riparian corridor. These habitat gains will come at the expense of about eight ac of developed areas, as well as agricultural grassland (333 ac), scrub-scrub (9 ac), and ruderal (23 ac) habitats (Table 1). However, these tradeoffs in habitat types will result in substantial ecosystem-level benefits and increased hydrologic functioning of the Salt River corridor.

The Salt River is currently flanked by agricultural and urban land. Some characteristics of the Salt River project area include poor water quality and hydrologic disconnectedness, limited habitat access for fish species, and low habitat complexity (for example the riparian habitat is dominated primarily by willow and alder) with a predominance of agricultural grasslands (Winzler & Kelly 2010d). The existing hydrologic conditions include reduced channel flow from high levels of sedimentation with little tidal influence. Benefits related to the restoration include improvements in: sediment management, hydraulic connectivity with tributary streams, increased acreage of valuable wildlife habitat area, improved habitat connectivity and fish passage, shading of the channel, nutrient inputs, improved and increased fish habitat, and the creation of micro-climates within the different habitat zones.

One of the major components of the project is the restoration of large areas of tidal wetlands within the Eel River Delta, at least 60% of which has been lost over time. Tidal wetlands support a great variety of marsh associated birds including herons, rails, shorebirds, waterfowl and others. Marshes in general and freshwater marshes in particular provide valuable bird habitat because standing water and saturated soil promote a biologically rich environment (Evens and Tait 2005). Estuarine habitats are highly productive systems and marshes within those habitats accumulate high levels of nutrients that encourage prolific plant growth which in turn provides cover for nesting and roosting and provides food resources in the form of invertebrates and seeds. The increase in acreage and diversity of new tidal wetlands, high marsh ecotone, and additional aquatic channels and mudflats will significantly increase habitat functions and values for a wider variety of wildlife species relative to existing conditions, for example birds that forage on macroinvertebrates. By achieving a nearly 15% increase in the size of the Eel estuary, tidal marsh restoration in Riverside Ranch will also provide new habitat suitable for longfin smelt, coho salmon, Chinook salmon, steelhead trout, cutthroat trout, and tidewater goby.

The other significant habitat benefit of the project is the restoration of the Salt River channel, including an increase in the quantity and quality of riparian habitat present in the system. Riparian habitats have been identified as the most important habitats to landbird species in

California (RHJV 2004.). They provide habitat for some of the most diverse avian assemblages in North America due to the structural complexity of vegetation, the association with water and typically high prey availability. In addition, many special-status species of birds are riparian associates and riparian habitats provide high quality habitat for a large number of Neotropical migrant birds, of major conservation interest throughout the North, Central and South America, that variously use riparian habitats for breeding, migratory stopover, and wintering. The restoration actions will increase the *diversity* of riparian vegetation within the Salt River riparian corridor and provide numerous terrestrial and aquatic food web benefits that translate into an increase in riparian function. For example, an increase in riparian canopy diversity will provide an increase in the quantity and quality of leaf litter provided to the stream. This leaf litter which decomposes and is broken down by bacteria, fungi, microorganisms, and invertebrates, creates a food source for additional invertebrate species, which in turn, provide a food source for predators such as salmonids. The created riparian corridor will provide increased structure and diversity of riparian tree and plant species and thus support a broader suite of bird species. This increase in the amount and diversity habitat will likely increase the potential for migration and dispersal of additional terrestrial wildlife species than currently use the riparian corridor. The restored riparian channel will also provide an increase in the amount and quality of overwintering and rearing habitat for juvenile coho salmon and other juvenile salmonids (Koski 2009). Freshwater channel habitat above the reach of tidal influence will also be increased and will provide additional overwintering and rearing habitat for salmonids.

The agricultural grassland and ruderal habitats that will be impacted are regionally abundant, highly disturbed habitats and lack the structural complexity and habitat diversity of the wetland and riparian habitats that will replace them. As such, these highly disturbed habitats support relatively low wildlife species diversity and many if not most of the species that occur in these areas are widespread, common and associated with anthropogenic disturbance.

IMPLEMENTATION PLAN

RESPONSIBLE PARTIES

The HCRCD will be the responsible party for implementing the Salt River Ecosystem Restoration work.

PROJECT PHASING, SITE PREPARATION AND GRADING

Vegetation removal and grading limits will be clearly defined and identified on the final construction plans. Project work areas currently vegetated with native plants will be protected unless they are in areas slated for excavation, fill, access roads or other essential items of work that involve ground disturbance. Protective fencing around trees to remain should be at the edge of the canopy or greater, unless fencing closer to the trunk is approved by a qualified biologist or arborist as not harmful to the survival/health of the tree. If excavation near very large trees encounters large roots (greater than 3 inches in diameter) a qualified biologist or arborist will be consulted to determine the least harmful manner of cutting and treating the large roots. Existing fences will be utilized as much as practical to protect any habitat areas slated for protection.

In order to avoid take of nesting birds, especially the state-listed willow flycatcher and western yellow-billed cuckoo, surveys for nesting birds will be conducted prior to the start of any removal of riparian vegetation during initial project construction or vegetation maintenance that occurs during the breeding season between March 1 and August 15. Nesting surveys would be conducted by a qualified biologist and would occur no more than one week prior to the initiation of site preparation. If active nests are found during surveys, a 100, 200, or 300-ft buffers (depending on species) will be established around each nest in which no construction activities will occur until nesting is completed (Grassetti 2011). The duration of the no-activity exclusion area(s) will be determined in consultation with DFG.

Because the construction of the overall project will occur in two phases in successive years the restoration work will also occur in two related phases (Table 4 and Table 5). The EMMP and Geotechnical and Engineering Geology Report (LACO Associates, 2011) also provides additional detail on construction methods, soils and grading and the construction design plans and specifications will finalize the details. Generally, the excavated soils are relatively homogeneous and versatile and will not require significant segregation to support reuse for specific applications. Given the saline conditions of the estuarine soils within the Riverside Ranch and proximity to proposed Riverside Ranch berms, these materials will be targeted for berm construction. The non-saline soils have similar reuse characteristics and may be considered interchangeable throughout the project area to support the designated reuse opportunities.

The Phase I work for the overall project would include constructing the improvements on Riverside Ranch and excavation of the lower 10,400 ft of the Salt River channel. The saline-sodic soils located within this lower reach of the Salt River can be reused in construction of the new and refurbished berms on Riverside Ranch. Phase 1 would likely also include partial or complete vegetation removal through the channel corridor in the Phase II area.

One variation on the approach to vegetation removal in the Phase II area would be to remove the vegetation from most of the trees and leave the unvegetated portions in place on the floodplain to provide some erosion protection during the winter between Phase I and II. Some of the trees may be moved back from the areas closest to the active channel to minimize the potential for them to move downstream during flood events and create logjams.

Non-native and undesirable weeds will be removed and disposed of at an approved location offsite or deeply buried onsite encapsulated in the toe of the set-back berm. Particular care needs to be taken during the removal and disposal of invasive weeds to ensure that removal activities do not in effect spread the weeds downstream and exacerbate infestations elsewhere. A control plan for dense-flowered cordgrass (*Spartina densiflora*) is currently being prepared by the California Coastal Conservancy and its partners for populations of the species in Humboldt Bay, the Eel River Delta, and the Mad River Estuary. In the long-term, the methods prescribed in that plan should be used to during any efforts to control dense-flowered cordgrass. During construction, non-native *Spartina* will be removed from all grading areas as one of the first items of work under clearing and grubbing. It will be removed en masse using mechanical equipment, taking care to not spread seed or roots, and either buried onsite or disposed of at a suitable facility offsite.

Live native plant material will be salvaged where possible; to provide material for sod matting, native willow stakes, and active bench plantings. Some of the salvaged woody material may be used as cuttings or live stumps. Live plant material may be held in a moist collection area onsite or offsite if it is in good condition and will be planted within 1-2 months. Specific planning for reuse of salvaged native plant material will be included in the final planting plans and specifications.

The Phase II work for the overall project would include excavation of the remaining Salt River channel including Francis Creek and Eastside Drainage and transporting the excavated material to the beneficial reuse locations. It would also include the removal of remaining vegetation within the work areas. Removed vegetation will either be re-utilized by chipping and spreading as mulch in revegetation areas, incorporated back into the channel or high marsh areas as habitat features, integrated into the bioengineered active channel bank, or disposed of offsite.

SOILS

As described in greater detail in the EMMP (Winzler & Kelly 2010a) and the Geotechnical and Engineering Geologic Report (LACO Associates 2011), the current proposed project involves reuse of excavated soils for the construction of earthen embankments, infilling of existing ditches, and beneficial reuse on nearby agricultural land. Thus some of the restoration area will occur on soils that will have been placed during site grading. The remaining restoration areas will occur on the *in situ* soils.

The bulk of soils within the project area are silty fine sands and sandy silts. Minor amounts of clay, poorly graded sand, and poorly graded fine gravels may exist as discontinuous lenses. Larger volumes of coarse sand and fine gravel may be present within the vicinity of the Francis Creek drainage. All of the soils within the project area represent relatively young soft/loose alluvial deposits. As discussed in the EMMP and the Geotechnical and Engineering Geologic Report the majority of the soils sampled in the project excavation areas were classified as non-saline, but one was saline and 2 were saline-sodic soils. The non-saline soils would provide a suitable revegetation substrate, the saline soil would be suitable if planting follows sufficient rainfall to leach the soluble salts, and the saline-sodic soil will not be spread in any of the restoration areas as it will hinder vegetation establishment. However, it may be used in certain areas of Riverside Ranch to provide fill in projected estuarine habitat.

In general the *in situ* soils do not appear to pose constraints to vegetation establishment. Vegetation establishment appears more closely related to hydrology, salinity related to tidal influence, grazing pressure, and other agricultural land uses that disturb vegetation. However, topsoil may be salvaged from excavated areas, and stockpiled until needed to create the upper soil layer in riparian planting areas. All other excavated materials can be respread in specific areas where needed, retained for agricultural use, used to build berms if the material is suitable for the purpose (to be determined by a qualified engineer), etc.

It is important to avoid soil compaction in all areas slated for restoration, whether by natural recolonization by vegetation or by active planting. All actively graded areas, including planting and recolonization areas will therefore be monitored for compaction, which should not exceed 80-85%. If compacted soils are found they will be ripped and tilled to relieve compaction. All planting areas (excluding reuse sites) that are not salt marsh or brackish marsh, in which soils have been placed, will be tested for salinity prior to planting. Planting will not take place in areas with salinity above 3-4 parts per million (ppm) until sufficient rainfall leaching has reduced salinity to acceptable levels, verified by repeated testing.

The final construction plans and specifications will address placement of the soils to provide stable surfaces and minimize erosion. The plans and specifications will also specifically address how compaction will be avoided and suitable (texture and fertility) surface soils will be provided to support successful plant establishment in restoration areas.

EROSION CONTROL

The grading operations will be per the construction documents and subject to project permits including a Stormwater Pollution Prevention Plan (SWPPP) administered by the State General Permit for Storm Water Discharges associated with Construction and Land Disturbance Activities (Order No. 2009-0009 DWQ, NPDES No. CAS000002). The SWPPP shall be developed by a Qualified SWPPP Developer (QSD) and implemented by a Qualified SWPPP Practitioner (QSP) to ensure the receiving waterbodies are not impacted as a result of erosion and sedimentation during construction activities and until the disturbed areas are stabilized and sheet and rill erosion potential are minimized and a Notice of Termination of the general permit has been filed with the Regional Board. Because of the proximity of the proposed grading activities to the Eel River, which is a 303(d) listed waterbody impaired by sediment and has beneficial

uses related to Cold Freshwater Habitat specifically for Spawning, Reproduction, Early Development and Migration of Aquatic Organisms such as Salmonids, the project will be subject to turbidity and pH monitoring during site stabilization.

The SWPPP will detail the location and type of erosion and sediment control Best Management Practices (BMPs). Sediment source control BMPs applicable for this project include silt fencing, fiber rolls, sediment basins and check dams and will be implemented prior to or during grading and excavation activities and removed once the site has stabilized. Applicable erosion control BMPs include seeding, mulching, erosion control blankets, plastic coverings and geotextiles. Erosion control BMPs will also include the greatest extent practical reuse of native top soil, mulch and organic material that is generated onsite, segregated and spread onto the exposed earth surfaces upon finished grading. Additional erosion control BMPs including seeding (see seed mix discussed below) and mulching will be implemented upon completion of the grading activities. Seed will be broadcast by hand or mechanically. Drill seeding is applied using an 8-12 ft tractor towing a seed drill. This method should be used to sow seeds in the grassland re-establishment area. Drill seeding rates are lower than broadcast rates and have a higher percentage of germination because seeds are drilled shallowly into the soil providing better contact with the soil medium and moisture.

Upon completion of grading and seed application, bare soil areas (except areas subject to tidal influence or active creek flow) shall be covered with up to a maximum of 3 inches of sterile rice straw or wood chips from on-site woody debris chipping, which will protect areas from erosion and reduce establishment of non-native weedy species. Alternatively, re-distributed native top soils and organic material will be utilized as much as practical. If straw is utilized, crimping will be the practice applied to anchor the straw mulch to the ground. Mechanically punching the straw in the soil can be done using a shovel or spade to anchor the mulch

LARGE WOODY DEBRIS STRUCTURES

Large woody debris structures will be placed where compatible with the geomorphic design of the active channel and active benches to provide escape cover for juvenile salmon and to add diversity to the aquatic habitat. Where and how these structures will be placed will be shown in the final construction plans. Imported redwood, cedar or fir will be utilized for in-channel structures where necessary and supplemented with salvaged alder and willow.

CONSTRUCTION MONITORING

The HRCD will be responsible for providing suitable monitoring during construction to confirm that all project regulatory permits and environmental conditions of approval are complied with; sensitive habitat and species, and water quality, are protected; and that the final construction PSE and this HMMP are properly implemented. Qualified biologists will conduct regular construction monitoring visits to document project compliance, photo-document project implementation, and a summary report will be prepared on the implementation of this HMMP and the final revegetation construction documents that will detail significant deviations from those documents. Likewise, qualified engineers and landscape architects will prepare Record Drawings to document project construction compliance with the final 100% PS&E.

PLANTING PLAN

Plant Species List

The restoration approach is described previously in this document under *Habitat Restoration Design by Reach* and in the cross section figures (Figures 6, 8, 10, 11, and 13). Table 5 below provides the planting palettes for the different restoration areas, relative proportions, on-center spacing, and container sizes. This plan was developed in concert with the geomorphic and hydraulic design of the corridor and provides short-term erosion/sediment control while promoting long-term habitat benefit.

Table 3. Plant Palette for Salt River / Riverside Ranch Restoration Areas[1]

PLANTING AREA		COMMON NAME	SCIENTIFIC NAME	ON-CENTER PLANT SPACING [3] (ft)	PROPAGULE TYPE [4]
High Marsh Ecotone	Weltand Plugs	Gumplant	*Grindelia stricta*	2-4	TB
		Saltgrass	*Distichlis spicata*	2	TB
		Jaumea	*Jaumea carnosa*	2	TB
		Seaside arrowgrass	*Triglochin maritima*	--	Seed
		Marsh rosemary	*Limonium californicum*	2-4	TB
Tidal Brackish Riparian	Trees	Sitka spruce	*Picea sitchensis*	16-20	DP
		Shore pine	*Pinus contorta*	14-18	DP
		Sitka willow	*Salix sitchensis*	12-14	DP
		Hooker's willow	*Salix hookeriana*	12-14	DP
		Red alder	*Alnus rubra*	14-18	DP + salvage
	Shrubs	California wax myrtle	*Myrica californica*	6-12	TB
		Twinberry	*Lonicera involucrata*	6-12	TB
		Cascara buckthorn	*Rhamnus purshiana*	6-12	TB
		California wild rose	*Rosa californica*		
		Thimbleberry	*Rubus parviflora*	6-12	TB
		California blackberry	*Rubus ursinus*		
		Coyote brush	*Baccharis pilularis*		
		Salmonberry	*Rubus spectablis*	6-12	TB
	Wetland Plugs	Tufted hairgrass	*Deschampsia caespitosa*	4-6	TB
		Alkali bulrush	*Bolboschoenus maritimus*	4-6	TB
		Salvaged plugs	native plants only	4-6	SC
		common rush	*Juncus patens*	4-6	TB
Tidal Freshwater Riparian and Marsh	Trees	Sitka spruce	*Picea sitchensis*	16-20	TB
		Black cottonwood	*Populus balsamifera* ssp. *trichocarpa*	16-20	TB + salvage
		Redwood	*Sequoia sempervirens*	16-20	TB + salvage
		Grand fir	*Abies grandis*	16-20	TB + salvage
		Red alder	*Alnus rubra*	14-18	TB + salvage
		Bigleaf maple	*Acer macrophyllum*		
		Sitka willow	*Salix sitchensis*	8-12	DP + cuttings
		Hooker's willow	*Salix hookeriana*	8-12	DP + cuttings

Table 3. Plant Palette for Salt River / Riverside Ranch Restoration Areas[1]

PLANTING AREA		COMMON NAME	SCIENTIFIC NAME	ON-CENTER PLANT SPACING [3] (ft)	PROPAGULE TYPE [4]
		Arroyo willow	*Salis lasiolepis*	8-12	DP + cuttings
		Pacific willow	*Salix lasiandra*	8-12	DP + cuttings
	Ferns	Mosquito fern	*Azolla filliculoides*	6-12	TB + salvage
		Giant chain fern	*Woodwardia fimbrilata*	6-12	TB + salvage
		Sword fern	*Polystichum muenitum*	6-12	TB + salvage
		Spreading wood fern	*Dryopteris expansa*	6-12	TB + salvage
	Shrubs	Red currant	*Ribes sanguineum*	6-12	TB + salvage
		Twinberry	*Lonicera involucrata*	6-12	TB + salvage
		Cascara buckthorn	*Rhamnus purshiana*	6-12	TB + salvage
		California wax myrtle	*Myrica californica*	6-12	TB + salvage
		Thimbleberry	*Rubus parviflora*	6-12	TB + salvage
		Salmonberry	*Rubus spectablis*	6-12	TB + salvage
		Red elderberry	*Sambucus racemosa*	6-12	TB + salvage
	Freshwater Plugs	Slough sedge	*Carex obnupta*	4-6	TB + salvage
		Spike rush	*Eleocharis macrostachya*	4-6	TB + salvage
		Tufted hairgrass	*Deschampsia caespitosa*	4-6	TB + salvage
		Common rush	*Juncus patens*	4-6	TB + salvage
		Salvaged plugs	native plants only	4-6	SC
Freshwater Riparian	Trees	Black cottonwood	*Populus balsamifera ssp. trichocarpa*	16-20	DP + salvage
		Sitka spruce	*Picea sitchensis*	16-20	DP + salvage
		Redwood	*Sequoia sempervirens*	16-20	DP + salvage
		Grand fir	*Abies grandis*	16-20	DP + salvage
		Red alder	*Alnus rubra*	14-18	DP + salvage
		Bigleaf maple	*Acer macrophyylum*		
		Sitka willow	*Salix sitchensis*	8-12	DP + cuttings
		Hooker's willow	*Salix hookeriana*	8-12	DP + cuttings
		Arroyo willow	*Salis lasiolepis*	8-12	DP + cuttings
		Pacific willow	*Salix lasiandra*	8-12	DP + cuttings
	Ferns	Mosquito fern	*Azolla filliculoides*	6-12	TB + salvage
		Giant chain fern	*Woodwardia fimbrlata*	6-12	TB + salvage
		Sword fern	*Polystichum munitum*	6-12	TB + salvage
		Spreading wood fern	*Dryopteris expansa*	6-12	TB + salvage
	Shrubs	Twinberry	*Lonicera involucrata*	6-12	TB + salvage
		Cascara buckthorn	*Rhamnus purshiana*	6-12	TB + salvage

Table 3. Plant Palette for Salt River / Riverside Ranch Restoration Areas[1]

PLANTING AREA		COMMON NAME	SCIENTIFIC NAME	ON-CENTER PLANT SPACING [3] (ft)	PROPAGULE TYPE [4]
		California wax myrtle	*myrica californica*	6-12	TB + salvage
		Thimbleberry	*Rubus parviflora*	6-12	TB + salvage
		Salmonberry	*Rubus spectablis*	6-12	TB + salvage
		Red elderberry	*Sambucus racemosa*	6-12	TB + salvage
	Freshwater Plugs	Slough sedge	*Carex obnupta*	4-6	TB + salvage
		Spike rush	*Eleocharis microstachya*	4-6	TB + salvage
		Salvaged plugs	native plants only	4-6	SC

1 Planting information is not included for salt marsh plain species as it is anticipated that these species will naturally recruit once tidal connectivity is established
2 Please refer to cross-section figures for percent composition within specific habitat areas.
3 Plant spacing will not be pervasive across all planting areas, as many plantings may be clustered, with larger spaces between clusters.
4 DP – deeppot planting container is 2 1/2" diameter x 10" long
TB – treeband planting container is 2 1/4" diameter x 5" long
SC – supercell planting container is 1 1/2" diameter x 8" long

Active Bench Seeding

Native topsoil, organics and mulch segregated during the earthwork will be re-distributed onto the active benches in cross-sections 6 and 8 and seeded with the following seed mix (Table 6), which comprises regionally native species adapted to wet floodplain conditions. This seeding will thus be conducted only in the brackish and freshwater reaches, not in the tidally influenced saline reach of the channel. The restored saline tidal areas will not be seeded as natural salt marsh vegetation recruitment is expected to be relatively rapid and the majority of this area will be stabilized by the existing grasslands.

Table 4. Active Bench Seed Mix (30 lbs/ac)

COMMON NAME	SCIENTIFIC NAME	PURE LIVE SEED/AC (lbs.)
Meadow barley	*Hordeum brachyantherum*	7.8
Creeping wild rye	*Leymus triticoides*	7.5
Slender wheatgrass	*Elymus trachycaulus*	8.7
Tufted hairgrass	*Deschampsia cespitosa*	1.5
Slender hairgrass	*Deschampsia elongata*	1.5
Sedge species	*Carex spp.*	3.0

Erosion Control Seeding

Areas disturbed during construction that are outside/above the active bench will be seeded with the following seed mix (Table 7) or a mix specified by the landowner and approved by the HCRCD. This seed mix is compatible with grazing (Gunderson 2011) which will likely occur on many of those areas.

Table 5. Erosion Control Seed Mix (22 lbs/ac)

COMMON NAME	PURE LIVE SEED/AC (lbs.)
Kenland red clover	5.1
Ladino clover	3.1
Salina strawberry clover	2.0
Alsike clover	1.3
New Zealand white clover	0.6
Tetraploid perennial ryegrass	7.0
Tetraploid annual ryegrass	2.9

Plant Material Sources/Nursery Production

All plant materials, with the exception of seed mixes, will be collected either on the project site or from locations within the Eel and Salt River watersheds within 10 mi of the project area or obtained from a native plant nursery. Native plant seed will be provided by a nursery approved by the HCRCD who will verify that seeds are of local watershed origin. If sufficient existing collection sources are not found within 10 mi, then the collection perimeter can be expanded with prior approval by the HCRCD in consultation with the project biologists to other areas within the Eel and Salt River watershed. See also salvage of onsite native plant material above

under *Project Phasing, Site Preparation and Grading*. If cuttings are taken from vegetation to remain, then no more than 30% of the tree canopy can be removed in a single season. A contract should be established with a nursery specializing in native plantings to collect and propagate the required plant materials. It will be important to maximize advance contracting with native plant nurseries to allow time to collect and multiply seed to maximize the number of propagules. The seed mixes can be obtained commercially by the installation contractor.

Plant Installation Methods/Schedule

Seeding (Broadcast or Drill Seeding)

All soils that are disturbed by project construction on the floodplains, adjacent slopes, , the Riverside Ranch setback berm, access routes, stockpile areas, etc. will be seeded with the seed mixes described above to control erosion and to establish ground covers for habitat value. Different methods will likely be employed in different areas depending on access for equipment, soil type, etc. Seeding will be conducted in or September or October, prior to the onset of the rainy season.

Wetland Plug Planting Methods

Wetland plugs, both nursery grown in treebands or salvaged during grading, will be installed by hand in holes at least 8 inches deep and 3 inches wide in selected parts of the active bench such as side channel, alcoves and backwater areas (the salt marsh plain will be revegetated by natural recruitment with no active wetland plant installation). No irrigation basins are required for these plantings. The soil excavated from the planting hole will be firmly tamped back around the installed plant such that large air gaps in the soil are avoided, but care must be taken to avoid overcompacting the soil, particularly if it is damp. The root crown of the plug should be slightly higher (approx. 0.5 inch) than the surrounding soil surface. Plant installation will take place towards the end of the flood season in April/May/June, contractors should be prepared for possible flooded site conditions; plants will only be installed when flood waters have receded.

Container and Cutting Planting Methods

Container plants and live cuttings will be installed between October and November before the onset of the time when the site is most likely to flood, but when rainfall has likely saturated the site's soils. Planting holes for trees will be 2 ft wide and 2 ft deep, and for shrubs will be 1 ft wide and 1.5 ft deep. All plants will be installed so that their root crowns are at or slightly above (0.5 inches) the soil surface following planting, soil settlement, and initial irrigation. Cuttings will be installed by creating a pilot hole at each planting location and inserting a single cutting into the hole such that approximately 2/3 of the cutting is below ground and 1/3 is aboveground. Container plants will be manually irrigated once immediately following planting.

Phasing of Planting

Phased planting will be an integral component of the planting plan. The overall project will be constructed in two phases as described above under *Project Phasing, Site Preparation and Grading*. In Phase I, planting will occur on the internal slopes of the Riverside Ranch setback berm and the plants will consist of high marsh ecotone plants (Table 4). The development of the

marsh plain vegetation of Riverside Ranch will rely heavily on natural recruitment during the first 2 years. If, in Year-3 the monitoring results determine that sufficient vegetation is not developing on the marsh plain, salt marsh plants will be installed per the AMP or Rare Plant Mitigation and Monitoring Plan (H. T. Harvey & Associates 2011b).

In Phase II, the Salt River channel corridor area will be planted. In Years 1-3 of Phase II, plantings may be focused solely on tree species, or a combination of tree species and limited shrub and understory species. Planting of tree and shrub species is designed in this phased method to encourage the larger tree species to establish and create shaded areas and to allow naturally recruiting shrub species to colonize. An adaptive management approach will guide the plantings of additional shrub or tree species. The addition of any tree and shrub species will be guided by the habitat descriptions and recommended species for each reach based on this HMMP and per the Revegetation Plan (H. T. Harvey & Associates 2010). Depending on the extent and location of naturally recruiting shrubs, additional shrub species may be planted to augment the naturally recruiting species, and to create a denser understory layer to enhance functions and values along the channel corridor.

Salvaged Plant Materials/Cutting Planting Methods

Salvaged plant materials that have been retained for planting will be installed under the supervision of a qualified restoration ecologist. These materials may come in a variety of sizes and conditions and therefore custom installation has the greatest potential for improved survival. In general they will be placed in locations with suitable soils and hydrology that will allow them to effectively root in place. If such materials are large, such as root wads, and are placed near the active channel the project engineers may recommend cabling the materials in place or otherwise reinforcing them (deeper burial, use of boulders, etc.) to avoid the material moving downstream and causing channel blockage. Salvaged plant materials would be installed in October or November.

Infill Planting Clusters

In an effort to reduce gaps in the riparian corridor the HRCD will work with willing landowners to identify locations where small "planting clusters" can be installed to infill openings in the riparian habitat. These would consist of small fenced groupings of trees, perhaps as few as 3-5, established to improve the continuity of the riparian corridor. These plantings may not represent a substantial acreage but a description of these clusters is included here, representing an opportunity to maximize riparian habitat functions and values in areas where landowners are amenable to planting. The locations for these have not yet been identified but the most likely areas will be in the upper reaches of the project area. The species will be compatible with plantings in other areas of the project and will be selected based on the soils and hydrology of the specific site.

MAINTENANCE PLAN

INTRODUCTION

This maintenance plan section provides for maintenance activities that will take place during the plant establishment period, which lasts for 3 years following restoration/planting implementation. Following that plant establishment period, the AMP will govern all site maintenance and management activities.

CHANNEL MAINTENANCE ACTIVITIES

Maintenance of the channel, including vegetation and sediment removal, will occur as directed by the AMP. In the event that channel transport and SMA performance are not capable of eliminating undesirable sediment accumulation in the mainstem Salt River channel or sediment accumulation poses an undesirable threat to property or project performance, excavation may be performed on a small scale within the River corridor (excavating specific areas of the channel). Larger-scale excavation across the entire width of the channel corridor may be necessary at sediment deposition-prone areas such as at the confluence with Francis Creek, if designed SMAs and adjacent Salt River corridor are overwhelmed with sediment, which overflows into the adjacent River corridor. Routine vegetation maintenance activities within SMAs will occur during late summer or early fall months when the channel flows are lowest to minimize the potential for erosion and sediment transport and to minimize impacts to salmonid and wildlife species (Grassetti 2011).

RESTORATION VEGETATION MAINTENANCE

Irrigation

A formal irrigation system is not proposed for this project for several reasons: 1) given the plant species to be installed, the seasonal timing for installation, suitable soils and hydrology, and the moist cool climate of the project area, plant survival should be acceptable without frequent irrigation unless severe drought conditions prevail; 2) the areas of active revegetation are vast and the cost would be prohibitive; 3) some areas are subject to regular flooding that would destroy standard irrigation systems. That being said, there is provision for an initial manual irrigation of the plantings at the time of installation, likely by watering truck and hoses. And secondly, if drought conditions do prevail or plant survival is observed to be severely affected by a lack of water then the project will need to provide irrigation to plants as a remedial action. At this time the latter is considered unlikely.

Weed Control around Woody Plantings during Plant Establishment Period

Weeds will be controlled around all installed woody plants during the first three years following planting. During the growing season all weeds within 3 ft of the base of the plantings will be manually controlled (hand weeding, weed-eaters, mowers, etc.) whenever the average height of the weeds exceeds 4 inches. Special care will be taken to train weed control crews to recognize and protect all desirable native plants recruiting into the project area, and even to weed carefully around recruits to encourage their rapid establishment. This is particularly important, since the large scale of this project requires that it rely to some degree on natural recruitment to establish substantial native habitat cover.

Fencing/Grazing

Given the large scale of the project, cost-effective control of weeds in the restoration areas is expected to be a challenge. One option that will be considered is flash grazing. Flash grazing may be carefully employed to control weed cover in active planting areas and natural recruitment areas but will be managed to avoid excessive damage to native plantings and recruits. Flash grazing involves bringing specific levels of grazing animals onsite in the spring for very brief periods when the animals will target new growth of the weeds over the vegetation that has been planted. Grazing will be supervised by someone familiar with weed management and restoration activities to ensure protection of these desired species during grazing activities. In general, grazing will be used relatively less during the first 3-5 years when the plantings are establishing and growing to heights that would put them beyond grazing damage. However, during that period flash grazing can be used for very brief periods, if it is monitored to ensure that damage to plantings is at an acceptable level (e.g., it is not impeding the ability of the site to meet the habitat establishment success criteria). If substantial damage to native plants (or demonstrable introduction of invasive species) occurs as a result of flash grazing, then it will likely be suspended. Temporary fencing will be employed to allow flash grazing of specific areas in and around the active revegetation and recruitment areas to control expanses of weeds without unduly damaging desirable native plants.

No grazing will occur in the low flow active channel. Grazing by sheep and/or goats would be preferred to cattle grazing to minimize impacts to the restored floodplain areas. Temporary fencing would consist of insulated fence posts and rods supporting multiple strands of electric wire or tape; the wire and posts could be easily be moved depending on grazing needs in a particular area. Depending on the size of the herd and the capacity of the animals, the Salt River channel would be broken up into reaches that would be flash grazed for a set number of days. Electricity for the hot wires would need to come from either an established 110-V connection or a solar charger. Solar chargers may be set up in connection with adjacent landowner's existing operations.

Invasive Species Control

Freshly disturbed and newly restored sites typically provide a suitable environment for invasive species to colonize unless an active maintenance program is in place to ensure that these species do not colonize during the plant establishment period. Invasive species which have the potential to invade the Salt River/Riverside Ranch restoration area and could impede success of the restoration goals are described below. Active maintenance and eradication will be necessary to ensure that these species do not establish in the restored corridor. Brief methods to control these species are included here.

Invasive Spartina

Dense-flowered cordgrass is a non-native invasive perennial that competes with native salt marsh species and typically invades bare mudflat and pickleweed habitats to form dense monospecific stands. Colonization by dense-flowered cordgrass in channel areas can also result in increased sedimentation. Dense-flowered cordgrass is difficult to eradicate and the current eradication techniques being used with some success in Humboldt County include mowing and hand-

digging. Herbicide use for large-scale *Spartina* eradication has been applied as a successful technique in San Francisco Bay, but has not been utilized in Humboldt County. A regional management plan for dense-flowered cordgrass is currently being prepared by the California Coastal Conservancy and its partners for invasive *Spartina* in Humboldt Bay, the Eel River Delta, and the Mad River Estuary. The methods developed in that plan should be used to eradicate dense-flowered cordgrass during long term monitoring. During clearing and grubbing, all *Spartina* within the grading footprint should be removed offsite or buried onsite so that it does not present an opportunity to spread vegetatively or by seed.

Purple Loosestrife

Purple loosestrife in a non-native perennial that competes with wetland plants and its vigorous growth forms dense colonies which can choke freshwater wetland areas. Established populations of purple loosestrife can dominate the seedbank of invaded areas. Purple loosestrife has been found in the Eel River area in Humboldt County; as with most invasive species, it is difficult to remove once established. Management recommendations include monitoring areas not yet infested and hand-pulling newly discovered seedlings to prevent its spread. Mechanical removal (mowing) before the seeds mature may help reduce its spread but cut stems may re-root. Neither burning nor flooding has been shown to be an effective control method (Bossard et al. 2000; DiTomaso and Healy 2003). Chemical control is currently not an option for treatment in Humboldt County. Herbicide treatment had been previously proposed to treat populations along the Eel River in Humboldt County, but the planned spraying has been halted until a full environment impact report is prepared under the guidelines of the California Environmental Quality Act. Another option for control is the use of a biocontrol agent to eradicate and limit the spread of purple loosestrife. Biocontrol has been used with some success in the eastern United States. The Illinois Department of Natural Resources has been using three beetle species since 1994 to feed on the roots, leaves and growing tips of purple loosestrife. Reductions in up to 95% of the plant's biomass have been observed (Blossey 2011).

Reed Canarygrass

Reed canarygrass is an aggressive waist high perennial grass which tolerates wet soil conditions and invades and dominates wetland habitats. Reed canarygrass is often one of the first wetland plants to emerge early in the growing season and readily invades bare or disturbed areas. Once established, it reduces plant diversity because it can outcompete seedlings of other establishing plants. It can also modify the hydrology of streams because of its ability to trap sediment, leading to constriction of waterways. Control of reed canarygrass will need to address suppressing above-ground vegetative growth and underground rhizomes and as well as the seed bank. An integrated approach should be used to control reed canarygrass. In Washington and Oregon, physical methods have included mowing, grazing when stems and leaves are young, use of ground coverings, burning, inundation, herbicide application and shading (Miller et al. 2008; Antieau 1998). Competitive exclusion is can also be a potential option to discourage reed canarygrass seedling establishment. Planting competitive grass species such as tufted hairgrass, spike rush, and bentgrass (*Agrostis* sp.) will help to exclude reed canarygrass. The planting of riparian vegetation, particularly coniferous forested wetland plant communities, may also provide adequate shading to limit reed canarygrass growth (Antieau 1998).

Himalayan Blackberry

Himalayan blackberry is a sprawling, evergreen shrub that occurs along disturbed areas and streambanks. It is commonly found in riparian areas, where it forms dense thickets. It can tolerate periodic inundation in both fresh and brackish conditions. It also can readily colonize disturbed areas. Once it is established, it can form impenetrable thickets that shade and outcompete native vegetation, including native blackberry. Mechanical removal or burning are potential methods of removing the plants, but these methods require persistent treatment to be successful. Removing only the aboveground growth will stimulate the growth of root sprouts. Repeated cutting, particularly while the plant is flowering can help in exhausting the root stores. The canes and the roots also need to be removed as Himalayan blackberry can easily resprout from any remaining roots, in addition to regenerating from seed. In areas where mature plants have been removed, regrowth may be successfully controlled by grazing of sheep and goats, particularly when the plants are exhibiting new growth. As with reed canarygrass, the establishment of fast-growing native shrubs or trees will aid in preventing colonization as shading can limit establishment and growth of Himalayan blackberry (Humboldt County Weed Management Area 2010; DiTomaso and Healy 2003; Bossard et al. 2000).

Maintenance Inspection Activities and Frequencies

Maintenance of the site should be regularly monitored by a qualified biologist to ensure that the plantings are being properly cared for, that the removal of undesirable species is done in a manner that does not compromise the establishment of the target habitat functions and values, and that desirable recruiting species are protected. It is recommended that a site inspection be conducted quarterly for the first 3 years and twice yearly thereafter until the end of the 10-year monitoring period or until the success criteria outlined in this Plan are met. If significant problems are encountered with the site, then inspections should be scheduled more frequently until the problems are resolved.

Maintenance Schedule

Maintenance activities will take place during the 3 year plant establishment period. Maintenance schedule will vary depending on weather conditions, but will be most intense during the spring and summer months. The actual schedule for maintenance will be determined by the landscape contractor who will be responsible for plant establishment.

REMEDIAL ACTIONS

If during the three year plant establishment period the target habitats are not establishing properly and the success criteria outlined above are not being met, then experts from the disciplines relevant to the specific issues encountered will conduct a site visit and determine the cause of the problem. These experts may include restoration ecologists, landscape architects, hydrologists, geomorphologists, soil scientists, etc. Remedial measures will then be proposed in a technical memo, and if appropriate submitted to the regulatory agencies for approval prior to implementation. Any remedial actions implemented will be accompanied by monitoring to determine if they are successful. Possible future remedial measures may include, but are not limited to: active replanting, increased weed abatement activities, supplemental irrigation, and changes to the grazing/fencing plan. After the 3-year plant establishment period, the AMP will be the primary guide for ongoing maintenance and management activities.

MONITORING PLAN

The monitoring plan for this HMMP is focused on ensuring the long-term viability of vegetated habitats created and restored as part of the project's goals and/or habitat mitigation needs. Monitoring measures for other project features, including channel geomorphology and individual wildlife or plant species, will be dealt with in other documents, including the Adaptive Management Plan, Biological Assessments and Opinions, and the Rare Plant Mitigation and Monitoring Plan to be prepared for listed species, and other regulatory technical documents and permits.

HABITAT DEVELOPMENT MONITORING

Annual monitoring of the Salt River/Riverside Ranch restoration area is designed to determine whether the site is progressing along a trajectory that will meet the habitat goals of creating native forested riparian and wetland habitats along the Salt River corridor and riparian, salt marsh, and upland ecotone habitat within Riverside Ranch.

The following monitoring plan describes performance and success criteria and methods for measuring these criteria to assess the degree to which the habitat restoration goals are being met. Given the scale of the changes proposed for the ecosystem, the wetland and riparian habitat areas will be monitored for 10 years after project completion.

Monitoring results will be compared to performance criteria to evaluate progress toward the goals and to provide a basis for any remedial action recommendations (if needed). The results of the wetland and riparian habitat monitoring in Year 10 will be compared to the final success criteria to determine if these criteria have been met. If the final success criteria have not been met, remedial actions and monitoring will continue until they have been met. Given the size of the project, its linear nature, and likely distinction between specific hydrologic zones, certain reaches may achieve their final success criteria before other areas. With agency coordination and approval, it may be possible that segments of the project are deemed successful, while targeted monitoring and remedial measures may be necessary for specific areas.

The project will be making some dramatic landscape scale changes within the project footprint, and the result will be a dynamic and shifting mosaic of habitats that will be difficult to monitor using methods frequently used on smaller mitigation sites. Given the large scale and complexity of this project, the following monitoring elements are proposed to attempt to capture the ecosystem benefits of the project.

Monitoring Elements:

- Large-scale habitat mapping
- California Rapid Assessment Method (CRAM)
- Avian Surveys
- Annual Qualitative Assessments:
  - Photo-documentation
  - Hydrologic function
  - Invasive species
  - Natural Recruitment

Performance Criteria

Comparing monitoring results to specific performance criteria will reveal the extent to which the SRERP is developing along a trajectory to meet the target habitat functions and values. This comparison can also be used to help identify and direct any necessary maintenance activities.

Performance criteria for this project will be centered more on large-scale evaluations of habitat acreage established (with maximum percent cover criteria for invasive species) and the general trends of habitat development, rather than on small sample plots of percent survival and/or percent cover of vegetation. This approach will better capture the trajectory of the restoration for a project of this scale. Habitat mapping, CRAM assessments, and avian surveys will be the dominant indicators successful establishment of restored habitats.

Habitat Mapping

Cover class estimates will be made by field personnel during ground-truthing of satellite imagery for riparian and wetland vegetation.

Percent Cover of Riparian Vegetation. Average percent cover of native trees and shrubs will be estimated for all riparian areas. Table 8 provides the performance criterion for riparian species.

Table 6. Percent Cover Performance Criteria for Riparian Areas in the Salt River

MONITORING YEAR	AVERAGE TOTAL PERCENT COVER OF RIPARIAN TREE SPECIES[1]
Year 1	--
Year 2	10
Year 3	25
Year 5	40
Year 7	50
Year 10	60

[1] No percent cover is required in Year 1 as the plants will be newly installed and establishing.

Percent Cover of Native Wetland Plants. Percent cover of native salt marsh species will be monitored in Years 3, 5, 7, and 10 using aerial photography or satellite imagery as described in the Monitoring Methods Section. The percent cover values for native salt marsh species will have shown a steady trend toward meeting the success criteria for native wetland salt marsh species for Years 3, 5, and 7 as shown in Table 8. By Year 10, there should be at least 60% cover of native salt marsh species within the restored Riverside Ranch restoration area. There are no performance criteria for percent cover for Years 1 and 2 as it will take several years for naturally recruiting species to establish.

Table 7. Percent Cover Success Criteria for Naturally Recruiting Salt Marsh Species in Riverside Ranch

SITE	YEAR 3	YEAR 5	YEAR 7	YEAR 10
Riverside Ranch	10%	30%	50%	60%

CRAM

We anticipate that the CRAM score for the site will show an immediate increase in 3 of the 4 monitoring attributes: Buffer/Landscape Context, Hydrology, and Physical Structure. Given the amount of grading and vegetation removal that will initially occur, we expect the Biotic Structure component to show an initial decrease in Year 1, with gradual improvements as habitat develops, ultimately surpassing the pre-project condition. These trends will be tracked and reported as an indication of the functional progression of the restoration.

Final Success Criteria

Final success criteria will be used to determine whether or not the project has met its restoration goals of creating forested riparian and wetland habitat along the footprint of the Salt River/Riverside Ranch project area. Attainment of the final success criteria will indicate that the project will likely meet the long-term habitat goals.

Habitat Mapping

Habitat mapping results will be reported in a format similar to Table 1 (Land Use and Habitat Projections). Instead of random samples of the habitat types being captured through quadrat or transect sampling, the project will quantify the entire population. Therefore, direct comparisons to habitat projections and pre-project conditions can be made stylizing the same method.

The final success criterion for the habitat mapping will be to be within +/- 10% of the projected habitat (by category, see Table 1) by Year 10. Deviations greater than 10% from the projected values in Year 5 (or later) may trigger more detailed evaluations of specific reaches to evaluate potential remedial or adaptive management actions.

Avian Surveys. After a possible initial decrease in species richness in Year 1, it is anticipated that the increased diversity of habitats at Riverside Ranch and along the Salt River corridor will result in increased avian species richness by Years 5 and 10. The final success criterion will be greater species richness in Year 10 when compared to pre-project conditions. If interannual

variability is determined to confound the richness results (based on monitoring of nearby reference areas), an alternative metric would be the presence and possibly increased numbers of riparian associates (e.g., yellow warbler (*Dendroica petechia*), yellow-breasted chat (*Icteria virens*) for the Salt River and marsh associates (e.g., northern harrier (*Circus cyaneus*), marsh wren (*Cistothorus palustris,*) for Riverside Ranch.

Presence of Invasive Species

The presence of invasive, non-native species will be limited to less than 5% within the active replanting areas within the project footprint at the end of the 10-year monitoring period.

Monitoring Methods

Record Drawings

Record drawings will be developed within 8 weeks following the completion of final site construction and planting. The record drawings will show any significant deviations from the final revegetation plans and specifications for the site. All active replanting areas, as well as any enhancement and pocket planting areas, will be surveyed using a GPS unit so that appropriate success criteria can be applied to the specific planting zones. Deviations that will be documented include changes in the numbers and species of plants installed, deviations from plant installation locations, unplanted areas, and any hardscape or other features added to the site. Future analysis of the site will be based on these record drawings.

Wetland Delineation

A delineation of mitigation wetland areas within the project footprint will be undertaken 3 years following site construction. The delineation will include an examination of vegetation, soils, and hydrology to determine the acreage and distribution of the jurisdictional areas associated with each wetland. However, field indicators of hydric soils are not anticipated to be present by Year 3 in created wetlands. Such features typically develop over long periods of time (e.g., tens to hundreds of years). As such, the protocol outlined in Section F "Atypical Situations," Subsection 4 "Man-Induced Wetlands" of the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) describing the use of 2 parameters (hydrology and plants) will be followed.

If the desired jurisdictional acreage is not achieved in Year 3 or if climatic conditions were atypical in that year, the wetland delineation will be repeated at the site in subsequent years to accurately determine the wetland acreage achieved.

Habitat Mapping

Commercially available satellite imagery (CIR and true color) will be acquired in Years 1, 3, 5, 7, and 10. Habitat mapping will be conducted using the satellite imagery and combined with extensive ground-truthing of the mapping throughout the restored landscape. The scale and level of effort will be similar to the Existing Conditions habitat map (Figure 3) and will be presented in tabular form similar to Table 1. This will allow the changes in the mosaic of habitats to be tracked and compared to the habitat projections. No statistical analysis will be needed as the

entire population will be sampled. This method will allow simultaneous tracking of areas that have been actively revegetated, as well as areas expected to naturally recruit native vegetation (e.g., Riverside Ranch salt marsh areas). In addition, where percent cover of an area is below 80%, biologists will estimate the percent cover of an area (or polygon) for riparian and wetland habitats.

CRAM

In addition to the monitoring described above, the California Rapid Assessment Method for Wetlands (CRAM) version 5.0.2 (Riverine Wetlands Field Book and Estuarine Wetlands Field Book) will be used to further assess the habitat functions and values for all restored areas (Collins et al. 2008). These data will not be used as a success criterion for regulatory sign-off, but rather will provide supplemental data on the site that may be useful in demonstrating the ecological benefits of SRERP that are not captured solely by monitoring vegetation establishment. Some of the attributes that can be assessed using CRAM include improved hydrologic connectivity via the removal of berms separating the creek from the floodplain, the removal of non-native and invasive species, and landscape-scale habitat connectivity.

The CRAM assessment framework consists of 4 overarching attributes: Buffer/Landscape Context, Hydrology, Physical Structure, and Biotic Structure. Within each of these attributes are a number of metrics that address more specific aspects of site conditions. To conduct a CRAM assessment, each of the metrics is evaluated in the field to yield a numeric score for an assessed site based either on narrative or schematic descriptions of condition or on thresholds across continuous values.

An initial assessment will be completed by a qualified biologist prior to Phase 1 construction to document site conditions prior to implementation. The CRAM assessment will then be repeated in Years 1, 3, 5, 7 and 10 following each phase of restoration and these scores will be compared to the base year (initial assessment).

Avian Surveys

Point count surveys will be used to determine avian relative abundance and species richness at a minimum of 15 fixed monitoring stations along the Salt River, 5 survey locations around the perimeter of Riverside Ranch, as well as an additional 5 survey locations in reference habitats (both riparian and wetland) in the immediate vicinity of the project site to help control for interannual variability in species abundance. The point counts will follow standardized protocols (Ralph et al. 1993). All surveys will be conducted within 4 hours of sunrise, which corresponds to the peak period of bird activity. No surveys will be conducted during rain or strong winds or after 10:00 am. Each location will be surveyed three times per month during the breeding season, (April, May, and June or July). Late June or July surveys are recommended to increase the probability of detection of breeding willow flycatchers and cuckoos, which typically arrive quite late in the spring/early summer. One set of surveys will take place prior to construction, and then the surveys will be repeated post-construction in Years 1, 5 and 10.

Surveys in tidal marshes should be conducted at a similar tidal stage for each replicate survey both within and across years (Conway, C.J. 2009). Survey points should be placed at least 400m apart in marsh habitats to avoid potential double counting of individual birds

Survey personnel must be highly experienced in avian identification, including vocalizations, as well as in the specific method being employed to help reduce error associated with using different observers. Ideally, the monitoring biologist would be the same for all surveys. However, given the long timeframe of the monitoring, this may not be feasible. Therefore, it is important that highly experienced personnel be utilized.

Annual Qualitative Assessments

A qualitative assessment will be performed annually in Years 1-10 by a qualified hydrologist/engineer and biologist. After Year 10, the Adaptive Management Team will evaluate the need to continue (or possibly decrease the frequency of) these assessments. Elements of this annual assessment would include the following:

- Natural Recruitment of desirable native vegetation
- Invasive species
- Photo-documentation
- Hydrologic function

Natural Recruitment of Desirable Native Vegetation. Natural recruitment is an important component in the successful revegetation of native plants within the restoration area. The revegetated areas will be qualitatively surveyed for naturally recruiting species for the duration of the monitoring period. A general description of the densities and locations of naturally occurring species will be included in the annual monitoring report.

Presence of Invasive Species. The presence of invasive wetland species such as dense-flowered cordgrass, purple loosestrife (*Lythrum salicaria*), reed canarygrass (*Phalaris aquatica* and *Phalaris arundinacea*) should be identified and mapped during all site visits to the revegetated areas. Invasive species of Humboldt County with potential to occur include Himalayan blackberry (*Rubus discolor*), poison hemlock, pampas grass (*Cortaderia* spp.), French, Scotch and Spanish broom (*Genista* and *Cytisus* spp), common gorse (*Ulex europaea*), Italian thistle (*Carduus pycnocephalus*), yellow starthistle (*Centaurea solstitialis*), Canada thistle (*Cirsium arvense*) bull thistle, Japanese and Himalayan knotweed (*Polygonum* spp.) foxglove (*Digitalis purpurea*) and periwinkle (*Vinca major*). Maintenance protocols will include methods for eradication of any invasive plant species from the project area should they colonize during the monitoring period.

Invasive species will be mapped during regularly scheduled habitat mapping. In addition to the scheduled mapping, visual surveys for invasive species such as *Spartina* and dwarf eelgrass will be conducted during routine monitoring visits. Locations of invasive species will be identified using GPS technology to create a map which will be provided to the RCD within 2 weeks of field surveys for distribution to the maintenance contractors.

Permanent Photo-Documentation Points. Photo-documentation points will be established at fixed locations and photos will be taken in Years 1-10. Photographs will also be taken to document the annual progress of the restoration. Photographs will also be taken to record any events that may have a significant effect on the success of restoration such as flood, fire, or vandalism. The locations of the photo-documentation points will be selected in the first year of monitoring after plant installation and mapped for future reference. Type of camera, focal length of lens, height above ground, and any other relevant information will be noted for each event.

Hydrologic Function. More detailed monitoring of the hydrologic function of the SRERP project is outlined in the AMP (H. T. Harvey & Associates 2010). A qualitative summary of this monitoring will be reported annually to the regulatory agencies. Monitoring elements will include erosion, sedimentation, scour, tidal exchange, and functioning of the Sediment Management Areas.

Management Recommendations

Management recommendations will be included in each monitoring report. Recommendations will identify any items inhibiting the progress toward successful restoration and will propose solutions to any identified problems as appropriate.

Monitoring Schedule

Wetland and riparian vegetation will be monitored for 10 years to ensure successful establishment of the desired native habitat. Table 10 shows the monitoring schedule for the SRERP project.

Table 8. Salt River/Riverside Ranch Monitoring Schedule

	PRE-CONSTRUCTION	8 WEEKS POST-CONSTRUCTION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
Record Drawings		X										
Wetland Delineation					X	X	X					
Habitat Mapping	X		X		X		X		X			X
CRAM	X		X		X		X		X			X
Qualitative Assessments			X	X	X	X	X	X	X	X	X	X
Avian Surveys	X		X				X					X

Data Collection, Analysis, and Reporting

Data collection will take place between May and October of each monitoring year. Data analysis will be conducted as soon as possible after data collection so that the data may be reviewed and additional site visits may be conducted if required to verify any discrepancies in the data.

Monitoring reports will be submitted to the regulatory permitting agencies by 31 December of each monitoring year. Annual monitoring reports will include a brief description of the project, maps showing the monitoring areas, the methods used to collect and analyze the data, the results of the data analysis, a discussion of the results, and conclusions regarding the present condition of the site. The report will also include a Recommendations section, which will discuss any additional actions required to achieve the final success criteria. Representative photographs will be included.

Monitoring-Maintenance Linkage

The results of monitoring and any management and/or maintenance recommendations will be included in the annual monitoring report. These recommendations will be conveyed to the administrator of the maintenance contractor to allow the information to be used in their ongoing maintenance program. In addition, if monitoring crews notice significant problems related to the site's maintenance and performance, then verbal reporting will be conducted to ensure that maintenance issues are addressed in a timely manner.

Completion of Restoration

A final monitoring report will be completed at the end of the monitoring period, at which time a final monitoring report will be prepared to determine if the project has met the final success criteria. If the project has successfully met the expected success criteria, a copy of the final report and a letter will be sent to permitting agencies acknowledging the site conditions at the project and requesting their concurrence.

MITIGATION MONITORING LINK TO AMP

The purpose of monitoring per the HMMP and the AMP is to assess progress of the project toward meeting Project goals and objectives, to track regulatory compliance during the required monitoring period, evaluate management actions, and to detect areas displaying potential problems or changes that may require remedial actions.

The HMMP serves as a companion document to CEQA and permit support documents and describes the mitigation associated with project impacts under regulatory jurisdiction. The HMMP includes a detailed description of the project impacts and a conceptual plan to mitigate for those impacts, including a description of implementation and planting plans for revegetated areas of the project. The HMMP also includes a description of the project's long-term mitigation site monitoring and maintenance requirements, and provides management recommendations for ongoing maintenance during the mitigation monitoring period.

The HMMP only addresses the three years of mitigation site maintenance during the plant establishment period and the 10 years of mitigation site monitoring required for regulatory compliance. The Adaptive Management Plan is a supplement to the HMMP and describes the process of monitoring and management to ensure the long term viability of the project relative to the overall goals and objectives.

CONTINGENCY MEASURES

If the initial monitoring determines that the site is not developing along a trajectory to meet the project goals and objectives and the regulatory permit requirements, additional monitoring and management activities may be prescribed through the adaptive management process. The AMP provides a structure and process to address project elements which may not be meeting the goals and objectives. The adaptive management process applies to the project as a whole, but management actions can be identified and implemented on individual reaches or sub-reaches, as determined by the monitoring results and consensus by the Adaptive Management participants. The process is flexible as it allows for a wide range of management actions but just as importantly it imposes a structured approach as management actions must derive from monitoring results. The adaptive management process also accommodates different physical and temporal scales for management actions.